Contents

Introduction

T-ION series products are advanced digital controllers designed for heating systems. They must be configured for the particular application that it will be used in.

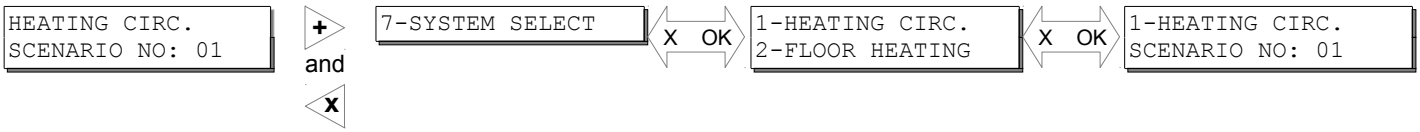
Although all systems can be configured from scratch, it is much more practical to select from one of the pre-defined templates. This document covers the configuration of the controller. Please refer to the “Users Manual” for daily usage.

The configuration is carried out by the following steps.

1. Template selection: Select the most suitable pre-configured system from the below table. Layouts of all the systems are also available as a document.
2. Adjust the following;
   - “System Design Temperature” under general parameters menu
   - Valve open – close time
   - Parameter for the room temperature sensor, if utilized.
3. Check the following;
   - Maximum temperature values for zones
   - Delta T, temperature difference
   - Max and min temperature settings for the burner.
   - All temperature sensors are connected, and operating
   - Boiler, valve and pump outputs are connected and operating
   - User set point
   - Date and time
   - DHWS time schedule

System Selection Menu

On first power-up of the controller, after the revision number, the current system type will appear. Pressing cancel and plus buttons will activate the system selection menu.



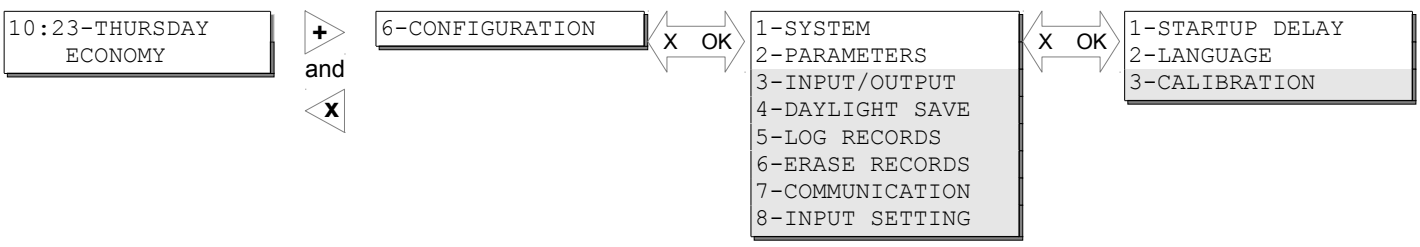
System selection chart

Please select your system from the following table. Drawings of these systems are available as a separate document. Underfloor heating systems must have a mixing valve.

TYPES		Burner 1	Burner 2	Bypass Pump	DHWS
Systems with mixing valves	Type 1	✓	✓	✓	✓
	Type 2	✓	-	✓	✓
	Type 3	✓	✓	✓	-
	Type 4	✓	-	✓	-
	Type 5	✓	✓	-	✓
	Type 6	✓	-	-	✓
	Type 7	✓	✓	-	-
	Type 8	✓	-	-	-
Systems without mixing valves	Type 9	✓	✓	✓	✓
	Type 10	✓	-	✓	✓
	Type 11	✓	✓	✓	-
	Type 12	✓	-	✓	-
	Type 13	✓	✓	-	✓
	Type 14	✓	-	-	✓
	Type 15	✓	✓	-	-
	Type 16	✓	-	-	-
Heat exchanger	Type 17	-	-	-	-
Heat exchanger / DHWS	Type 18	-	-	-	✓

Configuration Menu

In the default screen, pressing the plus and cancel buttons enters the configuration menu.
All the parameters under configuration menus are explained in the following pages.



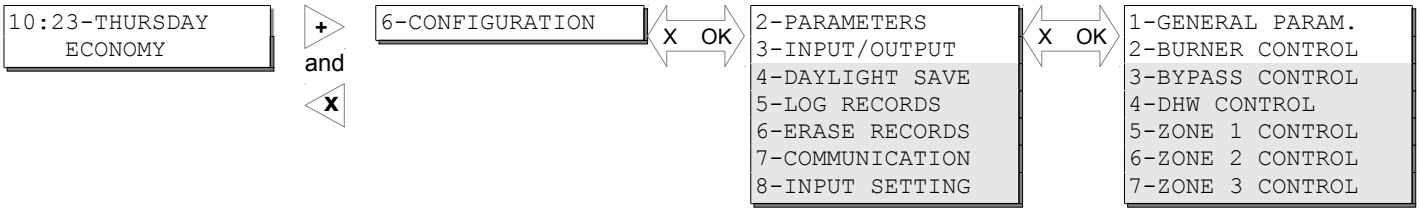
System Menu

This menu covers the general settings for the controller.

1-Startup Delay	Delay time for the control functions after power failure (min 1 second). Different delay times in facilities with multiple controllers will provide lighter loads on the supply lines after a power failure.
2-Language	Turkish and English (contact Ontrol for different languages.)
3-Calibration	Factory calibration values. Do not change.

Parameters Menu

Parameters to fine-tune the system are categorized under this menu. These will be explained in detail in the following pages.



Input / Output Menu

This menu is for monitoring inputs and outputs. Labels and current values can be displayed. Further, values can be fixed for testing purposes.

For fixing inputs or outputs, locate the appropriate point in the menu and press OK. Adjust the required value with the arrows. Pressing OK will override the point to the fixed value. A "!" symbol will appear next to the fixed points.

To release an overridden value, simply select that point with OK and press the cancel button to exit. All fixed points will be released if you return to the default screen.

Logs of fixed points are recorded.

WARNING: All other functions will continue to operate normally. Fixed input values will be used instead of the measured values, and outputs will be fixed at the set values, regardless of calculated values, including alarm conditions. These can result in undesired results. Only authorized users should use this feature.

Analog inputs	All inputs configured as analog, and their current values
Analog outputs	All outputs configured as analog, and their current values
Digital outputs	All inputs configured as digital, and their current values

Daylight Saving Menu

Parameters to define daylight savings time change over schedules. These values will not be reset..

1-Daylight save?	Enable - Disable. (Default: Enable)
2-Summer Time Start Month	Month the summer time starts (Europe : 03)
3-Summer Time Finish Month	Month the summer time ends (Europe : 10)

Log Records Menu

The fourth item in the configuration menu is "Log Records"

Event logs can be monitored under this item. The latest event is labeled as 1. T-ION will keep latest 200 events with timestamps, after which the oldest event will be overwritten.

Events that will be logged are, alarms from inputs/outputs, power failures and overridden points.

Erase Records Menu

1-Erase logs?	Erases all logs in memory

Communication Menu

The communication protocol can be configured in this menu. Only available on models with such protocols.

These parameters are not reset when a new template is selected.

1-Modbus Address	Modbus address, 1-247. (Default : 1)
2-Modbus Baudrate	1200-2400-4800-9600-19200 baudrate (Default : 19200)
3-Modbus Parity	None, Even, Odd (Default : Odd)
4-Stopbit Number	1-2 (Default : 1)

Input Setting Menu

Offsets for analog inputs can be input under this menu. This can be used to correct any calibration mistake caused by long cables.

General Parameters Menu

Parameters that are not directly related to a control loop are set under this sub-menu.

1-System Design Temperature	The outside temperature that the boiler is expected to operate at maximum temperature. This value depends on the worst case design conditions and system capacity.
2-Room Temperature Enable	This option should be enabled if a room temperature sensor is connected. Room temperature sensor will only be used for the control of zone1. After enabling, the controller should be shut down and restarted.
3-Soft Start Time	To avoid noises caused by pipe extensions on cold startups, the temperature will be limited by 50°C for the duration set under this item. This function can be canceled by setting it to zero.
4-Freeze Protection Enable	Enables freeze protection function. If any of the pipe temperature sensors drops below 8 degrees, relevant pump will operate and boiler operated if necessary.

Burner Control Menu

Parameters for boiler control are set under this menu. For the boiler control to function, boiler temperature sensor and burner output(s) should be connected.

1-Maximum Boiler Temperature	Maximum allowable temperature at the boiler. This limit has priority over all other functions.
2-Minimum Boiler Temperature	Minimum allowable temperature at the boiler. This limit is not relevant for systems with by-pass pumps.
3-Heating Difference Value	For systems with zone valves, setpoint for the boiler is calculated by adding this value to the calculated temperature for the zone. Default is 10 K.
4-DHW Difference Value	For systems with DHW, setpoint for the boiler is calculated by adding this value to the calculated temperature for the DHW. Default is 15 K.
5-Burner Histerisis	Burner will be shutdown when it reaches the setpoint, and remain off until the temperature drops by this histerisis value. Default is 5 K.
6-Burner Minimum Running Time	The first stage burner will operate at least for this duration, even if the setpoint is reached. Default is 150 seconds.
7-Burner Minimum Stopping Time	The first stage burner will remain off at least for this duration, even if the temperature drops below the histerisis value. Default is 150 seconds.
8-2nd Stage Delay Time	The time delay for the second burner. Default is 240 seconds.
9-2nd Stage Min. Running Time	The second stage burner will operate at least for this duration, even if the setpoint is reached. Default is 150 seconds.
10-2nd Stage Min. Stopping Time	The second stage burner will remain off at least for this duration, even if the temperature drops below the histerisis value. Default is 150 seconds.
11-Boiler Design Delta T	Return temperature difference used in system design. This item is available for systems without three-way valves. Default is 20 K for radiator and 10 K for underfloor heating systems.

Bypass Control Menu

Parameters for by-pass pump control are set under this menu. For this function, boiler return temperature sensor and by-pass pump output should be connected.

1-Bypass Pump Setpoint	By-pass pump is shutdown when return temperature reaches this value. Default is 50C.
2-Bypass Pump Histerisis	By-pass pump is restarted if the return temperature drops below the setpoint by this histerisis. Default is 5 K.

Domestic Hot Water (DHW) Control Menu

Parameters for domestic hot water are set under this menu.

1-DHW Setpoint	Setpoint for the domestic hot water. Setting to zero cancels DHW function. Default is 50C.
2-DHW Histerisis	DHW pump is restarted if the return temperature drops below the setpoint by this histerisis. Default is 5 K.
3-DHW Priority Value	This parameter allows the controller to give priority to DHW over heating system. If zero, the boiler will try to supply both systems. If DHW is expected to have priority this value should be set at least twice the histerisis value. (In systems without zone valves, zone pump will be disabled when the DHW pump is running.)
4-Sterilization Enable	If enabled, the DHW tank will be heated to 70 C for two hours to sterilize the system. Sterilization will be operated at 2:00 a.m. on the first day with DHW schedule. If no schedule is set, or continues DHW is scheduled, the function will operate on Monday.
5-DHW From Boiler	If the DHW is not supplied from the boiler, the setpoint has no effect on burner control. Default is from the boiler.

Zone Control Menu

Parameters for heating zone are set under this menu. For multi-zone systems, each zone should be adjusted separately.

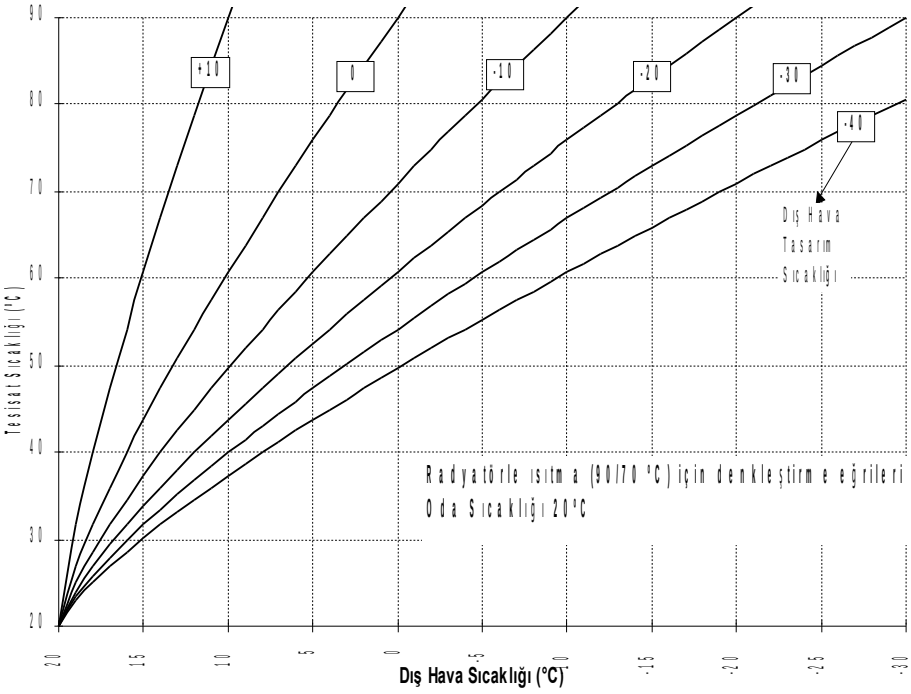
1-Zone Maximum Temperature	Maximum allowable temperature for the zone. Defaults are 90 C for radiator and 55 C for underfloor heating systems.
2-Zone Design Delta T	Return temperature difference used in system design. Default is 20 K for radiator and 10 K for underfloor heating systems.
3-Zone Valve Run Time	Operating time for the zone valve, in seconds.
4-Zone Proportional Band	Proportional band value for the PI control loop of the mixing valve
5-Zone Integral Time	Integral time value for the PI control loop of the mixing valve

Çalışma Prensipleri

Outside Air Temperature Compensation

T-ION controller keeps indoor air temperature constant by controlling the heating system temperature at a level based on the outside air temperature.

The setpoint for the boiler temperature is calculated by using minimum design outside temperature, difference between supply and return to the system, room setpoint and current outside temperature.



Calculation of setpoint temperature for the zone

If the controller is on automatic and the time schedule for the zone is active, setpoint calculation is based on comfort settings. If the schedule is not active, calculation is based on economy settings.

The setpoint for the zone might be overridden by the following conditions:

DHW requirements

Temperature sensor failures

Soft start function

Calculation of setpoint temperature for DHW

If the time schedule for DHW is active, the user setpoint is used. Outside the scheduled times, the setpoint is zero.

Under sterilization, the setpoint is 70 C.

Calculation of setpoint temperature for the boiler

Boiler temperature is calculated from the zone or DHW with highest temperature requirement.

For systems without zone valves, the setpoint calculated for the zone is also applied to the boiler. (If the DHW pump operates, the zone pump is disabled in these systems.)

Room temperature sensor

Room temperature sensor only effects the temperature of the first zone. The difference between the setpoint and actual measurement is used to shift the temperature calculated for the zone heating.

Burner operation

Operates on the setpoint and the actual measurement of the boiler temperature. Overrides and special conditions can apply.

By-pass pump

Operates on the setpoint and the actual measurement of the boiler return temperature. Overrides and special conditions can apply.

DHW pump

Operates on the setpoint and the actual measurement of the DHW temperature. Stops if the boiler temperature is below the DHW.

Circulation pump for the heating zone

For systems with valves, operates when the setpoint for the zone is above zero. Stops when the zone temperature sensor drops below 30 C.

Default screen, special condition alerts

Disabled	All the pumps and valves are off. Freeze protection function is enabled.
Automatic	When the outside air temperature is above a user-input value, the controller will revert to summer mode. A running average of outside temperature is used to determine summer/winter changeover to avoid fluctuations. In summer mode the zone pumps and valves are closed. Burners will operate when there is a demand for DHW.
Exercise	During summer valves and pumps are exercised weekly, every friday at 12:00, to avoid clogging due to long nonoperative period.
Synchronization(Sync.)	After a power failure, valves are shut down temporarily to assure proper positioning.
Soft Start	On cold startups, the system is kept below 50 C to avoid noises caused by pipe extensions.
Sterilization	DHW systems are heated to 70 C once every week to sterilize against bacteria and viruses.
Test	All the components of the boiler system are turned on for 20 minutes. Facilitates the testing of the heating system. Returns to normal operation when the time is up. Re-powering the controller will end the function.
Alarm	Indicates a failure with one of the temperature sensors.
Freeze	Pumps are started if any of the pipe temperature sensors drop below 8 C. Further, if the temperature drops below 4 C, the burner is also started.
High Temperature	If the boiler is 5 K above the maximum allowable temperature, the burners are stopped an all the pumps are operated.