

# ISPort User Manual

## Part 2

### - Device Configuration

ISDOK:

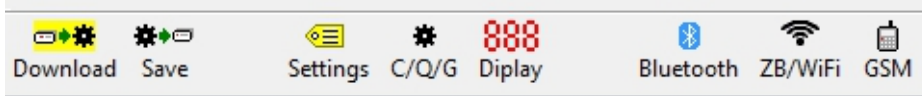
**DPM2\_EN\_V20**

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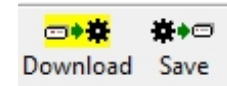
## Device Info

This tab contains a variety of settings assembled to different devices.



By pressing "Download/Save" buttons, can settings be returned from PCs memory to the devices memory or save to PCs memory from the devices memory

The file, where settings will be saved is named by DEFAULT.TB1 (default)  
Settings can be saved also with some other name file



### Return the settings

Open the "Load settings" dialogue by clicking on "Download" button. Choose from the list wanted format (settings).

### I/O-settings

Devices IO-configuration settings

### Calibration

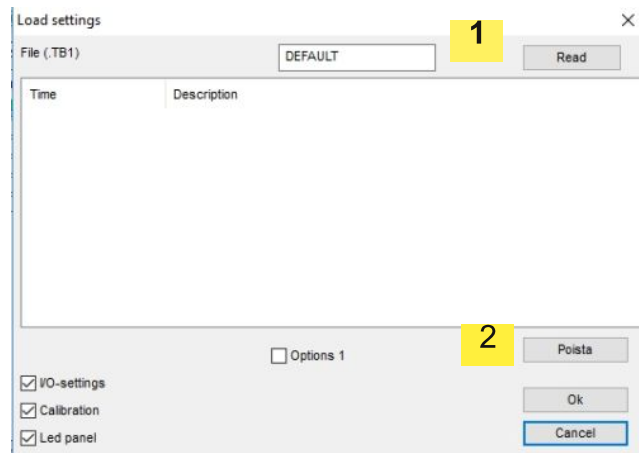
Calibration chart and calibration certificates info

### Led panel

Led panels settings.

### Options 1

Device info, temperature controllers settings, PWE settings, recording, overheat limit and PIN code



#### [1] Read

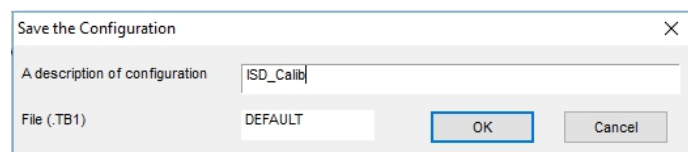
Choose the file, from where configurations will be read

#### [2] Delete

Delete choosen settings/configuration

### Save settings

Open the dialog with the "Save" button. Give a fitting name to the settings and press "OK". All device settings are saved to the same file, so it is important to at least announce what kind of device in question. Settings are saved in the DEFAULT.TB1 (default) file.



Open the "General settings for the device" dialogue by pressing "Settings" button



#### [1] Device ID (Used on this PC)

When programs and documents refer to this device, this ID code is used. If the ID field is empty it is automatically filled with the ID saved in the device.

#### [2] Device ID (in the device's memory)

This ID is used if device ID if empty.

#### [3] ID

Device ID number. The number is used when more than one device (ISC) are connected to the same data channel (RS-485). The number must be between 1-15 and all the devices connected to the same channel, must have a different number. Since the devices in the same channel (eg, a furnace) send data to each other, the ID number works as a transmission queue number. There can be up to fifteen devices in the same channel (ISC). The ID number is not used in the communication between the devices and the PC, so devices that are not connected to each other via the channel, may use the same ID number.

#### [4] the PIN code

A code can be set to protect the device from unwanted users. Each time the device is connected to the ISPort program, its PIN code is checked. If the right PIN code has not been saved on the PC, it will be asked for from the user at the beginning of connecting. When the code is correct, it is saved to the PC's memory, and not asked for at the next times of connecting. If the PIN code field is left empty, the code is not in use, and the device can be connected to with all ISPort programs.

#### [5] Zigbee settings

- Zigbee/WiFi modem installed: Always chosen when Zigbee is in use. This choice must be there to use Zigbee connection
- ZB/WiFi modem used to transfer messages to other modules: Always chosen when Zigbee/WiFi is used
- Process status sent by ZB modem: Chosen when more then one controller is connected to same process with Zigbee

Edit "controller settings" by pressing "C/Q/G" button.



#### [1] Fast operation mode

In fast processes the step execution time needs to be short, so that fast timings are possible. Therefore, the device can be set to high-speed operation mode, wherein the step time is one second instead of the normal 13 s. In the high-speed operation mode data transfer between the devices is not used, so all controllers used in the same process must be located in the same device (ISC, ISQ), a maximum of six controllers for heating. Expansion I/O modules (ISD) can be used normally.

#### [2] Slow PID-controller

Suitable for furnace

#### [3] Output Power monitor active

Output current detection active

#### [4] The overheating limit value

The maximum operating temperature for the device can be set. If any of the controllers exceed this limit, then after a short delay the output 9006 is activated. The output can be used as an alarm trigger or for example for disconnecting power from heaters. This heat limit should be used only in error situations.

#### [5] Serial numbers of connected I/O-units (ISD)

ISD expansion units connected to the controller (ISC, ISQ), must be defined. The serial number list is saved to the device's memory by the "OK" button.

### [6] Direct control settings

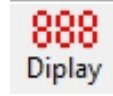
"Direct control in use" will be chosen, when potentiometers (for direct controlling) or ISQ display is in use. It's recommended to keep this setting always chosen.

"Add controller to same heating with earlier controller.." will be chosen, if wanted to add controllers to the same heating with earlier controllers from direct control buttons.

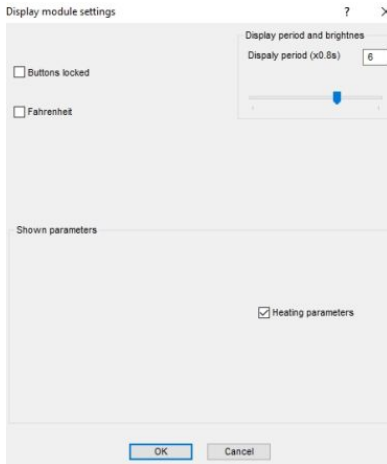
"Allow connected potentiometers to change set values" will be chosen, if wanted to change set values from potentiometers

"Always use manual power" if this is chosen, it's possible to change manual power always from potentiometers

### Edit the display settings by pressing "Display" button

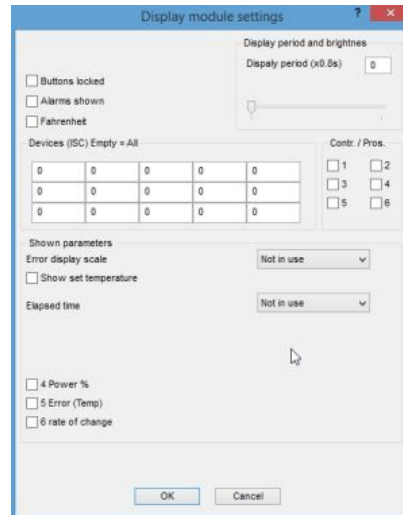


Every device with display, (ISQ, ISNxx), has different display settings



ISQ

**Controller, processes can be altered directly from the keypad**



ISN2

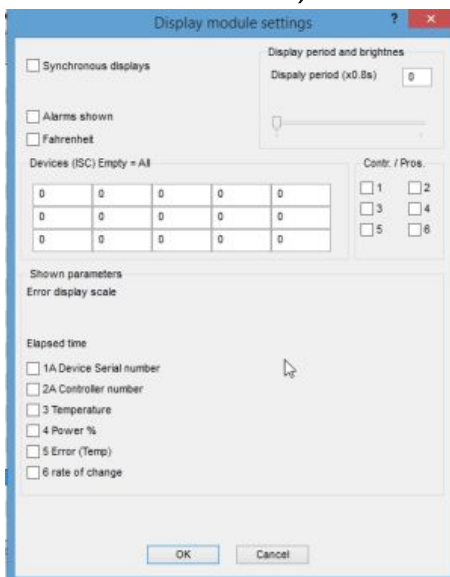
**Shows all process average values at once. Process can be controlled from the panel**

- Buttons locked: Can not use buttons on the ISQs panel
- Fahrenheit: Temperatures as fahrenheit, normally celsius
- Display period and brightness: Adjust led and screen brightness and period
- Parameters: Choose what parameters are shown in ISQ display (heating parameters)

- Adjust same settings as ISQs displaysettings
- Also:

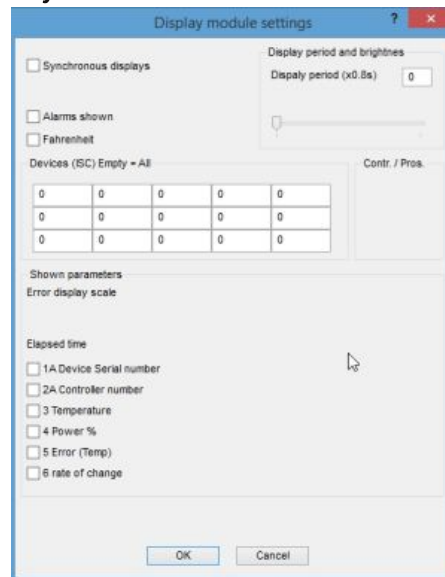
- Devices: Set ID nr for which controllers are showed. Empty (0), shows automatically all devices connected to the same CAN bus
- Controllers/Processes: Choose all
- Parameters: Choose which parameters that will be visible

**ISN2 must have own ID nr if process want to be controlled from the keypad (Settings --> Set ID nr 1-15) the ID nr must be different from any else ID nr that is in use**



ISN1A

**Shows one controllers all values (Power, error etc.)**



ISN1B

**Shows at a time all controllers values (Power, error etc.)**

- Adjust same settings as ISN2
- Controllers: Choose which controllers values are shown
- Parameters: Choose which parameters are shown

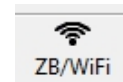
- Adjust same settings as ISN2
- Controllers: Shows automatically all controllers
- Parameters: Choose which parameters are shown

Edit the BT settings by pressing "Bluetooth" button



Device ID: ISPort automatically reads the devices ID  
 Set Pin code if in use  
 Serial nr: ISPort automatically reads the devices serial number  
 Port (Com xx) to be used: Set the (sending) COM port number that the PC has given from the PCs Bluetooth settings

Open "ZB and WiFi settings" dialogue by pressing "ZB/WiFi" button



WiFi and internet connection works in network. Connection can be made to all controllers, to where in the factory is installed WiFi option.

To make correct connection, right IP address must be setted to the device and to ISPort

### Set the IP address

First, take internet connection to PC (local network). When established, take USB connection to controller that has WiFi radio installed.

Then choose "Device Info" tab and press button "ZB/WiFi". to open the "ZB and WiFi settings" dialogue.

**To "Port Out" field, set number 9750 (ISPort programs number) if it does not come automatically.**

By pressing "Search", controller seeks local networks. Choose same network as chosen to PC and put correct IP settings. If the network is encrypted, choose right type of encryption and password.

After this, press "Connect"

**If IP addresses are unknown, choose "DHCP in use". Then the local network gives a temporary IP address, that is also installed to the controller. This works the same way as for example connecting with your phone to a WiFi network. This setting is only intended for temporary use.**

When in "Status" field reads "Connected to network", close the dialogue with "Ok". The settings is then saved automatically to controllers flash memory.

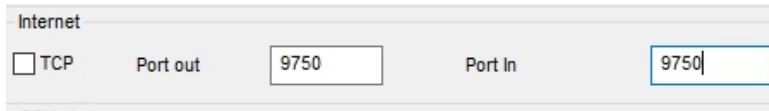
By pressing "Cancel", ISPort asks "Do you want to save the settings to controllers flash memory", answer "Yes" or "No". Answering "No", old network settings comes to controller after next reset.

When connection is established and right settings setted, doubleclick on the controllers row in device list. The "Device Settings" dialogue opens, here the IP address is installed to controller, the same IP address as earlier in "ZB and WiFi settings" dialogue.

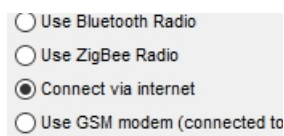
Then, press "Set" and close the dialogue.



Go to "Ports" -Dialogue, and press "Settings". Set to the Internet Port out and Port In.



Choose from ports connection type "Internet". If connection is not automatically established, press controllers connection mark.



Devices connected to same RS-485 bus, can connection be established after installing same IP address to their settings, by doubleclicking on device row.

**Edit GSM settings by pressing on "GSM" button. Use when GSM modem is connected to the controller (ISC,ISQ)**



#### [1] GSM

Choose "GSM modem in use". Set the phone number in form "+..."

#### [2] Device

Choose from which error situations a SMS will be send.

#### [3] Process

Choose from which process situations a SMS will be send. An alarm will be given once per phase, if the process moves on to the next phase and the error is not fixed, same SMS will be send again.

#### [4] Controller

Choose from which controller situations a SMS will be send. Alarm is given when error happens.

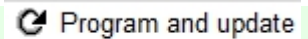
#### [5] SMS are sending periodically

Choose how often and when a textmessage is sent

#### [6] Send test SMS

Test the GSM modem, the text message will be sent within one minut after "Use" button is pressed.

## Program and update



The ISx devices' programs are located in the CPU flash memory. If necessary, the programs can be updated and new programmatic features can be introduced. The software consists of the operating system, and the program modules operating under this. This design allows the software to be updated in parts, and if necessary new modules can be added.

At the list are program modules currently loaded and running. If a later version of the module is saved to the UPD directory, the column of the list will display a "New Version" message.

The program modules can be updated in two ways, manually or automatically.

Delete extra language versions from UPD file that you don't use.

**When you update, always connect with fixed line (USB, RS232) to PC  
Never update device, when there is a process running**

### Automatic update

16	EF	Module	14:1	1	FF	1.12	1.13	25.12.12	Ledpanel interface
17	F0	Module	11:1	1	FF	1.22		19.03.13	6C Pid Controller

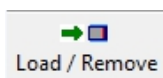
When updating a module, always connect device with cable (USB, RS232) to PC. Make sure no processes are in progress when you update.

- If operating system (IsRTos) is new, must it be updated first.
  - Doubleclick on operating systems row, press start download.
  - When loading is done, press "Close", and device will reset automatically
- Next all other modules can be updated



Start the update with "Update all" button. All marked modules are updated at the same time, when modules are updated, ISPort automatically resets the device.

### Manual update



12C Process control		Module
Current Version	Downloadable version	
1.70	1.72	
08.02.16		
12.6	6/12	
3	3	
Remove	Select ...	

← **Version Nr.**

← **Module ID**

The program modules can be updated manually. If you do not want to update the selected module, or if you want to remove a program module, or reload same version again, updating can be done manually.

- The module to be processed is selected from the list
- Open the update dialogue with the "Load/Remove" button

The module is removed by the "Remove" button, in the case that a new module is not downloaded to replace the removed one. This must be done with caution, because all modules have a specific task.

- If a newer version of the module can be found in the UPD directory, this will be chosen by default into the "Download version" - section.

If desired, the pre-selected version can be changed, or if the same module is reloaded, the download of the selected module done by the "Select" button. It is essential that the ID number (type) of the module to be downloaded, is same as the module to be updated.

- The download is started by the "Start downloading" button.
- After the deletion or download, the dialogue is closed by the "Close" button.
- Go back to step 1 and carry out the same procedure for all modules to be processed.
- Finally, the system is started by the "Reset" button or by moving away from the "Program" tab.

**If "Status" column has red color on the module row, the module is not matching with the operating system, and the module is not in use. Download new module from PC or from Ice Star's website. Modules that are marked by red color, should be updated, for that ISPort works right way**

14	-								
15	-								
16	EF	Module	16:11	31	4DCD	1.14	1.20	20.04.15	ISO Interface FI
17	EA	Module	11:11	7	0300	1.43	(1.43.11)	14.09.15	6C Pid Controller



# I/O Configuration

## IO IO-Configuration

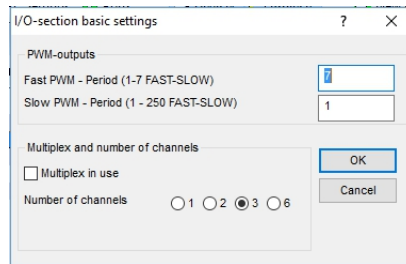
The largest I/O-point count for ISx devices is 42. The first three points have been taken into the system's use, and the rest are free for the user. The I/O points are connected in order to the installed I/O adapters, that will finally define the type and quantity of the I/O points. All of the I/O points used in the system have their own ID number, that define how the I/O-point is used in the system. The values used by the system and their ID numbers are specified in the range of 1 - 9299. Free ID numbers for the user are between 9300 -9599.

If the I/O-point defined by the user, is located in the I/O expansion unit (ISD), then it must be added to the controller's I/O-list virtually. For this all the rest of the (empty) I/O points are available for use.

No.	I/O Type	Modul-ID (used)	Description (I/O Name)	I/O-Point location	Variable ID	Variable Name	Value	Status
1	Analog I/Res	Käyttöjännite	0: 1	0:301	9301	Operation power	20.229 mV	
2	Analog I/Res	Lämpötila	0: 2	0:302	9302	Device temperature (Power supply)	45.8°C	
3	Analog I/Res	TC Cold End	0: 3	0:303	9303	Connector temperature (Cold end)	46.6°C	
4	Analog I/Res		1: 1	1:355	4355	Controller 1 Temperature (Measured)	52.5°C	
5	Analog I/Res	[R1 Tc]	1: 2	1:357	4357	Controller 2 Temperature (Measured)	60.2°C	Manual
6	Analog I/Res	[R5 Tc]	1: 3	1:337	9337	Cold End measurement 1		
7	Analog I/Res	[R6 Tc]	2: 1	2:449	4449	Controller 3 Temperature (Measured)	51.3°C	
8	Analog I/Res	[R2 Tc]	2: 2	2:4451	4451	Controller 4 Temperature (Measured)	63.1°C	
9	Analog I/Res	[R4 Tc]	2: 3	2:338	9338	Cold End measurement 2		Manual
10	Analog I/Res	[R5 Tc]	3: 1	3:483	4483	Controller 5 Temperature (Measured)		Manual
11	Analog I/Res		3: 2	3:4515	4515	Controller 6 Temperature (Measured)		Manual
12	Analog I/Res		3: 3	3:339	9339	Cold End measurement 3		Manual
13	Digital Out		4: 1	4:843	843	Controller 1 Output Power %	4 %	
14	Digital Out		4: 2	4:845	845	Controller 2 Output Power %	4 %	
15	Digital Out		4: 3	4:857	857	Controller 3 Output Power %	5 %	
16	Digital Out		4: 4	4:849	849	Controller 4 Output Power %	5 %	
17	Digital Out	Pövern lämpötila	4: 5	4:895	895	Process 1 Measured temperature AVG		
18	Digital Out		4: 6	4:0	0			
19	Digital Out		5: 1	5:851	851	Controller 5 Output Power %	5 %	
20	Digital Out		5: 2	5:863	863	Controller 6 Output Power %	6 %	
21	Digital Out		5: 3	5:900	900	Process running (Output)	Running	
22	Digital Out		5: 4	5:901	901	Device fault (Output)	No Fault	
23	Digital Out		5: 5	5:0	0			
24	Digital Out		5: 6	5:0	0			
25	Virtual		1	1:9315	9315	Extra Temp 1		
26	Virtual		2	2:9316	9316	Extra Temp 2		
27	Virtual		3	3:9317	9317	Extra Temp 3		
28	Virtual	8551	4	4:9318	9318	Extra Temp 4		
29	Virtual	8552	5	5:9319	9319	Extra Temp 5		
30	Virtual	8553	6	6:9320	9320	Extra Temp 6		
31	Virtual	8554	7	7:9601	9601	Simulated heater 1	35.0°C	
32	Virtual	8555	8	8:9602	9602	Simulated heater 2	36.7°C	
33	Virtual	8556	9	9:9603	9603	Simulated heater 3	38.4°C	
34	Virtual		10	10:9604	9604	Simulated heater 4	39.0°C	
35	Virtual		11	11:9605	9605	Simulated heater 5	40.1°C	
36	Virtual		12	12:9606	9606	Simulated heater 6	41.3°C	
37	Virtual		13	13:9606	9606	Simulated heater 6	41.3°C	
38	Virtual	0	14	14:0	0			
39	Virtual	0	15	15:0	0			
40	Virtual	0	16	16:0	0			
41	Virtual	0	17	17:0	0			
42	Virtual	0	18	18:0	0			

### Number of channels must be defined to ISD and ISC

Choose number of channels by pressing "Constants"



Both of the duty ratio start-up frequencies can be changed in the dialogue as follows

- Fast Pwm 1-7 (Fastest - Slowest)
- Slow Pwm 1-250 (Fastest - Slowest)
- Multiplex in use: Mark when multiplex is in use, ex. QDP assembly
- Number of channels: Choose 3, if six channel controller. Choose 6 if twelve channel controller.

If direct control is in use, must the ISD device to where direct control is connected, choose Multiplex in use and 6 channels.

### What the columns refer to No. : I/O point number.

**I/O type:** The type determined by the I/O adapter.

### Module ID (in which unit used, is defined in the settings tab)

If several ISC and ISD units are connected to the same I/O-bus (can), then it must be defined in which module I/O-data is to be used. For example, the controller's temperature (actual value) ID, is the same for all modules.

- Empty value/0 Value is not transferred to other units
- \* Value is transferred to all connected units
- 1-15 Value transferred to the unit in accordance with the ID number

### I/O point description

This description is used in this PC to clarify the type and location of the point. If multiple devices are connected to the PC at the same time, it is also a good idea to describe in the description which device the point is located in. It eases the process of selecting points for a project.

### I/O point location SS:NN

- SS The adapter, and the I/O connector number ISD: 1-4 ISC 1-5
- NN The number of the point in the adapter. Depending on the type of adapter 3-6

### The variable ID

The ID number of the variable connected to this I/O point. All variables must be defined in advance, before they can be connected to an I/O point. The defining is done by the ISPortIO.txt file. If the I/O point is an input-type it updates the value of a variable, while the output is controlled by the variable value. The same variable can be linked to only one I/O-input. The same variable may however be used for more than one outputs.

### Variable name: The description of the point in the definition file

- Value: The current value
- Status: The current action

## Configuring an I/O-point and connecting to a variable.

Configuration dialogue opens by double-clicking the the I/O-line.

### The fields in the configuration dialogue

#### [1] The description point on this PC.

Settings can be defined for the point for use on this PC. The description is saved to the PC's memory

#### [2] The variable of the point

The variable connected to the I/O point. The variable can be connected to one input at a time, in the outputs the same variable may be used more frequently. The dialogue for selecting the variable is opened by the "Select" button.

#### [3] Scaling

Different scaling is available, depending on the type of the I/O point and variable.

#### [4] Settings

Additional settings depending on the type of the I/O

#### [5] Manual

Manual operation for the point

### [1] Point description

The additional point settings are saved to the PC, so they do not move when the controller is used on another PC. It is a good idea to also use the devices serial number in the point ID, this way it is easier to distinguish the points from each other when there is more than one device connected to the PC at the same time. In the absence of the ID the point is marked with the serial number in brackets. When the points are selected for a project colors are selected for them in the order in which they have been defined in the PC's settings. If you want to always use the same color for the same point, the selection is marked and a suitable color chosen.

The points can be grouped in the certificate using a group ID number. Differently from the point ID, the group ID can be given to a point also later when it has already connected to a project.

### [2] The variable of the point

The I/O point must always be connected to a pre-defined variable. The variables are either fixed system variables, or variables defined by the user. The system variables have pre-defined ID numbers and types. The ID numbers 1-9299 are reserved for the system and the numbers 9300 - 9599, are available for defining by the user. Most of the variables can be connected to both the inputs and outputs, but to an input or input-like system variable only once. How the I/O point and the variable coordinate the values between themselves, depends on the type of the I/O point and the variable.



### Variable selection

The variable selection dialogue is opened, and the variable is selected from the list. All user's variables must be defined in advance in the ISPortIO.txt file. The variables are divided into groups to make the selection easier. If you want to detach a variable from the I/O point (delete) do not choose a new variable, only exit with the OK button.

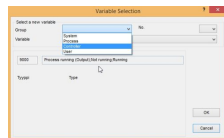
As an example an analog 16 bit resolution input is used as temperature measurement of the controller No.1.

Open the configuration dialogue by double-clicking the desired input. In the picture the first point of the first adapter. The H-type adapter has three points. The controller's temperature sensor can only be connected to a H-type adapter.

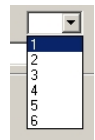


Open the configuration dialogue, and then "Variable selection" -dialogue by clicking the "Select ..." button.

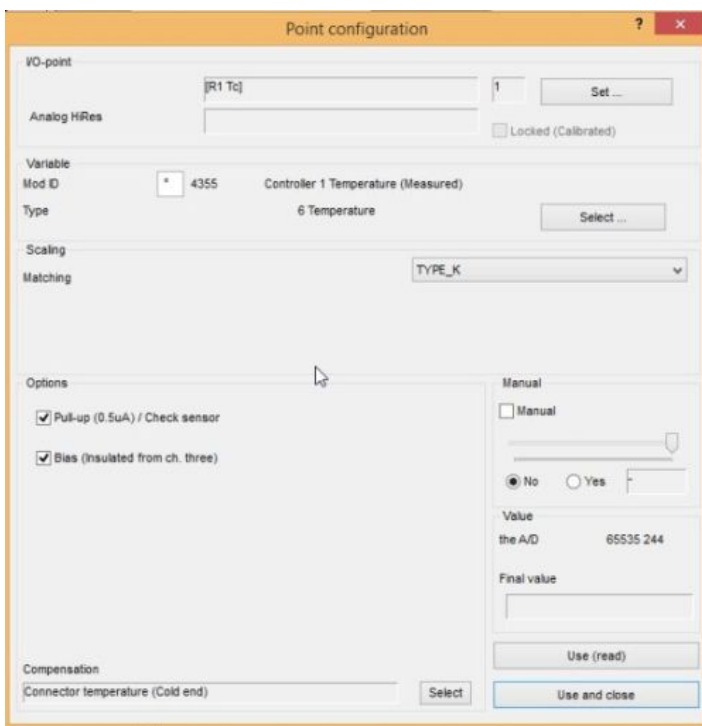
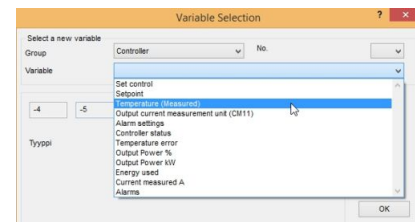
Select the "Controller" group



Select controller No. 1



Select "Temperature" and close the dialogue by the "Ok" button



### ModID

In the ISC configuration the field is left empty (is in use in the device where the I/O point is located).

In the ISD configuration the \*-character is inserted into the field. (in use in any ISC device connected to the Can-channel)

Select matching, in the picture type K.

### Pull-up set (a continuous 0.5 uA current for testing the sensor)

If the sensor is broken (loose), the temperature rises over the range, and sensor fault is detected.

### Pull-up not set

The pull-up may interfere with other devices using the same sensor, where the pull-up is switched on. If a broken sensor do not have the pull-up set, then the temperature reading is undefined (will show whatever value).

### Compensation

The cold-junction compensation used with thermocouples. Select the desired variable from the "User group" list.

**Close the dialogue using the "Close" button**

**Example: The configuration of the controller's No. 1 power output.**

Open the configuration dialogue by double-clicking on the line which is used as a power output. In the picture the first output of the I/O adapter No. 4.

13	Digital Out	4: 1	8453	Controller 1 Output Power %	4 %
14	Digital Out	4: 2	8485	Controller 2 Output Power %	5 %
15	Digital Out	4: 3	8517	Controller 3 Output Power %	4 %

Select "Output power %" as the variable

**ModID**

Leave empty (the output can be located in the ISC or the ISD unit)

**Scaling**

How to change the value of an analog variable to the output electric mode depends on the type of output being used.

**1 High-speed PWM**
**2 Slow PWM**

An analog variable such as power, is scaled analogously to a duty ratio between "Scale max" - "Scale min". If for example the "Scale max" setting is 80%, then the 100% controller output power gives a duty ratio of 80%. And with the same logic the "Scale min" is the duty ratio obtained by the controller output power of 0%.

**3 On/Off**

The variable is compared with the limit value (NOT). When the value of the variable is less than the limit (NOT) then the output is switched off, otherwise it is on. If the "Over limit value" is defined and the value exceeds this, the output is also turned off.

**Settings**
**"Reverse" marked:**

Duty ratio: -100% - 0 Output is scaled to the negative values ( ie negative output power is cooling power)  
On/Off: Output is inverted (Reverse)

**Current control**

Takes the output current monitoring and warning into use.

**Output power**

The load connected to the output (kW). This value is used to calculate the output power and the energy used by this output. If the controller has several outputs, the outputs powers are summed.

**The high-speed duty ratio is available only for the first four I/O points of the adapters installed to the devices' I/O positions three and four. When using the slow PWM mode, then the switching is automatically synchronized with the H-adapters' measuring sequence. The slow PWM mode must be used with contactors in order to avoid interfering with temperature measurement. All slow PWM mode outputs, also in different units, will be in synchronized with each other.**

**After changing the editable fields (text, number) the "Apply" button must be pressed**

**The dialogue is closed and the values taken into use by the "Close" button**



The configuration is saved to the device memory by the "Upload" button. The modified configurations of the thermocouples will take effect after saving. Cold-end measurements take a short period to stabilize to their correct values.



If you want to recover the previous configuration in the middle of making changes, this can be done by the "Reload" button. After saving the previous configuration can no longer be recovered. After the reset the list is updated when the tab is visited again.

## ICM Current measurement calibration

Current is measured from the output power cables, so we know how much the current is. ICM is not a current measurement device, it controls the output current so the operator knows that the heating element is good. The ICM sensor gives alarm, if the current is too low or high.

With the newest updates (06.05.2016 forward) is no longer Offset, zero point, putted to place.

There is two different ways for ICM calibration:

1. Käyttäjä muokkaa Gain ja Offset arvot kunnes Amperit ovat samat kuin virranmittauslaitteen antamat lukemat.
2. Syötetään Amperi-määrät ISPort-ohjelmaan ja ohjelma skaalaa itse sopivat Gain ja Offset arvot.

### METHOD 1

Make connection with ISD module, where ICM sensors are connected and open that ISD's IO configuration window

- Start with channel 1, put outputpower 1 manual power on, example 100%

Doubleclick "Controller 1 output power %" row

5: 1	7173	Controller 1 Output Power %	0 %
5: 2	7205	Controller 2 Output Power %	0 %
5: 3	7237	Controller 3 Output Power %	0 %
5: 4	7269	Controller 4 Output Power %	0 %
5: 5	7301	Controller 5 Output Power %	0 %
5: 6	7333	Controller 6 Output Power %	0 %

Opens "Point configuration" -dialogue

[1] Choose "Manual" in use

[2] Put manual power to, ex 100 %, with slide tab

[3] Press "Use and close"

Picture: "Controller 1 output power%" -dialogue

- Go next to "Controller 1 Output measurement (ICM1)" -dialogue

Doubleclick on "Controller 1 output current measurement unit" row

I/O-Point location	Variable ID	Variable Name	Value
0: 1	9301	Operation power	23712 mV
0: 2	9302	Device temperature (Power supply)	51.7°C
0: 3	9303	Connector temperature (Cold end)	34.8°C
1: 1	5124	Controller 1 Output current measurement...	0 A
1: 2	5156	Controller 2 Output current measurement...	0 A
1: 3	5188	Controller 3 Output current measurement...	0 A
1: 4	5220	Controller 4 Output current measurement...	0 A
1: 5	5252	Controller 5 Output current measurement...	0 A
1: 6	5284	Controller 6 Output current measurement...	0 A

Opens "Point configuration" -dialogue

**With these settings device is sent from Ice Star (Values in picture)**

Picture: "controller 1 output current measurement unit" -dialogue

- [1] - Connect 1 heating element  
 - Measure the current with current measurement device  
 - Check ICM sensor "Final value"  
 - Connect 2 heating elements  
 - Measure the current with current measurement device  
 - Check ICM sensor "Final value"

this Amper change in ICM between 1 and 2 heaters, has to be as big as the change in the current measurement device. For example if the measurement device showed with 1 heater 40A, and ICM 20A and with two the measurement device showed 80A and ICM 50A, must Gain be adjusted until the ICM change is as big as the measurement device change (in this example the change is 40A), so adjust ICM Gain to show with 2 heaters 60A. When altering the Gain value, press "Use (read)" after changing value.

Repeat with 1 and 2 heaters until ICM change is same as the current measurement device. If 3 heaters are used, repeat with one, two and three heaters until the change is same between ICM and current measurement device.

**NOTE! The value ICM gives, is not the same as the current measurement device. It is important that the change is same when switching amount of heaters. Later the scale is set to place with adjusting Offset.**

[2] Next Offset is set to palce

In this phase it does not mater how many heaters are connected  
 When altering the Offset value, press "Use (read)" after changing value.

- If the current measurement deice shows ex. 40A, and ICM "Final value" 20A, adjust Offset until both has the same Amper value

Finally test with difference amount of heaters, that the ampers shows correct between ICM sensor and current measruement device.

Note! +-3A difference between sensor and current measurement device is not major and it can be leaved.

[3] Set high current limit to wanted value, ex 100 A, this is the device high current alarm limit. Set Low current limit to wanted value, ex. 0 A.

[4] When Gain and Offset is set to place, press "Use and Close"

**After this repeat same to channels 2-6**

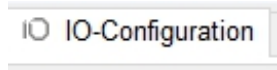
**NOTE!**

**When all channels are calibrated, press "Upload" in I/O-configuration tab**



**METHOD 2**

Make connection with ISD module, where ICM sensors are connected and open that ISD's IO configuration window



- Start calibrating with output current measurement channel 1i

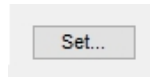
**Current measurement sensors arrives from factory with these values:**  
**110A Sensors with value Gain 150 and Offset 0**  
**200A Sensors with value Gain 300 and Offset 0**

**NOTE!**

If ISPort can not move Gain and Offset values correctly, set factory values. ISPort can not scale if the values are too big from start.

- Doubleclick on "Controller 1 output current measurement unit" row and dialogue "Points configuration" opens.

- Press button "Set..." , and "ICM calibration" dialogue opens.


**NOTE!**

**100 % choice connects to chosen channel, in this case no. 1, manual power 100%.**

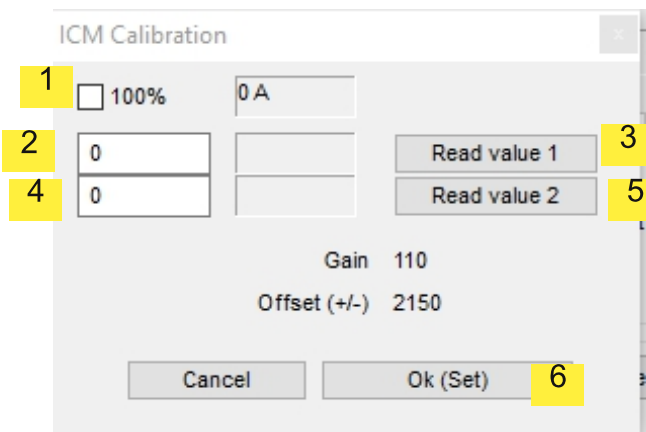
**The mark only works if the output powers are connected the the same ISD module as the current measurement sensors (ICM).**

**If they are not connected to the same, the power must be putted on like told in "METHOD 1"**

**If the mark is used, will manual power stay on to that channel even after taking the "100%" mark away.**

**Take manual power away like this:**

- Doubleclick on "Controller 1 output power %" row and the "Points configuration" dialogue opens.
- Take mark "Manual power" away.



**If you calibrate current with one heating element, do like this:**

- Insert value 0 to place [2] and press "Reed value" [3]
- Connect one heating element
- Choose 100 % power [1]
- Measure with current measurement device output current and insert the value in place [4]
- Press "Reed Value 2" [5]
- Take away 100 % power [1]
- Press "Ok (Set)" [6]

**Remember to take away manual power from the channel before moving on to the next one**

After this, repeat to all other channels

**If you calibrate the current with more than 1 heating element, do like this:**

- Connect one heating element
- Choose 100% power [1]
- Measure with current measurement device output current and insert the value in place [2]
- Press "Reed value" [3]
- Connect next the maximal amount of element you use, for example 2 or 3
- Measure with current measurement device output current and insert the value in place [4]
- Press "Reed Value 2" [5]
- Take away 100 % power [1]
- Press "Ok (Set)" [6]

**If the Amp values are not close enough to real values, repeat the calibration**

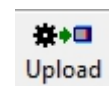
**Remember to take away manual power from the channel before moving on to the next one**

After this, repeat to all other channels

**NOTE!**

**When ready with all channels, check**

1. that the power or manual power setting is not on
2. Press "Upload" button before leaving IO-configuration tab.



# Temperature controllers

PID Temperature controllers

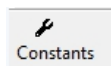
The settings of the temperature controllers can always change, even if there is a process running.

No.	Type	Code	Process	Status
1	PID	A1	19	
2	PID	A2		
3	PID	A3		
4	PID	A4		
5	PID	A5		
6	PID	A6		

## Controller list

In picture controller 1 is in use in process 19

## Controller defaults



"Constants" -dialogue is very important when controlling heating. Ex, PID parameters and recording settings are possible to alter via this dialogue. Settings which are made in this dialogue are for controller and will be saved to controller's memory.

*The settings are device-specific, that is, the devices in the same process use their own settings. However, the parameter set defined in the process settings (Control tab) is the same for all devices.*

*Settings are saved to the device's memory with the "Ok" button, the new settings will take effect immediately. The parameters (parameter set) are taken to use, when a set other than zero (0) is selected from the slider in the "Additional process settings" dialogue.*

### [1] Capturing

"Record temperature" choose when want to record temperature. Recommended to choose this setting always. Write to fields "minimum capture interval" in seconds and "the smallest change in temperature ", which will be recorded. Ex, if temperature will change 0.2°C in under 20 seconds, the temperature will be recorded also then, but at latest after 20 seconds, if the temperature hasn't changed.

The controller's measured output power and the rate of change, may be saved to the device's memory. Diagrams can be printed from the recorded values. Recording is performed at regular intervals. If the power and change diagrams are not needed, it is recommended to turn off Recording in order to save flash memory. The On/Off setting can also be controlled from other dialogues, but the recording interval is only determined here.

### [2] Controller's extra settings

Choose the extra settings, if you need these settings. These settings will work then, if there is no heating rate or cooling rate in process plan.



### [3] The controller parameters

The controller's PID parameters consist of six different values. Since the values usually depend on each other, it makes sense to adjust them together. The "Advanced process settings" dialogue has a slider with which all the parameters can be chosen at the same time. The slider's each position from 1-10 selects a pre-defined set of parameters. All the controllers (in the same device) connected to the process use the same parameter set. When using the parameter set zero (0) the controller's parameters are not set, but controller specific parameters are used. When something else than the set zero is chosen with the slider, the corresponding set of parameters is moved from the "controller parameters" table to all the controllers connected to the project.

#### **Reduce the slew rate ...**

This value determines how gently controller will move between a heating / cooling- phase and a Hold-phase. Values of -15 - 15 may be provided, so that value -15 is steep and value 15 is as gentle as possible (Smooth). Setting zero (0) means that curve smoothing is not in use.

#### **P (Basic power)**

How much does the temperature error affect to the output power. Normally useful values are from 4 to 20. If this value is too high, the controller reacts too strongly to the temperature error, so the output power and also the temperature starts to wobble.

#### **I (Slow regulation)**

Since the controllers P-part needs a temperature error to give the output power, this error will be removed by replacing the P-part by I-Part. I-Part is slowly changing basic power which will be added to the P-Part. Basic power must be altered so slowly, that it will not affect to the dynamics of the controller. If the base power is changing too quickly (too big I-Part), it will affect to the controllers stability. I-Part value may be from 3 to 50. Value zero means that I-Part is not in use.

#### **D (Brake)**

D-Part changes the output power to prevent temperature changes. The temperature approaching (from low temp.) to the set temperature, D-Part will reduce the output power. Usable values are from 5 to 200. Value zero (0) means that P-Part is not in use.

#### **Time period**

Adjustment period is the most important parameter which affects to the behavior of the controller. Adjustment period will determine how fast the altered output power rating will influence to the measured temperature. If the temperature will respond to the change of power with a long delay, longer time is needed between power calculations. Value one (1) is very fast adjustment period (3s), and it is suitable only for special rapid heating. Useful are from 2 to 200. Depends on which assembly is in use, which values are the best. Ex, In QDD time period is 1.2s per channel, so if the value is 5 the controller regulates in every 6 seconds. Ex, in QDP time period is 3.6s (Because of multiplexer) per channel, so if the value is 5 the controller regulates in every 18 seconds.

If there is faster time period in controller, use bigger values, and if there is slower time period use smaller values.

#### **Power boost**

If the rate of heating or cooling is changed, will the controller change the output power immediately.

Value zero (0) means that this parameter not in use. 1 means that the power is changed a little, and max. value 15 will change output power more.

When temperature is going up and down ("jumps"), it may be good to change this value smaller.

### [4] The sensor error settings

The operation of a controller in the situation of sensor error, depends if there are other temperature sensors in use in the same process. If other sensors are not connected, the controller's power control will automatically be set to zero, and the progress of the process will be left to wait for the proper temperature. The output power can be manually controlled. If the process has a usable power reading (other controllers are working), it is sensible to use this instead of the manual power setting. The output power of the process is a average of all controllers connected to the process. Also the controller can use the process temperature as the measured temperature.

#### **Use the process power**

In the absence of temperature measurement, the process output power % is primarily used as controller's output power.

#### **Use the process temperature**

If the process output power does not exist, or if it is not wanted to be used, the process temperature is used. Using the temperature requires that other controllers or measurement points is connected to the process.

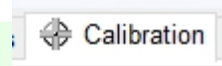
#### **Sensor error acknowledgement**

A faulty sensor can be taken out of use, in which case the sensor is not taken into use even if it seems to be ok. The sensor is acknowledged as error-free by taking the I/O points "Manual" setting off.

#### **If the temperature falls by more than 50%**

There can be a short-circuit on the thermocouple or compensating cable, in which case the temperature is measured at place of short-circuit. When the temperature is over 50 degrees, and then falls to one-half, during one measurement period (3s), it is assumed to be defective. The situation will, however, only last for two measurement periods, so the error lock and acknowledgement can be used.

# Calibration

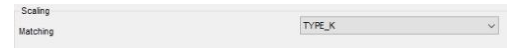


ISx devices are calibrated programmatically in such a way that the Offset and Gain of every point is calibrated separately. Only the points connected to H-type adapters are calibrated. Calibration and the possible additional information for the calibration certificate are saved to the device's EEPROM memory.

## Preparation before calibration using the I/O configuration (These settings are made in factory)

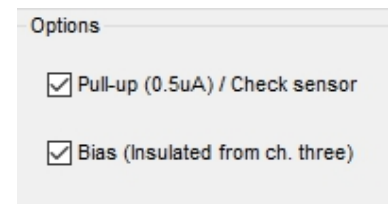
Before calibration the configuration of the I/O point is checked

### 1 The calibration table is chosen for the point (E\_Type ... PT100)



### 2 Ensure the correct settings (Pull-up)

The pull-up current (0.5 uA) monitoring the thermocouple, causes an error to the temperature reading if the sensor resistance is high. If the sensor wire, or its compensating cable is long, then this installation should also be used during calibrating if possible. Efforts have been made to compensate pull-up error programmatically, but due to the tolerances of the components, the temperature reading will change when the pull-up is turned on or off.



### 3 Selecting the temperature measuring point for the cold-junction compensation

When using thermocouples, the sensor's cold-junction must be measured and compensated. The I/O point used for compensation must be chosen for each adapter. All 1-3 points of the H-adapter use the same compensation point, so all thermocouples connected to the same adapter, must be of the same type.



### 4 Save the configuration to the device

It takes a while before temperature readings are correct.



## Calibrating ISC/ ISD

- Open ISPort2C.exe for calibration
- Make connection with controller (ISQ), where IO modules (ISDs) are connected
  - Recommended to use fixed lines while calibration, ex. USB cable
- Choose the IO module which one you want to calibrate first, by clicking on the device row from device list
  - Recommended to take connection away from other devices (by clicking the communication link), calib. will be faster

- Open Calibration tab

- Open the device's lock

<input type="checkbox"/>	FE 0	Q184	7	184
<input checked="" type="checkbox"/>	0	D207	0	207
<input type="checkbox"/>	0	D209	0	209



### Releasing lock

Calibration is password-protected to prevent accidental alteration. The password is entered into the "Lock" dialogues password box. The password is set on the PC settings "Passwords" tab. The calibration password can only be set by the administrator. If no password is set, then a simple "Ok" is enough to unlock.

**Make sure you have all fields you need for information to calibration certificate. If not, add it to the file ISPortC.txt, notice, that you must activate the .bat file so new fields come to the field dialog, close ISPort, doubleclick on bat file and start ISPort.**

- Choose the sensor type from dropdown list

#### Selecting the points to be calibrated

The type to be calibrated is selected from the list. Also, the calibrator is set to source same type. All the same type of I/O points can now be selected for the actual calibration.

- Activate all the TCs from the list by clicking on the square in the beginning of the row

#### Activating the points to be calibrated

If the calibrator is connected to the incoming connections with a splitter, several points can be calibrated at the same time. The green triangle indicates an activated point.

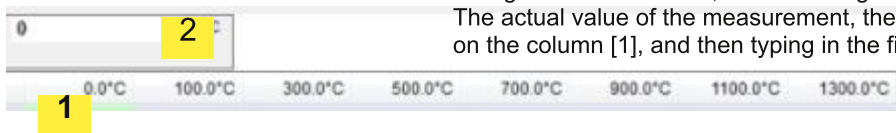
No.	ID ...	Fitting	Error
4	1: 1	TYPE_K	
5	1: 2	TYPE_K	+0.0
6	1: 3	Pt100 / 1mA	+0.0
7	2: 1	TYPE_K	
8	2: 2	TYPE_K	+0.0
9	2: 3	Pt100 / 1mA	+0.0
10	3: 1	TYPE_K	
11	3: 2	TYPE_K	+0.0
12	3: 3	Pt100 / 1mA	+0.0

- Click on the first column and the temperatures will open. The temperature of the column can be changed from the field above of table

#### Calibration table columns

Although the calibration is performed at only two points, space has been reserved in the checking table for eight check values. Usually the point is calibrated with the value zero and with the highest value to be used. When using thermocouples zero is a sensible value because the thermocouple voltage is then also zero, wherein the gain effect is minor.

The actual value of the measurement, the column value, is given by clicking on the column [1], and then typing in the field [2] the column value.

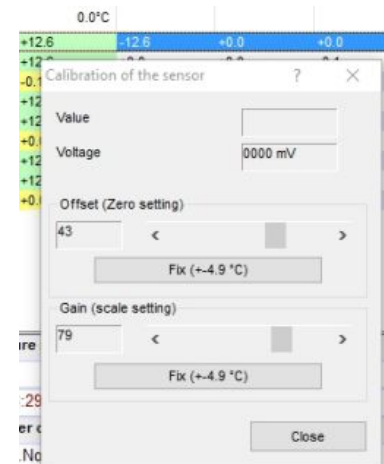


- Start with calibrating Offset in all TCs, after that calibrate Gain in all TCs. Other temperatures will not "fix".

#### Zero point calibration (offset)

Offset is the correction which is added to the value received from the A/D converter. Its purpose is to correct the errors of the amplifier, converter, and protection components.

- 1 Select the column, usually the smallest value, by clicking on the column header.
- 2 Set the calibrator to enter the same value. For each selected point the error is displayed on the corresponding row.
- 3 If measured error is too high, then correction dialogue is opened by double-clicking on the line (I/O point).
- 4 The offset is changed either manually from the "Offset" slider or by clicking the "Offset fix" button.
- 5 When the error is zero, the dialogue can be closed
- 6 The same operation is done for all activated activated points



**Change the calibrator value after you have moved to the next column**

- After this, fill the fields for calibration certificate

- Save the calibration by clicking on "upload" -button and give a name/ registration number to calibration



- Go to "Print" -tab and print the calibration certificate

#### Scale calibration (Gain)

Gain changes the A/D-converter, scaling.

- 1 Select the column, usually the biggest value
- 2 Set the calibrator to source the corresponding value.
- 3 If measured error is too high, open the correction dialogue by double-clicking on the line.
- 4 The gain is changed either manually from the "Gain" slider, or by clicking the "Gain fix" button.
- 5 When the error is zero, the dialogue can be closed
- 6 The same operation is done for all activated activated points

#### Filling in the checking table

- 1 Select the temperature and column where the error is checked by clicking on the column header.
- 2 Set the same temperature into the calibrator.
- 3 When all the measuring points have error values, move to the next column
- 4 Finally deactivate points.

## Completed processes

The events and temperatures are saved in the controller's flash memory, from where they are transferred to the PC, either during heating or afterwards. The last 250 processes is available on the memory's Table of Contents. If heatings are long, then it is possible that although the process information appears in the table of contents, the actual data in the flash memory has been overwritten.

No	RegNo	Drive No	Start time	Event	Measurement	Status
1	19	2	01.04.2016 16:19	17	18	---

### [1] Update

Update the list

### [2] Delete

Deletes memory from controller, so info on these tabs also emptys:  
System events and Completed processes

#### No.

Memory location 1-250. Ring buffer

#### RegNo

Completed process ID (file name)

#### Drive No.

Record number, if the same heating plan used more than ones.

#### Start time

The process start time

#### Event

Event starting point in the flash memory

#### Measurement

Measurement starting point in the flash memory

#### Status

Not in use

## Recovering process data from memory

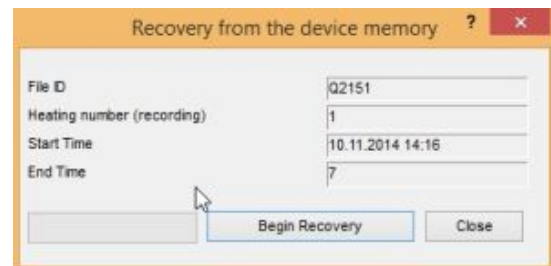
Recorded processes can be recovered, that is, be re-read from the controller's memory. Recovering can be used when the project has been removed from the PC, or the process is located on another computer.

*The recovering dialogue is opened by double-clicking the line of the process to be recovered*

*The recovery is complete when the "Begin recovery" button is available again.*

*The dialogue can be closed once the recovery has begun.*

*The possible project added is at the end of the project list.*



**Recovering process data from memory is not possible if earlier "Delete" button is used and memory is empty**

## System events

The most recent events. Only for monitoring

## View

The calibration certificate templates are located in the "\Layout" directory. The template file must be in the form ISD\_xxxx.TXT.