Inspired by
temperature

SpyControl®

Manual

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SpyControl®

Table of contents

1 Introduction

SpyControl® is a software to visualize and document process-relevant data. The outstanding feature it offers is the possibility of controlling several temperature control units by means of a programmer. The communication takes place via RS-232, RS-485 or TCP/IP. The installation is very simple. SpyControl® requires hardly any computer storage space and is very easy to operate. The recorded data are plotted against time. The axes of the diagram are freely scalable. A zoom function simplifies the graphical analysis of individual time periods. SpyControl® is able to simultaneously record the data of up to 10 temperature control units. Each data channel is documented independently and the graphical visualization options are also freely configurable. SpyControl® allows the user to create temperature programs which then run automatically. The segments of a temperature program are entered in a user-friendly manner in the so-called Temperature Program Xplorer (TP Xplorer). The temperature programs created can be modified and archived as desired.

2 Installation / important notes

To install SpyControl®, start the appropriate installation program that can be downloaded at www.huber-online.com. The program is compatible with the operating systems Microsoft Windows 7, 10 and 11. The installation program was designed to be user-friendly and does not require any special knowledge. It copies SpyControl® to a directory of your choice. Then it creates links to the desktop and entries in the start menu.

In the course of installation, you can decide between different versions of the program. "SpyLight" is free of charge and offers the option to record a temperature control unit or to visualize already existing records. The number of value series displayed may be reduced for this version. In addition, it does not come with a programmer. "SpyControl" requires a license fee to be paid. With its enhanced range of functions and programmer, this version can record and provide visualizations of up to 10 temperature control units. "SpyControl Evaluation" offers you the option to evaluate the entire range of functions for 30 days free of charge. After expiry of the evaluation period, the program will be downgraded to the free-of charge "SpyLight" version. It is possible to activate "SpyControl" and "SpyControl Evaluation" at any time even after installation.

2.1 Important note:

- Follow the operation manual of the temperature control unit used!
- This application makes use of the PC system time as reference for the time base. Please note that any change to the PC system time by a time server **or** the automatic clock change from daylight saving time to standard time can lead to faulty data records.
- To establish a connection via RS-232, the slave address 1 must be selected at the temperature control unit used.

3 Starting SpyControl®

3.1 User Interface
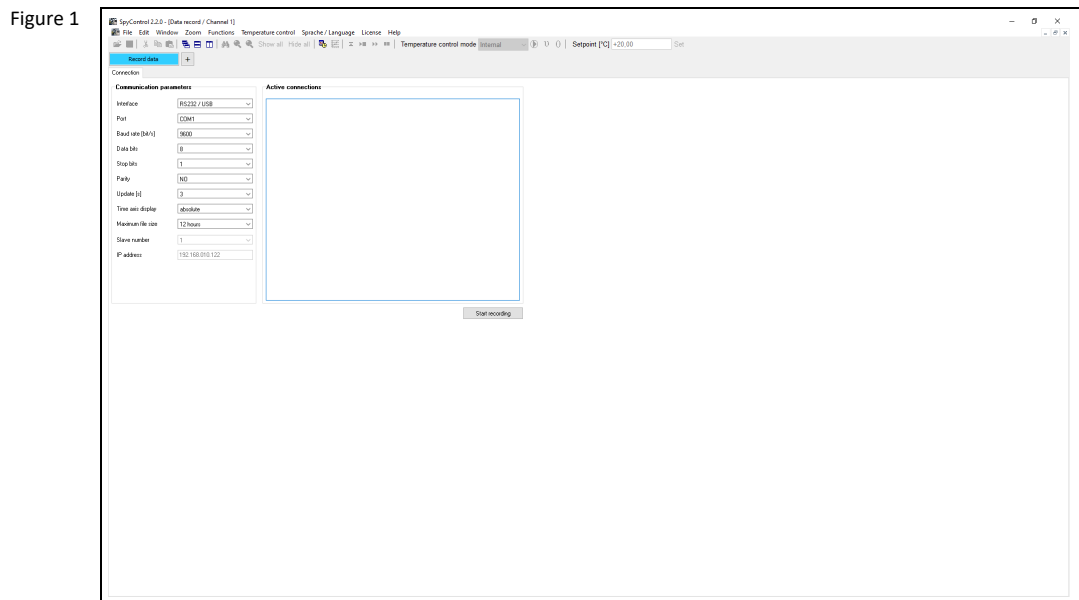
Figure 1

SpyControl offers the option of visualizing an already existing file, starting a new data recording, executing a temperature program in a programmer or calling up the Temperature Program Xplorer.

Figure 1 shows an overview of the user interface. The main window consists of several bars with different functions and is used to manage the individual subwindows.
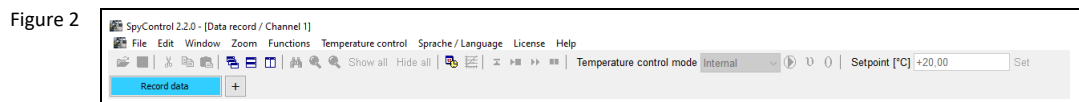
Figure 2

Figure 2 shows the menu, function and channel bar of the main window. The function bar below the menu offers fast access to the most important functions. All functions shown can also be found within the menu.

All functionalities require a channel where the data can be displayed. Up to ten data channels that are displayed as subwindows can be displayed at any one time. The individual subwindows can be opened and displayed via the channel bar.

The menu bar is made up of the following menu items:

- File
- Edit
- Window
- Zoom
- Functions
- Temperature control
- Sprache / Language
- License
- Help

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3.2 File

This menu item can be used to configure a data recording, to visualize already saved data, to call up a programmer or the Temperature Program Xplorer. An already opened child window can be closed when the focus is placed on it. During the data recording phase, it is possible to save the measured values of the current data recording. You have the option of printing the currently displayed measured values or the content of the application's information windows. It is also possible to save a picture of the current visualization and to close the application.

3.3 Edit

This menu offers text operations. Thus it is possible to copy a status or error message from an information window to the clipboard. In this manner, the information can be made available to other programs. The standard operations "Cut", "Copy" and "Paste" are available.

3.4 Window

This menu item is used to graphically arrange existing child windows. Child windows can be arranged in an overlapping, vertical or horizontal manner. The menu also shows all existing child windows. This function is very useful if a child window conceals another child window.

INFORMATION	This product supports ten child windows.

3.5 Zoom

This menu item provides the zoom functions "Overview", "Arrange left axis" and "Arrange right axis". These functions are described on page 17 in section **»Zoom functions«**.

3.6 Functions

This menu item contains functions for the graphical display. With "Show all" and "Hide all" it is possible to hide or show all signals at once. The display of errors and segments of the programmer can be controlled with the functions "Segment marks" and "Error marks". In addition, it is possible to change the designation of the current channel.

3.7 Temperature control

Here you can switch circulation or temperature control of a temperature control unit on or off. In addition, you can specify a setpoint for the current temperature control unit.

INFORMATION	For a programmer, these functions are only available if no temperature program is activated.

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3.8 Sprache / Language

With this menu item the language used in SpyControl® can be set. You can choose between German and English.

3.9 License

This opens a window where user and license information is displayed.
Alternatively, "SpyControl Evaluation" or "SpyControl" can be activated if the software was installed without a license key. Clicking on the button "Registration" opens an input field for the license information. Restart the application after you have successfully entered the license key to gain access to all functions. With the function "Activate evaluation", you can start a period of 30 days during which you can evaluate the entire range of functions free of charge. Please note that this function is only available if the test version has not yet been activated. When the evaluation period has elapsed, you can continue to use the "SpyLight" version free of charge.

3.10 Help

You can open an information window under this menu item. You can find the manual in PDF format in the SpyControl® installation directory.

4 Recording new data

Before starting to record data, you must connect a thermostat to your PC. The interfaces RS-232, RS-485 and TCP/IP are available for this purpose. How to connect the temperature control unit by means of a serial interface cable is described in the operation manual of the appropriate temperature control unit. After you have connected a temperature control unit to your PC, you can select the menu item "Record data" via the menu "File", submenu "New", as illustrated in the following picture (Figure 3). You can also call the menu item "Record data" via the short cut key <Ctrl+N>.

Figure 3
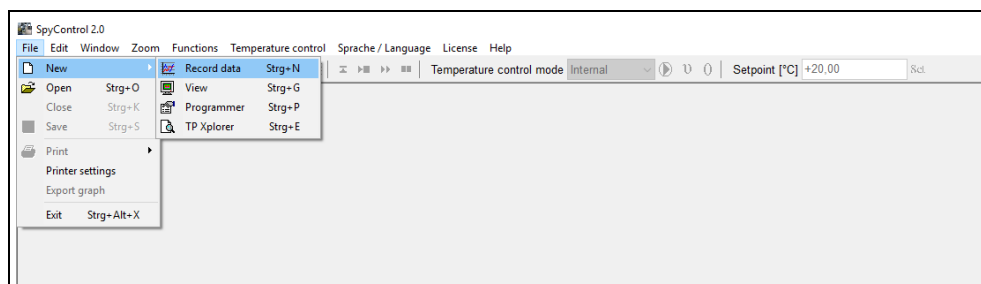
Subsequently you must specify important parameters for the transmission in another window. This includes, for example, the required interface, the appropriate COM port and the Baud rate. The individual parameters are described in the following Table 1.

Table 1

| Parameters	Description
Interface	Select the required interface (RS-232/USB, RS-485, TCP/IP). To establish a TCP/IP connection, you must specify an IP address and a corresponding port. **Note:** A firewall can cause the communication between PC and temperature control unit to fail.
Port	Depending on the interface selected, the program determines the available COM ports.
Baud rate	This parameter can have values ranging from 1200 bps to 19200 bps. You can reference the correct value in the operation manual of the connected temperature control unit.
Data bits	Here you can normally apply the default value.
Stop bits	Here too you can apply the default value.
Parity	You can apply the default value.
Update	The graph is updated with the currently measured process data after the specified time. Keep in mind that a high updating rate causes the file size to increase accordingly.
Time axis display	When a relative time axis display is chosen, the time axis starts at zero seconds. By contrast, the time axis starts with the current system time when an absolute time axis display is chosen.
Maximum file size	The maximum file size determines after what time a new file is created for the ongoing recording.
Slave number	It is only possible to determine this parameter with interface RS-485. It specifies the identifier of the slave used.
IP address	If you have chosen the TCP/IP interface, you can here specify the IP address.

INFORMATION

You must install the Pilot ONE driver package on your PC to be able to use the USB interface on the temperature control unit. You can download the driver package under www.huber-online.com. The driver provides a virtual COM interface on the PC. After installation, please connect a USB cable with USB Mini-B connector to the left-hand socket of the Pilot ONE. The PC now offers the option to communicate with the temperature control unit via the COM interface.
The virtual COM interface only becomes visible after selecting the "RS-232/USB" interface under the menu item "Port".

Once these parameters have been specified, you can start with the identification of the temperature control unit by clicking the button "Start recording". During the identification process, different commands are sent to the temperature control unit. Apart from the name and the serial number of the device it is determined which value series can be recorded.
Figure 4 shows that the temperature control unit has been successfully identified.

Figure 4
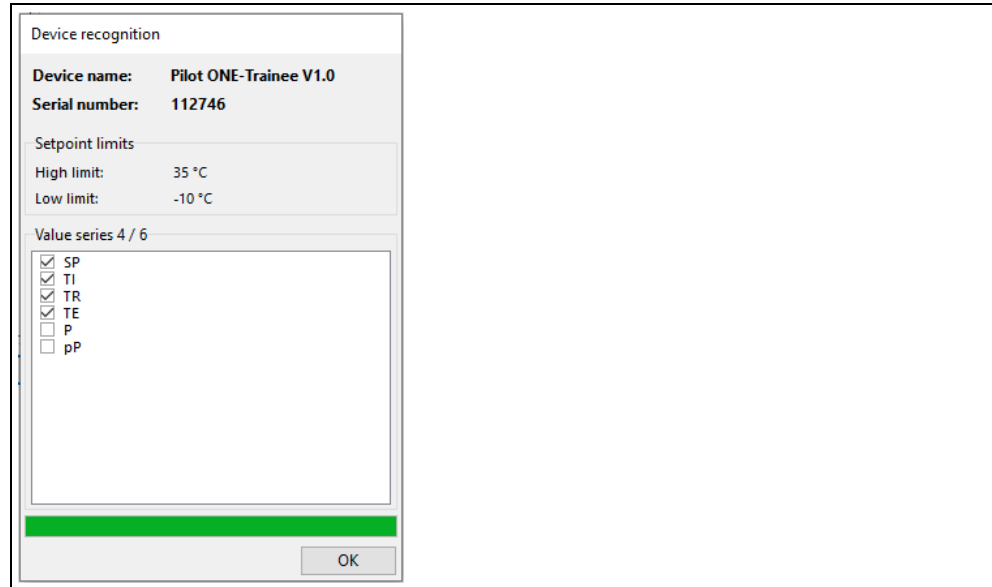
Following the successful identification, a list of values series is displayed, which can be recorded by the software. For temperature control units with Pilot ONE and current software version, this list may vary. The number of value series depends on the type of machine and the E-grade. In addition, by setting or removing the checkmark it is possible to specify which value series are to be actually recorded.

For devices without Pilot ONE or with older software versions, a fixed list is used that cannot be edited.

Once you have confirmed the identification, you can specify a file name for the recording. The application automatically changes to the following display (Figure 5).

Figure 5
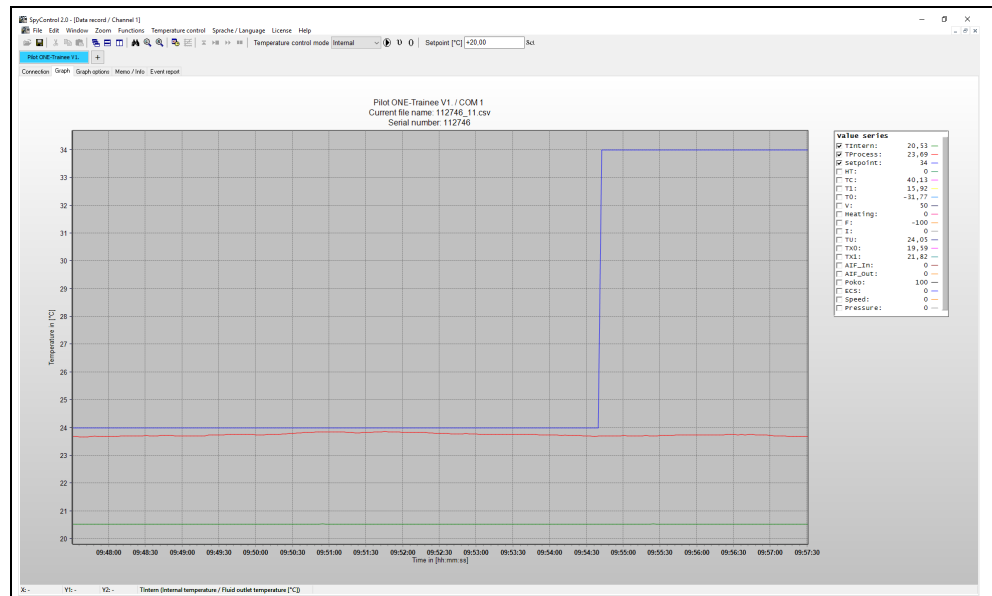
The user is now offered the option to obtain additional information about the current data recording by means of five tabs. In the "Connection" tab on the left-hand side of the window you can view the previously specified parameters and on the right-hand side an overview of the current connections.

The "Graph options" tab is used to change the graphical representation of process data. Under the "Value series" tab you can change the name and color of a value series. In the "Scaling" group you can manually specify the axis values or select automatic scaling for the time axis or Y axis. Automatic scaling overrides a manual setting. In addition, the "Graph" group enables you to activate / deactivate the course of the graph (the border of the visualization) or the representation of the current values of the signals in an expression.

Two information windows can be found under the menu item "Memo / Info". The left-hand window is used to record notes regarding the current data recording. The right-hand window, by contrast, is used to display information such as the temperature control unit used and the path and file name of the current data recording. The file is compatible with MS Excel as it has the extension csv (comma separated value). The file name is made up as follows:

<Name or serial number chosen by user> + _<Data channel> + <Index>.csv

A new file is automatically generated if a data recording lasts longer than the maximum file size. The index is increased by 1 in such a case.

The last tab provides event-specific messages such as the start of a new data recording or possible errors during a data recording. For control purposes, each entry is recorded with the current data and current time.

The "channel bar" provides you with an overview of how the ten data channels are used. The green-colored channels represent visualizations. By contrast, blue-colored channels are allocated to the data recordings. A channel marked yellow indicates the use of a programmer and an amber-colored channel is used for the TP Xplorer. Clicking on a channel changes to the corresponding child window. The current channel is then displayed in a brighter color. Non-assigned channels are hidden or grayed out. In the top area of the control, you can switch circulation or temperature control on or off and specify a setpoint. If, for example, you want to switch to external temperature control, first select "Process" under "Temperature control mode" and then click on the "ϑ" symbol. The corresponding operation is carried out after a security query.

INFORMATION	Make sure that you have selected the correct temperature control unit beforehand!

5 Visualizing an existing data record

To visualize a data recording that has been saved beforehand, select the menu item "View" under the "File" menu, submenu "New" or use the short cut key <Ctrl+G>. You can now select the corresponding file in a file browser.

The left-hand axis of the graph represents measured values in the unit Degrees [°C]. All other measured values are plotted on the right-hand axis. The horizontal axis is noted in absolute or relative time. A legend with the attributes of the measured values can be found to the right of the graph. The activation, the name and the color of each value series are shown. In addition, the measured values are shown at the position of the mouse pointer when the mouse pointer is located in the graph. There is a bar above the graph, which specifies the assigned data channels and the currently active data channel. In this bar, a menu, which can be used to open further data channels, can be opened with a mouse click on the "+" character.

Figure 6
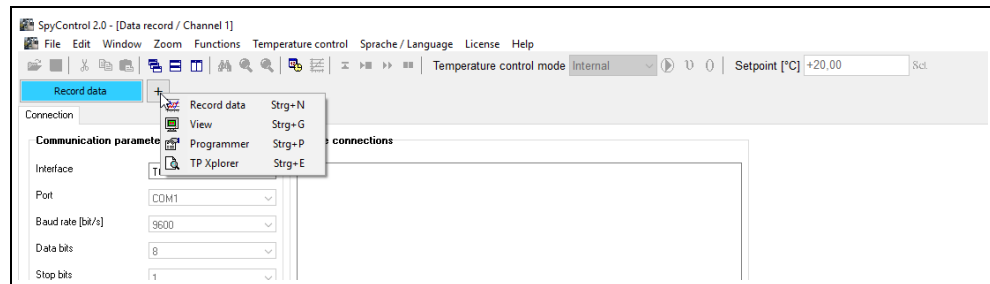
The menu item "Graph options" is subdivided into three areas. These areas are named "Value series", "Scaling" and "Graph". In the "Value series" area, you can select a color and specify a name. The second area can be used to manually set the minimum and maximum axis values of all three axes. It is also possible to select automatic scaling. In this case, the minimum of the time axis is fixed and the maximum is adapted to the current time value. The minimum depends on the option "Time window". A time window represents the user-defined time span of the current data recording. All measured values that are older than this time span are hidden. In the "Graph" area you have the option to change the color gradient in the background and to activate/deactivate the display of the current signal values. The button "Apply values" applies all modifications made since the menu was called last.

The "Memo / Info" tab contains a text input window and an information window. The text input window contains a preformulated test description. You can also enter user-defined descriptions for a temperature control process. The information window displays program status messages. The content of both windows can be both printed and saved. Another information window, which displays its information by means of status and error messages with date and time of the message, is located below the menu item "Event report".

Several options are available for an accurate analysis of the recorded data. First of all, it is possible to manually display a range by means of the "Graph options". In addition, you can move the graph by an arbitrary range with the right mouse button. However, you should make sure that the starting point is not located on a value series, as otherwise there will be no function. Basic and enhanced zoom functions are integrated in this program for a larger display of a range. Please read page 17, section **»Zoom functions«**.

6 Designing a temperature program

A Temperature Program Xplorer (TP Xplorer), by means of which temperature programs can be visualized as tree structure, was implemented to enable the simple design of a temperature program. You can call up the "TP Xplorer" via the menu "File", submenu "New" or via the short cut key <Ctrl+E>. The structure of the TP Xplorer can be viewed in the following picture (Figure 7).

Figure 7
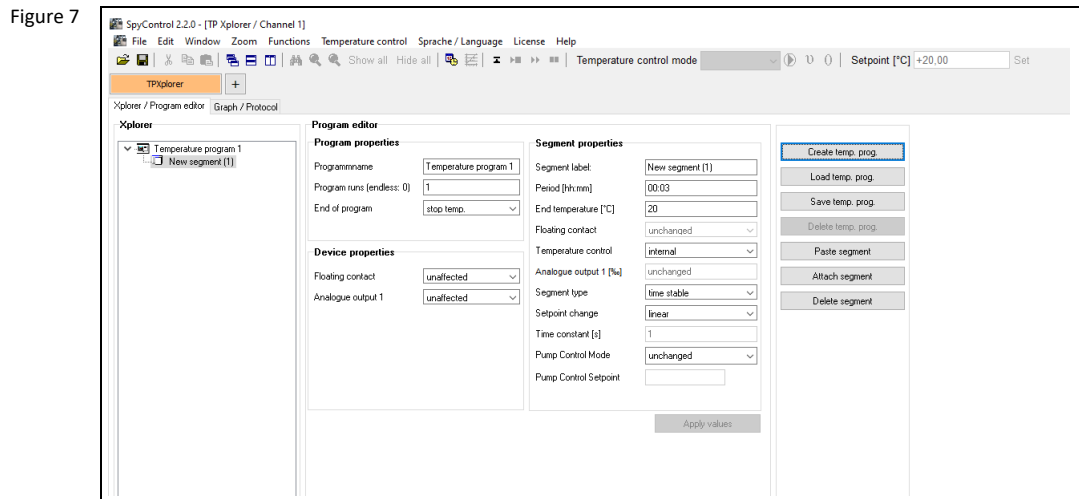
You now have the option to load a temperature program or to create a new temperature program via the corresponding buttons. Depending on the respective situation, further menu items, for example, "Delete program", "Attach segment", "Delete segment" or "Paste segment" can be selected. The above-mentioned functions are also available by **right-clicking** a temperature program. A temperature program is displayed with its name and the designations of its segments. Program and segment features are shown to the right of the Xplorer. They are updated by **left-clicking** on a segment or on the source of a temperature program.

The program properties include the parameters "Program name", „Program runs" (how many times the program is to be repeated) and "End of program" (the current temperature control is continued or terminated).

The device properties consist of the parameters "Floating contact" and "Analogue output 1" that can be activated or deactivated.

Segment properties include the parameters "Segment label", "Period" (length of a segment in hours and minutes), "End temperature" (temperature to be reached after expiry of the segment length), "Potential free contact" (the POKO can be switched actively or passively), "Temperature control method" (the specified setpoint is defined for the external or internal temperature control), "Analogue output 1" (the specification for the analogue output in per mill), "Segment type" (a segment of a temperature program is executed with time or temperature stability). In the case of a temperature-stable segment, a check is made after the end of the segment duration to see whether the internal or external temperature is within a temperature band of ± 1 Kelvin of the target temperature. If that is not the case, the current specified setpoint is retained. A time-stable segment type is only based on the specified segment length.

Additional parameters are „Setpoint change" (linear or exponential change of the setpoint), „Time constant", „Pump control mode" (setting the speed, pressure or flow rate control for the pump) and „Pump control setpoint". A temperature control program with modified pump control mode can only be executed for devices supporting this function.

If you change the properties of a segment or temperature program, the modifications must be confirmed by clicking on the button "Apply values". In this product, you can simultaneously edit up to ten temperature control programs with 200 segments each.

7 Use of a programmer

The programmer allows for a thermostat to be controlled by a previously created temperature program. It can be called up via the menu "File", submenu "New" or via the short cut key <Ctrl+P>. First of all, as described under the program item "Record data", you must define the connection parameters and start identification of the temperature control unit by clicking on the button "Start recording". After successful recognition, the process data of the connected temperature control unit are recorded as for ordinary data recording. In addition, it is now possible to load **one** temperature program by means of the corresponding button on the tab "Xplorer / Program editor". In contrast to the "TP Xplorer", no segments can be attached, deleted or pasted. However, it is possible to adapt the segment properties, provided the temperature program is not currently running.

A temperature program is started by clicking on the button "Start temperature program". Further buttons are activated thereafter. You are now given the option to abort the current temperature program, to pause a segment or to skip to the next segment. During execution of a temperature program, the legend of the visualization below the tab "Graph" displays the remaining time of the current segment. You can determine the current state of the temperature program by clicking on the tab "Graph / Protocol". Refer to the following Figure 8 in this regard. The general course of the temperature program is displayed in the top area of the screen. Segments that have not yet been run are colored blue and segments that have already been run and the current segment are colored yellow. To the right of the graph, a legend shows the number and name of the individual segments. Below the graph, a log records the current step with the current date and time. In the example shown, the temperature program "SQUARE" was started.

Figure 8
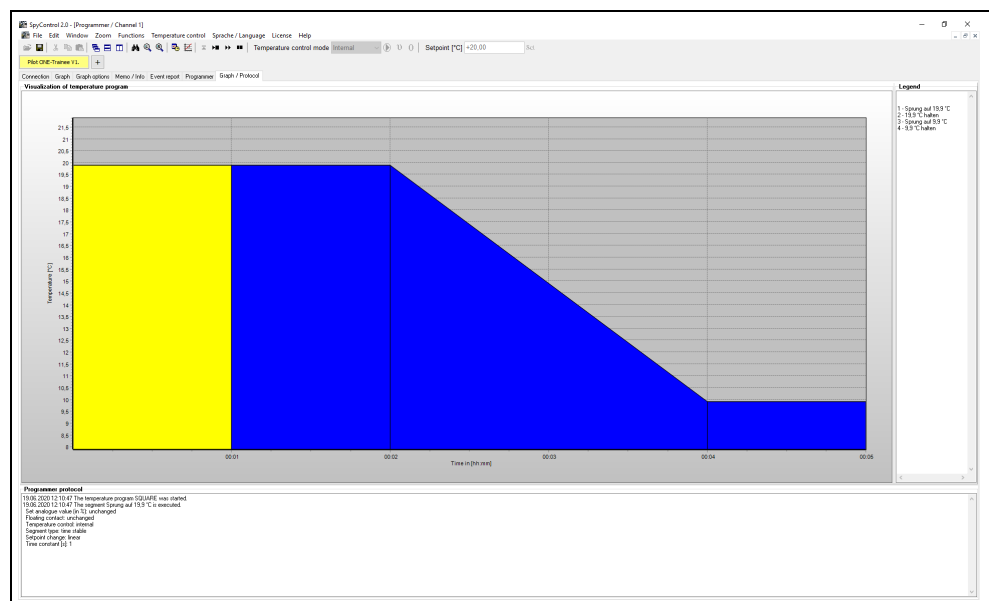
With a programmer, you can control a thermostat via a channel. You can use further programmers via different channels. You should however keep in mind that the use of several programmers makes high demands on speed and storage capacity of your PC hardware.

MANUAL

8 Calendar start

SpyControl® offers you the option of performing an automatic start of a temperature control process. The following example describes the configuration of such an automatic start:

PROCEDURE

➢ Connect a thermostat to the PC by means of an appropriate Huber data cable.
➢ In the SpyControl® software, select the menu item "File → New → Programmer" and set the appropriate communication parameters. Identification of the temperature control unit starts after clicking the button "Start recording". After the application has successfully identified the temperature control unit, you can call up the menu for configuration of the calendar start by means of the button shown.

Figure 9
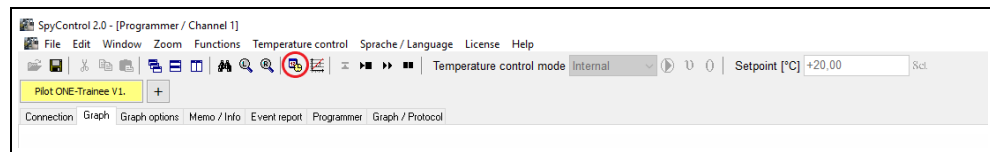
➢ You now see an overview of all available data channels in SpyControl®. Please note that only data channels that are configured as programmer can be provided with a calendar start. No temperature program may be active in the viewed data channel.
➢ Now highlight the first line as shown in the following picture (Figure 10). Click on the button with the directory symbol to load a temperature program. Now start date and start time can be programmed. The start date may be set within a time frame of 96 hours. In addition, you must select the option whether the current data recording is to be suspended or continued up to the start.

Figure 10
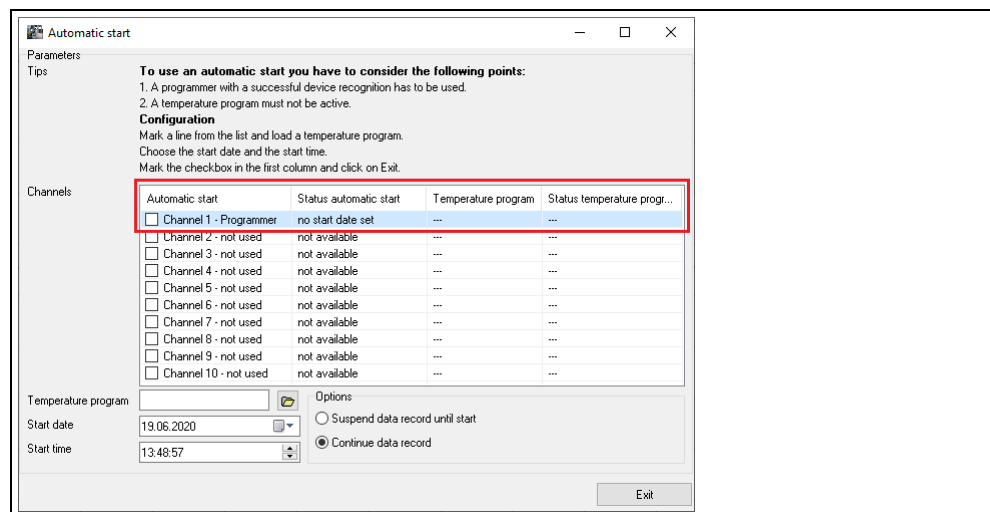
➢ Activate the calendar start after specification of the parameters. To do so, mark the checkbox in the line you have just selected. It is only possible to activate a checkbox if you have loaded at least one temperature program.

Figure 11

➢ Close the dialogue by clicking once on Exit. The status, the start date and the start time are now displayed below the legend. Leave the data channel in this state. When the PC system time matches the specification, the calendar start will be executed.
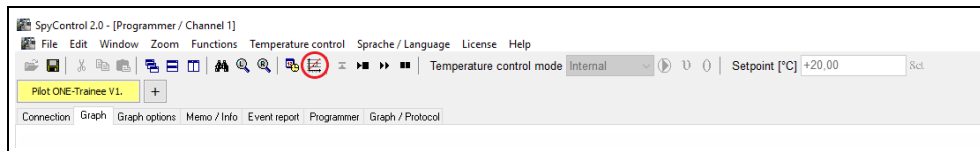
INFORMATION

In the menu mentioned above, you can modify the parameters of a calendar start before it is executed. It is also possible to deactivate a calendar start.

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9 Plotting a single ramp

SpyControl® offers the option of plotting a single ramp in a data channel that has been configured as programmer. Click on the following button.

Figure 12

Specify the end temperature and the period. Confirm the entries by clicking OK. SpyControl® will automatically create a corresponding temperature program. The program is executed immediately.

INFORMATION

1. The data channel used for this must be configured as programmer.
2. It is not possible to execute a single ramp in the data channel considered while a temperature program is executed **or** delayed.
3. A single ramp replaces a previously loaded temperature program!

10 Zoom functions

The basic zoom functions of SpyControl® include the "Zooming in" and "Zooming out" of a graph. You can "zoom in" to a graph by expanding a rectangle from the upper left corner to the lower right corner. Expand the rectangle in the opposite direction to undo the zoom.

Refer to the following Figure 13 in this regard. By clicking on the "binoculars" symbol you are given a comprehensive view of the available graph. This function serves to provide an overall impression of the entire recorded period. The "magnifier" symbols provide the option of aligning value series in such a manner that the entire value range of all active value series on the corresponding axis is made visible.

A manual graphical representation of a section is possible under the tab "Graph options" of a data recording, a visualization or under a programmer. Manually enter the limits **and** deactivate automatic scaling. Make sure you apply the changed values.

INFORMATION

Note regarding the use of the extended zoom functions:
Proceed as follows to visualize a certain range: First deactivate those value series you do not require in the legend of the graph. Then align the value series with the "magnifier" symbol and zoom into the desired range. Reverse the zoom operation to return to the saved range.

Figure 13
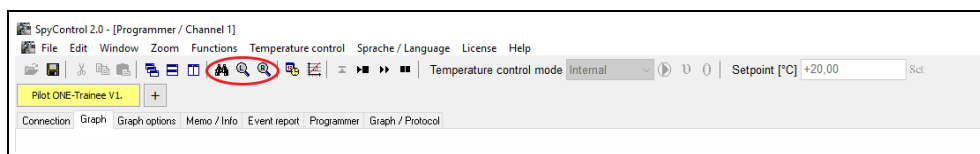
11 Unistat® pin assignment

For a RS-232 connection, a cable must have the following pin assignment:

Table 2

Unistat® side: 9-pin Sub D plug (at Stv12)	PC side: 9-pin Sub D socket
Pin 1 - not connected (analogue I/F, see 3)	Pin 1 - not connected
Pin 2 - data in	Pin 3 - data out
Pin 3 - data out	Pin 2 - data in
Pin 4 - not connected (analogue I/F, see 3)	Pin 4 - connect with pin 6
Pin 5 - ground (for RS-232/485, see 2)	Pin 5 - ground
Pin 6 - not connected (for RS-485, see 2)	Pin 6 - connect with pin 4
Pin 7 - not connected (for RS-485, see 2)	Pin 7 - connect with pin 8
Pin 8 - not connected (for RS-485, see 2)	Pin 8 - connect with pin 7
Pin 9 - not connected (for analogue I/F, see 3)	Pin 9 - not connected
Shielding not connected	Shielding connected, connect with plug housing.

12 List of abbreviations process data

During data recording, the identifiers of the process data are shown in abbreviated form in the graph legend. The meaning of these abbreviations is listed below:

Table 3

Abbreviation	Meaning
TIntern	Internal temperature / supply temperature [°C]
TProcess	Process temperature [°C]
Setpoint	Setpoint [°C]
HT	Position of HT slide valve
TC	Condensation temperature [°C]
T1	Temperature evaporator end (depending on the temperature control unit used)
T0	Evaporation temperature
V	Position of expansion valve
Heating	Main heating [%]
F	Fine heating [%] (is shown in the range 0 -100 in the graph)
I	Current coefficient
TU	reserved (Huber-Service)
TX0	reserved (Huber-Service)
TX1	reserved (Huber-Service)
AIF_In	Input analogue interface
AIF_Out	Output 1 analogue interface (depending on the temperature control unit used)
POKO	Floating contact (depending on the temperature control unit used)
ECS	External clearance signal (depending on the temperature control unit used)
Speed	Pump speed (depending on the temperature control unit used)
Pressure	Pump pressure [mbar] (depending on the temperature control unit used)

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Inspired by **temperature**
designed for you

-125 °C ...+425 °C

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