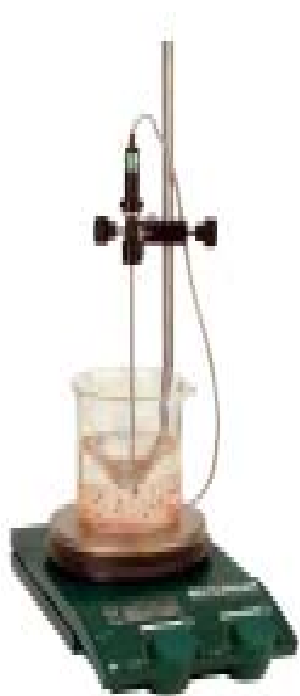


CG-1990-35 Digital Hot Plate Stirrer



CHEMGLASS

3800 North Mill Road • Vineland, NJ 08360
U.S. and Canada Phone: 1-800-843-1794 • Fax: 1-800-922-4361
customer-service@chemglass.com • www.chemglass.com

Guarantee

You have purchased an original Chemglass machine which meets the highest engineering and quality standards.

In accordance with Chemglass guarantee conditions, the guarantee period is 24 months. For claims under the guarantee please contact Chemglass Technical Service Dept to obtain a Return Authorization Number (RA#). You will be liable for freight costs.

Safety Instructions

Caution: Never heat up any medium with ignition point higher than the fix adjusted safety temperature limit. Value for safety temperature limit is listed under "Technical data" on page 15.

The instrument may not be operated in rooms with explosion hazard.

Furthermore, it must be placed upon a fireproof surface that is not able to burn.

Please make sure that the main cable does not contact the heating plate! **Attention - Magnetism!** Effects of the magnetic field have to be taken into account (e.g., data carriers, cardiac pacemakers). When using PTFE-coated magnetic bars, the following has to be noted: Chemical reactions of PTFE occur in contact with molten or dissolved alkaline and alkaline earth metals, as well as with fine-particled powders of metals of the 2. and 3. group of the periodical system at temperatures above 300-400°C.

Only elementary fluorine, chlorine trifluoride and alkaline metals do attack PTFE, halogen hydrocarbons have a reversible swelling effect. Source: *Römpps Chemie-Lexikon* and "Ullmann" Bd. 19.

Exercise caution when touching the housing parts and the heating plate! Risk of burns! The heating plate can reach temperatures in excess of 300°C. Please beware of possible dangers due to the release of toxic or flammable gases caused by heated medium.

Correct Use

The Chemglass Digital Hot Plate Stirrer is a heating instrument with a stirring function. It is used in the chemical industry, in laboratories, in schools, as well as in pharmacies. The instrument is suitable for tempering substances which are placed on the heating plate in vessels. By means of a built-in stirring drive and with the help of a magnetic bar within the vessel, the substances can be stirred at the same time. The mixing intensity is dependent on the motor speed and on the size of the magnetic bar.



Unpacking

Please unpack the equipment carefully and check for any damage. It is important that any damage which may have occurred during transport is ascertained when unpacking. If applicable, a fact report must be set faxed immediately to 800-922-4361.

The delivery scope covers a Chemglass Digital Hot Plate Stirrer, operating instructions, the main cable, and a short instruction sheet.

Commissioning

Check whether the voltage specified on the type plate matches the main voltage available. The power socket used must be grounded (protective earth conductor contact). If these conditions are met, the device is ready to operate after plugging in the main plug. If these procedures are not followed, safe operation cannot be guaranteed and/or the equipment may be damaged. Observe the ambient conditions (temperature, humidity, etc.) listed under "Technical Data."

Modes of Operating

The Chemglass Digital Hot Plate Stirrer can be operated in the following three modes:

A MODE OF OPERATION

The stirrer's control visc is switched at our Works to the A mode of operation. In this mode, an operation is only possible when the **Pt 100 medium sensor is inserted.**

When the instrument is switched to "power", heating and stirring functions are switched off.

The set rated values are stored and digitally displayed. They are taken over when the respective function is switched on. The set rated values can be changed. If there has been an interruption of the main, both functions have to be restarted. The safety circuit can only be set and/or changed in the A-mode of operation

B MODE OF OPERATION

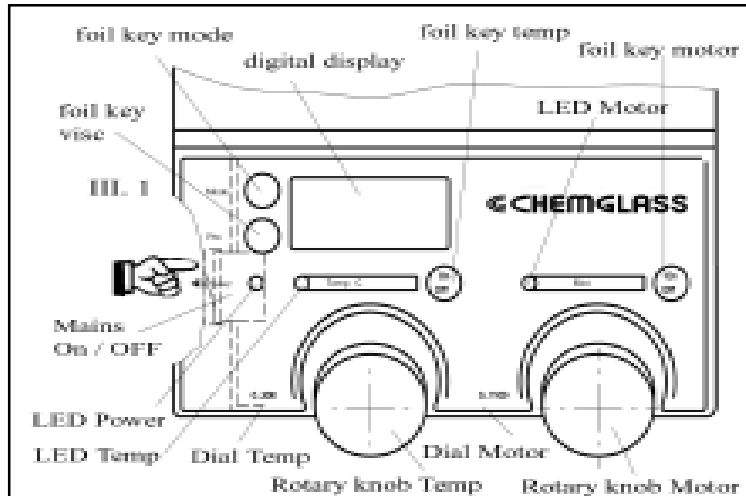
When the instrument is switched on, the state of the functions heating and stirring before the last switching off (main OFF) as well as the data set last are taken over. The set rated values can be changed. This B-mode of operation that is less safe than the A-mode, which is indicated by symbol "ä". When using the main switch for switching on, the B-mode of operating is displayed in addition.

C MODE OF OPERATION

When the instrument is switched on, the state of the functions heating and stirring before the last switching off (mains OFF), as well as the data set last are taken over. The set rated values from A and B modes of operating cannot be changed.

For reversing the modes of operation, the following steps are required:

- Switch off the instrument by way of main switch.
- Keep foil key Mot and Temp depressed and switch instrument on via main switch, release foil keys after about 1 second.



Switching On

The instrument is switched on by the main switch on the left side of the instrument (see illustration 1).

After the instrument has been switched on, the LED power and the LED's Temp and Mot blink for a short time and this indicates that a self-test is carried out. All relevant safety functions are checked in this test.

A - Mode of Operation

All display segments of the digital display blink twice at the same time.



Then the mode of operation is displayed. A mode of operation is displayed for about 2 seconds.



The set safety temperature (preset to 300°C at our Plant) is displayed. SV is blinking.



After the termination of the self-test, the display changes to SAFE OK.



B - Mode of Operation

Switch on as described under A - mode of operation.



The digital display shows the following images:
All display segments blink three times.



B mode of operation is displayed for about 5 seconds.

The set safety temperature (preset to 300 °C at our Plant), SAFE OK and

* are displayed.



C - Mode of Operation

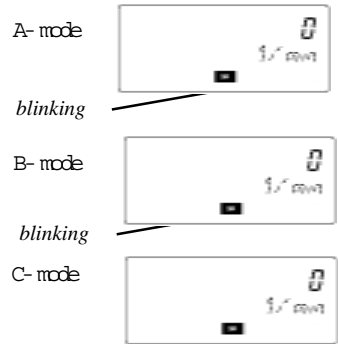
Switch on as described under A -mode of operation.



The digital display shows the following images:
All display segments blink three times. The C -mode of operation is displayed for about 5 seconds.



After the termination of the safety check-up, the following displays can be seen in the digital display, while the functions are switched off:



Function Heating

The temperature of the heating plate of the instrument is kept constant by a control circuit. In addition, this temperature is monitored by two safety circuits. The required temperature sensor - a thermocouple - is built into the heating plate. The first safety circuit can be set from 100 - 300°C; the second safety circuit is firmly set to about 370°C.

An electronic sparkquench circuit prevents the burning of the contacts on the switching relay. The instrument is equipped with a silumin heating plate with a heating power of 600 watts. In order to facilitate cleaning, the surface of the heating plate is polished. It gets coated rather quickly with an aluminium oxide protective layer that is chemically very resistant.

Controlling the Medium Temperature with a Pt 100 Measuring Sensor:

Controlling the medium temperature with the Pt 100 is preferred. The Pt 100-operation is digitally displayed by the symbol **Probe**. The displayed rated temperature and the real temperature refer to the medium temperature. The temperature of the heating plate is limited via the set safety temperature.

A Mode of Operation with inserted Pt 100

The required medium temperature (0° C - 300° C) is set on the rotary temp. When the set temperature is displayed on the digital display **SV** is blinking.

The heating function is switched on and off with foil key Temp. If the heating function is switched on, the LED Temp yurns green, and the digital display changes to the next display. Real temperature - medium is displayed.



In the **A**-mode of operation, the requested medium temperature can only be set when the Pt 100 is inserted.



The heating plate heats up the medium to the set temperature. During the heating phase the temp LED-color changes from green to orange (orange=energy supply to heating plate).

B - Mode of Operation with inserted Pt 100

The required medium temperature (0°C - 300°C) is set by means of the Temp rotary knob. When the set temperature is displayed on the digital display, **SY** is blinking.

The heating function is switched on and off with foil key Temp. If the heating function is switched on, the LED Temp turns green, and the digital display changes to the next display. Real temperature - medium is displayed.

B Mode of Operation without PT 100

The required temperature of the heating plate (0°C - 300°C) is set on the rotary knob Temp. The set temperature is displayed on the digital display.

Probe and **SY** are blinking. The heating function is switched on and off with foil key Temp. If the heating function is switched on, the LED Temp shines green and the digital display changes to the next display. Real temperature of the heating plate is displayed. **Probe** is blinking.



C - Mode of Operation with inserted Pt 100

In the **C** -mode of operation the temperature of the heating plate **cannot** be changed. The heating function is switched on and off with foil key Temp. If the heating function is switched on, the LED Temp turns green and the digital display changes to the next display. Real temperature - medium is displayed.



C - Mode of Operation without Pt 100

In the **C** -mode of operation the temperature of the heating plate **cannot** be changed. The heating function is switched on and off with the foil key Temp. If the heating function is switched on, the LED Temp turns green and the digital display changes to the next display. The real temperature of the heating plate is displayed. **Probe** is blinking.



Please note: An operation without Pt 100 is marked by the symbol **Probe** blinking. The displayed temperature values always refer to the heating plate.

In case of a disturbance, the heating plate is **permanently switched off** by the safety circuit.

If there is a failure in the safety circuit, the LED Temp blinks red, and the error is displayed (see section on Error Codes). The heating function cannot be started.

Setting the Safety Temperature

Setting and/or changing the safety temperature is only possible in the "A" - mode of operation.

To set the safety circuit, switch instrument on with main switch on the left side of the instrument.

As soon as the display shifts to SAFE TEMP (SV is blinking), press the foil key Mode (SV is no longer blinking). Keep this foil key depressed and set the requested safety temperature with the TEMP rotary knob.

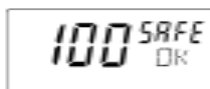
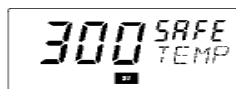
The set safety temperature (e.g., 100°C, is displayed).

After releasing the foil key Mode, SAFE OK is displayed for about 2 seconds, and the safety temperature is stored this way.

Function Stirring

A - Mode of Operation

The motor speed is set on the rotary knob. Mot (0 and/or 50 - 1100 1/min in steps of 10 1/min each). **SV** is blinking.



The stirring function is started and stopped with foil key Mot. If the stirring function is started, the motor runs smoothly to the set speed, and LED Mot beside the imprint Mot 1/min turns green. The display changes to real speed display.

B - Mode of Operation

The motor speed is set on the rotary knob Mot (0 and/or 50 - 1100 1/min in steps of 10 1/min each). **SV** is blinking.

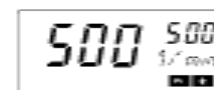
The stirring function is started and stopped with foil key Mot. If the stirring function is started, the motor runs smoothly to the set speed, and the LED Mot beside the imprint Mot 1/min turns green. The display changes to real speed display.

C - Mode of Operation

In the **C**-mode of operation, the speed cannot be changed. The stirring function is started and stopped with foil key Mot. The sequence of displays is the same as in **B**-mode of operation.

Measurement of Viscosity Trend

This measurement is determined with the help of the control software via the controlling variable given to the motor, and is shown in percent format in the digital display. The maximum controlling variable (maximum torque of motor) is 100%.



The instruments are **not** designed for measuring the absolute viscosity. Only the relative change in the product, in relation to an initial point determined by the user, is measured and displayed. As the controlling variable is strongly dependent on the real speed, this should not be changed during a measurement.



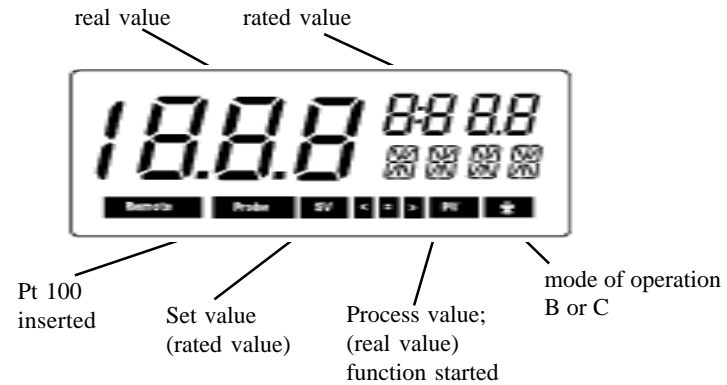
After the speed of the motor and of the magnetic bar in the medium have stabilized to the set rated speed (waiting time about 3 minutes), the viscosity measurement is started by pressing foil key Visc. The real controlling variable is stored as reference value 0%, and is digitally displayed. Also displayed are the set rated speed, as well as the viscosity change in %. Depending on the increase or decrease of viscosity, the value is displayed as positive or negative. A simultaneous display of the percentage and of the real speed is not possible.

By pressing foil key mode, it is possible to view rated and real temperature, but the measurement of the viscosity trend has priority, and the instrument switches the digital display back to trend display after about 5 seconds. When the stirring function is switched off, the trend display is switched off as well. The trend display can only be switched on with an activated stirring function.

Please note: While the measurement of the viscosity trend is on, the state of the heating plate cannot be seen on the digital display, even if the heating plate is exceeding 50° C.

Display

When the functions are switched off, the digital display always shows the set speed value.



If in all three modes of operation only heating function has been started, the display shifts to rated and real temperature.

If in all three modes of operation only stirring function has been started, the display shifts to rated and real speed.

If both functions have been started, the display of heating function always has preference. If in this case the speed is changed via rotary knob Mot (not possible in the C-mode of operation), the display reverses to speed display for a duration of 5 seconds.

The mode of the display can also be changed by pressing foil key Mode once. After 5 seconds the display shifts back to temperature display.



If heating function is switched off, and if the heating plate temperature is higher than 50° C, LED Temp will be blinking orange (20% ON...80% OFF).



The digital display changes constantly from rated temperature °C to rated temperature HOT.

Error Codes

Example of an error code



Er 1	Measuring sensor Pt100 not inserted in A -mode of operation; LED "Temp" blinks alternately green - red	heating is switched off	Er 4	Speed deviation from rated to real speed higher than ± 300 1/min; LED "Mot" blinks green	heating and motor are switched off
Er 3	Internal temperature of instrument exceeds 80°C; LED "Temp" blinks alternately red - orange	heating is switched off	Er 5	Measuring sensor Pt100 not in medium or wrong measuring sensor inserted; LED "Temp" blinks red	heating is switched off
			Er 21	Faulty safety relay; LED "Temp" blinks red	heating is switched off
			Er 22	Firmly set safety circuit faulty; LED "Temp" blinks red	heating is switched off
			Er 23	Adjustable safety circuit faulty; LED "Temp" blinks red For setting back the error code and new calibrate the safety circuit on a new safety temperature. (see setting the safety temperature)	heating is switched off
			Er 24	Breakage of heating plate thermocouple; LED "Temp" blinks red	heating is switched off
			Er 25	Polarity of thermocouple; LED "Temp" blinks red	heating is switched off

Configuration of the Serial RS 232 C Interface

- The functions of the interface lines between laboratory instrument and automation system are selected from the specified signals of the EIA-standard RS 232 C, corresponding with DIN 66 020 Part 1. The allotment of the bushing can be taken from illustration 2.

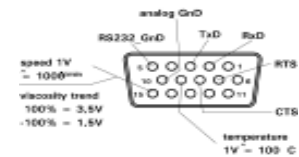
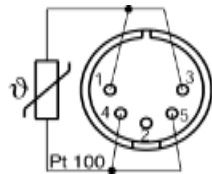
- For the electrical properties of the interface lines and for the allotment of the signal status, standard RS 232 C, corresponding with DIN 66 259 Part 1 applies.

- Transmission method: Asynchronous signal transmission in start-stop-operation.
- Mode of transmission: Fully Duplex.
- Character format: Character imaging acc. to data format DIN 66 022 for start-stop-operation.
1 start bit
7 character bits
1 parity bit (even)
1 stop bit
- Transmission speed: 9600 bit/s

- RTS (pin7) LOW (positive tension): PC may send
- RTS (pin7) HIGH (negative tension): PC may not send
- CTS (pin8) LOW (positive tension): PC recipient
- CTS (pin8) HIGH (negative tension): PC not recipient

- Access method: Data communication from laboratory instrument to processor is only possible on demand of the processor.

Connection for Measuring Sensor and Analog Output



Instruction Syntax and Format

Here applies the following:

- The instructions are generally sent from the processor (master) to the laboratory instrument (slave).
- The laboratory instrument exclusively sends on demand of the processor. Even error codes cannot be spontaneously communicated from the laboratory instrument to the processor (automatic system).
- The instructions are transmitted in capital letters.
- Instructions and parameters as well as subsequent parameters are separated by at least one blank. (Code: hex 0x20)
- Each individual instruction including parameters and data as well as each reply are terminated with CR LF (Code: hex 0x0D and 0x0A) and have a maximum length of 80 characters.
- The decimal separator in a floating point number is the point. (Code: hex 0x2E)

The above statements largely correspond with the recommendations of the NAMUR-Association. (NAMUR-recommendations for the design of electric plug connections for the analog and digital signal transmission to laboratory - MSR individual units).

Overview of the NAMUR-Instructions

Abbreviations:

X,y=	numbering parameter (integer number)
n=	value of variable, floating point number
X=1	Pt 100 temperature
X=2	heating plate temperature
X=3	safety temperature
X=4	speed
X=5	viscosity trend

<u>NAMUR-Instructions</u>		<u>Function</u>	<u>Display (additional)</u>
IN_PV_X	X=1;2;3;4;5	Reading the real-value	
OUT_SP_Xn	X=1;4	Setting the rated value to n	
IN_SP_XX	X=1;2;3;4	Reading the set rated value	
START_X	X=1;4;5	Starting the instruments (remote) function	REMOTE
START_16		Activation of the watchdog function. If no rated value is entered given in the next 60 seconds, the heating is switched off.	
STOP_X	X=1;4;5	Switching off the instrument function. Variables set with OUT_SP_S are maintained. Contains the instruction RMP_STOP.	REMOTE
RESET		Switching off the instrument function.	
STATUS_X	X=1;4;5	Display of status 1S: A-mode of operation 2S: B-mode of operation 3S: C-mode of operation S0: manual operation without fault S1: Automatic operation Start (without fault) S2: Automatic operation Stop (without fault) <0: error code: (-1) -83: wrong parity -84: unknown instruction -85: wrong instruction sequence -86: invalid rated value -87: not sufficient storage space	

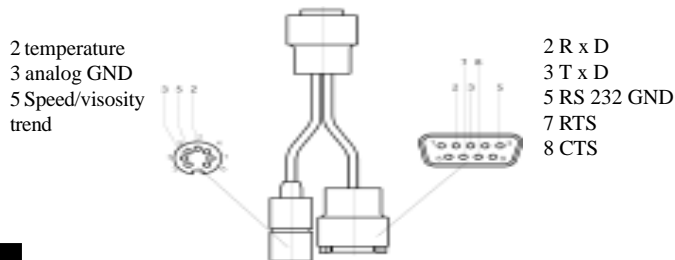
NAMUR-Instructions**Function****Display
(additional)**

RMP_IN_X	X=1;4	Reading the real segment number of ramp. With ramp not started: 0	
RMP_IN_X_y	X=1;4	Reading the accumulated value and the ramp segment duration of ramp segment y.	
RMP_OUT_X_yn hh:mm:ss	X=1;4	Setting the accumulated value (n) and the ramp segment duration (hh:mm:ss) for ramp segment y.	
RMP_START_X	X=1;4	Starting the ramp function, beginning with ramp segment No. 1. (Only possible after prior START_X. After RMP_STOP_X START_X is not necessary).	
RMP_STOP_X	X=1;4	Switching off ramp function. Rated value = 0. (Ramp is maintained, which means, ramp can be restarted with RMP_START_X).	
RMP_PAUSE_X	X=1;4	Stopping the ramp function. Freezing of real rated value and real ramp segment time.	
RMP_CONT_X	X=1;4	Continuation of ramp function (After prior RMP_PAUSE_X).	
RMP_RESET_X	X=1;4	Switching off ramp functions and deleting of all set ramp segments.	

Further Instructions	
RMP_LOOP_SET_X X=1;4	To work off the ramps in one loop
RMP_LOOP_RESET_X X=1;4	Ending of ramp loop
IN_TYPE	Requiring identification of laboratory instrument
IN_NAME	Requiring the designation name
OUT_NAME name	Output of designation name (max. 6 digits)

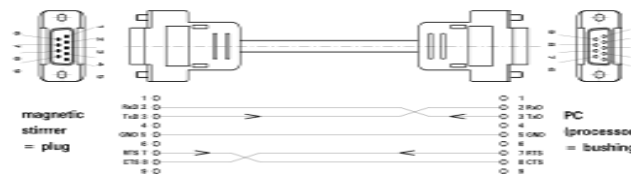
PC 5.1 Adapter Control

An adaptor cable is available as an accessory part. It splits the analog and serial signals. The analog output signals are allotted to a 7-polar coupling according to the NAMUR-recommendation; the serial signals to a 9-polar Sub-D-bushing plug (RS 232 C).



PC 2.1 PC-Cable

For connecting the 9-polar bushing with a PC, a PC-cable is required.



Maintenance and Cleaning

The Chemglass Digital Hot Plate Stirrer is maintenance-free. It is subject only to the natural wear and tear of components and their statistical failure rate.

When ordering spare parts, please give the manufacturer number shown on the type plate, the machine type, and the name of the spare part.

Please send in equipment for repair only after it has been cleaned and is free from any materials which may constitute a health hazard. To remove use the following:

Dyes	isopropyl alcohol
Construction materials	water containing tenside / isopropyl alcohol
Cosmetics	water containing tenside / isopropyl alcohol
Foodstuffs	water containing tenside
Fuels	water containing tenside

For materials which are not listed, please request information from IKA. Wear the proper protective gloves during cleaning of the devices. Electrical devices may not be placed in the cleansing agent for the purpose of cleaning.

Before using a non-recommended method for cleaning or decontamination, the user must ascertain with the manufacturer that this method does not destroy the instrument.

Associated Standards and Regulations

Construction in accordance with the following safety standards
EN 61 010-1 UL 3101-1 CAN/CSA C22.2 (1010-1)

Construction in accordance with the following EMC standards
EN 50 082-1 EN 55 014 EN 60 555-2; -3 EN 50 081

Associated EU guidelines
EMC-guidelines: 89/336/EWG
Machine guidelines: 73/023/EWG

Accessories

Pt 100.50 temperature measuring sensor MAS50-plug, stainless steel
Pt 100.51 temperature measuring sensor MAS50-plug, glass-coated
RS 1 set of stirring bars
H16V support rod
RSE PTFE-stirring bar remover

H 43 contact safety device
R 380 stand support
R 360 holding fork
H 36 holding rod
H 44 cross sleeve
H 15 bath top, stainless steel
PC 5.1 adapter IKA-Control
PC 2.1 PC-cable

Technical Data

design voltage:	VAC	230±10%
	or	VAC 115±10%
design frequency:	Hz	50/60
motor:		EC-motor with ball bearings, without brushes
max. power input of motor:	W	12
speed range:	1/min	0 bis 1100 adjustable
speed deviation from idle to max. load:	1/min	±30
heating plate:		silumin, GK AlSi 12 polished
∅ of heating plate:	mm	135
heating power:	W	600
max. surface temperature:	°C	300
max. safety temperature under error conditions:	°C	370
temperature setting:	°C	infinitely variable from ambient temperature in 1-K steps

Technical Data (continued)

control accuracy of the medium in Pt100 measuring sensor operation:	K	±0,2 FUZZY
analog output 0...10V	temp. speed	1V/100K 1V/1000 1/min viscosity trend 100%=3,5V -100%=1,5V
permissible ambient temperature:	°C	+5 bis +40
permissible relative humidity:	%	80
permissible duration of operation:	%	100
protection class acc. to DIN 40 050:		IP 42
fuses:	F1/F2	10AT/250V Id-No 2755400
	F3	1,025AT/250 Id-No 2756300
	F4	0,800AT/250 Id-No 2756200
contamination level:		2
overvoltage category:		II
protection class:		I(protective earth)
dimensions:	mm	160 x 280 x 90
weight:	kg	2,68

List of Spare Parts

Item	Designation	Item	Designation
2	bushing	38	taptite countersunk screw
3	radiating sheet	39	cap
4	sealing washer	40	screwed plug
5	washer	41	operation knob poti
6	taptite cheese-head-screw	44	flat-strip lead
7	distance bushing	45	taptite cheese-head screw
8	sleeve	46	locking washer
9	foil keyboard	47	reference plate
10	housing, coated	48	insulating tape (foil keyboard)
11	BLP-control	49	locking set
12	poti holder	50	plastic cover
13	hood	51	sealing washer
14	hexagonal nut	52	cap
15	cover for Pt100	53	flexible wire
17	fixing clip	102	ceramic stone
18	nut, M 7 x 0.75	2001	heating plate, complete
19	O-ring	2002	EC-motor, complete
21	toothed washer	3001	LCD-display
22	taptite cheese-head screw	3002	poti
23	disc, arched	3003	rocker switch
24	washer	3004	bushing plug
30	EC-motor	3005	Sub-D-busing plug
31	bottom part, coated	3006	mains bushing
32	plastite-screw	3007	relay
33	BLP-power unit	3008	fuse 10A
34	distance bushing	3009	fuse 1,25A
35	magnet	3010	fuse 0,8A
36	countersunk screw	3011	LEMO-bushing (S17)
37	plastic cover	5001	ball bearing
		5002	grooved ball bearing

Spare Parts Diagram

