Manual
Eluent Heating Device Thermocontrol

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Inhalt

Introduction

The Eluent Heating Device ThermoControl is used for preheating eluents in HPLC systems.

The ThermoControl can be operated as stand alone unit (manual control via the touch screen) or using a control software via serial or ethernet port.

There are two options for the software control of the ThermoControl Module: the preparative chromatography software PurityChrom (PrepCon) or the *dedicated* TempLogger software.

Product Description

Technical specifications heater element:

Temperature Range	ambient temperature … 100 °C
Heater power	1000 Watt
Heated tubing	max. 6.5 m stainless steal tubing moulded in 6 Kg of tin
Flow range	Max. 500 ml/min
tubing	1/16“ with 1,0 mm inner diameter
Dead volume	Ca. 6.5 ml
wetted materials	Stainless steal DIN 1.4571
System security	Thermo insulation thermal circuit breakerr (100°C)
dimensions (HxWxL)	18 x 30 x 28 cm (34 cm with plugs and cables)
weight	13,0 kg
Temperature acquisition	Pt100 resistance thermometer
Temperature control input	Input of Setpoints, feedback control parameters and temperature limits via PC software, push-buttons for manual input of setpoints
channels	up to 10 control or data channels possible, maximal 2 channels controllable via touch screen

communication	Ethernet or RS-232 (serial)
Input power	up to 1050 W
Power supply	230 VAC

Shipment:

- Eluent heater module
- Network cable
- Power cable for control module
- Operational manual

Optional:

- Control and supply cable for further heater modules
- PT100 sensors with connection cables

Security

The general security measures at the installation site apply. While working with eluents the following general security equipment should be used:

- Protection goggles
- Protective gloves
- Protective clothing

CAUTION: Depending on the set temperatures there may be a risk of burns from high temperatures at the output pipes!

Only suitable power supplies compatible with the declared maximal allowable power for the device may be used. The maximal current consumption has to be considered when using power strips.

Installation ThermoControl Module

Connection of tubing

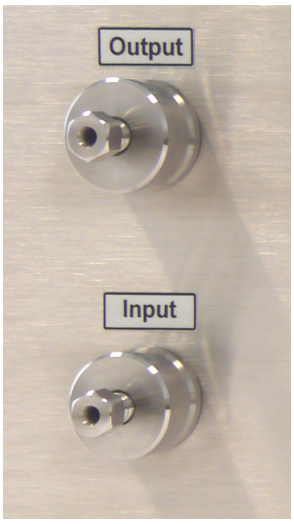

Fig. 1: connectors of the heater element (front

The heater module of the ThermoControl is usually integrated into the HPLC System between pump and column.

The heater element is equipped with two tubing connectors with UNF 10-32 internal threads for standard HPLC fittings for tubings with1/16“ OD (Figure 1). The connectors are labelled with *Input* and *Output*, respectively.

The rear panel of the device hosts

- power supply connector
- power supply fuse
- connector for external heater jacket
- 2 connectors for external temperature sensors
- configuration RS-232 port
- ethernet connector

Fig. 2: Rear Panel

Due to the high power consumption (up to 1000 W) of the heater elements the maximal power consumption has to be considered when using power strips.

Operation

The green main switch labelled *Power* switches the ThermoControl module on and off. The set temperature and setup is controlled via the touch screen. The screen shows four status and control displays for the heater zones, a temperature profile display and 3 buttons for different configuration menus such as network, device and service. The zones can be configured either as temperature control or as temperatur channel. In the latter case the control buttons ‚Power' and ‚Adjust' are disabled. The buttons at the upper screen are labelled with the names of the individual heater zones and can be used to open a display of a single heater zone. This display is enlarged such that it is legible also from a distance.

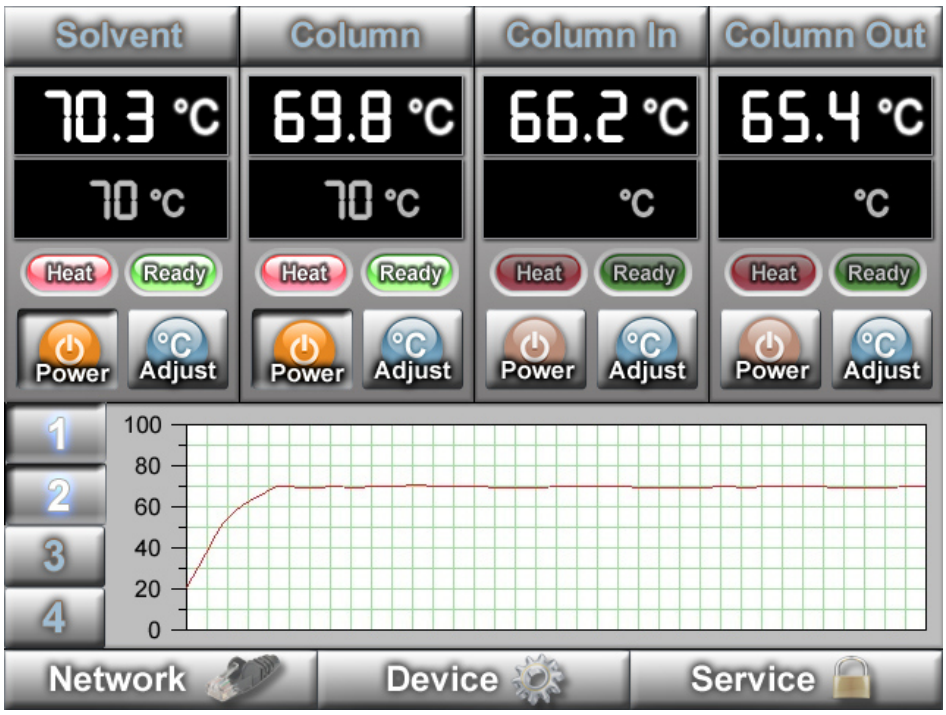

Fig. 3: touch screen

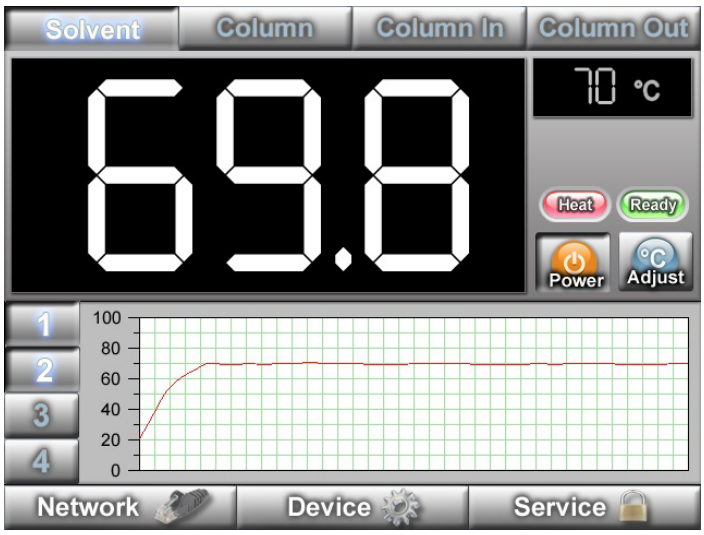

Fig. 4: Enlarged display

Entering / Changing the Set Temperature (Setpoint)

Each control circuit has a control panel displaying the setpoint (grey) and the actual temperature (white) and two buttons for switching the heater on or off and for adjusting the set temperature. The red label (‚Heat') shows the current heater power while the green label (‚Ready') indicates if the set point is reached within the configured tolerance (default ±1°C) .

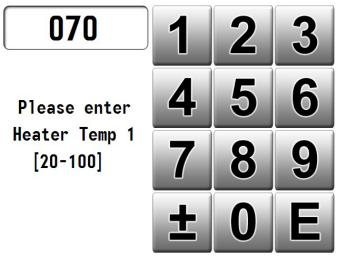

Fig. 5: temperature input

Clicking on the button ‚Adjust' opens a numeric keyboard (Figure 5) for the set point input. With ‚E' the entered value will be applied.

Display of Temperature profiles

The temperature profiles (fig. 6) over the time are displayed below the control displays of the four temperature zones. With the Buttons ‚1', ‚2', ‚3' and ‚4' the temperature profiles can be selected.The axis settings can be adjusted via the button ‚Device'.

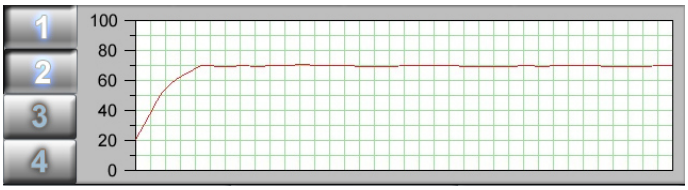

Fig. 6: temperature profile

Configuration of the Thermocontrol

The three buttons ‚**Network**', **Device**' und ‚**Service**' (fig. 3) open screens for the configuration of the ThermoControl.

Network

The button ‚**Network**' opens a screen for the configuration of network parameters (fig. 7).

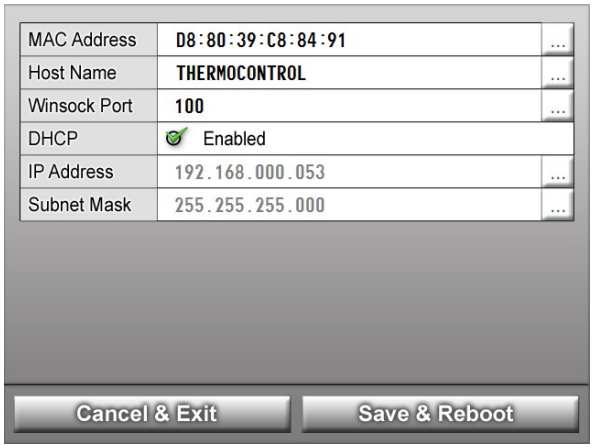

Fig. 7: Network configuration

Device

The button **‚Device'** opens a screen for the configuration of the temperature and time axis of the temperature profile displays.

Service

The button ‚**Service**' opens a screen for the configuration of the maximal temperatures of the heater zones , the parameters of the control algorithm and the activation of heater zones. Since the control parameters should only be changed by trained persons the screen ‚**Service'** is password protected.

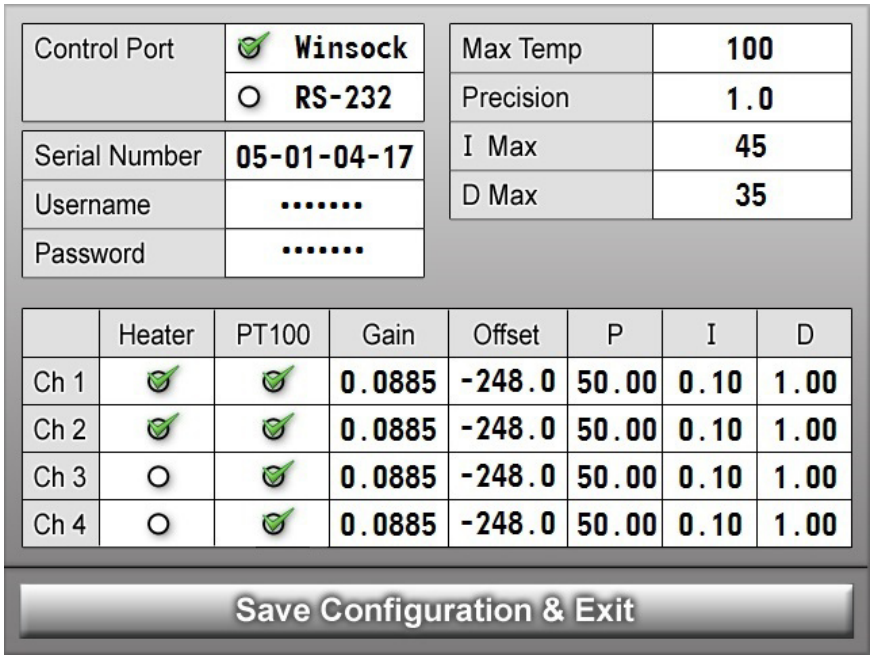

Fig 8:service parameters

Definition of the control algorithm parameters

Max Temp: maximal set point.

Precision: maximal deviation of the set point for which the Ready-display is active.

I Max: Maximal contribution of the I-Term to the actuating variable of the control algorithm.

D Max: Maximal contribution of the D-Term to the actuating variable of the control algorithm.

Parameters for temperature channels:

Heater: temperature control is activated for this channel.

PT100: temperature channel is available and displays the temperature.

Gain: gain factor.

Offset: temperatur eOffset in °C.

P: P-Term of the temperature control algorithm.

I: I-Term of the temperature control algorithm.

D: D-Term of the temperature control algorithm.

External Control

The ThermoControl module can be connected to a PC via Ethernet and controlled by software. The Ethernet plug is located at the rear of the control module.

Configuration

The IP-address of the ThermoControl module can be read out or set via the RS232-port. The parameters of the RS232 interface: 9600 Baud, 8 data bits, 1 stop bit.

RS232 commands:

IP-adress query:	ASK
IP- address configuration (e.g. 192.168.0.105):	$IP=192.168.0.105$

The network configuration of the ThermoControl module can be changed using a web browser and accessing the Thermocontrol Browser Interface (http://thermocontrol/) (fig. 7).

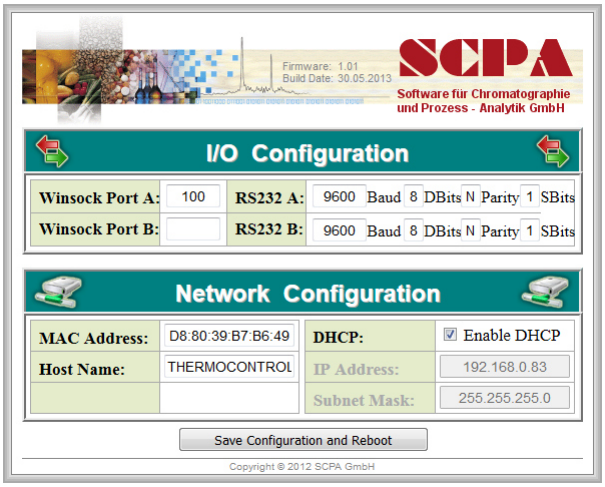

Fig. 9: Browser interface

Data acquisition and control

The ‚SPCA Templogger'software can be used to control the Thermocontrol and for data acquisition. Details can be found in the Templogger sofware manual.

Maintenance

In case of specified normal operation no special maintenance for the ThermoControl is necessary.

Housing:

Please make sure that no liquids may enter the housing of the ThermoControl device. Do not block any ventilation openings. The housing may be cleaned using mild detergents and water.

HPLC connectors:

Leakage may leed to pollutions and damages to the connectors and should be eliminated immediately. Emerged liquids should be removed completely and without any residues.

Spear and wear parts

Description	Specification	Item number/manufacturer
bulkhead HPLC connectors	Two-sided 10-32 female thread, 1,0 mm orifice	ZBU1L / VICI Valco Fittings
ferrules	For tubings 1/16“ OD, stainless steel	A0110 (packaging size 30) / Knauer
fittings, nuts	For tubings 1/16“ OD with UNF 10-32 male thread, stainless steel	A0112 (packaging size 10) / Knauer

Document

Titel:	Operation Manual ThermoControl				
Version :	1.0.0.1	Author: LH	www.scpa.de	Date	7.9.2016
Version:	1.0.0.2	Author: CR	English version	Date	4.10.2016
Version:	1.0.0.3	Author: CR	New device with touch screen	Date	14.6.2017