11.06.2013

Ice Star ISPort

User Guide

ISPort V0.0 - V1.52

Part 2
Device Configuration

ISDOK:

DPM2_FI V1.0

Ice Star Oy
Turku Finland

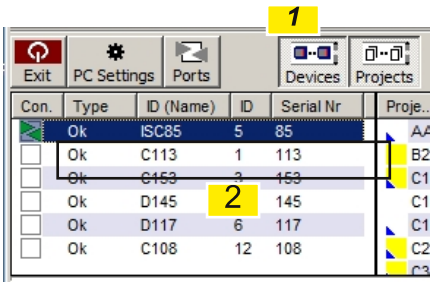
icestar.fi
office@icestar.fi

Directory

Device configuration

ISx devices are fully configured programmatically by the user. On delivery devices are unconfigured, or have the configuration used by the customer as default.

Prior to use, the customer must always check that the configuration is complete and matches the intended purpose of use of the device.



Selecting the device to be configured

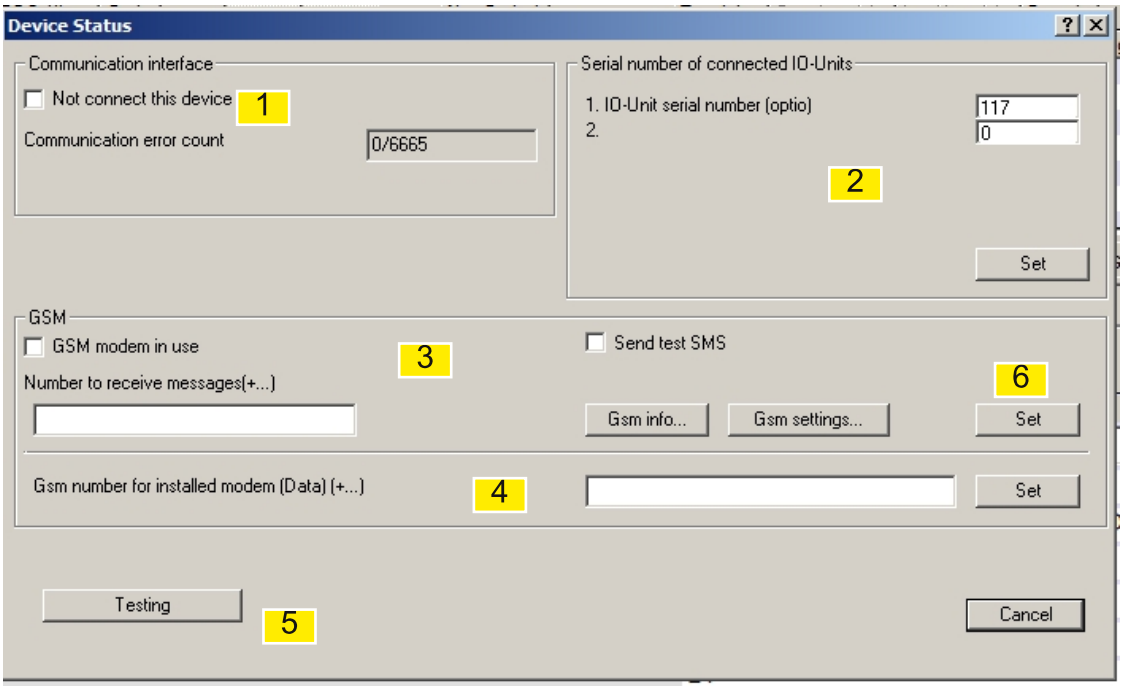
1 The device list is displayed by the "Devices" button [1]

The device to be configured must be connected to a PC, and must be active (green arrow).

2a By clicking on the device line the device opens in the workspace.

2b By double-clicking on the device line, the device's communication settings dialogue opens.

Communication settings



[1] Data connection

Not connect this device

Select the device that you do not want to connect to (Activate). ISD expansion units only need to be connected to for the time of configuration.

Communication error count

The relationship of defective and error-free messages. Describes the connection quality.

[2] Serial numbers of connected I/O-units

ISD expansion units connected to the ISC controller, must be defined. One or more ISD expansion unit can be connected to the ISC unit using the I/O channel (CAN). The serial number list is saved to the device's memory by the "Set" button.

[3] GSM

GSM modem in use
If the device uses a GSM modem.

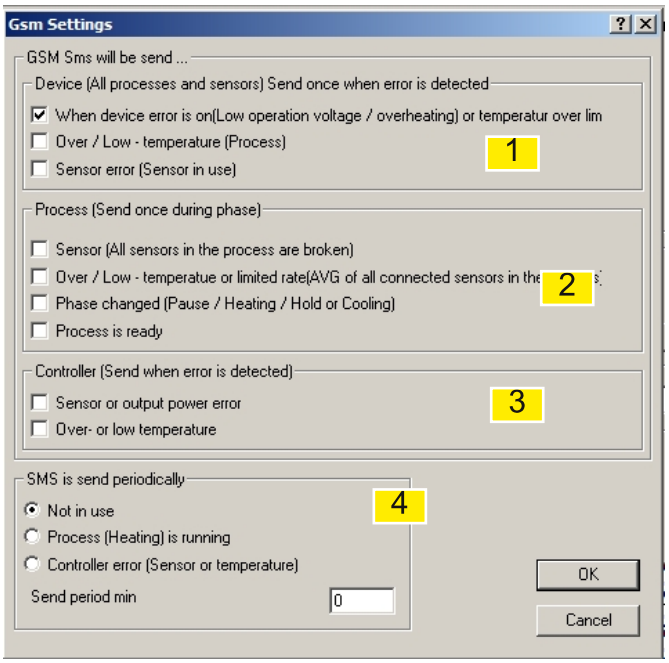
Telephone number
The user's phone number, which the SMS messages will be sent to.

Send a test SMS
Test the modem and the phone number by sending a test message each time the "Set" button is clicked.

GSM Info

GSM settings ...
The GSM settings to be saved to the device. If the settings are changed, they must be saved to the device's memory with the "Set" button [6]

GSM settings (Device memory)



[1] The device

These selections apply to the entire device. The alarm is triggered once when the error occurs. If the error is already active when the process is started, the alarm will not be triggered.

[2] The process

Serious errors that effect the performance of the process. If several temperature controllers are used in the project, the error in one of the controllers does usually not cause changes to the whole process. These alarms are given once per phase, so the same error alarm is given again when the process moves from e.g. the heating phase to the holding phase.

[3] Controller

An error in an individual temperature controller. This message is given when the error occurs, and the phase change does not result in a retransmission

[4] At fixed intervals

A message can be sent at fixed intervals when some process is running, or when there is an error in one of the connected controllers.

[4] (GSM) The phone number installed into the device (Modem)

If there are several GSM modems in use, it is easier to use device-specific telephone numbers instead of one defined in the "Port Settings" –dialogue. When one device at a time is being connected to the ISPort program it will use this telephone number. If the field is empty (begins with a ' '- character), the number defined in the "Port Settings" dialogue will be used. When the number has been altered, it must be saved to the PC's memory by the "Set" button.

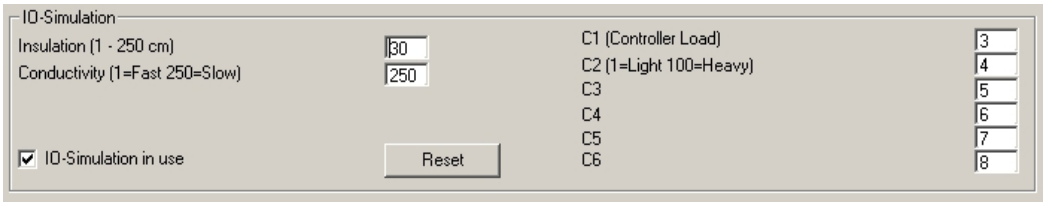
[5] Testing...

The test dialogue is used mainly for error detecting, and there are no functions which are important during normal use. The I/O -simulation may be useful for testing and in learning to use, so there are more detailed instructions on this.

I/O Simulation

When using the I/O simulation, temperature measurements to controllers are disconnected, and replaced by calculated temperatures. The controller calculates the temperature using the output power and the simulation parameters.

The simulation should not be turned on if the outputs are connected to the real heating systems.



Simulation is started by checking the box "IO simulation in use" and pressing the "Reset" button. When the device is turned on, or it is reseted, the simulation is not active by default. If you wish to reset the temperatures used by the simulation, the simulation is turned off and then back on again.

The parameters affecting the calculation:

Insulation thickness (1-250)
Affects heat dissipation. 70% of the heat dissipates through the resistor and the rest through the object. The amount of energy bind to the resistor cannot be changed.

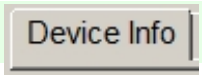
Heat transfer (1-250)
Affects the transfer of heat from the resistor to the object, and since most of the heat dissipates through the resistor, the cooling of the object. Heat transfer improves as the value increases.

The controllers' load (1-100)
Each controller can be given a separately simulated load, which, together with the heat transfer determines the dynamics of the controller. The larger the mass and the slower the heat transfer the longer the adjustment range needs to be.

The temperature of the resistors and the energy attached to them can be seen by specifying the additional virtual measurement points in the I/O configuration and using these in the project. The simulated resistor temperature IO numbers are 9601-9606.

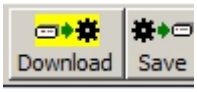
28	Virtual	85S1	1	9601	Simulated heater 1
29	Virtual	85S2	2	9602	Simulated heater 2
30	Virtual	85S3	3	9603	Simulated heater 3
31	Virtual	85S4	4	9604	Simulated heater 4
32	Virtual	85S5	5	9605	Simulated heater 5
33	Virtual	85S6	6	9606	Simulated heater 6

Device information



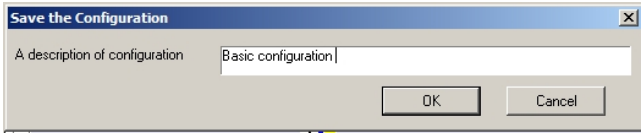
The user cannot change the settings on this tab, only check the default settings.

All the settings can be saved to the PC, and if necessary, they can be read back. All tabs' settings are saved and recovered on this tab



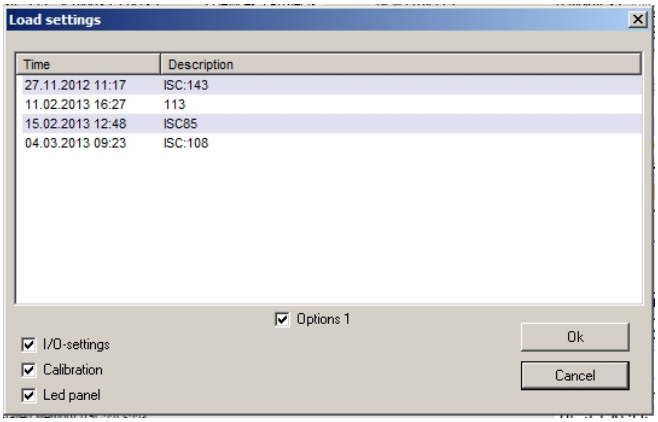
Saving settings

The saving dialogue is opened by using the "Save" button. Give the settings a descriptive name and press the "OK" button. All the devices' settings are saved in the same file, so it is a good idea to mention in the description at least what type of device is in question.
The settings are saved to the DEFAULT.TB1 file



Recovering the settings

Open the "Load settings" dialogue with the "Download" button. Select from the list the most suitable initialization for the device (settings). The device can be initialized also partially, in which case only the parts to be initialized are selected.



I/O Settings
I/O configuration, including calibration. The IDs for measuremnet points and other settings affecting the presentation, are saved to the PC.

Calibration data
The calibration error table and the calibration certificate data

Led - panel
The led-panel settings. The printing data needed for the panel, is saved to the PC

Settings1
Device information, settings for temperature controllers, PWM settings.

Settings

Options

This tab contains a variety of settings affecting the operation of the device. Settings are saved to the memory of the device by the "Upload" - button. The information to be saved, may vary between different devices.

[804] 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 (805).

[802] 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.

[805] Device ID (in the device's memory)
This ID is used by default if the device ID [804], is left empty.

[803] Power monitor active
Output current detection active. If more than 1A current is detected when there should not be any current (0% output power), then output 9006 is activated.

[807] 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.

[808] 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.

[809] High-speed 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), a maximum of six controllers for heating. Expansion I/O modules (ISD) can be used normally.

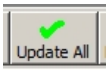
Changed settings are stored to the device by clicking the "Upload" - button

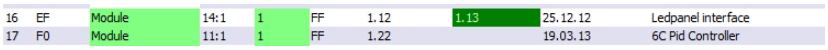
Updating device's software

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.

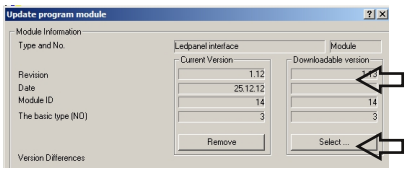
Automatic update





An automatic update can be performed when the program modules already downloaded, have later versions available in the UPD directory (Figure 1). The update is started by the "Update all" - button. All selected (green version number) modules, are updated one at a time, after update the device is resetted automatically.

Manual update



Versio No.

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.

1 The module to be processed is selected from the list
2 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.

3 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.

4 The download is started by the "Start downloading" button.

5 After the deletion or download, the dialogue is closed by the "Close" button.

6 Go back to step 1 and carry out the same procedure for all modules to be processed.

7 Finally, the system is started by the "Reset" button or by moving away from the "Program" tab.

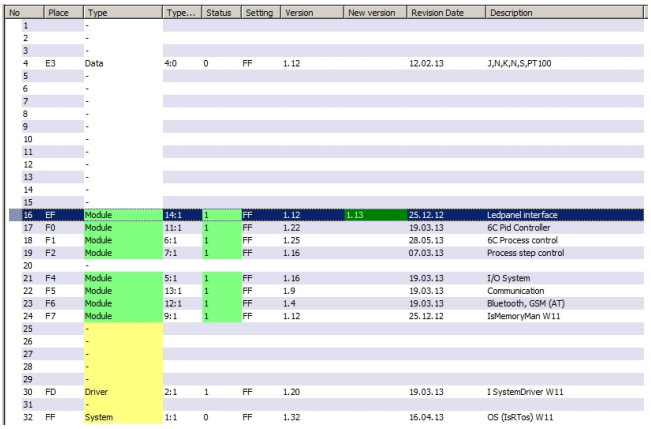
The list is updated when the device is restarted with the "Reset" button

All settings can be set to factory defaults by the "Clear memory" button. All running processes are stopped and maybe lost.

How to update the operating system

Everything, including the system driver, is updated as described above. If some kind of disturbance occurs during the download process, such as a power failure, the module will naturally not be functional, and must be reloaded. Always after start-up (reset) the operating system checks the downloaded modules and will launch only those which are error free. However, every module is essential from the point of view of the functioning of the system.

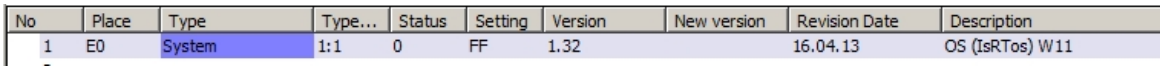
The following list includes all the modules that are necessary for operating.



No	Place	Type	Type...	Status	Setting	Version	New version	Revision Date	Description
1		-							
2		-							
3		-							
4	E3	Data	4:0	0	FF	1.12		12.02.13	J,N,K,N,S,PT100
5		-							
6		-							
7		-							
8		-							
9		-							
10		-							
11		-							
12		-							
13		-							
14		-							
15		-							
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
18	F1	Module	6:1	1	FF	1.25		28.05.13	6C Process control
19	F2	Module	7:1	1	FF	1.16		07.03.13	Process step control
20		-							
21	F4	Module	5:1	1	FF	1.16		19.03.13	I/O System
22	F5	Module	13:1	1	FF	1.9		19.03.13	Communication
23	F6	Module	12:1	1	FF	1.4		19.03.13	Bluetooth, GSM (AT)
24	F7	Module	9:1	1	FF	1.12		25.12.12	IsMemoryMan W11
25		-							
26		-							
27		-							
28		-							
29		-							
30	FD	Driver	2:1	1	FF	1.20		19.03.13	I SystemDriver W11
31		-							
32	FF	System	1:1	0	FF	1.32		16.04.13	OS (IsRTos) W11

The operating system cannot be updated directly by selecting it from the list, instead a new version is downloaded to the program position one (First line, 1 E0). During the next start-up the old operating system will check the downloaded version, and if it seems to be ok, and the operating voltage is more than 20V, the old system is deleted and replaced by the new version and the systems starts normally. The exchange is done automatically, and the user cannot influence it. If electricity is lost during the exchange, the part of the operating system that performs the copying will remain in memory, and the copying will be retried at the time of the next start-up.

The operating system downloaded to place one (1) will not be deleted after the changeover, but it will remain as a spare copy. The operating system in place one is updated in the same way as other program modules, automatically or manually.



No	Place	Type	Type...	Status	Setting	Version	New version	Revision Date	Description
1	E0	System	1:1	0	FF	1.32		16.04.13	OS (IsRTos) W11

I/O Configuration

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 ISC'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 LoRes		Käyttöjännite	0: 1	9301	Operation power	26 229 mV	
2	Analog LoRes		Lämpötila	0: 2	9302	Device temperature (Power supply)	45.8°C	
3	Analog LoRes		TC Cold End	0: 3	9303	Connector temperature (Cold end)	46.6°C	
4	Analog HiRes			1: 1	4355	Controller 1 Temperature (Measured)	52.5°C	
5	Analog HiRes		[R1 Tc]	1: 2	4387	Controller 2 Temperature (Measured)	60.2°C	
6	Analog HiRes		[R5 Tc]	1: 3	9337	Cold End measurement 1		Manual
7	Analog HiRes		[R6 Tc]	2: 1	4419	Controller 3 Temperature (Measured)	51.3°C	
8	Analog HiRes		[R2 Tc]	2: 2	4451	Controller 4 Temperature (Measured)	63.1°C	
9	Analog HiRes	0	[R4 Tc]	2: 3	9338	Cold End measurement 2		Manual
10	Analog HiRes			3: 1	4483	Controller 5 Temperature (Measured)		Manual
11	Analog HiRes			3: 2	4515	Controller 6 Temperature (Measured)		Manual
12	Analog HiRes	0		3: 3	9339	Cold End measurement 3		Manual
13	Digital Out			4: 1	8453	Controller 1 Output Power %	4 %	
14	Digital Out			4: 2	8485	Controller 2 Output Power %	4 %	
15	Digital Out			4: 3	8517	Controller 3 Output Power %	5 %	
16	Digital Out			4: 4	8549	Controller 4 Output Power %	5 %	
17	Digital Out		Powerin lämpötila	4: 5	8195	Process 1 Measured temperature AVG		
18	Digital Out	0		4: 6	0			
19	Digital Out			5: 1	8581	Controller 5 Output Power %	5 %	
20	Digital Out			5: 2	8613	Controller 6 Output Power %	6 %	
21	Digital Out			5: 3	9000	Process running (Output)	Running	
22	Digital Out			5: 4	9001	Device fault (Output)	No Fault	
23	Digital Out	0		5: 5	0			
24	Digital Out	0		5: 6	0			
25	Virtual			1	9315	Extra Temp 1		
26	Virtual			2	9316	Extra Temp 2		
27	Virtual			3	9317	Extra Temp 3		
28	Virtual		8SS1	4	9318	Extra Temp 4		
29	Virtual		8SS2	5	9319	Extra Temp 5		
30	Virtual		8SS3	6	9320	Extra Temp 6		
31	Virtual	0	8SS4	7	0			
32	Virtual		8SS5	8	9601	Simulated heater 1	36.0°C	
33	Virtual		8SS6	9	9602	Simulated heater 2	36.7°C	
34	Virtual			10	9603	Simulated heater 3	38.4°C	
35	Virtual			11	9604	Simulated heater 4	39.0°C	
36	Virtual			12	9605	Simulated heater 5	40.1°C	
37	Virtual			13	9606	Simulated heater 6	41.3°C	
38	Virtual	0		14	0			
39	Virtual	0		15	0			
40	Virtual	0		16	0			
41	Virtual	0		17	0			
42	Virtual	0		18	0			

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	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.

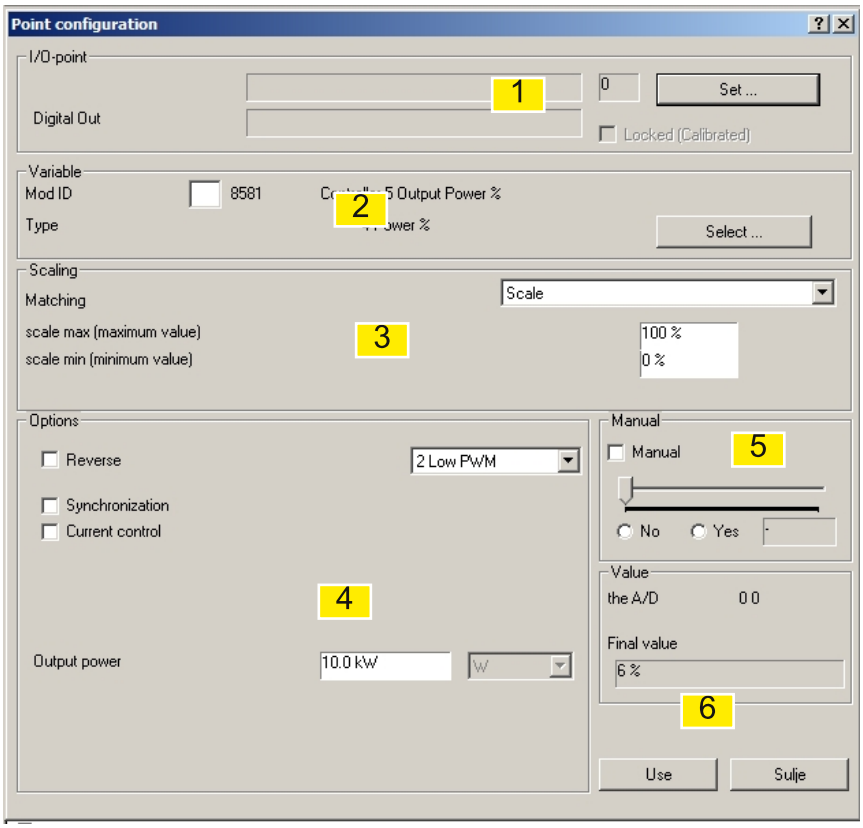
Variable name: The description of the point in the definition file

Value: The current value

Status: The current action

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

Configuration dalogue 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

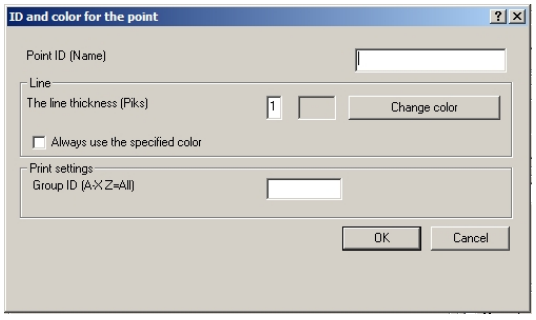
[2] The variable of the point
The variable connected to the I/O point. The variable can be connected to one input at a time, in the outputs the same variable may be used more frequently. The dialogue for selecting the variable is opened by the "Select" button.

[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

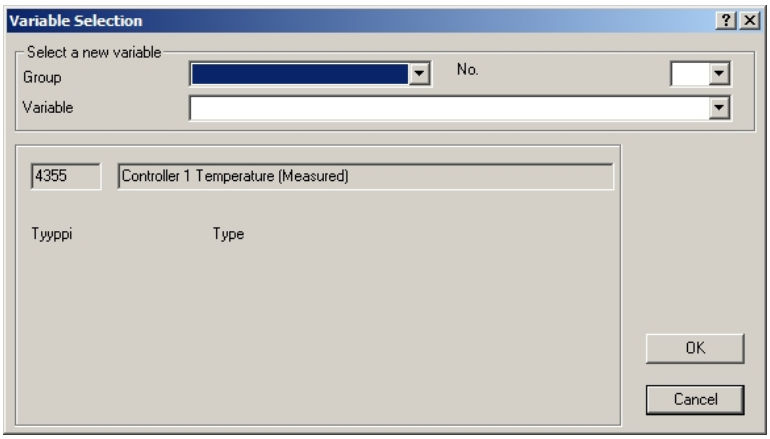
[1] Point description



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

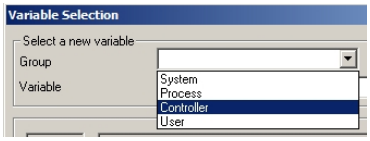
The variable selection dialogue is opened, and the variable is selected from the list. All user's variables must be defined in advance in the ISPortIO.txt file. The variables are divided into groups to make the selection easier. If you want to detach a variable from the I/O point (delete) do not choose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

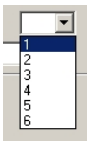
Open the configuration dialogue by double-clicking the desired input. In the picture the first point of the first adapter. The H-type adapter has three points. The controller's temperature sensor can only be connected to a H-type adapter.

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

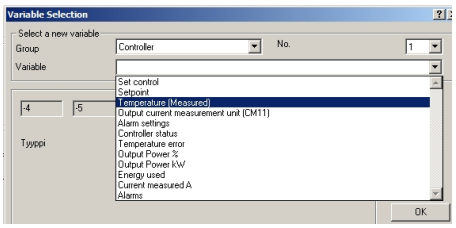
Select the "Controller" group

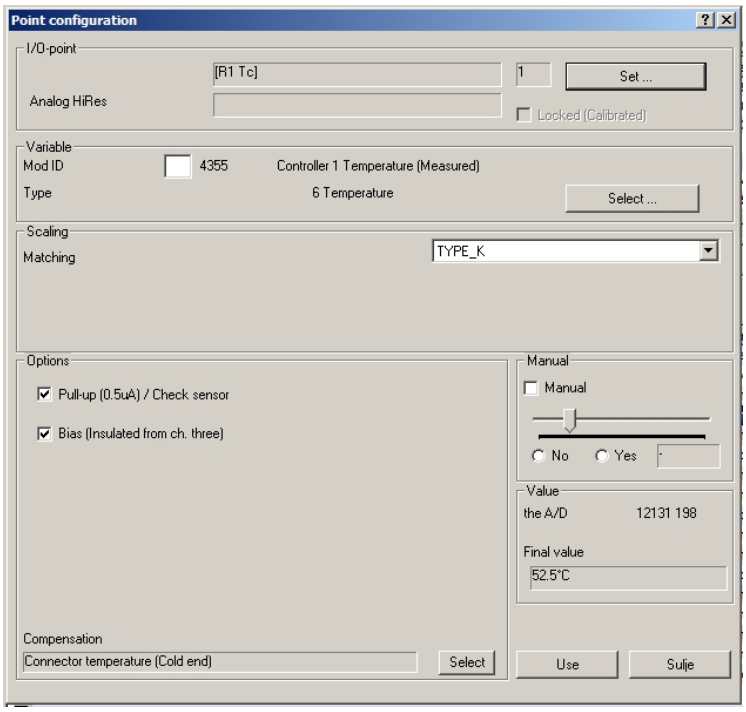


Select controller No. 1



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.

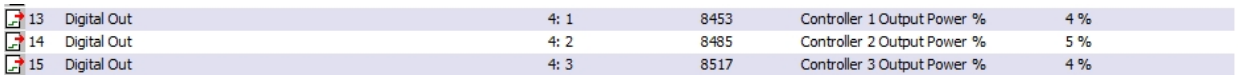
Pull-up set (a continuous 0.5 uA current for testing the sensor)
If the sensor is broken (loose), the temperature rises over the range, and sensor fault is detected.
Pull-up not set
The pull-up may interfere with other devices using the same sensor, where the pull-up is switched on. If a broken sensor 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.

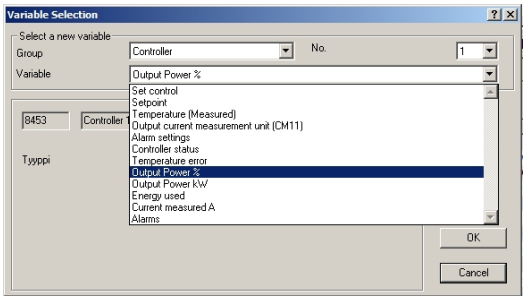
Close the dialogue using the "Close" button

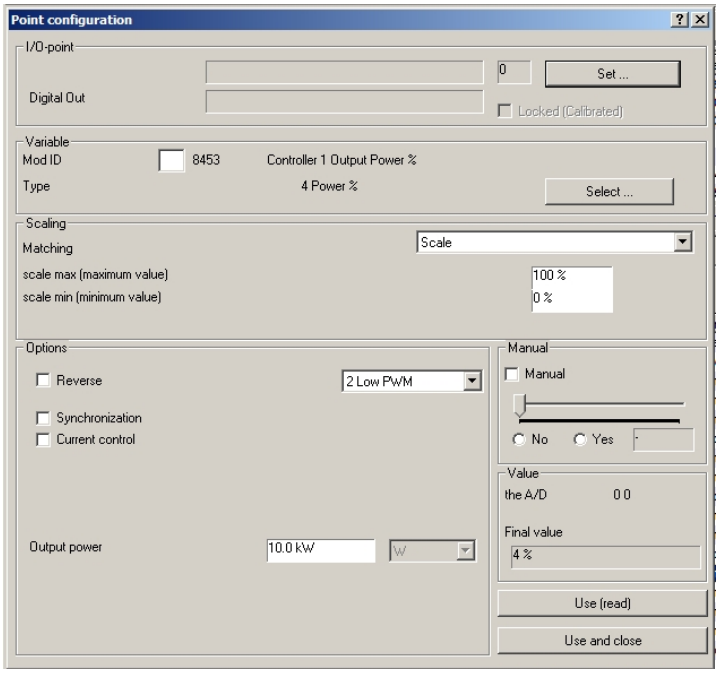
Example: The configuration of the controller's No. 1 power output.

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.



Select "Output power %" as the variable





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 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

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 ouput power is cooling power)
On/Off: Output is inverted (Reverse)

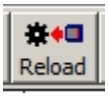
Current control

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 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.



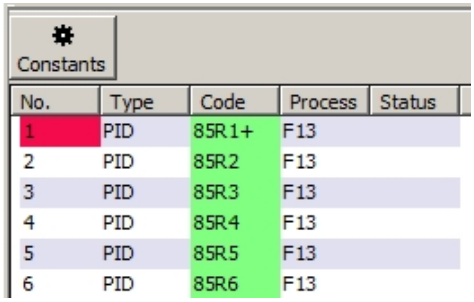
If you want to recover the previous configuration in the middle of making changes, this can be done by the "Reload" button. After saving the previous configuration can no longer be recovered. After the reset the list is updated when the tab is visited again.

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)

Temperature controllers

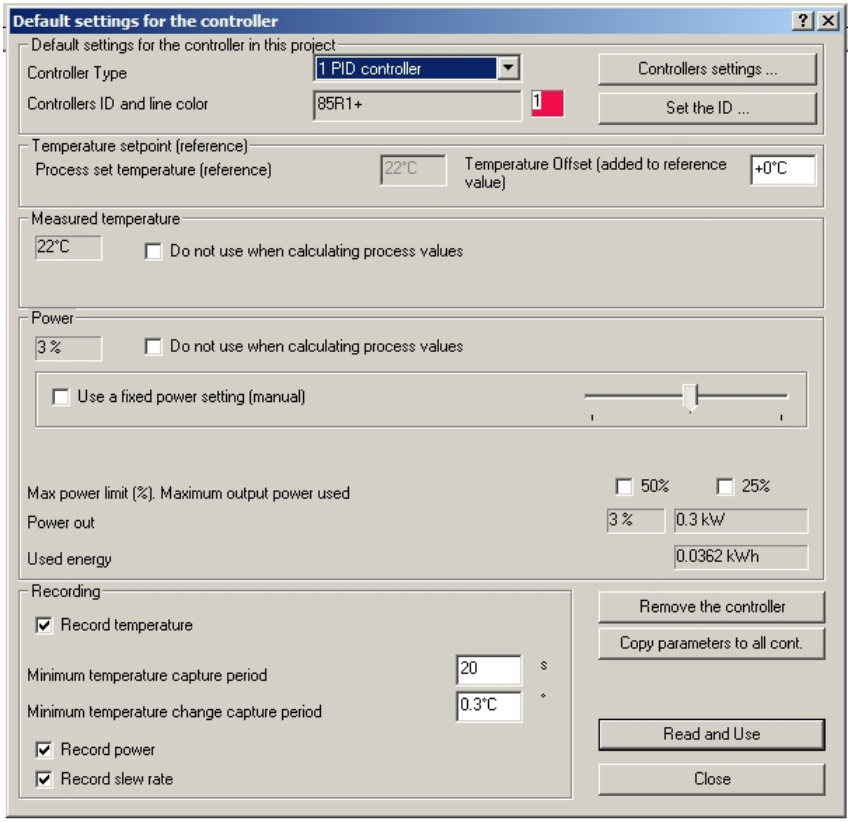
Temperature controllers

The settings of the temperature controllers are usually changed when the controller is in use (connected to a project). Then the controller settings dialogue can be opened by double-clicking the controller at the "Connected devices" list. The controller's ID is read into the project data when the controller is selected to the project, so ID must be set before connecting.



Controller list

The "Settings" dialogue is opened by double-clicking the controller line. In the picture for the controller one (1) has been set a fixed color, and controller five (5) is in use in the project Q52.



Most of the dialogue settings work in the same way as when the dialogue is opened from the "Connected devices" list (Instructions part 1).

Set the ID

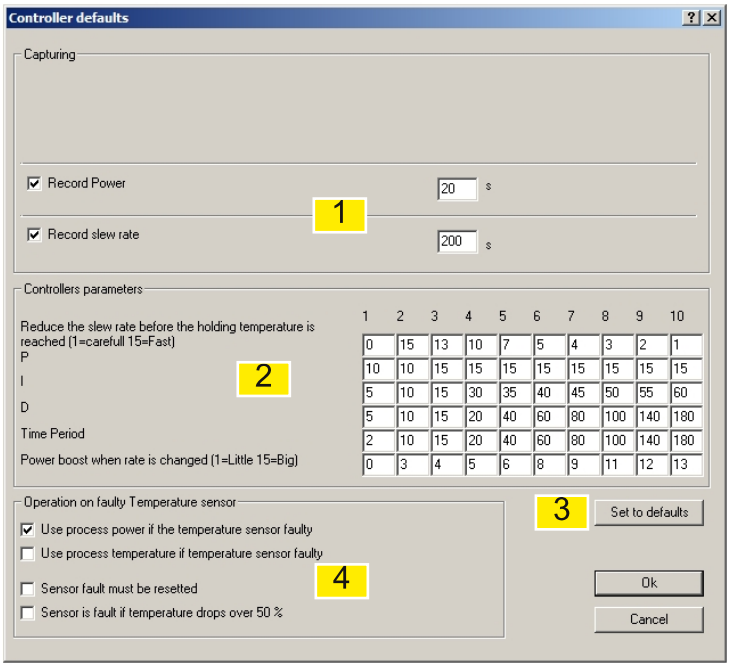
Controller's ID-number. If for the controller has not been defined a fixed color, the colors defined in the PC settings are used in the order in which the controllers are added to the project . All controllers (or points) do not need have a fixed color.

Disconnect the controller from the project

If the project (heating) is removed from the PC project list, or the process has been started from another PC, the dialogue cannot be opened from the "Connected devices" list, and the settings cannot be accessed. In this case one way to stop the process is to remove all the controllers from it, whereupon the process will stop.

Controller defaults

Constants



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] Saving

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 saved values. Saving is performed at regular intervals. If the power and change diagrams are not needed, it is recommended to turn off saving in order to save flash memory. The On/Off setting can also be controlled from other dialogues, but the saving interval is only determined here.

Save power
Save rate of change
Fixed saving interval

[2] The controller parameters

The controller's PID parameters consist of five different values. Since the values usually depend on each other, it makes sense to adjust them together. The "Additional 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 in moved from the "controller parameters" table to all the controllers connected to the project. The explanations of the parameters can be found in a separate instruction.

[3] The factory settings

All of the dialogue settings can be returned to the default values

[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.

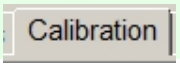
Use the process temperature

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 (16b) are calibrated. Calibration and the possible additional information for the calibration certificate are saved to the device's EEPROM memory.

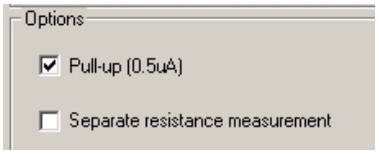
Preparation before calibration using the I/O configuration

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.



4 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.

5 Checking the value of the cold-junction

If points, which are not calibrated are used for compensation, it must be ensured that the temperature reading is approximately correct. If necessary the point's offset can be adjusted.
With NTC-type measurement, the temperature reading drops when the offset increases.
If the offset is changed, and the new value is set by the "Apply" button, then the temperature reading can be checked from the "Final value" field.

6 Save the configuration to the device

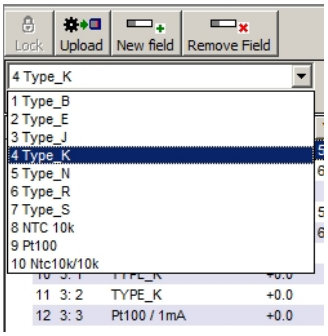
It takes a while before temperature readings are correct.

Carrying out the calibration

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.

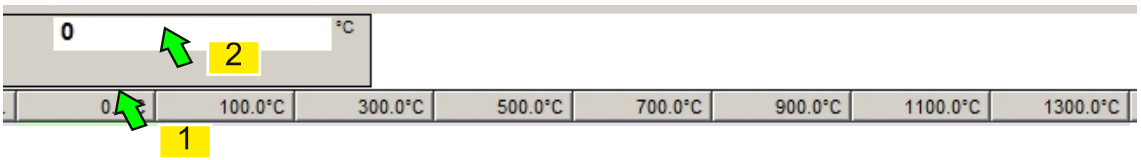
Selecting the points to be calibrated



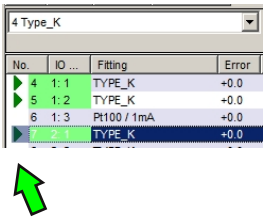
The type to be calibrated is selected from the list. Also, the calibrator is set to source same type. All the same type of I/O points can now be selected for the actual calibration.

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.
You can move to the next column also by using the TAB button



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.
Points to be calibrated are activated by clicking on the number field. The green triangle indicates an activated point.

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 correction" button.
5 When the error is zero, the dialogue can be closed
6 The same operation is done for all activated activated points (Section 3)

The gain calibration

Gain calibration (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 correction" button.
5 When the error is zero, the dialogue can be closed
6 The same operation is done for all activated activated points (Section 3)

Filling in the checking table

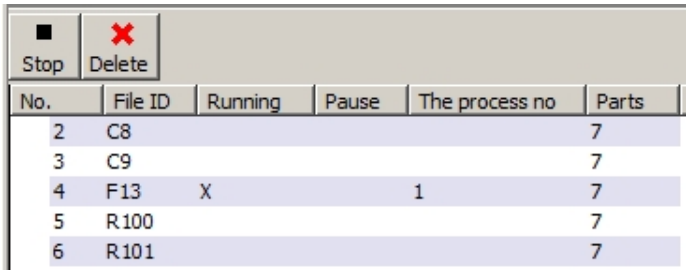
1 Select the temperature and column where the error is checked by clicking on the column header.
2 Set the same temperature into the calibrator.
3 When all the measuring points have error values, move to the next column
4 Finally deactivate points.

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

Process Instructions (heating plan)

Process Instructions

Before starting the process, the software uploads the heating plan to the controller's memory. There is space reserved in the controller for 24 heating plans. The same plan can be used up to 250 times. The current reference (heating) can be stopped and removed from the device memory.



No.
The plan number (memory location). The plan is automatically uploaded to the first empty location, or if there are no empty locations, to the place with the oldest plan. If the user wants to upload the plan to a specific memory location, then the location number is to be defined in the process settings. The specified location is used if the user would like to start the plan for example with the I/O button.

RNro
Reference ID and file name

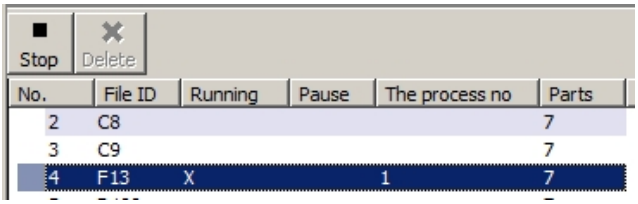
In progress
A reference in use cannot be removed. The process must first be stopped

Pause

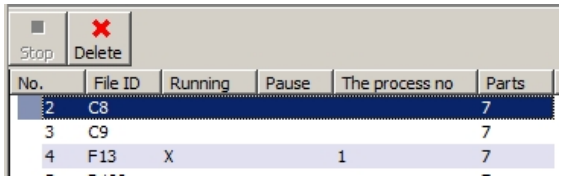
Process
The process execution number. The controller is capable of performing six simultaneous processes. When started, the process will automatically be given the next empty process number, or the defined number is used if free. The process number must be known if the process is referred to, for example via I/O.

Parts
The inspection number. 7 = Ok

The process can be stopped with the "Stop" button. This stop method should only be used when the process can not be found on the controlling PC. Then the process has been started on another computer, or the process has been removed from the PC.



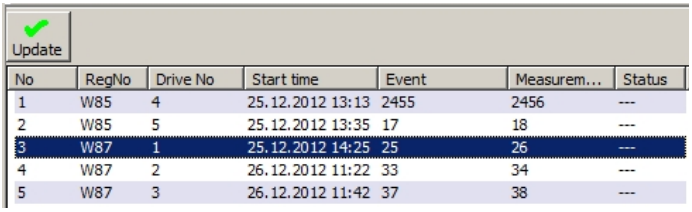
The plan can be removed from the device memory. Normally there is no reason to remove unnecessary references, as they are automatically erased when new references are loaded into the memory.



Completed processes

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.
Memory location 1-250. Ring buffer
RegNo
Completed process ID (file name)
Process 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.

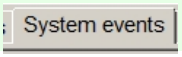
The recovering dialogue is opened by double-clicking the line of the process to be recovered

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.

System events



The most recent events. Only for monitoring

Printing

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