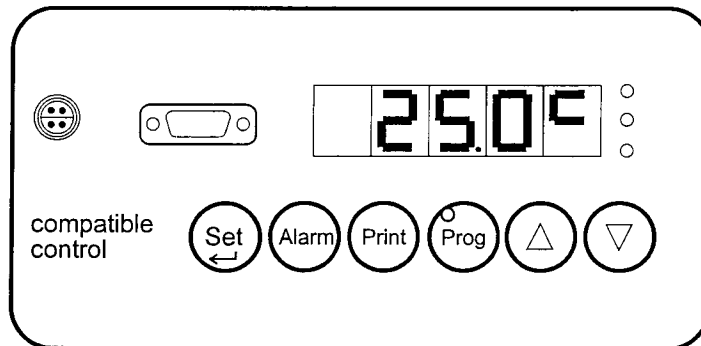


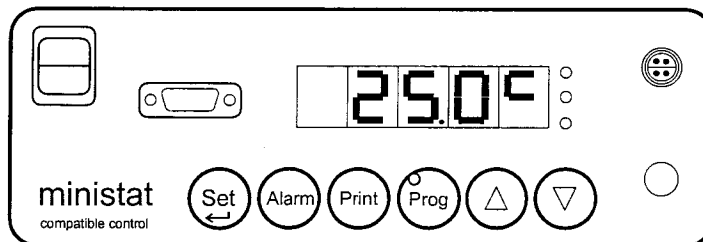
OPERATING INSTRUCTIONS

Version 3.7

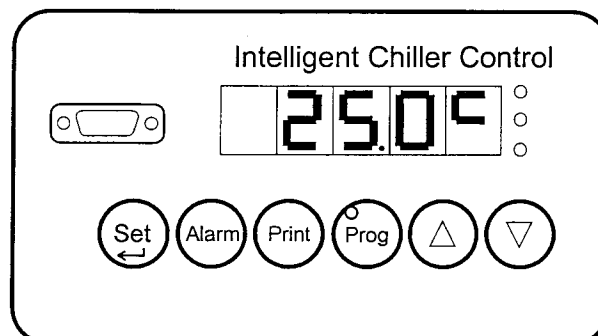
compatible control



ministat compatible control



Intelligent Chiller Control



Foreword: Please read carefully	1
Product description.....	1
New features from V3.01:.....	1
Important changes from V3.01:	2
Hardware changes from V3.01:	2
New functions from V3.04	3
Unit Scheme	4
1. Features of the set-key	5
1.1 Reading or adjusting the set-point value	5
1.1.1 Reading the set-point value.....	5
1.1.2 Adjusting the set-point value	6
1.1.3 Displaying the second actual value	6
1.1.4 The ventilation function.....	7
1.2 Reading or setting temperature set-point values	8
1.3 Activating internal or external circuit control modes	9
1.4 Setting the temperature-unit to Celsius or Fahrenheit.....	10
1.5 Setting set-point value limits.....	10
1.6 Calibration program	11
1.6.1 Pt100 internal offset (shift) circuit calibration program.....	11
1.6.2 Pt100 external offset circuit calibration program	12
2. Alarm-key features	12
2.1.1 Alarm messages for the Compatible Control unit	13
2.1.2 Alarm messages for the Compatible Control unit	14
2.1.3 Alarm messages for the Intelligent Chiller Control unit	14
2.2 Setting the alarm mode	15
2.3 Setting the upper and lower alarm limits	16
2.4 Clearing alarms	17
3. Print-key features	17
3.1. Manual print-out.....	17
3.2 Automatic print-out	18
3.3 Digital interface - baud-rate setting, protocol	19
3.4 Setting the device ID number.....	20
4. The program-key and program features	20
4.1 General information	20
4.1.1 Information on the ramp function	20
4.1.2 Information regarding the program controller.....	21
4.2 Default program	22
4.2.1 Starting the default program 0	23
4.2.1.1 Jumping a segment	24
4.2.2 Activating the pause feature in the default program 0.....	24
4.2.3 Deactivating the pause feature in the default program 0.....	25
4.2.4 Terminating the default program 0.....	25
4.3 Printing-out the default program 0	27
4.4 Reading and modifying the default program 0, programming procedure.....	28
4.5 Reading freely programmable steps	30
4.6. Deleting programs	30

5.	Interface	31
5.1	Analogue interface	31
5.1.1	Analogue input.....	31
5.1.2	Analogue output.....	32
5.1.3	Notes	33
5.2	Digital Interface.....	34
5.2.1	Printer and File Software Protocol.....	34
5.2.2	LAI Software Protocol.....	43
5.2.2.1	the LAI Command Group	43
5.2.2.2	Tecon compatible Command group.....	49
5.2.3	The IF232 Command group	50
6.	Setup menu	51
6.1	Call-up and functions	51
6.1.1	The compressor automatics	53
6.1.2	The maximum heat output.....	53
6.1.3	The analog input.....	53
6.1.4	The analog output	53
6.1.5	The digital interface	54
6.1.6	Pt100 internal two-step calibration program	54
6.1.7	The factory-set equipment parameters	56
6.1.8	The acoustic sensor.....	57
6.1.9	The automatic cutout.....	57
6.1.10	The user level	58
6.1.11	The backup memory for equipment configuration and calibration data	58
6.1.12	Leaving the setup menu	59
7.	Pin assignment	60
7.1	Pt100 connection	60
7.2	Interface jack with 15 pin D-Sub plugged connector	60
7.3	Diagram of the analogue interface	61
7.4	Position of the Jumpers	61
8	Automatic compressor control	62
8.1	Activate automatic compressor control	62
8.2	Description of automatic compressor control	62
9.	Type recognition	62
9.1	Type recognition for compatible control units.....	63
9.2	Type recognition for intelligent chiller control units	63
A	Appendix	65
A1	Additional information for using:	65
A1.1	The Compatible Control as a replacement control unit.....	65
A1.2	Display of the software version.....	65
A1.3	Adjusting the factory-set unit parameters	65
A1.4	Feature keys	65
A1.4.1	Escape feature:	65
A1.4.2	Enter feature.....	65
A1.4.3	MasterClear feature	65
A2	Additional Information Regarding the Program Controller	66
A2.1	Programming.....	66
A2.2	Terminating the program controller	66
A2.3	Status of the program controller.....	66

Foreword: Please read carefully.

Product description



“Compatible Control” and “Intelligent Chiller Control” are compact, microprocessor control units for Huber's “Compatible Control” temperature-controlled circulator bath or “Intelligent Chiller” product ranges. They incorporate a program controller, a master control unit an external circuit sensor, a digital RS232 interface and a 4...20mA analogue control signal interface. Furthermore, the set-point value tolerances, the alarm tolerances the alarm mode, the compressor automatic controls and the °C or °F display are all individually adjustable. The control unit can be re-calibrated - thus permitting compliance with ISO9000ff. All significant data is stored in a non-volatile memory. Data is entered by the user and alpha-numeric data input is supported.

Safety advice for replacing the control unit:



Electrical hazards must never be underestimated. For this reason, always switch off the circulator bath and disconnect the mains power supply before replacing the Compatible Control controller. Ensure that the mains power supply is not re-connected. Ensure foreign bodies do not enter the control unit slot once the control unit has been removed from the circulator bath. Do not touch the control unit or the circulator bath contacts under any circumstances.

Examine the replacement control unit contacts before installing the unit. They must all be aligned (in a straight line). The contact strip must not be soiled.

When inserting the replacement control unit, ensure it is not tilted and do not use excessive force under any circumstances. Re-insert the fastening screws. Always follow the advice in the circulator bath operating instructions. The circulator bath can now be re-commissioned.

New features from V3.01:



As of Software Version V3.01, the user is provided with a new keyboard interface. The automatic confirmation of the entries has been replaced with user-controlled data entry modes, i.e., entries must be confirmed by the user. The control unit ignores unconfirmed entries and returns to the default status (displaying the actual value) after 4 minutes.

The time-out feature is deactivated while calibration data is being entered or while the program controller is being programmed, thus permitting the user to enter the data at a comfortable speed.

The data entry modes are divided into two levels:

1. Feature selection:

The features, e.g., set-point value adjustment, alarm tolerances, etc., are selected using the keys Set, Alarm, Print and Prog. The display does not flash during these operations. A feature can be accessed using the arrow-keys, thereby permitting entry to the 2nd programming level.

2. Data entry mode:

The arrow-keys are used to enter a numerical value, e.g., the set-point value, or to select a program option, e.g., Auto, On or Off for the compressor automatic controls. The display flashes during these operations. The value or the option must be confirmed using the set-key. The control unit will annul the data entry and return to the default status (displaying the actual value) unless the data entry is confirmed within 4 minutes. Only then does the control unit save the data in the non-volatile memory.



Important changes from V3.01:

1. When displaying the temperature calibration, Contr. (control) appears on the display. The selected temperature control mode is displayed once a feature has been selected using an arrow-key (see §1.3).
2. As on the previous model, the calibration program for the internal circuit sensor requires two dissimilar calibration temperatures. The entire calibration program must always be performed if correct calibration is to be ensured. Depending on the calibration temperatures, it may be necessary to replace the temperature calibration temperature liquid and thus necessitate deactivation of the circulator bath. This occurs after the entry of the first reference temperature. When the calibration program is activated on the second occasion, the first calibration temperature must be bypassed in order to be able to regulate the second calibration temperature. To do this, the display for the first temperature calibration liquid must be confirmed using the set-key and not the arrow-key. This confirmation procedure was performed using the Prog-key on previous versions of this software.
3. The analogue output can be deactivated. However, the current output signal which corresponds to the zero line will continue to be present (see §5.1.2). The analogue output is deactivated in the factory settings. See §5.1.2 for information regarding activation of the analogue output.

Hardware changes from V3.01:

1. The setup menu contains an option which permits activation of an acoustic signalling device. If this option is selected, a fault is also acoustically signalled (see §6.1.8).
2. An RS485 interface is incorporated as a second digital interface. As a result, the thermostat is bus-enabled. The LAI protocol (which via the slave address is also bus-enabled) is envisaged as the software protocol. The hardware is set in the setup menu (see §6.1.5), the software and the baud rate are set together (see §3.3). The various software protocols are described under §5.2 Digital Interface.

New functions from V3.04

From software version V3.04, a few additional functions have been incorporated in the operating software. The thermostat is now fitted with a programmable automatic cutout. The user can determine the activation conditions himself. Only when the automatic cutout is switched on does the thermostat start the temperature control when the power is connected or after a power failure. If the automatic cutout is switched off, the user has to start the temperature control when  is displayed by pressing the  key (see §6.1.9).

In addition to the offset calibration of the external Pt100 sensor, it is now possible to perform offset calibration of the internal Pt100 sensor (shift). For this, the two-step calibration and the entry of the calibration temperatures have been combined in the setup menu under the menu point *CAL*. See §6.1.6.

Depending upon the controller mode, the external or internal Pt100 may be provided with an offset (shift) as described in §1.6.1 and §1.6.2.

It is now possible to save the user-defined settings in the permanent memory so they may be reloaded if required. Access to this function is a complicated process in order to prevent it from being called up unintentionally (see §6.1.11). Another innovation is the saving of the calibration settings. The user-saved calibration data or the factory calibration data may be loaded if required. Access to this function is a complicated process in order to prevent it from being called up unintentionally (see §6.1.11). To prevent unintentional changes to the equipment settings, user levels have been defined. These specify the functions to which the user has access.

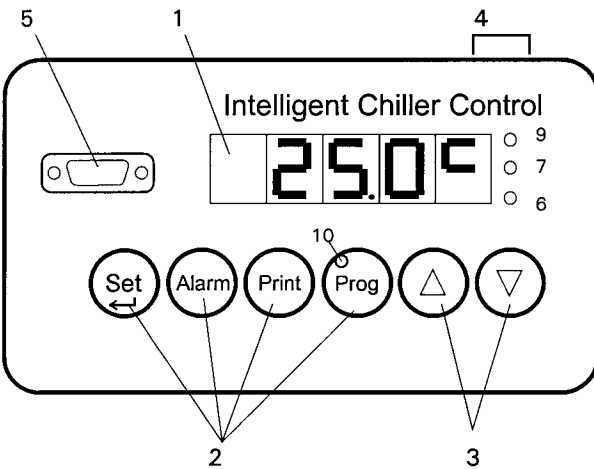
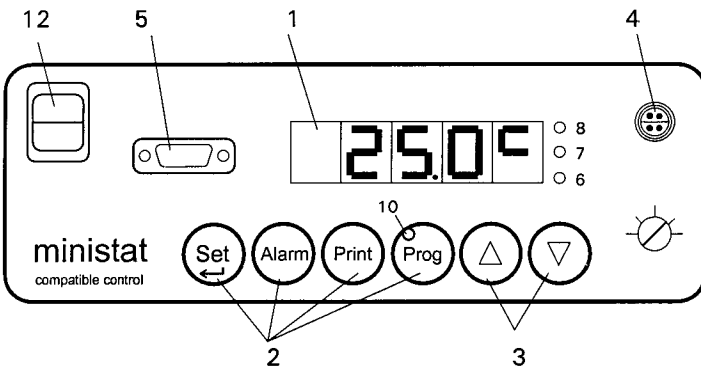
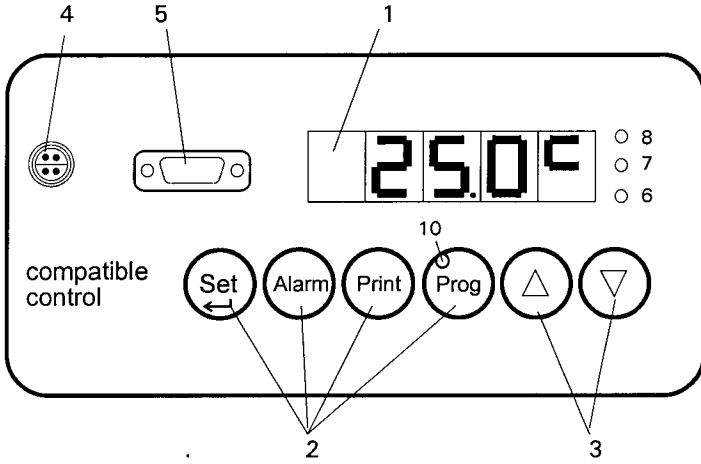
In user level 1, only the set value may be set. All other functions are blocked.

In user level 2, in addition to level 1 function, all alarm, programming and setup functions are accessible. All interface settings for the analog interface, the RS232 and the RS485 interface are blocked. In user level 3, the complete range of functions are available. Access to the user level-function is a complicated process to prevent it from being called up unintentionally (see §6.1.10).

With external temperature control, it may be necessary to know the temperature of the internal bath. Similarly, with internal temperature control, the external Pt100 sensor may be connected and used for measurements. This second actual value is then displayed (see §1.1.3). To improve external ventilation, a ventilation function has now been installed. This enables the pump to be operated in alternating mode. (see §1.1.4).

The programmer has been expanded by the option of connecting the acoustic sensor at the end of the program (see §4.1.1. and §4.4). The option of jumping the current segment is a new feature (see §4.2.1.1). Some new commands for the digital interfaces have been incorporated (see §5.2.1ff).

Unit Scheme



- 1 Display
- 2 Function keys
- 3 Arrow keys
- 4 Pt100 connection
- 5 STV12 (POKO, AIF, RS232, RS485)
- 6 Power-LED
- 7 Heating-LED
- 8 External-LED
- 9 Compressor-LED
- 10 Program-LED
- 11 Overtemperature protection
- 12 Mains switch

1. Features of the set-key

1.1 Reading or adjusting the set-point value



Safety first!

The set-point value limit should be adjusted when commissioning the unit and each time the temperature regulation liquid is replaced.




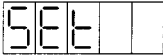

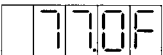
The set-point value limit is software-controlled and separate from the high-temperature and high-level safety devices whose activation does is not controlled by the control system electronics.

Limit the upper set-point value to 5K below the flash-point of the temperature regulation liquid (e.g., 25°C when ethanol is used).

Limit the lower set-point value according to the viscosity or freezing point of the temperature regulation liquid (e.g. 5°C with water).

See section §1.5 for the relevant procedure.



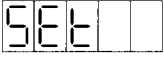




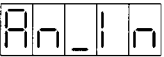
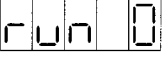

1.1.1 Reading the set-point value

  		Press the set-key once, then release Press one of the arrow-keys. If no arrow-key is pressed, the actual value will re-appear after approx. 4 minutes.
		e.g.: 25.0° Centigrade or
		or 77.0 ° Fahrenheit After approx. 4 minutes the actual value is displayed.



To view the actual value immediately - press both arrow-keys simultaneously (= escape feature) or press the set-key.

1.1.2 Adjusting the set-point value

      	<p>Press the set-key once, so that <i>Set</i> is displayed.</p> <p>Pressing an arrow-key once displays the previously saved set-point value.</p> <p>Use the arrow-keys to raise or lower the set-point value, as required. The set-point value will initially change in steps of 0.1 K up to the next full degree Centigrade and then in steps of 1 K, afterwards in steps of 10K.</p> <p>Press the set-key once to confirm the set-point value. If the set-point value is not confirmed within 4 minutes, the data entry mode will be terminated and the adjusted set-point value will not be saved.</p>
	<p>The set-point value cannot be adjusted and <i>An_In</i> is displayed. This indicates that the analogue interface is activated (see §5.1.1)</p>
	<p>The set-point value cannot be adjusted and <i>run 0</i> is displayed. This indicates that program 0 is currently running and the program control unit is determining the set-point value (see §4).</p>
	<p>The set-point value cannot be adjusted and <i>Remot</i> for Remote is displayed. The digital interface is activated and the control unit is receiving its set-point value from the digital interface. (see §5.2).</p>




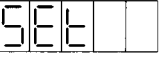
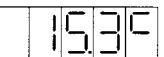



If the adjusted set-point value (flashing display) is not confirmed within 4 minutes, or the escape-feature is not activated by pressing both arrow-keys simultaneously, the data entry mode will be terminated and the adjusted set-point value will not be saved.

1.1.3 Displaying the second actual value



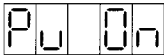





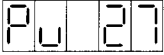
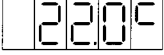
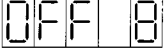
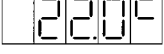

The current actual value is dependent on the control mode selected. Refer to §1.3 for the selection of the control mode.

With internal control, the bath temperature is the current actual value, the external Pt100 sensor measures the second actual value. With external control, it is the other way round, the external Pt100 sensor measures the current actual value, the bath temperature is the second actual value.

 	<p>The display shows the current actual value</p>
 	<p>Press the Set key and keep pressed. <i>Set</i> appears on the display.</p>
	<p>After 5 seconds, the display changes to the second actual value. The superscript C flashes.</p>
	<p>When the Set key is released, the current actual value appears again.</p>



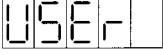




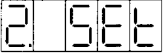

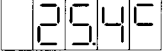



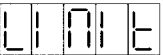
1.1.4 The venting function

With external applications, an alternating pump operation during the ventilation may be very beneficial. With the ventilation function, the ON and OFF periods of the pump may be input one after the other.

  & power on.           	<p>Before connecting the power, press the Set key and keep pressed.</p> <p><i>Pu On</i> appears on the display for the ON period.</p> <p>Use the arrow keys to set the desired ON period for the pump and confirm with the Set key. The ON period may be set within the range 3 - 90 seconds.</p> <p><i>PuOff</i> appears on the display for the OFF period.</p> <p>Use the arrow keys to set the desired OFF period for the pump and confirm with the Set key. The OFF period may be set within the range 3- 90 seconds.</p> <p>During the ON time, the display alternately shows the actual value and <i>PU xx</i>, with xx standing for the remaining ON time. The Power LED is off.</p> <p>During the OFF time, the display alternately shows the actual value and <i>Offxx</i>, with xx standing for the remaining OFF time.</p> <p>The Set key is used to terminate the ventilation function, the temperature control starts and the Power LED comes on.</p>
--	--

1.2 Reading or setting temperature set-point values / Setting the 2nd set-point value

10 frequently used set-point values can be saved as temperature set-points in a table. A new set-point temperature can be stored in the memory while *MEM* is displayed. Entering more than 10 set-point values will erase the value first saved. The temperature set-point values are used for calling up a set-point quickly and can, for example, be used for performing manual programming operations.

  2x           	<p>Press the set-key twice so that <i>User</i> is displayed</p> <p>Press an arrow-key</p> <p>Page through the temperature set-point values using the arrow-keys. If <i>Mem</i> (memory) is displayed, a new temperature set-point value can be saved.</p> <p>If no temperature set-point value has been saved, only <i>Mem</i> (memory) is displayed and 2. <i>Set</i> (second set-point value).</p> <p>If the set-key is depressed, the currently displayed temperature set-point value is assumed as the current set-point value. Confirmation of the display <i>Mem</i> (using the set-key) permits a new temperature set-point value to be entered. The current actual value will be assumed as the set-point value.</p> <p>The new temperature set-point value can now be adjusted using the arrow-keys.</p> <p>Depressing the set-key registers the adjusted temperature set-point value as the set-point value and saves it in the table along with the other temperature set-point values.</p> <p>Confirmation of the display 2. <i>Set</i> permits the 2nd set-point value to be entered instead of the user temperature. The 2nd set-point value is for error-processing at the analog input (see §5.1.1) and for the watchdog function of the serial interface (see §5.2.1.4).</p>
	<p>If <i>Limit</i> is displayed, the temperature set-point value entered is outside the permissible set-point value range (see §1.5). The entered temperature set-point value will be saved, however the set-point value will be restricted to the set-point value limit.</p>



The data input mode can be terminated at any time by using the escape feature (depress both arrow-keys simultaneously).






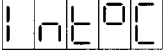

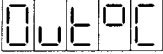


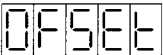
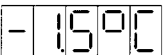









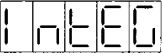


The adjusted temperature set-point value will not be saved and the set-point value will not be altered.

1.3 Activating internal or external circuit control modes



An external circuit Pt100 sensor can be connected to the 4-pole NAMUR jack. The position of the sensor bush is described in the unit scheme at the beginning of the operating instructions. In case of the Intelligent Chiller Control, the black plastic cover has to be removed on the unit's upper surface. The external circuit control mode must be activated. For operation with an external sensor.

For the "Compatible Control" and the "Ministat" compatible control" units the activated external circuit control mode is indicated by the external circuit LED illuminating. The display for the "Intelligent Chiller Control" unit alternates between out and the current external circuit actual value when the external circuit control mode is activated.

  3x                      	<p>External circuit Pt100 sensor must be connected</p> <p>Press the set-key so that <i>Contr.</i> is displayed. Pressing the arrow-key once displays the selected control mode.</p> <p><i>Int°C/Int°F</i> indicates internal circuit temperature control. <i>Out°C/Out°F</i> indicates external circuit temperature control. Select the desired control mode using the arrow-keys. Press the set-key to confirm the settings. The confirmed control mode will be immediately saved.</p> <p>Afterwards, <i>Shift</i> resp. <i>Offset</i> is displayed (for setting the Shift see §1.6.1, Offset §1.6.2)</p> <p>The selected parameter setting is subsequently displayed. Select a pre-defined parameter set (PID0..PID8) using the arrow-keys. If the parameter setting PID 9 is selected, the freely programmable parameters are taken over.</p> <p>If <i>Mem</i> is selected, the parameters for parameter set Pid 9 (proportional band and integral time parameters) can be set.</p> <p><i>Prop</i> for proportional coefficient will appear on the display. Now set the proportional coefficient using the arrow-keys. Confirm the settings by pressing the set-key.</p> <p><i>Integ</i> for integral coefficient will appear on the display. Now set the integral coefficient using the arrow-keys. Confirm using the set-key.</p>
	<p>External circuit Pt100 sensor is not connected</p> <p>If no external sensor is connected, <i>Int</i> and <i>Out</i> are not displayed, <i>Shift</i> is immediately displayed.</p>



The data entry mode can be terminated using the escape-feature (press both arrow-keys simultaneously). The control mode is saved once it is confirmed. The parameter settings are only saved once they have been entered correctly. If the escape-feature is used before saving the changes, the previous settings are retained.





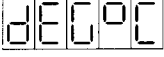


Predefined parameters for external circuit control mode:


PID.	0	1	2	3	4	5	6	7	8	9
Prop.	75	150	300	600	1500	3000	150	300	600	50...30000
Integr.	35	75	150	300	750	1500	50	100	200	0...30000

Predefined parameters for internal circuit control mode:


PID.	0	1	2	3	4	5	6	7	8	9
Prop.	5000	3000	10000	5000	200	200	500	3000	5000	50...30000
Integr.	1000	1000	1000	500	200	0	0	0	0	0...30000


1.4 Setting the temperature-unit to Celsius or Fahrenheit



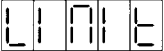



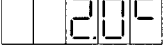

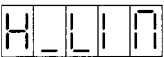



  4x     	<p>Press set-key until <i>Deg.</i> is displayed.</p> <p>Switch over between <i>Deg°C</i> and <i>Deg°F</i> using the arrow-keys.</p> <p>Confirm the temperature measurement unit setting using the set-key. The current actual value will then be displayed in the selected temperature measurement unit.</p>
--	--

 The data entry mode can be terminated at any time using the escape-feature (press both arrow-keys simultaneously). The temperature measurement unit setting is not saved.

1.5 Setting set-point value limits

 Set the maximum set-point value to at least 5 K below the flash-point or boiling point (water). Set the minimum set-point value to at least 3 K above the freezing point of the temperature regulation liquid and taking account of its viscosity. Generally, increased viscosity results in reduced heat transfer rate and thereby reduced system efficiency.

 The upper and lower limits of the set-point value should be redefined each time the temperature regulation liquid is replaced in order to ensure operation within a suitable temperature range and also accounting for the flash-point and viscosity. If flammable liquids are used (e.g., alcohol), the upper limit must be 5K below the flash-point.

  5x          	<p>Press the set-key until <i>Limit</i> is displayed Once an arrow-key is pressed <i>L-Lim</i> will be initially displayed. The lower set-point value limit can now be adjusted using the arrow-keys.</p> <p>Example: The lower limit is 2°C</p> <p>Confirm the temperature setting using the set-key.</p> <p><i>H-Lim</i> is displayed. The upper set-point value limit can now be adjusted using the arrow-keys.</p> <p>Example: The upper set-point value limit is 95°C. Once the settings are confirmed using the set-key, the values will be saved and the actual value will be displayed.</p>
---	---

The set-point value limit affects both the internal circuit temperature control unit and the external circuit temperature control unit when using the external circuit control mode (see §1.3). This implies that the predefined set-point value output from the external circuit control unit to the internal circuit control unit is compared against the set-point limit value and reset if necessary. Consequently, the internal circuit bath temperature is never below the low-limit value and never exceeds the high-limit value.

The set-point value limit likewise affects the set-point of the program controller and therefore limits the temperature range.



The data entry mode can be terminated at any time by using the escape-feature (press both arrow-keys simultaneously). The confirmed entries are saved and the unconfirmed entries are discarded.

1.6 Calibration program

1.6.1 Pt100 internal offset (shift) circuit calibration program



This program only starts when the internal circuit control mode is activated (see §1.3).

The internal circuit Pt100 sensor can be calibrated using the keyboard thus permitting calibration of the microprocessor control unit and the circulator bath for conformance with ISO 9000 ff. or for quality assurance requirements. The internal circuit sensor is calibrated at any point within the temperature range of the device. The Offset calibration can be adjusted a maximum of +/-5K.

	<p>The internal circuit control mode is activated.</p>
	<p>Press the set-key until <i>Shift</i> is displayed. Call up the Shift program using an arrow-key.</p>
	<p>The current Shift is displayed, e.g., -1.55K</p>
	<p>The Shift is added to the temperature value. E.i. the indicated temperature rises in case of a positive shift and goes down in case of a negative shift.</p>
	<p>Use the arrow-keys to adjust the Shift. Confirm the entry using the set-key.</p>
	<p>Finally, the new Shift setting is displayed for 2 seconds.</p>



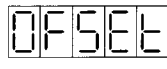

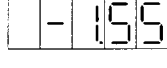

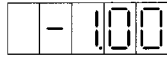

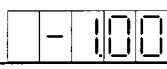



At any time you can terminate the message with the help of the escape feature (press both arrow-keys simultaneously) without memorizing the set value.

1.6.2 Pt100 external offset circuit calibration program

i This program only starts when the external circuit control mode is activated (see §1.3).

The external circuit Pt100 sensor can be calibrated using the keyboard thus permitting calibration of the microprocessor control unit and the circulator bath for conformance with ISO 9000 ff. or for quality assurance requirements. The external circuit sensor is calibrated at any point within the temperature range of the device. The Offset calibration can be adjusted a maximum of $\pm 5K$.

		The external circuit control mode is activated.
 6x		Press the set-key until <i>Offset</i> is displayed. Call up the Offset program using an arrow-key.
		The current Offset is displayed, e.g., <i>-1.55K</i>
		The Offset is added to the temperature value. E.i. the indicated temperature rises in case of a positive shift and goes down in case of a negative shift.
		Use the arrow-keys to adjust the Offset. Confirm the entry using the set-key.
		Finally, the offset setting is displayed for 2 seconds.

 At any time you can terminate the message with the help of the escape feature (press both arrow-keys simultaneously) without memorizing the set value.

2. Alarm-key features

A summation check is performed on the control unit every time the mains power is switched on. The unit's functions are continuously monitored during operation.

The microprocessor's alarm mode can indicate various malfunctions or when values exceed the user's predefined tolerance ranges.

i

The circulator bath trips out automatically if:

- there is an electronic malfunction (immediately)
- overtemperature protection device has been activated (immediately) - see operating instructions for equipment
- the level in the bath is too low (after 3 seconds) - see operating instructions for bath- and circulation circulator baths
- the alarm mode is activated and the temperature has fallen below the lower alarm limit within the predefined time (see §2.3)
- the alarm mode is activated and the temperature has exceeded the upper alarm limit within the predefined time (see §2.3)
- a unknown error has occurred (immediately)

2.1.1 Alarm messages for the Compatible Control unit

FLoARt	Level in bath too low.
MEENP	Mech. overtemperature protection device has tripped
Pt100t	Internal circuit Pt100 sensor faulty or not connected
Pt100e	External circuit Pt100 sensor faulty or not connected
LoAL	Value dropped below lower alarm limit
HiAL	Value exceeds upper alarm limit
UnErr	Disconnect the power supply. Call service and have compatible control unit replaced 📞.
H-Err	Error in controller hardware. Inform Service.
E2Err	EEPROM error, notify Service 📞.
AnErr	Analog error. The analog input receives a set value which is too high or too low. The cause could be an interruption to the power supply, failure of the set-point transmitter or the input overload. The thermostat has switched off (see § 5.1.1).
noAn	Warning, analog input signal off the admissible range. The cause could be an interruption to the power supply, an input overload or the failure of the set-point transmitter. The thermostat adjusts to the 2 nd set-point value (see § 1.2)
diErr	No digital file transfer. The watchdog function (see § 5.2.1.4) has switched off the thermostat.
no di	No digital file transfer. The watchdog function (see § 5.2.1.4) has switched over to the 2 nd set-point value. The thermostat adjusts to the 2 nd set-point value (see § 1.2).
UP	Automatic cutout not activated. Press the arrow key to start it.
disAb	An attempt is being made to call up a function which is not accessible in the current user level.
noOut	The Time-out after the „CETM“-command or. „RTE“-command has run out (see § 5.2.1.1). With it the external regulation and „CETM“-mode have been switched off. Acknowledge the warning with Break-function.

2.1.2 Alarm messages for the Compatible Control unit

ERROR	Level in bath is too low, or mechanical overtemperature protection device has tripped (see current operating instructions)
Pt100E	Internal circuit Pt100 sensor faulty or disconnected.
Pt100E	External circuit Pt100 sensor faulty or disconnected
LOWAL	Value dropped below lower alarm limit
HIAL	Value exceeds upper alarm limit
TYPEER	The control unit is installed in a unit which has a Type Recognition and which is not recognised by the control unit (see §9).
UnERR	Disconnect the power supply. Call service and have the compatible control unit replaced 📞.
Cond	The message <i>Cond</i> is displayed as soon as the condensation temperature exceeds its maximum. The cooling capacity is reduced. The alarm does not lead to deactivation of the unit.
PtCon	Condensation temperature sensor is defective or disconnected.
H-ERR	Error in controller hardware. Inform Service.
EEPROM	EEPROM error, notify Service 📞.
AnERR	Analog error. The analog input receives a set value which is too high or too low. The cause could be an interruption to the power supply, failure of the set-point transmitter or the input overload. The thermostat has switched off (see § 5.1.1).
noAn	Warning, analog input signal off the admissible range. The cause could be an interruption to the power supply, an input overload or the failure of the set-point transmitter. The thermostat adjusts to the 2 nd set-point value (see §1.2)
diERR	No digital file transfer. The watchdog function (see §5.2.1.4) has switched off the thermostat.
no di	No digital file transfer. The watchdog function (see §5.2.1.4) has switched over to the 2 nd set-point value. The thermostat adjusts to the 2 nd set-point value (see §1.2).
UP	Automatic cutout not activated. Press the arrow key to start it.
disAb	An attempt is being made to call up a function which is not accessible in the current user level.
noOut	The Time-out after the „CETM“-command or. „RTE“-command has run out (see §5.2.1.1). With it the external regulation and „CETM“-mode have been switched off. Acknowledge the warning with Break-function.

2.1.3 Alarm messages for the Intelligent Chiller Control unit

The alarm messages displayed by the Intelligent Chiller Control unit correspond to those displayed by the Compatible Control unit. In addition, the following messages can be displayed (see §2.1.2.).

2.2 Setting the alarm mode



The alarm mode can only be activated if the device if the unit is not in an alarm status. If the unit is in an alarm status, the alarm reset feature is automatically activated (see §2.4). The alarm mode is set for conditions which are above and below alarm threshold values. (see §2.3.)

Status - no alarm:

If the actual temperature is above the lower alarm limit and below the upper alarm limit and no other features are malfunctioning, the unit will not have an alarm status. The potential-free contact remains active as long as the unit does not have an alarm status. The contact open-circuits if power supply is interrupted. The relay contact rating is 30V, 100mA.

Status - alarm:

If the actual temperature is below the lower alarm limit or above the upper alarm limit, the unit will have an alarm status - even if all other features are in order. The potential-free contact will open circuit and an alarm will be issued.

	<p>Alarm should deactivate the unit after a predefined interval.</p>
	<p>Press the alarm-key and confirm the setting using an arrow-key</p>
	<p>Select the <i>Stop</i> mode using the arrow-keys and confirm the setting using the set-key.</p>
	<p>The unit will now be deactivated when an alarm is activated.</p>
	<p>When <i>Delay</i> appears, set the time-out interval using the arrow-keys.</p>
	<p>The time-out interval can be set between 15 seconds and 60 seconds.</p>
	<p>The display <i>D = 15</i> denotes a time-out interval of 15 seconds following activation of the alarm status. Confirm the setting using the set-key.</p>

	<p>Alarm should not deactivate the device.</p>
	<p>Press the alarm-key and confirm using an arrow-key.</p>
	<p>Using the arrow-keys, select <i>Run</i> mode and confirm using the set-key.</p>
	<p>Alarm condition displays a message but does not deactivate the device</p>

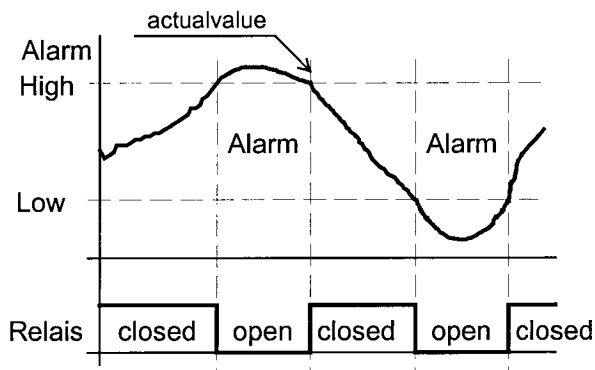
2.3 Setting the upper and lower alarm limits



The upper/lower alarm response can be set to either deactivate the unit or continue operation.

This setting is independent of the mechanical overtemperature protection device which operates as specified in DIN 12879.

The potential-free contact is connected at the SUB 15 HD jack. This is a “normally open” contact which is activated (switch is made) when the mains power supply is switched on and which is deactivated (switch is broken) when the mains power supply is switched off and in the event of an alarm.



The LOW LEVEL ALARM must always be lower than the HIGH LEVEL ALARM. If this is not so, the control unit will interchange the two alarm values.




The difference between the LOW LEVEL ALARM and the HIGH LEVEL ALARM must be at least 1K. If the settings do not comply with this requirement, the control unit will reset the HIGH LEVEL ALARM to a value 1K above the LOW LEVEL ALARM.

			First press the set-key and then the alarm-key. <i>Alarm</i> will be displayed. Confirm the settings using the arrow-key.
			<i>Lo_Al</i> will be displayed, meaning LOW ALARM.
			The arrow-key activates the lower alarm limit. Set the lower alarm limit using the arrow-keys. Confirm the settings using the set-key.
			<i>Hi_Al</i> will be displayed, meaning HIGH ALARM.
			The arrow-key activates the upper alarm limit. Set the above alarm limit using the arrow-keys. Confirm the settings using the set-key.



The escape feature is available at any time to exit the data entry mode (depress both arrow-keys simultaneously). Unconfirmed entries are then not saved.

2.4 Clearing alarms

  	<p>If the cause of the alarm signal, which lead to the deactivation of the unit, is rectified the alarm signal can be cancelled without deactivating the unit.</p> <p>An alarm signal will be displayed, e.g., <i>Hi_Al</i> for High-Alarm. The temperature has dropped in the meantime.</p> <p>Press the alarm-key. <i>Alarm</i> is displayed. Confirm the alarm using an arrow-key.</p> <p><i>Clear</i> is displayed for 2 seconds. The message will deleted and the unit will be restarted.</p>
HI_AL	
ALARM	
CLEAR	




3. Print-key features

When printing the first time, or if a page is completely full, a header is printed. The unit, date, test-name or user's name can be entered in this header. The page numbers from 1 to 250 are also printed. After page 250, the numbering restarts with page 1. In the subsequent lines, the unit identification number (see §3.4), the actual value, the set-point and if necessary a comment (error or alarm) and the time since the last print-out (in seconds) are printed. No time is indicated when printing manually.

3.1. Manual print-out



The print-key feature can only be activated if the unit is operated using a software protocol printer or file. The software protocol is set using the set print-key (see §3.3).

  	<p>Press the Print-key. <i>Print</i> will be displayed.</p> <p>Once the settings have been confirmed by using an arrow-key, ASCII characters are transmitted on the digital interface.</p> <p><i>Busy</i> is displayed during the printing procedure.</p>
PRINT	
BUSY	
WAIT	<p>The <i>Wait</i> message is displayed if the digital interface is occupied with performing other control operations. Repeat the data entry at a later time.</p>



The printing format can be programmed. The data can be transferred either directly to a printer or via PC to a spreadsheet program such as MS-EXCEL. (see §3.3).

3.2 Automatic print-out



Printing can be performed manually or an automatic printing interval can be set. The latter offers the advantage of supplying the user circulator bath readings at predefined intervals in the form of verifiable documentation. The printing interval can be set at 5 - 7200 seconds ... or OFF.

3 types of printing interval can be set:

- an interval for if the lower alarm limit is passed
- an interval for if the upper alarm interval is passed
- an interval for if there is no alarm status.




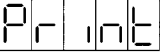

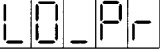








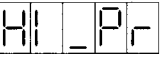



Example:

- lower alarm limit = 15.00°C
- upper alarm limit = 55.30°C

- Printing interval 1 (every 5 seconds) if the actual temperature is $\leq 15.0^\circ\text{C}$,
- Printing interval 2 (every 3600 seconds) if there is no alarm status
- Printing interval 3 (every 20 seconds) if the actual temperature is $\geq 55.3^\circ\text{C}$

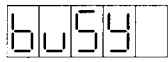
A print-out is performed every hour if there is no alarm status, every 5 seconds if the lower alarm limit activated and every 20 seconds if the upper alarm limit is activated.

Automatic printing

   	<p>Press the set-key Press the print-key and confirm the setting using an arrow-key.</p>
 	<p>The <i>Lo_Pr</i> message will be displayed, indicating Low_Print. The printing interval <i>Lo_Pr</i> is activated if the actual temperature is less than or equal to the lower alarm limit.</p>
  	<p>Confirm the setting using an arrow-key. The current <i>Lo_Pr</i> is displayed and can be changed using the arrow-keys. Deactivate the printing interval using the <i>L_Off</i> feature. The current <i>Lo_Pr</i> value must be confirmed using the set-key.</p>
	<p><i>Mi_Pr</i>, indicating Middle_Print, is displayed. The printing interval <i>Mi_Pr</i> is activated if the actual temperature is higher than the lower alarm limit and lower than the upper alarm limit.</p>
  	<p>Confirm the setting using an arrow-key. The current <i>Mi_Pr</i> value is displayed and can be changed using the arrow-keys. The printing interval is deactivated using the <i>M_Off</i> feature. The current <i>Mi_Pr</i> value must be confirmed using the set-key.</p>
 	<p><i>Hi_Pr</i>, indicating High_Print, is displayed. The printing interval <i>Hi_Pr</i> is activated if the actual temperature is greater than or equal to the upper alarm limit. Confirm the setting using the arrow-keys.</p>
  	<p>The current <i>Hi_Pr</i> value is displayed and can be changed using the arrow-keys. The printing interval is deactivated using the <i>H_Off</i> feature. The current <i>Hi_Pr</i> value must be confirmed using the set-key.</p>



The data entry mode can be terminated at any time by using the escape feature (press both arrow-keys simultaneously). Any unconfirmed inputs will not be saved.
 The printing intervals depend on the upper and lower alarm limit values.
 The upper and lower alarm limit values can be set using the Set Alarm feature.
 The printing interval settings are retained even if the device is switched off.
 If the printing interval is set to OFF there will be no print-out.



If a printing interval setting has been exceeded, the current temperatures and the fault status will be transmitted via the digital interface. *Busy* will be displayed.

3.3 Digital interface - baud-rate setting, protocol



The baud rate can be set to 1200, 2400, 4800 or 9600.
 The parameter settings are fixed, such as: Start (1 Bit), Data (8 Bits), Parity (none), Stop (1 Bit). All data is transmitted in ASCII format.

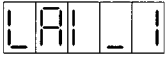
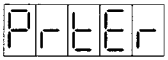
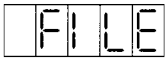
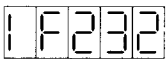
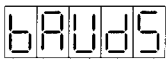
The software protocol for the data is programmed once the baud rate has been set, ASCII data can be formatted for use with EXCEL, printers or Huber IF232 equipment.

EXCEL format is compatible with most spreadsheets applications.

Files are provided which are formatted for printing using printers with serial interfaces: Data in Huber IF232 is compatible with IF232 PC program controller software.



2x



Press the set-key

Press the print-key twice, so that the *Bauds* message is displayed

Press the arrow-key.

The current baud rate is displayed and can be changed using the arrow-keys.

The value displayed is confirmed using the set-key.

The following displays appear:

IF232 for Huber IF232, not for PC-control

FILE for EXCEL file,

Print for Printer, or PC-control

LAI-1 for Labor Applikations Interface.


Select the printing format using the arrow-key:




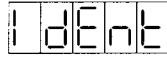


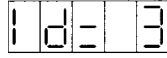

Confirm the printing format the using the set-key




The data entry mode can be terminated at any time by using the escape feature (press both arrow-keys simultaneously). Any unconfirmed entries will not be saved.

3.4 Setting the device ID number

 The circulator bath can be assigned an ID number between 0 and 99 using the keyboard. The ID number will then be included in the print-out.

	
	Press the set-key once
 3x 	Press the print-key three times, so that <i>Ident</i> is displayed.
	Confirm the setting using the arrow-key.
 	The current value is displayed, e.g. <i>ID = 3</i> . Use the arrow-keys to change the value.
	Confirm the value using the set-key.

 The data entry mode can be terminated at any time by using the escape feature, (press both arrow-keys simultaneously). Any unconfirmed entries will not be saved.

4. The program-key and program features

4.1 General information




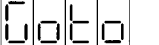

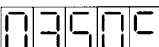



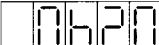

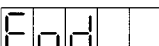

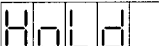





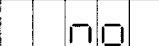

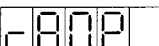
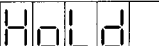


The inbuilt programmer may be used to program temperature profiles and then to run them using a temperature priority. The set value cannot be changed during a program run. The MasterClear function (see §A1.4.3) may be used to terminate a running temperature control program.

From software version 3.04, it is possible to activate the acoustic sounder at the end of the temperature control program or ramp. It is switched back off by pressing an arrow key.

4.1.1 Information on the ramp function

This ramp function may be used to quickly and easily program a ramp from the current bath temperature to a new temperature. The behaviour in connection to the ramp may also be programmed. The new bath temperature, the time in which this temperature is to be reached and the final mode should be entered one after the other.

At the end of the ramp, the thermostats set the temperature to the final ramp value. The sensor issues a sound depending upon the programming. One press on an arrow key terminates the ramp and switches the sensor off. On *End*, when the ramp has ended, the thermostat sets the temperature back to the set value which was set before the ramp. On *Hold* the thermostat sets the temperature to the final ramp value after the end of the ramp.

		Press the Set key and the Prog key. <i>Ramp</i> appears on the display.
		Confirm with an arrow key. <i>Goto</i> appears on the display.
		Use the arrow keys to set the new bath temperature, eg 35 °C.
		Confirm with the Set key. <i>Time</i> appears on the display.
		Use the arrow key to set the time in which the new bath temperature should be reached, eg 20 minutes.
		Now, use the arrow keys to select the final mode <i>End</i> or <i>Hold</i> and confirm with the Set key.
		
		<i>Beep</i> appears on the display.
		Use the arrow keys to set <i>Yes</i> for sensor at the ramp end ON or <i>no</i> for sensor at ramp end OFF and confirm with the Set key.
		
		The Prog. LED comes on, the programmed ramp is executed. The current actual value and <i>Ramp</i> appear one after the other on the display. When the new bath temperature is reached it is retained.
		Now, the current actual value and <i>Hold</i> or <i>End</i> , depending upon the preselected final mode, appear one after the other on the display.
		The ramp is terminated by pressing an arrow key.

4.1.2 Information regarding the program controller



A program consists of:

- a program number from 0 to 9,
- a start temperature,
- one or more temperature ramps,
- a final temperature,
- acoustic signal ON or OFF. (from V3.04).

Program controller features:

- 50 program steps can be distributed as required over 10 programs.
- Choice between Hold/End/Cycle modes.
- Reading or changing an existing program.
- Deleting programs or program steps.
- Interrupting and restarting a program.



The set-point value calculated by the program controller is compared against the set-point limit and if necessary restricted to the set-point limit value. As a result the actual temperature profile can deviate from the programmed temperature profile. The set-point limit values should be checked before starting a program (see §1.5). As exceeding the alarm temperatures can lead to deactivation of the circulator baths, it is advisable to check the alarm temperatures and the alarm mode before starting a program (see §2.2 and §2.3).

Hold-mode indicates that the set-point for the last segment will be retained after the last segment time has expired until the program is terminated (see 4.2.4).

End-mode indicates that once a program has been executed the set-point value set

prior to starting the program will be retained. End is displayed, the Prog-LED is extinguished. The *End* message must be terminated using the Prog-key.

During the run of a programme or ramp, it is not possible to write, to edit or to cancel another programme. In case of a ramp programme, the message *run-r* is shown, in case of a temperatur programme the message. *run-O* is displayed. The figure indicates the number of the activated programme.

From software version 3.04, it is possible to activate the acoustic sounder at the end of the temperature control program. For this, *Beep* is displayed after the final mode *Hold* or *End*. Use the arrow keys *Yes* for sounder at program end ON or *no* for sensor at program end OFF and confirm with the Set key. If the sounder is activated, it comes on automatically at the program end. If there are several cycles, this is after the last cycle. It is switched off again by pressing an arrow key.

4.2 Default program












The compatible control system is supplied with a default program which is saved as Program 0. This program can be overwritten to implement any desired changes.

The program specifies a temperature increase (a ramp) of 20°C to 30°C in a period of 12 minutes. Once the program is completed, the final temperature of 30°C is retained as the set-point (hold-mode).

4.2.1 Starting the default program 0



All other programs must be deactivated. The program LED will be extinguished.
 See §4.2.2. or §4.2.3.
 The analogue input is deactivated (see §5.1.1).
 A program number must be entered (see §4.4).

 	Pr00	Press the prog-key.
	Pr00	Press the arrow-key and activate Program 0.
	Run 0	Start the program using the set-key.
	Start	The <i>Run 0</i> message will be displayed, the program will be started and the prog-LED will illuminate.
	Start	<i>Start</i> will flash on the display until the actual temperature corresponds to the start temperature. The tolerance for activation of the program is $\pm 1K$
		The ramping procedure will start when the actual temperature equals $20^{\circ}C \pm 1K$.
	PO_1	The <i>PO_1</i> message will be displayed - thus indicating Program 0 and Step 1. This message will be displayed for 1 second followed by the actual temperature for 4 seconds.
	PO_2	When the temperature reaches $25^{\circ}C$ after 10 minutes the <i>PO_2</i> message will be displayed, indicating Program 0, Step 2.
	Hold	If the hold-mode has been programmed, the <i>Hold</i> message will be displayed. The set-point temperature will remain at $25^{\circ}C$.
	Stop	<i>Stop</i> will be displayed once the prog-key is pressed. Select <i>Yes</i> using an arrow-key and confirm using the set-key.
	YES	
	An_In	<i>An_In</i> is displayed when the prog-key is pressed. This indicates that the analogue interface is activated. (see §5.1.1).
	Empty	<i>Empty</i> is displayed when the prog-key is pressed. The memory does not contain any executable programs. A program number must be entered before starting a program (see §4.4).





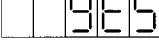

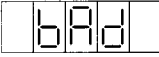


When a program is active, the set-point cannot be changed, no set-point temperature can be defined and the activated program can neither be read nor written nor changed. However, you can:

- read the set-point calculated by the program (set-key)
- set a pause in the program or clear it completely.

4.2.1.1 Jumping a segment

If very long pauses are programmed in a temperature control program, it may be useful to terminate the segment prematurely. This may optimise the processing time. This is possible using to the following function. This function may also be used to jump the starting temperature. The temperature control program then processes the first segment immediately.

  2x    	<p>Press the Prog. key 2x. <i>Jump</i> appears on the display. Use an arrow key to call up the function. If the option <i>Yes</i> is selected, the program moves to the next segment. If no jump is to be performed, select the option <i>no</i>. Confirm the option confirm with the Set key.</p>
	<p>If after confirmation with the Set key, <i>bath</i> appears on the display, the function was called up at a time at which a jump was not allowed. For example, this is the case with the last program segment or if no program is activated.</p>



If the option set (flashing display) is not confirmed within 4 minutes or the break function is called up by simultaneously pressing both arrow keys, the entry is terminated without performing the jump.

4.2.2 Activating the pause feature in the default program 0






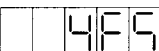


Pausing the program is useful for analysing certain faults, process monitoring or performing necessary changes to the peripheral devices.

Examples:

- breakage of a connecting hose
- replacing temperature regulation fluid
- definition of a fixed temperature.

2 steps must be performed to activate the pause feature. This is a precaution, designed to prevent unintentional activation of the pause feature. The program cannot be paused if it is in its start-up phase, only terminated (see § 4.2.4 - Security steps).




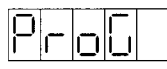

     	<p>Pressing the prog-key while the program is active causes the <i>Pause</i> message to be displayed.</p> <p>Security step 1: This message must be confirmed within 4 minutes using an arrow-key, otherwise the actual temperature will be displayed again.</p> <p>Security step 2: <i>Yes</i> will appear on the display following this confirmation. This display must be confirmed using the set-key, in order to activate the pause feature.</p> <p>The Pause message will be displayed for 1s, and then the actual temperature will be displayed for 4s. The prog-LED will flash. The control unit will regulate to the last calculated program set-point, until the pause feature is deactivated again (see §4.2.3).</p>
--	--




The data entry mode can be terminated at any time by using the escape feature (press both arrow-keys simultaneously). The program then remains activated.

4.2.3 Deactivating the pause feature in the default program 0

i When the pause feature is deactivated the program restarts at the point at which it was interrupted.









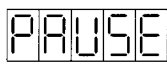
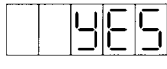
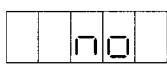
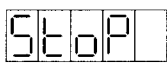
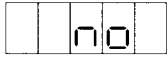
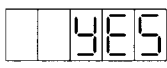
  	 	<p>The program and pause features are activated. The LED Prog. flashes. Press the prog-key once.</p> <p>The <i>Run 0</i> message (Program 0) is displayed. Confirm the setting using the set-key. The prog-LED illuminates continuously.</p>
---	--	--


 An interrupted program can be resumed by deactivating the pause feature. A program can be terminated using the stop feature.

4.2.4 Terminating the default program 0

i The program must be active. It is not possible to quit the program while the pause feature is activated.

4 security steps must be performed to stop a program. This precaution prevents a program being terminated unintentionally. If the program is in its starting phase or hold mode, the Stop message will be displayed immediately, without first displaying the *PAUSE* message.


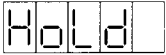
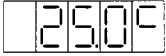



       	     	<p>Press the prog-key while a program is active. The <i>Pause</i> message is displayed.</p> <p>Security step 1: This message must be confirmed within 4 minutes using an arrow-key, otherwise the actual temperature will be displayed again.</p> <p>The <i>Yes</i> option will be suggested.</p> <p>Security step 2: Select the <i>No</i> option using the arrow-keys. Confirm this setting using the set-key. If this does not occur within 4min, the entry will be automatically terminated and the program remains activated.</p> <p>The <i>Stop</i> message is displayed.</p> <p>Security step 3: This message must be confirmed within 4 minutes using an arrow-key, otherwise the actual temperature will be displayed again.</p> <p>The <i>No</i> option is displayed.</p> <p>Security step 4: Select the <i>Yes</i> option using the arrow-keys. Confirm this setting using the set-key. If this does not occur within 4 minutes, the entry will be automatically terminated and the program will remain activated. The program is terminated when the setting is confirmed. The prog-LED is extinguished.</p>
---	--	---

 The data entry mode can be terminated at any time by using the escape feature (press both arrow-keys simultaneously). The program will remain activated.


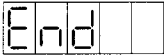



4.2.5 Terminating programmes

The display of the regulator after working with the programme changes depending on the programme's end mode.





Hold-Mode:

     	<p>After working with the last programme segment the display shows <i>Hold</i> or the actual temperature at the display. The Prog LED stays illuminated.</p> <p>To terminate the programme press Prog-button once. The display shows <i>Stop</i>.</p> <p>Chose <i>YES</i> with the cursor keys and acknowledge with Set-key.</p> <p>The Prog LED extinguishes and the regulator regulates to the set value that was valid before starting of programme.</p>
--	---

End-Modus:

    	<p>After working with the last segments of the programme the display shows <i>End</i> or the actual temperature at the display.</p> <p>The Prog LED has extinguished, the regulator regulates to the set value that was valid before starting of the programme.</p> <p>To delete the <i>END</i>-display, press Prog-key once and when display shows <i>Clear</i> press cursor key. The display <i>End</i> no longer appears.</p>
--	--

4.3 Printing-out the default program 0

   	<p>PRG</p> <p>LIST</p> <p>BUSY</p>	<p>Press the prog-key, then press the Print-key. The List will be displayed - indicating listing.</p> <p>Confirm the program using an arrow-key. The entire contents of the memory for the programmable control unit are listed via the digital interface. The Busy message will be displayed during the printing procedure.</p> <p>Data from the default program 0 Program Listing 1 Prog 0 1 Start 20.0°C 2 25.0°C 0H10 3 Hold 4 Free END OF LISTING</p> <p>If several programs are saved in the memory, the other programs will be listed.</p>
	<p>IF232</p> <p>LAI_1</p>	<p>If instead of the <i>IF232</i> or <i>LAI_1</i> message is displayed instead of <i>List</i>, the printing format is not correctly set (see §3.3 Setting the baud-rate)</p>
	<p>WAIT</p>	<p>The <i>Wait</i> message is displayed if the digital interface is occupied by other control function requirements. Repeat the entry some time later.</p>



The printing format must be set to correspond to the printer or file. No data is available in the IF232 format (see §3.3).

An individual program cannot be printed out. All saved programs are printed by using this command.

4.4 Reading and modifying the default program 0, programming procedure



Up to 10 programs can be stored in the memory (0 to 9).

The data entry time-out feature is deactivated while the program controller is being programmed. The data entry procedure is not time limited. Existing programs are displayed as *Prog* + Number, e.g., *Prog 0*.

Unassigned program numbers are displayed as *Free* + number, e.g., *Fre_1*.

The programming procedure can only be performed if no programs are activated.

The default program 0 should be as follows:





























from 15°C to 20°C in 10 minutes,


from 20°C to 10°C in 21 minutes,

The end-mode should be activated after 3 cycles.







The *Full* message will be displayed and the write program will be terminated if there are no further program steps available (see also §4.5).

	Press the set-key
2x	Press the prog-key 2x. The <i>Prog</i> message is displayed.
	Use an arrow-key to confirm this setting.
	Press the arrow-key until the desired program number is displayed, e.g., <i>Prog0</i> for an assigned program number or, e.g., <i>Fre_2</i> for a vacant program number. Confirm the entry using the set-key.
	The number of free program steps is displayed for approx. 2 seconds, e.g. <i>_ 47_</i> .
	The <i>Start</i> message is displayed.
	Set the start temperature using the arrow-keys, e.g. 15.0°C. Confirm the setting using the set-key.
	If a program is recorded for the first time, the actual and start temperatures are set to the same value.
	The <i>Goto1</i> message is displayed after approx. 2 seconds, indicating the first set-point in the first program step.
	Set 20°C using the arrow-keys and confirm the setting using the set-key. The <i>Time1</i> message is displayed, indicating the ramping interval in the first program step.
	Press the arrow-keys. The display will indicate either <i>Fast</i> - representing maximum speed or will indicate HH MM - for setting the desired ramp time.
	Set <i>0H10</i> using the arrow-keys and confirm using the set-key.
	The <i>Goto2</i> message will be displayed indicating the set-point in the second program step.

  CYCLE  HoLD  ENd  EENP 	<p>The mode options Temp/Hold/End/Cycle can be activated as of the second program step.</p> <p>Press the arrow-keys to display the messages: <i>Hold, End, Temp, Cycle</i> respectively.</p> <p>Select <i>Temp</i> using the arrow-keys for another temperature segment and confirm using the set-key.</p>
 10.0C  ETime2 	<p>Set 10°C using the arrow-keys and confirm using the set-key. The <i>Time2</i> message is displayed after approx. 2 seconds, indicating the ramping time in the second program.</p>
 0H21  00E03 	<p>Press the arrow-keys maximum speed or HH MM - indicating a time setting for the segment.</p> <p>Set 0H21 using the arrow-keys and confirm using the set-key.</p>
 CYCLE  0nE 	<p>Select the <i>Cycle</i> using the arrow-keys and confirm using the set-key. The message <i>One</i> will be displayed.</p>
 noEND 	<p>Set the number of cycles using the arrow-keys. The <i>Noend</i> message indicates an infinite number of cycles. The <i>One</i> message indicates one cycle. The <i>CY=xx</i> message indicates xx times cycle.</p>
 CY= 3  StOP 	<p>Set <i>CY= 3</i> using the arrow-keys and confirm using the set-key. The <i>Stop</i> message will be displayed.</p>
 HoLD  ENd 	<p>Enter <i>End</i> using the arrow-keys and confirm using the set-key.</p>
 bEEP  yES 	<p>The message <i>Beep</i> is now displayed..</p> <p>Use the arrow keys to set <i>Yes</i> for sensor at program end ON or <i>no</i> for sensor at program end OFF and</p>
 no 	<p>confirm with the Set key. The program is finished.</p>

 Any existing program can subsequently extended or shortened as long as program steps remain available (see §4.5).

4.5 Reading freely programmable steps

   3x   	<p>Press the set-key</p> <p>Press the prog-key 3x. The <i>Step</i> message will be displayed. After 2 seconds the number of free program steps will be displayed:</p> <p>e.g. 42 freely programmable steps.</p>
---	---






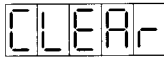


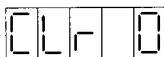


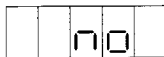

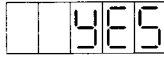

The _ O _ message indicates that no further program steps are available. Existing programs can nevertheless be overwritten or modified as long as the number of program steps remains identical.
Example: All the program steps are occupied. Program 0 is to be changed with a number of program steps remaining unaltered:

Before:	After:
Start = 20.0°C	Start = 25.0°C overwrite,
Goto1 = 30.0°C	Goto1 = 10.0°C overwrite,
Time1 = 0H12	Time1 = 1H52 overwrite,
Goto2 = Hold	Goto2 = End overwrite

4.6. Deleting programs



3 steps must be performed to use the delete feature. This is to prevent programs being unintentionally deleted.

   4x          	<p>Press the set-key</p> <p>Press the prog-key 4x. The <i>Clear</i> message will be displayed. Confirm this command using an arrow-key.</p> <p>Security step 1: If no button is pressed within 4 minutes, the program will remain activated and the actual temperature will be displayed. Select the program to be deleted using the arrow-key. Confirm this selection using the set-key.</p> <p>Security step 2: The <i>No</i> message is displayed. Select the <i>Yes</i> option within 4 minutes using the arrow-keys. Otherwise the selected program will not be deleted.</p> <p>Security step 3: Confirm the <i>Yes</i> option using the set-key. The selected program will then be deleted.</p>
--	--


























Any activated programs must be stopped before a program can be deleted. If all of the programs are empty, the Empty message will appear. The data entry mode can be terminated at any time by using the escape feature (press both arrow-keys simultaneously).

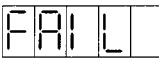
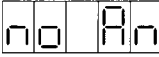
5. Interface

5.1 Analogue interface

5.1.1 Analogue input

The temperature increase (ramp) of the bath can be controlled using an analogue signal whose magnitude represents the set-point. The corresponding temperature range can be set by the user (e.g., -25 to 120°C or 0 to 100°C, etc.). The temperature range is valid for the analogue input as well as for the analogue output.

		
	SETE	Press the set-key.
	ALARM	Then press the alarm-key once.
	SETUP	Press the print-key once. The <i>Setup</i> message will be displayed.
	COMP	Enter the program using the arrow-keys.
	HEAT	The <i>Comp.</i> message (representing compressor) will be displayed. This feature is described in paragraph 6.
	An_In	Do not press the arrow-key.
 2x	An_In	Press the set-key twice. The message <i>An_In</i> will be displayed representing the analogue input. Select the program using the arrow-key. The current status of the analogue input will be displayed. <i>No</i> indicates that the analogue is not activated as a set-point source.
	no	Select the <i>Yes</i> option using the arrow keys in order to activate the analogue input as the set-point source.
	YES	Confirm the selected option using the set-key.
	CUT	If the analog input is switched on with the option <i>Yes</i> , the following display is <i>Cut</i> . Select the option <i>No</i> with the help of the arrow keys if, in case of a faulty analog input signal, the temperature should adjust to the 2 nd set-point value (see §1.2). Select the option <i>Yes</i> , if, in case of a faulty analog input signal, the thermostat should be switched off.
	no	Confirm the selected option with the help of the Set-key.
	YES	
	NULL	The <i>Null</i> message (zero) will be displayed. The escape feature is still available at this point. Set the corresponding temperature for the zero line for the analogue interface using the arrow-keys and confirm using the set-key.
	0.0°C	
		
	SPAN	The <i>Span.</i> message will then be displayed. The escape feature is no longer available at this point. Enter the temperature corresponding to the limit value setting of the analogue interface using the arrow-keys.
	100.0°C	Confirm using the set-key
		The <i>Lo_In</i> message will be displayed. The escape feature is available at this point. This indicates that the analogue input must be supplied with the signal which corresponds to the previously set zero line, e.g., 4mA. Use the set-key to escape as soon as this value is set.
	Lo_In	
		
	Hi_In	The <i>Hi_In</i> message will be displayed. This indicates that the analogue input must be supplied with the signal which corresponds to the end limit set previously, e.g., 20mA. The escape feature is not available.
		Use the set-key to escape as soon as this value is set.
		The analogue input is now set, the setup menu escaped.

	<p>The difference between <i>Lo_In</i> and <i>Hi_In</i> must be at least 5mA. If this value is not attained, the FAIL message will be displayed and the currents level setting procedure for <i>Lo_In</i> and <i>Hi_In</i> will have to be repeated.</p>
	<p>The message <i>no-An</i> is display if the analog input is to be activated, but no input current or an over-high input current was measured.</p>



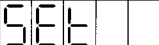



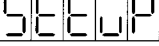



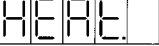

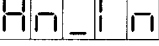




If the analogue interface is activated, the initial level of current determines the set-point and it is not possible to enter a set-point using the keyboard. (see 5.1.3). It is however possible to check the set-point (see §1.1.1).

The master-clear feature can be used to terminate the set-point output via the analogue interface. It is then modulated to the set-point value which was set prior to the activation of the analogue interface (see also §A 1.4.3). The data entry mode cannot be terminated at any time using the escape feature, e.g., during the data entry procedure for the zero line and the limit value setting. As a result both values must be entered and the automatic data entry check can come into effect (see also §5.1.3).

5.1.2 Analogue output

The indicated temperature (internal or external circuit) can be transmitted via the interface jack. This does not depend on the source of the set-point (keyboard, digital or analogue interface). The corresponding temperature range can be defined by the user (e.g., 25°C to 120°C or 0°C to 100°C, etc.). The temperature range is valid for both the analogue input and output.

		
		Press the set-key,
		then the alarm-key once.
		Press the print-key once. The <i>Setup</i> message will be displayed. Enter the program number using the arrow-keys.
		The <i>Comp.</i> message (representing compressor) will be displayed. This function is described in paragraph 6.
		Do not press the arrow-keys.
		Press the set-key 3x and the <i>AnOut</i> message will be displayed.
		

		Press the arrow-key once to display the status of the analogue output. Use the arrow-keys to select <i>No</i> for deactivated or <i>Yes</i> for activated. Confirm this setting using the set-key.
	no	If the <i>No</i> option is selected, the current level output will correspond to the current level setting for the zero line (<i>LoOut</i>).
	YES	
	NULL	If the <i>Yes</i> option is selected, the <i>Null</i> message (zero) will be displayed. Use the arrow-keys to enter the corresponding temperature for the zero line of the analogue interface and confirm the setting using the set-key.
	000	
	SPAN	The <i>Span</i> . message will be displayed. Enter the temperature corresponding to the limit value setting of the analogue interface using the arrow-keys and confirm using the set-key.
	10000	
	LoOut	The <i>LoOut</i> message will be displayed. The current level at the analogue output will correspond to the previously defined zero line setting.
		This current level can be changed using the arrow-keys.
		If the current corresponds to the desired value, e.g. 4mA, use the set-key to confirm this setting.
	HiOut	The <i>HiOut</i> message is displayed. At the analogue interface the current level output corresponds to the previously defined limit value setting.
		This current level can be modified using the arrow-keys.
		If the current corresponds to the value desired, e.g. 20mA, use the set-key to confirm this setting.
		The analogue output is now set-up and, the set-up menu ended.

5.1.3 Notes



The temperature differential between the *Null* and *Span* values must be at least 10K, but are not permitted to exceed 320K.

E.G.: *Null* = 0°C, *Span* = 10°C = minimal difference.

Null = -20°C, *Span* = 300°C = maximum difference.

The analogue interface has been designed for current levels of 4...20mA. Higher currents levels must be avoided as this could damage the control unit module. Ensure the polarity is correct for the same reason.

The analogue interface is supplied as a current interface. If the analogue input is to be used as a voltage input, it is supplied with a feature which permits the input resistance to be increased. To do this jumper 1 must be plugged into position U (see §7.3). The permissible supply voltage is then 1....5V. See §7.4 regarding jumper positioning.

5.2 Digital Interface

General information:

The controller is equipped with a bi-directional RS232 interface and an RS485 semi-duplex interface. The hardware can be changed over in the setup menu using the sub-program diGi. Use the option 232 for RS232 and the option 485 for RS485 (see §6.1.5).

With each command, it is specified whether the setting is lost when the power is switched off, i.e. the storage is volatile, or whether the setting will still be available when the power is switched back on, i.e. the storage is permanent.

Observe the following procedure when commissioning via the digital interface.

1. Ensure both the PC and the circulation bath are switched off. The connection cable can now be plugged into the PC and the circulation bath.
2. Firstly switch on the circulation bath,
3. Then switch on the PC
4. The data transmission can be started.

The following software protocols are possible. The setup procedure for the software protocol is described under §3.3.

5.2.1 Printer Software Protocol

In order to simplify the instructions:

- Upper and lower case letters are not differentiated. SET = set = Set = sET.
- All temperatures are displayed in °C, even if °F is displayed
- The character is factorial, i.e., +25 = 25
 - All temperatures can be written without a decimal point, i.e., without „0,, 15 represents 15.0, and -25 = -25.0



Any instruction which is incorrectly entered or unrecognised will be indicated as

follows:

--	--	--	--	--	--

.

This message will be displayed even if the interface mode IF232 is activated. In this case enter the mode *Printer* or *File*(s. § 3.3).

The pause between every character of an instruction must not exceed 2 seconds, otherwise the whole instruction will be erased and the above message will be displayed. The interval between any two instructions should exceed 3 seconds.

If the analogue input is defined as the set-point source in the set-up menu, this set-point overrides the set-point transmitted via the digital interface to the control unit.

The keyboard cannot be used when the unit is in the remote-mode. There is only one exception to this rule - the so called MasterClear key feature (pressing Alarm + Prog simultaneously). This command terminates the remote-mode, permitting use of the keyboard to operate the control unit. At the same time, the control unit set-point defined prior to the instruction REMOTE <CR> <LF> is reactivated (user-defined default set-point).

Alternatively, if the remote-mode is terminated using the instruction LOCAL <CR> <LF>, the last set-point transmitted via the interface is retained (continuous control).

The following operating modes are available:

Activating REMOTE mode

REMOTE <CR> <LF>	none		
Keyboard disabled, printer protocol commands may be used, autoprint functions blocked. Set value control possible.		permanent	no

Activating LOCAL mode

LOCAL <CR> <LF>	none		
Keyboard free, printer protocol commands not usable, autoprint functions released. Default after Power ON.		permanent	no

The following line formats are available in the REMOTE mode.

- [1] Set value in °C with one decimal place from the PC to the controller
 -###.# # stands for a digit 0 - 9,
 - stands for a negative prefix (+ optional).
 eg 12.5, +1.3, .5, -1.9, -12.3, -100.0, 100.0
- [2] Set value in 1/100K from the PC to the controller
 -##### # stands for a digit 0-9,
 - stands for a negative prefix (+ optional).
 eg +1000 (10°C), -123 (-1.23°C), +12345 (123.45°C)
- [3] Set value in °C with a decimal place from the controller to the PC
 ±%%#. # stands for a digit 0...9,
 % stands for a digit 0...9 or a space,
 ± stands for a prefix + or -
 eg + 12.5, + 1.3, + 0.5, - 1.9, - 12.3, -100.0, +100.0
- [4] Set value or actual value in 1/100K from the controller to the PC
 ±##### # stands for a digit 0...9,
 ± stands for a prefix + or -
 eg +01000 (10°C), -00123 (-1.23°C), +12345 (123.45°C)
- [5] Actual value in °C with a decimal place from the controller to the PC
 §##.#C # stands for a digit 0...9,
 § stands for a negative prefix or for a digit 0...9
 eg 12.5C, 1.3C, 0.5C, -1.9C, -12.3C, -99.9C, 100.0C
- [6] Whole numbers from the PC to the controller or from the controller to the PC
 %%% % stands for a digit 0...9 or a space,
 eg 1000, 20, 15000.

The description of commands corresponds to the chart:

Description

Command	[number format]	Response	[number format]
Comments, Examples		Storage	Compatible

A flexible command interpreter was used for some commands. This enables the programmer to use a command in a different way. These commands are marked with a @ (for echo) after the command. These commands may be used as setting commands, interrogation commands or setting commands with echo commands. An example:

SP@ -##### <CR> <LF>	[2]	SP ±##### <CR> <LF>	[4]
Set set value with echo		volatile	yes

This command may be used in three variants

Set value from the PC to the controller.

SP -#####<CR><LF>	[2]	none		
Are given in 1/100K, eg SP 10000<CR><LF> for +100°C, SP - 120<CR><LF> for -1.2°C			volatile	yes

Set value from the controller to the PC

SP?<CR><LF>		SP ±#####<CR><LF>		[4]
In 1/100K with prefix and leading zeros, eg SP -00123 for 1.23°C.		-		yes

Set value from the PC to the controller, echo from the controller to the PC.

SP@ -#####<CR><LF>	[2]	SP ±#####<CR><LF>		[4]
Set set value with echo		volatile		yes

The following commands described as compatible are also available in the Unistat Control from V3.7. This makes it possible to write programs which can function both on all CC thermostats from V3.04 and all unistates from V3.7. However, here the different time response of the thermostats should be taken into account. For example, the power up operation takes different lengths of time and so the response to the command *KM?* <CR><LF> is not identical. A test run on both equipment types is essential.

5.2.1.1 Set value and set value restrictions, actual values

Set value from the PC to the controller.

SET -###.#<CR><LF>	[1]	none		
SET 100.0<CR><LF>, SET -12.3<CR><LF>		volatile		no

Set value from the controller to the PC

SETPOINT? <CR><LF>		±%#.#<CR><LF>		[3]
+ 12.3, - 0.1 (leading space).		-		no

Set value from the PC to the controller, echo from the controller to the PC.

SP@ -#####<CR><LF>	[2]	SP ±#####<CR><LF>		[4]
Set set value with echo		volatile		yes

2nd set-point value from the PC to the controller, echo from the controller to the PC.

SP2@ -#####<CR><LF>	[2]	SP2 ±#####<CR><LF>		[4]
Set set value with echo		permanent		yes

Insert new set value in the user table. The eleventh set value deletes the oldest table value.

ADD USER -###.#<CR><LF>	[1]	none		
ADD USER -15.6<CR><LF>		permanent		no

Deletes the set value-user table.

CLEAR USER<CR><LF>		none		
		permanent		no

Set value restrictions from the PC to the controller.

LO LIMIT -###.#<CR><LF>	[1]	none		
LO LIMIT 5.0<CR><LF> For low-limit 5°C		volatile		no

HI LIMIT -###.#<CR><LF>	[1]	none		
HI LIMIT +95.2<CR><LF> for high-limit 95.2°C		volatile		no

Set value restrictions from the PC to the controller, echo from the controller to the PC.

LL@ -#####<CR><LF>	[2]	LL ±#####<CR><LF>	[4]
LL@ 500<CR><LF> For low-limit 5°C		volatile	yes

LH@ -#####<CR><LF>	[2]	LH ±#####<CR><LF>	[4]
LH@ 09520<CR><LF> For high-limit 95.2°C		volatile	yes

Internal temperature from the controller to the PC.

INTERN?<CR><LF>		§###.#C<CR><LF>	[5]
In °C, eg 12.5C, -0.5C, 125.0C, -12.4C (leading space).		-	no

TI?<CR><LF>		TI ±#####<CR><LF>	[4]
In 1/100K with prefix and leading zeros, eg TI +00100<CR><LF> for 1.0°C		-	yes

External temperature from the controller to the PC

EXTERN?<CR><LF>		§###.#C<CR><LF>	[5]
In °C, eg 12.5C, -0.5C, 125.0C, -12.4C (leading space).		-	no

TE?<CR><LF>		TE ±#####<CR><LF>	[4]
In 1/100K with prefix and leading zeros, eg TI -00100<CR><LF> for -1.0°C		-	yes

Change external set value to interface

With the „CETM,-command the source of the external actual value of the Pt100 can be changed to the serial interface. After switching on every 5 seconds a new external actual value has to be transmitted with activated external regulation. This happens through „RTE,-command.

CETM_ON@<CR><LF> CETM_OFF@<CR><LF>		CETM ON<CR><LF> or CETM OFF<CR><LF>	
CETM_ON<CR><LF> = switch on TempMove without echo CETM_OFF@<CR><LF> = switch off TempMove with echo CETM?<CR><LF> = interrogation of TempMove-Status		volatile	yes

Command to transfer the external temperature through the serial interface. With activated external regulation every 5 seconds a new external actual value has to be transmitted, if not the warning „noOut,, is displayed , the regulation is changed to internal and the CETM-Mode is switched off.

RTE@ -#####<CR><LF>	[2]	RTE ±#####<CR><LF>	[4]
RTE@ 00100<CR><LF> = setting the external temperature to 1°C with Echo RTE 01000<CR><LF> = setting the external temperature to 10°C without echo. RTE?<CR><LF> = interrogation of temperature .		volatile	yes

5.2.1.2 Alarm temperatures, alarm messages and alarm treatment

Lower alarm temperature from the PC to the controller

LO_ALARM -###.# <CR> <LF>	[1]	none		
LO_ALARM -10 <CR> <LF> for low-alarm -10°C			volatile	no

Upper alarm temperature from the PC to the controller

HI_ALARM -###.# <CR> <LF>	[1]	none		
HI_ALARM 120.5 <CR> <LF> for high-alarm 120.5°C			volatile	no

Request device status

ERROR? <CR> <LF>	ERROR # <CR> <LF>			
# = 0 = no error, # > 0 = error	-			yes

Deleting an alarm message

ALARM <CR> <LF>	none			
The cause of the error must be rectified before using this command (see §2.4).	-			no

5.2.1.3 Control mode

Set internal temperature control mode

INTERN! <CR> <LF>	none			
see also §1.3			volatile	no

INTERN@ <CR> <LF>	INTERN ON <CR> <LF>			
Set and request temperature control mode. INTERN? see above	volatile			yes

Set external temperature control mode

EXTERN! <CR> <LF>	none			
Only with connected Pt100, otherwise ineffective.			volatile	no

EXTERN@ <CR> <LF>	EXTERN ON <CR> <LF>			
Only with connected Pt100, otherwise Response = INTERN ON <CR> <LF>. EXTERN? see above	volatile			yes

Request temperature control mode

TEMP? <CR> <LF>	INTERN <CR> <LF> EXTERN <CR> <LF>			
Response dependent on the temperature control mode (see §1.3)	-			yes

5.2.1.4 Miscellaneous

Change temperature display

DEGRE C <CR> <LF>	none			
LED-display in °C			volatile	no

DEGRE F <CR> <LF>	none			
LED-display in °F			volatile	no

Define controller number

IDENT %#<CR> <LF>	none		
Defines the device ID number (see §3.4)	permanent	no	
IDENT?	ID = %#<CR> <LF>		
Returns the device ID number.	-	no	

Read out device code

With this command the device code is read out.

The command „DSPY 49<CR> <LF> „ is basically compatible to unistats, the answer however depends on the unit.

DSPY 49<CR> <LF>	33Byte<CR> <LF>	see below	
Read out device code .		yes	

Description of answer with CC-thermostats. Please see manual for Unistat Control.

The answer always consists of 33byte plus <CR> <LF> .

The first byte always is a FormFeed (0x0d).

Followed by 16 byte consisting of

6 byte for regulation groupe , like „UNI CC„, „POLYCC„, „MINICC„ or „ICC „(three space characters).

1 byte space character.

max. 6 byte identification. This identification is shown with first switch on.

min. 3 byte space characters

Another 16 byte with temperature limits of thermostat.

6 byte for min temperature

4 byte space characters

6 byte max temperature

Last 2 byte <CR> <LF>

The watchdog

The watchdog is a security installation which allows the surveillance of the communication between thermostat and PC. In order to activate the watchdog, a WDX-command together with a time indication has to be sent to the thermostat. Within this time, the command has to be refreshed, otherwise, the watchdog executes his action. Taking the WD1-command, the watchdog switches off thermoregulation, an error message is displayed. Taking the WD2-command, the watchdog replaces the set value by the 2nd set value, to which the thermostat then adjusts. A warning is displayed. A WDX-command with time = 0 deactivates the watchdog.

Watchdog in mode 1 = set switch off.

WD1@ %%%<CR> <LF>	[6]	WD1 + #####<CR> <LF>	[4]
Set watchdogmode 1 (switch off) with echo		volatile	yes

Watchdog in mode 2 = set 2nd set-point value.

WD2@ %%%<CR> <LF>	[6]	WD2 + #####<CR> <LF>	[4]
Set watchdogmode 1 (switch off) with echo		volatile	yes

5.2.1.5 Status interrogations

STATUS0 <CR> <LF>	S0 §##.#C RMINCKZ vvvvvvU <CR> <LF>		
R = Remote, A = analog M = No alarm, H = High, L = Low alarm I = Internal, e = External, G = OFF N = No error, T = Overtemp., F = Level or Error, B = both errors C = Calibrated, U = Uncal, J = IntCal, O = ExtCal K = Compressor automatics, D = ON, P = OFF Z = No Open, X = PtOut, Y = PtInt, W = PtOut + PtInt v = Software version U = Unistat CC, M = Ministat CC, P = Polystat CC	-		no

STATUS1 <CR> <LF>	S1 §##.#C§##.#C%%%%s%%%%s%%%%sU <CR> <LF>		
§##.# = Low-alarm in °C with a decimal place §##.# = High-alarm in °C with a decimal place %%%% = Low-print in seconds %%%% = Middle-print in seconds %%%% = High-print in seconds U = Unistat CC, M = Ministat CC	-		no

STATUS2 <CR> <LF>	S2 §##.#C §##.#C §##.#C §##.#C U <CR> <LF>		
§##.# = Low-limit in °C with a decimal place §##.# = High-limit in °C with a decimal place §##.# = Min-range in °C with a decimal place §##.# = Max-range in °C with a decimal place U = Unistat CC, M = Ministat CC	-		no

5.2.1.6 Control parameters

P factor internal controller

PINT@ %%%<CR> <LF> [6]	PINT %%%<CR> <LF> [6]		
Set and request P factor (50...30000)	permanent		no

I factor internal controller

IINT@ %%%<CR> <LF> [6]	IINT %%%<CR> <LF> [6]		
Set and request I factor (0...30000)	permanent		no

P factor external controller

PEXT@ %%%<CR> <LF> [6]	PEXT %%%<CR> <LF> [6]		
Set and request P factor (50...30000)	permanent		no

I factor external controller

IEXT@ %%%<CR> <LF> [6]	IEXT %%%<CR> <LF> [6]		
Set and request I factor (0...30000)	permanent		no

5.2.1.7 Switching temperature control on and off

With the Ministat CC, the heating, compressor and the pump are switched on or off. With the Compatible Control and Intelligent Chiller Control, the heating and the compressor are switched off, the pump continues to run. These commands should not be used too often as the compressor must not be switched on and off too frequently.

Switching on temperature control

KM ON<CR> <LF>	none		
Only switching on.		volatile	yes

KM ON@<CR> <LF>	ON<CR> <LF>		
Switching on and echo.		volatile	yes

Switching off temperature control

KM OFF<CR> <LF>	none		
Only switching off		volatile	yes

KM OFF@<CR> <LF>	OFF<CR> <LF>		
Switching off and echo.		volatile	yes

Requesting temperature control

KM?<CR> <LF>	ON<CR> <LF> OFF<CR> <LF>		
Only echo.		-	yes

5.2.1.8 Handling the floating contact (POKO)

To switch the floating contact via the RS-interface, it is first necessary to set the POKORS mode to ON with the POKORS commands. In POKORS mode OFF, the POKO commands are ignored, but the POKO? command returns the current POKO status. When the power is switched on, the POKO remains in the current status, when it is switched off the controller determines the POKO status.

Determining POKORS mode

POKORS ON<CR> <LF>	none		
Handling POKO via the interface		volatile	yes

POKORS ON@<CR> <LF>	POKORS ON<CR> <LF>		
Handling POKO via the interface with echo.		volatile	yes

POKORS OFF<CR> <LF>	none		
Handling POKO from the controller		volatile	yes

POKORS OFF@<CR> <LF>	POKORS OFF<CR> <LF>		
Handling POKO from the controller with echo		volatile	yes

POKORS?<CR> <LF>	POKORS ON<CR> <LF> POKORS OFF<CR> <LF>		
Request POKORS mode.		-	yes

Handling POKO

POKO_ON<CR> <LF>	none		
Switching POKO on		volatile	yes
POKO_ON@<CR> <LF>	POKO_ON<CR> <LF> POKO_OFF<CR> <LF>		
Switching POKO on with echo		volatile	yes
POKO_OFF<CR> <LF>	none		
Switching POKO off		volatile	yes
POKO_OFF@<CR> <LF>	POKO_ON<CR> <LF> POKO_OFF<CR> <LF>		
Switching POKO off with echo		volatile	yes
POKO?<CR> <LF>	POKO_ON<CR> <LF> POKO_OFF<CR> <LF>		
Request POKO		-	yes

5.2.1.9 Handling the programmer

To start a single ramp via the interface, it is first necessary to select the single ramp type PROG_SELECT. Then, the new bath temperature and the time in which it is to be reached should be sent to the controller with PROG_TEMP and PROG_TIME.

Use the PROG_STATUS command to start the single ramp.

Setting single ramp data

PROG_SELECT@ %%<CR> <LF> [6]	PROG_SELECT = %%<CR> <LF> [6]		
Select single ramp with echo 99 = at ramp end HOLD 98 = at ramp end END 97 = at ramp end HOLD and sensor ON 96 = at ramp end END and sensor ON		volatile	no
PROG_TEMP@ -#####<CR> <LF> [2]	PROG_TEMP = -#####<CR> <LF> [2]		
Set new bath temperature in 1/100K with echo		volatile	no
PROG_TIME@ %%%>>>><CR> <LF> [6]	PROG_TIME = %%%>>>><CR> <LF> [6]		
Set ramp time in seconds with echo		volatile	no

Temperature control programs from the controller memory may also be selected, started, suspended and terminated via the interface. It is also possible to jump a segment.

Selecting temperature control program

PROG_SELECT@ #<CR> <LF> [6]	PROG_SELECT = %#<CR> <LF> [6]		
Select temperature control program 0- 9 with echo. (see §4.2.1)		permanent	no

Selecting, starting, suspending and terminating a temperature control program

PROG STATUS@ # <CR> <LF> [6]	PROG STATUS = %# <CR> <LF> [6]		
0 = terminate program, terminated 1 = suspend program, suspended 2 = start program, started 3 = continue program, runs 4 = single ramp runs 5 = HOLD or END at program end See also §4.	<table border="1"> <tr> <td>permanent</td> <td>no</td> </tr> </table>	permanent	no
permanent	no		

Jumping a segment

PROG_SEGMENT@ 1 <CR> <LF>	PROG_SEGMENT = %% <CR> <LF> [6]
These command corresponds to the <i>Jump</i> (see §4.2.1.1) %% = Program segment number 0 = Start segment 99 = single ramp	

5.2.2 LAI Software Protocol

Two command groups are located under the protocol designation LAI_1: The LAI command group and two tecon-compatible commands.

5.2.2.1 the LAI Command Group

General: the master unit transmits to the slave unit and always receives an answer (echo). No slave unit transmits unless prompted.

This procedure is upper and lower case sensitive.

Numerical values are transmitted as hexadecimal numbers in two's complement notation. As a result each Byte is represented by 2 ASCII characters. The decimal number 100 corresponds to the hexadecimal number 64h therefore the ASCII characters '6' and '4' are transmitted. The decimal number -100 corresponds to the hexadecimal number 9Ch therefore the ASCII characters '9' and 'C' are transmitted.

Temperatures are transmitted with a resolution of 0.01K, i.e., +100°C corresponds to the decimal number 10000 and the hexadecimal number 2710h therefore the ASCII characters '2', '7', '1', '0' are transmitted. The temperature -100°C corresponds to the decimal number -10000 and the hexadecimal number D8F0h therefore the ASCII characters 'D', '8', 'F', '0' are transmitted.

The ASCII characters '0'...'9' and 'A'...'F' are used when transmitting numerical and temperature values.

A request from the master to the slave is constructed according to the following assignment:

'[mssilld...dpp\r'

This includes:

[	Start character 5Bh	1 Byte
m	Transmitter ID M = Master 4Dh	1 Byte
ss	Slave address 00..99	2 Byte
i	Data group identifier	1 Byte
ll	Length of the data field	2 Byte
d...d	Data group	0...50 Byte
pp	Checksum	2 Byte
\r	End character CR 0Dh	1 Byte

An answer from the slave to the master is constructed according to the following assignment:
 '[mssilld...dpp\r]'

This includes:

[	Start character 5Bh	1 Byte
m	Transmitter ID S = Slave 53h	1 Byte
ss	Slave address 00..99	2 Byte
i	Data group identifier	1 Byte
ll	Data field length	2 Byte
d...d	Data groups	0...50 Byte
pp	Checksum	2 Byte
\r	End character CR 0Dh	1 Byte

Characters which precede the checksum are described as the data field.

Characters following the 7th Byte and preceding the checksum are described as the data group. The actual data is contained within the data groups. The meaning of the data is indicated using an identifier. The commands are designated according to the ID in the following.

A checksum is transmitted in order to improve data security. The checksum is the 1-Byte sum of all hexadecimal values from the start character up to the last character before the checksum.

Example: The master transmits: '[M01V07C6\r]'

	ASCII	Hex	Meaning
1 st Byte	[	5Bh	Start character
2 nd Byte	M	4Dh	Transmitter ID M = Master
3 rd Byte	0	30h	Slave address 01
4 th Byte	1	31h	Slave address 01
5 th Byte	V	56h	Data group identifier
6 th Byte	0	30h	Length of the data field 07 Byte
7 th Byte	7	37h	Length of the data field 07 Byte
8 th Byte	C	43h	Checksum C6
9 th Byte	6	36h	Checksum C6
10 th Byte	\r	0Dh	End character CR

The length of the data field is the number of Bytes preceding the checksum. The checksum is created using these Bytes.

$$5Bh + 4Dh + 30h + 31h + 56h + 30h + 37h = 1C6h \rightarrow 1\text{Byte-Summe} = C6h.$$

Protocol setting for the LAI commands

Baud rate 1200, 2400, 4800, 9600 asynchronous

Start bit 1

Data bits 8

Parity none

Stop bit 1

The following commands are valid for all HUBER controllers with an RS232/RS485 interface. In the examples, slave 01 is always the subject of interrogation.

<p>'V' Verify</p>	<p>Provided to check if a slave is present. The command is not assigned a data group. Master enquiry: 'IM01V07C6\r' The master enquires whether the Slave 01 is connected to the bus. Slave reply: 'IS01VOEMINI CCAD\r' Slave 01 is connected to the bus and the device is a ministat CC. The command has the data group 'MINI CC'. This is 7 Byte long. These 7 Bytes added to the 7 Bytes from the data group result in a data field length of 14 Bytes = 0Eh Bytes.</p>
<p>'G' General</p>	<p>This command communicates the most important temperatures and status information. A modified set-point value is not stored in the permanent memory, i.e., this value is lost when the power supply is disconnected. Master enquiry : 'IM01GODsatttpp\r' s = Temperature control mode: 'C' = Circulation activated. Is ignored by every CC thermostats. 'E' = Activate external temperature control. 'I' = Activate internal temperature control. 'O' = Off, Deactivate temperature control. Is ignored by every CC by thermostats. '*' = Do not change the current status. a = Reset alarm 'O' = No alarm reset. '1' = Any activated alarm is reset. '*' = Do not change the current status. tttt = Set-point in the temperature format described above. '*****' = No change of the set-point. pp = Checksum in the format described above. \r End character CR. Slave Reply: 'IS01G15sattttiiiiieeeepp\r' s = Temperature control mode 'C' = Circulation activated. Not feasible for CC thermostats. 'E' = External temperature control activated. 'I' = Internal temperature control activated. '*' = Only permitted if the status cannot be determined. a = Alarm status 'O' = No alarm. '≠ 0' = A numerical value which does not equal 0 indicates an alarm. tttt = Set-point in the temperature format described above. iiii = Internal actual value in the temperature format described above. eeee = External actual value is in the temperature format described above. pp = Checksum in the format described above. \r End character CR.</p>

<p>'L' Limit</p>	<p>This command communicates the set-point limits(see §1.5 Setting the Internal Set-point Limit).</p> <p>Master enquiry: '[M01L0Fllllhhhhpp\r'</p> <p>llll = Low limit, lower set-point limit in the above temperature format. **** = no change of the lower set-point limit.</p> <p>hhhh = High limit, upper set-point limit in the above temperature format. **** = no change of the upper set-point limit.</p> <p>pp = Checksum in the format described above. \r End character CR.</p> <p>Slave reply: '[S01L17llllhhhhuuuuooooopp\r'</p> <p>llll = Low limit, lower set-point limit in the temperature format described above.</p> <p>hhhh = High-Limit, upper set-point limit in the temperature format described above.</p> <p>uuuu = Lower working range. This limit is specific to the device and cannot be modified. The lower set-point limit is not permitted to be lower than the lower working range limit.</p> <p>oooo = Upper working range limit. This limit is specific to the device and cannot be modified. The upper set-point limit is not permitted to exceed the upper working range limit.</p> <p>pp = Checksum in the format described above. \r End character CR.</p>
<p>'I' Ident</p>	<p>This command changes the slave address (see §3.4 Setting device ID.).</p> <p>Important! The slave address is stored in the permanent memory. This is limited to 100,000 overwrite cycles as a result of the components used. When programming, ensure that these memory addresses are not overwritten too frequently.</p> <p>Master enquiry: '[M01I09nnpp\r'</p> <p>nn = New slave address '00'...'99'. ** no change of the slave address.</p> <p>pp = Checksum in the format described above. \r End character CR.</p> <p>Slave reply: '[S01I09nnpp\r'</p> <p>nn = New slave address. This address is valid after the reply is transmitted. Was entered as new slave address ** the previous slave address is returned.</p> <p>pp = Checksum in the format described above. \r End character CR.</p>

The following commands are valid for all HUBER-Compatible Controllers with an RS232/RS485 interface.

<p>'A' Alarm</p>	<p>This command communicates the alarm temperatures (see §2.3 Setting Alarm Values).</p> <p>Master enquiry : '[M01A0Fllllhhhhpp\r'</p> <p>llll = Low-alarm, lower alarm value in the temperature format described above. **** = No change of the lower alarm value.</p> <p>hhhh = High-alarm, upper alarm value in the temperature format described above. **** = No change of the upper alarm value.</p> <p>pp = Checksum in the format described above. r End character CR.</p> <p>Slave reply: '[S01A0Fllllhhhhpp\r'</p> <p>llll = Low-alarm, lower alarm value in the temperature format described above.</p> <p>hhhh = High-alarm, upper alarm value in the temperature format described above.</p> <p>pp = Checksum in the format described above. \r End character CR.</p>
------------------	---

<p>'S' Status</p>	<p>This command communicates status information regarding the device status.</p> <p>Master enquiry : '[M01S080F4\r'</p> <p>A 'O' must be entered in the data group. This is the defining ID O. Currently only this defining ID is occupied.</p> <p>\r End character CR.</p> <p>Slave reply: '[S01S1A0aabcdeffgVxxxxxyypp\r'</p> <p>aa = Set-point source: 'A0' = analogue set-point, 'R2' = RS232, 'R4' = RS485.</p> <p>b = Alarm status: 'H' = High-alarm, 'L' = Low-alarm, 'M' = No alarm</p> <p>c = Temperature control mode: 'E' = External temperature control, 'I' = internal temperature control, 'G' = Controller status = off.</p> <p>d = Error status: 'T' = Overtemperature on the mini CC, 'F' = Level on the mini CC or error on the uni CC, 'B' = Both errors simultaneously on the mini CC, 'N' = No error.</p> <p>e = Calibration status: 'C' = Internal and external systems calibrated, 'U' = Internal and external systems not calibrated, 'J' = Only internal system calibrated, 'O' = Only external system calibrated.</p> <p>ff = Compressor automatic controls -Status: 'D1' = Compressor automatic controls ON, 'PO' = Compressor automatic controls OFF, 'K1' = Compressor automatic controls have activated the compressor 'KO' = Compressor automatic controls have deactivated the compressor.</p> <p>g = Sensor status: 'X' = External sensor leaking, 'Y' = Internal sensor leaking, 'Z' = Both sensors OK, 'W' = Both sensors leaking.</p> <p>V = Version ID xxxxxx = Version number as a string, e.g., '03.01A' or '03.10A'</p> <p>yy = PCB status with hardware ID 'M1' = mini CC hardware 1 'U1' = uni CC hardware 1 'P3' = Polystat CC hardware 3</p> <p>pp = Checksum in the format described above.</p> <p>\r End character CR.</p>
-------------------	---

5.2.2.2 Tecon compatible Command group

General: The master transmits to the slave and always receives an answer (echo). No slave transmits unless prompted.

This procedure is upper and lower case sensitive.

Temperatures are transmitted with a resolution of 0.1K, i.e., +100°C corresponds to the decimal number 1000 and the hexadecimal number 00003E8h. The ASCII characters '0','0','0','0','0','3','E','8' are therefore transmitted. The temperature -100°C corresponds to the decimal number -1000 and the hexadecimal number FFFFC18h. The ASCII characters 'F','F','F','F','F','C','1','8' are therefore transmitted.

The ASCII characters '0'...'9' and 'A'...'F' are therefore used to transmit temperature values. A request from the master to the slave is constructed according to the following assignment:

'#ssmmzlld...dpp\r'

This includes:

#	Start character 23h	1 Byte
ss	Slave address	2 Byte
mm	Master address	2 Byte
z	Data set ID	1 Byte
ll	Data set ID number	2 Byte
d...d	Data character	0...50 Byte
pp	Checksum	2 Byte
\r	End character CR 0Dh	1 Byte

A reply from the slave to the master is constructed according to the following assignment:

'<mmss = d...dpp\r'

This includes:

<	Start character 3Ch	1 Byte
mm	Master address	2 Byte
ss	Slave address	2 Byte
=	Message acknowledged	1 Byte
d...d	Data character	0...50 Byte
pp	Checksum	2 Byte
\r	End character CR 0Dh	1 Byte

The meaning of the data is indicated by the data set ID. The commands are designated according to the data set ID in the following. A checksum is also transmitted to improve data security. The checksum is the 1-Byte sum of all of the hexadecimal values from the start character up to the character preceding the checksum.

Example: The master transmits: **'#0100v00\r'**

ASCII	Hex	Meaning
1 st Byte	#	23h Start character
2 nd Byte	0	30h Slave address 01
3 rd Byte	1	31h Slave address 01
4 th Byte	0	30h Master address 00
5 th Byte	0	30h Master address 00
6 th Byte	v	76h Data set ID
7 th Byte	0	30h Data set ID number
8 th Byte	0	30h Data set ID number
9 th Byte	B	42h Checksum BA
10 th Byte	A	41h Checksum BA
11 th Byte	\r	0Dh End character CR

The checksum is derived from these Bytes.

23h + 30h + 31h + 30h + 30h + 76h + 30h + 30h = 1BAh --> 1Byte-Summe = BAh.

Protocol setting for the tecon commands

Baud rate 1200, 2400, 4800, 9600 asynchronous
 Start bit 1
 Data bits 7
 Parity bit 1
 Stop bit 1
 Parity odd

'v'	<p>Provided to check if a slave is present. Master enquiry : '#0100v00pp\r' The master enquires if slave 01 is connected to the bus. Slave reply: '<0001=UNI-0001pp\r' Slave 01 is connected to the bus and is a Huber unit.</p>
'C'	<p>Transfer of the set-point and actual values Master enquiry : '#0100C00ttttttt*****pp\r' The master unit 00 transmits the set-point value tttttttt to the slave 01 in the temperature format described above. If the set-point does not have to be modified, the temperature '*****' must be transmitted instead. Slave reply: '<0001 = tttttttt*****iiiiiiiieeeeeee***** 0x0y*****pp\r' tttttttt = Set-point in the temperature format described above. For internal temperature control: iiiiiii = Internal actual value in the temperature format described above. eeeeeee = External actual value in the temperature format described above. If no sensor is connected, '*****' is transmitted. For external temperature control: iiiiiii = External actual value is in the temperature format described above. eeeeeee = Internal actual value is in the temperature format described above. x = Alarm status: '0' = No alarm, '1' = Alarm. y = Controller status: '0' = Controller off, '4' = Controller on.</p>

5.2.3 The IF232 Command group

The software protocol IF232 is designed for communicating with the software of the Huber IF232 interface.





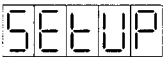

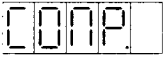



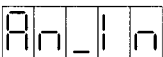







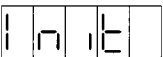

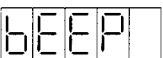

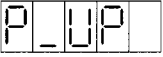

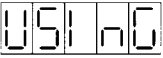

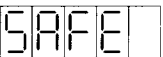

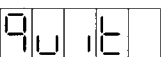


6. Setup menu

6.1 Call-up and functions

The setup menu contains the functions for the equipment configuration. These are:

- the compressor automatics (automatic, ON, OFF),
- the maximum heat output (100%, 75%, 50%, 25%),
- the analog input (on/off, range, matching),
- the analog output (on/off, range, matching),
- the digital interface (RS232 / RS485),
- the Pt100 internal two-step calibration program,
- the factory-set equipment parameters (Init),
- the acoustic sensor (Beep on/off),
- the automatic cutout (Power up on/off),
- the user level (CC1, CC2, CC3),
- the backup memory for the equipment configuration and calibration data.

The setup menu is a ring menu. The Set key may be used to page through the individual menu points one after the other. After the last menu point, you are returned to the first menu point. The desired menu point or the desired function is selected with an arrow key.






		The current actual value is shown on the display.
		
		Press the Set-, Alarm and the Print keys one after the other <i>Setup</i> appears on the display.
		Use an arrow key to call up the Setup menu. Display <i>Comp.</i> for compressor automatic (see §6.1.1).
		Continue with the Set-key. Display <i>Heat.</i> for heat output restriction (see §6.1.2).
		Continue with the Set-key. Display <i>An_In</i> for analog input (see §5.1.1).
		Continue with the Set-key. Display <i>AnOut</i> for analog input (see §5.1.2).
		Continue with the Set-key. Display <i>Digi.</i> for digital interface (see §6.1.5).
		Continue with the Set-key. Display <i>Cal</i> for the Pt100 internal two-step calibration program (§6.1.6).
		Continue with the Set-key. Display <i>Init</i> for the factory-set equipment parameters (see §6.1.7). Continue with the Set-key.
		Display <i>Beep</i> for the acoustic sensor (see §6.1.8). Continue with the Set-key.
		Display <i>P_UP</i> for automatic cutout (see §6.1.9).
		Continue with the Set-key. Display <i>Using</i> for the user level (see §6.1.10).
		Continue with the Set-key. Display <i>Safe</i> for the backup memory (see §6.1.11).
		Continue with the Set-key. Display <i>Quit</i> to terminate the Setup menu (see §6.1.12).
		Use the Set key to return to the start of the Setup menu. Display <i>Comp.</i> for compressor automatics.




If the set menu point is not confirmed within 4 minutes or the break function called up by simultaneously pressing both arrow keys, the Setup menu is terminated.







6.1.1 The compressor automatics


For compatible control: The options of the compressor automatics are only effective when the compressor continuous operation is set to switch setting 0. See the operating instructions for the thermostat.

 <div style="border: 1px solid black; padding: 2px; display: inline-block;">CONP</div>	To call up the compressor automatics, press and arrow key when the display shows <i>Comp.</i>
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">AUTO</div>	Use the arrow keys to set the desired option. <i>Auto</i> for compressor automatics (see §8.2),
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">On</div>	<i>On</i> for compressor continuous operation,
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">OFF</div>	<i>Off</i> to switch off the refrigeration machine.
	Confirm the set option confirm with the Set key, the setup menu is left.



 If the set option (flashing display) is not confirmed within 4 minutes or the break function called up by simultaneously pressing both arrow keys, the entry is terminated without storing the option.

6.1.2 The maximum heat output



 <div style="border: 1px solid black; padding: 2px; display: inline-block;">HEAT</div>	To call up the heat output restriction, press an arrow key when the display shows <i>Heat</i> .
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">100</div>	Use the arrow keys to set the desired option. <i>100</i> for maximum 100% heat output,
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">75</div>	<i>75</i> for maximum 75% heat output,
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">50</div>	<i>50</i> for maximum 50% heat output,
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">25</div>	<i>25</i> for maximum 25% heat output.
	Confirm the set option with the Set key, the setup menu is left.

 If the set option (flashing display) is not confirmed within 4 minutes or the break function called up by simultaneously pressing both arrow keys, the entry is terminated without storing the option.

6.1.3 The analog input




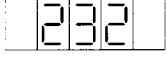
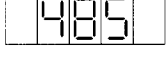

 <div style="border: 1px solid black; padding: 2px; display: inline-block;">An_In</div>	To activate the analog input press an arrow key when the display shows <i>An_In</i> .
	To set the analog input see §5.1.1

6.1.4 The analog output

 <div style="border: 1px solid black; padding: 2px; display: inline-block;">AnOut</div>	To activate the analog output, press an arrow key when the display shows <i>AnOut</i> .
	To set the analog output see §5.1.

6.1.5 The digital interface

The digital interface provides the option of choosing between two hardware configurations. The RS232 interface is used for point-to-point connections, the RS485 interface has a bus-capability. For the terminal assignment see §7.2. Only the selected interface may be connected, as otherwise malfunctions may occur.

 	To select the digital interface press an arrow key when the display shows <i>Digi.</i>
  	Use the arrow keys set the desired interface. 232 for RS232-interface, 485 for RS485-interface.
	Confirm the set interface with the Set key, the setup menu is left.

For the selection of the software protocol see §3.3

For the description of the software protocols see §5.2



If the set option (flashing display) is not confirmed within 4 minutes or the break function called up by simultaneously pressing both arrow keys, the entry is terminated without storing the setting.

6.1.6 Pt100 internal two-step calibration program

This program only starts with internal control (see §1.3).




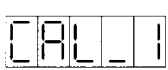

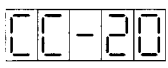

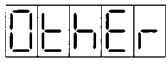


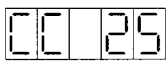




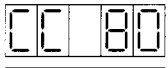







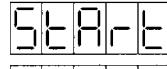

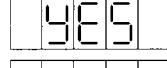

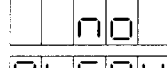



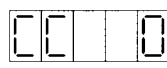



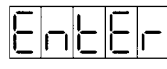



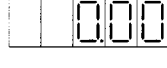


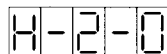




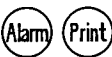



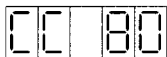

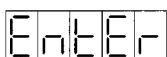





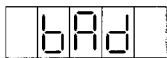

The internal Pt100 sensor may be calibrated via the keyboard, so that the microprocessor controller and hence the bath and circulating thermostat may be calibrated according to the ISO 9000 series of standards or for quality assurance purposes. After the calibration, the settings are stored. The controller is calibrated when the thermostats are delivered. With replaceable controllers, the accuracy should be checked.



Before the calibration of the controller, the calibration temperatures must be defined. The calibration temperatures should be based on the temperature control medium used and the working area. The first calibration temperature must always be lower than the second calibration temperature. The difference between the two calibration temperatures must be more than 10 Kelvin and must not exceed 250 Kelvin. Before the calibration, the set value limits and the alarm values should also be set so that there can be no conflict with the calibration temperatures (see §1.5 and §2.3).

The displays for the temperature control medium are dependent upon the calibration temperatures. With a calibration temperature of $< 20^{\circ}\text{C}$, *Alcoh.* is displayed, between 20°C and 94°C *H-2-O* is displayed for water and with a calibration temperature of $\geq 95^{\circ}\text{C}$, *Oil* is shown on the display. These defaults are only suggestions. The correct temperature control medium must always be determined by the user. The following describes calibration of the internal sensor at 0°C with alcohol and at 80°C with water.

 	<p>The internal temperature control mode must be activated. Fill the bath with alcohol and switch the thermostat on. To call up the internal Pt100 two-step calibration program press an arrow key when the display shows <i>Cal</i>. <i>Cal_1</i> appears on the display.</p>
     	<p>To input the first calibration temperature press an arrow key when the display shows <i>CAL_1</i>. The arrow keys may be used to select from a table with predefined calibration temperatures. With the display <i>Other</i>, there is an option of entering any calibration temperature.</p>
  	<p>Confirm the table value or the option <i>Other</i>. Confirm with the Set key. Only with the option <i>Other</i>: Use the arrow keys to set any calibration temperature and confirm with the Set key.</p>
      	<p>To enter the second calibration temperature press an arrow key when the display shows <i>CAL_2</i>. The arrow keys may be used to select from a table with predefined calibration temperatures. With the display <i>Other</i>, there is an option of entering any calibration temperature.</p>
  	<p>Confirm the table value or the option <i>Other</i> with the Set key. Only with the option <i>Other</i>: Use the arrow keys to set any calibration temperature and confirm with the Set key.</p>
      	<p><i>Start</i> appears on the display. To start the calibration program, select the option <i>Yes</i> with the arrow keys and confirmed with the set key. With the option <i>no</i>, the function is left.</p>
   	<p>After the option <i>Yes</i>, the display <i>Alcoh</i> appears. Acknowledge with an arrow key. The program <i>CC 0</i> starts automatically, the controller specifies a set value of 0°C. The display <i>CC 0</i> appears for about 1s and alternates for 2s with the actual temperature eg: 20.00(°C).</p>
        	<p>If 0°C is measured and the bath temperature is stable for a certain time, the message <i>Enter</i> appears. Until this time, the calibration may be interrupted with the break function without changing the calibration data. Check the stability of the bath temperature on the reference thermometer. If this is stable, set the temperature shown on the reference thermometer with the arrow keys. The displayed value may be corrected by $\pm 5^\circ\text{K}$. Pressing the Set key confirms the entered temperature.</p>
 	<p>The display <i>H-2-0</i> for water appears.</p>

             	<p>Switch off the thermostat, empty the bath, fill with water, switch on the thermostat.</p> <p>Call up the setup menu. Confirm the display <i>Cal</i> with an arrow key. Using the Set key, confirm the 1st and 2nd calibration temperatures. Start the calibration program. Acknowledge the display <i>Alcoh.</i> with the Set key. This jumps the 1st calibration temperature and calibration is only performed with the 2nd calibration temperature.</p> <p>The display <i>H-2-O</i> for water appears.</p> <p>Acknowledge with an arrow key. If the calibration temperatures are set in the setup menu (see §6.1) so that there is no need to change the temperature control fluid, the 2nd display for the temperature control fluid may be acknowledged with an arrow key and the calibration is then performed for the 2nd calibration temperature. The program <i>CC 80</i> starts automatically, the controller specifies the set value 80°C.</p> <p>The display <i>CC 80</i> appears for about 1s and alternates for 2s with the actual temperature eg: <i>56.00(°C)</i>.</p> <p>If 80°C are measured and the bath temperature is stable for a certain time, the message <i>Enter</i> appears. Check the stability of the bath temperature on the reference thermometer. If this is stable use the arrow keys to set the temperature displayed on the reference thermometer.</p> <p>Pressing the Set key confirms the entered temperature. The message <i>Good</i> appears on the display, the correct data are saved. See also §6.1.11, Saving the calibration data.</p>
	<p>In the event of a poor calibration, <i>bad</i> is displayed.</p>
	<p>In the event of non-calibrated controllers, <i>UnCal</i> is displayed</p>




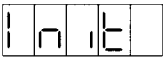

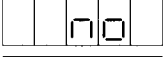
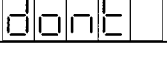
If the set calibration temperature (flashing display) is not confirmed within 4 minutes, the entry is terminated without storing the calibration temperature. The break function is not accessible.



The calibration cannot be interrupted with the break function.

If the calibration is not completed correctly, the data up to now are lost. The thermostat is no longer calibrated. The message *UnCal* is displayed.

6.1.7 The factory-set equipment parameters




  	    <p>To set the factory-set equipment parameters, press an arrow key when the display shows <i>Init</i>.</p> <p>Set the option <i>Yes</i> for the factory-set equipment parameters. Set the option <i>no</i> to leave the function. The equipment parameters remain unchanged.</p> <p>Confirm the set option with the Set key. The end of the initialisation is displayed with the message <i>done</i>. The setup menu is left.</p>
---	--




If the set option (flashing display) is not confirmed within 4 minutes or the break function called up by simultaneously pressing both arrow keys, the entry is terminated without the initialisation of the equipment parameters.


6.1.8 The acoustic sounder

The acoustic sounder shows a safety cutout for the thermostats. In addition, the programmer may be programmed so that a signal sounds at the end of temperature control program (see §4.4).




 <div style="border: 1px solid black; padding: 2px; display: inline-block;">bEEP</div>	<p>To set the signal generator press an arrow key when the display shows <i>Beep</i>.</p>
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">YES</div>	<p>Use the arrow keys the option <i>Yes</i> for sensor on, or the option <i>no</i> for sensor off.</p>
	<p>Confirm the entry with the Set key.</p>




 If the set option (flashing display) is not confirmed within 4 minutes or the break function called up by simultaneously pressing both arrow keys, the entry is terminated without storing the option.

6.1.9 The automatic cutout

 The automatic cutout determines the behaviour of the thermostats when the power is switched on or after a power outage. If the automatic cutout is activated, the thermostat starts the temperature control when it is switched on at the mains switch. The thermostat also starts the temperature control again automatically after a power outage.

For safety reasons, it may be necessary for the thermostat to remain switched off after a power outage. In such a case, the automatic cutout must be switched off.

 <div style="border: 1px solid black; padding: 2px; display: inline-block;">P_UP</div>	<p>To set the automatic cutout, press an arrow key when the display shows <i>P_UP</i>.</p>
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">YES</div>	<p>Use the arrow keys to set the option <i>Yes</i> for automatic cutout ON, or the option <i>no</i> for automatic cutout OFF.</p>
	<p>Confirm the entry with the Set key.</p>

 <div style="border: 1px solid black; padding: 2px; display: inline-block;">UP</div>	<p>When the automatic cutout is switched off, the thermostat does not automatically start the temperature control. After the starting phase when the display shows <i>HELLO</i> and the type display, the display alternates between the current actual value and the reference <i>UP</i>. If the  key is now pressed, the thermostat starts the temperature control. The reference <i>UP</i> no longer appears on the display.</p>
 <div style="border: 1px solid black; padding: 2px; display: inline-block;">25.0°C</div>	

6.1.10 The user level



To prevent an unintentional change to the equipment setting, user levels have been defined. These are to define the functions to which the user has access. In user level 1, it is only possible to set the set value. All other functions are blocked. In user level 2, all alarm, programming and setup functions are also accessible. All interface settings for the analog interface, the RS232 and the RS485 interface are blocked. In user level 3, the entire range of functions is available.

The access to the user level-function is a complicated process to prevent it from being called up unintentionally.

	USING	To set the user levels, press an arrow key when the display shows <i>Using</i> .
	Code	The reference <i>Code</i> appears on the display
	108	Use the arrow keys to set the password <i>108</i> and confirm with the Set key.
	CC3	Use the arrow keys the desired user level.
	CC2	CC 3 stands for user level 3,
	CC1	CC 2 stands for user level 2,
		CC 1 stands for user level 1.
		Confirm with the Set key.
	FAIL	The message <i>Fail</i> appears if an incorrect password is entered.



Only the operation is restricted by user levels 1 and 2. The functions are retained. This means that a temperature control program started in user level 2 continues to run, even if a switch is made to user level 1. However, it is then no longer possible to suspend or terminate the program. Or, if the analog interface is activated in user level 3, this setting is also retained in user level 1 and user level 2, but it is no longer possible to reconfigure the analog Interface. For this, it is necessary to switch back to user level 3.



If the set user level (flashing display) is not confirmed within 4 minutes or the break function called up by simultaneously pressing both arrow keys, the entry is terminated without storing the user levels.

6.1.11 The backup memory for equipment configuration and calibration data



The access to this function is a complicated process to prevent it from being called up unintentionally. It is now possible to save the user-defined settings in the permanent memory so that it may be reloaded if required. This is displayed by the menu points *L.USER* and *S.USER*. All settings and programming operations are saved and loaded.

Another innovation is the saving or reloading of the calibration settings. The user-saved calibration data are saved under the menu point *S_CAL* and reloaded under the menu point *L_CAL*. The factory calibration data may be loaded under the menu point *ReCAL* if required. Access to the load function is protected with a *Yes/No* question to prevent it from being called up unintentionally.

The calibration data should only be reloaded if the user is aware of the content of the backup copy. If false data are backed up, loading this data may degrade the accuracy.

	SAFE	To obtain access to the backup memory for the equipment configuration and the calibration data, press an arrow key when the display shows <i>Safe</i> .
	Code	The reference <i>Code</i> appears on the display.
	108	Use the arrow keys to sent the password <i>108</i> and confirm with the Set key.
	LUSER	Use the arrow keys to set the desired backup option. <i>L.User</i> stands for load user data (equipment configuration),
	SUSER	<i>S.User</i> stands for backup user data (equipment configuration),
	L_CAL	<i>L_CAL</i> stands for load user calibration data,
	S_CAL	<i>S_CAL</i> stands for backup user calibration data,
	ReCAL	<i>ReCAL</i> stands for load factory calibration,
	Quit	When the display shows <i>Quit</i> , the menu may be left without changing the data.
	POP U	If <i>L.User</i> is confirmed with the Set key, <i>POP U</i> appears on the display. The last equipment configuration saved is loaded from the backup memory.
	PUSHU	If <i>S.User</i> is confirmed with the Set key, <i>PushU</i> appears on the display. The current equipment configuration is loaded into the backup memory.
	SURE	If <i>L_CAL</i> is confirmed with the Set key, <i>Sure</i> appears on the display.
	no	Use the arrow keys to set <i>Yes</i> and confirm with the Set key.
	YES	<i>POP C</i> appears on the display, the last saved calibration data are loaded from the backup memory into the main memory.
	POP C	
	PUSHC	If <i>S_CAL</i> is confirmed with the Set key, <i>PushC</i> appears on the display. The current calibration data are loaded into the backup memory.
	SURE	If <i>ReCAL</i> is confirmed with the Set key, <i>Sure</i> appears on the display.
	no	Use the arrow keys to set <i>Yes</i> and confirm with the Set key.
	YES	<i>ReCAL</i> appears on the display, the factory calibration data are loaded from the backup memory into the main memory.
	ReCAL	



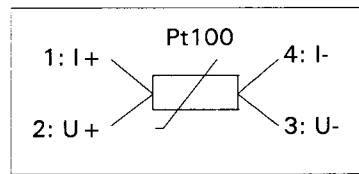
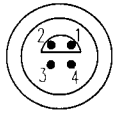
If the set option (flashing display) is not confirmed within 4 minutes or the break function called up by simultaneously pressing both arrow keys, the entry is terminated without the executing the option.

6.1.12 Leaving the setup menu

	Quit	To leave the setup menu without changing, press an arrow key when the display shows <i>Quit</i> .
	25.0°C	The current actual value appears on the display.

7. Pin assignment

7.1 Pt100 connection



Contact 1: I+
 Contact 2: U+
 Contact 3: U-
 Contact 4: I-

Pt100 Sensor, 1,5m cable

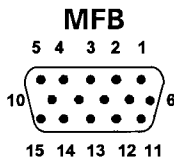
Protection tube closed, Ø6 mm, 180 mm long
 Protection tube closed, Ø6 mm, 200 mm long with hand grip
 Protection tube open, Ø8 mm, 170 mm long
 plug for external Pt100 sensor
 other parts see catalog

Order No.

6138
 6105
 6205
 3086

7.2 Interface jack with 15 pin D-Sub plugged connector

The RS 232 interface can be used to connect the unit to a PC or a recorder. Please note:



Contacts 4, 8 and 9 are reserved. Please do not use these contacts.

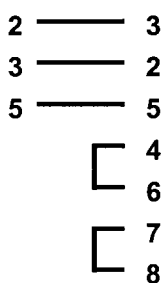
Contact 1	connection resistance 120Ω RS485	
Contact 2	RxD/ RS232	(colour white)
Contact 3	TxD/ RS232	(green)
Contact 5	DNGD	(brown)
Contact 6	volt-free contact	(yellow)
Contact 7	connection resistance 120Ω RS485	
Contact 10	volt-free contact	(pinc)
Contact 11	A/ RS485	
Contact 12	analogue output	(red)
Contact 13	analogue ground AGND	(grey)
Contact 14	analogue input	(blue)
Contact 15	B/RS485	

In order to activate the terminal resistance of the RS485, contact 1 must be cross-connected to contact 7.

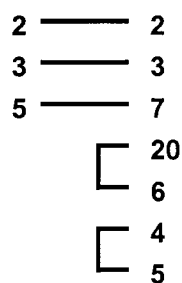
The colours indicated in brackets are the wire colours for the control cable (Order No. 6218).

Cabel for PC-control

MFB PC-Com
9 pole



MFB PC-Com
25 pole



8 Automatic compressor control

8.1 Activate automatic compressor control

The user can enter the set-up menu by pressing the following keys: SET-ALARM-PRINT (see §6). Pressing one of the arrow-keys permits the user to enter next level of the set-up menu. COMP will be displayed. The automatic compressor control mode can now be altered using an arrow-key.

ON represents continuous operation of the chiller - the cooling capacity power adjustment feature remains activated.

OFF represents deactivation of the chiller, the cooling capacity power adjustment feature is also deactivated.

AUTO represents activated automatic compressor control, the cooling capacity power adjustment is also activated. This mode achieves good results for most of the application cases.

8.2 Description of automatic compressor control

The automatic compressor control assesses three states of temperature control.

1. The set-point is set to a value below 20°C. In this case, the chiller is continuously activated.

2. The set-point jump.

If the set-point jumps to a temperature which is more than 5 K higher than the previous set-point, the chiller will be deactivated (if necessary) as long as this complies with the chiller duty factor requirements. If this pre-condition is not met the chiller will only be deactivated when the minimum duty period is exceeded.

If the set-point jumps to a temperature which is more than 2 K below the previous set-point, the chiller will be activated (if necessary).

3. Continuous monitoring of heating capacity.

The monitoring of the heating capacity will be started once the set-point jump has been equalised. The chiller will be deactivated if the required heating capacity exceeds the deactivation threshold of the automatic controls. This prevents unnecessary conflict between the circulation bath and the chiller. This also considers the minimum duty period for the chiller. The chiller will be activated if the required heating capacity falls below the activation threshold for the automatic controls in the course of normal operation.

This prevents the bath temperature drifting slowly. The automatic controls also regulate the switching frequency of the chiller. If the chiller is activated on several occasions at the same set-point, the chiller will remain activated.

9. Type recognition

(Only valid for Compatible Control and Intelligent Chiller Control)

As of software version V2.6 a unit-type recognition was introduced. This permitted the use of unit-specific parameters. In the following tables, the currently defined unit types are described. The use of an unrecognised control unit will result in the error message *TYPERR* being displayed. The unit table can be up-dated by up-dating the software. The recognised type is indicated following the *HELLO* display.

9.1 Type recognition for compatible control units

unit	display after <i>HELLO</i>
Unistat Classic or HS xx	<i>tYP 0</i>
Unistat CC before V2.6	<i>tYP A</i>
CC xx before V2.6	<i>tYP b</i>
CC130	<i>CC130</i>
CC150	<i>CC150</i>
CC150w	<i>CC.150</i>
CC155w	<i>CC.155</i>
CC156w	<i>CC.156</i>
CC175	<i>CC175</i>
CC180	<i>CC180</i>
CC230	<i>CC230</i>
CC231	<i>CC231</i>
CC240	<i>CC240</i>
CC241	<i>CC241</i>
CC245	<i>CC245</i>
CC250	<i>CC250</i>
CC250wl	<i>CC250</i>
Unistat CC	<i>uniCC</i>
Variostat	<i>CC</i>
CC300 230V	<i>CC300</i>
CC300 400V	<i>300 d</i>
CC301	<i>CC301</i>
CC40	<i>CC 40</i>
CC40w	<i>CC_40</i>
CC41	<i>CC 41</i>
CC41w	<i>CC_41</i>
CC42	<i>CC 42</i>
CC42w	<i>CC_42</i>
CC55	<i>CC 55</i>
CC55w	<i>CC_55</i>
CC75	<i>CC 75</i>
CC75w	<i>CC_75</i>
CC80	<i>CC 80</i>
CC80w	<i>CC_80</i>
CC90	<i>CC 90</i>
CC90w	<i>CC_90</i>

The suffix 'w' represents water-cooled.

9.2 Type recognition for intelligent chiller control units

unit	display after <i>HELLO</i>
IC 006 before software V2.6	<i>tYP A</i>
Other IC before software V2.6	<i>tYP b</i>
IC 1	<i>tYP 1</i>
IC 2	<i>tYP 2</i>
IC 3	<i>tYP 3</i>
IC 4	<i>tYP 4</i>
IC 1w	<i>tP 1_</i>
IC 2w	<i>tP 2_</i>
IC 3w	<i>tP 3_</i>
IC 4w	<i>tP 4_</i>
IC 1H	<i>tP 1H</i>
IC 2H	<i>tP 2H</i>

unit	display after <i>HELLO</i>
IC 3H	<i>tP 3H</i>
IC 4H	<i>tP 4H</i>
IC 1wH	<i>t 1_H</i>
IC 2wH	<i>t 2_H</i>
IC 3wH	<i>t 3_H</i>
IC 4wH	<i>t 4_H</i>
IC 1HSK	<i>tP 1h</i>
IC 2HSK	<i>tP 2h</i>
IC 3HSK	<i>tP 3h</i>
IC 4HSK	<i>tP 4h</i>
IC 1wHSK	<i>t 1_h</i>
IC 2wHSK	<i>t 2_h</i>
IC 3wHSK	<i>t 3_h</i>
IC 4wHSK	<i>t 4_h</i>

IC 1 control units have a set-point range of -5°C... +40°C

IC 2 control units have a set-point range of -10°C... +40°C

IC 3 control units have a set-point range of -20°C... +40°C

IC 4 control units have a set-point range of -25°C... +40°C

The suffix 'w' represents water-cooled.

The suffix 'H' represents IC with heating.

The suffix 'SK' stands for the extended temperature range up to +80°C.

A Appendix

A1 Additional information for using:

A1.1 The Compatible Control as a replacement control unit.

If a "Compatible Control" control unit is used as a replacement control unit, please ensure that neither an external circuit program controller nor a temperature sequence control unit is used and that there is no other device connected to the 3-pole diode jack on the back of circulation bath.

A1.2 Display of the software version

Press the following keys: SET, ALARM, PRINT and PROG. to display rOM and the software version, e.g., 2.2.

A1.3 Adjusting the factory-set unit parameters

In order to adjust the factory-set parameters (without altering the calibration data) *YES* must be selected using the arrow-keys in the *SETUP* menu under the *INIT* feature (see operating instructions §6.1.7).

All user-specific settings are cleared as soon as the *DONE* message is displayed (e.g. the program controller programs, user temperatures, temperature mode, alarm values, print values, set-point limits, control parameters, AIF-settings...).

A1.4 Feature keys

A1.4.1 Escape feature:

Pressing both arrow-keys simultaneously terminates the current data entry mode. The current entries are not saved.

This escape feature is not always available, i.e., during the calibration program (see §1.6.1).

A1.4.2 Enter feature

The set-key is used as an enter-key during the data entry mode. Pressing this key confirms the current entry.

A1.4.3 MasterClear feature

Pressing the alarm-key and the prog-key simultaneously can: terminate an active temperature control program, deactivate the analogue interface or changing the digital interface from remote mode to local mode.

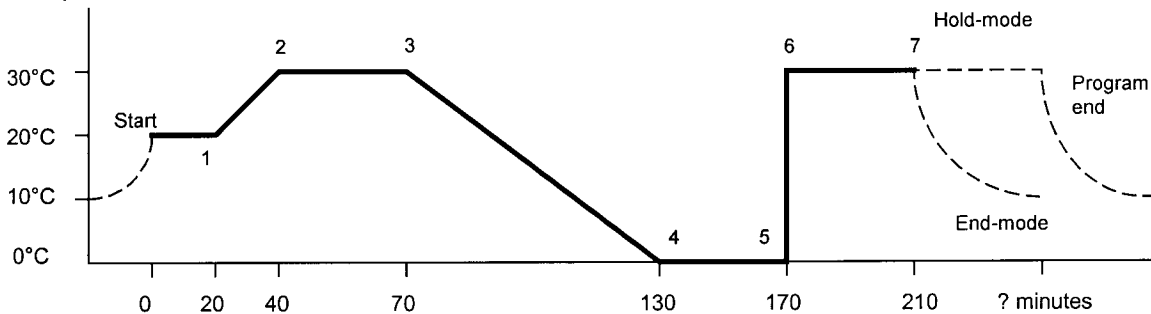
A2 Additional Information Regarding the Program Controller

A2.1 Programming

In order to simplify the programming of the programmer it is advisable to first draw the sketch of the temperature profile.

Using this sketch, the segment data can be noted in the table at the end of this appendix.

Example: Sketch



Program data table:

Program number	?	Starting temp.	20°C	1 st Memory address
1. Segment	Goto	20°C	Time h 20 min	2 nd Memory address
2. Segment	Goto	30°C	Time h 20 min	3 rd Memory address
3. Segment	Goto	30°C	Time h 30 min	4 th Memory address
4. Segment	Goto	0°C	Time 1 h 0 min	5 th Memory address
5. Segment	Goto	0°C	Time h 40 min	6 th Memory address
6. Segment	Goto	30°C	Time h Fast min	7 th Memory address
7. Segment	Goto	30°C	Time h 40 min	8 th Memory address
Cycles	0			no Memory address
Hold <input type="checkbox"/> ?	End <input type="checkbox"/> ?			9 th Memory address

A segment memory is assigned for each of the following: the program number, the start temperature, the program end mode, and the number of cycles (if necessary), i.e., the above program is assigned to segment memory address 9.

A2.2 Terminating the program controller

The procedure described in §4.2.4 of the operating instructions must be performed in order to terminate the program. As of software version 2.2 the calling of the program controller has been changed as follows: ProG is displayed after the prog-key has been pressed for software versions which are older than version 2.2, this is achieved by the automatic confirmation procedure in program 0 even if no further button is pressed. As of version 2.2 an arrow-key must be pressed in order to select the desired program, otherwise the user is returned to the actual value display and no program will be started.

As of V2.10 the program number must be confirmed using the set-key following the selection procedure.

A2.3 Status of the program controller

The green LED located above the prog-key indicates the status of the program controller.

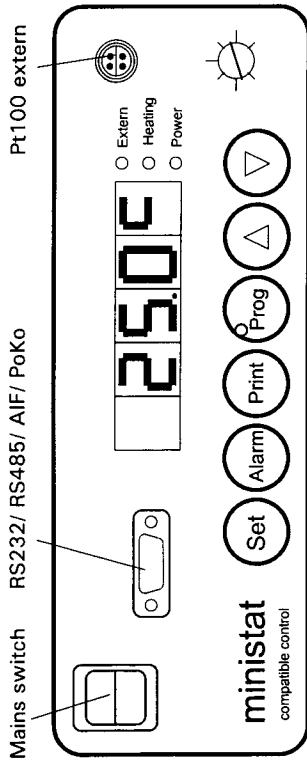
1. Continuously illuminated = Program controller activated
2. Flashing = Pause feature active
3. LED off = Program controller deactivated.

The program controller cannot be deactivated when it is paused. The program controller must be reactivated first (see §4.2.3).

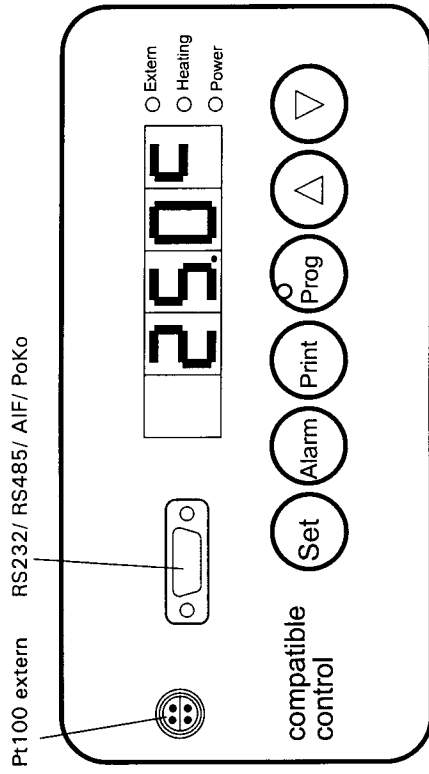
Program data table

Program number	:	.....	Starting temperature	:	.....
1. Segment Goto	:	.....	Time	:	.....h.....min
2. Segment Goto	:	.....	Time	:	.....h.....min
3. Segment Goto	:	.....	Time	:	.....h.....min
4. Segment Goto	:	.....	Time	:	.....h.....min
5. Segment Goto	:	.....	Time	:	.....h.....min
6. Segment Goto	:	.....	Time	:	.....h.....min
7. Segment Goto	:	.....	Time	:	.....h.....min
8. Segment Goto	:	.....	Time	:	.....h.....min
9. Segment Goto	:	.....	Time	:	.....h.....min
10. Segment Goto	:	.....	Time	:	.....h.....min
11. Segment Goto	:	.....	Time	:	.....h.....min
12. Segment Goto	:	.....	Time	:	.....h.....min
13. Segment Goto	:	.....	Time	:	.....h.....min
14. Segment Goto	:	.....	Time	:	.....h.....min
15. Segment Goto	:	.....	Time	:	.....h.....min
16. Segment Goto	:	.....	Time	:	.....h.....min
17. Segment Goto	:	.....	Time	:	.....h.....min
18. Segment Goto	:	.....	Time	:	.....h.....min
19. Segment Goto	:	.....	Time	:	.....h.....min
20. Segment Goto	:	.....	Time	:	.....h.....min
21. Segment Goto	:	.....	Time	:	.....h.....min
22. Segment Goto	:	.....	Time	:	.....h.....min
23. Segment Goto	:	.....	Time	:	.....h.....min
24. Segment Goto	:	.....	Time	:	.....h.....min
25. Segment Goto	:	.....	Time	:	.....h.....min
26. Segment Goto	:	.....	Time	:	.....h.....min
27. Segment Goto	:	.....	Time	:	.....h.....min
28. Segment Goto	:	.....	Time	:	.....h.....min
29. Segment Goto	:	.....	Time	:	.....h.....min
30. Segment Goto	:	.....	Time	:	.....h.....min
31. Segment Goto	:	.....	Time	:	.....h.....min
32. Segment Goto	:	.....	Time	:	.....h.....min
33. Segment Goto	:	.....	Time	:	.....h.....min
34. Segment Goto	:	.....	Time	:	.....h.....min
35. Segment Goto	:	.....	Time	:	.....h.....min
36. Segment Goto	:	.....	Time	:	.....h.....min
37. Segment Goto	:	.....	Time	:	.....h.....min
38. Segment Goto	:	.....	Time	:	.....h.....min
39. Segment Goto	:	.....	Time	:	.....h.....min
40. Segment Goto	:	.....	Time	:	.....h.....min
41. Segment Goto	:	.....	Time	:	.....h.....min
42. Segment Goto	:	.....	Time	:	.....h.....min
43. Segment Goto	:	.....	Time	:	.....h.....min
44. Segment Goto	:	.....	Time	:	.....h.....min
45. Segment Goto	:	.....	Time	:	.....h.....min
46. Segment Goto	:	.....	Time	:	.....h.....min
47. Segment Goto	:	.....	Time	:	.....h.....min
48. Segment Goto	:	.....	Time	:	.....h.....min
Cycles	:	.....		
Hold	<input type="checkbox"/>	End	<input type="checkbox"/>		

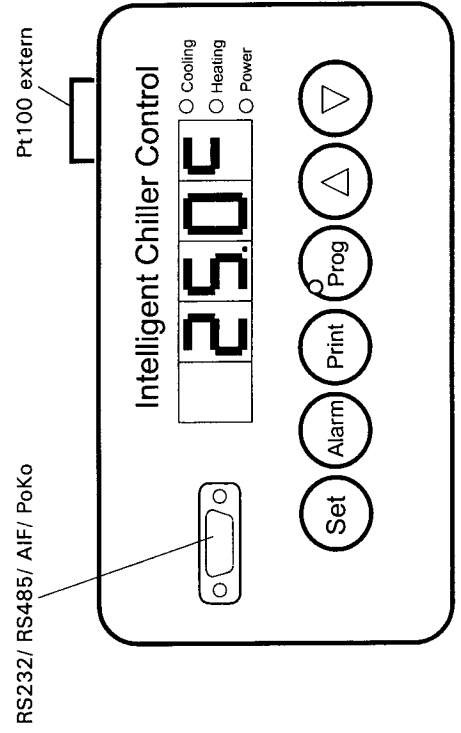
ministat compatible control



compatible control



Intelligent Chiller Control



Short manual (as of Software Version V3.04)

6 keys are used to operate and program the "Compatible Control".

General Functions

Using 34 functions can currently be called up.
Using setpoints or other settings can be changed.

Setting Mode

In setting mode the LED display flashes.
Using setpoints or other settings can be changed.

User controlled Confirmation

Changes and new settings must be saved to memory or confirmed. If the display is blinking, the Set-key works as Enter-key:

Enter = when display is blinking

Break

'Break' interrupts an active function. As there is no physical key for this, 'Break' is simulated by pressing both arrow keys simultaneously.
'Break' stops parameter changes being saved.

Break = & together

MasterClear feature

Pressing the alarm-key and the prog-key simultaneously can: terminate an active temperature control program, deactivate the analogue interface or changing the digital interface from remote mode to local mode.

MasterClear = & together