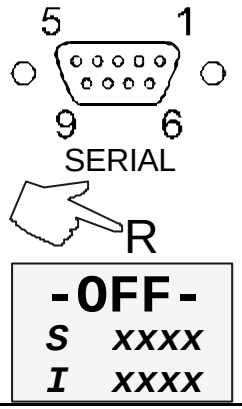
11. Remote control

11.1. Setup for remote control



1. Check the interface parameters for both interfaces (on circulator and PC) and make sure they match.
   (Serial interface see page 45)
2. In the menu > MENU / CONFIG < set the menu item > SETPoint < to > SERIAL < .
   (see 7.3.1. SETPOINT – Keypad control or remote control on page 40)
3. Connect both units with an interface cable..

Like all parameters which can be entered through the keypad, interface parameters are stored in memory even after the circulator is turned off.

11.2. Communication with a PC or a superordinated data system

If the circulator is put into remote control mode via the configuration level, the VFD COMFORT-DISPLAY will read „R -OFF-„ = REMOTE STOP. The circulator is now operated via the computer.
In general, the computer (master) sends commands to the circulator (slave). The circulator sends data (including error messages) only when the computer sends a query.

☞ In remote control mode: After a power interruption the order to start and all values which have to be adjusted must be resent from the personal computer via the interface.
AUTOSTART is not possible.

A transfer sequence consists of:

- address (RS485 interface only)
- command
- space (⇔; Hex: 20)
- parameter (the character separating decimals in a group is the period)
- end of file (↵; Hex: 0D)

The commands are divided into **in** or **out** commands.

in commands: asking for parameters to be displayed

out commands: setting parameters

☞ The **out** commands are valid only in remote control mode.

Examples:

When the RS485 interface is used, the three-digit instrument address stands in front of each command.
(example: address Ad32 = A**032**)

Command to set the working temperature >Setpoint1< to 55.5 °C

out_sp_00 Û **55.5**¿
A032_out_sp_00 Û **55.5**¿

Command to ask for the working temperature >Setpoint1<

in_sp_00¿
A032_in_sp_00¿

Response from the circulator:

55.5¿
A032_55.5¿

11.3. List of commands

out commands: Setting temperature values or parameters.

Command	Parameter	Response of circulator
out_mode_01	0	Use working temperature > SETP 1<
out_mode_01	1	Use working temperature > SETP 2<
out_mode_01	2	Use working temperature > SETP 3<
out_mode_02	0	Selftuning „OFF“. Temperature control by using the stored parameters.
out_mode_02	1	Selftuning „ONCE“ Single selftuning of controlled system after the next start.
out_mode_02	2	Selftuning „ALWAYS“ Continual selftuning of controlled system whenever a new setpoint is to be reached.
out_mode_03	0	Set external programmer input to voltage. Voltage 0 V ... 10 V
out_mode_03	1	Set external programmer input to current. Current 0 mA ... 20 mA
out_mode_04	0	Temperature control of internal bath.
out_mode_04	1	External control with Pt100 sensor.
out_mode_05	0	Stop the unit = R –OFF-.
out_mode_05	1	Start the unit.
out_mode_08	0	Set the control dynamics - aperiodic
out_mode_08	1	Set the control dynamics - standard
out_sp_00	xxx.xx	Set working temperature. „SETP 1“
out_sp_01	xxx.xx	Set working temperature. „SETP 2“
out_sp_02	xxx.xx	Set working temperature. „SETP 3“
out_sp_03	xxx.xx	Set high temperature warning limit „OVERTEMP“
out_sp_04	xxx.xx	Set low temperature warning limit „SUBTEMP“
out_sp_06	xxx.xx	Set manipulated variable for the heater via serial interface -99.99 ... +100 [%]
out_sp_07	x	Set the pump pressure stage. (1 ... 4)

Command	Parameter	Response of circulator
out_par_04	x.x	CoSpeed 0 ... 5.0 Band limit during external control. Setting the maximum difference between the temperatures in the internal bath and external system.
out_par_06	xxx	Xp control parameter of the internal controller. 0.1 ... 99.9
out_par_07	xxx	Tn control parameter of the internal controller. 0 ... 9999
out_par_08	xxx	Tv control parameter of the internal controller. 0 ... 999
out_par_09	xxx	Xp control parameter of the cascade controller. 0.1 ... 99.9
out_par_10	xxx	Proportional portion of the cascade controller. 1 ... 99.9
out_par_11	xxx	Tn control parameter of the cascade controller. 0 ... 9999
out_par_12	xxx	Tv control parameter of the cascade controller. 0 ... 999
out_par_13	xxx	Maximum internal temperature of the cascade controller.
out_par_14	xxx	Minimum internal temperature of the cascade controller.
out_par_15	xxx	Band limit (upper) 0 ... 200 °C
out_par_16	xxx	Band limit (lower) 0 ... 200 °C

in commands: Asking for parameters or temperature values to be displayed.

Command	Parameter	Response of circulator
version	none	Number of software version (V X.xx)
status	none	Status message, error message (see page 73)
in_pv_00	none	Actual bath temperature.
in_pv_01	none	Heating power being used (%).
in_pv_02	none	Temperature value registered by the external Pt100 sensor.
in_pv_03	none	Temperature value registered by the safety sensor.
in_pv_04	none	Setpoint temperature of the excess temperature protection
in_sp_00	none	Working temperature „SETP 1“
in_sp_01	none	Working temperature „SETP 2“
in_sp_02	none	Working temperature „SETP 3“
in_sp_03	none	High temperature warning limit „OVERTEMP“
in_sp_04	none	Low temperature warning limit „SUBTEMP“
in_sp_05	none	Setpoint temperature of the external programmer (REG+E-PROG) .

Command	Parameter	Response of circulator
in_sp_07	none	Pump pressure stage
in_sp_08	none	Value of a flowrate sensor connected to the E-Prog input
in_par_00	none	Temperature difference between working sensor and safety sensor
in_par_01	none	Te - Time constant of the external bath.
in_par_02	none	Si - Internal slope
in_par_03	none	Ti - Time constant of the internal bath.
in_par_04	none	CoSpeed - Band limit (max. difference between the temperatures in the internal bath and external system).
in_par_05	none	Factor pk/ph0: Ratio of max. cooling capacity versus max. heating capacity
in_par_06	none	Xp control parameter of the internal controller.
in_par_07	none	Tn control parameter of the internal controller.
in_par_08	none	Tv control parameter of the internal controller.
in_par_09	none	Xp control parameter of the cascade controller.
in_par_10	none	Proportional portion of the cascade controller.
in_par_11	none	Tn control parameter of the cascade controller.
in_par_12	none	Tv control parameter of the cascade controller.
in_par_13	none	Adjusted maximum internal temperature of the cascade controller.
in_par_14	none	Adjusted minimum internal temperature of the cascade controller.
in_par_15	none	Band limit (upper)
in_par_16	none	Band limit (lower)
in_mode_01	none	Selected setpoint: 0 = SETP 1 1 = SETP 2 2 = SETP 3 3 = Last setpoint setting was carried out through an external programmer
in_mode_02	none	Selftuning type: 0 = Selftuning „OFF“ 1 = Selftuning „ONCE“ 2 = Selftuning „ALWAYS“

Command	Parameter	Response of circulator
in_mode_03	none	Type of the external programmer input: 0 = Voltage 0 V to 10 V 1 = Current 0 mA to 20 mA
in_mode_04	none	Internal/external temperature control: 0 = Temperature control with internal sensor. 1 = Temperature control with external Pt100 sensor.
in_mode_05	none	Circulator in Stop/Start condition: 0 = Stop 1 = Start
in_mode_08	none	Adjusted control dynamics 0 = aperiodic 1 = standard

11.4. Status messages

Status messages	Description
00 MANUAL STOP	Circulator in „OFF“ state.
01 MANUAL START	Circulator in keypad control mode.
02 REMOTE STOP	Circulator in „r OFF“ state.
03 REMOTE START	Circulator in remote control mode.

11.5. Error messages

Error messages	Description
-01 LOW LEVEL ALARM	Low liquid level alarm.
-02 REFRIGERATOR ALARM	Control cable of the refrigerated circulator or MVS solenoid valve controller short-circuited or interrupted.
-03 EXCESS TEMPERATURE WARNING	High temperature warning.
-04 LOW TEMPERATURE WARNING	Low temperature warning.
-05 WORKING SENSOR ALARM	Working temperature sensor short-circuited or interrupted.
-06 SENSOR DIFFERENCE ALARM	Sensor difference alarm. Working temperature and safety sensors report a temperature difference of more than 25 °C.
-07 I^2C-BUS ERROR	Internal error when reading or writing the I^2C bus.
-08 INVALID COMMAND	Invalid command.

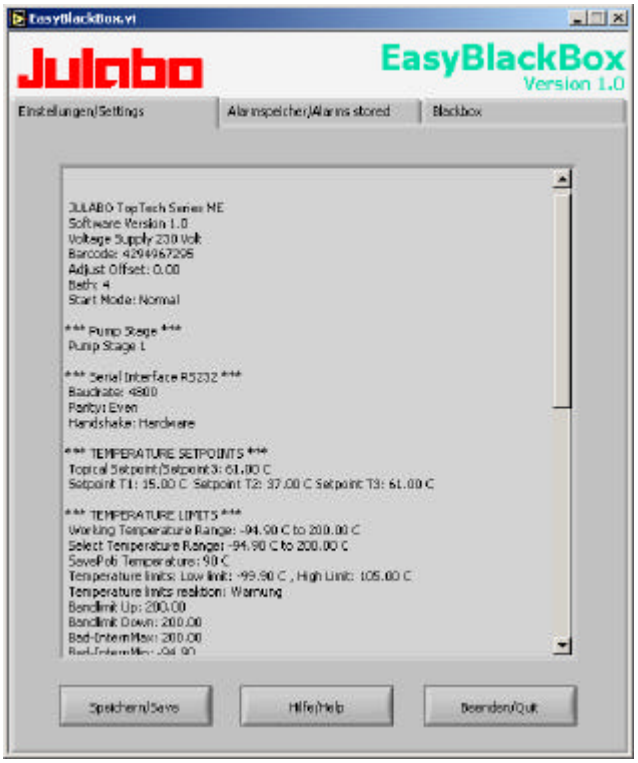
Error messages	Description
-09 COMMAND NOT ALLOWED IN CURRENT OPERATING MODE	Invalid command in current operating mode.
-10 VALUE TOO SMALL	Entered value too small.
-11 VALUE TOO LARGE	Entered value too large.
-12 TEMPERATURE MEASUREMENT ALARM	Error in A/D converter.
-13 WARNING : VALUE EXCEEDS TEMPERATURE LIMITS	Value lies outside the adjusted range for the high and low temperature warning limits. But value is stored.
-14 EXCESS TEMPERATURE PROTECTOR ALARM	Excess temperature protector alarm 
-15 EXTERNAL SENSOR ALARM	External control selected, but external Pt100 sensor not connected.
-20 WARNING: CLEAN CONDENSOR OR CHECK COOLING WATER CIRCUIT OF REFRIGERATOR	Cooling of the condenser is affected. Clean air-cooled condenser. Check the flow rate and cooling water temperature on water-cooled condenser.
-21 WARNING: COMPRESSOR STAGE 1 DOES NOT WORK	Compressor stage 1 does not work.
-22 WARNING: COMPRESSOR STAGE 2 DOES NOT WORK	Compressor stage 2 does not work.
-23 WARNING: HIGH TEMPERATURE ON COMPRESSOR STAGE 1	Excess temperature on compressor stage 1.
-24 WARNING: HIGH TEMPERATURE ON COMPRESSOR STAGE 2	Excess temperature on compressor stage 2.
-25 REFRIGERATOR WARNING	Error in the cooling machine.
-26 WARNING: STAND-BY PLUG IS MISSING	External standby contact is open. (see page 58 and 67)
-30 CONFIGURATION ERROR: CONFIRM BY PRESSING <ENTER> ON CIRCULATOR	The configuration of the circulator does not conform to its present use. Press enter to automatically perform a single modification of the configuration.
-33 SAFETY SENSOR ALARM	Excess temperature sensor short-circuited or interrupted.
-38 EXTERNAL SENSOR SETPOINT PROGRAMMING ALARM	Ext. Pt100 sensor input without signal and setpoint programming set to external Pt100.
-40 NIVEAU LEVEL WARNUNG	Low liquid level warning in the internal reservoir.

12. JULABO Service – Online remote diagnosis

JULABO circulators of the HighTech series are equipped with a so-called black box. This box is implemented in the controller and records all significant data for the last 30 minutes.
In case of a failure, this data can be read out from the unit by using special software. The respective program is available for **free** download from www.julabo.de \ EasyBlackBox.

- Installation is easy and carried out step by step.
  Please observe the instructions.

- Data read-out is possible in the conditions „OFF“, „R OFF“ or „ALARM“.
- Connect the circulator to the computer using an interface cable.
- Start the EasyBlackBox program.
  The program asks for the used port (COM1, ...) and the baud rate of the unit.
  You do not have this information on hand? Simply try it out! The program keeps on sending this request until the actually used port and correct baud rate are entered.



- Data is read out and shown on the monitor divided in the sections >Einstellungen/Settings<, >Alarmspeicher/Alarms stored<, >Blackbox<

  ← see example

- After pressing >Speichern/Save< a text file is compiled. The program proposes a filename - >C:\model description and barcode no.<. Modifications are possible.
- E-mail this file to service@julabo.de, JULABO's service department. JULABO is thus able to provide rapid support.