OPERATING MANUAL and INSTALLATION INSTRUCTIONS for **CHW+1210 rev13.2**

IntelliCon®-CHW

COMMERCIAL HYDRONIC HEATING SYSTEM ECONOMIZER

Description

The *IntelliCon®-CHW* is a patented microprocessor-based fuel-saving controller for hydronic heating systems 2.5MM BTUs and above. It reduces fuel consumption, wear on boiler parts and burner emissions by actively managing the burner, in conjunction with the boiler operating-control, to properly match the boiler output to the required load. This controller indicates actual savings on a burner cycle by cycle basis and also indicates the averages of these cycles. In addition, certain parameters are programmable. All of the programmable parameters and savings values and run-times are stored in memory that will not be lost in the event of the unit being turned off or a power failure. This unit is compatible with Intellidyne's Remote Display Unit (model RDU).

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 device. 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 temperatures, burner run-time, and displays any warning messages. The possible messages and their explanation are:

Display Messages - First Line:

STANDBY MODE - The boiler is operating under its own internal operating-control, which has turned the burner off. This occurs for a period of time after the burner has shut down.

ECONOMIZER MODE - The boiler aquastat has requested the burner to come on but the controller 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 hot water.

HEATING MODE – The controller has released the burner to fire.

HEATING LOW LIMIT - The controller has released the burner to fire due to a load condition that has caused the water temperature to go below the programmed low limits. This condition may occur occasionally. If this message appears frequently, the boiler operating-control may need to be increased in 5ºF(3ºC) increments until the condition stops or the low limits may need to be adjusted (see Programming section)

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

Display Messages– Second and Third Line :

HEAT -- *HEATING WATER TEMP.* -- The temperature measured by the boiler outflow water sensor is displayed in degrees F or C .

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

Display Messages – Fourth Line

INST SAVE = xx.x% -- The calculated savings of the last complete burner cycle.
Note: If the value can not be calculated this item will not be displayed.

AVG SAVE = xx.x% -- The calculated average savings of all valid burner cycles since commissioning of the controller.
Note: The numeric value will not be displayed until a value that is greater than zero is calculated.

ET HRS = xxxxx.x -- Total hours of Economizer time.
The option to display this screen is programmable (Default = ON).
(maximum value = 65,535.9 hours).

RT HRS = xxxxx.x -- Total hours of Burner run- time.
The option to display this screen is programmable (Default = ON).
(maximum value = 65,535.9 hours).

In the event that a sensor fails, the power indicator will blink and the unit will return full control of the boiler to the operating control. The display will indicate which sensor has failed and the "SYSTEM BYPASSED" message will be displayed. If a sensor fault message appears; call your installer for service.

Installation

The controller is electrically installed in series (**NEVER IN PARALLEL**) with the boiler operating-control as shown conceptually in the wiring diagrams. It is very important that it be installed, electrically, before any interlocks to ensure proper operation of the burner and to eliminate any alarm or fault conditions that could be caused by the IntelliCon controller holding the burner off. **AT NO TIME SHOULD ANY SAFETY CONTROLS OR CIRCUITS BE CIRCUMVENTED.** Check and determine the voltages of the burner control circuit and power circuit prior to installation.
For safety, power to the boiler must be off during installation.

To ensure maximum savings and proper operation, the following recommended settings should be made:

HLOLIM should be set 15˚F (9˚C) below the aquastat setpoint minus the differential setting. (e.g. for an aquastat with a setpoint of 170˚F and with a 10˚F differential, the HLOLIM setting should be: 170˚-10˚-15˚=145˚). If a domestic temperature sensor is used, DLOLIM should be set to the minimum desired temperature of the Domestic Hot-Water.

These values can be seen during power-up and are programmable.

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 diagrams on the reverse side. It is important to read all of the instructions and the NOTE on the reverse side of these instructions. Ensure that POWER TO THE UNIT IS OFF DURING INSTALLATION.

Sensors

Plug one of the temperature sensor cables in to the "Supply" sensor jack. Attach the sensor to the boiler outflow pipe as close to the boiler as possible

using tape, Tie-Wraps, or other suitable method (see Fig. 2). Make sure that the sensor makes good thermal contact with the pipe. Cover the sensor with a piece of pipe insulation (not provided) and secure in-place (see Fig. 3).

For boilers which also supply domestic hot water, a second temperature sensor is required. Plug this sensor in to the 'Domestic' sensor jack and attach the sensor to the domestic hot water outlet at the storage tank, if present, or at the boiler domestic water outlet, if no storage tank is used. Mount the sensor using the same procedure as that of the 'Heating Sensor'. This sensor is not used if the boiler does not supply domestic hot water.

If Return water temperature indication and sensing is desired, plug this temperature sensor in to the 'Return' sensor jack, and attach the sensor to the heating system return pipe as close to the boiler as possible. Mount the sensor using the same procedure as that of the 'Supply Sensor'. While this sensor is not required for proper operation, it does enhance the IntelliCon®-CHW operation.

If any of the sensor leads are too short they can be extended using standard 'modular telephone' wire and connectors (see Fig. 4).

Checkout

Recheck wiring one last time and make sure that the temperature sensor(s) is plugged into the proper connector(s). The sensor(s) are only detected during power-up. Set the controller's switch to 'Off/Bypass' and restore power to the boiler. Reset the controller's switch to 'On'. After a brief check of the electronics and displaying various parameters of the controller, the sensor(s) will be detected and the 'Power/Normal' indicator should light continuously. It is important to verify recognition of the sensors by viewing the temperature reading(s), on the display. If the installed sensor(s) are not detected, the IntelliCon controller will not function properly. After the sensor-check, depending upon the temperature of the boiler water at power-up, the controller will go into one of its various operating modes. If the controller went into 'STANDBY MODE'; **note the operating-control setting** and force a burner call by temporarily adjusting the operating-control higher and verifying the change of mode of the controller to the 'ECONOMIZER MODE', 'HEATING MODE' or 'HEATING/LOLIM' mode. If the controller went in to the 'ECONOMIZER MODE' you can either wait for the water temperature to drop and for the controller to go into 'HEATING MODE' or 'HEATING/LOLIM', or by removing a sensor plug, the controller will go into bypass mode, and the burner should fire shortly thereafter. If, after adjusting the operating-control, the controller went directly into 'HEATING MODE' or 'HEATING/LOLIM' the burner should fire shortly thereafter. The burner should run continuously until the call from the operating-control is satisfied. Once satisfied, the burner should stop firing and the controller should go into the 'STANDBY MODE'. The controller and burner following the above sequence indicates a properly wired and functioning control. **Make sure that if the operating-control was previously adjusted, to return it to its' previous setting.** If the burner fires for a brief second then stops (even though the operating-control is calling for the burner to run) is likely caused by the Yellow and Red wires being reversed. If the controller does not come out of "STANDBY MODE" when the boiler's operating-control is calling for the burner to run, the unit is wired incorrectly. The likely cause in this situation is either a reversed Yellow and Red wire or an improperly connected 'common' connection for the control circuit. See the IMPORTANT note (number 7).

Service and Troubleshooting

After Installation and Checkout, the controller does not require maintenance and will provide years of trouble free operation. The unit may be taken out of the circuit at any time by placing the switch to the 'Off/Bypass' position. In this position, the unit has no effect on the system and the burner is controlled as it was prior to the IntelliCon controller's installation. This allows service personnel to troubleshoot or work on the system without the controller intervening.

If at any time the Power/Normal light on the front panel blinks continuously, a sensor is not operating properly and The *IntelliCon*® controller has automatically gone into 'bypass mode'.

If the message "TIMER FAULT" is displayed the switch should be placed into the OFF/Bypass position and service called.

If the burner is running and the control is in "STANDBY MODE" a problem exists and service should be contacted.

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, Heating Water Low-Limit, Domestic Water Low-Limit, Return Water Low-Limit, 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 Average Savings, 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.

Any 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 the 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 SAVINGS? -- This parameter will clear the Average Savings accumulator.

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

RESET ECONOMIZE 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.

S/W SWITCH = NORMAL / REVERSE – This parameter is not used on this model.

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.

SUPPLY LOLIM = xxx ˚F(C) -- This parameter is used by the controller to set the low-limit temperature for the heating water. When the heating 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 = 145˚F / 62˚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 'Heating' 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. *If a Dual or Triple Aquastat is used, it is recommended to set this parameter 5˚F (3˚C) below the "B" stat setting.*

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 indicate "HEATING/LOLIM" on the display. *If a Dual or Triple Aquastat is used, it is recommended to set this parameter 20˚F (12˚C) below the "B" stat setting.*

RETURN LOLIM = xxx ˚F(C) -- This parameter is used by the controller to set the low-limit temperature for the hot-water return. When the return 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 = 90˚F / 32˚C). The +/Menu and -/Menu pushbuttons will allow the setting to be changed between the maximum (120˚F/49˚C) and minimum (70˚F/21˚C) settings. If the 'Return' 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). The +/Menu and -/Menu pushbuttons will allow the setting to be changed between the maximum (240 Secs.) and minimum (000 Secs.) settings.

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!**

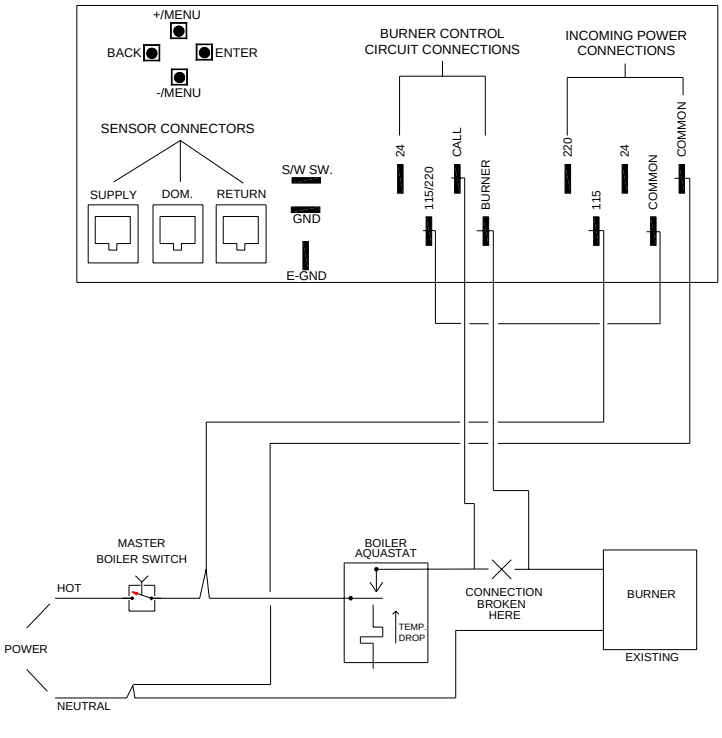
This condition is not necessarily a fault and will occur naturally if the heating system has been "off" or there are long periods of time between aquastat heating calls. The only time that this should be considered a problem is if the controller is in "STANDBY MODE." and the burner is running. This would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

I SAVE DISPLAY = ON/OFF? -- This parameter controls whether or not the "I Savings" is displayed (default = OFF). Using the pushbuttons, select the desired setting and then press the enter pushbutton twice to accept the change.

A SAVE DISPLAY = ON/OFF? -- This parameter controls whether or not the "A Savings" is displayed (default = ON). 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.

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

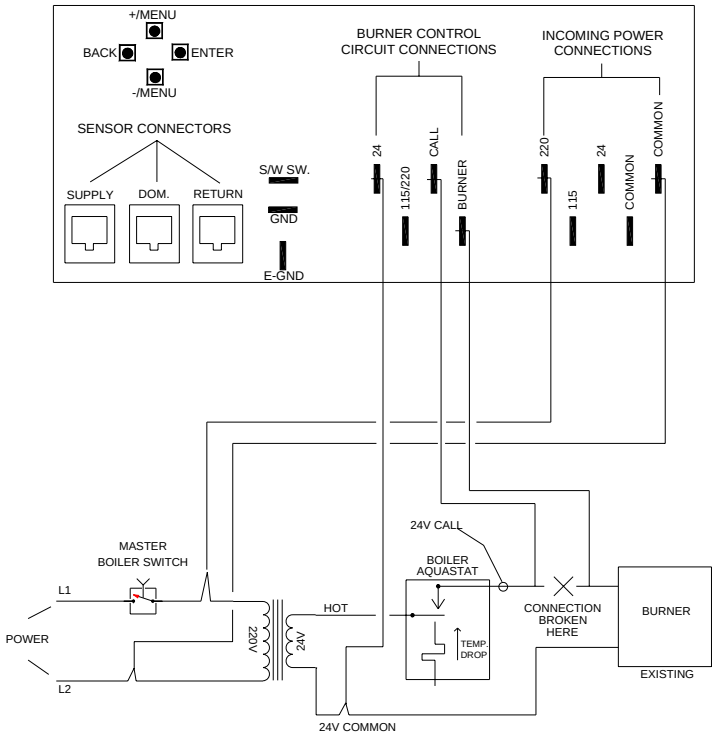
IntelliCon Wiring Compartment



TYPICAL 115 POWER & CONTROL -- BOILER BURNER CIRCUIT

Fig. 1A

IntelliCon Wiring Compartment



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

Fig. 1B

<u>WIRING NOTE:</u> 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.

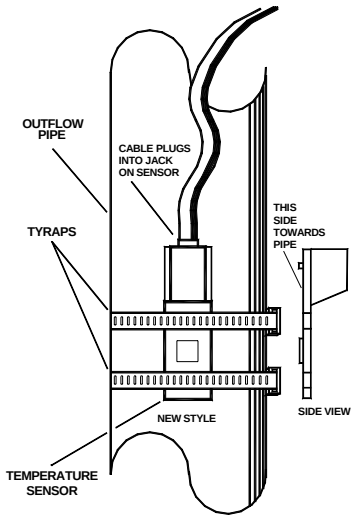


Fig. 2

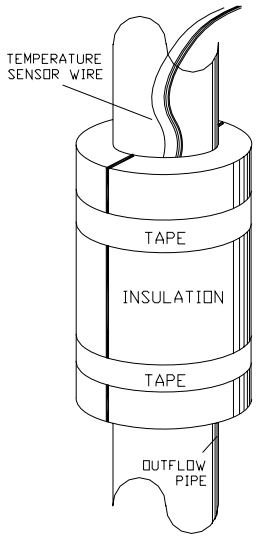


Fig. 3