Dynamic Thermoregulation

For more than 20 years, the dynamic thermoregulation of the Unistat range introduced a revolution in fluid temperature control. Unistats are the ideal solution for fast and precise thermal control of externally connected applications. In comparison to other circulators, the Unistats offer rapid temperature change and a wide temperature range without fluid change. There are over 50 models to choose from with cooling powers from 0,7 to 130 kW. What ever the application, Unistats provide professional scale-up offering the same stable process conditions from the development lab to production systems.

TFT Display Graphical Colour Display
Plug & Play Controller
TAC True Adaptive Control
VPC Variable Pressure Control
Easy Control User friendly operation
Programmer with Ramp Functions
Protection+ Level / Overtemperature
Heating Power Options available
CoolNet® max. Cooling Power
huber Natural Refrigerant
ATEX Version available
Com.G@te® RS232, RS485, Analogue...
Web.G@te® USB, Ethernet, Internet...
SpyControl® Control, Visualize, Record

The Puma has a so called wonder net, which is a fine spongy tissue filled with blood vessels in its nose and mouth. Evaporation during breathing causes the blood flowing in the brain to be cooled, so the Puma keeps a cool head even during periods of great effort.

Advantages & Functions

- Working temperatures from -120 °C to +425 °C
- Previously unachievable performance
- Highly acurate, intelligent temperature control
- Maximum process stability and reproducibility
- The fastest heating and cooling rates
- High Cooling Power from 0,7 to 130 kW
- Large temperature range without fluid change
- Increased thermal fluid life
- Incredibly compact
- Colour TFT display shows all process parameters
- Comprehensive warning and safety functions

Typical Applications:

» Reactor systems Autoclaves
» Pilot systems
» Miniplant systems
» Scale up for operational development
» Double wall reactors
» Reaction calorimeter
» Distillation systems
» Test rigstands
» Material testing
» Combinational chemistry
» Semiconductor industry
» Kilo labs
» Vacuum chambers

Functions and features depend on the model, see chapter „Controllers & Functions" for details.

Unistats® – Highly dynamic ther

Unistats® should not be compared to conventional technology.
Thermodynamically there is no alternative.

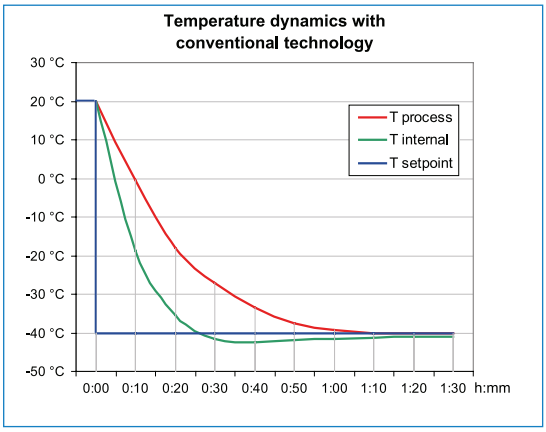
Tango® and the big Unistats® for -120 to 425 °C for laboratory and production

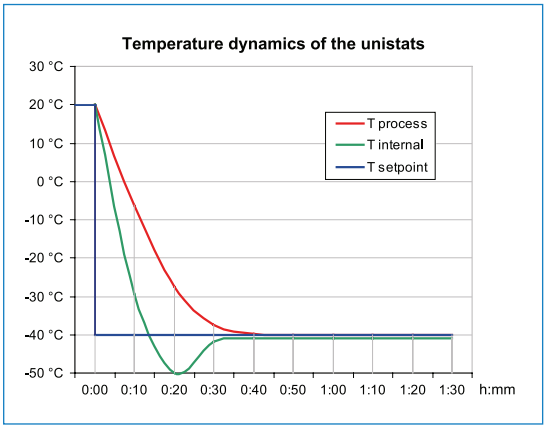
Safety is a priority
Our engineers know what is required in research and production: **PROCESS SAFETY!**

The security that the critical process temperatures in your laboratory or production facility run exactly as required, with no compromises, every time. Unistats bring peace of mind whilst delivering **PROCESS STABILITY in high end quality!**

Pump technology
Our improvements in pump technology have increased HTF flow rates and resulted in tangible improvments in heat transfer to and from the application.

Predictable, repeatable results and a previously unachievable response to changing thermal loads, provide a much faster return on investment, further improved by the minimal operating costs of the Unistat principle!





moregulation

Conventional baths and circulating chillers operate with a hydraulically open bath.
With open bath technology (picture 1) the bath fluid is un-pressurised and open to atmosphere, regardless of whether the temperature control is internal (A), or external (B). During external temperature control (B) the level must be controlled in two locations. In typical externally closed temperature control (picture 2) where the object is directly (D) or indirectly (C) in contact with the heat transfer medium, the atmospherically open bath is also used to contain the expansion and contraction in HTF volume as the fluid heats and cool.

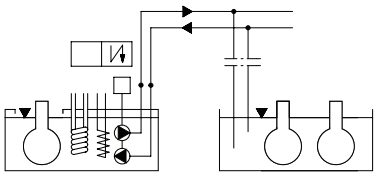
Unistats® embody capacity and dynamics. Small in size, big in power.
The Unistat System (Pic. 3) combines the efficiencies of effective thermodynamics and modern microelectronics, making it a highly efficient alternative to open bath temperature control technology. Unistats are circulation thermostats without a bath. An expansion vessel for thermal expansion and contraction replaces the conventional bath. The expansion vessel is isolated from the thermoregulation of open baths (F). Being hydraulically sealed they can be located below or above the application.
The Unistat principle uses minimal heat transfer fluid (HTF) volume and increased thermal transfer abilities through higher HTF flow rates, reduced HTF pressure and highly efficient heat exchange surfaces. This Increases the systems speed of response to changes in demand. Unistats have the most rapid ramping rates, and are capable of cooling rates of more than 100 K/hr. For comparisons in cooling power densities (Watt/litre) please refer to DIN 12876.

Large Unistats® in tower cases have small footprints and require little floor space

Tango Cub
In 1988 the first generation proved the concept of the Unistat Technology. The second generation consolidated and led the growth of Unistat Technology into industry. The Third Generation is refined, more efficient and more responsive, gives tighter control and is easier to use.

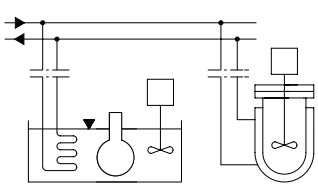
The international Tango Club (Unistat users across the world) sheds light on the trends of tomorrow. As a result, the range of functions has been increased, and simple control has eased operation. Every function of the Unistat has been subjected to uncompromising tests on applications under industry conditions the quality spotlight of experienced users focused on results.

Picture 1: Open Baths



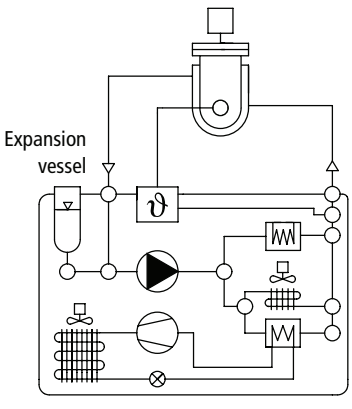
A B

Picture 2: Closed Circuits

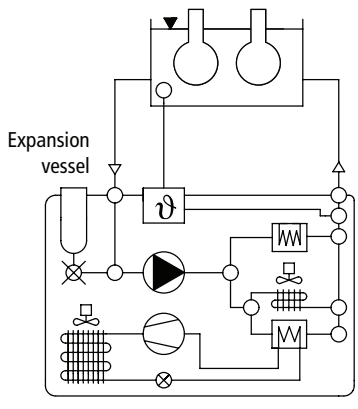


C D

Picture 3: The Unistat principle



E



F

Unistats® – for professional Sc

Predestined for process and chemical engineering

Unistats are predestined for applications in process and chemical engineering, such as temperature control of reactors, autoclaves, Miniplant/Pilot systems, reactor blocks and calorimeters.
Unistat temperature control systems with their unique thermodynamics provide highly accurate and reproducible results, guaranteeing the shortest heating and cooling times and a wide temperature range without fluid change. Environmentally and economically Unistats stand out, offering natural refrigerants and an efficient energy management system for reduced operating costs.

Plug & Play
3 years warranty

huber Natural Refrigerant inside

ale-up

Professional Scale-Up

The Unistat range offers temperature control solutions from the smallest process up to production volumes with temperatures from -120 up to 425 °C and cooling capacities from 0,7 to 130 kW. The range offers over 60 models, in sleek tower housings, or flat-build, for flexible scale-up in Research, Kilolabs, Mini-plant, Pilot-Plant, and Production. Whilst the Unistats grow with the application, their operation and the Unistat principle remain the same.

Unistat® advantages

- **The fastest heating and cooling rates**
  ideal for isothermal chemical processes
- **Highly responsive**
  the first choice for operational safety with exothermic reactions
- **The highest cooling power densitiy [Watts/l]**
  for dynamic and rapid temperature changes
- **Incredibly compact**
  "volume cooling power"
  truly powerful, truly compact
- **Wide temperature ranges with no oil change**
  DW-Therm thermal fluid offers a temperature range from -90 to 200 °C
- **Large colour TFT touch screen display**
  graphics, multilingual, simple communication and easy to use
- **Reproducible precision**
  for demanding temperature applications from -120 to 425 °C
- **Flexible Communication**
  Com.G@te, Web.G@te (Optional)

Unistats® create space

A compact machine is one that is small with no loss of power. This is measured with the ratio watts/dm³. At every temperature the Unistat is the most compact.

petite fleur® – the baby Tango®

The petite fleur® is the entry level model for temperature control applications in the mid-range -40 °C to 200 °C.

Plug & Play

3 years warranty

huber Natural Refrigerant inside

the smallest Unistat®

The smallest Unistat E-grade professional and Com.G@te are included as standard.
Natural refrigerant to protect the evironment.

The Tango was the original and smallest circulator of the Unistat range and had been the benchmark for many years. The Petite Fleur in comparison with the Tango Nuevo, is ⅔ the size, ⅔ the power and ⅔ the price.

The Tango and the Unistats are suitable for externally open baths or closed applications, e.g. reactors. With the expansion tank and the large illuminated sight glass, it is instantly recognisable as a Unistat with all the advantages of the Unistat range.

„Good Day"
The Petite Fleur welcomes the user with 3,5" display of the CC-Pilot. The picture left, shows the usual configuration, with the expansion tank and sight glass on the left, and on the right the automatic controller and control panel.

Functionality for all Applications
As with the large Unistats, the Petite Fleur, comes with full controller functionality. The powerful variable speed pump combined with the VPC pressure control and the TAC adaptive internal and cascade control ensure the best possible results. The „Professional" E-grade and an internal Com.G@te are factory installed as standard.

Lift and Roll
Just 260 mm wide the baby Tango is ideally suited to fit in extract hoods. The casters fitted at the back of the unit allow it to be easily manoevered into the required position, just lift and roll.

View from the back:
Com.G@te®, M16x1 pump connections

Ready for action
If the application is regularly changed, residual water in hoses and reactors can be a problem. The water mixes with the thermal fluid and inhibits the heat transfer process. The new water separation system allows water to be removed from the thermal fluid during thermal regulation.

More Power
DIN 12876 requires that cooling powers are measured at full pump speed. Decreasing the pump speed reduces the heat energy entering the system. This leads to higher cooling powers and lower end temperatures. The Petite Fleur has an unusually powerful pump. Decreasing the pump speed can make additional cooling power available – an extra 30 to 50 Watts can be achieved. We always quote cooling at maximum pump speed.

Unistat® for Professional Scale-Up and Process Development
The introduction of the Petite Fleur now means that the Unistat temperature control systems are available with cooling capacity from 480 Watts at 20 °C.
With a temperature range of -120 to +425 °C and cooling and heating powers up to 130 kW, the Unistat temperature control systems can be combined with customer steam and brine systems and are therefore suitable for applications beyond the 10 m³ class.

Unistats are the only temperature control system in the world which offers professional scale-up from small scale laboratory R&D through to production plant.

VPC
Variable Pressure Control

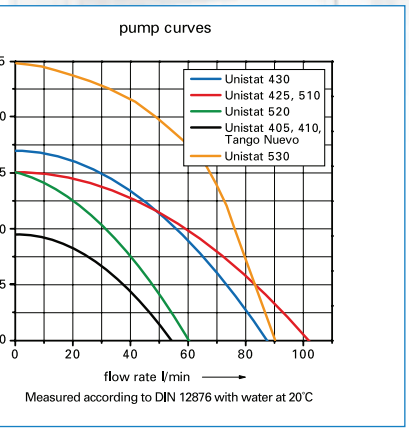
DIN 12876
Our cooling powers are always quoted at full pump speed

Model	Working Temperature Range (°C)	Pump max. VPC (l/min)	(bar)	Heating (kW)	Cooling Power (kW) at (°C) 200	20	0	-20	-30	Dimensions W x D x H (mm)	Cat.No.	G	Price
petite fleur®-NR	-40...200	33	0,9	1,5	0,48	0,48	0,45	0,27	0,16	260 x 450 x 504	1030.0001.04	3	
petite fleur® w-NR	-40...200	33	0,9	1,5	0,48	0,48	0,45	0,27	0,16	260 x 450 x 504	1030.0003.04	3	
petite fleur®-eo-NR	-40...200	33	0,9	1,5	0,48	0,48	0,45	0,27	0,16	260 x 450 x 504	1030.0004.04	3	

eo = for external open operation

| unistat® 510w | | unistat® 430 | | unistat® 520w |

-55 °C
Models
from 0,7 to 21 kW



VPC
Variable Pressure Control

ATEX
ATEX Solutions (Option)

Additional Heating
(Option)

| unistat® tango® nuevo |

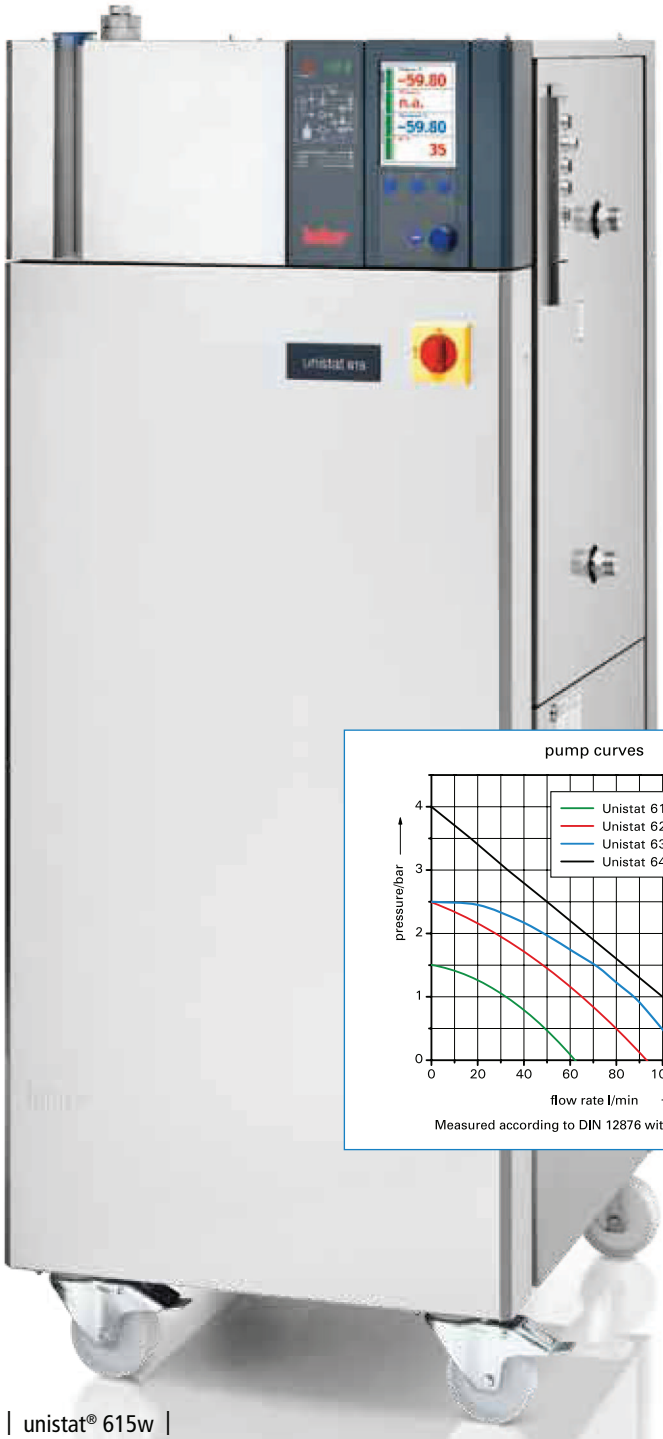
Model to -55 °C	Working Temperature Range (°C)	Pump max. VPC (l/min)	(bar)	Heating (kW)	Cooling Power (kW) at (°C) 250	200	100	0	-20	-40	Dimensions W x D x H (mm)	Cat.No.	G	Price
tango® nuevo	-45...250	55	0,9[1]	1,5/3,0	0,7	0,7	0,7	0,7	0,4	0,06	425 x 270 x 636	1000.0001.05	3	
tango® nuevo wl	-45...250	55	0,9[1]	1,5/3,0	0,7	0,7	0,7	0,7	0,4	0,05	425 x 270 x 636	1000.0002.05	3	
unistat® 405	-45...250	55	0,9[1]	1,5/3,0	1,0	1,0	1,0	1,0	0,6	0,15	425 x 308 x 636	1002.0003.05	3	
unistat® 405w	-45...250	55	0,9[1]	1,5/3,0	1,3	1,3	1,3	1,3	0,7	0,15	425 x 270 x 636	1002.0002.05	3	
unistat® 410w	-45...250	55	0,9[1]	1,5/3,0	1,7	2,5	2,5	1,5	0,8	0,2	425 x 360 x 636	1031.0001.05	3	
unistat® 425	-40...250	105	1,5[2]	2,0	2,0	2,0	2,0	2,5	1,8	0,2	460 x 554 x 1332	1005.0002.05	3	
unistat® 425w	-40...250	105	1,5[2]	2,0	2,8	2,8	2,8	2,5	1,9	0,2	460 x 554 x 1332	1005.0003.05	3	
unistat® 430	-40...250	90	1,7[2]	4,0	3,5	3,5	3,5	3,5	2,2	0,3	460 x 554 x 1332	1005.0006.05	3	
unistat® 430w	-40...250	90	1,7[2]	4,0	3,5	3,5	3,5	3,5	2,2	0,3	460 x 554 x 1332	1005.0007.05	3	
unistat® 510w	-50...250	105	1,5[2]	6,0	5,3	5,3	5,3	5,3	2,8	0,9	460 x 554 x 1332	1005.0001.05	3	
unistat® 515w	-55...250	105	1,5[2]	6,0	7,0	7,0	7,0	5,0	2,8	0,9	460 x 554 x 1332	1032.0001.05	4	
unistat® 520w	-55...200	60	1,5[2]	6,0	–	6,0	6,0	6,0	4,2	1,5	540 x 604 x 1332	1006.0001.05	4	
unistat® 525w	-55...250	60	1,5[2]	6,0	10,0	10,0	10,0	7,0	4,2	1,5	460 x 550 x 1332	1033.0001.05	4	
unistat® 530w	-55...250	90	2,5[2]	12,0	7,0	19,0	21,0	16,0	9,0	3,0	540 x 704 x 1491	1034.0001.05	4	

[1]integrated VPC pressure control [2]VPC pressure control via bypass Option: natural refrigerants available on request Flat built models available on request

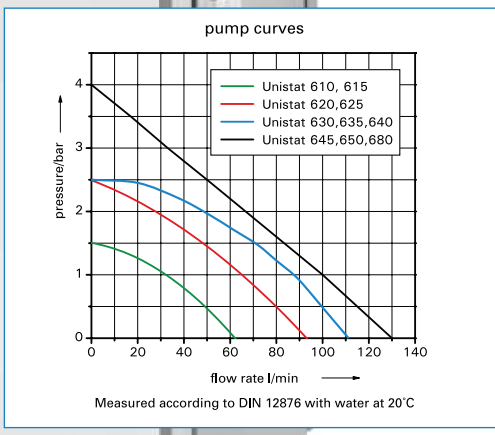
| unistat® 650w |

-60 °C
Models
from 7 to 130 kW

Natural Refrigerant inside



| unistat® 615w |



Model to -60 °C	Working Temperature Range (°C)	Pump max. VPC (l/min)	(bar)	Heating (kW)	Cooling Power (kW) at (°C) 200	100	0	-20	-40	-60	Dimensions W x D x H (mm)	Cat.No.	G	Price
unistat® 610w	-60...200	60	1,5[2]	6,0	7,0	7,0	7,0	6,4	3,3	0,8	600 x 704 x 1520	1007.0001.05	4	
unistat® 615w	-60...200	60	1,5[2]	12,0	9,5	9,5	9,5	8,0	4,8	1,2	600 x 704 x 1520	1007.0002.05	4	
unistat® 620w	-60...200	90	2,5[2]	12,0	12,0	12,0	12,0	12,0	6,5	1,8	700 x 804 x 1520	1008.0002.05	4	
unistat® 625w	-60...200	90	2,5[2]	12,0	16,0	16,0	16,0	15,0	7,4	2,2	700 x 804 x 1520	1008.0003.05	4	
unistat® 630w	-60...200	110	2,5[2]	24,0	22,0	22,0	21,0	20,0	14,0	5,0	920 x 1004 x 1655	1009.0001.05	5	
unistat® 635w	-60...200	110	2,5[2]	24,0	27,0	27,0	27,0	25,0	18,0	6,0	920 x 1004 x 1655	1009.0002.05	5	
unistat® 640w	-60...200	110	2,5[2]	30,0	32,0	32,0	35,0	30,0	18,0	6,0	920 x 1004 x 1655	1010.0001.05	5	
unistat® 645w	-60...200	130	4,0[2]	36,0	45,0	45,0	45,0	42,0	22,0	7,0	1830 x 1200 x 1830	1011.0001.05	5	
unistat® 650w	-60...200	130	4,0[2]	48,0	65,0	65,0	65,0	56,0	30,0	11,0	1830 x 1200 x 1830	1012.0002.05	5	
unistat® 680w	-60...200	130	4,0[2]	96,0	130,0	130,0	130,0	80,0	60,0	20,0	4500 x 2000 x 2000	1013.0001.05	5	

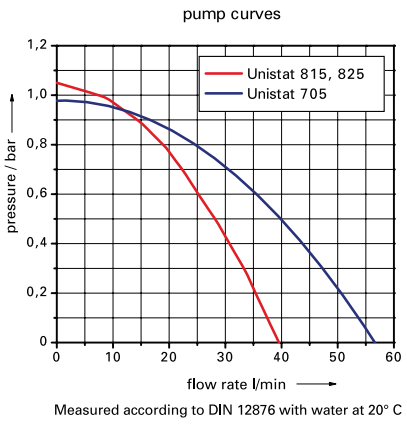
Options: natural refrigerant, additional heating capacity, air cooled units available on request

-85 °C
Air- or
water-cooled

| unistat® 825 |

| unistat® 815w |

| unistat® 705w |



Measured according to DIN 12876 with water at 20° C

huber Natural Refrigerant inside

VPC
Variable Pressure Control

ATEX
ATEX Solutions (Option)

Additional Heating
(Option)

Model	Working Temperature	Pump max. VPC		Heating	Cooling Power (kW) at (°C)								Dimensions	Cat.No.	G	Price
to -85 °C	Range (°C)	(l/min)	(bar)	(kW)	250	200	100	0	-20	-40	-60	-80	W x D x H (mm)			
unistat® 705	-75...250	55	0,9[1]	1,5 / 3,0	0,6	0,6	0,6	0,65	0,6	0,6	0,3	–	425 x 400 x 720	1001.0002.05	3	
unistat® 705w	-75...250	55	0,9[1]	1,5 / 3,0	0,6	0,6	0,6	0,65	0,6	0,6	0,3	–	425 x 400 x 720	1001.0001.05	3	
unistat® 815	-85...250	40	0,9[1]	2,0	1,3	1,3	1,3	1,5	1,5	1,4	1,2	0,2	460 x 604 x 1342	1014.0003.05	3	
unistat® 815w	-85...250	40	0,9[1]	2,0	1,5	1,5	1,5	1,5	1,5	1,4	1,2	0,2	460 x 604 x 1342	1014.0004.05	3	
unistat® 825	-85...250	40	0,9[1]	3,0	2,3	2,3	2,3	2,2	2,0	2,0	1,4	0,3	460 x 604 x 1342	1014.0001.05	4	
unistat® 825w	-85...250	40	0,9[1]	3,0	2,3	2,3	2,3	2,4	2,4	2,4	1,5	0,3	460 x 604 x 1342	1014.0002.05	4	

[1]Integrated VPC pressure control

Option: natural refrigerants available on request

| unistat® 930w |

- 90 °C
- 120 °C

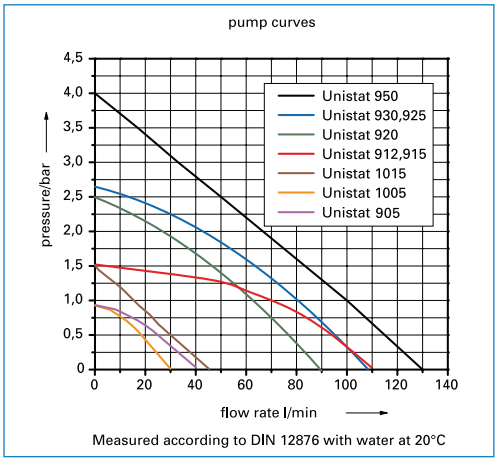
Models
from 5,2 to 36 kW

| unistat® 915w |

Scale-Up live – more than 30 Unistats® in operation

„Here in GSK Chemical Development, at Research Triangle Park, we've been using jacketed laboratory reactors of various sizes for over ten years now. From the very beginning, our temperature control requirements demanded the best solution available, and we have relied on Huber Unistats to deliver this capability. The Huber technology has allowed us to significantly improve our process development activities and is a critical tool in collecting data for Quality by Design studies."

Roy Flanagan,
Team Manager, Process Safety and Design



Measured according to DIN 12876 with water at 20°C

Model to -90 °C	Working Temperature Range (°C)	Pump max. VPC (l/min)	(bar)	Heating (kW)	Cooling Power (kW) at (°C) 250	200	100	0	-20	-40	-60	-80	Dimensions W x D x H (mm)	Cat.-No.	G	Price
unistat® 905	-90...250	40	0,9[1]	6,0	4,0	4,0	3,8	3,6	3,5	3,5	2,2	0,7	540 x 654 x 1500	1035.0001.05	4	
unistat® 905w	-90...250	40	0,9[1]	6,0	4,5	4,5	4,5	4,5	4,5	4,0	2,5	0,7	540 x 654 x 1500	1035.0002.05	4	
unistat® 912w	-90...250	110	1,5[1]	6,0	7,0	7,0	7,0	7,0	7,0	6,0	3,5	0,9	600 x 704 x 1565	1016.0019.05	4	
unistat® 915w	-90...250	110	1,5[1]	6,0	11,0	11,0	11,0	11,0	11,0	8,0	4,0	1,1	600 x 704 x 1565	1036.0001.05	4	
unistat® 920w	-90...200	90	2,5[1]	12,0	–	11,0	11,0	11,0	11,0	10,0	8,0	2,0	920 x 1204 x 1655	1017.0011.05	4	
unistat® 925w	-90...200	110	2,5[1]	12,0	–	16,0	16,0	16,0	16,0	15,0	13,5	3,5	920 x 1204 x 1655	1017.0001.05	4	
unistat® 930w	-90...200	110	2,5[1]	24,0	–	19,0	19,0	20,0	20,0	20,0	15,0	5,0	920 x 1204 x 1655	1017.0002.05	5	
unistat® 950	-90...200	130	4,0[1]	36,0	–	30,0	30,0	30,0	30,0	30,0	24,0	10,0	3315 x 1485 x 3030	1018.0002.05	5	
unistat® 950w	-90...200	130	4,0[1]	36,0	–	36,0	36,0	36,0	36,0	36,0	25,0	10,0	2630 x 1300 x 1930	1018.0001.05	5	

[1]VPC pressure control via bypass

Model to -120 °C	Working Temperature Range (°C)	Pump max. VPC (l/min)	(bar)	Heating (kW)	Cooling Power (kW) at (°C) 100	0	-20	-40	-60	-80	-100	Dimensions W x D x H (mm)	Cat.No.	G	Price
unistat® 1005w	-120...100	30	0,9[1]	2,0	1,5	1,5	1,5	1,5	1,4	1,4	1,0	700 x 804 x 1520	1019.0001.05	4	
unistat® 1015w	-120...100	44	1,5[1]	4,0	2,5	2,5	2,5	2,5	2,5	2,0	2,0	920 x 1204 x 1655	1020.0001.05	5	

[1]Integrated VPC pressure control Option: natural refrigerants available on request

High Temperature Thermostats

High-precision and space saving temperature control up to +425 °C. The new HT thermostats of the Unistat cc400 range set new standards in safety, easy operation, and rapid, dynamic temperature control. The Unistat cc401w HT model features an integral stepper motor to control the HT-Cooling, level protection and configurable overtemperature protection. Its minimal internal volume allows the shortest heat-up times to be achieved, while at the same time the maximum expansion tank temperature is limited to +60 °C. The working life and properties of the thermal fluid are also protected, by avoiding direct contact between the hot fluid and atmosphere.
The HT thermostats with controlled HT-Cooling are suitable for temperature control applications up to +425 °C, e.g. a double jacketed reaction vessel (reactor), and pilot plants, as well as the semiconductor Industry and high temperature distillation. They are suitable for maintaining constant high temperatures, or to contain an exothermic reaction at high temperature.

Advantages:

- Small space required
- Low fill-volume
- High Pump capacity
- Rapid, efficient filling of the complete application – with venting
- +60 °C max. expansion tank temperature
- Plug & Play Technology
- Simple operation
- High level of safety through constant monitoring

| unistat® T320 |

| unistat® T340 |

| unistat® T305 |

Some like it hot

In the DSM Nutritional Products, NRD/CC-Miniplant Process Technology Solutions Centre, Switzerland, Huber HT-Thermostats are used extensively where heating power is required in confined spaces. My colleagues are particularly impressed with the technical functionality, which is simple to use with the Huber Software. The optional pressure booster pump is ideal for use with the HT-Thermostats in both glass and stainless steel apparatus. This equipment is irreplaceable in our daily work.

Peter Zimmermann, Technical Team Leader Mini-Plant, DSM Nutritional Products

Plug & Play
3 years warranty

Model	Temperature Range (°C)	Pump max. VPC (l/min)	(bar)	Heating (kW)	Cooling Power (kW) at (°C) 400	300	200	100	Dimensions W x D x H (mm)	Cat.No.	G	Price
unistat® cc®401	50...400	31	0,9[2]	3,0/9,0	–	–	–	–	288 x 378 x 750	1028.0001.04	3	
unistat® cc®401w HT	(15) 50...400	31	0,9[2]	3,0/9,0	10,0	10,0	10,0	10,0	288 x 378 x 750	1028.0002.04	3	
unistat® cc®402	80...425	31	1,0[2]	3,0/9,0	–	–	–	–	288 x 332 x 870	1028.0006.04	3	

Model	Temperature Range (°C)	Pump max. VPC (l/min)	(bar)	Heating (kW)	Cooling Power (kW) at (°C) 400	300	200	100	Dimensions W x D x H (mm)	Cat.No.	G	Price
unistat® T305	(15) 65...300	45	0,9[2]	3,0/6,0	–	–	–	–	425 x 250 x 635	1003.0001.05	3	
unistat® T305 HT	65...300[1]	45	0,9[2]	3,0/6,0	–	3,2	2,3	0,6	425 x 250 x 635	1003.0002.05	3	
unistat® T305w HT	(15) 65...300	45	0,9[2]	3,0/6,0	–	10,0	10,0	10,0	425 x 250 x 635	1003.0003.05	3	
unistat® T320	(15) 65...300	70	1,5[3]	12,0	–	–	–	–	460 x 554 x 1332	1004.0001.05	3	
unistat® T320w HT	(15) 65...300	60	1,5[3]	12,0	–	10,0	10,0	6,0	460 x 554 x 1332	1004.0002.05	3	
unistat® T330	(15) 65...300	70	2,5[3]	24,0	–	–	–	–	460 x 554 x 1332	1004.0008.05	3	
unistat® T330w HT	(15) 65...300	60	2,5[3]	24,0	–	10,0	10,0	6,0	460 x 554 x 1332	1004.0009.05	3	
unistat® T340	(15) 65...300	75	2,5[3]	48,0	–	–	–	–	600 x 704 x 1517	1024.0001.05	3	
unistat® T340w HT	(15) 65...300	60	2,5[3]	48,0	–	10,0	10,0	6,0	600 x 704 x 1517	1024.0002.05	3	
unistat® T350	(15) 65...300	110	4,0[3]	96,0	–	–	–	–	700 x 804 x 1515	1025.0001.05	4	

[1]Lowest working temperature 15 K above ambient temperature [2]integrated VPC pressure control [3]VPC pressure control via bypass

Unistat® Hybrid: High performance industrial solution

Large scale pharmaceutical and chemical manufacturing plants traditionally use a centralised system of heating and cooling with inaccurate temperature control and a restricted temperature range. The disadvantages of these traditional methods are:

	Method	Heating / Cooling type	Process temperature	Disadvantages
	1	Heating by steam	Typically limited to +180°C (depending on stream pressure)	Limited temperature range
	2	Heating by electrical heater	+400°C	Very high cost of consumed electricity
	3	Cooling by water (water/glycol, brine) with the help of cooling tower or powerful Chiller	Ambient ... down to -20°C	Limited temperature range
	4	Cooling by liquid nitrogen (dispensing into the chemical process directly)	-196°C	Difficult to control temperature, handling, consumption, running cost, safety

The Unistat Hybrid allows improvements of existing temperature control solutions by linking them with a hydraulically sealed temperature control system from the Unistat range (Fig 1).
The advantage of the Huber Unistat Hybrid system is the partial modernisation of an existing central heating and cooling system, as a result expensive and time consuming complete renovation of the system in no longer required. The Unistat Hybrid system increases the present cooling and heating power and expands the temperature range in already existing systems. The Unistat Hybrid ensures fast, precise temperature control for the entire chemical engineering process

Advantages

- Higher heating and cooling power through use of existing resources such as steam, cooling water, liquid Nitrogen etc.
- Temperature range extension with existing systems
- Highly accurate control of the process temperature
- Reliable compensation of thermal reactions
- Reasonably priced modernisation of existing systems
- Minimises expensive and time consuming system replacement exchange

Fig. 1: The Unistat® range offers a large choice of thermal control systems in various power classes

Max. cooling capacity:
(2-3 stage cooling system)
150 kW at 0 °C
10 kW at -80 °C
4 kW at -100 °C

Max. heating capacity:
100 kW

Utilise existing energy sources

Method 1: The heat is transferred from the steam to the thermal fluid through the external heat exchanger. If necessary, the Unistat can raise temperatures up to +400 °C.

Method 2: The use of electrical heaters is inadvisable because of the high cost of consumed electricity. We consider electrical heating to be limited to 200 kW, because of high installation (infrastructure) and running costs.

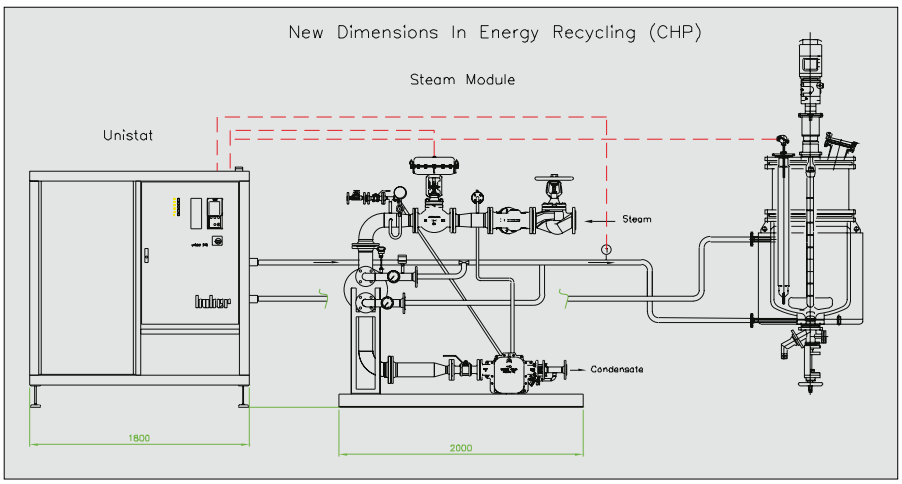
Method 3: The cooling system works in a similar method to system 1; cooled heat transfer fluid (down to -20 °C) is transferred from the plant chiller* through the external heat exchanger, and lower temperatures (-90 °C … -120 °C) can be achieved with the Unistat.

*If required, Huber can supply a powerful chiller with a cooling capacity of up to 400 kW @ 0 °C.

Method 4: Liquid nitrogen enters the external (LN2/thermal fluid) heat exchanger conducts cooling capacity at low temperatures.
The Unistat controls and regulates the dosing of nitrogen into the heat exchanger. The Unistat controls all systems (steam module, chiller, nitrogen) automatically and monitors reactor temperature by means of an external Pt100 sensor.

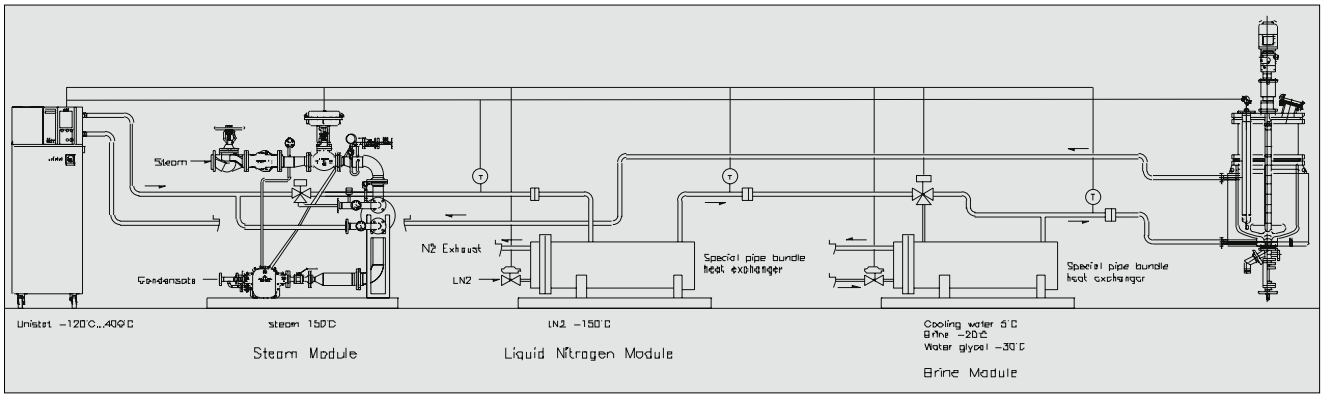
Pic. 2: External heat exchanger for steam

Installation diagram



System 1
The Unistat® (Left) and external heat exchanger unit (center) connect to the reactor jacket mantel (Right).

The Unistat® thermal control system and external heat exchanger unit is connected to the reactor jacket. The heat transfer oil flows through the Unistats®, heat exchanger and reactor jacket.



System 2
Complete solution: The Unistat Hybrid thermal control system with external heat exchangers for the various energy sources serves for an optimum interaction between them. The individual external energy sources (steam, cooling water, liquid Nitrogen) are precisely controlled from the Unistat and the reactor temperature is monitored using an external PT100. Depending on the application, the heat exchanger can be built into the Unistat.

Unistats® in practice

In comparison to other thermal control systems, Unistats differ sometimes considerably in their thermodynamic characteristics. In practice Unistats offer definite advantages in your work: noticeably shorther heating and cooling times, better stability and reproducibility through the entire process chain, greater safety for expensive glass reactors and the contained substances, together with simple and easy operation.

Advantages:

1 Process Safety
Unistats provide an option to allow the circulation pump and compressor to continue to work despite an over temperature trip. This allows controlled heat removal and protects your thermally controlled products from being destroyed.

2 De-Gassing
Unistats only require de-gassing after each application set up. As a result uncontrolled conditions during normal operation will be minimised.

3 Hydraulically sealed
Volume changes due to fluid temperature fluctuations are equalised by the expansion vessel. The fluid in the expansion vessel hydraulically seals the fluid circuit and prevents early Oxidation.

4 Touchscreen Colour Display
The large, graphic touchscreen aids operation and shows convenient display of temperature runs directly on the machine. Therefore essential application parameters are always in view.

5 Data-Communication
Unistats offer numerous possibilites for data communication. RS232/RS485 interfaces are fitted as standard, as well as various analogue interfaces. The optional Web.G@te offers additional interfaces for Ethernet, Internet and USB.

6 Temperature Control
The intelligent temperature control TAC analyses the controlled fluid circuit continuously, and adjusts the control parameters automatically. The result is the best control results even with difficult applications.

7 Pressure Control
The pressure control VPC continuously monitors the pressure in the connected application and therefore protects the sensitive glass reactor from breakage.

8 Power / Volume
Unistats have a high power to volume ratio (Watts/Litre). In practice, Unistats offer a very high speed of temperature change in the region of several hundreds of Kelvin per hour.

9 Space saving design
Unistats have a compact design requiring little space. The power to volume ratio (Watts/cm³) according to DIN 12876 documents the extremely small space requirement of the Unistats.

10 Heat Transfer
Powerful circulation pumps and a large hose cross section ensure maximum flow rates and optimum heat transfer.

Explosion proof installations

Two solutions are available for ATEX zones 1 & 2:

The Unistat can be placed in a Stainless Steel Ex-p pressure enclosure. Compressed air is pumped in purging the cabinet of any potentially dangerous vapours and creating a pressure slightly above atmospheric to keep potentially explosive vapours out.

An ATEX certified controller II 2G Ex ib IIC T4 is located in the ATEX zone, controlling the Unistat situated in the safe zone.

Description:
Ex-p enclosure for zones 1 and 2
with pressure encapsulation to EN 60079-2

Type:
Ex px II T4

Features:
Stainless steel construction

- Door with Ex double door seal and turnbuckle latch
- 1 breakout with safety film for installation of Unistat-Pilot (standard operability and functionality are not impaired)
- 2 x bulkhead fittings for cooling water connection
- Conductive rollers
- Ex-px enclosure pressurised encapsulation to EN 60079-2
- Ex ia temperature measurement (Cat.No. 9399)
- 2 x metal braided hoses for cooling water connection
- redundant temperature monitoring

Please advise us of the zone, explosion sub-group and temperature class when requesting information.

Ex-p Enclosure	for Unistat® model	Cat.No.	G	Price
Ex-p Enclosure I	425w, 430w, 510w, 515w, 520w, 525w, 530w, 610w, 615w, 620w, 625w, 815w, 825w, 905w, 912w, 915w, 1005w, T320w HT	6967	–	
Ex-p Enclosure II	630w, 635w, 640w, 920w, 925w, 930w	6968	–	
Ex-p Enclosure IV	tango® nuevo wl, 405w, 410w, 705w, T305w HT	6970	–	
Remote Control Unistat® II 2G EEx ib IIC T4	all Unistats® with Nuevo Technology	9401	–	
Ex ia Process Temperature Measurement	all Unistats® with Nuevo Technology	9399	–	