huber

high precision thermoregulation

E-grade® for Unistats®

Explore

NEW

The all-new E-grade "Explore" turns a Unistat into a Process engineering development tool

Suitable for: Petite Fleur® • Grande Fleur® • Tango® • Unistat®

Test it now!
Free of charge

The new E-grade®
"EXPLORE" for Unistats®

NEW

NEW: The E-grade® "Explore" turns your Unistat® into a development tool for Process engineering

The new E-grade "Explore" for Unistats is more than just another functions package. It makes important information available to users of Unistat temperature control systems. Temperature values and temperature differentials as well as for the actual heating power, cooling power and pump power within the system are displayed on the touch-panel.

E-grade "Explore" is an evolution of the existing Unistat technology. Existing sensors are utilised to make important process temperature and power data visible. In addition to making the data visible on the display of the device, it can also be accessed via the digital interfaces for further processing.

Application examples for E-grade® "Explore"

- Process and product development and optimisation
- Use-Tests of raw materials, quality control
- Enhanced data collection for scale-up trials

E-grade® "Explore" – the new tool in detail: Development and optimisation of processes made easy

In many laboratories of the chemical and pharmaceutical manufacturing industry, temperature control units are used to give the required temperature to jacketed reaction vessels. Until now it was possible only to set a target value for temperature and to read the temperature of jacket and the process temperature. Additional measurement systems were required to evaluate the thermodynamic data of the process. This made process development costly and complex. The E-grade "Explore" is a tool which will greatly facilitate process development.

Relevant process data clear and concise

Fig. 1 shows process temperature (red) and jacket temperature (green) in different exothermic processes with constant duration. It can be seen that the exothermic reactions within the process are being controlled. The greater the exothermic reaction, the lower the jacket temperature. The temperature difference between the jacket temperature and the process temperature increases. The temperature conditions of the jacket (reactor inlet and outlet temperatures) were, until now, not accessible and also the actual cooling power being consumed. This data is now available thanks to the E-grade "Explore". E-grade "Explore" delivers this system relevant data visually and via the Pilot ONE interfaces. Using the Data log function, this data can be directly recorded onto a USB Stick in Excel Format, for analysis (Fig. 3).

E-grade® "Explore" expands process development possibilities

Fig. 2 shows power currently being delivered by the Unistat. The negative values indicate cooling and positive indicate heating power (Watts). It also shows jacket temperature (reactor inlet temperature), return temperature (reactor outlet temperature), process temperature, the temperature differential and, optional, thermal fluid flow rate (external flow meter required).

E-grade "Explore" simplifies the development and optimisation of processes and procedures. It is now possible to document procedures and processes in a comparatively

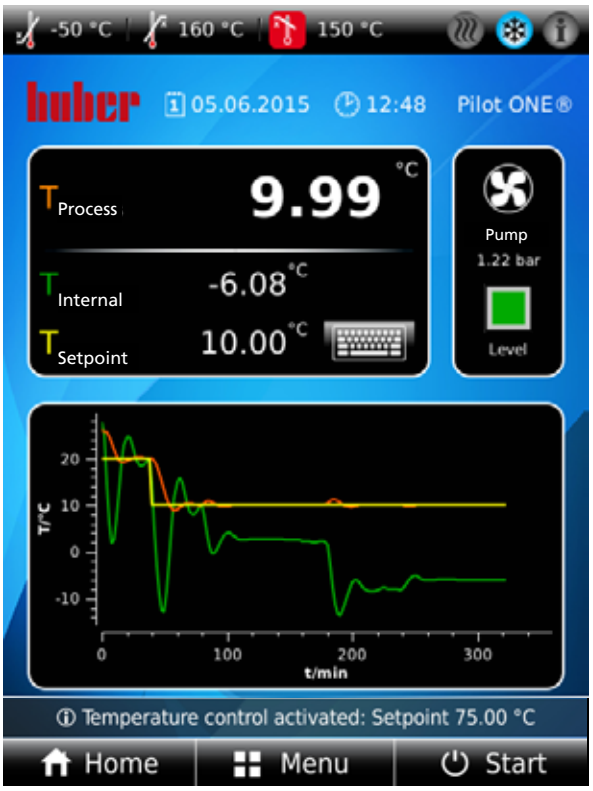


Fig. 1: Controlling a process temperature with different and constant exothermic reactions.

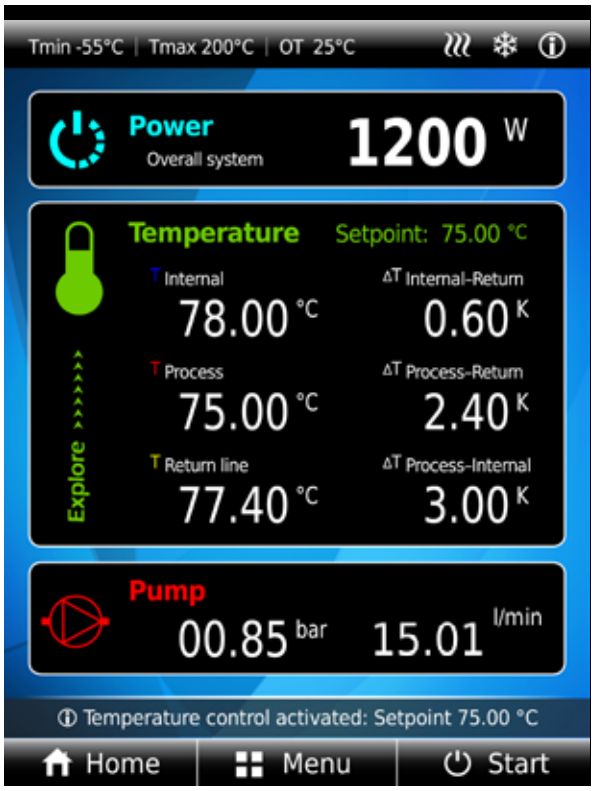


Fig. 2: The E-grade® "Explore" shows relevant system data in process temperature control made via an additional display.

simple manner and to obtain important insights. "Explore" allows, for example, investigation of how products and processes change when the volume flow rate and hence, the inlet and outlet temperatures at the reactor are changed. A scale-down procedure is available to scale down processes from a production level to a laboratory level. The process parameters can then be changed, refined and optimised. Once completed, the process can be scaled back to production level. The advantages are clear:

- **Process information without additional equipment**
  - Improved reproducibility
  - Extensive documentation possibilities
- **Targeted process- and procedure optimisation**
  - Improved quality
  - Increased yield
- **Monitor capacity usage of your temperature controller**
  - Increased operation safety and improved planning
- **Development at lab scale**
  - Save on cost

	A	B	C	D	E	F
1	[TYPE]	PROCESS_DATA				
2	[VERSION]	1.0				
3	[TITLE]	UserData				
4	[DATE]	42200,00				
5	[TIME]	0,40				
6	[DEVICE]	petite fleur				
7	[SERIALNO]	114697,00				
8						
9						
10	[SIGNAL]		100,00	1,00	2,00	3,00
11	[UNIT]	s	°C	°C	°C	°C
12	[EXPONENT]	0,00	0,00	0,00	0,00	0,00
13	[DATA]	time	SP	TI	TR	TE
14		0,00	20,00	19,98	20,24	20,09
15		5,00	20,00	19,90	20,19	20,07
16		10,00	20,00	19,85	20,16	20,06
17		15,00	20,00	19,85	20,20	20,08
18		20,00	20,00	19,88	20,24	20,04
19		25,00	20,00	19,92	20,26	20,07
20		30,00	20,00	19,94	20,30	20,07
21		35,00	20,00	19,94	20,28	20,09
22		40,00	20,00	19,93	20,26	20,08
23		45,00	20,00	19,90	20,21	20,10
24		50,00	20,00	19,86	20,18	20,09
25		55,00	20,00	19,82	20,15	20,09
26		60,00	20,00	19,80	20,12	20,09
27		65,00	20,00	19,79	20,12	20,10

Fig. 3: Available process data can be easily recorded as a CSV-file, and then further process for example with Microsoft Excel. Recording is done directly onto a USB Stick or via interface (USB, RS232).

The following charts that have been recorded with the data recorder function (Logging) on a Petite Fleur with Pilot ONE:

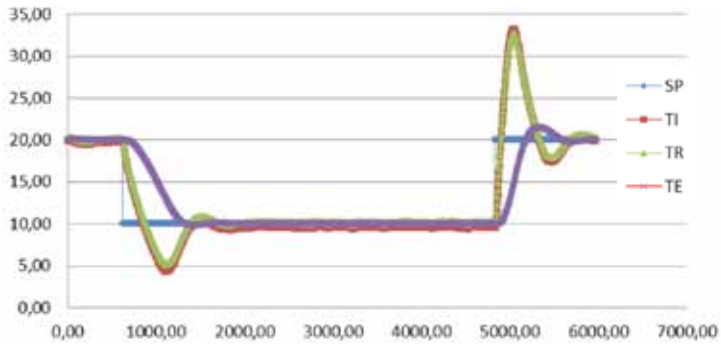


Fig. 4: Temperature profiles (Target value SP, jacket temperature TI, Return temperature TR)

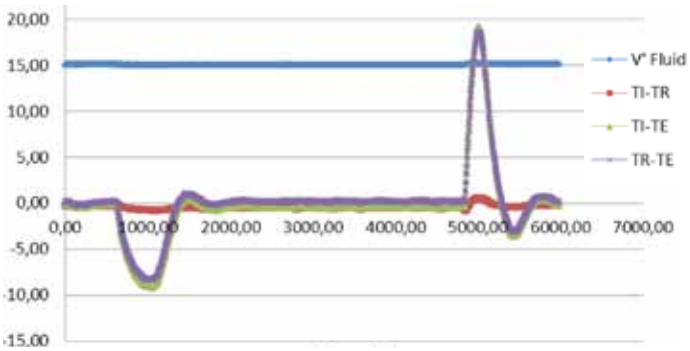


Fig. 5: Volume flow V Fluid and Temperature differences

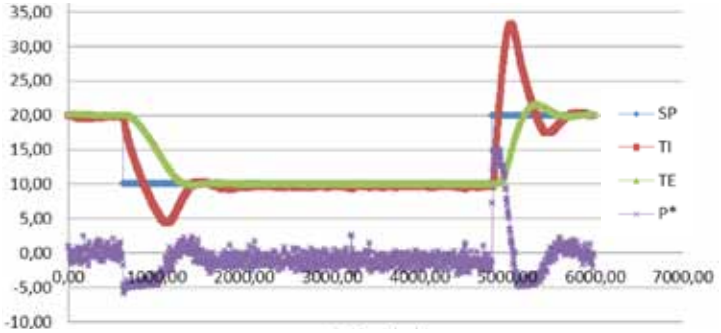
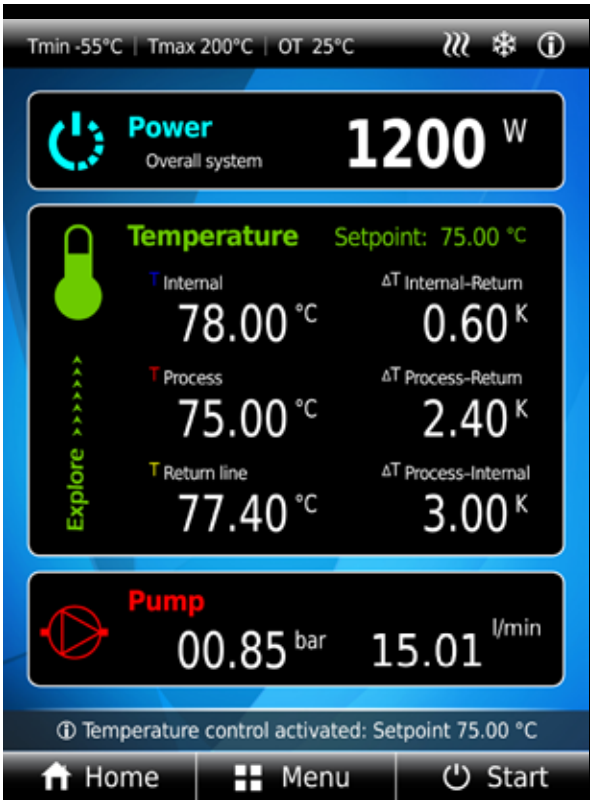


Fig. 6: Temperature profile and Power P* (for clarity displayed as P/100). A value 15 is, for example, 1500 Watt (Heating power).

Summary:
The new E-grade® "Explore" offers a wide range of possibilities and supports users with process engineering.

Development Tool for Process Engineering



Additional screen for the most important process data

The process in focus:

Performance:
Current heating or cooling capacity of the system

Temperature values:
Setpoint, internal, process, return

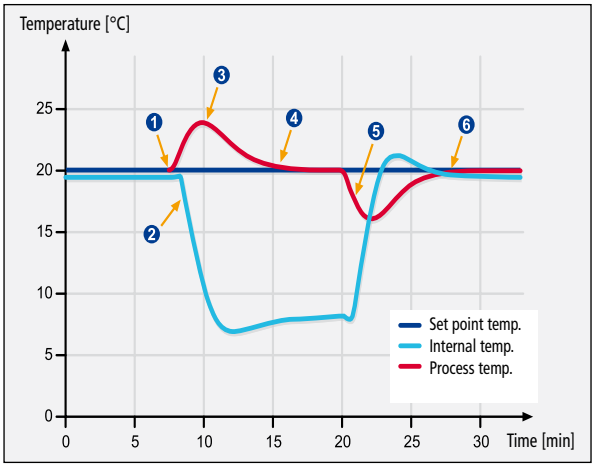
Temperature differences:
ΔT internal return, ΔT process return, ΔT process internal

Circulation pump:
Pressure / speed (depending on model)

Advantages

- ✔ Access to critical process data directly from the Unistat
- ✔ No additional hardware required
- ✔ Display of process data directly on the device display of Pilot ONE
- ✔ Communication, recording and visualisation via data interfaces (USB, LAN, RS232, etc.)

E-grade® "Explore" enables targeted process optimisation for process scale-up (example graphic: controlled exothermic reaction) based on set point, actual values, temperature differences and heating / cooling capacity data.



Item description	Cat.No.
E-grade "Explore" for Unistats	10495

Note: The E-grade® "Explore" is only available for Unistats®.

Reliable, environmentally friendly and best value for money:

Thermoregulation from Huber

Quality
Made in Germany

Best value
for money

Unique
Plug & Play

Case studies for
performance comparison

Proven
technology

Worldwide
Sales & Services

DIN

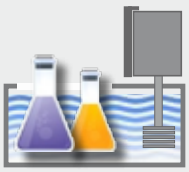
Accurate information
according to DIN 12876

Safe investment
due to E-grade function

Maximum safety for
operator and application

Environmentally friendly
with natural refrigerant

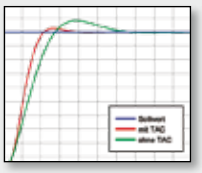
Connections for
USB and network



Models for all
applications

Time saving heat-up
and cool-down times

Easy-to-use
operation



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