

# Multi-Purpose Lubrication System Controller

## DESCRIPTION

The Graco Multi-Purpose Controller (MPC) is a micro-processor based monitor/controller dedicated to the operation and monitoring of a centralized lubrication system. The MPC is designed to schedule lubrication intervals and monitor the operation of Trabon pumps and lubricant distribution systems, consisting of either Series Progressive, Injector, or Dual-Line types of proportioning and dispensing valves.

The Multi-Purpose Controller can initiate lubrication schedules with either a time or machine stroke/cycle basis. It will also continuously monitor and display the status of the lubrication system it is controlling. It can be programmed to protect the critical equipment and components by shutting down the machine operation when a lubrication system fault occurs.

System performance can be easily determined with (8) LED indicators and also by a back-lighted two line, 16 character alphanumeric Liquid Crystal Display (LCD).

The MPC is easily programmed at the application site. No special training or knowledge of computer language is necessary. Programming the MPC is simply a matter of inputting parameters and selecting or bypassing options as prompted by its LCD.

## ENCLOSURE

The enclosure is fabricated from polyester fiberglass and is rated as a NEMA 4 (IP-66) enclosure. Proper techniques and seals should be used when inserting fittings to ensure that the enclosure's NEMA 4 integrity is not compromised. When preparing the enclosure for mounting to a surface, a slow-speed drill should be used to prevent the material from becoming overheated. A punch may also be used as a means to cut the fiberglass. It is recommended that proper personnel-protective devices be used to protect the installer from flying chips and other airborne debris and dust.



## INSTALLATION

The Multi-Purpose Controller must first be prepared for installation before programming and operation can occur by providing ports for electrical wiring connections. The ports are drilled or punched into the enclosure at locations convenient for use with the application site's power supply connections.

When forming wire-entry holes in the enclosure, it is recommended that all circuit boards be removed from it. Removing the circuit boards is a simple task: (1) open the door by unclipping the clips on the right side; (2) unlock the control panel by rotating the circular knob on the right side so that the flat of the knob is in a vertical position, pointing either up or down; (3) remove the ribbon cable from its header by gently pulling up on the connector with a rocking motion; (4) remove the top panel by pulling its two spring loaded hinge pins toward the center of the panel edge; (5) disconnect the top panel's ground wire by removing the hex nut and lock washer on the right side of the sub panel; (6) remove the RS-232 port connector from the sub-panel's circuit board, by pulling up on the connector with a gentle rocking motion; and (7) remove the sub-panel by removing the screws in each corner of the sub-panel (4 total). Place both items in Anti-Static bags for protection of their electronic components from being damaged by static electricity.

Wire-entry holes may be placed on the left, right, or bottom sides of the enclosure. They should be located on a center line two (2) inches from the back side of the box. On the sides, holes should not be located near its center line because a ground stud is located inside the enclosure at that point. Similarly, holes in the bottom panel should not be located closer than 2½ inches from the hinge as this may interfere with the panel hinge mounting bracket. It is recommended that the DC sensor wires be brought into the cabinet on the left (hinged) side of the enclosure, while input power and output signal wiring be brought in on the bottom or lower right side (opposite of the hinge) of the enclosure.

Before drilling the holes through the enclosure's walls, make certain to fit proper safety glasses and dust mask protection in place to avoid eye injury and inhalation of fiberglass particles during the drilling process. These wiring-entry holes will need to be equipped with liquid-tight seals when the wiring is placed through them in order to not affect the watertight-integrity capability of the enclosure.

After the appropriately placed holes have been cut in the enclosure, clean all shavings and debris out of the box by first shaking it upside down and then wiping the inside surfaces with a damp cloth to remove any remaining particles and dust. Attach the mounting feet to the enclosure using the #10-32 mounting screws and feet provided. At this time, the box should be mounted to a surface at the appropriate mounting position for the application because it will be easier to run the necessary conduit and cable connections into the enclosure before the circuit boards are re-installed. The back surface has a mounting-hole pattern of four holes, spaced 6.0 inches apart horizontally by 10.9 inches vertically. Fasteners up to a ¼ inch diameter may be used. It is recommended that washers be used when attaching the enclosure to the mounting surface in order to distribute forces evenly on the mounting tabs. After the enclosure is mounted, reattach the sub-panel assembly to the bottom of the enclosure using the four 10-32 screws.

Next, install the conduit fittings in the wire-entry holes and connect the power and signal wires to the proper terminals on the sub-panel assembly board. Decals are placed on the left and right edges of the sub-panel to aid the installer in identifying the correct locations for each wire.

After all input wiring has been completed and verified, re-connect the Control Panel's green ground wire back onto the ground lug on the right side of the sub-panel and reinstall the RS-232 lead wire connector and the Control Panel ribbon connector to their mating connectors on the sub-panel's circuit board.

Finally, replace the Control Panel into the top two holes by retracting the two spring-loaded hinge pins and then releasing them into the retaining holes. Secure the Control Panel by rotating its circular knob back to a horizontal position and lock the outer enclosure door shut with the two hold-down clasps.

## WIRING:

**CAUTION:** VERIFY THAT THE CONTROLLER CIRCUITRY IS PROPERLY GROUNDED.

Two #6-32 studs and locking nuts are located on the lower-right side of the sub-panel for use in providing a high-integrity ground for the Controller's three circuit boards. The green ground wire must be securely fastened to the **top / upper** stud. **THIS IS A SAFETY REQUIREMENT.**

Refer to panel and terminal strip diagrams on pages 3 through 5. Additional system specific diagrams are shown on pages 15 through 19.

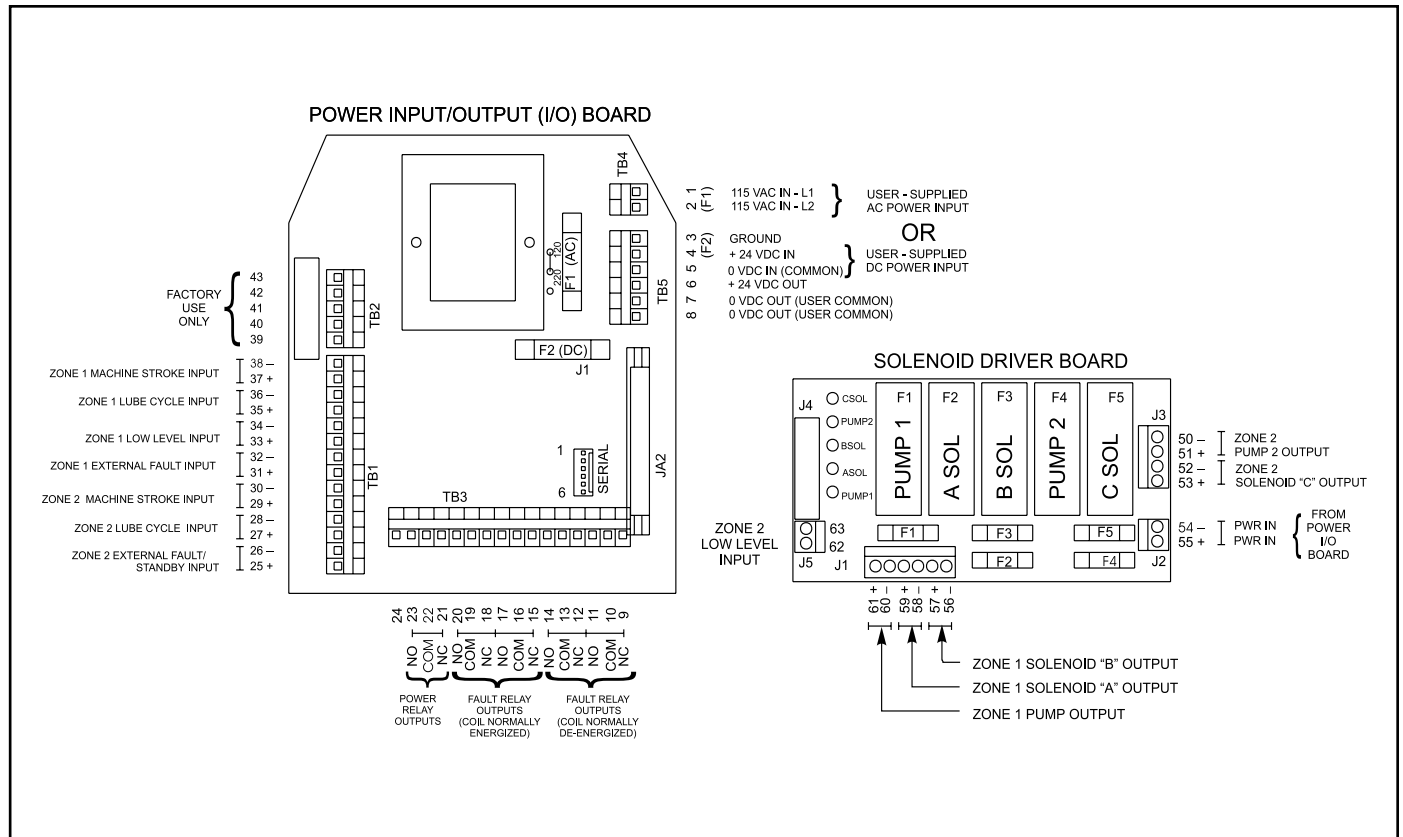


Figure 1

## POWER:

The Power Input/Output (I/O) board may be powered by either 115 VAC, 230 VAC, or 24 VDC, depending upon the particular model of MPC. If AC power is used, connect the L1 line to terminal #1 and the L2 neutral line to terminal #2 on the Power I/O Board. If the DC model is used, connect (+) to terminal #4 and (-) to terminal #5.

The 24 VDC output available from terminal 6 is limited by an internal 240 ohm resistor to 100 ma.

## SENSORS:

Determine which sensor inputs are going to be used on the system. All sensor inputs are designed to run at 24 volt DC logic levels and are driven in the same manner. The input circuit is a **source** type design. The terminal marked plus (+) is tied to 24 volts through an external 1K ohm resistor while the other terminal is connected to the input gate. In the case of an alarm input, a contact closure will initiate an alarm.

Depending upon what operating parameter the switch is monitoring or representing, its signal is connected to the appropriate set of input signal terminals (#25 through #38) on the Power I/O board. See Figure 1.

The inputs may also be operated using two or three wire solid state proximity switches. Two wire systems are connected in the same way as a dry contact type of switch. See Figures 2 and 3.

Three wire DC proximity switches may be used as sensor inputs, but some additional wiring considerations must be incorporated. Power to drive the sensor may be taken off the 24 volt supply on **terminal #6 (+)** and **terminal #7 (-)** on the Power I/O board. See Figure 1.

When using a **source** type proximity switch, the output of the switch connects directly to the unmarked (-) input terminal through a 1K ohm external resistor. There is nothing connected to the marked (+) terminal. See Figure 4.

To use a **sinking** type proximity switch, the Controller's two input terminals must be jumpered together and the junction taken to the sensor. Note that this will also cause an inversion of the inputs, causing a normally closed type of input. See Figure 5.

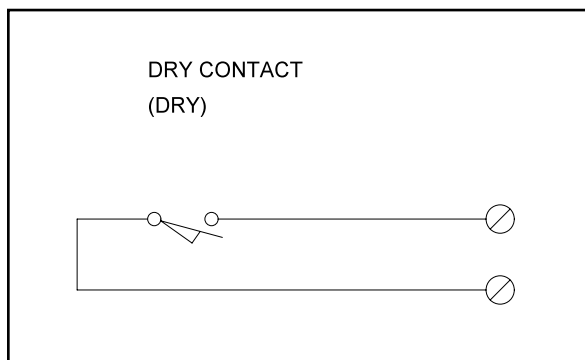


Figure 2

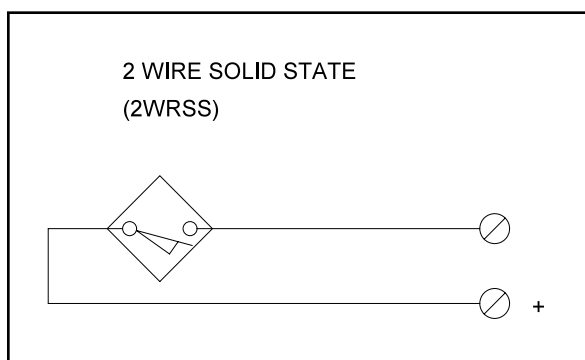


Figure 3

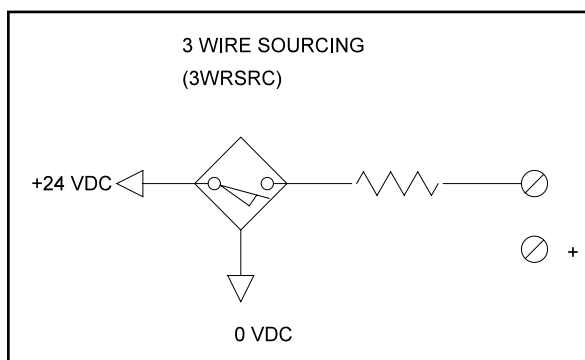


Figure 4

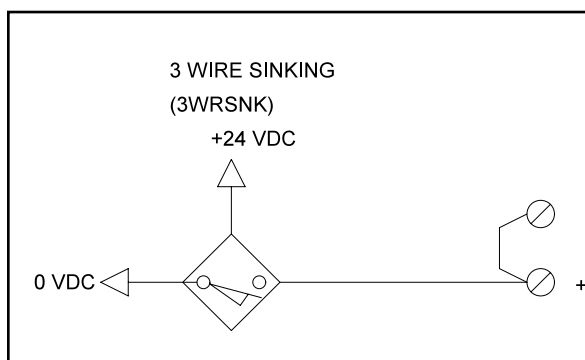


Figure 5

## OUTPUTS:

There are four MPC power outputs available for operating two independent lubrication systems or zones. The two programmable (continuous or pulsed) power outputs will operate the centralized lubrication system's pump(s), while the two non-programmable (continuous power only) power outputs, designated as Solenoid A (Zone 1) and Solenoid C (Zone 2), are intended for operation of the lubrication system's controls components, such as solenoid coils which operate lubricant and air control valves. These four outputs, when matched with appropriate Solid State Relay modules as a group, can drive either AC or DC loads. If the output module is intended to power an AC load, the Solenoid Driver Board power terminals #54 & #55 must be connected to terminals #1 & #2 respectively on the Power I/O board. If a DC load is being used, then the Solenoid Driver Board power terminals must be connected to the DC supply terminals #4 & #5 on the Power I/O board. See Figure 6.

**NOTE:** Do not power any DC solenoid drivers from the 24 VDC output terminals 6 and 7.

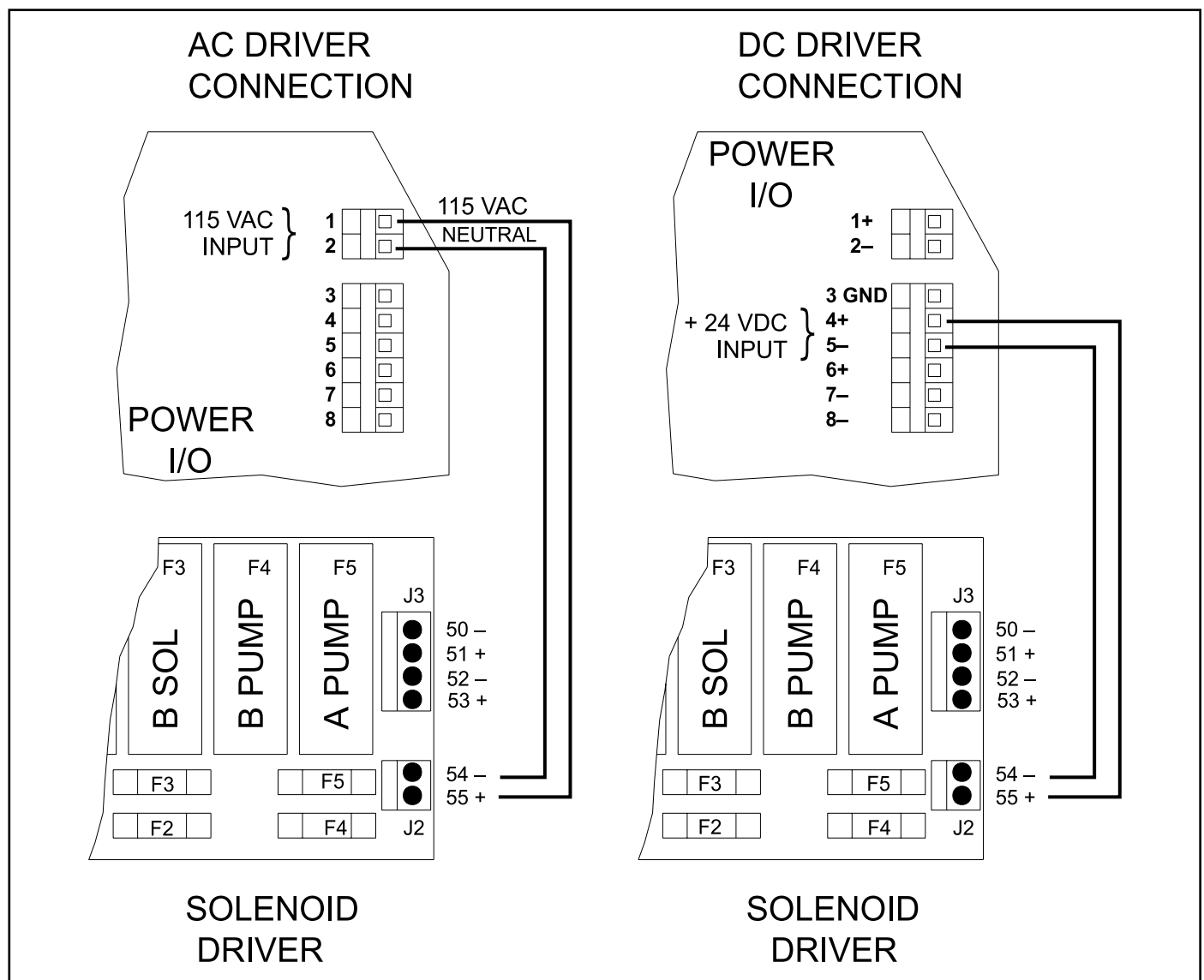


Figure 6

## SECTION ONE – INPUTS AND OUTPUTS

### GENERAL

The Graco Multi-Purpose Lubrication Systems Controller (MPC) is designed to monitor, control, and operate several types of lubricant distribution systems. Bi-Flo dual line, Series-Progressive, Piston-Distributor, Injector, and Air/Oil systems, with either one or two independent zones, are able to be monitored and controlled by the MPC. The MPC can be programmed to operate with either of two modes of operation, time-based or stroke/cycle-based, and can be easily programmed on-site by the operator for either basis. In addition to its lubrication systems control capabilities, the MPC will continuously monitor and display the status of the lubrication systems during both ON and OFF periods, and can protect the system by suspending equipment operation if a lubrication system fault is detected during either period of time.

The MPC has:

- Three front panel mounted push-button for use as the user programming interface;
- A back-lighted two-line by sixteen character liquid crystal display (LCD) for readout of operating messages, data, and programming information;
- Eight light emitting diodes (LED) for visual indication of operational and general system status.

### Inputs are provided on the MPC for:

Note that the state of the bank of input switches used may be changed from “Normally Open” to “Normally Closed” contacts. This applies to the entire bank. Switches may not be individually programmed for mixed states.

1. **Zone 1 Stroke Cycle** – External switch signal or contact indicating the number of machine strokes or operations on user’s equipment; used as an alternative to time-based lubrication cycle intervals.
2. **Zone 2 Stroke Cycle** – External switch signal or contact indicating the number of machine strokes or operations on user’s equipment; used as an alternative to time-based lubrication cycle intervals.
3. **Zone 1 Lube Cycle** – External switch signal or contact indicating lubricant-cycle switch activity (proximity switch or injector pressure switch) for measurement and indication of proper system lubrication application. Uses the open-to-closed switch contact transition as the lubrication system lube cycle completion indicator in Bi-Flo dual-line, Injector, Piston Distributor, and Air/Oil (using Piston Distributors) systems; uses first full cycle (two contact transitions: open-to-closed + closed-to-open) in Series-Progressive and gear-spray (using Series-Progressive feeders) systems.

4. **Zone 2 Lube Cycle** – External switch signal or contact indicating lubricant-cycle switch activity (proximity switch or injector pressure switch) for measurement and indication of proper system lubrication application. Uses the open-to-closed switch contact transition as the lubrication system lube cycle completion indicator in Bi-Flo dual-line, Injector, Piston Distributor, and Air/Oil (using Piston Distributors) systems. Uses first full cycle (two contact transitions: open-to-closed + closed-to-open) in Series-Progressive and gear-spray (using Series-Progressive feeders) systems.

If the zone is programmed for use with an injector lubrication system, the cycle count must be set to one (1) for terminating the application. Otherwise, the MPC will continue to expect more input signals from the pressure switch and will signal a lube time out fault at the end of the monitor time period.

**The end user may assign different fault messages to each of the fault inputs, allowing him to customize the control to his specific installation.**

**Selections include:**

- |                    |            |
|--------------------|------------|
| A. Low Level 1     | F. Low Air |
| B. Low Level 2     | G. Fault 1 |
| C. High Pressure 1 | H. Fault 2 |
| D. High Pressure 2 | I. Fault 3 |
| E. Dirty Filter    | J. Fault 4 |

5. **External Fault 1 (LLVL1)** – External switch signal or contact indicating assigned fault A through J is activated.
6. **External Fault 2** – External switch signal or contact indicating assigned fault A through J is activated.
7. **External Fault 3** – External switch signal or contact indicating assigned fault A through J is activated.
8. **External Fault 4/Standby** – Input terminals for use at user’s option and choice. External switch contacts can be used to indicate any fault A through J. Alternatively, this input for Zone 2 may be programmed to place the controller in a standby (pause) mode when the contacts are closed.

## Outputs are provided for:

1. **Pump 1**– Solid state relay output for providing operating power to the Zone 1 lubrication pump.
2. **Pump 2**– Solid state relay output for providing operating power to the Zone 2 lubrication pump.
3. **Solenoid A**– Solid state relay output, sequenced with the Zone 1 pump relay, to control the air solenoid for air/oil mixtures for gear spray applications. It is also used to control the direction A solenoid in an electric Bi-Flo dual-line system.
4. **Solenoid B**– Solid state relay output, sequenced with the Zone 2 pump relay, to control the air solenoid for air/oil mixtures for gear spray applications. It is also used to control the direction B solenoid in an electric Bi-Flo dual-line system.
5. **Solenoid C**– Solid state relay output which is energized during the time that zone “B” is in a lubricating process. It deactivates when the lube has been satisfied by the cycle count, or the occurrence of a lube fault to zone 2. Alternatively, this output may be used to drive a four-way valve when the system is used with a single pump in a non-header system.
6. **System Fault 1** (normally de-energized coil) – DPDT relay used to provide an indication of a lubrication system operating fault when detected by the MPC. In a system fault condition, this relay becomes energized.
7. **System Fault 2** (normally energized coil) – DPDT relay used to provide an indication of a lubrication system operating fault when detected by the MPC. In a system fault condition, this relay is de-energized.
8. **Power** – Form A contact that is closed when relay is energized with MPC input power and drops out when system power is lost.

**MACHINE CYCLE** – One complete operating cycle of the user’s equipment. It can be used as an input (stroke-based) to the MPC for determining the proper lubrication cycle interval.

**MONITOR TIME** – a programmed input that specifies the expected maximum time allowed to complete a lubrication application. Failure to complete the lubrication cycle within this time window will generate a “time-out” fault.

**IDLE TIME** – The interval allowed between lubrication cycles, measured in either time or number of machine cycles.

**PROGRAMMING** – The process of setting up the MPC to execute the lubrication program established for the user machine or equipment to be lubricated.

**TIME-BASED PROGRAMMING** – Programming the interval between lube applications time in days/hours/minute/seconds.

**MACHINE STROKE/CYCLE-BASED PROGRAMMING** – Programming the interval between lube applications time in number of machine cycles.

**WATCHDOG TIME** – A monitor of the machine cycle/stroke input circuit. Failure to receive a full switch contacts’ transition input signal from the external switch within a time period designated by the user will generate a fault, prompting the user to check the “health” of the machine cycle switch for possible operating problems.

## SECTION TWO – DEFINITION OF TERMS

**LUBRICATION SYSTEM** – A complete lubricating system consists of (1) a lubricant reservoir, (2) a lubrication pump, (3) a lubricant distribution system (Bi-Flo dual line, Series-Progressive, Piston-Distributor, Injector, or Air/Oil proportioning + dispensing valves), (4) supply lines to each lubrication point), and (5) a lube system Controller.

**LUBRICATION PROGRAM** – A lubrication schedule established according to the machine and/or moving component manufacturer’s specifications to ensure that the Lubrication System will deliver the required amounts of lubricant to the designated lubrication points at the proper intervals.

**PULSE ON/OFF** – User-variable On/Off power duty cycle output to a control device or lubricating system pump – enabled and specified by the user during initial Controller programming. Directly driven electric gear type pumps would be programmed for zero “off” time.

**PRE-LUBRICATION (PRE-LUBE) @ POWER ON** – When turned “ON”, a complete lubrication application will occur immediately when power is first applied to the Controller. If this feature is programmed “OFF”, a complete IDLE TIME period must pass before lubrication is applied.



**ZONE 2** – When enabled during programming, this feature doubles the number of lube zones monitored and controlled by the MPC. Activation of ZONE 2 enables lubrication application to be performed in two separate locations on the same machine, or on adjacent machines, using independently-controlled lubrication pumps and reservoirs/lubricants as required. When Zone 2 is enabled during programming, two lubrication schedules are then required, one for each zone, and the Solenoid B output can be used to direct lubricant or air to the active zone currently being lubricated. When Zone 2 is disabled during programming, the MPC defaults to servicing only Zone 1.

**Normal** – When the green LED's are on, the MPC is powered and the lube zone is in a no-fault operating mode. No external or operating faults have occurred.

**Operate** – When the yellow Operate LED's are on, a lube cycle has been initiated by the MPC and the lube cycle inputs are being monitored for a successful completion. Typically, the pump power output terminals are energized during this time and the lubrication pump is operating. However, when an Injector Delay time period and/or an air-spray After Blow time period have been enabled, the pump output power will be terminated at the completion of the required number of Cycles, but the Operate LED will be continue to be illuminated to indicate the entire lube interval as programmed is still in progress. The Operate LED will go off after the Delay and/or After Blow times have been completed.

**Cycle** – When the yellow Cycle LED's are on, the Zone's lube cycle switch contacts are closed. A LED that is alternating on-and-off indicates continued cycling activity for the switch, and therefore for the feeder that it is mounted on.

**Fault** – When the red LED's are on, the MPC has detected a problem with one or more of the inputs from the lube system's indicating switches. The two fault relays will reverse from their normal state to provide output alerts to user-provided alarm circuit that a system fault has occurred.

**Stand-By Mode** – The Stand-By/Pause will be initiated when a closed switch is inputted into the External Fault input terminals, which have been previously programmed for the Stand-By function. The green LED will continue to be on, but the operation of the Zone's lube cycling activity will be suspended until the switch contacts are opened. Upon release of the Pause switch contacts, lube cycle activity will continue from the point in the program where it was paused at. Programming the Standby option will disable the external fault monitoring option for Zone 2.

**Injector** – Single shot lubricant dispensing device in single-line parallel lube distribution system requiring supply line pressure venting between firing cycles for re-priming.

**Divider/Feeder** – Series-Progressive divider valve assembly.

**Spray System** – Gear spray lubrication system using air and oil or grease mixture dispensed through spray nozzles. Oil or grease can be supplied from either an injector or Series-Progressive distribution system.

**Afterblow** – The time allowed by the programming specification to keep power applied from the Solenoid output to the valve controlling the air supply to the spraying nozzles. Normally used to purge and clean out the nozzles of residual oil or grease before the lube cycle is terminated.

**Overcount** – Programmable parameter that specifies a trigger point for system fault indication. Normally used as a monitor for a lube system, or zone's, cycling activity during normally idle periods. For example, if a lube zone's control valve is de-energized during an idle period but develops a leak, the continued flow into the zone through the malfunctioning valve will cause continued cycling activity in the zone's distribution system, which will then cause cycle counts to be generated into the "off" zone's lube cycle switch terminals. The MPC's monitoring of the idle zone's activity will then cause a lube system fault to be displayed, once the number of cycle counts received exceeds the programmed overcount specification.



**Hydraulic Reversing Valve** – Pressure-operated directional control valve used in Bi-Flo dual-line parallel type of lubricant distribution system.

**Electric Reversing Valve** – Electric solenoid coil-operated directional control valve used in Bi-Flo dual-line parallel type of lubricant distribution system. Requires use of Solenoid A and Solenoid B power outputs from the MPC to direct the lubricant flow alternately into each of the two supply line in a Bi-Flo system.

**NOTE:** A 5-second delay is automatically set for each spool movement to change states. Also, air spray is not available as a programming option for this operational mode.

**Half-Cycle** – During dual-line lubricating system operation, the MPC will service one line of a Bi-Flo dual line system separately from the second line by waiting for the programmed idle time period before servicing the second line.

**Full-Cycle** - During dual-line lubricating system operation, the MPC will service both lines of a Bi-Flo system alternately during the same operational period. When electric reversing valve operation is programmed, the MPC will automatically start and stop pump operation, while activating the Solenoid A and B power outputs as required for valve directional control, until both sides of the dual-line system have been lubricated during the same “on” period.

## SECTION THREE – CONTROLLER PROGRAMMING

User configuration of the Graco Multi-Purpose Lubrication Systems Controller (MPC) is accomplished using the LCD display and the three operator buttons on the front panel of the controller. (Note that the Safety Set Data Wand may be used in lieu of the push-button.) In the programming mode, the three push-button perform the following functions:

**RST/CLR/MAN RUN (Reset/Clear/Manual Run)** – This button is used in the programming mode to toggle user decisions such as Enable/Disable. It is also used to advance between digit positions when entering numerical data.

**NOTE:** When the display mode is in normal operation, this button is also used to initiate a manual lubrication cycle and to reset faults.

**SLCT (Select)** – This button is used to scroll numerical values into digits when entering times, counts, etc. in the Programming mode. It may also be used to toggle between answers to the various set-up questions. During the operational mode, the Select button is useful when a lube fault occurs to toggle between the fault-indication display and the operating cycle status display.

**PRGM (Program)** – This button is used to enter the programming or review mode, and to scroll/advance through the programming input screens. It also is used to exit the programming mode at the end of the Programming cycle.

With power applied to the controller, the program/review mode may be entered at any time by pressing the PRGM button. The default setting will be displayed .

**Review** – Continued pressing of the PRGM will scroll through all the settings and return back to the control monitor mode. The Control Programming Flow Diagram in this manual provides a good overview of the entire user programming sequence and should be used as a guide. Attempts to change stored programmed values while in the review mode will be ignored.

During the programming sequence, the user will be required to enter the system's lubrication requirements in terms of time periods and/or machine cycle counts using the RST/CLR and SLCT buttons for the purposes described above. While advancing through the different configuration questions, the current setting/input value will first be displayed. If no change is to be made for this value, simply press the PRGM button to advance to the next input display panel. Note that all decisions and variables may be set and reset within a given screen until the PRGM button is pressed to advance to the next programming step. At the end of the programming sequence, the user will be allowed to review the programming sequence by toggling to the Review option and continuing to press the PRGM button. Alternatively, the user may exit the programming mode, with or without saving any changes made during the programming sequence.

The following four pages present the user with a step-by-step guide through the Programming sequences. Refer to the Flow Diagram on page 14 for an overview of all of the potential Programming paths and options.

1. **Press the PRGM button to enter the programming mode.**  
The LCD screen will display Program/Review – Review.
2. **Press the PRGM button to enter into the Review mode** and scan the current selected options. Note that, in the review mode, the RST/CLR and SLCT buttons are disabled and have no effect.
3. Upon cycling back to the Program/Review – Review display, **press the SLCT button to change the selection to the Program mode.**
4. **Press the PRGM button to select the Programming mode and to advance to the next Password selection screen.**  
The use of a password controlled gate to the Programming mode will prevent unauthorized entries and changes. The LCD screen will prompt the user to enter a password; four-digit passwords from 0000 to 9999 can be entered. The default password for every new Controller will be **0000**; change the Controller's password to a user-controlled code by using the RST/CLR button to advance/cycle through the four positions and the SLCT button to select the desired values in each of the four fields.
5. **Press the PRGM button to enter the new password** and to advance to the next Zone selection screen. The LCD screen will display Select Zone – Zone 1 or Select Zone – Zone 2, depending upon the previous selection. The selection can be changed by using the SLCT button to toggle between the two choices. If Zone 1 is chosen when the PRGM button is pressed, the succeeding Programming inputs will be applied

as lubrication cycle values for the system controlled by Zone 1. If Zone 2 is chosen, the succeeding inputs will be applied as the lube cycle requirements for the second lubrication system to be monitored and controlled by the MPC.

6. **Press the PRGM button to enter the Zone selection** and to advance to the next selection screen. If Zone 1 was chosen, the display will read System Type – Dual Line/Bi-Flo or Single; go to Step 9 to continue programming parameters for Zone 1. If Zone 2 was selected, the display will read Zone 2 – Enabled or Zone 2 – Disabled. The user has the option to activate or de-activate Zone 2 by choosing Enable or Disable, depending upon whether the MPC will be used to control and monitor one lubrication system/zone or two. **Use the SLCT button to toggle** between the Enable and Disable choices and then press the PRGM button to enter the desired configuration.
  7. If Zone 2 was enabled in Step 6, the display will default to System Type – Single. **Press the PRGM button again to advance to the next screen: Distributor Type – Injector / Divider**. Go to Step 13 to continue programming parameters for Zone 2.
  8. If Zone 2 was disabled in Step 6, the display will advance to the Save Changes – Review/No/Yes decision block at the end of the programming loop. Go to Step 47 to continue.
  9. If Zone 1 has been selected to be programmed in Step 6, **use the SLCT button to toggle** between the choices of Dual Line/Bi-Flo or Single line distribution systems and then **press the PRGM button to enter the desired System Type**. If Dual Line is selected, the display will advance to the next selection screen: Cycle Type – Full / Half. If Single is chosen for Zone 1, the display will advance to the Distributor Type – Injector / Divider screen. Go to Step 13 to continue Single-Line programming for Zone 1.
- NOTE:** THE CHOICE OF DUAL-LINE OPERATION FOR ZONE 1 WILL AUTOMATICALLY DISABLE ZONE 2, EVEN IF IT HAS PREVIOUSLY BEEN ENABLED AND PROGRAMMED WITH SINGLE-LINE SYSTEM PARAMETERS, AND MAKE IT UNAVAILABLE FOR USE.
10. When Dual Line has been selected for Zone 1, **use either the RST/CLR or the SLCT button to toggle between the Cycle Type – Full / Half options** in the display screen and then **press the PRGM button to enter the desired choice** to advance to the next selection screen: Reversing Valve – Hydraulic / Electric.
  11. **Use either the RST/CLR or the SLCT button to toggle** between the Hydraulic / Electric options in the display screen and then **press the PRGM button to enter the desired choice** and advance to the next selection screen.

12. If the Electric Reversing Valve option was selected in Step 11, the display will advance to the **Idle Mode – Time/Machine Cycle** screen. Go to Step 22 to continue. If the Hydraulic Reversing Valve option was selected, the display will advance to the **Spray System - Enabled/Disabled** screen. Go to Step 18 to continue.
13. IF ZONE 2 WAS ENABLED IN STEP 6 OR A SINGLE-SYSTEM TYPE WAS SELECTED FOR ZONE 1 IN STEP 9, the next display on the LCD screen will read **Distributor Type – Injector** OR **Distributor Type – Divider**, depending upon the previous selection. Use either the **RST/CLR** or the **SLCT** button to toggle between the **Injector** and **Divider** selections until the appropriate choice is made.
14. Press the **PRGM** button again to enter the **Distributor Type** selection and to advance to the next selection screen. The LCD will now display **Injector Delay – M:SS (Minutes / Seconds)** if the Injector type was selected in Step 13. Go to Step 16 if **Divider** was selected as the type of distributor. Placing a time value (1 second to 9:59 minutes) in this screen will result in a programmed delay in shutting off the injector lubricant pump after the system pressure switch has been activated. The delay may be necessary on some machines in order to allow slides and other moving machine components to move off of any injectors or PD's that may have been blocked from firing during normal system pressure rise. Use the **RST/CLR** to toggle between the three fields and the **SLCT** button to input the desired values in each of them.
15. Press the **PRGM** button again to enter the Injector Delay value selection and to advance to the next selection screen. The LCD will now display **Cycle Counts On – Count XX**. Go to Step 17 to continue programming.
16. If **Divider** was selected in Step 14, the **Over Count – Count X** screen will appear. Use the **SLCT** button to set the count to the desired value between 0 and 9. This programmed value will be the trip/fault value for the number of Divider Valve cycles allowed to occur during the lubrication system's "off" periods before a lube system fault is declared; such cycles may be due to a zone's inlet valve leakage. Press the **PRGM** button again to enter the **Over Count –Count X** value selection for Zone 1 and to advance to the next selection screen.
17. **Cycle Counts On – Count XX** will next be displayed after Step 15 or 16. Use the **RST/CLR** and **SLCT** buttons to enter desired values in the two available fields to result in a number between 1 and 99. Press the **PRGM** button again to enter the **Cycle Counts On – Count XX** value selection for Zone 1 and to advance to the next selection screen: **Spray System - Enabled/Disabled**.
18. The screen will now display the **Spray System - Enabled/Disabled** choice screen. Use either the **RST/CLR** or the **SLCT** button to toggle between the **Enable/Disable** options in the display screen and then press the **PRGM** button to enter the desired choice and advance to the next selection screen.
19. If the Spray System was enabled in Step 18, the **After Blow Time – M:SS (Minutes / Seconds)** screen will appear next. If the Spray System option was disabled, the next display will be **Idle Mode – Time/Machine Cycle**; go to Step 22 to continue programming the Idle Mode.
20. Use the **RST/CLR** and **SLCT** buttons to set the minutes and seconds up to 9:59 (M:SS) for the desired After Blow time interval. The selected time will appear on the screen.
21. Press the **PRGM** button again to enter the **After Blow Time** selection and to advance to the next selection screen. The display will change to **Idle Mode – Time/Machine Cycle**.
22. Use the **RST/CLR** button to select between **Time** and **Machine Cycle** for specifying the idle mode duration. The LCD screen will display the selected option.
23. Press the **PRGM** button again. If the Time option was selected, then the **Idle Time – DD:HH:MM:SS (Days / Hours / Minutes / Seconds)** screen will appear. If **Machine Cycle** was chosen, go to Step 26.
24. Use the **RST/CLR** and **SLCT** buttons to set the Idle Time to the appropriate value in Days, Hours, Minutes and Seconds. The selected time interval will appear on the display.
25. Press the **PRGM** button again. The **Monitor Time – HH:MM:SS (Hours / Minutes / Seconds)** screen will appear in the screen. Go to step 32 to continue programming.
26. If the **Machine Cycle** option was chosen in Step 22, the **Machine Cycle Ct – Counts XXXXXX** screen is now displayed. Use the **RST/CLR** and **SLCT** buttons to register the number of Machine Cycle operations/counts in the range of 0 to 999999 required for the lubrication interval. The selected number of counts will appear on the screen.
27. Press the **PRGM** button again to enter the **Machine Cycle Ct – Counts XXXXXX** value selection and to advance to the next selection screen: **Watchdog Timer – Enabled/Disabled**.
28. Use either the **RST/CLR** or the **SLCT** button to toggle between the **Enabled / Disabled** options in the display screen and then press the **PRGM** button to enter the desired choice and advance to the next selection screen.

29. If the Watchdog Timer was disabled in Step 28, the next displayed screen will be **Monitor Time – HH: MM:SS (Hours / Minutes / Seconds)**. Go to step 32 to continue programming.
30. If the Watchdog Timer was enabled in Step 28, the **Watchdog Time – MM:SS (Minutes / Seconds)** option is now displayed. Use the **RST/CLR** and **SLCT** buttons to enter the desired time interval in Minutes and Seconds in the range from 0 to 59:59 (MM:SS). The selected time will appear on the screen.
31. Press the **PRGM** button again. The display will change to **Monitor Time – HH: MM: SS (Hours / Minutes / Seconds)**.
32. Use the **RST/CLR** and **SLCT** buttons to set the desired Monitor Time in Hours, Minutes and Seconds (HH:MM:SS up to 29:59:59). The selected time will appear on the screen.
33. Press the **PRGM** button again to enter the Monitor Time value selection and to advance to the next selection screen: **Prelube @ Pwr On – Disabled/Enabled**.
34. Use the **RST/CLR** or **SLCT** buttons to **Enable** or **Disable** the **Pre-lubrication At Power On** option. The selected option will appear on the screen.
35. Press the **PRGM** button again to enter the **Pre-lubrication At Power On** selection and to advance to the next selection screen. The **Power to pump – Continuous/Pulsed** screen will appear on the display.
36. Use either the **RST/CLR** or the **SLCT** button to toggle between the **Continuous / Pulsed** options in the display screen and then press the **PRGM** button to enter the desired choice and advance to the next selection screen.
37. If the **Continuous** mode for pump power was selected, then the **Ex Fault/Standby – Extern Fault En/Standby Enabled** screen will appear next. Go to Step 42 to continue programming.
38. If the **Pulsed** option was selected in Step 36, the **Pulse on Time – M:SS (Minutes / Seconds)** screen will appear. Use the **RST/CLR** and **SLCT** buttons to set the pulse on-time in the range of 0 to 9:59 (M:SS). The selected ON time should appear in the display before proceeding to Step 39.
39. Press the **PRGM** button again to enter the **Pulse on Time** selection and to advance to the next selection screen. The display will now show **Pulse off time – M:SS (Minutes / Seconds)**.
40. Use the **RST/CLR** and **SLCT** buttons to set the desired pulse off-time in the range of 0 to 9:59 (M:SS). The selected OFF time should appear in the display before proceeding to Step 41.
41. Press the **PRGM** button again to enter the **Pulse off Time** selection and to advance to the next selection screen. The **Ex Fault/Standby – Extern Fault En/Standby Enabled** display screen will appear.
42. Use either the **RST/CLR** or the **SLCT** button to toggle between and select either **Extern Fault En** (External Fault Enabled) or the **Standby Enabled** option in the display screen. The desired selected should appear in the display before proceeding to Step 43.
43. Press the **PRGM** button again to enter the **Extern Fault En** or **Standby Enabled** selection and to advance to the next selection screen.
44. The display will advance to the **Save changes – Review/NO/YES** selection screen if the **Review** option was chosen in Steps 2 or 3. Go to Step 47 to continue programming. If the **Program** option was chosen in Steps 2 or 3, the **Change Password – XXXX** selection screen will appear.
45. The current access password will be displayed. Use the **RST/CLR** and **SLCT** buttons to select a new password if a change is desired. Any numeric value from 0 to 9999 may be used. Note that leading zeros are suppressed from the display.
46. Press the **PRGM** button again to enter the current or new Password selection and to advance to the next screen. The display will advance to the **Save changes – Review/NO/YES** selection screen.
47. Use the **RST/CLR** or **SLCT** buttons to toggle between the Review, NO, and YES options.

If **Review** is selected, then the program mode will be re-entered at the beginning screen **System Type – Dual / Single** when Zone 1 is being programmed, or **Zone 2 – Disabled / Enabled** when Zone 2 is being programmed. The user can use the buttons to scroll through and modify any selections, ultimately winding up at the **Save changes – Review/NO/YES** screen again.

If **NO** is selected, then the next press of the **PRGM** key will exit the program mode without saving any changes made since the programming mode was activated.

If **YES** is selected, then all changes entered will be saved when the **PRGM** key is pressed.

The Programming mode sequence for the Graco Multi-Purpose Lubrication Systems Controller is completed once a Yes or No response is selected and entered in Step 47. The Program mode will be exited after an input of **NO** or **YES** in response to **Save changes – Review/NO/YES** query in the last display window. If the last programming input was **YES**,

the MPC will then return to the Normal operation display mode and will use the new programmed input values during the next scheduled automatic lubrication cycle.

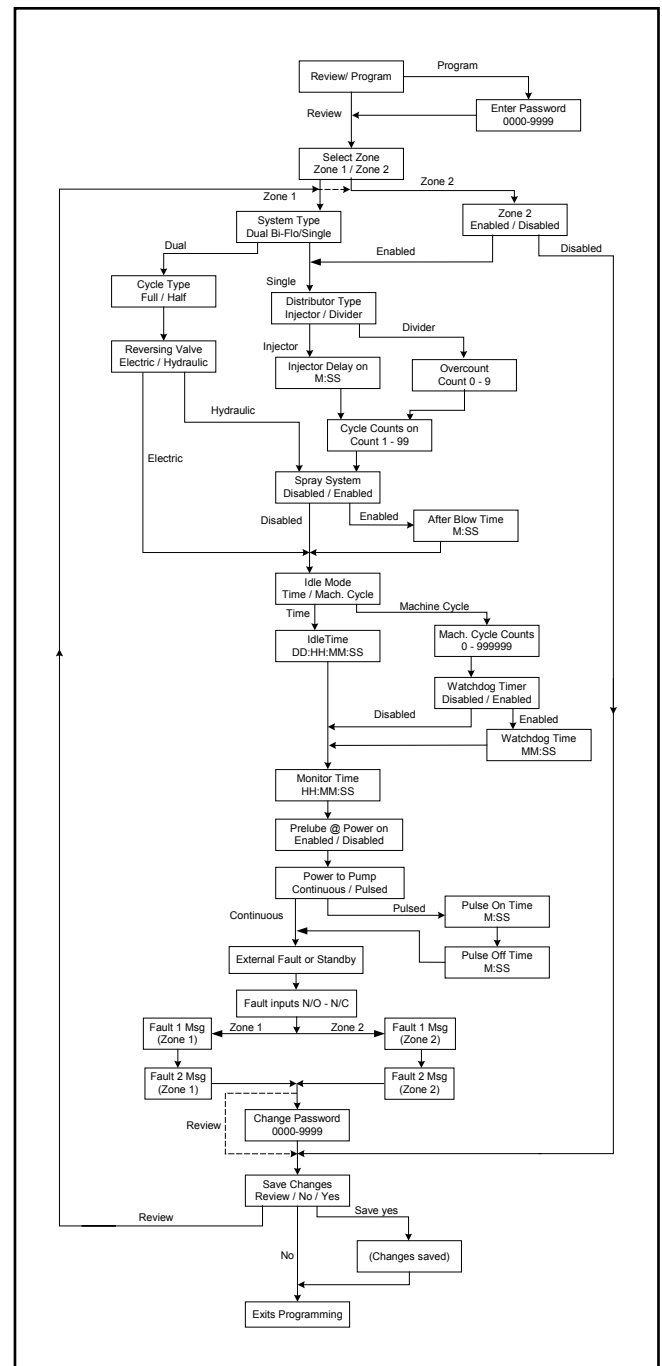
### Programming Note:

For applications consisting of two lube systems or zones that are to both receive lubricant from a common (single) pump source/reservoir, MPC should be configured and programmed as follows:

- Jumper Zone 1 pump and Zone 2 pump output terminals together, i.e. terminal 61 to terminal 51 and terminal 60 to terminal 50.
- Use Solenoid A's output to control a valve that opens lubricant flow to the first system or zone when the pump is turned on.
- Use Solenoid B's output to control a valve that opens lubricant flow to the second system or zone when the pump is turned on.
- Do not program for an air/oil mixture spraying application (there are no additional outputs available for controlling the air flow control valve).
- During programming, disable the afterblow option.
- When programming Zone 2, program the Zone 2 pump settings to be identical to those used for the Zone 1 pump's operating times.

An example of this type of operation would be a two-zone header line lubricating system that receives lubricant from a single pump package. The two lube zones may be independently programmed and operated with separate, and perhaps very different, lube application schedules as required by the components within each lube zone.

## Multi-Purpose Controller Programming Flow Diagram



**Look to GRACO, INC.  
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Centralized Lubrication System needs.**

**Products include:**

**DIVIDER VALVES:** for oil and grease...to 7500 PSI... 1 to 20 points from a single valve assembly...up to 400 points from a Master/Secondaries circuit...or systems that handle an entire plant.

**PUMPS:** fixed and variable displacement...manual and air, hydraulic, electric motor or mechanically driven.

**TIMERS/AUTOMATIC CONTROLS:** from simple on/off to complete flow and pressure monitoring, either time-or machine-actuated.

**ACCESSORY VALVES:** balancing, check and flow.

**INDICATORS:** performance and broken line.

**ACCESSORIES:** fittings, brackets, clamps, filters and strainers.

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