

OPERATING MANUAL and INSTALLATION INSTRUCTIONS for **IntelliCon®-LCS (2- 25 PSI and 25 - 145 PSI Operating Pressure versions)** LIGHT-COMMERCIAL STEAM HEATING SYSTEM ECONOMIZER

Form LCS rev. 9.6



Description

The Intellidyne IntelliCon®-LCS is a patented microprocessor-controlled fuel-saving device for light-commercial steam heating systems. The LCS can be configured in the field for either low pressure (4-25 PSI) or high pressure (25-145 PSI) operation. The LCS is shipped configured for low pressure applications and requires a low-pressure sensor (p/n 4006). High pressure operation requires a high-pressure sensor (p/n 4005) and will require the control to be re-configured. This is accomplished by following the instructions in the programming section. While working in unison with the boiler's pressure controls; IntelliCon®-LCS reduces fuel consumption, wear on boiler parts and burner emissions by dynamically altering the boiler's response to heating load changes. This unit is compatible with Intellidyne's Remote Display Unit (model RDU # 4076). In addition, certain parameters are programmable and are stored in memory that will not be lost in the event of the unit being turned off or a power failure. *The standard configuration for this control is for a steam boiler with a domestic water coil. Other configurations are possible and require re-configuration and/or a model # 4077 Sensor & I/O Breakout module. A system configured with a Steam-boiler, HeatTimer™, and domestic water generated by the boiler (summer/winter operation) require the # 4077 Breakout module. A steam boiler with a HeatTimer™ but no domestic water generation (heating only, no summer operation) does not require the Breakout module, but will require re-configuration of the domestic water sensor Jack to accept the Return Sensor.*

Electric Ratings

Power input: 24,115,220 VAC ± 10%, 5 Watts max., 50/60Hz
Control circuit input: 24,115,220 VAC ± 10%, 0.1A max. Burden
Relay Contact: Form B, 10A @ 220 VAC (General Purpose)

Environmental Conditions

For Indoor Use
Maximum Altitude (2000M)
Rated Ambient Temperature 32 - 120°F. (0 - 49°C.)
Maximum Rh 90% non-condensing
Mains Supply Voltage Fluctuations ± 10%
Transient Over-Voltage Category (III)
Pollution Degree (2)

Operation

After installation, setting the power switch on the unit to the 'ON' position activates the control. After the system check, the power indicator on the front of the display will indicate that the power is on. In the event of a sensor fault the power indicator will blink to indicate a trouble condition. The back-lit LCD display indicates the operational mode of the device, the measured system pressure/temperatures, total burner run-time and economizing time, and any warning messages. The possible messages and their explanation are:

Display Messages:

STANDBY MODE The boiler's control has been satisfied and is not requiring the burner to run.

ECONOMIZER MODE The boiler's control has requested the burner to run but the IntelliCon®-LCS has sensed that there is available heat which can be used without burning fuel. The burner will remain off and useful heat will be delivered from the boiler's existing supply of steam or condensate.

HEATING MODE The burner has been released to run.

HEATING / LOW LIM The burner has been released to run due to an increase in load. This condition may occur occasionally. If this message appears frequently, the low-limit settings in the controller may have to be reprogrammed.

STEAM = ??? The pressure measured by the pressure sensor is displayed in PSI or KPa.

DOMESTIC = ??? The temperature measured by the domestic hot water outflow sensor is displayed in degrees F or C.

RETURN = ???
The temperature measured by the condensate return water sensor is displayed in degrees F or C. This is only available if the additional sensor and sensor adapter is purchased.

RT HRS = XXXXXX The accumulated burner run-time in hours. This value will reset to zero after 65535.9 hours. This value is stored in non-volatile memory and will not be lost if the unit is shut-off or if power is removed. This display may be shut off via programming.

ET HRS = XXXXX.X The accumulated economizing time in hours. This value will reset to zero after 65535.9 hours. This value is stored in non-volatile memory and will not be lost if the unit is shut-off or if power is removed. This display may be shut off via programming.

In the event that a sensor fails, the power indicator will blink and the unit will return full control to the boiler's controls. The LCD will display a message indicating which sensor has failed and that the "SYSTEM is BYPASSED". If a sensor fault message appears; call your installer for service.

Installation

The LCS unit is electrically wired in series with the boiler's pressure control as conceptually shown in the wiring diagram (Fig. 1a or 1b). All units have multiple voltage inputs for Power and Burner control circuit.

For safety, power to the boiler must be off during installation. For improved savings, it is recommended that the burner pressure-control setpoint should be set so that the minimum pressure at which point the burner would come on, without The IntelliCon® present, is 4 PSI (25 PSI for HP version). If the setting is higher than that, it should not be re-adjusted.

Mounting

The LCS may be mounted using the ½" electric fitting on the bottom of the unit or surface mounted using an optional mounting bracket. Consideration should be given to visibility of the display, wiring, sensor-lead routing, and access to the unit.

Wiring

All wiring and connections must comply with Local and National Electrical Codes. The unit should be wired as shown in the wiring diagrams. It is important to read all of the instructions and the WIRING NOTE contained in these instructions. Ensure that POWER TO THE UNIT IS OFF DURING INSTALLATION and that all unused leads are individually taped/insulated.

SENSORS:

PRESSURE SENSOR

Attach the pressure sensor (p/n 4006 or p/n 4005) to the boiler using standard plumbing practices for the pressures involved. The pressure sensor must be mounted to a 'steam pigtail siphon tube' to protect the sensor from high temperatures (see fig. 3). Failure to do so will void the sensor warranty. Route the sensor wire back to the IntelliCon® controller in a workman like manner. Insert the sensor connector into the correct jack on the side of the unit.

DOMESTIC WATER SENSOR ***

For boilers that also supply domestic hot water; attach a temperature sensor (p/n 4001 or p/n 4002), as shown in fig. 2, to the domestic hot water outflow-pipe at the boiler's domestic water coil outlet and insulate. Route the sensor wire back to the IntelliCon® controller in a workman like manner and insert the temperature sensor connector into the DOMESTIC WATER jack on the side of

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the unit. *This sensor should not be used if the boiler does not supply domestic hot water.*

“RETURN” (Condensate Return Sensor) ***

If a Heat-Timer is present or condensate return temperature indication and sensing is desired, plug this temperature sensor in to the ‘Return’ jack, and attach the sensor to the condensate return pipe as close to the boiler as possible or upstream of condensate pump (if present). Mount the sensor (as shown in fig. 2). While this sensor is not required for proper operation, it does enhance the operation of the IntelliCon[®]-LCH and should be used if a Heat-Timer is present. Use of the Model # 4077 Sensor & I/O Breakout Module may be required to use this sensor.

****This temperature sensor is not included and must be ordered separately.*

Heat-Timer / Summer-Winter Switch

A Dry (No Voltage) contact should be connected to the S/W SW. terminals. The contact should be closed for summer operation or when there is a domestic water call when used with a Heat-Timer.

NOTE: Use of the Return Sensor and Summer/Winter Switch require the use of the Model # 4077 Sensor & I/O Breakout Module. If the application does not require Summer/Winter operation and there is no need for a Domestic water sensor. The Domestic water sensor jack may be reconfigured and not need the # 4077 module.

Checkout

Recheck the wiring one last time and make sure that all of the installed sensors are plugged into the proper jacks. The sensors are only detected during power-up. Set the IntelliCon[®] power switch to ‘OFF/BYPASS’ and restore power to the boiler. Next set the switch to ‘ON’. The display will illuminate and will then indicate the results of a sequence of status checks of the unit’s electronics. Next, it will check to see which sensors are attached and indicate which; on the display. The installer should verify that each sensor attached is detected by the unit. If an installed sensor is not detected, power the unit down and remove and reattach the sensor’s connector. Restore power. If the sensor is still not detected; replace the sensor with another. After these tests are successfully completed, the unit will display one of the operating mode messages depending upon the pressure/temperature of the boiler at power-up. If the IntelliCon[®] comes on and goes into the ‘Standby Mode’; note the pressure-control setting and force a burner call by temporarily setting the control higher and verifying the change of mode of the IntelliCon[®]. Make sure to return the pressure-control to its’ previous setting. If the IntelliCon[®] does not come out of ‘STANDBY MODE’ when the boiler’s pressure control is calling for the burner to run, the unit is probably miswired; see the WIRING NOTE. After completion of the above checkout procedure and observation of a full boiler cycle, the installation is complete.

Service and Troubleshooting

The IntelliCon[®]-LCS does not require any maintenance and will provide years of trouble free operation. The unit may be disconnected at any time by putting the power switch to the ‘OFF/BYPASS’ position. In this position, the unit has no effect on the system and the boiler is wired as it was prior to the IntelliCon[®] installation. This allows service personnel to diagnose boiler problems without the IntelliCon[®] intervening.

If at any time the power indicator on the front panel blinks, a sensor fault has been detected. A “FAIL” messages will be displayed, for the faulty sensor, on the LCD display. If this occurs, the unit automatically disconnects itself and returns full control to the boiler. If a sensor fault message appears; call your installer for service.

IMPORTANT - READ CAREFULLY

1. **Failure to follow these instructions may result in damage to the system or cause a hazardous condition.**
2. **Installer must be experienced, qualified, and in certain locations, licensed to work on the system that this control is being installed on.**
3. **After installation is complete, follow the check-out procedure as provided in these instructions to confirm proper system operation.**
4. **Intellidyne is not responsible for improper installation or any damages that may result from improper installation.**

5. **Actual wiring may differ from that shown in the diagrams.**
6. **Equipment may have controls not shown.**
7. **Because the IntelliCon can operate with different voltages for the power and control circuits, it has separate common wires for these circuits. It is necessary that these wires are connected to the proper commons or the unit will not function properly. See the wiring diagrams on the reverse side of this sheet for details.**

IMPROPER VOLTAGE SELECTION MAY DAMAGE THE UNIT AND VOID THE WARRANTY.

PROGRAMMING

The following parameters may be changed in the field by following these instructions.

Pre-Purge time, Temperature indication in either degrees F or C, Steam indication in either PSI or KPa, Steam Pressure high/Low operation select, Steam Pressure Low-Limit, Domestic Water Low-Limit, Condensate Return Water Low-Limit, Condensate Return Water Differential, Maximum Economizer Hold-Off Time, maximum Standby-Time, Economizer Time Displayed, Burner Run-Time Displayed, and the ability to zero-out the Pressure Sensor.. The system may also be returned to factory default values and the Economizer Time, and Run-Time accumulators may be cleared.

All of the default values have been carefully selected to result in the greatest savings for the broadest scope of heating system applications. Individual system requirements may require changes. Please note that all of these programmable parameters will affect the amount of savings. Prudent changes are strongly advised.

It is very important that if there is any kind of a delay (more than fifteen (15) seconds), from the time that the Operating-control calls for the burner to start and the burner actually starts, that this time delay value be entered into the controller as a Pre-Purge time (e.g. actual pre-purge timer, Flue Damper interlock, etc.). If there is a delay and the correct value is not programmed into the controller, the burner run-time accumulator will be incorrect.

ALL PROGRAMMING IS ACHIEVED BY INSERTING AND REMOVING THE PRESSURE SENSOR PLUG INTO THE PRESSURE SENSOR CONNECTOR, WHEN DIRECTED TO DO SO VIA THE DISPLAY ON THE CONTROLLER.

YOU HAVE TEN (10) SECONDS TO RESPOND TO ANY OF THE DISPLAY PROMPTS. THE 10 SECOND COUNTDOWN IS DISPLAYED ON THE CONTROLLER’S LCD DISPLAY.

PROGRAMMING MAY BE STOPPED OR ABORTED AT ANY TIME BY TURNING THE CONTROLLER OFF. ANY PARAMETERS THAT WERE CHANGED WILL REMAIN CHANGED.

Entering Configuration Mode:

To enter configuration mode, the controller must be powered up without any sensors connected. When prompted, insert the pressure sensor plug into the PRESS SENSOR connector. To confirm, remove the plug when prompted. The unit will then indicated that it has entered “***Config Mode***”. After a 4 second delay the display will advance to the first programmable parameter (RESET DEFAULTS?).

Any changes made to a programmable parameter will be confirmed by indicating “ **DATA SAVED ”.**

RESET DEFAULTS?

This parameter will reset all of the programmable parameters to factory defaults. It will not clear any of the accumulators.

RESET RUN TIME?

This parameter will clear the Run-Time accumulator.
(Note: This value is accumulated even if not being displayed.)

RESET ECON TIMER

This parameter will clear the Economizer Time accumulator.
(Note: This value is accumulated even if not being displayed.)

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SWAP RTN SENSOR?

OR

SWAP DOM SENSOR?

This parameter allows the function of the domestic water jack to become the return water jack for applications that require a return sensor but no domestic water sensor without using the # 4077 Sensor & I/O Breakout module. The controller will prompt you to change to whatever value is NOT currently selected.

FOR DEGREES C?

OR

FOR DEGREES F?

This parameter controls whether the temperature(s) are displayed in "F or " C. The controller will prompt you to change to whatever value is NOT currently selected (default value = F). For example, if the parameter is currently set for degrees F, the only choice will be to change to degrees C.

STEAM P IN PSI?

OR

STEAM P IN KPa?

This parameter control whether the Steam Pressure is displayed in PSI or KPa. The controller will prompt you to change to whatever value is NOT currently selected (default value = PSI). For example, if the parameter is currently set for PSI, the only choice will be to change to KPa.

P RANGE = 25 PSI

OR

P RANGE = 145 PSI

This parameter sets the control for low-pressure or high-pressure operation. The controller will prompt you to change to whatever value is NOT currently selected (default value = 25 PSI/172 KPa). For example, if the parameter is currently set for 25 PSI, the only choice will be to change to 145 PSI.

S/W SW = NORMAL

OR

S/W SW = REVERSE

This parameter controls the direction of operation for the S/W Switch. In "NORMAL" mode, a contact closure of the S/W SW terminals will put the unit in to Summer Mode. In Summer Mode the Steam Pressure is ignored and the controller only responds to Domestic Water Temperature changes. In the "REVERSE" mode a contact opening would have the same effect. The controller will prompt you to change to whatever value is NOT currently selected (default value = NORMAL). For example, if the parameter is currently set for NORMAL, the only choice will be to change to REVERSE.

ET DISPLAY = ON

OR

ET DISPLAY = OFF

This parameter controls whether or not the totalized economizing time is displayed. The controller will prompt you to change to whatever value is NOT currently selected (default value = ON). For example, if the parameter is currently set for ON, the only choice will be to change to OFF. *Note – the accumulator is active even if not displayed.*

RT DISPLAY = ON

OR

RT DISPLAY = OFF

This parameter controls whether or not the totalized burner run-time is displayed. The controller will prompt you to change to whatever value is NOT currently selected (default value = ON). For example, if the parameter is currently set for ON, the only choice will be to change to OFF. *Note – the accumulator is active even if not displayed.*

SP LOLIM = ?? PSI

OR

SP LOLIM = ?? KPa

This parameter is used by the controller to set the low limit; below which the controller will no longer attempt to achieve any savings and will return control to the operating-control. The indicated value will be what is currently set in the controller. The default values are 2 PSI (14 KPa) for the low pressure unit, and 22 PSI (155 KPa) for the high pressure unit.

The setting may be set between the minimum 1 PSI (7 KPa) to a maximum of 10 PSI (70 KPa) for low-pressure operation and a minimum of 12 PSI (84 KPa) to a maximum of 32 PSI (224 KPa) for high-pressure operation. If the steam pressure goes below this value while the operating-control is calling for the burner to run, the controller will indicate "HEATING/LOLIM" on the display.

D LOLIM = xxx °F

OR

D LOLIM = xxx °C

This parameter is used by the controller to set the low-limit temperature for the domestic hot water. When the domestic water temperature goes below this setting, the controller will no longer attempt to achieve any savings and will return control to the operating-control. To change this setting, plug in the

sensor when prompted. The indicated value will be what is currently set in the controller (default = 115°F / 46°C). Next the controller will count up until the maximum settable value is reached (180°F/82°C), and then will jump to the minimum settable value (90°F/32°C). Remove the sensor when the desired value is reached. If the 'Domestic' water temperature goes below this value while the operating-control is calling for the burner to run, the controller will indicate "HEATING/LOLIM" on the display.

PREPURGE=xxx SEC

This parameter indicates the pre-purge time currently programmed into the controller (default value = 000 seconds). Next you will be prompted to change by inserting the sensor plug within 10 seconds. If not inserted within the 10 seconds the controller will advance to the next programmable parameter (For Degrees F or C). If inserted you will be prompted to force a burner call, typically done by increasing the set-point of the operating-control, and then to remove the sensor plug when the burner starts. When prompted to "FORCE A HEATING CALL" the controller will wait indefinitely (NO 10 second time-out) for the CALL. So it is not necessary to rush. To abort this process, turn the control off.

MAX ECON = xxx MIN

This feature of the controller is to limit the maximum amount of time that the controller is allowed to remain in the Economizer Mode during Heating-only or Winter operation. To change this setting, plug in the sensor when prompted. The indicated value will be what is currently set in the controller (default = 30 minutes). Next the controller will count up until the maximum settable value is reached (120 minutes), then "DISABLED", and then will jump to the minimum settable value (10 minutes). Remove the sensor when the desired value is reached. If the controller goes in to the "HEATING MODE" as a result of this feature, there will be a period (".") appended to the word "MODE" on the display.

SUM ECON = xxx MIN

This feature of the controller is to limit the maximum amount of time that the controller is allowed to remain in the Economizer Mode during Summer mode operation. This function will only be active if the Summer/Winter switch input is being used. To change this setting, plug in the sensor when prompted. The indicated value will be what is currently set in the controller (default = Disabled). Next the controller will count up until the maximum settable value is reached (120 minutes), then "DISABLED", and then will jump to the minimum settable value (10 minutes). Remove the sensor when the desired value is reached. If the controller goes in to the "HEATING MODE" as a result of this feature, there will be a period (".") appended to the word "MODE" on the display.

NOTE: For Summer/Winter operation - the S/W switch connection must be used. To access this connection the # 4077 Sensor & I/O Breakout Module must be used.

MAX STBY = xxx MIN

This feature of the controller is to limit the maximum amount of time that the controller is allowed to remain in the Standby Mode as a means of monitoring the internal electronics against failure. If a heating call is not sensed within the prescribed time period, the timer will expire and the control will take itself out of the circuit (fail-safe). A period (".") will be appended to the "STANDBY MODE" message to indicate that this timer has expired for service personnel. It will only reset upon sensing a call from the aquastat. Cycling power to the control will NOT reset the timer.

To change this setting, plug in the sensor when prompted. The indicated value will be what is currently set in the controller (default = 180 minutes). The controller will count up until the maximum settable value is reached (180 minutes), then "DISABLED", and then will jump to the minimum settable value (45 minutes). Remove the sensor when the desired value is reached.

Disabling this function is NOT recommended!

This condition is not necessarily a fault and will occur naturally if the heating system has been "off" or there are long periods of time between aquastat heating calls. The only time that this should be considered a problem is if the controller is in "STANDBY MODE." and the burner is running. This would indicate a failure of the on-board electronics and that the IntelliCon has taken itself out of the circuit.

FOLLOW THE SCREEN INSTRUCTIONS TO EXIT THE CONFIGURATION MODE AND REBOOT THE CONTROL.

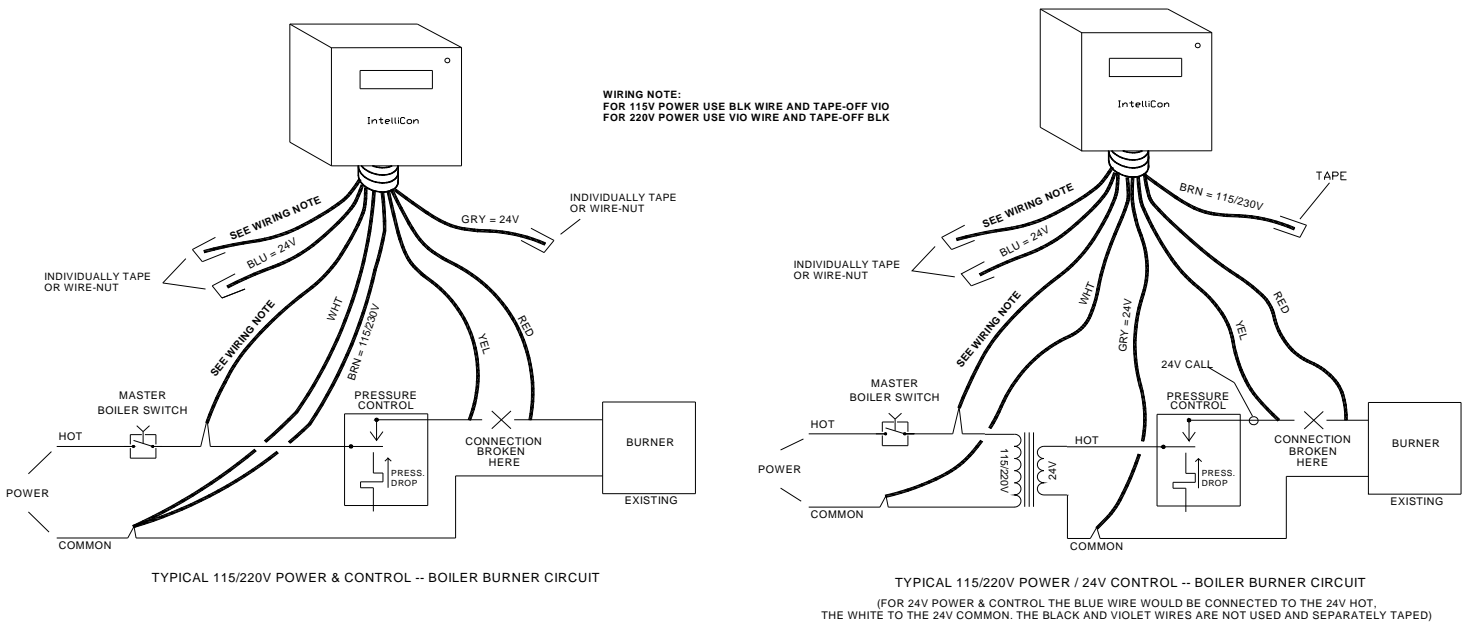


Fig. 1a

Fig. 1b

WIRING NOTE: The IntelliCon unit has MULTI-VOLTAGE capability and has separate return connections for the Power and Control circuits. It is necessary that these wires be connected to the appropriate returns for the circuit or the unit will not function properly. For convenience, two (2) "Common" connections are provided in the "Power" connection area and are for connection to the control circuit common if it is from the same source as the power (see Fig. 1a). Fully insulated connectors must be used. **IMPROPER VOLTAGE SELECTION WILL DAMAGE THE UNIT and Void the Warranty.**

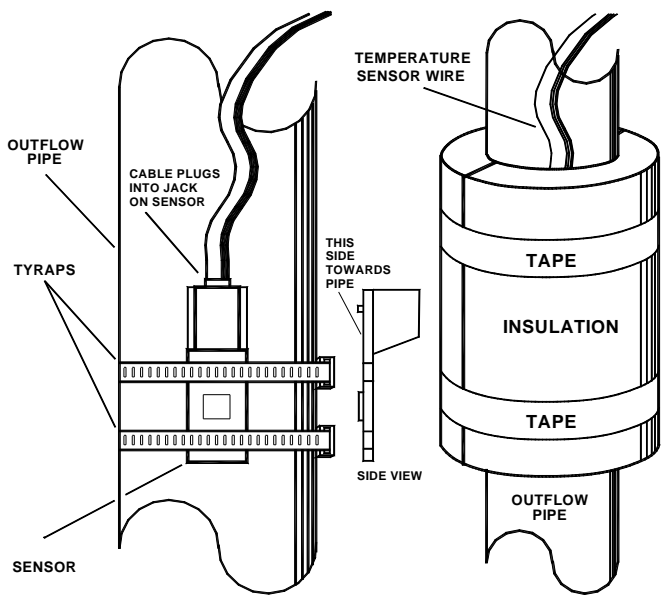


Fig. 2

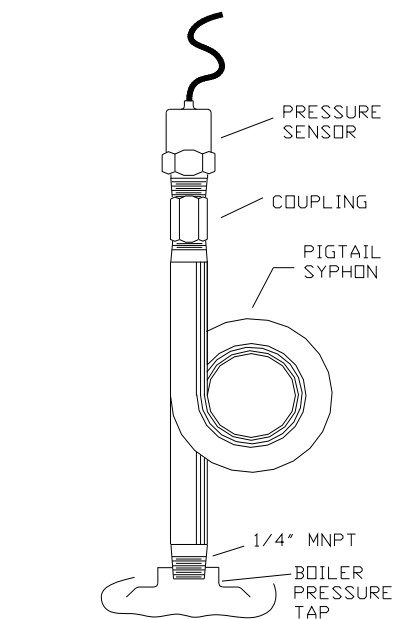


Fig. 3