

Operating Instructions



Digital Temperature Controller DPC III

Type 17-8821-4.2222303.00

Reservation

Technical data subject to change without notice.
Changes, errors and misprints do not justify any claims for damages.

Content

1. Use in accordance with the intended purpose	2
2. Product description	2
2.1. General points	
2.2. Display and control elements	
3. Safety instructions	3
4. Assembly, installation and commissioning	3
4.1. Assembly	
4.2. Dimensions	
4.3. Installation	
4.4. Commissioning	
5. Adjustment of the two-position controller	4
5.1. Setpoint inputs	
5.2. Altering the hysteresis	
6. Mode of operation of the controller	5
6.1. Two-position controller (factory setting)	
6.2. PID controller	
6.3. Digital input	
7. Use as a PID controller	6
8. Operation, maintenance	7
9. Alarm management	7
9.1. Measuring circuit monitoring	
9.2. Temperature alarms	
10. Technical data	7
11. Electrical Data	8
12. Electrical connection/device connections	8 - 9
12.1. Connection plan DPC III Standard	
12.2. Connection plan DPC III Monitor	
13. List of parameters	10
14. Fault alarms/fault clearance	10
15. Type declaration	10
16. Service address	10

1. Use in accordance with the intended purpose

The DPC III digital temperature controller serves to control temperature in explosion-proof or media-protected heating and heating circuits. In all cases, the DPC III must be installed outside the hazardous (potentially explosive) area. In use, a differentiation must be made between:

- a) monitoring explosion-proof heating circuits: the DPC III is used together with the Pt100 Ex (Type 27-71...-3.....) resistance thermometer.
- b) monitoring non-explosion-proof heating circuits: the DPC III is used along with a media protected Pt100 resistance thermometer, e.g. Pt100-resistance thermometer art. no. 03-9040/00.

As a basic rule, in order to ensure a reliable thermal coupling, the resistance thermometer must be attached with mechanical and temperature stability to the point to be measured. This should be done with the aid of aluminium adhesive tape or similar material with the right temperature resistance

2. Product description

2.1. General points

The DPC III digital temperature controller is a microprocessor-controlled „single loop“ digital controller, with ON/OFF control (two-position controller) and PID with the functions of AUTOTUNING and the automatic calculation of the „FUZZY OVERSHOOT CONTROL“ parameters for PID control.

The controller has default parameterisation as a two-position controller (ON/OFF) controller.

It is possible to reprogram it as a PID controller (see chapter „Use as a PID controller“).

The PID control of the device has a special algorithm that optimises the control effect during process faults or during the alteration of setpoints.

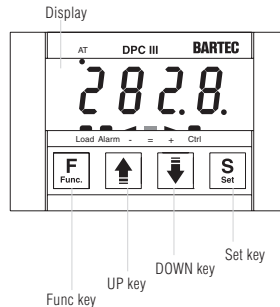
The actual value is shown in the red 4-digit display.

The device also has a programmable deviation display consisting of three LEDs.

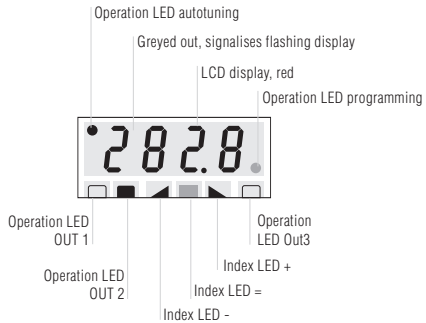
The LEDs show the status of the outputs. Up to 4 setpoints can be stored in the device. The DPC III has two relay outputs and a logic output to control the semi-conductor relay (SSR).

The DPC III series is completely downwardly compatible with the earlier DPC series.

Display- and control elements



Details Display



2.2. Display and Control elements

- 1.) „S (Set)“ key: Access to the programming mode, fast setting and input confirmation.
- 2.) „DOWN“ key ↓: This key is used to decrease the level being set. Holding this key down returns the user to the previous programming level until the programming mode is exited.
- 3.) „UP“ key ↑: This key is used to increase the level being set. Holding this key down moves the user on to the next programming level until the programming mode is exited. Outside the programming mode, this key displays the controlling power at the output.
- 4.) Button „F“ (Func): Holding this key down for a few moments deactivates/activates the control
- 5.) „Load“ LED: indicates the status of output 1 (OUT 1)
- 6.) „Alarm“ LED: indicates the status of output 2 (OUT 2)
- 7.) Index LEDs (-, =, +): indicates deviations from the setpoint.
- 8.) „Ctrl“ LED: indicates the status of output 3 (OUT 3)
- 9.) AT LED: indicates that AUTOTUNING is in progress.
- 10.) SET LED: indicates access to the programming mode.
- 11.) 4-digit red display: shows the actual value.

3. Safety instructions

- The DPC III must always be installed outside the hazardous area.
- Before commissioning, please check the marking on the DPC to make sure that it is suitable for the intended purpose.
- When using electrical systems, the relevant installation and operation regulations must be followed (e.g. Directives 1999/92/EC and 94/9EC, the DIN VDE 0100 series and other relevant national regulations).
- All generally applicable statutory rules and other binding directives on workplace safety, accident prevention and environmental protection must be complied with.
- Before connecting the outputs to the consumer, it is essential to ensure that the set parameters actually conform to the required parameter levels and that the application functions correctly so that the system will not be affected by any faults that could harm people or damage equipment.
- The device may not be opened when connected to the voltage supply. Repairs may only be done by the manufacturer

4. Assembly, Installation and Commissioning

4.1. Assembly

The controller is fitted into a DIN enclosure with 4 horizontal pitches. The device is snapped onto a TS 35 rail (in conformance to DIN EN 60715 TH35).

It must be ensured that the device is ventilated sufficiently. Avoid installation in areas which have devices that could cause the controller to undershoot or overshoot the specified temperature range.

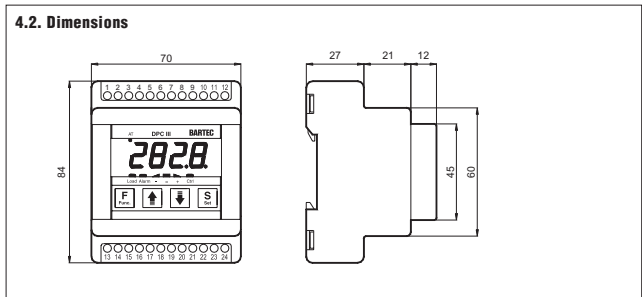
The device must be installed as far away as possible from sources that could cause severe electromagnetic interference (e.g. from motors).

When connecting multi-wired or fine-wired conductors, the ends of the conductors must be prepared accordingly.

Installation instructions for the assignment of the terminals

Conductor	Min. cross-section	Max. cross-section	Minimum length of wire end ferrule
rigid	0,2 mm ²	2,5 mm ²	
with wire end ferrule	0,25 mm ²	2,5 mm ²	10 mm
2 conductors, rigid	0,2 mm ²	0,75 mm ²	
2 conductors with non-insulated wire end ferrule	0,2 mm ²	0,75 mm ²	10 mm
2 conductors with TWIN wire end ferrule	0,5 mm ²	1,5 mm ²	10 mm

4.2. Dimensions



4.3. Installation

- The device must be connected in accordance with the wiring diagram with due consideration to the current/voltage specifications. It is essential to observe the specifications on the type label.
- As the device is provided for a permanent connection in a device, it has neither switches nor internal guards against overcurrent. For that reason a disconnecting device must be provided to interrupt the supply of power to the device.
- In addition, all circuits connected to the device must be protected by suitable devices (e.g. fuses) that are appropriate for the existing current levels

4.4. Commissioning

The device may only be operated if it is in a clean and perfect condition. If damage is visible, the device must be put out of operation and appropriate repair measures taken.

Commissioning must be done in the following order:

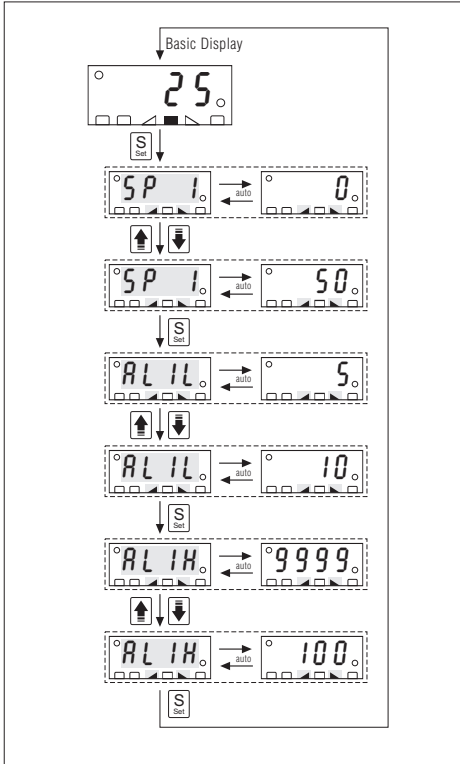
- Establish the electrical connections for the device
- Assign parameters for the setpoints
- Check that the device functions in the proper manner for the application.
If used as a two-position controller, the switching rate must be checked. If the switching rate is high, the hysteresis must be increased (see Chapter 5.1)

5. Adjustment of the two-position controller

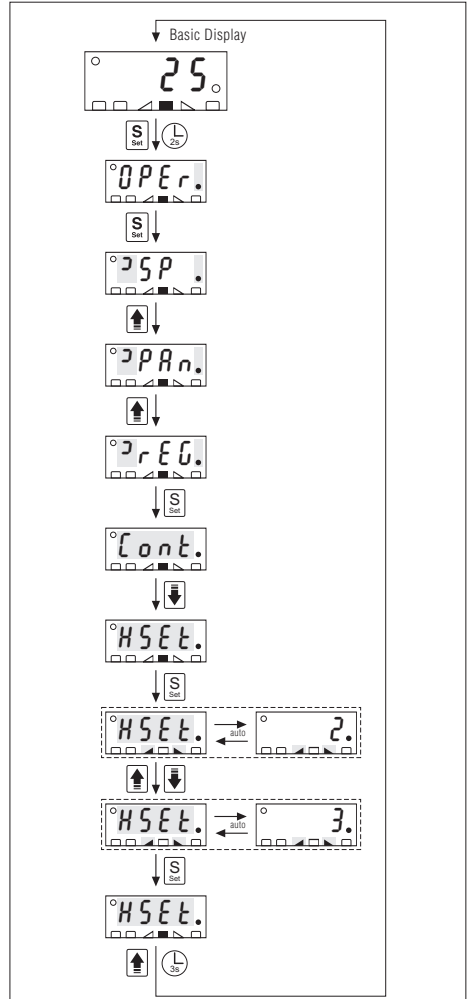
5.1. Setpoint inputs with the function:

„Fast setting“ (factory setting)

Example: Setpoint (SP1 = 50 °C)
 Low alarm (AL1L = 10 °C)
 High alarm (AL1H = 100 °C)

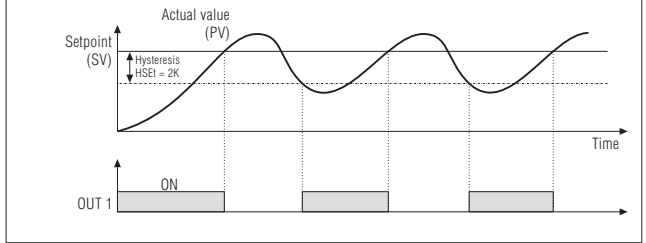


5.2. Altering the hysteresis

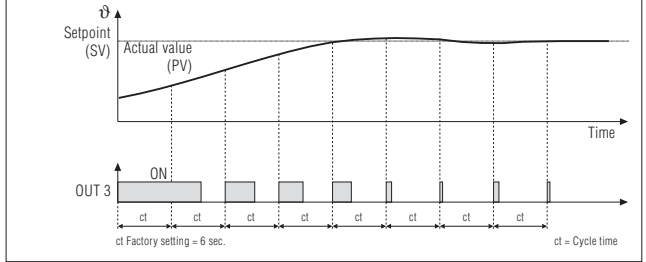


6. Mode of operation of the controller

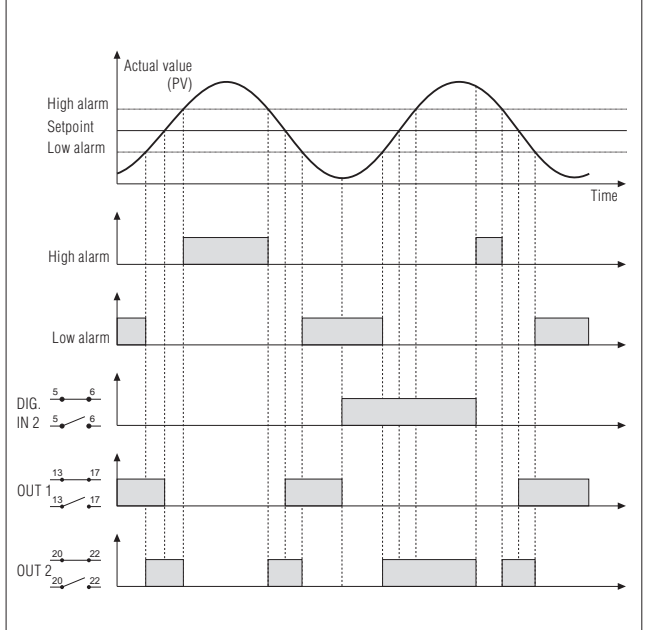
6.1. Function diagram two-position controller (factory setting)



6.2. Function diagram PID-controller



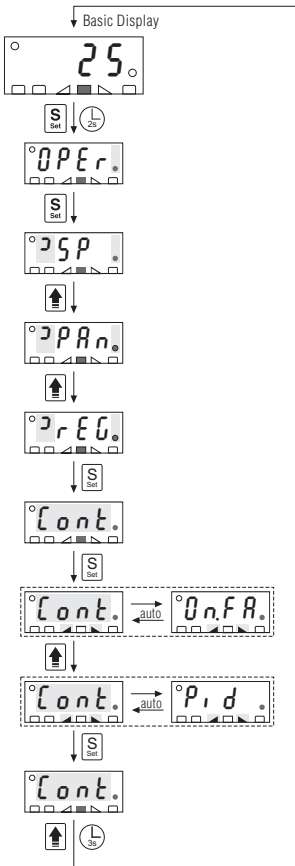
6.3. Function diagram digital input



7. Use as a PID controller: This type of control can be set in the following three steps:

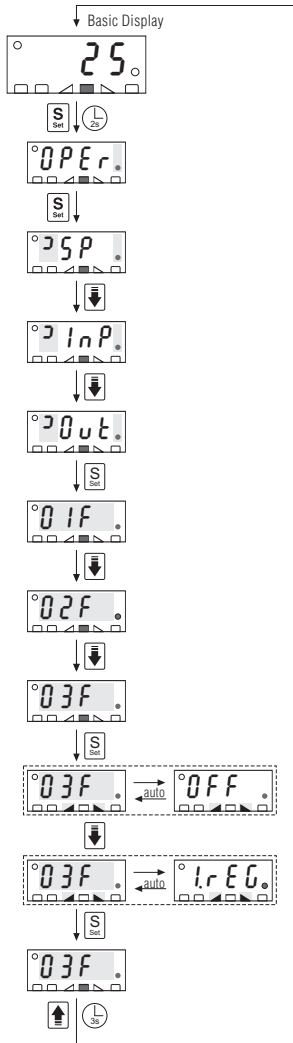
Step 1

Define the logic output (Out 3) as a regulating output



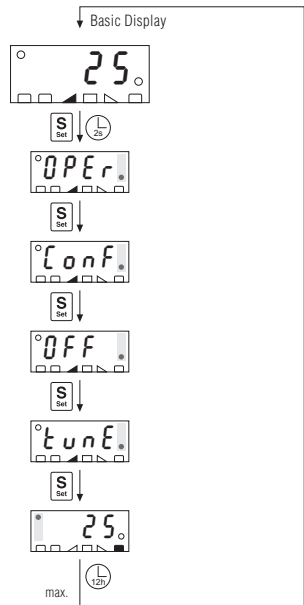
Step 2

Select the PID type of control



Step 3

If you so wish, the factory-set standard PID parameters can be determined automatically by means of AUTOTUNING and saved in the device.



8. Operation, Maintenance

The owner/managing operator of an electrical system must ensure that the operating equipment is in proper condition, operate it in accordance with instructions, monitor it and carry out preventative and corrective maintenance.

Each piece of electrical equipment must be selected according to its suitability.

Before being put into operation again, the applicable laws and directives must be observed. The safety instructions given must be followed before maintenance work is done or failures rectified.

9. Alarm management

9.1. Measuring circuit monitoring

The connected temperature sensor system (Pt100) is monitored for the following faults:

- Short-circuit sensor
- Interruption sensor
- Sensor undershooting or overshooting of the measuring range

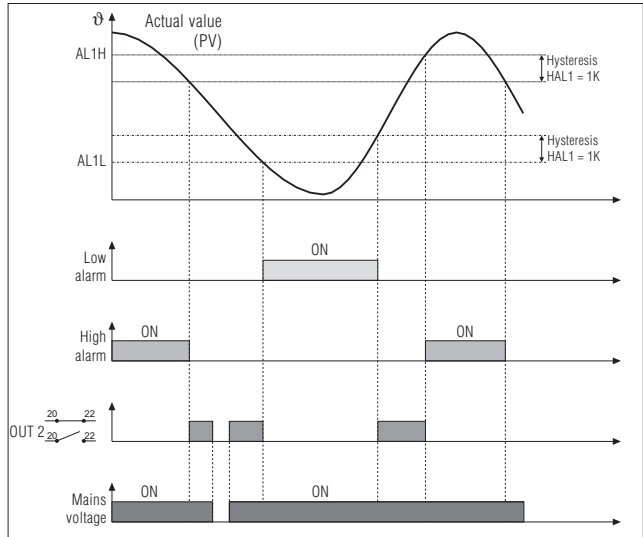
When one of these faults occurs, the device reacts as follows:

- Contact load relay (OUT 1) opens
- Contact alarm relay (OUT 2) opens
- Logic output (OUT 3) switches off

9.2. Temperature alarms

The floating relay output OUT 2 is factory-set as a group alarm output in the „normally energised / NC = normally closed“ mode of operation. Accordingly, the contact remains closed (relay activated) as long as there isn't any fault. This principle of action allows wire breakage and power failure to be detected.

The following shows this effect in detail



10. Technical Data

Types of control

Two-position (ON/OFF), PID

Serial interface

Only Version Monitor:
RS485 with Modbus RTU protocol

Display

1-line, red display (h = 12 mm, 4 digit);
some green status LEDs

Measuring and display accuracy

0.5 %

Ambient temperature range

0°C up +50 °C

Storage temperature

-10°C up +60°C

Enclosure

Plastic UL 94 V0

Terminals

Terminal screws; max. 2.5 mm²
(see also the Chapter on Assembly)

Dimensions

Length: 70 mm
Width: 84 mm
Mounting depth: 60 mm

Installation dimensions

4 DIN horizontal pitches (45 x 70 mm)

Protection class

IP 40 (front plate)

Installation position

Horizontal on TS 35 rail

Weight

ca. 230 g

11. Electrical data

Voltage supply (see type label)

AC 100 to 240 V, +/-10 %, 50/60 Hz or AC/DC 24 V, +/-10 %

Digital inputs

Floating contacts required

Output 1

Relay (normally-open contact)
AC 250 V 16A (ohmic load)

Output 2

Relay (change-over)
AC 250 V 8A (ohmic load)

Output 3

Logic output for SSR control
(DC 11 V/20 mA)

Power consumption

Max. 5 VA

Measuring circuit

$U_{max} = 5 \text{ V}$, $I_{max} = 0.15 \text{ mA}$

Electrical safety

EN 60730-1, -A1, -A12, -A13, -A14
EN 60730-2-9, -A1, -A2, -A11, -A12

Electromagnetic compatibility

EN 61326-1

12. Electrical Connection Device Connections

Terminals 1, 3	Mains connection
Terminals 4, 5, 6	Digital inputs
Terminals 7, 8, 9	RS485 interface
Terminals 13, 17	Floating normally-open contact OUT 1 (Regulating output for ON/OFF control)
Terminals 20, 22, 24	Floating change-over OUT 2 (Group fault alarm)
Terminals 18, 19	Logic output for SSR control (Regulating output for PID control)
Terminals 10, 11, 12	Sensor connection for: <ul style="list-style-type: none"> ■ BARTEC resistance thermometer Pt100 Ex, (2 or 3-conductor version) ■ BARTEC resistance thermometer Pt100 M, (2 or 3-conductor version) ■ Thermocouple J, K, S ■ Voltage signal 0 to 50 mV 0 to 60 mV, 12 to 60 mV

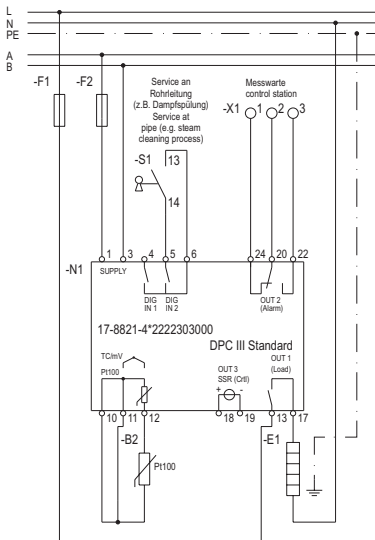
Note:

In the Pt100 two-conductor version terminals 2 and 3 must be bridged – as the sensor will otherwise malfunction!

12.1. Wiring diagrams DPC III Standard

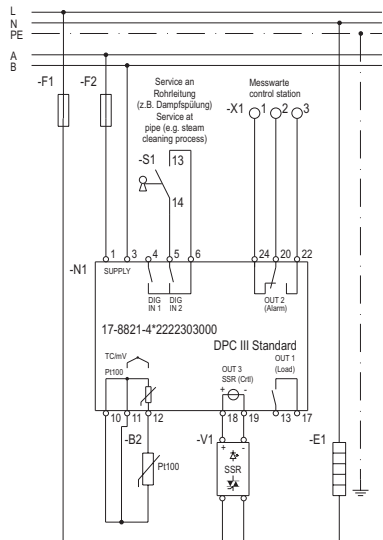
DPC III standard as two-position controller (ON/OFF)

Supply voltage A-B see type label



DPC III Standard PID Controller

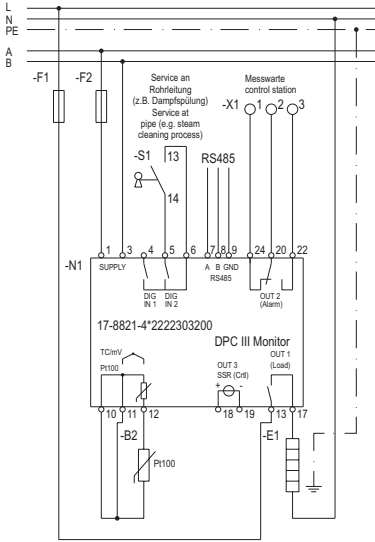
Supply voltage A-B see type label



12.2. Wiring diagrams DPC III Monitor

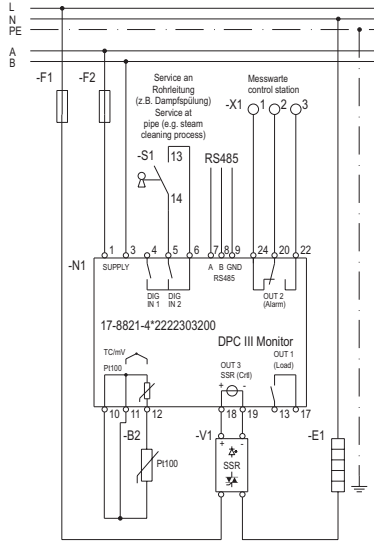
DPC III Monitor as two-position controller (ON/OFF)

Supply voltage A-B see type label

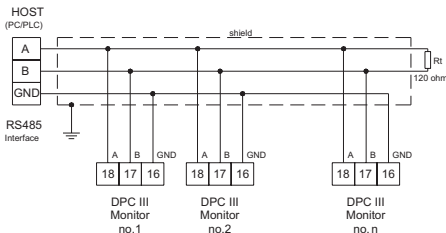


DPC III Monitor as PID-Controller

Supply voltage A-B see type label



Interface wiring when connecting several devices through the RS485



13. List of Parameters

Display Parametername	Display Parametergruppe	Description	Levels/ Setting range	Factory setting	Version Standard	Version Monitor
SP 1	SP	Setpoint 1 heating (regulating output)	-1999 °C to +9999 °C	0 °C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AL1L	AL1	Setpoint low alarm (alarm output)	-1999 °C to AL1H	5 °C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AL1H	AL1	Setpoint high alarm (alarm output)	AL1L to 9999 °C	9999 °C	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
add	SEr	Device address for serial interface	0 to 255	1		<input checked="" type="checkbox"/>
baud	SEr	Transmission speed of the serial interface	1200 / 2400 / 9600 / 19.2 / 38.4	9600		<input checked="" type="checkbox"/>
PACS	SEr	Access control through serial port "LoCI" = can only be programmed with keypad; LorE = can be programmed with keypad and interface	LoCI/LorE	LorE		<input checked="" type="checkbox"/>

14. Fault signals/fault clearance

Display of the fault in the display	Description	Fault clearance procedures
	Interruption sensor	Check and if necessary replace the sensor. The fault signal is automatically reset once the fault has been rectified.
	The temperature measured is lower than the sensor limit level.	Check and if necessary replace the sensor. The fault signal is automatically reset once the fault has been rectified.
	The temperature measured is higher than the sensor limit level.	Check and if necessary replace the sensor. The fault signal is automatically reset once the fault has been rectified.
	Autotuning cannot be carried out.	Set the controller to OFF and then activate the automatic regulation (rEG) to eliminate the fault. Repeat autotuning once the cause of the fault has been found.
	Autotuning could not be repeated within a period of 12 hours.	Check sensor and heating circuit for operability and then repeat autotuning.

15. Type Designation

Type	Description
17-8821-4722/2230 3000	DPC III Standard; AC 100 to 240 V
17-8821-4C22/2230 3000	DPC III Standard; AC/DC 24 V
17-8821-4722/2230 3200	DPC III Monitor; AC 100 to 240 V, with RS485
17-8821-4C22/2230 3200	DPC III Monitor; AC/DC 24 V, with RS485

16. Service address

BARTEC GmbH
Germany
Max-Eyth-Straße 16
D-97980 Bad Mergentheim
Phone: +49 7931 597-0
Fax.: +49 7931 597-119

Example type label

BARTEC	
DPC III Standard	
Type:	17-8821-4722/22303000
No.:	275765
Supply:	100 ... 240V AC
Input:	Pt 100 / TCI(L,K,S) / mV
Out 1:	Relay 16(6)A AC
Out 2:	Relay 8(3)A AC
Out 3:	20mA / 11VDC for SSR
Dig. input:	YES (2)
Date:	DD - MM - YY
Release:	02

Erklärung der EG-Konformität
Declaration of EC-Conformity
Attestation de conformité CE

BARTEC

BARTEC GmbH
Max-Eyth-Straße 16
97980 Bad Mergentheim

Wir

We

Nous

BARTEC GmbH,

erklären in alleiniger
Verantwortung, dass das
Produkt

declare under our sole
responsibility that the
product

attestons sous notre seule
responsabilité que le
produit



**Digitaler
programmierbarer
Regler DPC III**

**Digital
programmable
Controller DPC III**

**Régulateur digital
programmable
DPC III**

Typ 17-8821-4*12/2230 3*; Typ 17-8821-4*22/2230 3***
Typ 17-8821-4*42/2230 3***; Typ 17-8821-4*52/2230 3*****

auf das sich diese
Erklärung bezieht den
Bestimmungen der
folgenden Richtlinien
entspricht

to which this declaration
relates is in accordance
with the provision of the
following directives

Se référant à cette
attestation correspond aux
dispositions des directives
suivantes

**2004/108/EG
2006/95/EG
2002/95/EG**

**2004/108/EC
2006/95/EC
2002/95/EC**

**2004/108/CE
2006/95/CE
2002/95/CE**

und mit folgenden Normen
oder normativen
Dokumenten
übereinstimmt

and is in conformity with
the following standards or
other normative
documents

Et est conforme aux
normes ou documents
normatifs ci-dessous

EN 60730-1: 2002-01
EN 60730-1/A1/A12/A13/A14: 2005-10
EN 60730-2-9:2003-01
EN 60730-2-9/A1/A11:2005-01
EN 60730-2-9/A2/A12:2005-04
EN 61326-1:2006-05

Kennzeichnung

Marking

Marquage



Bad Mergentheim, den 23.04.2008

Ewald Warmuth
General Manager

