



GELNORM® – Geltimer and PST-1

1 Channel Control Unit with Temperature Measurement, incl. software



GELNORM®- Geltimer is an instrument for the automatic determination of the gel time of reaction resins. The design is based on DIN 16 945, DIN 16 916, EN 14022 method 5 and DIN EN ISO 9396.

The test with GELNORM® - Geltimer is very easy to perform and gives exceptionally good reproducibility. The automatically measurement can be performed for any reaction resin, for example:

- **Unsaturated polyester resins**
- **Phenolic resins**
- **Epoxy resins**
- **Polyurethane resins**
- **Acrylic resins**
- **Silicone resins**

Description

The GELNORM®- Geltimer PST-1 evaluates all factors which influence the gel time of reaction resins such as type and quantity of hardener, accelerator, inhibitor, filler, pigments, as well as temperature and moisture. The instrument is easy to operate and normally no maintenance necessary.

The principle of measurement of GELNORM®- Geltimer is simple: A stamper made of aluminium or stainless steel performs an up-down cycle in a test tube filled with resin. When the point of gelation is reached, the test tube is pulled up by the stamper. This stops the clock which was started at the beginning of the experiment and the gel time can be read of. With the probe temperature system, the exothermic reaction can be measured. The electrical heating device, option heating block GT, can be controlled directly with the internal temperature controller.

The GELNORM® - Geltimer PST-1 consists of:

- Gel timer
- Sample temperature measurement system
- Temperature control for the electric heating
- Software for capturing and recording of all relevant data's

The device has a USB port and will be delivered with software. The system and the measurement can be configured directly on the PC. The recorded data are displayed graphically and can be processed as a csv-file in other programs.

The device can be used online or offline. In online mode, the measurements can be carried out comfortably, record and compare the measured data.

This is a long-life measurement system!



Front view PST-1

- Timer, LCD display with HH: MM: SS resolution
- Start button for the Geltimer
- Temperature controller

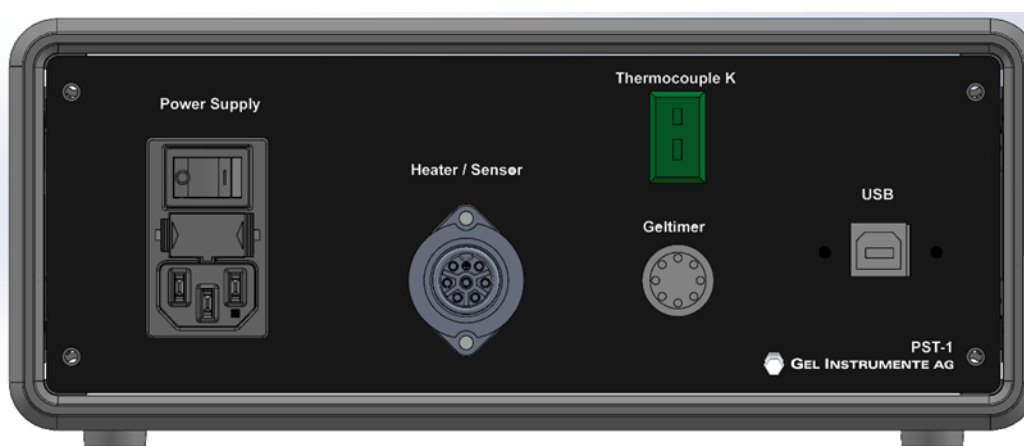
With actual value and setpoint display

Switchable to sample temperature display



Rear View PST-1

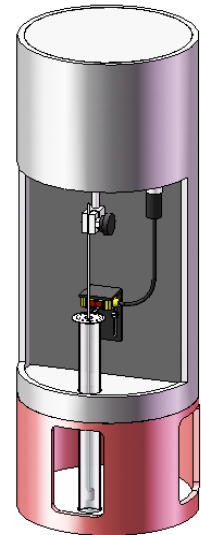
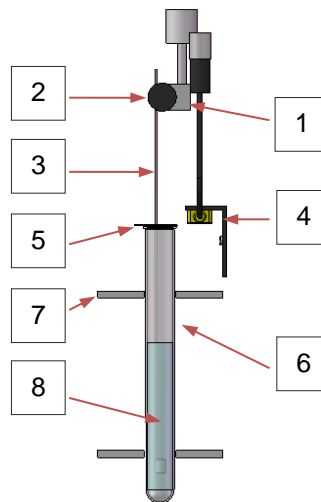
- Power connector with fuses and main switch
- Connection for electrical heating block
- Connection for the Gelnorm Geltimer
- Connection for sample temperature sensor, thermocouple type K
- USB port for on-line measurement on PC





System Test Unit with optical Sensor

- 1 Friction clamp
- 2 Machine screw
- 3 Measurement stamper
- 4 Opto sensor
- 5 Foam ring
- 6 Test tube
- 7 Test tube holder
- 8 Sample mixture



Stamper made of aluminium wire with a coiled head are used. This design provides the same gel time measurement as the glass stamper specified in the specification of DIN 16 945 but is more economical. The design of the aluminium stamper moreover provides a minimum of surface area, which leads to minimized air inhibition which is especially important for unsaturated polyesters.

It is also possible to use a glass stamper (\varnothing 3 mm, length 230 mm with fused base) according to DIN 16 945. (Please notice that another stamper attachment clamp is used in this case.) Test tubes are of 160 x \varnothing 16 mm with lip.

Time Measurement and Measuring Cycles

The control units are provided with digital LCD clock-modules. The automatic digital time measurement gives a reading of 1 second for test durations up to 99 hours. By starting a new measurement the clock is automatically reset to zero.

The continuous up-down motion cycle of the stamper is set to 10 seconds as our standard. For individual needs, test units with other motion cycles are available upon request.

Required periodic calibration work

- Timer with reference stopwatch
- Sensing distance 6mm with reference scale
- Heating block with reference thermometer
- Thermocouple input with type K thermocouple simulator



Electrical data from the Control Unit PST -1

Electrical Specifications

Power supply	115VAC / 230 VAC, 50/ 60 Hz (internally switchable)
Power consumption	20 VA, 650 VA with heating
Connector	8 pole, N, P, PE and Pt100 2 wires, plug type Binder
Main switch	on the rear panel
Fuses	2 pieces, F 3.15A L 250 VAC
Electric conformity	EMV 2014/30/EU, EN 61010-1:2010, EN 61010-2-010:2014, EN 61326-1:2013
Interface	USB 2.0 type A connector
Connection Geltimer	M12 8 pole, 24 VAC, 10 VA

Temperature control for the electrical heating block GT

Actual value (Pt100) :	Range: 0.0 °C ... 250.0 °C , adjustable and calibrated
Accuracy:	± 0.3 % of full scale ± 1 digit
Set value:	Range: 0.0 °C ... 200.0 °C
Resolution:	0.1 K
Load output	power max. - Resistive load: maximum 600 W self-optimization

Temperature measurement for the sample

Sensor	Thermocouple Type K (Ni-CrNi), EN 60 584
Connector	Mini connector type K thermocouple, EN 60 584
Range	0.0 °C 400.0 °C ...
Accuracy	± 1.5 °C including cold-junction compensation Adjustable and calibratable

Time

Display	LCD, 12mm
Start	Button with status indicator
Stop	Optical switch
Range	up to 99HH: 59MM: 59SS
Accuracy	± 1 second / 2 hours

Test Unit with optical Sensor

Motor	24 VAC, 50/ 60 Hz, 6 rpm
Switch	optical sensor, standard!
Sample temperature	Thermocouple type K for installation in the test tube to the sample
Stroke	25mm, 10 seconds for an up and down motion



Electric heating for the sample, thermal block GT (Standard) Art. No 200.16.41

The integrated control system controls the temperature of the heating block temperature for the sample. The actual and set-point temperature is displayed digitally with a background lighted LCD. About the display colour of the control difference is optically very visible represented.

To ensure high reliability, the controller switches at a value exceeding from the power supply for the heater. In the heating block GT, an reversible safety thermostat which switches off at 270 °C is installed. This heating block can be installed as an option later at any time on Geltimer.

Security:

- Exceeding controller alarm temperature set point +10 °C
- Safety temperature limiter at 270 °C
- Short circuit of the sensor
- Interruption of the sensor
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Note: Expanding samples can damage the test tube and heating block



Using the software, activate the heater and adjust the set point. The release for the measurement takes place only when the set point has been reached. The heater can be adjusted with an actual value offset.

Thermostatic control

Prerequisite for accurate and repeatable measurement is a precise temperature control of the sample. Using a water or oil bath, the buoyancy force of the immersed sample must be considered!

Thermostatic Bath with silicon-oil, 30 °C ... 150 °C

It is possible to perform tests at defined temperatures by submersing the portion of the test tube with the reaction resin into a thermostatic bath. The amount of the liquid in the bath should be adjusted such that its level is about 1 cm higher than the level of the reaction resin in the test tube. (Please note, that the volume excluded by the test tube influences the experiment and, hence, it must be constant in order to reach an optimal reproducibility of the results.)

Note that the buoyancy forces distort the measurement!

A balancing weight on the test tube must be attached.

Note:

According to DIN EN ISO 9396 the use of the bath requires a coating weight of 10 g and 20 g for liquid resins for solid or powder resins.

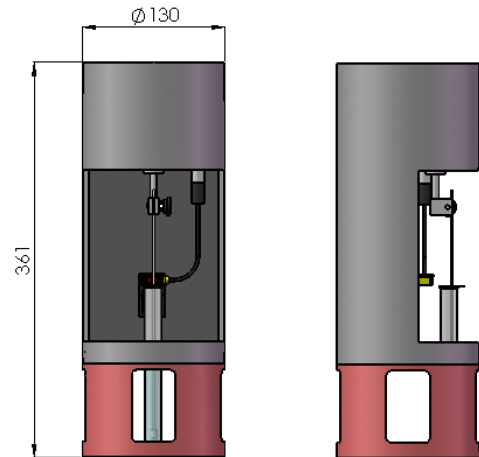




Technical Data

Test Unit with optical sensor 200.20.18

Time	99h 59min 59s
Cycle	10 sec (On request other cycles are possible)
Dimension	Ø 130 mm, H = 361 mm
Weight	~ 2.5 kg
Material	aluminium anodised
Environment temperature	-30 °C... 50 °C
Power	24 VAC
Connection cable	0.5 meters



Modular variants of the Geltimer measuring heads:

- 1 Test unit with electric heating block
- 2 Standard model
- 3 Test unit for Water- or Oil bath



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PST-1 – 1 Channel control unit

Housing frame	die-cast aluminium
Base and lid	coated sheet
Ventilation	slots in base plate
Front and rear walls	aluminium anodized
Dimensions	W x H x D = 257 mm x 103 mm x 271 mm
Weight	~ 3.1 kg



Order code, item numbers

GELNORM® - Geltimer for one channel measurement:

1 piece control unit PST-1 (incl. software, USB- and power cable)	200.13
1 piece Test Unit with optical sensor	200.20.18

Options for the 1 channel measuring system

Electric Heating	
Thermo block GT for Ø 16 mm glass tubes	200.16.41
Thermo block GT for Ø 20 mm glass tubes	200.20.41
K-type thermocouple, 5 meters, ready for use	20.32
Thermostatic bath	
Thermostatic bath for 1 measuring head (without thermostatic oil)	20.50
with holder and cover for the thermostat	20.50HC

Consumable materials for GELNORM® - Geltimer

Stamper aluminum 1 x 235 mm, package with 500 pcs	20.30
Stamper steel (for aggressive specimen mixture), D = 1 mm x 235 mm, package with 500 pcs	20.36
Test tubes 16 x 160 mm, package with 100 pieces	20.55
PE Foam Rings, set with 10 pcs	80.50
Holder for Alu-stampers, 3 pieces	20.48

Our Gelnorm® Devices are supplied with a factory calibration certificate.

Our reference measuring instruments are provided with an internationally recognized Calibration.



Gel Time Measuring



Temperature Measuring



Temperature Controlled



Geltimer