

**IntelliCon<sup>®</sup>-CHS (4 - 25 PSI Operating Pressure and 25 - 145 PSI Operating Pressure versions)**  
**COMMERCIAL STEAM HEATING SYSTEM ECONOMIZER****Description**

The Intellidyne IntelliCon<sup>®</sup>-CHS is a patented microprocessor-controlled fuel-saving device for commercial steam heating systems. The CHS can be configured for either low pressure (4-25 PSI) or high pressure (25-145 PSI) operation. The CHS is shipped configured for low pressure applications and requires a low-pressure sensor. High pressure operation requires a high-pressure sensor 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<sup>®</sup>-CHS 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) software version 4.3 and higher. 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.

**Electric Ratings**

Power input: 24,115,220 VAC  $\pm$  10%, 5 Watts max., 50/60Hz  
Control circuit input: 24,115,220 VAC  $\pm$  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  $\pm$  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 four line 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 - First Line:**

'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 come on but IntelliCon<sup>®</sup>-CHS 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 is running.

'HEATING LOW LIMIT' - The unit has switched the burner on due to an increase in load. This condition may occur occasionally. If this message appears frequently, the boiler's pressure control is set too low and should be increased by 2 PSI (5 PSI for HP version).

*During normal operation, the first three messages will appear sequentially.*

**Display Messages- Second and Third Line :**

PSI / KPa. -- *HEATING STEAM PRESSURE.* -- The pressure measured by the pressure sensor is displayed in PSI or KPa.

DOM. -- *DOMESTIC WATER TEMP.* -- The temperature measured by the domestic hot water outflow sensor is displayed in degrees F or C.

RTN. -- *RETURN WATER TEMP.* -- The temperature measured by the boiler return water sensor is displayed in degrees F or C.

*Note: "N/U" (Not Used), indicates a sensor that was not detected during power-up.*

**Display Messages – Fourth Line**

BURNER HRS -- 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 feature may be shut off via programming.

ECONO HRS -- 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 feature 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 display will indicate which sensor has failed and the RUNTIME will be replaced with the message "SYSTEM BYPASSED". If a sensor fault message appears; call your installer for service.*

**Installation**

The CHS 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<sup>®</sup> present, is 4 PSI (25 PSI for HP version). If the setting is higher than that, it should not be re-adjusted.

**Mounting**

The control should be mounted using screws in a 3-point mounting configuration. Screw size should be minimum #8 (4.0mm) - maximum #10 (5.00mm). Length should be suitable for mounting material thickness. Using the mounting template and suitable hardware, mount the unit vertically. Consideration should be given to visibility of the display, wiring, sensor-lead routing, and access to the unit. One mounting point is centered on the rear of the unit, near the top, and is for the unit to rest/hang upon. The other two mounting points are accessible through the wiring compartment, in the lower corners of the enclosure.

**Wiring**

**All wiring and connections must comply with Local and National Electrical Codes. Connections are made in the wiring compartment using 1/4" (6.35mm) push-on crimp connectors. The unit should be wired as shown in the wiring diagram (Fig. 1A or 1B) on the reverse side.**

**SENSORS: (see note # 8 below)****"SUPPLY" (Steam Pressure Sensor)**

Attach the pressure sensor 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<sup>®</sup> controller in a workman like manner. Insert the sensor connector into the 'SUPPLY' jack (J1) on the unit.

**"DOM" (Domestic Hot Water Sensor) \*\*\***

For boilers that also supply domestic hot water; attach a temperature sensor (as shown in fig. 2) to the domestic hot water outflow-pipe at the storage tank (if used) or at the boiler's domestic water coil outlet-pipe, if no storage tank is used, and insulate. Route the sensor wire back to the IntelliCon<sup>®</sup> controller in a workman like manner and insert the temperature sensor connector into the 'Dom' jack (J2). *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 (J3), 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<sup>®</sup>-CHS and should be used if a Heat-Timer is present.

\*\*\*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.

### 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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup>. Make sure to return the pressure-control to its' previous setting. If the IntelliCon<sup>®</sup> 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<sup>®</sup>-CHS 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<sup>®</sup> installation. This allows service personnel to diagnose boiler problems without the IntelliCon<sup>®</sup> 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.
8. For CE compliance, all wiring and sensor leads must be installed in grounded metallic conduit.

### 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 Intedation in either PSI or KPa, Steam Pressure Low-Limit, Domestic Water Low-Limit, Return Water Low-Limit, Return Water Differential, Maximum Economizer Hold-Off Time, Standby-Timer Override, and whether or not the Economizer Time and/or Burner Run-Time Hour accumulators are Displayed.** 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 savings calculations will be incorrect.

### ALL PROGRAMMING IS ACHIEVED BY USING THE FOUR (4) SWITCHES LOCATED IN THE WIRING COMPARTMENT ABOVE THE SENSOR CONNECTOR JACKS

### PROGRAMMING MAY BE STOPPED OR ABORTED AT ANY TIME BY BACKING OUT OF THE MENU STRUCTURE OR BY TURNING THE CONTROLLER OFF. ANY PARAMETERS THAT WERE CHANGED WILL REMAIN CHANGED.

#### Entering Configuration Mode:

To enter configuration mode, both the +/menu and -/menu pushbuttons must be depressed simultaneously when the "Line Frequency = ??Hz" screen is displayed. Pressing the buttons before or after this screen will result in the unit NOT going into the configuration mode. Navigating the menus, changing parameters, and confirmations are all done using the appropriate pushbutton. Follow the on-screen instructions for switch usage.

Changes made will be confirmed by indicating " \*\*DATA SAVED\*\*".

After making a change and the " \*\*DATA SAVED\*\*" message is displayed, you can move forward or backward in the menu structure to make any additional changes before exiting Configuration Mode.

**RESET TO 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 ECONO-TIME?** -- This parameter will clear the Economizer Time accumulator.  
(Note: This value is accumulated even if not being displayed.)

**TEMP READING IN °F or °C** -- The controller will indicate whatever value is currently selected (default value = F). Using the pushbuttons, select the desired setting and then press the enter pushbutton twice to accept the change. This setting will alter the displayed values of the LOLIM programmable parameters, and how the temperatures are displayed when the controller is in normal operation.

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**STEAM READING IN PSI or KPa** -- The controller will indicate whatever value is currently selected (default value = PSI). Using the pushbuttons, select the desired setting and then press the enter pushbutton twice to accept the change. This setting will alter the displayed value of the Steam Pressure LOLIM programmable parameter, and how the steam pressure is displayed when the controller is in normal operation.

**P RANGE = 0-25 PSI (0-172 KPa) OR 0-145 PSI (0-1000 KPa) –**

The controller will indicate whatever value is currently selected (default value = 0- 25 PSI). Using the pushbuttons, select the desired setting and then press the enter pushbutton twice to accept the change. Changing this setting will erase any changes that may have been made to the Steam Pressure LOLIM, and will reset the Steam Pressure LOLIM to the default values for that range.

**S/W SWITCH = NORMAL or REVERSE** – This parameter allows the direction of operation of S/W SW (summer/winter switch) to be reversed. In NORMAL mode, a contact closure of the S/W SW terminals would 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.

**ET DISPLAY = ON/OFF?** -- This parameter controls whether or not the Economizer Time accumulator is displayed. Using the pushbuttons, select the desired setting and then press the enter pushbutton twice to accept the change. Note – the accumulator is active even if not displayed.

**RT DISPLAY = ON/OFF?** -- This parameter controls whether or not the Burner Run-Time accumulator is displayed. Using the pushbuttons, select the desired setting and then press the enter pushbutton twice to accept the change. Note – the accumulator is active even if not displayed.

**STEAM LOLIM = xxx PSI or 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 +/Menu and -/Menu pushbuttons will allow the setting to be changed between the minimum 1 PSI (7 KPa) to a maximum of 10 PSI (70 KPa) for a low pressure unit and a minimum of 12 PSI (84 KPa) to a maximum of 32 PSI (224 KPa) for a high pressure unit. 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.

**DOMESTIC LOLIM = xxx °F(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. The indicated value will be what is currently set in the controller (default = 115°F / 46°C). The +/Menu and -/Menu pushbuttons will allow the setting to be changed between the maximum (180°F/82°C) and minimum (90°F/32°C) settings. If the 'Domestic' water temperature goes below this value while the operating-control is calling for the burner to run, the controller will release the burner to run, and will indicate "HEATING/LOLIM" on the display.

**RETURN LOLIM = xxx °F(C)** -- This parameter is used by the controller to set the low-limit temperature for the condensate return. When the condensate temperature goes below this setting, 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 (default = 90°F / 32°C). The +/Menu and -/Menu pushbuttons will allow the setting to be changed between the maximum (180°F/82°C) and minimum (70°F/21°C) settings. If the 'Condensate' temperature goes below this value while in Winter Mode, and the operating-control is calling for the burner to run, the controller will release the burner to run, and indicate "HEATING/LOLIM" on the display.

**RETURN DIFF = xx °F(C)** -- This parameter is used by the controller to set the point at which the burner will be allowed to run when in Winter Mode. In Winter Mode, the burner will be inhibited from firing as long as there is energy in the condensate. When the condensate

temperature goes below this setting, 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 (default = 10°F ~ 6°C). The +/Menu and -/Menu pushbuttons will allow the setting to be changed between the maximum (25°F/18°C) and minimum (5°F/3°C) settings. If the 'Condensate' temperature goes below this value while in Winter Mode, and the operating-control is calling for the burner to run, the controller will release the burner to run, and indicate "HEATING" on the display.

**PREPURGE = xxx SEC** -- This parameter indicates the pre-purge time currently programmed into the controller (default value = 000 seconds). The +/Menu and -/Menu pushbuttons will allow the setting to be changed between the maximum (240 Secs.) and minimum (000 Secs.) settings. This setting is important for proper run-time hours accumulation.

**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. The indicated value will be what is currently set in the controller (default = 30 minutes). The +/Menu and -/Menu pushbuttons will allow the setting to be changed between "Disabled" or the maximum (120 Mins.) and minimum (5 Mins.) settings. 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.

**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.

The indicated value will be what is currently set in the controller (default = 180 mins). The +/Menu and -/Menu pushbuttons will allow the setting to be changed between "Disabled" or the maximum (180 Mins.) and minimum (45 Mins.) settings.

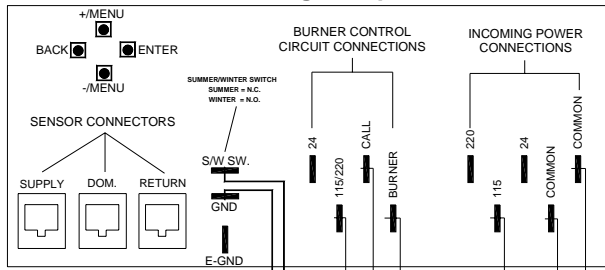
**DISABLING THIS FUNCTION IS NOT RECOMMENDED!**

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.

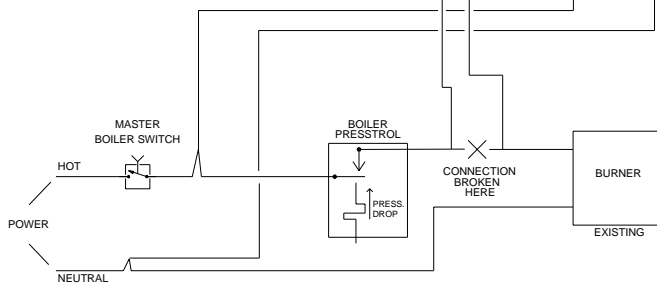
**FOLLOW THE SCREEN INSTRUCTIONS TO EXIT THE CONFIGURATION MODE AND REBOOT THE CONTROL.**



**IntelliCon Wiring Compartment**



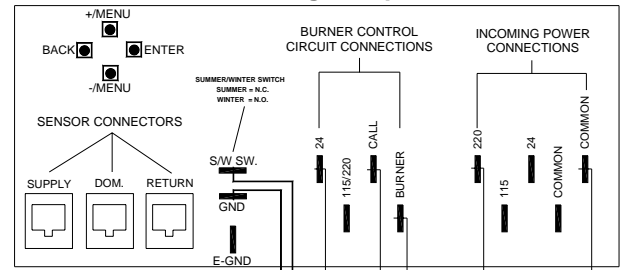
NOTE: S/W SW TERMINALS MUST BE USED IF THERE IS SUMMER-WINTER OPERATION OR IF A HEAT-TIMER IS USED ON A BOILER THAT ALSO GENERATES DOMESTIC HOT-WATER. A N.O. DRY CONTACT SHOULD CLOSE WHEN SUMMER MODE IS DESIRED OR WHEN THERE IS A DOMESTIC HOT-WATER CALL WHEN USED IN CONJUNCTION WITH A HEAT-TIMER.



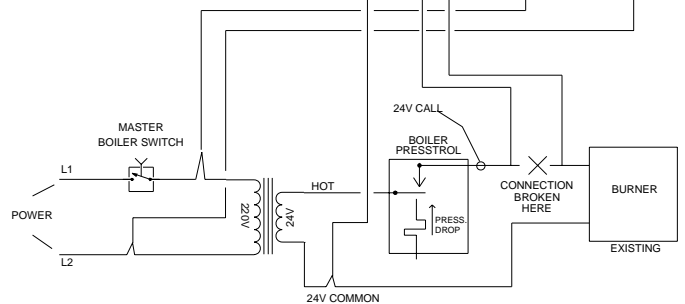
TYPICAL 115V POWER & CONTROL -- BOILER BURNER CIRCUIT

Fig. 1A

**IntelliCon Wiring Compartment**



NOTE: S/W SW TERMINALS MUST BE USED IF THERE IS SUMMER-WINTER OPERATION OR IF A HEAT-TIMER IS USED ON A BOILER THAT ALSO GENERATES DOMESTIC HOT-WATER. A N.O. DRY CONTACT SHOULD CLOSE WHEN SUMMER MODE IS DESIRED OR WHEN THERE IS A DOMESTIC HOT-WATER CALL WHEN USED IN CONJUNCTION WITH A HEAT-TIMER.



TYPICAL 220V POWER / 24V CONTROL -- BOILER BURNER CIRCUIT

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.**

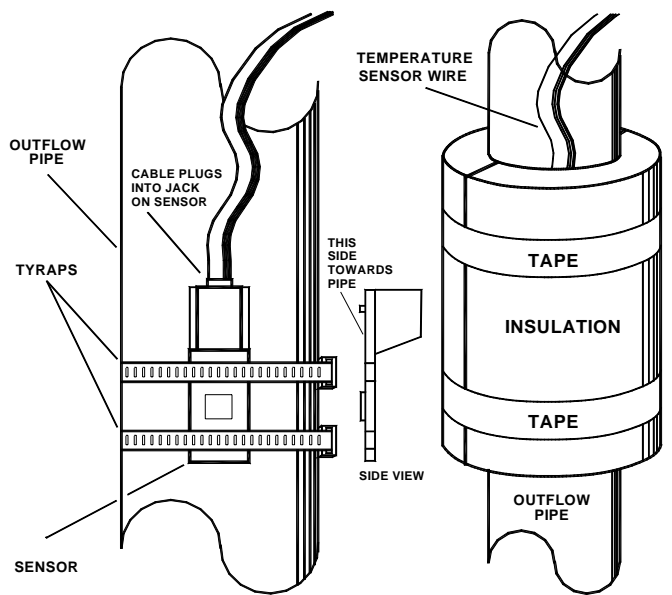


Fig. 2

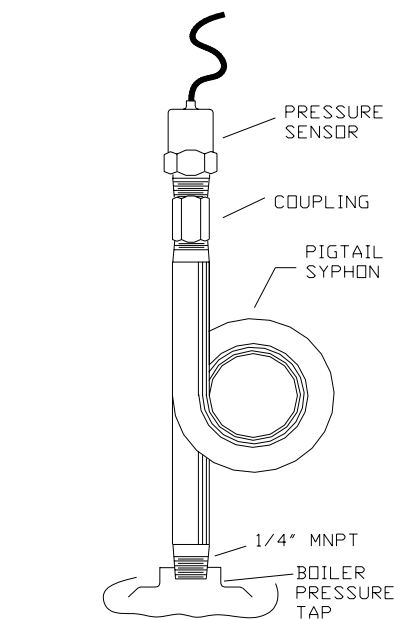


Fig. 3