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Introduction

T-ION is an advanced control device for outside air compensated temperature control in central heating systems. T-ION enables substantial energy savings by enabling control of both the boiler itself and a three-way mixing valve.

A number of advanced features are also provided to protect the heating system and to increase comfort levels.



Basics

- General** T-ION has a user-friendly display and menu structure, thanks to clear language prompts. Several languages are available.
- LEDs** Green LED: Indicates that the device is powered. If this is not on, please check the power connection and associated circuit breaker or fuse.
Red (P) LED: Hardware fault indication. This should normally on with the green (power) LED.
Blue (S) LED: Indicates that the controller is functional. This should be blinking in normal operation.
Red RX ve TX LEDs: These modbus communication indicators are present only on devices with the optional modbus comms board. They blink to indicate data transfer to a modbus master.
- Display** All T-ION series controllers have a 16 character, two-line, backlighted liquid crystal display.
- Main View** When the system is energized, the display will briefly show the selected heating program, then the main view.
The main view provides an indication of current system status. Time and date are displayed on the first line.
If no keys are pressed for a while, the display reverts to this main view. Pressing the x key repeatedly will also always return to this main view.

The possible status indicators in the main view are:

Disabled: All pumps are off and valves are in the off position with the freeze-protection logic still functional.

Automatic: Normal operation. All outputs are controlled according to the time schedules and temperature control settings.

Hot Water: Zone heating is off, but domestic hot water production and control is operational (summer operation).

Sync: (Synchronization) After a power interruption, the controller will drive all valves to fully closed position for a short period to reset position tracking. .

Soft Start: At the start of the heating period, the controller will limit the system temperature to a maximum of 50 degrees for the defined period, to prevent noise due to expansion of pipes.

System Exercise: In summer operation, the pumps and valves are briefly energized to prevent corrosion due to long periods of inaction. This occurs at noon time, once a week.

Sterilization: In systems with domestic hot water heating, the sterilization program raises the hot water temperature to 75 degrees once a week to prevent certain viruses.

Test: This shows the controller is in manual test mode, which forces all systems to be running for a period of 20 minutes. To exit this mode, the panel can be re-energized.

Alarm Detected: Indicates a faulty temperature sensor.

Freeze: Indicates that the system is in freeze-protection mode. This occurs when any one of the pipe sensors detect a temperature below 8 degrees, when all the pumps are started. If the temperature falls further to less then 4 degrees, the burner is also fired automatically.

High Temperature: This indication occurs when the boiler output temperature is more then 5 degrees above the configured maximum. In this case, the burner is switched off and all pumps are switched on to reduce the temperature.

Main View Examples

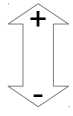
```
16:23-THURSDAY
AUTOMATIC
```

```
10:23-THURSDAY
SOFT START
```

```
16:23-THURSDAY
V1 SYNC.
```

```
10:23-THURSDAY
ALARM DETECTED
```

Keys Only four keys are sufficient to configure and use the system. These are explained below.



- Use the UP / DOWN keys to
- Navigate between menus
 - Change values and setpoints



- Use the OK key to
- Enter the menus from the main view display
 - Select items in menus
 - Save a value change to memory



- Use the BACK key to
- Return to the previous menu
 - Exit a value change without saving it

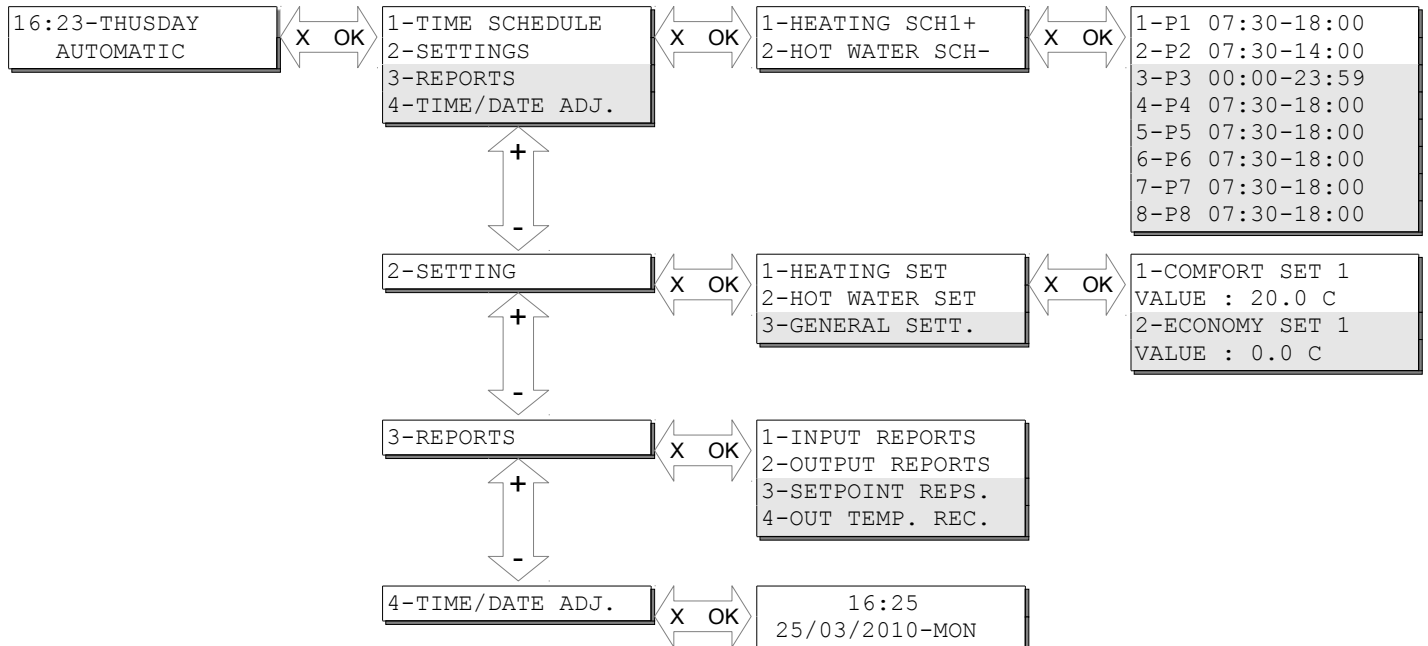
From the main view, press the OK key to access the user menus. UP/DOWN keys can then be used to navigate between menu choices. When the desired choice is in the top line, press the OK key to select that choice. The BACK key can be used at any time to return to an upper menu.

If the selected choice is a parameter value that can be modified, it will start to blink when the OK key is pressed. The value can then be changed by the UP/DOWN keys. Holding down one of the keys will cause the value to change more rapidly. Press OK to save the changed value, or the BACK key to exit without saving.

WARNING: In the main view, pressing the BACK and UP keys simultaneously will enter the system configuration menus. Changing parameter values in these menus must be avoided except by expert technical service personnel. The configuration options are explained in detail in the Engineering Guide.

Main Menu Structure

Main menu structure is shown below. Each option is explained in detail in the following pages.



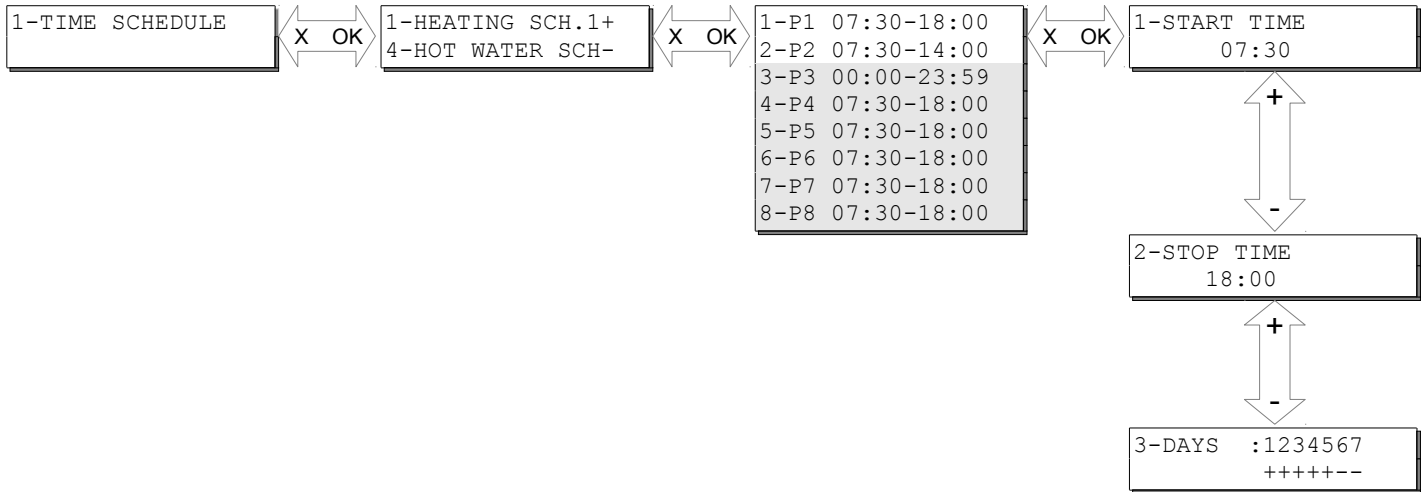


Time Schedule Menu

The Time Schedule menu allows setting of start and stop times for the heating program and the domestic hot water program. A '+' or '-' sign at the end of each line indicates whether each schedule is active or inactive at that instant.

Each schedule allows setting of eight different time periods. These are indicated on individual lines P1...P8 on the display, together with configured start and stop times. For each time period, you can set the start time, stop time and days of the week. Monday to Sunday are indicated as numbers 1..7. A plus (+) sign under these numbers indicates that the program will be used for that day of the week, a minus (-) sign indicates that it will not be active. To disable a time period completely, simply make all days of the week inactive.

The heating system will use the comfort temperature setpoint during the active periods, and the economy temperature setpoint during the inactive periods.





Settings Menu

The settings menu allows viewing and changing of setpoints and operating mode.

To change any setting first select it by pressing OK when the parameter is displayed. The value will begin to flash. Use the UP/DOWN keys to select the desired value. Then click OK to save the new value, or BACK key to return to the old value without saving.

1-Heating Settings

Comfort Setpoint

The desired room temperature during comfort hours.

Economy Setpoint

The desired room temperature outside of comfort hours. If this is set to 0 degrees, the heating will be completely switched off outside of comfort hours.

2-Hot Water Settings

Desired domestic hot water temperature. This is active during the periods set in the associated time schedule. If this is set to 0 degrees, domestic hot water heating is completely switched off.

3-General Settings

1-Panel Running Mode

Disabled

All functions are disabled except freeze-protection.

Automatic

Heating operates according to comfort setpoint during the periods set in the heating time schedule. Outside these periods, heating operates according to economy setpoint. If the economy setpoint is zero, heating will be switched off during the off-hours.

Domestic hot water production is also active, operating during periods set in the hot water time schedule.

Hot Water

Only domestic hot water production is enabled, main heating program is off.

2-Winter/Summer Changeover

This setting determines under which outdoor temperature, the heating will be enabled. The system will switch to summer mode if the outdoor average temperature for the last 24 hours is above this setpoint.

2-Test mode enable

Selecting YES here will enable the Test Mode. For 20 minutes all pumps and burners will be switched on and the valves driven to open position. This is for testing during installation or device only.

To exit this mode, either select NO in this menu item, or simply de-energize and re-energize the controller.



Reports Menu

The Reports menu allows monitoring of process values. It only provides information, there are no modifiable parameters under this menu.

1-Input Reports

All temperature measurements in the system can be monitored under this menu. Depending on system configuration, some of the below items may not be visible.

If “????” is displayed instead of a value, there is a problem with the sensor. In this case, the cabling, connections or the sensor itself needs to be checked.

1-Outside Air Temperature

The currently measured outdoor temperature

2-Supply Temperature 1

Water temperature in the first heating circuit, that is controlled by the three-way valve. This line doesn't appear in systems with no three-way control valve.

3-Boiler Temperature

Water temperature at the boiler outlet. The burners are switched according to this temperature. This line doesn't appear in systems with no boiler.

4-Boiler Return Temperature

Water temperature returning from the heating circuit. The by-pass pump is switched according to this temperature. This line doesn't appear in systems with no by-pass pump.

5-Hot Water Temperature

Domestic hot water temperature in the hot water tank. The DHW heating pump is switched according to this temperature. This line doesn't appear in systems with domestic hot water heating.

6-Room Temperature

The room temperature sensor is not commonly used in multi-apartment dwellings.

7-Supply Temperature 2

Water temperature in the second heating circuit, that is controlled by the second three-way valve. This line doesn't appear in systems with no second heating zone or second three-way control valve.

8-Supply Temperature 3

Water temperature in the third heating circuit, that is controlled by the third three-way valve. This line doesn't appear in systems with no third heating zone or third three-way control valve.

2-Output Reports

Current system outputs to pumps, burners and control valves can be monitored under this menu.

Depending on system configuration, some of the below items may not be visible.

1-Heating Valve 1

Three-way valve position, in percent.

4-Burner Stage 1

Burner output. In case of a two-stage burner, this line is for the first stage.

5-Burner Stage 2

In case of a two-stage burner, this line displays the current output to the second stage.

6-Hot Water Pump

The output to the domestic hot water heating pump.

7-Circulation Pump

The output to the main heating circulation pumps.

8-Bypass Pump

The output to the bypass pump, typically installed between the supply and return lines of the boiler.



3-Setpoint Reports

This menu is used to monitor a number of values calculated by the controller.

1-Calculated Season

Result of the automatic summer-winter changeover calculation. Determines the operating mode of the system.

2-Average Outside Temperature

24-hour average of the outdoor temperature. Used for automatic summer-winter changeover logic.

3-Zone 1 Effective Setpoint

Desired temperature to be maintained at the heating circuit supply line, by positioning the three-way valve. This calculation is based on the outdoor temperature and comfort or economy setpoint, depending on the time schedule.

4-Effective Boiler Setpoint

Desired temperature to be maintained at the boiler supply.

5-Effective Room Addon

When a room temperature sensor is deployed, this parameter determines how much the supply temperature will be shifted, depending on deviation from the comfort or economy setpoint.

6-Effective DHW Setpoint

Setpoint currently active for domestic hot water heating pump control.

7-Zone 2 Effective Setpoint

Desired temperature to be maintained at the second heating zone circuit supply line, by positioning the second three-way valve.

8-Zone 3 Effective Setpoint

Desired temperature to be maintained at the third heating zone circuit supply line, by positioning the third three-way valve.

4-Outside Temperature Records

Average hourly outdoor temperatures for each hour of the last 24 hours. These will be reset if the controller loses power.

Date / Time Adjustment Menu

Select this menu and press the OK key again to start the date/time adjustment. Initially the hour value will be flashing and adjustable by the UP/DOWN keys. Press the OK key to move to the next value and adjust similarly.

4-DATE/TIME ADJ.



10:23
30/07/2009-MON