

Lube Sentinel II Monitor

313903B
EN

Bulletin: 44701, 555840

- Monitors and computes lube cycle lubrication rates -

Part No.: 562870 JIC Enclosure - Not for use in explosive atmospheres!

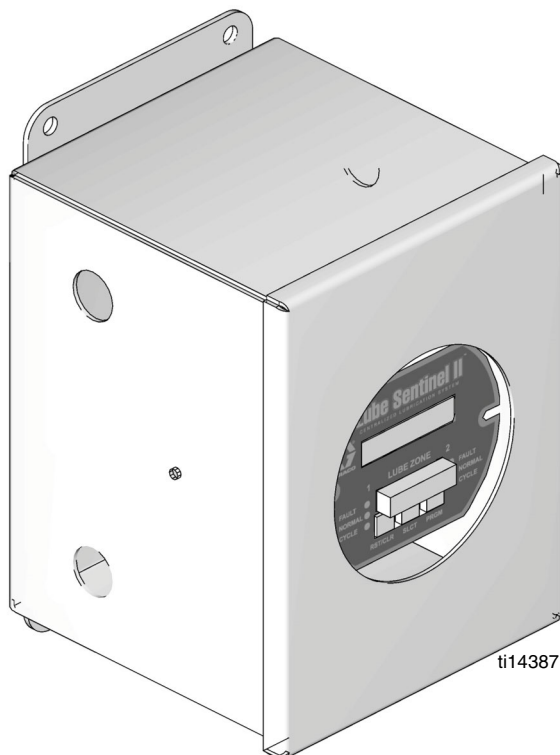
Part No.: 562871 - Includes Explosion Proof Enclosure



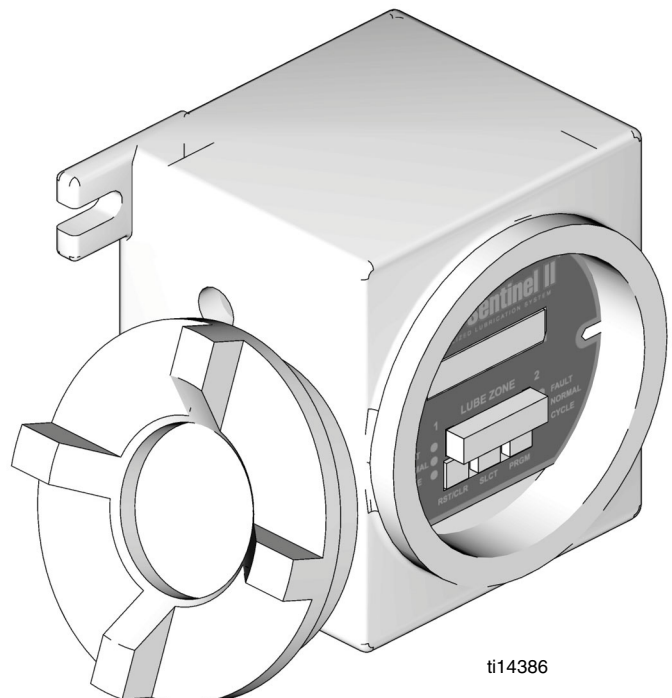
Important Safety Instructions

Read all warnings and instructions in this manual.
Save these instructions.

See Technical Data, page 26 for model information, including power requirements.






Model: 562870







Model: 562871

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbol refers to procedure-specific risk. Refer back to these warnings. Additional, product-specific warnings may be found throughout the body of this manual where applicable.

 WARNING	
	<p>ELECTRIC SHOCK HAZARD</p> <p>This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.</p> <ul style="list-style-type: none">• Turn off and disconnect power at main switch before disconnecting any cables and before servicing equipment.• Connect only to grounded power source.• All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.
	<p>EQUIPMENT MISUSE HAZARD</p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none">• Do not operate the unit when fatigued or under the influence of drugs or alcohol.• Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See Technical Data in all equipment manuals.• Do not leave the work area while equipment is energized or under pressure. Turn off all equipment and follow the Pressure Relief Procedure in this manual when equipment is not in use.• Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.• Do not alter or modify equipment.• Use equipment only for its intended purpose. Call your distributor for information.• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.• Do not kink or over bend hoses or use hoses to pull equipment.• Keep children and animals away from work area.• Comply with all applicable safety regulations.

Installation

					
AUTOMATIC SYSTEM ACTIVATION HAZARD <p>Unexpected activation of the system could result in serious injury, including skin injection and amputation.</p> <p>This device has an automatic timer that activates the pump lubrication system when power is connected or when exiting the programming function. Before you install or remove the Lube Sentinel II Monitor from the system, disconnect and isolate all power supplies and relieve all pressure.</p>					

Grounding



The equipment must be grounded. Grounding reduces the risk of static and electric shock by providing an escape wire for the electrical current due to static build-up or in the event of a short circuit.

Ground connections should not be connected to conduits or other electrical boxes. The ground wire should be connected to a grounding rod or a grounded bus bar that is tied to a grounding rod in the earth.

Electrical Connections



Electrical interference from improperly installed equipment may cause erratic behavior of the device.

When installing the Sentinel II, use 18 - 24 gauge machine tool wire (MTW). 18 gauge wire is recommended for the input power.

It is also recommended that wiring be run in its own conduit to minimize electrical interference. If the installation is in an area of high electrical noise/interference, or in trays with other control wiring, a shielded cable pair is recommended.

Shielded cable should be used on applications where engines or heavy-duty motors are in close proximity to the monitor, wiring or sensors. If shield cable is used, the shield should stay intact as close to the termination screws as possible. (Do not remove shielding from cable if it is in a shared tray).

The shield should be connected to the designated ground at both the sensor and the monitor.

Circuit Board Connections

(FIG. 1 - FIG. 7 show the circuit board and power connections necessary to install the Lube Sentinel II Monitor in your lubrication system.)

All electrical connections are made to terminals along both sides and the bottom of the main circuit board, except for serial communications. Serial communication connections are made via a special plug-in header block.

External Connection Terminals

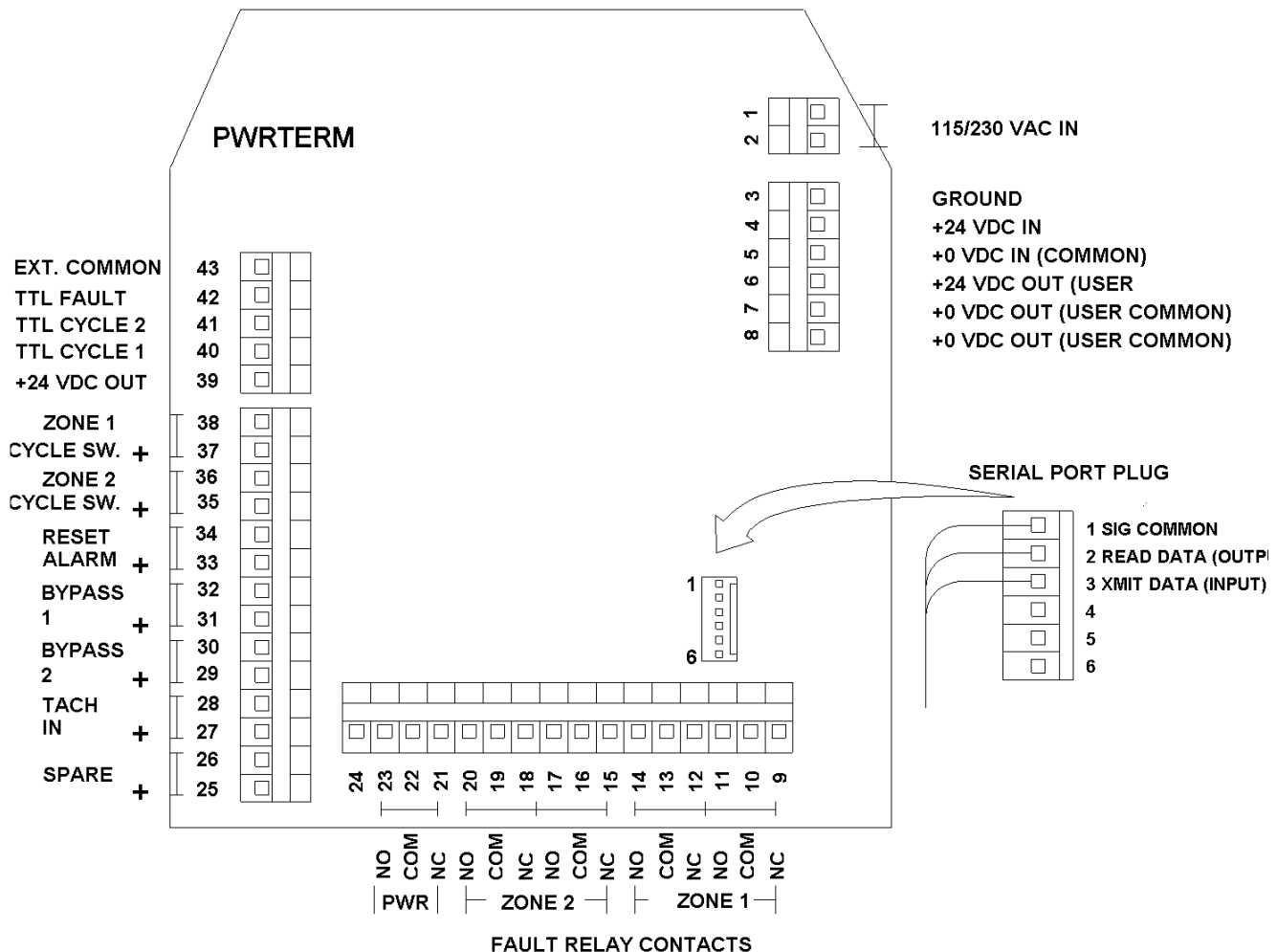


FIG. 1

Terminal Strip - Right Side Power Connections

Terminals	Power Connection
1 & 2	115/230 VAC power input terminals (polarity insensitive)
3	Earth Ground
4	+24 VDC Input
5	0 VDC Input
6	+24 VDC Out (for sensor use)
7	0 VDC Out (for sensor use)
8	0 VDC Out (for sensor use)

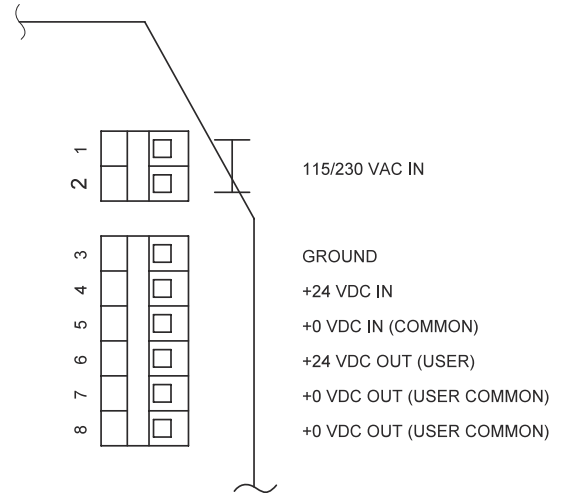
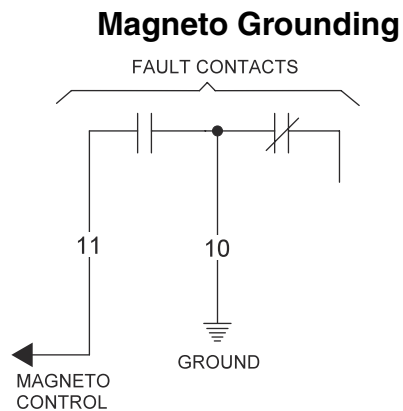
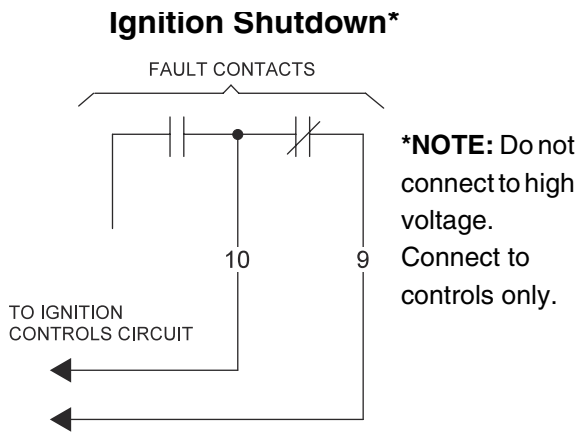


FIG. 2

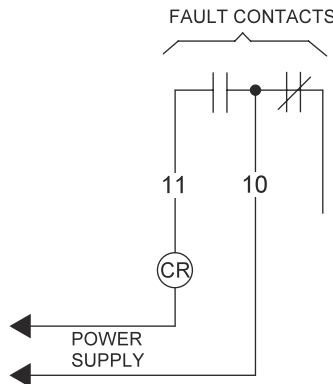
Terminal Strip Bottom - Fault Relay Connections

Terminals 9 - 14, Zone 1 Fault Relay:

The zone fault relay is a double-pole, double-throw (DPDT), Form-C relay. Relay contacts are wired directly to the terminal strip. Pole "A" uses terminals 9 (N.C.), 10 (com) and 11 (N.O.). Pole "B" uses terminal 12 (N.C.), 13 (com) and 14 (N.O.). Power is not supplied to these contacts. Contacts are rated 0.5 ampere at 125VAC and 1.0 ampere at 30VDC. The relays may be programmed to either energize or deenergize during a fault. (See FIG. 3.)



External Flow/No Flow Lights



Energize External Load (relay coil, etc.)

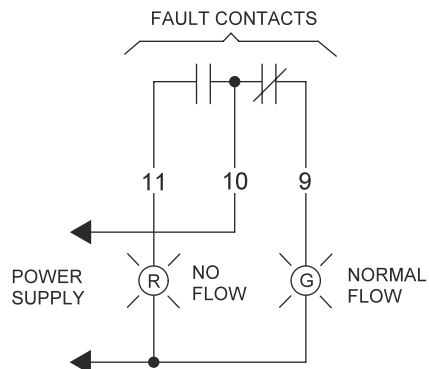


FIG. 3: Examples of Wiring for Zone 1 Faults

Terminals 15 - 20, Zone 2 Fault Relay:

Relay data for Zone 2 is the same as for Zone 1. Pole "A" (for Zone 2) uses terminals 15 (nc), 16 (com) and 17 (no). Pole "B" (for Zone 2) uses terminals 18 (nc), 19 (com) and 20 (no). (See FIG. 4.)

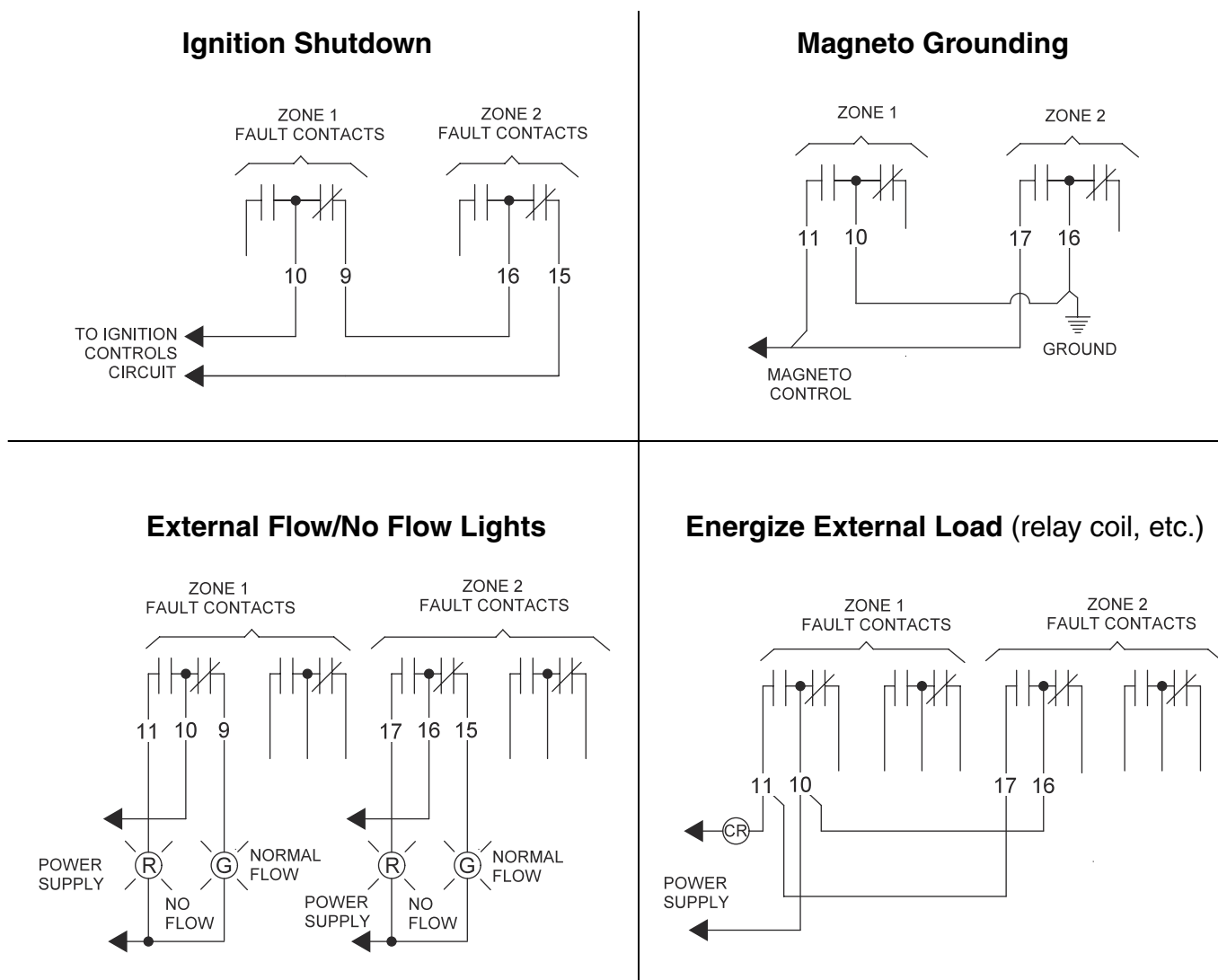


FIG. 4: Wiring Examples when Zone 1 and Zone 2 are used.

Terminals 21 - 23, Power Failure Relay:

The power-fail relay is a single-pole, single-throw (SPST) relay rated for 0.5 ampere at 125 VAC or 1.0 ampere at 30 VDC. Terminals are to Form "C" contacts: 21 (nc), 22 (com) and 23 (no). This relay will be energized as long as power supply voltage is active (FIG. 5).

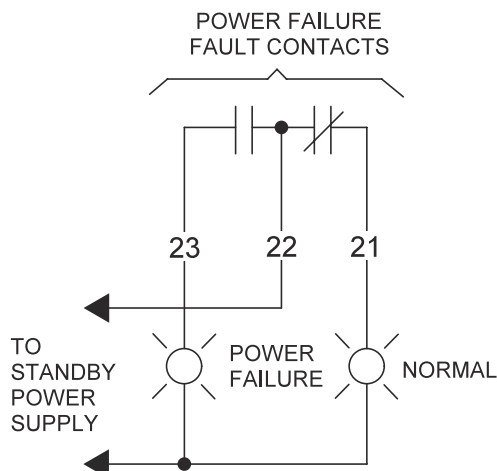


FIG. 5: Power Failure Relay Connections

Terminal Strip Left Side Bottom - Sensor Inputs

Terminals	Sensor Inputs
+25 & -26	For Factory Use
+27 & -28	Tachometer Input
+29 & -30	Bypass Zone 2
+31 & -32	Bypass Zone 1
+33 & -34	Reset Alarm
+35 & -36	Cycle Switch Zone 2
+37 & -38	Cycle Switch Zone 1

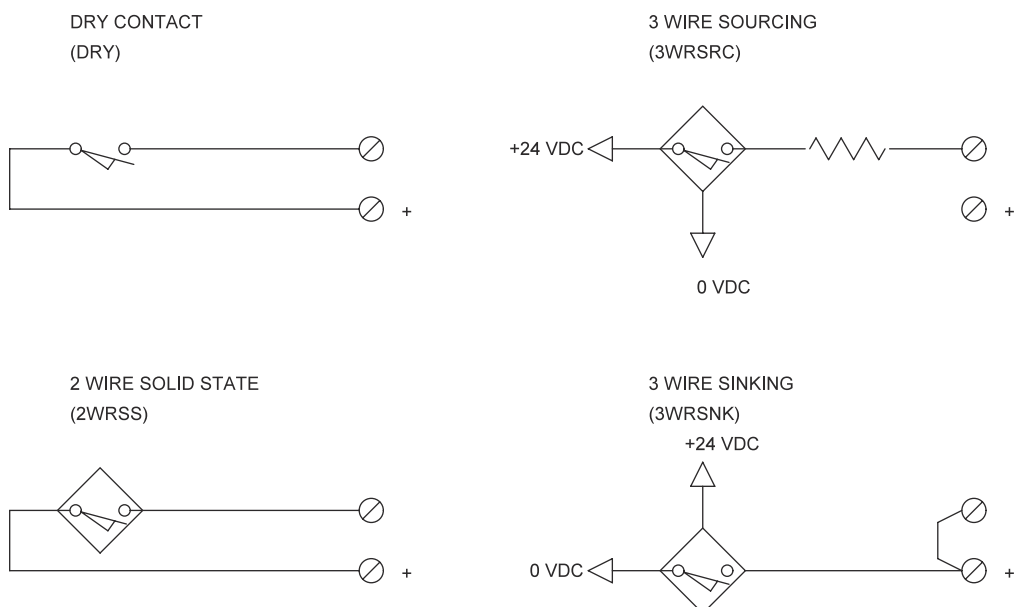


FIG. 6: Typical Input Devices

Terminal Strip Left Side TOP - Open Collector Outputs

These outputs are open collector, floating TTL outputs. There are no protection devices on these drivers. If the transistor output is connected directly to +24 volts with no load, these devices may be damaged. These drivers are optically isolated from the local power supply and their commons are floating. To utilize these drivers, Terminal 43 must be connected to the common of the voltage supply for the device being driven (such as a PLC input power supply, input common).

Terminals	Sensor Inputs
39	+24 VDC Out
40	Sensor Echo Zone 1
41	Sensor Echo Zone 2
42	System Fault
43	Floating Drive Common

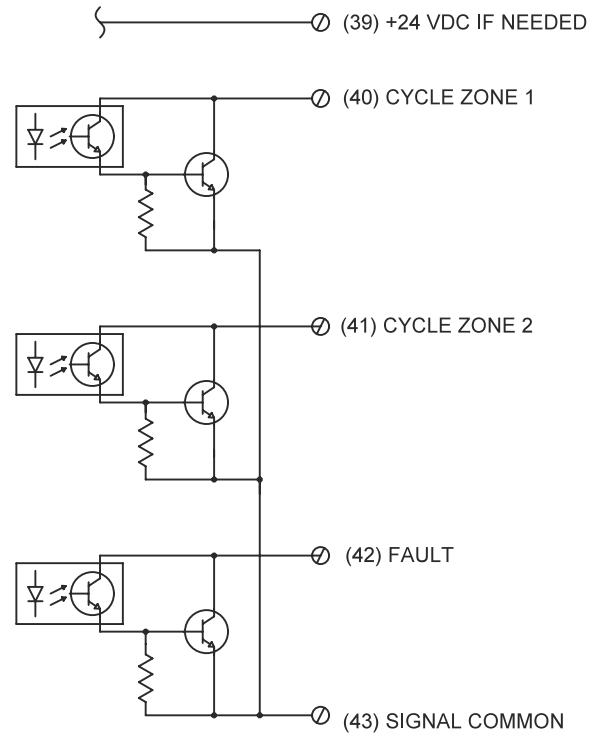
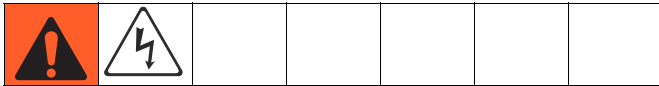


FIG. 7

Safety Set (optional)



The Safety Set is a plug-in option that allows the operator to manually activate the function buttons from outside the enclosure.

1. Disconnect all power to the monitor.
2. Verify that the module is properly aligned and all pins are in their proper sockets.
3. Place the magnetic Datawand over the Safety Set target above the desired button to activate the function buttons (FIG. 8).

The Datawand activates the sensor through the window and keeps it activated until the Datawand is removed.

NOTICE

Use caution when handling and storing the Datawand. It emits a strong magnetic field. Bringing the Datawand near magnetic media found on credit cards, floppy diskettes, or audio tape could destroy stored information!

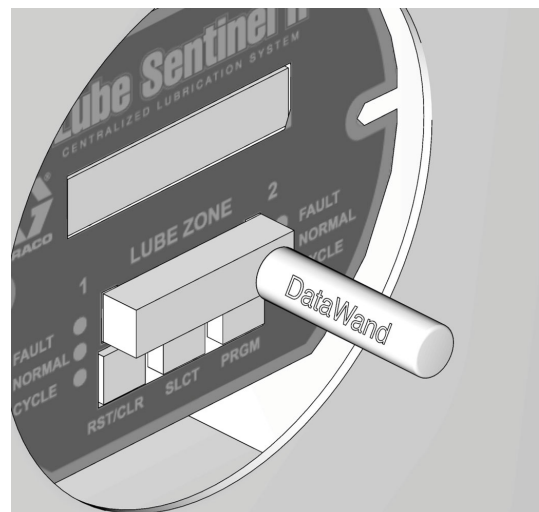


FIG. 8

Serial Communication

Remote communication (up to 100 feet) can be achieved using an RS-232-type port.

Information can be read from, or written to the Sentinel II by a personal computer (or other intelligent device). This communication is a master/slave protocol with the Sentinel II as the slave and the PC as the master.

NOTE: With the exception of a sign-on message when powered up, the slave will not send any data or information unless requested by the master.

- Data is sent across the serial port as ASCII characters with leading zeros suppressed.
- A BYTE can be up to 3 characters.
- An INTERGER can be up to 5 characters.
- Each command and each response is terminated with a carriage return (CR) (ASCII - Hexadecimal 0D or Decimal 13)
- If the data is not presented in the correct format, the command is not executed. Note that a “read” should be made after doing a “write” to verify the proper action has taken place.

NOTE: Changes made through the serial link are active but not permanent until the “save to E²” command (WC) is issued. If the WC command is not issued, turning the power off and on restores the originally saved operating parameters. See page 26 for recommended, user supplied, communication port connectors.

Serial Communication Wiring

- The Serial Communications are wired through a 6-point header on 0.1 inch centers (FIG. 9).
- Only three pins (1 - 3) are used (See Table 1).
- The other end of this cable may be connected to a personal computer.
 - ✓ Pin 1 (nearest to the transformer) is the signal ground.
 - ✓ Pin 2 is an output that connects to received data at PC.
 - ✓ Pin 3 is an input that connects to transmit data of the PC.

Table 1: Serial Pin Data

Pin #	Description	PC DB-9F	PC DB-25F
1	Signal Ground	5	7
2	Read Data	2	3
3	Send Data	3	2

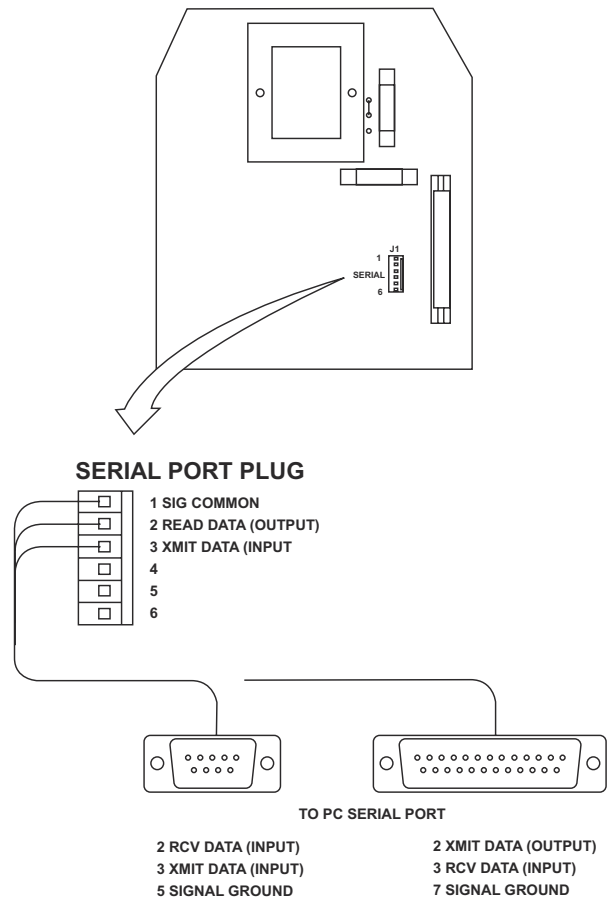


FIG. 9

Component Identification

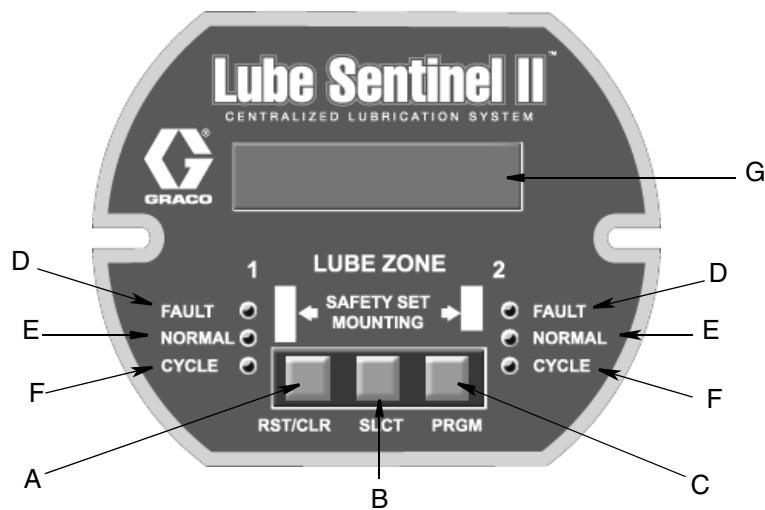


FIG. 10

Control Buttons

Operation and programming are controlled through the use of three buttons located on the front display panel.

- A RST/CLR button: In programming mode, used to reset or clear a function
- B SLCT button: In programming mode, toggles through field options.
- C PRGM button: In programming mode, used to enter programing field.

Zone LEDs

There are three LED's per zone for quick visual status reporting.

- D RED LED: Lites any time a zone is in fault.
- E GREEN LED: Lites if a zone has its alarm active and system is normal.

NOTE: Absence of either red or green lit LED's indicates that associated zone alarms are disabled.

- F YELLOW LED: Echoes the cycle switch sensor status and is lit when the switch is closed.

LCD Display - G

Displays information in one of three ways. Any of these can be selected by pressing the SLCT button (B). The LCD displays letter codes to identify the chosen display.

- "I" (Instantaneous): Displays the lube displacement (over a 24 hour period) based on the time interval between the last two cycles of the divider valve.

This time and the amount of lube delivered by one cycle of the divider valve are factored together to determine the 24-hour displacement.

- "A" (Average): Displays the lube displacement (over a 24 hour period) based on the amount of time required to complete ten cycles of the divider valve.
- "T" (Total): Displays the total amount of lubricant that has been displaced.

The value is determined by multiplication of the divider valve delivery by the number of times the valve has cycled. This number is automatically stored in memory upon completion of every ten minutes operation.

General Feature Information

Tachometer

Displays actual engine/compressor shaft speed (RPM). A flashing asterisk indicates the tachometer is enabled.

A second LCD line displays the normal target operating speed.

An ON/OFF indication displays to indicate when alarm monitoring is active.

It is possible to override the active alarms when the tachometer is enabled and drive mechanism is operating a minimal speed, by pressing the **RST/CLR** button until the machine accelerates to 50% of its normal operating speed. At that point, the alarm override ceases, allowing proportional alarmed startup of the equipment.

Enabled alarms stay active through all ranges of input rpm until they are manually reset after the machine has decelerated from 50% of its normal operating speed.

NOTE: When the alarm override is active, a letter “T” and the word “OFF” will be displayed on the LCD.

When the **RST/CLR** button is pushed to reset Sentinel II, the display resets back to 0 (zero). However, if the display is in the totalized mode (identified by the letter “T”) pressing **RST/CLR** resets the totals back to the last stored value. Care should be taken when resetting a fault to ensure that the display is not in the totalized mode. Resetting the fault will also reset the total accumulated usage.

Zone Enable/Disable

Zones are enabled during programming. A zone may be disabled initially by programming the zone “OFF” or by temporarily placing an enabled zone in “BYPASS” mode (Terminals 29, 30, 31 and 32).

Closing the contacts for “ZONE BYPASS” disables a zone from any fault time-outs. The zone display shows the word “BYPASS” to indicate this condition.

When the bypass has been removed, active monitoring of the zone continues. If the alarm is enabled, the alarm time-out will restart.

Fault Relay

There are three fault relays. One is used as a Power Monitor and two are used as Zone Fault relays.

The Power Monitor Relay is a single-pole, double-throw relay with Form C contacts. It energizes approximately 5 seconds after power is applied and stays energized as long as power is available to the monitor. When power is removed from the system, the relay deenergizes immediately.

Zone Fault Relays are enabled during programming. Each Zone Fault Relay is a double-pole, double-throw relay with two Form C contacts that change state when their associated zone goes into fault. The Zone Fault Relay may be programmed to either pick or drop when a fault is detected, allowing for fail-safe operating if desired.

A system fault TTL output is also available to annunciate faults. It is linked with programming for relay energization settings.

Resetting Faults

Faults may be reset in several ways:

- Manually reset at the monitor by pressing the **RST/CLR** button.
- Using the “Safety Set” target (see Safety Set, page 8).
- Electrically by closing the remote reset contacts.
- Serial Port commands (see Serial Communication, page 9).

Cycle Switches and Other Sensor Inputs

All sensor inputs should be dry contact type. Refer to FIG. 6, page 7. and Technical Data, page 26.

Cycle switch TTL outputs are provided for each zone to echo the status of the sensor input from the divider valve or other device. The output conducts current when the sensor contacts are open. When the sensor contacts close, the output shuts off.

NOTE: These outputs should not be used for cycle rates faster than one pulse per second. Output pulses may be missed if higher cycle rates are used.

These outputs are not short-circuit protected (100mAmax). Improper connection could result in damage to these outputs. (See Circuit Board Connections, beginning on page 4.)

Programming the Lube Sentinel II Monitor

Operation of the Lube Sentinel II is controlled through three buttons located on the front display panel.

Buttons are labeled:

- RST/CLR - reset and/or clear
- SLCT - select
- PGRM - program

After the Lube Sentinel is programmed, it is ready for normal operation in the monitor mode. In this mode the Lube Sentinel II monitors the lubricant delivery and provides associated data on the LCD display.

Programming Overview

NOTE: The following Programming Overview instructions are provided as a quick guide, only. Detailed, Step-By-Step Programming instructions are provided on page 14.

Entering Data

There are four main selections within the programming field:

- **Configuration? Zone 1:** Sets Zone 1 parameters
- **Configuration? Zone 2:** Sets Zone 2 parameters
- **Serial Port:** Sets parameters for serial communications to PC
- **Global Settings:** Specifies how the monitor reacts to faults and how relays are energized or deenergized

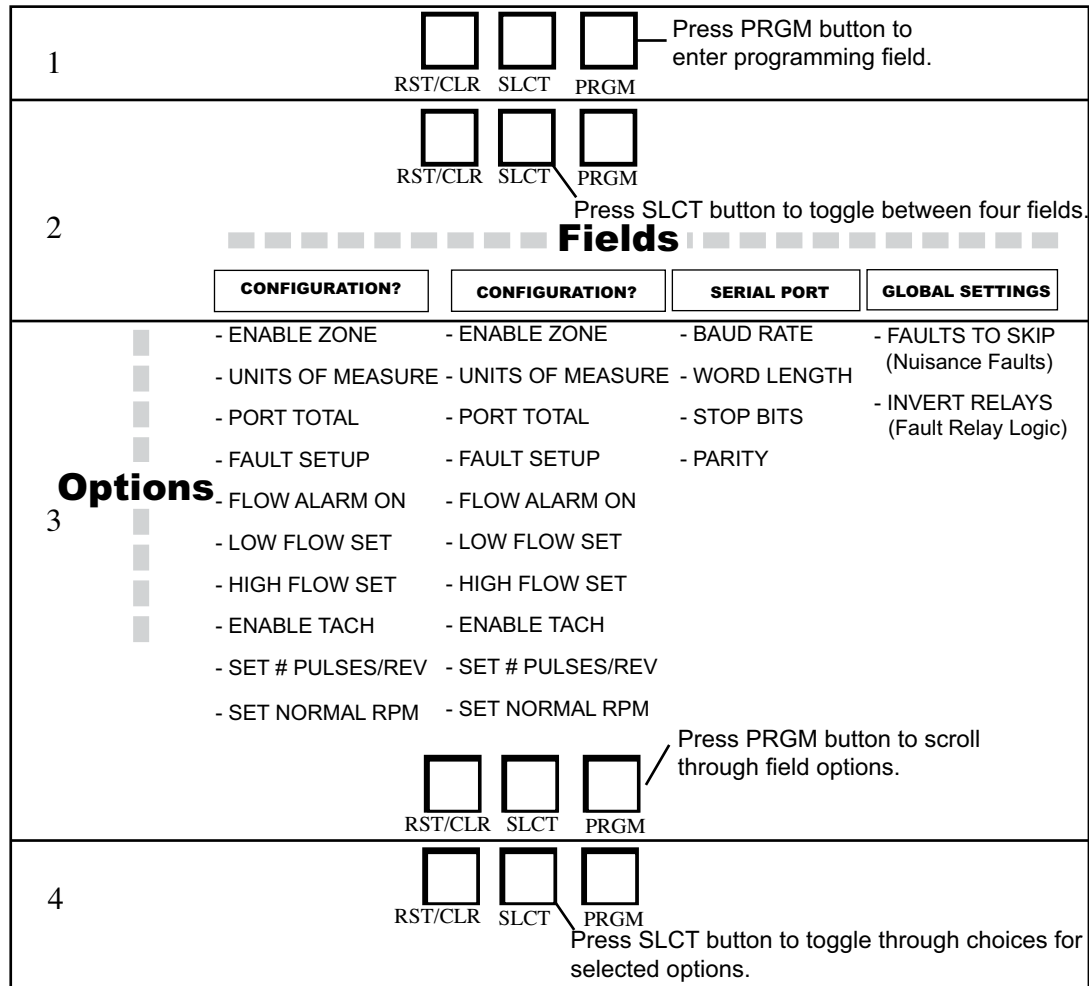


FIG. 11

For the following instructions, refer to FIG. 11.

1. Press **PRGM** button once to enter programming field.
2. Press **SLCT** button to move from CONFIGURATION?ZONE1, to CONFIGURATION?ZONE2, to SERIAL PORT, and to GLOBAL SETTINGS.
3. When the desired field is selected, pressing the **PRGM** button scrolls through the options within that field.
4. Pressing the **SLCT** button toggles through the choices available for the selected option.

Saving Program Changes

1. When the display shows CONFIGURATION?ZONE1, CONFIGURATION?ZONE2, SERIAL PORT, or GLOBAL SETTINGS, press the **RST/CLR** button to place the Sentinel II in the monitor mode.
2. A prompt will ask if any changes should be saved. The default is NO. To save the changes, press the **SLCT** button to change to YES.
3. Then press the **PRGM** button.

NOTE: Pressing any other button when NO is showing will erase any changes indicated and leave all settings as they were before entering the programming function.

Step-By-Step Programming Instructions

The following instructions are listed in order of appearance. To bypass a selection, press the **SLCT** button until the desired selection displays.

Configuration?Zone1

1. Press **PRGM** button to enter the programming mode.

CONFIGURATION?ZONE1 displays.

2. With CONFIGURATION?ZONE1 displayed, press the **PRGM** button again to enter the options for Zone 1.
 - **Enable Zone:** The first option will be to enable the zone.
 - a. Press **SLCT** button to toggle between YES and NO. If the zone is **not** to be enabled, no further options will be asked for. A disabled zone appears as dashes across the screen and will not generate any faults. (FIG. 12).
 - b. Press **PRGM** again to advance to the next programming option.



FIG. 12

- **Units of Measure:** Choose one - ounce, pints, gallons, liters, milliliters or counts.
 - a. Press the **SLCT** button to toggle between the displayable units.
 - b. When choice displays on screen, push **PRGM** button to advance to the next programming option.

NOTE: Each zone can read out in different units.

- **Port Total:** The total quantity of lubricant volume provided to lubrication points.

This input is necessary for calibrating the Sentinel II for the lubricant volume required for one cycle of the divider valve assembly.

To determine this number:

- a. Locate the divider valve assembly that has the lube system cycle switch mounted on it.
- b. Add the output volume numbers stamped in the upper right corner of each of the assembly's valve sections (FIG. 13) (i.e., the 10 from a 10T or 10S section. etc.).

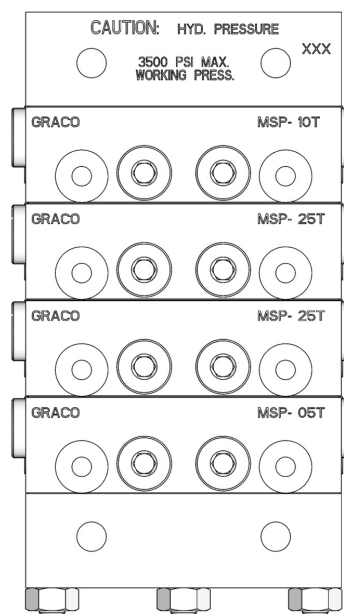


FIG. 13

- c. Double the sum quantity.
- d. Subtract any individual output value(s) connected to an output line that is not feeding a lubrication point or another secondary feeder assembly (i.e., a line returning oil to the reservoir, or any other destination that is not a rotating/moving lubrication point).

This number is the Port Total.

- e. Press and hold the **SLCT** button to increase the value until the Port Total from step d, (page 14) displays. (9999 is the maximum amount allowed in this field.)
Use the **RST/CLR** button to decrease the value.
- f. Release the button when the Port Total is shown on the display.

NOTE: Changing the Port Total on the display, changes the displayed alarm rate. Always reset the alarm rate after altering the Port Total.

- g. Press the **PGRM** button to advance to the next programming option.
- **Fault Setup:** Choose one - INTERLOCKED, INDEPENDENT or DISABLED
 - a. Press **SLCT** button to toggle between choices.
 - ✓ INERLOCKED: ties the two zones into a first alarm indication only.
 - ✓ INDEPENDENT: each zone is allowed to register a fault when its rate limit has been exceeded. This allows the Sentinel II to be used to monitor two separate systems.
 - ✓ DISABLED: no fault will be generated from that zone.

NOTE: Changing the status of one alarm zone will automatically change the status of the other zone.

- b. When choice displays, press the **PGRM** button to advance to the next programming option.
- **Flow Alarm On:** Choose one - LOW FLOW, HIGH FLOW or HI and LOW FLOW alarms.
 - a. Press the **SLCT** button to toggle between choices.
 - b. When choice displays, press the **PGRM** button to advance to the next programming option.

- **Low Flow Set:** Appears if LOW FLOW or HI and LOW FLOW is selected. (If HIGH FLOW only was selected, skip to the HIGH FLOW SET section.)

The alarm is based on the minimum usage rate (Low Flow) per 24 hours. Should the usage drop below that value, the zone will go into fault and display the letter "L" in the zone status line for that zone (FIG. 14).



FIG. 14

- a. Press and hold the **SLCT** button to increase the value and set the Low Flow rate. (9999 is the maximum amount allowed in this field.)

Use the **RST/CLR** button to decrease the value.

- b. Release the button when the Low Flow rate is shown on the display.

NOTE: If the HI and LOW FLOW is selected, the amount entered, cannot exceed 85% of the HIGH FLOW value.

- c. Press the **PGRM** button to advance to the next programming option.

- **High Flow Set:** Appears if HIGH FLOW or HI and LOW FLOW is selected. (If LOW FLOW only was selected, skip to the ENABLE TACH section.)

The alarm is based on the maximum usage rate (High Flow) per 24 hours. Should the usage exceed that value, the zone will go into fault and display the letter “H” in the zone status line for that zone (FIG. 15).



FIG. 15

- Press and hold the **SLCT** button to increase the value and set the High Flow rate. (9999 is the maximum amount allowed in this field.)

Use the **RST/CLR** button to decrease the value.

- Release the button when the Low Flow rate is shown on the display.

NOTE: If the HI and LOW FLOW is selected, the amount entered, cannot drop below 15% of the LOW FLOW value.

- Press the **PGRM** button to advance to the next programming option.

- **Enable Tach:** Choose one - YES or NO.

- Press the **SLCT** button to toggle between choices.

If the tachometer is not to be enabled, select NO. No further options will be asked for the zone.

Enabling the tachometer (selecting YES) will add a + (plus) sign to the display screen to indicate that alarm times are being adjusted (FIG. 16).

NOTE: The + (plus) sign also appears if Faults Skip, option 2 or 3, is chosen, page 18.

Tachometer parameters selected are programmed common to both zones.

Settings made for Zone 1 are automatically entered for Zone 2.



FIG. 16

- Press the **PGRM** button to advance to the next programming option.

- **Set # Pulses/Rev:** Program the number of pulses the sensor will see in one revolution of the pump drive mechanism. The tachometer input is based on this number.
 - Press and hold the **SLCT** button to increase the pulse count. (20 pulses per shaft revolution maximum.)

Use the **RST/CLR** button to decrease the value.

- b. Release the button when the pulse count is shown on the display.
- c. Press the **PGRM** button to advance to the next programming option.
- **Set Normal RPM:** Programs the normal speed at which the pump drive mechanism is expected to operate.
 - a. Press and hold the **SLCT** button to increase the RPM to a specified maximum. (See Table 2. Maximum RPM Pulses/Rev, page 17 for limits.)

Use the **RST/CLR** button to decrease the RPM's. (The minimum selectable speed is 50 rpm.)

- b. Release the button when the pulse count is shown on the display.

Table 2. Maximum RPM for Pulses/Rev.

Pulse/Rev	RPM Max	Pulses/Rev	RPM Max
1	5000	11	454
2	2500	12	416
3	1666	13	384
4	1250	14	357
5	1000	15	333
6	833	16	312
7	714	17	294
8	625	18	277
9	555	19	263
10	500	20	250

NOTE: The Sentinel II program allows the machine and lubricator pump speed to vary without causing a high or low lube fault. As the actual measured rpm varies from the target normal rpm, the fault rate will also vary by the same deviation percentage. The maximum deviation from the target fault setpoints is +/- 50%.

EXAMPLE:

A drive is expected to operate at 100 rpm. The LOW FLOW rate for Zone 1 is set to 30 pints per day. If the drive is reduced to 75 rpm (or 75%), the LOW FLOW fault point is adjusted down to 22.5 pints per day (also 75%). Note that the minimum and maximum adjusted values are +/- 50% (45 pints at 150 rpm and 15 pints at 50 rpm).

- c. Press the **PGRM** button. Since there are no additional options, the display returns to the start of the CONFIGURATION?ZONE1 selection.
3. Push the **SLCT** button to toggle to CONFIGURATION?ZONE2.

NOTE: Pressing **RST/CLR** at this time exits the programming mode and asks if the changes made should be permanent. Use the **SLCT** button to choose the desired response and press the **PGRM** button to exit the programming field and return back to the monitor mode.

Configuration?Zone2

The method of configuring Zone 2 is the same as Zone 1. If you 2 does not need to be configured, press the **SLCT** button to toggle to Serial Port.

Serial Port

NOTE: If a Serial Port is not being used, press the **SLCT** button to toggle to Global Settings.

To configure the Serial Port settings:

1. Press **PGRM** button to enter the options for the Serial Port.
 - **Baud Rate:** Choose one rate - 1200, 2400, 4800 and 9600.
 - a. Press the **SLCT** button to toggle between choices.
 - b. When choice displays, press the **PGRM** button to advance to the next programming option.
 - **Word Length:** Permanently set to 8 bits.

Press the **PGRM** button to advance to the next programming option.

- **Stop Bits:** Choose one: 1 or 2 bits.
 - a. Press the **SLCT** button to toggle between choices.
 - b. When choice displays, press the **PGRM** button to advance to the next programming option.
- **Parity:** Choose one: ODD, EVEN and SELECT.
 - a. Press the **SLCT** button to toggle between choices.
 - b. When choice displays, press the **PGRM** button to advance to the next programming option. Since there are no additional options, the display returns to the start of the Serial Port selection.

2. Push the **SLCT** button to toggle to the Global Settings.

Global Settings

1. Press **PGRM** button to enter the options for Global Settings.
 - **Faults to Skip (nuisance faults):** Allows Sentinel II to ignore nuisance faults. It will delay logging a fault until one, two or three consecutive faults are received.

Choose either 1, 2 or 3:

- a. Press the **SLCT** button to toggle between choices.
 - ✓ 1: The normal operation setting uses 1. Faults on the first occurrence of a time out.
 - ✓ 2 or 3: If 2 or 3 is selected a + (plus) sign will display in the monitor window to indicate that alarm times are being dynamically adjusted.

NOTE: The + (plus) sign also appears if the Tachometer option is chosen, page 16.








- b. When choice displays, press the **PGRM** button to advance to the next programming option.

- **Invert Relays (fault relay logic):** Allows selection of whether the zone fault relays and the TTL output will energize or deenergize when a fault is registered.

Choose either YES or NO:

- a. Press the **SLCT** button to toggle between choices.
 - ✓ NO: The fault relay contacts will be deenergized during normal system operation and energize upon a fault.
 - ✓ YES: The fault relay contacts will be energized during normal system operation and deenergize upon a fault.
- b. When choice displays, press the **PGRM** button to advance to the next programming option. Since there are no additional options, the display returns to the start of the Global Settings selection.

2. Push the **SLCT** button returns to the CONFIGURATION?ZONE1 option.

						
AUTOMATIC SYSTEM ACTIVATION HAZARD						
<p>Unexpected activation of the system could result in serious injury, including skin injection and amputation.</p> <p>This device has an automatic timer that activates the pump lubrication system when power is connected or when exiting the programming function. Before you install or remove the Lube Sentinel II Monitor from the system, disconnect and isolate all power supplies and relieve all pressure.</p>						

Exit/Save Changes

1. Press **RST/CLR** button at any time moves to the exit routine.
2. You will be prompted to Save Changes. The default response is NO.
3. If all modifications to the Sentinel II are satisfactory and ready to be permanent, press the **SLCT** button to change the response to YES.

4. Press the PGRM button.

When the Sentinel II returns to the monitor mode and updated with the new, saved changes.

NOTE:

- Pressing any other button, or leaving the response set to NO, erases and does NOT save changes. Sentinel II returns to the original setup configuration.
- Once the changes have been saved, pressing RST/CLR button will not undo the new setup configuration.

Definitions

Data	Definition
R1z	<p>Read settings of Zone 1 or 2. The z is set to either 1 or 2. The returned message is a data structure arranged in the following order:</p> <ul style="list-style-type: none"> a. BYTE - 0 or 1 indicates whether the zone is enabled b. BYTE - Unit of measurement on the display <ul style="list-style-type: none"> 0 = Ounces 1 = Pints 2 = Gallons 3 = Liters 4 = Millimeters 5 = Counts c. BYTE - Interlock of alarms <ul style="list-style-type: none"> 0 = Alarm Disabled 1 = Alarm Zones Interlocked (First Alarm) 2 = Alarms Independent d. BYTE - Alarm Generation <ul style="list-style-type: none"> 0 = Low Flow Alarm Only 1 = High Flow Alarm Only 2 = Both Low and High Flow Alarms e. BYTE - 0 or 1 indicates whether the Tachometer is enabled. f. INTEGER - Block Total g. INTEGER - Low Flow Limit for Alarm h. INTEGER - High Flow Limit for Alarm i. INTEGER - Tachometer Setting for Normal RPM j. BYTE - Tach Pulses per RPM
R2z	<p>Read the current status of Zone 1 or 2. The z is set to either 1 or 2. The returned message is a data structure arranged in the following order:</p> <ul style="list-style-type: none"> a. BYTE - Cycle Position. Indicates if the input is opened or closed (0 or 1). b. INTEGER - Cycle Timer. Running time in 0.1 seconds since start of cycle. c. INTEGER - Last Cycle Time. Time of the last cycle. d. INTEGER - Cycle Count. Number of cycles since last reset. e. BYTE - Fault Status (N/F) for Normal or Fault.
R3	INTEGER - Read Current RPM.
R4	BYTE - Read the number of faults skipped before signaling a fault (value = 1, 2 or 3).
R5	BYTE - Read if relay output is inverted. <ul style="list-style-type: none"> 0 = Normal 1 = Inverted

W1zx	Set Zone Enable/Disable. a. BYTE z = 1 or 2 for the zone being addressed. b. BYTE x = 0 or 1 to disable or enable the zone.
W2zx	Set zone unit of measure. a. BYTE z = 1 or 2 for the zone being addressed. b. BYTE x = selects units to display. 0 = Ounce 1 = Pints 2 = Gallons 3 = Liters 4 = Millimeters 5 = Counts
W3zx	Set Zone Interlock. a. BYTE z = 1 or 2 for the zone being addressed. b. BYTE x = Interlock of alarms. 0 = Alarm Disabled 1 = Alarm Zones Interlocked (First Alarm) 2 = Alarms Independent
W4zx	Set high/low alarm limits. a. BYTE z = 1 or 2 for the zone being addressed. b. BYTE x = Alarm generation. 0 = Low Flow Alarm Only. 1 = High Flow Alarm Only. 2 = Both Low and High Flow Alarms.
W5zx	BYTE - Turns the Tachometer On or Off. 0 = Disabled 1 = Enabled
W6zxxxx	Set the port total. a. BYTE z = 1 or 2 for the zone being addressed. b. INTEGER xxxx = 5 to 9999 (thousandths of a cu-in.).
W7zxxxx	Set Low Flow Alarm. a. BYTE z = 1 or 2 for the zone being addressed. b. INTEGER xxxx = 5 to 65535 per sentinel specifications. Low Flow Alarm should be at least 10% less than the High Flow Alarm.
W8zxxxx	Set High Flow Alarm. a. BYTE z = 1 or 2 for the zone being addressed. b. INTEGER xxxx = 5 to 65535 per sentinel specifications. High Flow Alarm should be at least 10% greater than the Low Flow Alarm.
W9xxxx	Set normal tachometer speed. INTEGER xxxx = 50 to 5001

WAxx	Set tachometer pulses per revolution. INTEGER xx = 1 - 32
WB	Reset Faults.
WC	Save Data to EEPROM. Programming changes become permanent.
WDx	Set the fault count to alarm on, where x = 1, 2, or 3.
WEx	Set the polarity of the fault relays. 0 = No. Relays not inverted, normally deenergized, energize on a fault. 1 = Yes. Relays are inverted, normally energized, deenergize on a fault.

Dimensions

JIC Model: 562870

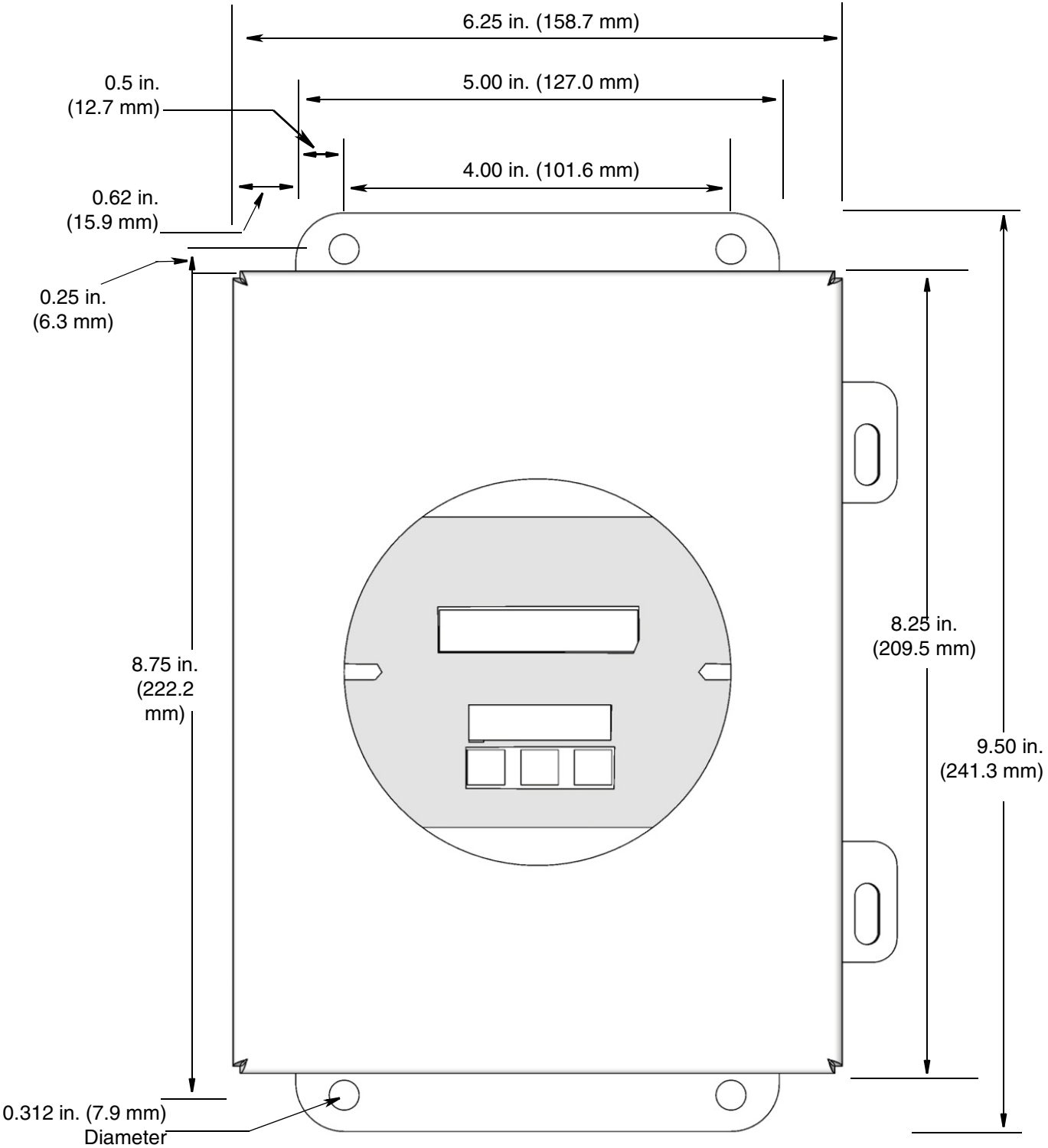


FIG. 17

Model: 562870

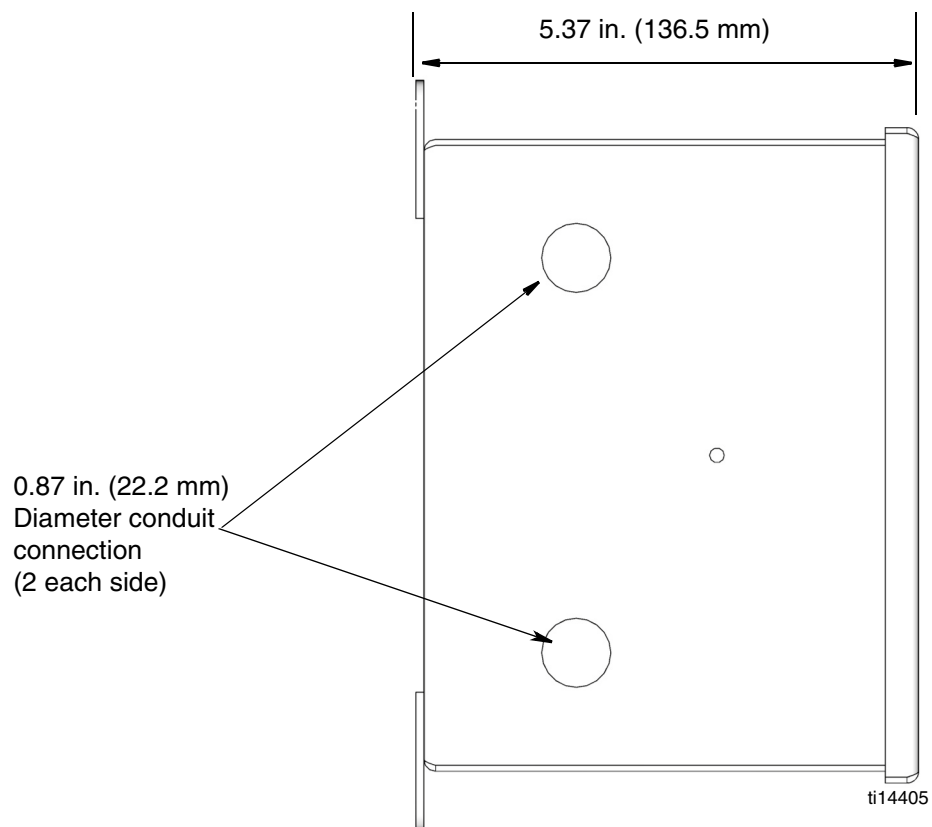


FIG. 18

Model: 562871

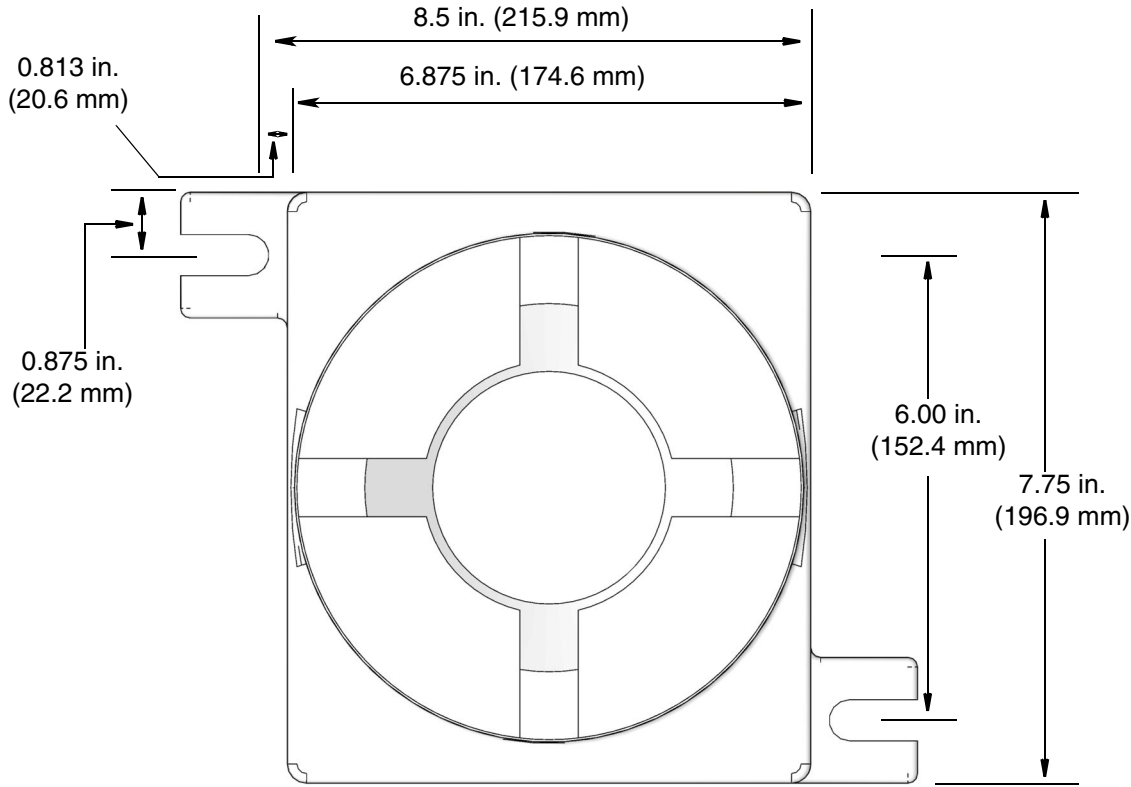


FIG. 19

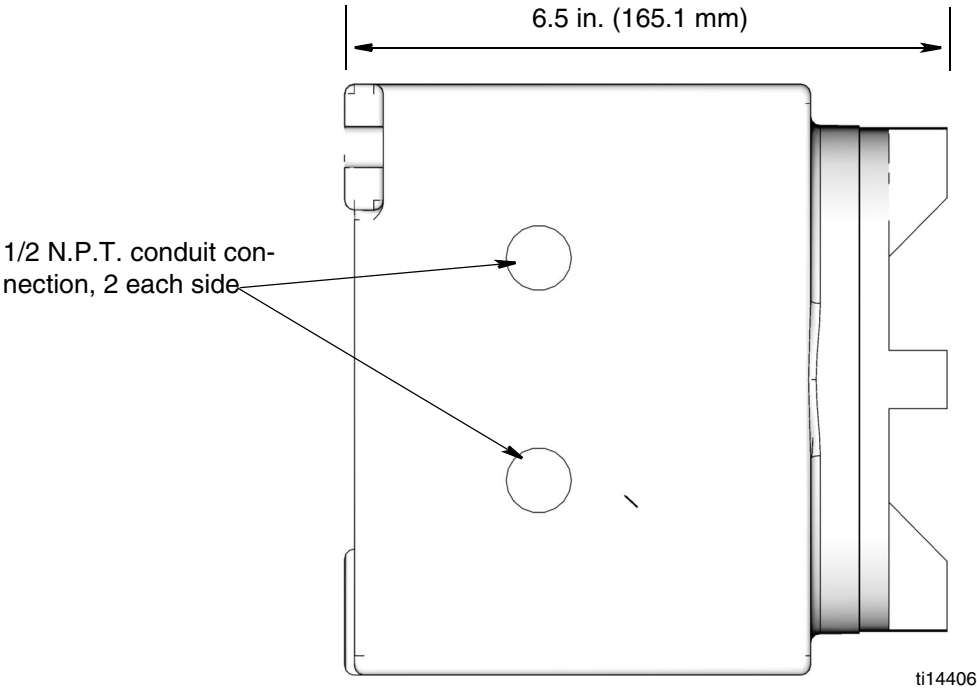


FIG. 20

Technical Data

Input Power Requirements	115VAC - 100 ma; 230VAC - 50 ma 24 - 30VDC - 200 ma
Fuses: FU-1 and FU-2 Use Medium Lag Fuses Only. Do NOT use Fast Acting Fuses.	1/4 in. x 1 in.: 0.5 AMP, 250VAC 5 mm x 20 mm: 0.5 AMP, 250VAC (buss# GMA-500 or equivalent)
Proximity Switch Pulse Inputs	24VDC - 12 ma each
Tach Sensor Pulse Input	24VDC - 12 ma
Zone Bypass and Alarm Inputs	24VDC - 12 ma each
Relay Outputs Contact Ratings	
Rated Load	0.5Amp at 125VAC 1Amp at 30VDC
Maximum Carry Current	2Amp
Maximum Operating Voltage	250VAC 220VDC
Maximum Switching Capacity	62.5 VA, 60W
Minimum Permissible Load	10 μ A 10mVDC
Relay Coil Current Consumption	70ma @ 115VAC 40ma @ 230VAC 150ma @ 24VDC
Communications Port Connector*	TTL Outputs (non-fused) 24VDC max 100ma max.
Maximum Pulse Rate	300 per minute @ 50% duty
Maximum Cycle Time	10.9 minutes
Ambient Temperature Range†	- 4°F to +158°F (- 20°C to +70°C)
Net Weight	
Model: 562870	8.4 lbs (3.8 kg)
Model: 562871	18.3 lbs (8.3 kg)

*User Supplied Component: Graco recommends

- Waldom-Molex Housing #22-01-3067 (or alternate part: AMP Housing #770602-6)
- Waldom-Molex Pins #08-50-01114 (or alternate part: AMP PINS #770666-1)

† Do not mount in direct sunlight. Prolonged exposure will damage LCD.

Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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This warranty does not cover, and Graco shall not be liable for general wear and tear, or 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 of Graco equipment with 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.

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