Архангельск (8182)63-90-72
Астана (7172)727-132
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
Новокузнецк (3843)20-46-81
Новосибирск (383)227-86-73
Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Пермь (342)205-81-47
Ростов-на-Дону (863)308-18-15
Рязань (4912)46-61-64
Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
Саратов (845)249-38-78
Севастополь (8692)22-31-93
Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Сургут (3462)77-98-35
Тверь (4822)63-31-35
Томск (3822)98-41-53
Тула (4872)74-02-29
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Ярославль (4852)69-52-93
Киргизия (996)312-96-26-47
Россия (495)268-04-70
Казахстан (772)734-952-31

https://kgw.nt-rt.ru || kwz@nt-rt.ru

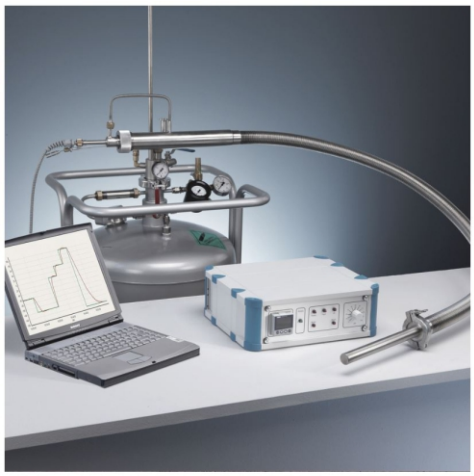
КАТАЛОГ

from +100°C KALTGAS

Type T-G

Type TG-LKF

+/-0°C KALTGAS



Type TG-LKF-H

Type TG-KKK

to max. -180°C KALTGAS

Type TG-RD

Type TG-RID

Kaltgas - Low temperature cooling system for cooling applications from max. +100°C (212°F) up to -180°C (-292°F)

What is Kaltgas?

KALTGAS is a tempering system that utilizes the very low temperature of liquid nitrogen as a cooling agent. The Jet vaporizes the liquid nitrogen in a cryogenic container, producing a steady cryogenic gas flow. This LN2 vaporizer (Jet) can be adjusted to minimize liquid nitrogen consumption and to adjust both the cooling rate and the volume of the gas flow. The cryogenic gas flow is then piped through a vacuum insulated flexible metal line (N gas line) to the object you wish to cool. A KALTGAS system needs only a few minutes to produce a cold gas flow with a temperature as low as -180°C (-292°F).

In most cases, this KALTGAS system is only used to produce a cold gas flow. The volume of the gas flow is adjusted with the safety control unit. Since the controlled system operates without a heat exchanger, it is not possible to maintain precise temperature stability.

To achieve good temperature and control stability, a post-heating module (heat exchanger) must be installed. This module can be connected directly to the line, or installed in a chamber right next to the cold gas flow. The heat exchanger is designed to heat the cold gas flow to the desired temperature. The final product, a clearly quantified gas flow exiting the heat exchanger at a clearly defined temperature, is ready for use as a cooling agent. With the safety controller SC5, a temperature stability of better than ±0.2°C can be achieved at a steady state.

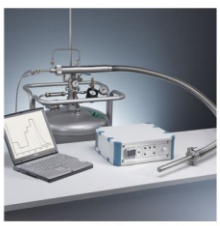
Apart from the high cooling speed, another advantage of KALTGAS systems is their modular design. By swapping out individual modules such as the N gas line, the LN2 vaporizer (Jet) or the heater, it is possible to change the cooling 2 speed, LN2 consumption as well as the application. The basic modules, including the LN2 container, the vacuum pump and the safety control unit, remain unchanged.

Fields of application

- Thermal testing of plastics, metals, composites etc.
- Cooling of electronic components
- Cooling of sample chambers
- Rapid freezing of biological samples, food and other materials
- Tempering of test samples during
    - Tension or torsion tests
    - Notched bar tests
    - Chemical or physical tests
    - Chemical engineering processes


Type T-G


Type TG-LKF


Type TG-LKF-H


Type TG-KKK


Type TG-RD


Type TG-RID

Table of Contents

Low temperature cooling system
Type T-G for applications
to -180°C (-292°F)

+/-0°C KALTGAS

to -180°C KALTGAS

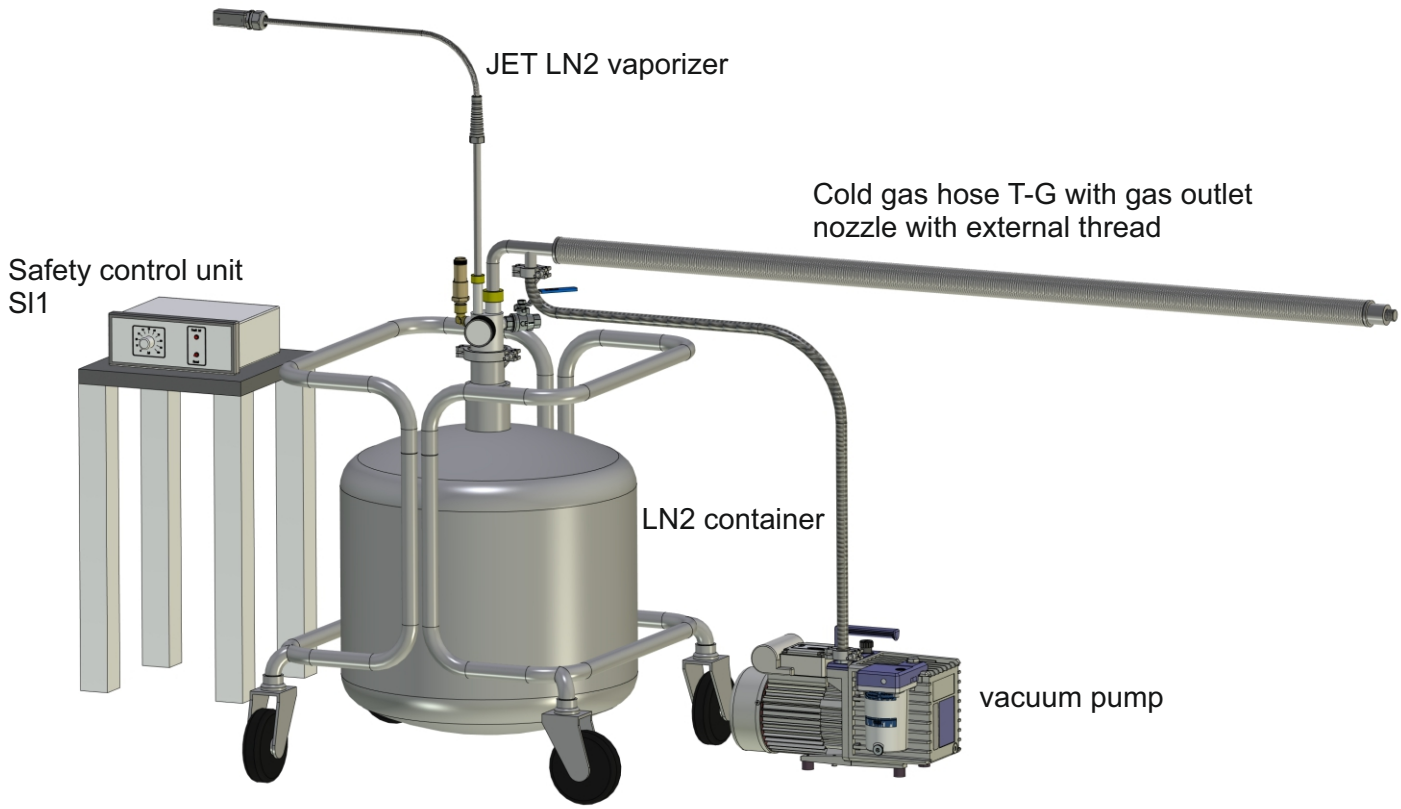
Cryogenic cooling system for cooling applications to -180°C (-292° F)

This KALTGAS system is designed to cool items to temperatures as low as -180°C (-292° F), by means of a tempering system that solely uses a flow of ultra cold gas. The system uses cold nitrogen gas to achieve very low temperatures. Liquid nitrogen (LN2) is vaporized in the LN2 storage container, and is then used as a cold gas for tempering. As examples of the many applications, a steady flow of cold gas can be directed at the object to be cooled or can be fed into a sample chamber to cool the whole space.

Applications include:

- Thermal testing of plastics, metals, composites etc.
- Cooling of electronic components
- Cooling of sample chambers
- Rapid freezing of biological samples, food and other materials
- Tempering of test samples during:
  - Tension or torsion tests
  - Notched bar tests
  - Chemical or physical tests
  - Chemical engineering processes

KALTGAS is a tempering system that utilizes the very low temperature of liquid nitrogen as a cooling agent. The Jet vaporizes the liquid nitrogen in a cryogenic container, producing a steady cryogenic gas flow. This LN2vaporizer (Jet) can be adjusted to minimize liquid nitrogen consumption and to adjust both the cooling rate and the volume of the gas flow. The cryogenic gas flow is then piped through a vacuum insulated flexible metal line (N_2gas line) to the object you wish to cool. A KALTGAS system needs only a few minutes to produce a cold gas flow with a temperature as low as -180° C (-292° F).
In most cases, this KALTGAS system is only used to produce a cold gas flow. The volume of the gas flow is adjusted with the SL1 safety control unit. Since the controlled system operates without a heat exchanger, it is not possible to maintain precise temperature stability.
To achieve good temperature and control stability, a post-heating module (heat exchanger) must be installed. This module can be connected directly to the line, or installed in a chamber right next to the cold gas flow.
The heat exchanger is designed to heat the cold gas flow to the desired temperature. The final product, a clearly quantified gas flow exiting the heat exchanger at a clearly defined temperature, is ready for use as a cooling agent.
.
Apart from the high cooling speed, another advantage of KALTGAS systems is their modular design. By swapping out individual modules such as the N_2gas line, the LN2vaporizer (Jet) or the heater, it is possible to change the cooling speed, LN2 consumption as well as the application. The basic modules, including the LN2 container and the vacuum pump remain unchanged.



The T-G 50 KALTGAS system includes a safety controller SL1, a KF-NW 50 siphon with an LN2 vaporizer (Jet), a flexible, evacuable N_2gas line, a PT100 temperature sensor and a vacuum pump with accessories.

Technical data for **Model T-G50**
LN2 vaporizer (Jet) = 500 watts / LN2 consumption = 1,1l/h to 11l/h (liters per hour)
N2 gas line = V2A, length 1.8 meters, flexible, with vacuum pump,
siphon for LN2 container with KF NW 50
Order No.: Typ T-G 50

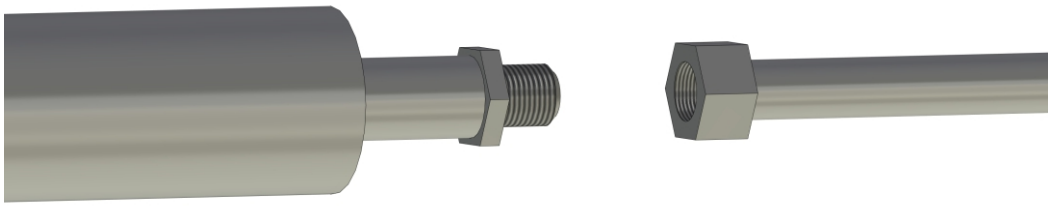
Best. Nr: T-G 50-1 (External thread)
Best. Nr: T-G 50-2 (Union nut)
Best. Nr: T-G 50-3 (Johnston coupling)
Best. Nr: T-G 50-4 (Swagelok)
Best. Nr: T-G 50-5 (Internal thread)

AccessoriesLN2 container with 20 to 300 liter capacity
Post-heating module

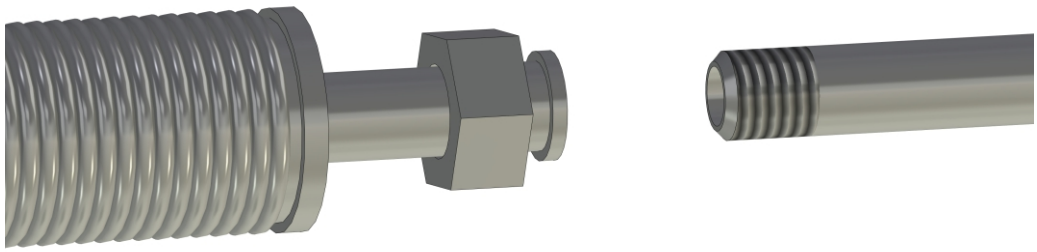
Further achievements of KALTGAS systems on request.
Technical subject to change.

Connection options

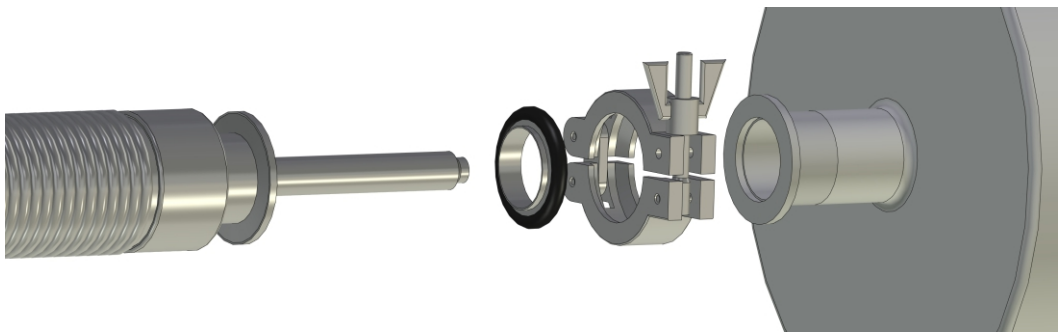
1. External thread (specify thread)



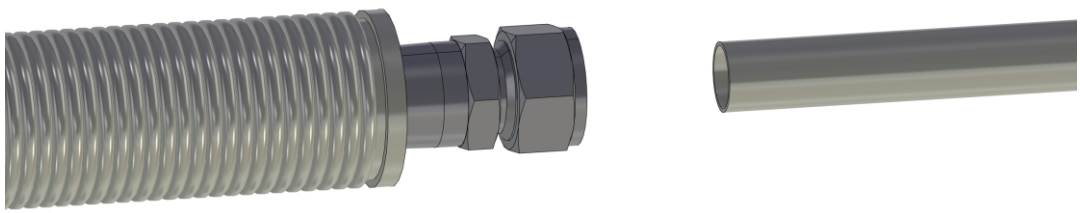
2. Union nut (UNF 3/4" standard kryo connector)



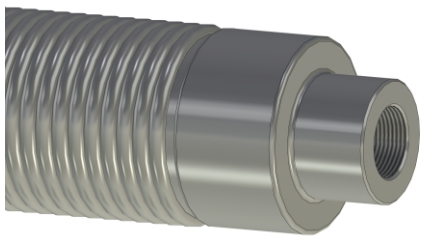
3. Johnston coupling (DN25/DN40) gas outlet pipe (l=80/150/200mm)



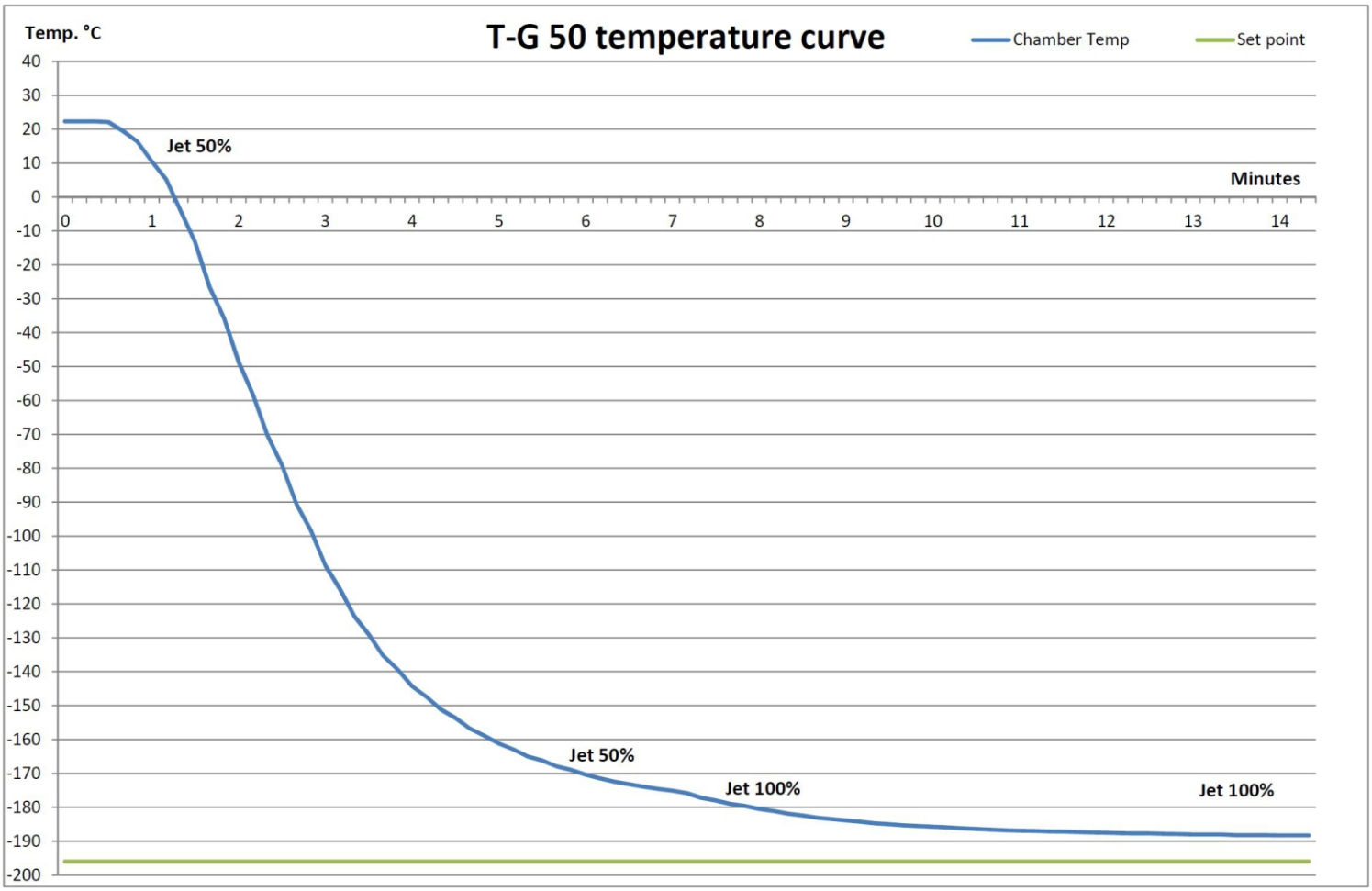
4. Swagelok (Specify pipe diameter)



5. Internal thread (specify thread)



Temperature curve with different JET power



Excel data on request

Measuring point at the gas outlet nozzle

Safety powerful manufactures for easy cryogenic cooling systems SL1

KALTGAS to -180°C

SL1 safety control unit

The SL1 safety controller has two functional components.

The first components is the LN2-evaporator. The gas rate is adjusted with a control knob, with possible manual settings for the gas rate ranging from 0 to 100 %. The resulting volume of cold N_2gas depends on the Jet power and the specified vaporizer rate. The Jet is available in ratings from 100 to 1000 watts. For an Jet with a rating of 1000 watts, that translates into a maximum N_2gas production of over 14,000 litr es of cold gas per hour. (A Jet with 100 watts evaporates approx. 2 litres of LN2 per hour, one litre of LN2 produces approx. 700 litres of N_2gas.)

The second component is the heating element safety monitor. It monitors the two heating elements for overheating. Should the internal temperature of either of the two heating elements (LN2vaporizer (Jet) and heater) rise above the specified safety temperature, the safety controller shuts the KALTGAS system off and sounds an alarm. The only way to turn on the system again is manually.

Cryogenic cooling system Type TG-LKF for cooling applications from +100°C (+212°F) to -180°C (-292°F)

from +100°C KALTGAS

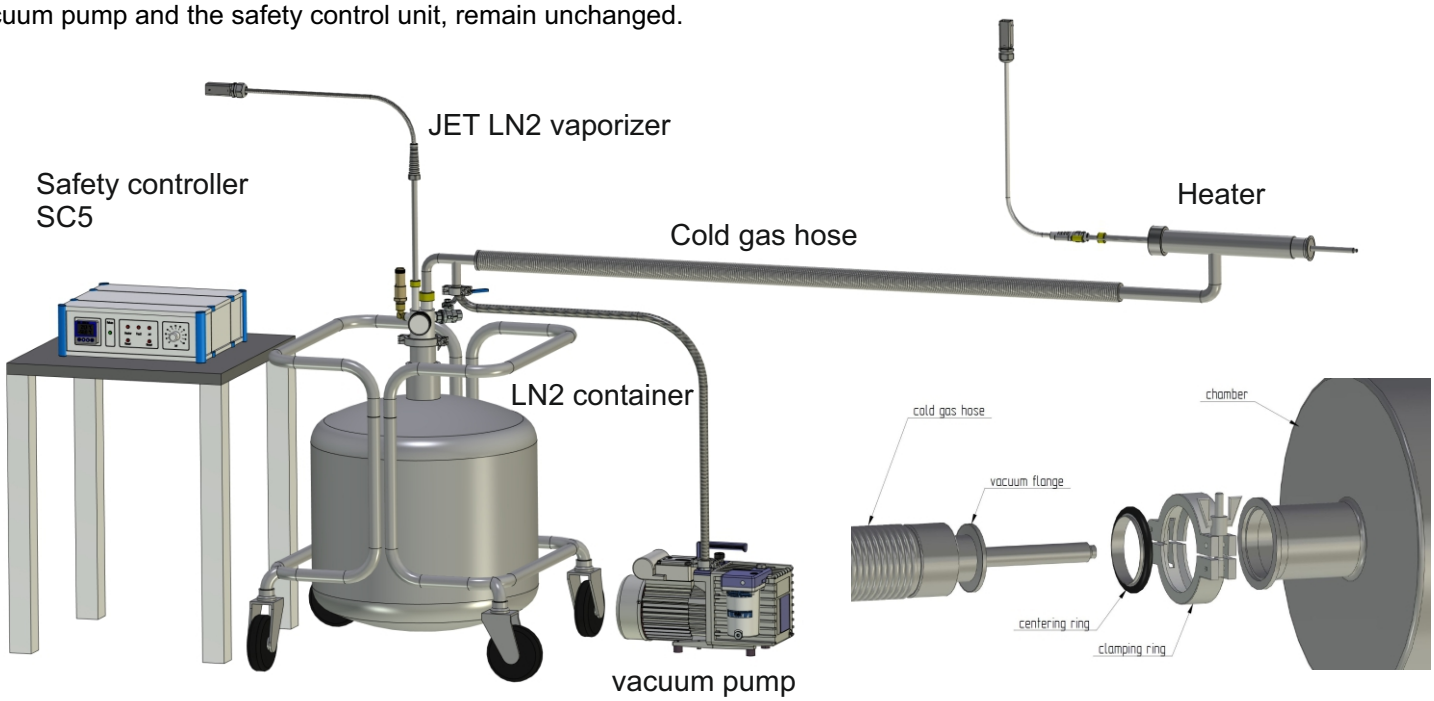
+/-0°C KALTGAS

to max. -180°C KALTGAS

Cryogenic cooling system in sample chambers

To obtain rapid cooling speeds and very low temperatures, sometimes you have to switch from conventional mechanical cooling to cryogenic cooling. With this scenario in mind, KGW-ISOTHERM has developed a new KALTGAS system. In it, a sample chamber is filled with cryogenic nitrogen gas, resulting in a high cooling speed.

KALTGAS is a tempering system that utilizes the very low temperature of liquid nitrogen as a cooling agent. The Jet vaporizes the liquid nitrogen in a cryogenic container, producing a steady cryogenic gas flow. This LN2vaporizer (Jet) can be adjusted to minimize liquid nitrogen consumption and to change both the cooling rate and the volume of the gas flow. The cryogenic gas flow is then piped through a vacuum insulated flexible metal line (N_2gas line) to a heat exchanger (heater). The heat exchanger is designed to heat the cold gas flow to the desired temperature. The final product, a clearly quantified gas flow exiting the heat exchanger at a clearly defined temperature, is ready for use as a cooling agent. A KALTGAS system needs only a few minutes to produce a cold gas flow with a temperature of -180°C (-292°F). Configuring the KALTGAS system to any customer's individual environment is possible thanks to various temperature controllers that can be embedded inside the safety control unit. Those temperature controllers are available with or without interfaces. By using an optimized temperature controller, a temperature stability of ± 0.1°C can be achieved. With the standard safety control unit (SC5), a temperature stability of better than ± 0.2°C can be achieved. The steady gas flow can be used to temper a chamber.
Another option is a circulating-air tempering system. It circulates the air in the chamber and cools it with a KALTGAS system type G. This setup enables full utilization of LN2 in temperatures above -20°C (-4°F).
In addition to their high cooling speed and good control stability, another advantage of KALTGAS systems is their modular design. By swapping out individual modules such as the N_2gas line, the LN2vaporizer (Jet) or the heater, it is possible to change the cooling speed, LN2 consumption as well as the application. The basic modules, including the LN2 container, the vacuum pump and the safety control unit, remain unchanged.



The TG-LKF 63/50 KALTGAS system includes a standard safety control unit SC5 (a temperature controller with current value/set point display and a safety controller), a KF-NW 50 siphon with an LN2 vaporizer (Jet), a flexible, evacuable N_2gas line with an integrated post-heating module (Heater), a PT100 temperature sensor and a vacuum pump with accessories.

Technical data for

Model TG-LKF 63/50
LN2 vaporizer (Jet)= 500 watts
Heater = 630 watts
LN2 consumption = 1.1l/h to 11l/h (liters per hour)
N2 gas line = V2A, length 1.8 meters, flexible, with vacuum pump
siphon for LN2 container with KF NW 50
Order No.: TG-LKF 63/50

Model TG-LKF 63/100
LN2 vaporizer (Jet)= 1000 watts
Heater = 630 watts
LN2 consumption = 2.2l/h to 22l/h (liters per hour)
N2 gas line = V2A, length 1.8 meters, flexible, with vacuum pump
siphon for LN2 container with KF NW 50
Order No.: TG-LKF 63/100

ordering example: TG-LKF 63/50-A-3

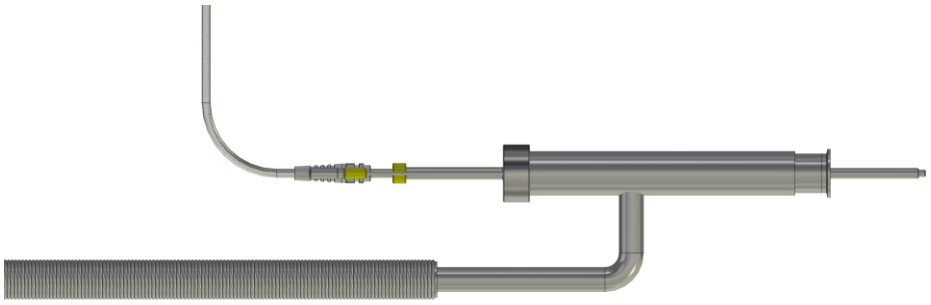
- 50/100
- Heater variants A-D
- Connections options 1-5

Accessories LN2 container with 20 to 300 liter capacity

Further information on KALTGAS systems available.
Technical data subject to change.

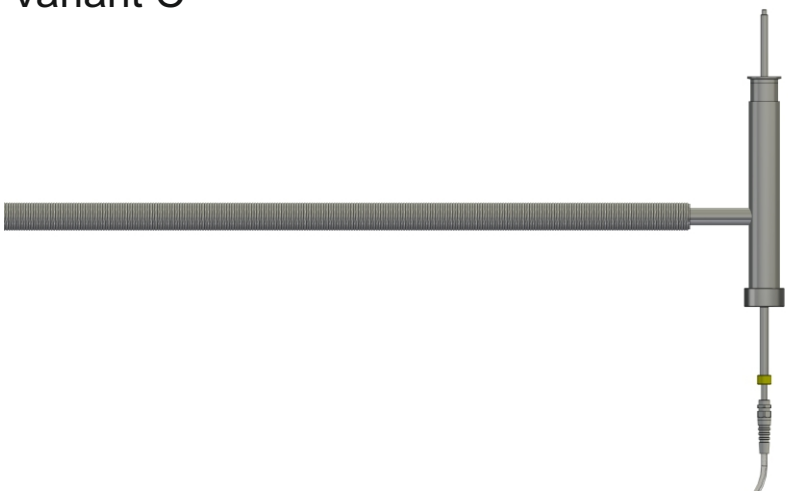
TG-LKF HEATER Variants

Variant A

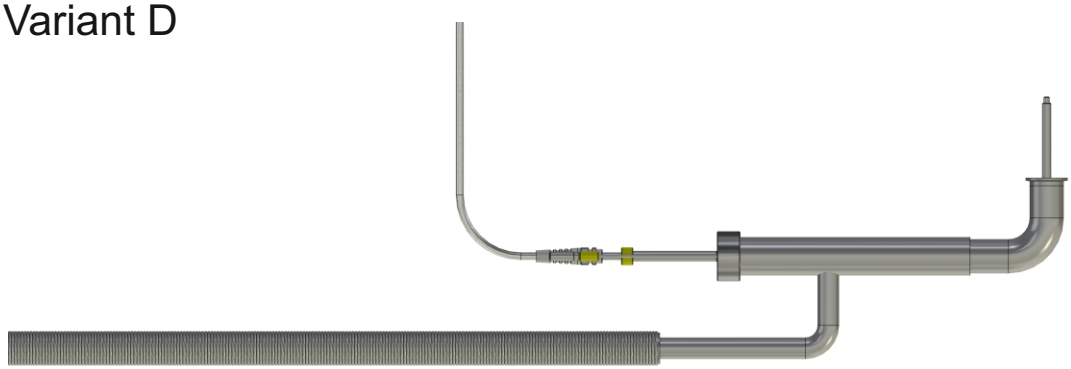


Variant B

Variant C

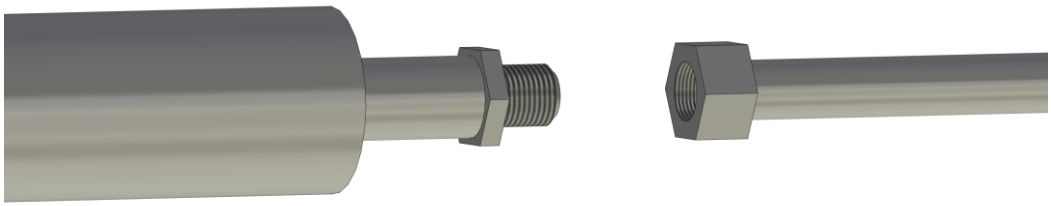


Variant D

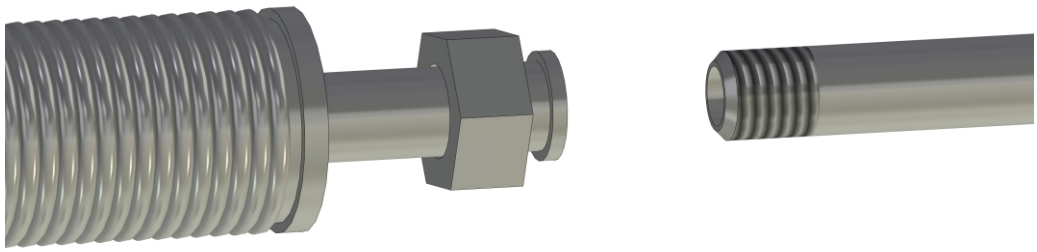


Connection options

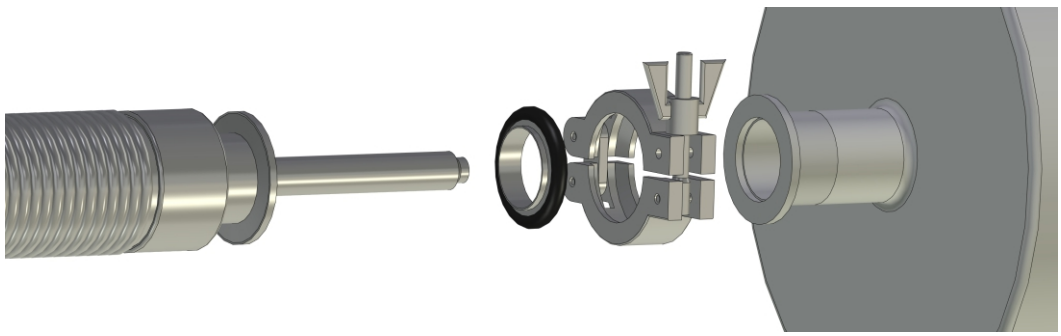
1. External thread (specify thread)



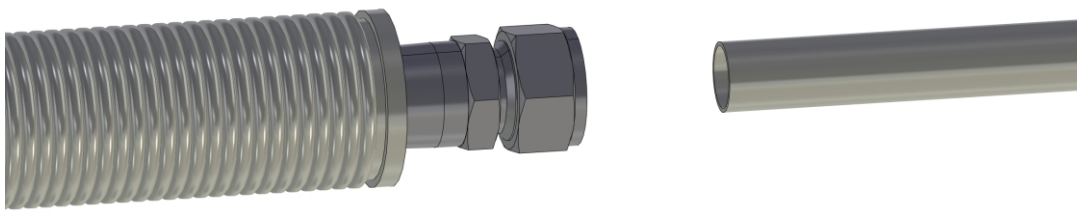
2. Union nut (UNF 3/4" standard kryo connector)



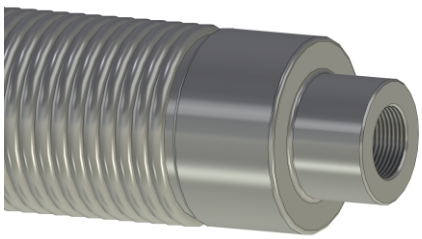
3. Johnston coupling (DN25/DN40) gas outlet pipe (l=80/150/200mm)



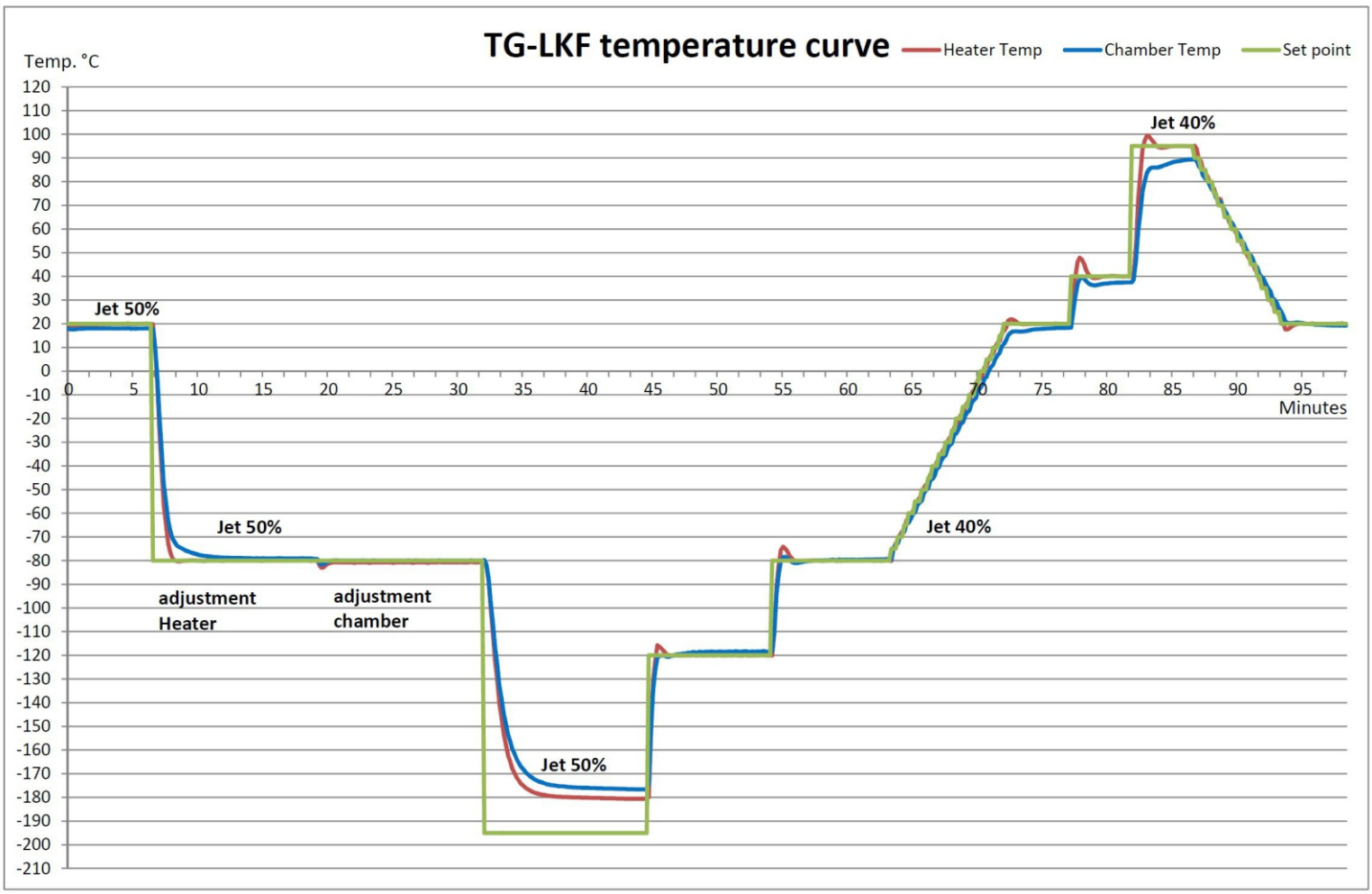
4. Swagelok (Specify pipe diameter)



5. Internal thread (specify thread)

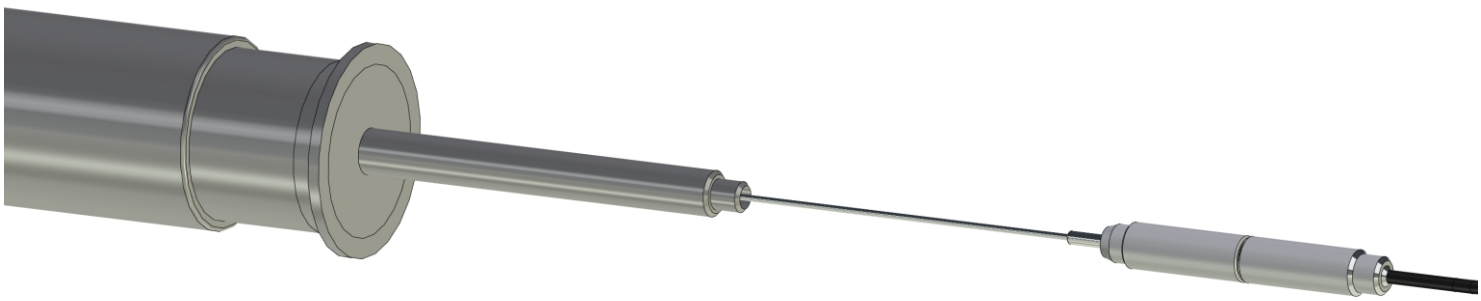


Temperature curve with different JET power



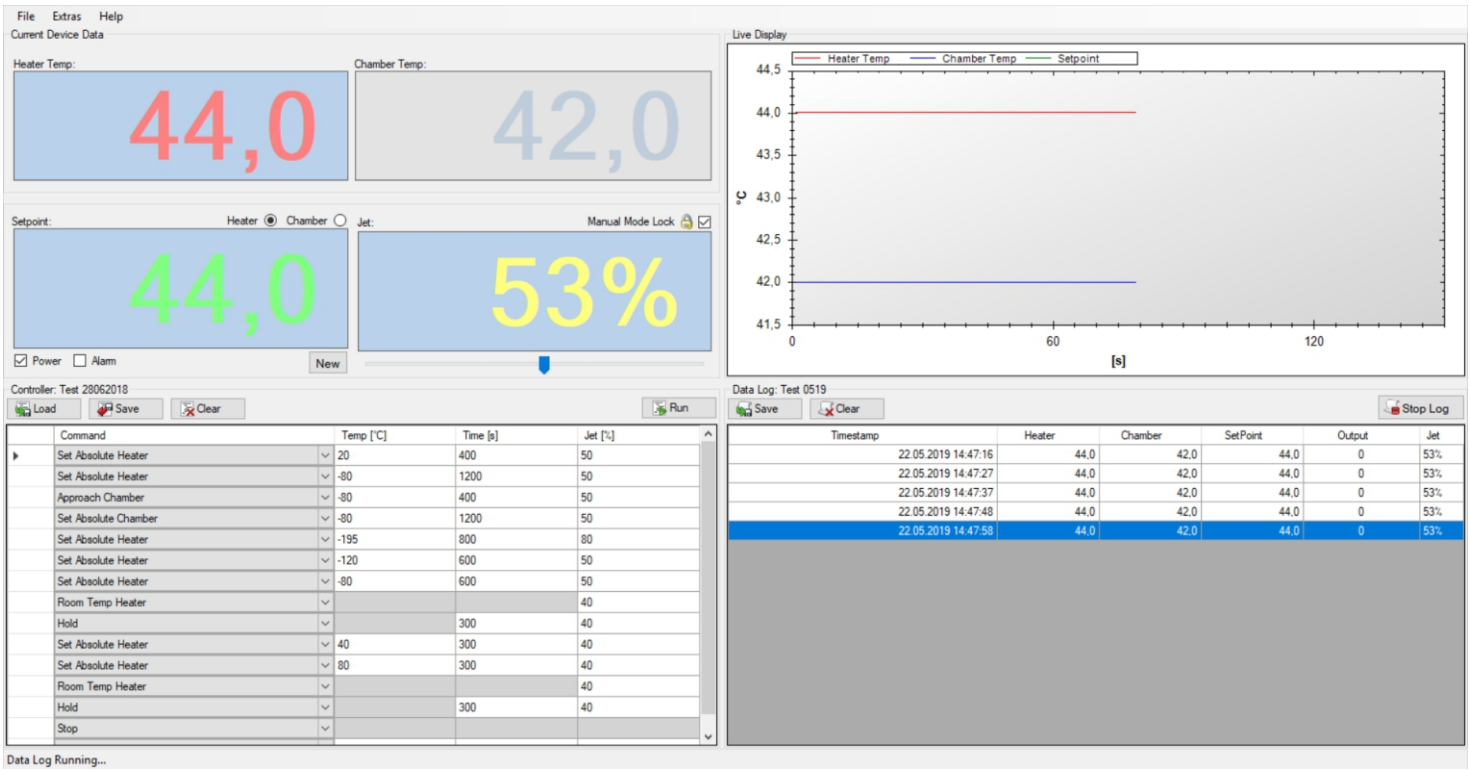
Excel data on request

Measuring point at the gas outlet nozzle



KALTGAS TOOL
Software to control kaltgassystems

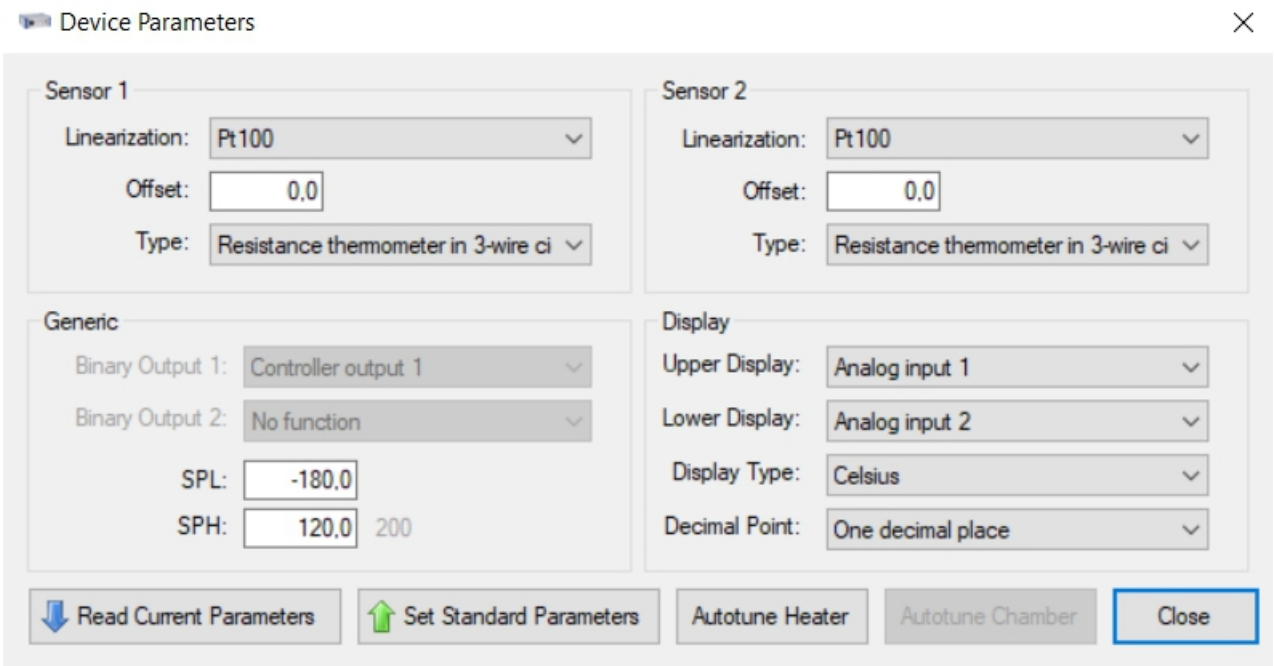
The user interface is shown in the following diagram:



Settings
Sensor and properties
a) Linearization
b) Offset: “0” spot offset
c) type of sensor

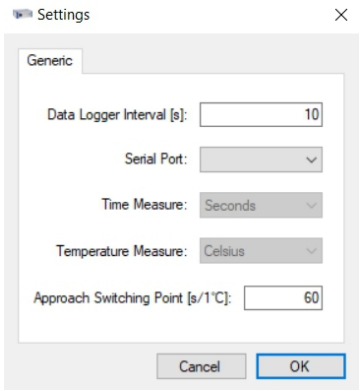
Display
set the upper prompt of controller
set the power prompt of controller
unit °C or K
Decimal place of the Display of Temperature

Abstract
define and set the desired value,
set the max lower desired value,
set the max upper desired value

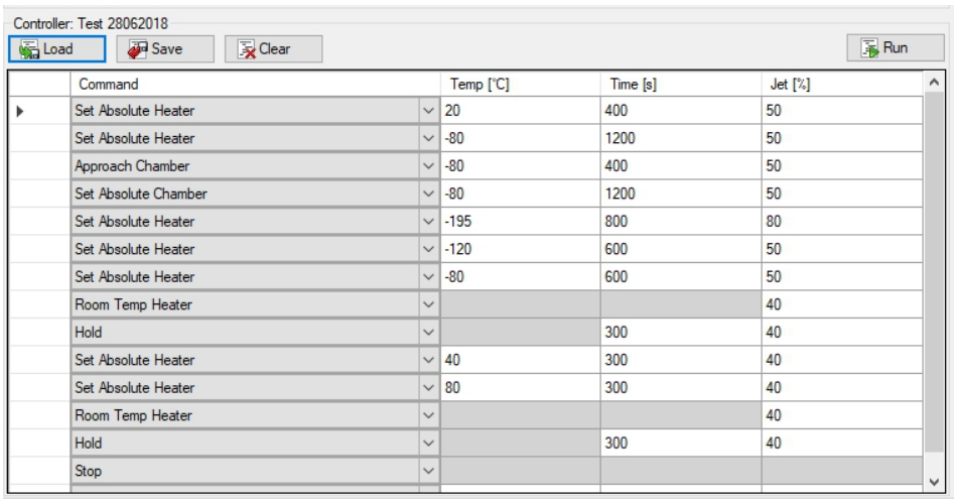


KALTGAS TOOL
Software to control kaltgassystems

Options
Here you can choose the serialport. Make sure
that your controller is connected to the right port.
Additionally, you can preset the

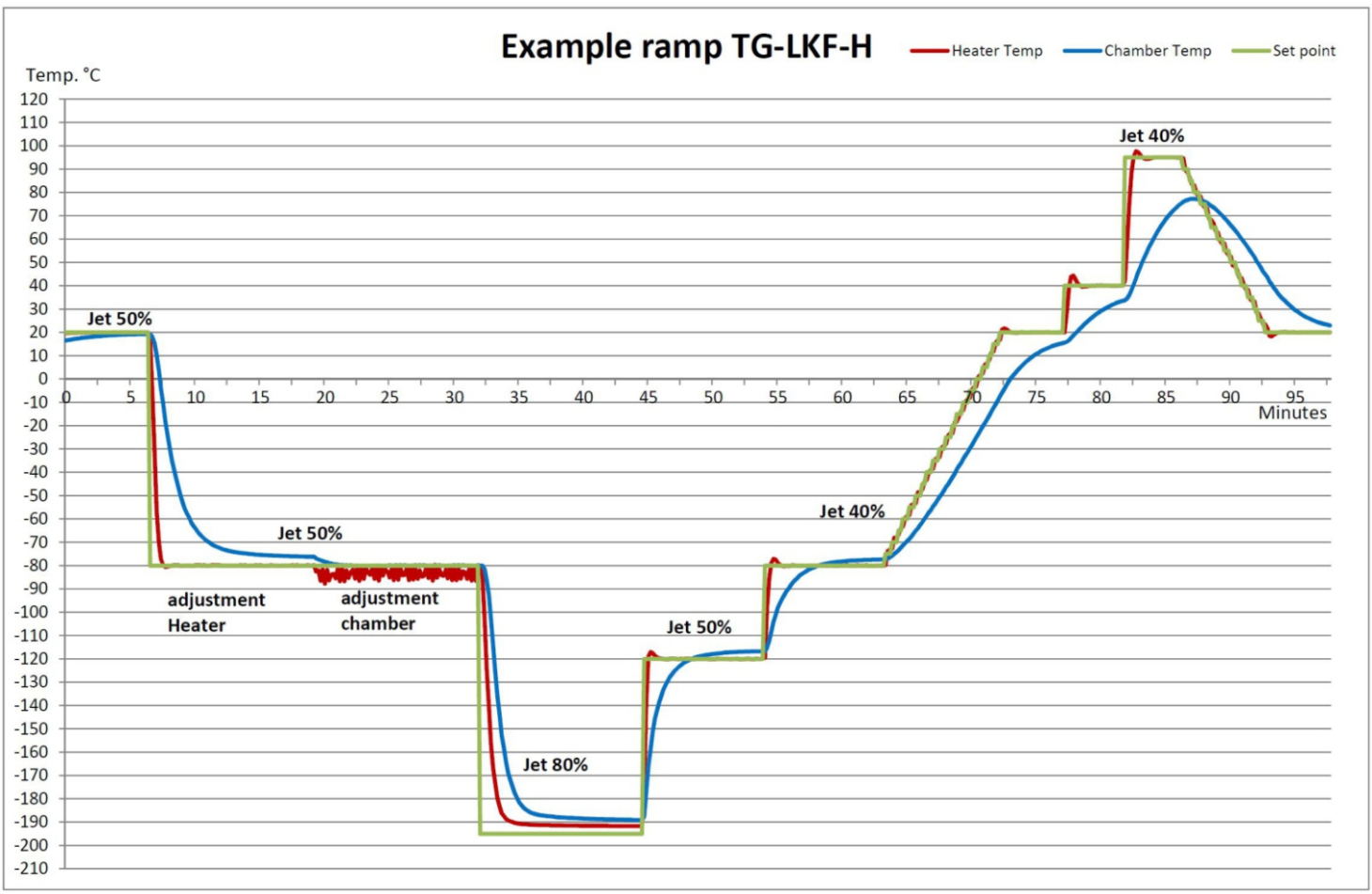


example program



	Command	Temp [°C]	Time [s]	Jet [%]
▸	Set Absolute Heater	20	400	50
	Set Absolute Heater	-80	1200	50
	Approach Chamber	-80	400	50
	Set Absolute Chamber	-80	1200	50
	Set Absolute Heater	-195	800	80
	Set Absolute Heater	-120	600	50
	Set Absolute Heater	-80	600	50
	Room Temp Heater			40
	Hold		300	40
	Set Absolute Heater	40	300	40
	Set Absolute Heater	80	300	40
	Room Temp Heater			40
	Hold		300	40
	Stop			

example ramp
(Excel data on request)



Safety control SC5 unit for cryogenic cooling systems with two temperature sensor connections for a temperature range from +100°C (+212°F) to -196°C (-320,8°F)

from
+/ 100°C
KALTGAS

+/-0°C
KALTGAS

to
-196°C
KALTGAS

SC 5 safety control unit

The SC 5 safety controller has three functional components. The first component is the temperature controller. It allows users to set the temperature set point of the gas flow at the front of the control unit. The temperature controller then shows the current and the set point temperatures separately. In addition, this controller has an RS 485 interface allowing users to address the controller with software and to specify temperature ramps. The controller also has an auto tuning function where the controller automatically searches for and reads in the control parameters required to reach a high level of control stability. The controller can either control the KALTGAS system using its own internal temperature sensor, or it can be manually switched to the second, internal temperature sensor (e.g., on the sample).
The second component is the heating element safety monitor. It monitors the two heating elements for overheating. Should the internal temperature of either of the two heating elements (LN2vaporizer (Jet) and heater) rise above the specified safety temperature, the safety controller shuts the KALTGAS system off and sounds an alarm. The only way to turn on the system again is manually.
The third component is the LN2 vaporizer (Jet). The gas rate is adjusted with a control knob, with possible manual settings for the gas rate ranging from 0 to 100 %. The resulting volume of cold N_2gas depends on the Jet power and the specified vaporizer rate. The Jet is available in ratings from 100 to 1000 watts. For an Jet with a rating of 1000 watts, that translates into a maximum N_2gas production of over 14,000 litres of cold gas per hour. (A Jet with 100 watts evaporates approx. 2 litres of LN2 per hour; 1 litre of LN2 produces approx. 700 litres of N_2gas.)

Cryogenic cooling system
Type TG-LKF-H for cooling applications
from +100°C (+212°F)
to -180°C (-292°F)

from +100°C KALTGAS

+/-0°C KALTGAS

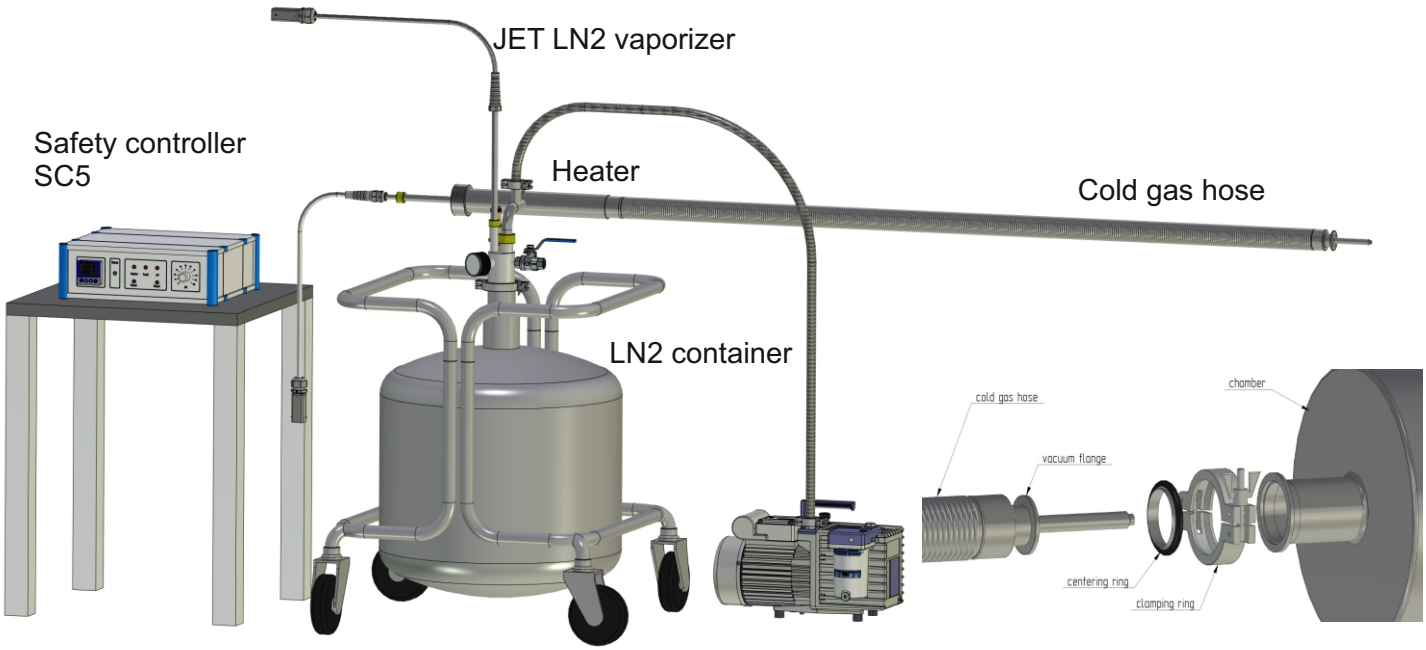
to max. -180°C KALTGAS

Indirect cryogenic cooling in a sample chamber

To obtain rapid cooling speeds and very low temperatures, sometimes you have to switch from conventional mechanical cooling to cryogenic cooling. With this scenario in mind, KGW-ISOTHERM has developed a new KALTGAS system. In it, the reactor is cooled with cryogenic nitrogen gas, resulting in a high cooling speed. For a better handling of the cold gas hose, the Heater is directly on the siphon of the LN2 container. With this modification the cold gas hose is simply to connect on a chamber.

KALTGAS is a tempering system that utilizes the very low temperature of liquid nitrogen as a cooling agent. The Jet vaporizes the liquid nitrogen in a cryogenic container, producing a steady cryogenic gas flow. This LN2vaporizer (Jet) can be adjusted to minimize liquid nitrogen consumption and to change both the cooling rate and the volume of the gas flow. The cryogenic gas flow is then piped through a vacuum insulated flexible metal line (N_2gas line) to a heat exchanger (heater). The heat exchanger is designed to heat the cold gas flow to the desired temperature. The final product, a clearly quantified gas flow exiting the heat exchanger at a clearly defined temperature, is ready for use as a cooling agent. A KALTGAS system needs only a few minutes to produce a cold gas flow with a temperature of -180°C (-292°F). Configuring the KALTGAS system to any customer's individual environment is possible thanks to various temperature controllers that can be embedded inside the safety control unit. Those temperature controllers are available with or without interfaces. By using an optimized temperature controller, a temperature stability of ± 0.1°C can be achieved. With the standard safety control unit (SC5), a temperature stability of better than ± 0.2°C can be achieved. The steady gas flow can be used to temper a chamber.

In addition to their high cooling speed and good control stability, another advantage of KALTGAS systems is their modular design. By swapping out individual modules such as the N_2gas line, the LN2vaporizer (Jet) or the heater, it is possible to change the cooling speed, LN2 consumption as well as the application. The basic modules, including the LN2 container, the vacuum pump and the safety control unit, remain unchanged.



The TG-LKF-H 63/50 KALTGAS system includes a standard safety control unit SC5 (a temperature controller with current value/set point display and a safety controller), a KF-NW 50 siphon with an LN2 vaporizer (Jet), a flexible, evacuable N_2gas line with an integrated post-heating module (Heater), a Pt100 temperature sensor and a vacuum pump with accessories.

Technical data for

Model TG-LKF-H 63/50
LN2 vaporizer (Jet)= 500 watts
Heater = 630 watts / LN2 consumption = 1.1l/h to 11l/h (liters per hour), N2 gas line = V2A, length 1.8 meters, flexible, with vacuum pump,siphon for LN2 container with KF NW 50
Order No.: TG-LKF-H 63/50

Best. Nr: TG-LKF-H 63/50-1 (External thread)
Best. Nr: TG-LKF-H 63/50-2 (Union nut)
Best. Nr: TG-LKF-H 63/50-3 (Johnston coupling)
Best. Nr: TG-LKF-H 63/50-4 (Swagelok)
Best. Nr: TG-LKF-H 63/50-5 (Internal thread)

Model TG-LKF-H 63/100
LN2 vaporizer (Jet)= 1000 watts
Heater = 630 watts / LN2 consumption = 2.2l/h to 22l/h (liters per hour), N2 gas line = V2A, length 1.8 meters, flexible, with vacuum pump, siphon for LN2 container with KF NW 50
Order No.: TG-LKF-H 63/100

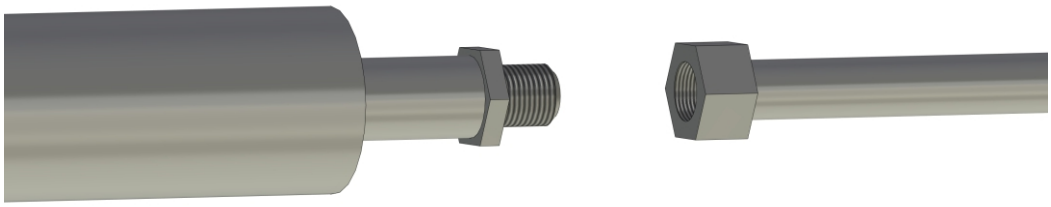
Best. Nr: TG-LKF-H 63/100-1 (External thread)
Best. Nr: TG-LKF-H 63/100-2 (Union nut)
Best. Nr: TG-LKF-H 63/100-3 (Johnston coupling)
Best. Nr: TG-LKF-H 63/100-4 (Swagelok)
Best. Nr: TG-LKF-H 63/100-5 (Internal thread)

Accessories: LN2 container with 20 to 300 liter capacity

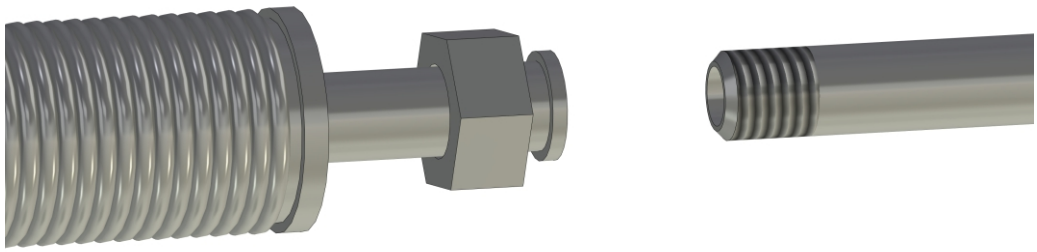
Further information on KALTGAS systems available.
Technical data subject to change.

Connection options

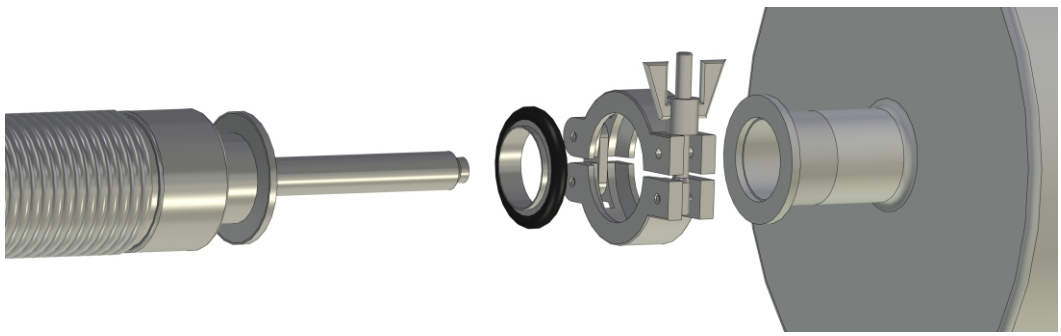
1. External thread (specify thread)



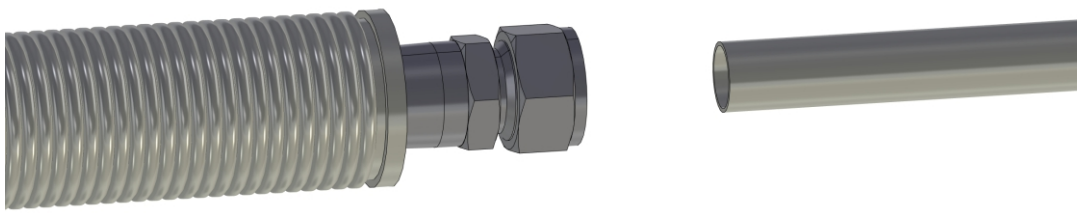
2. Union nut (UNF 3/4" standard kryo connector)



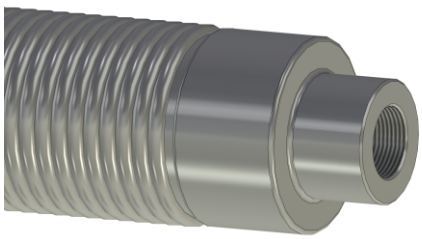
3. Johnston coupling (DN25/DN40) gas outlet pipe (l=80/150/200mm)



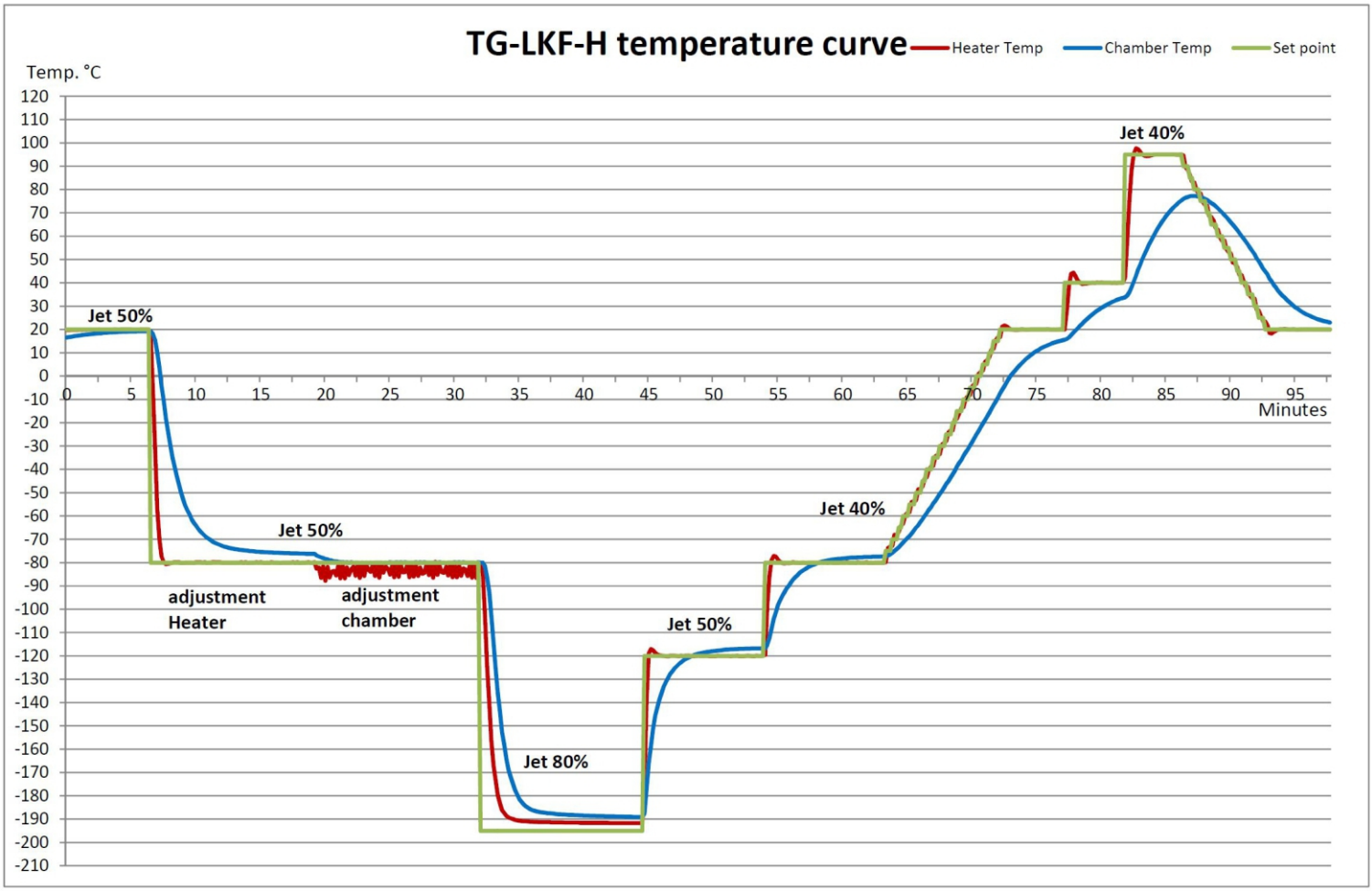
4. Swagelok (Specify pipe diameter)



5. Internal thread (specify thread)



Temperature curve with different JET power

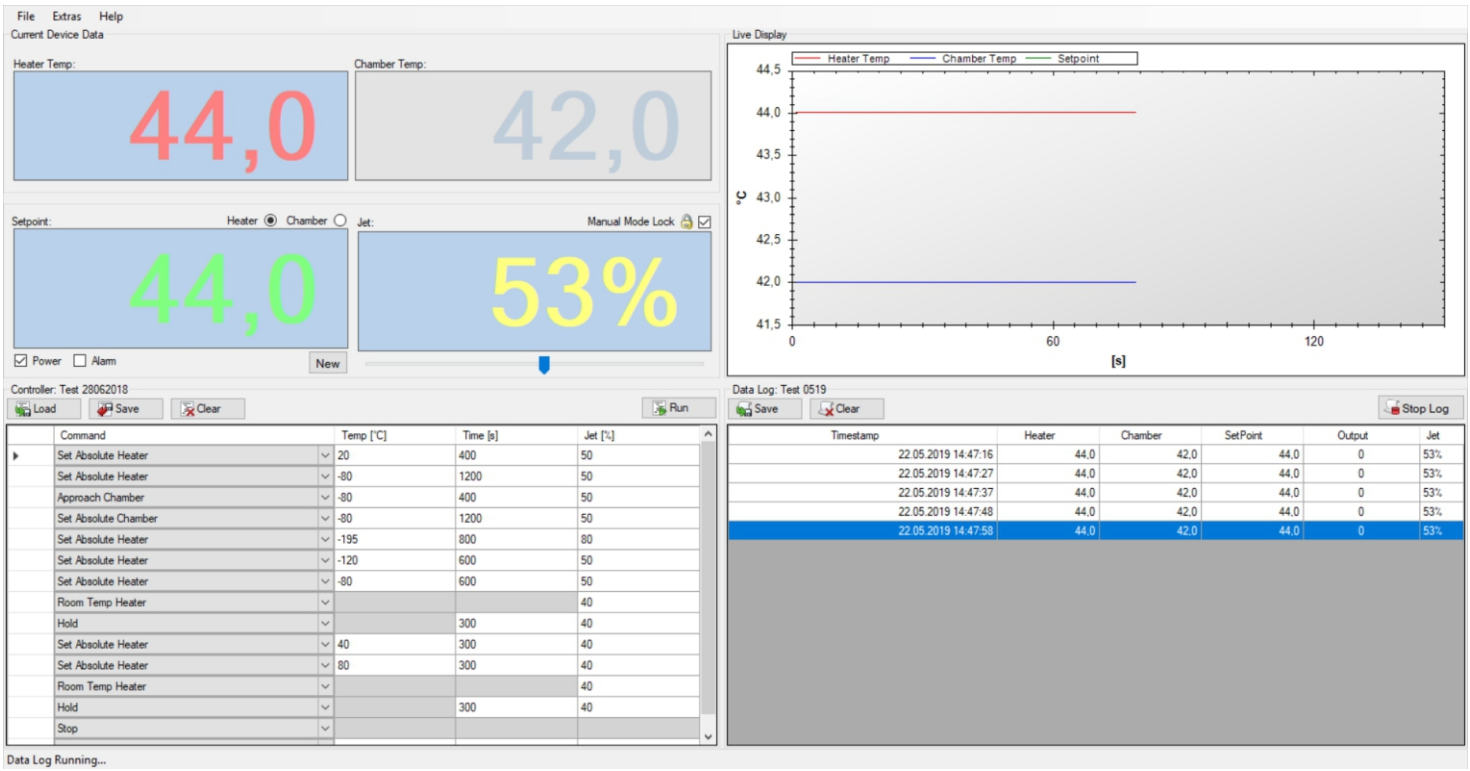


Excel data on request

Measuring point at the gas outlet nozzle

KALTGAS TOOL
Software to control kaltgassystems

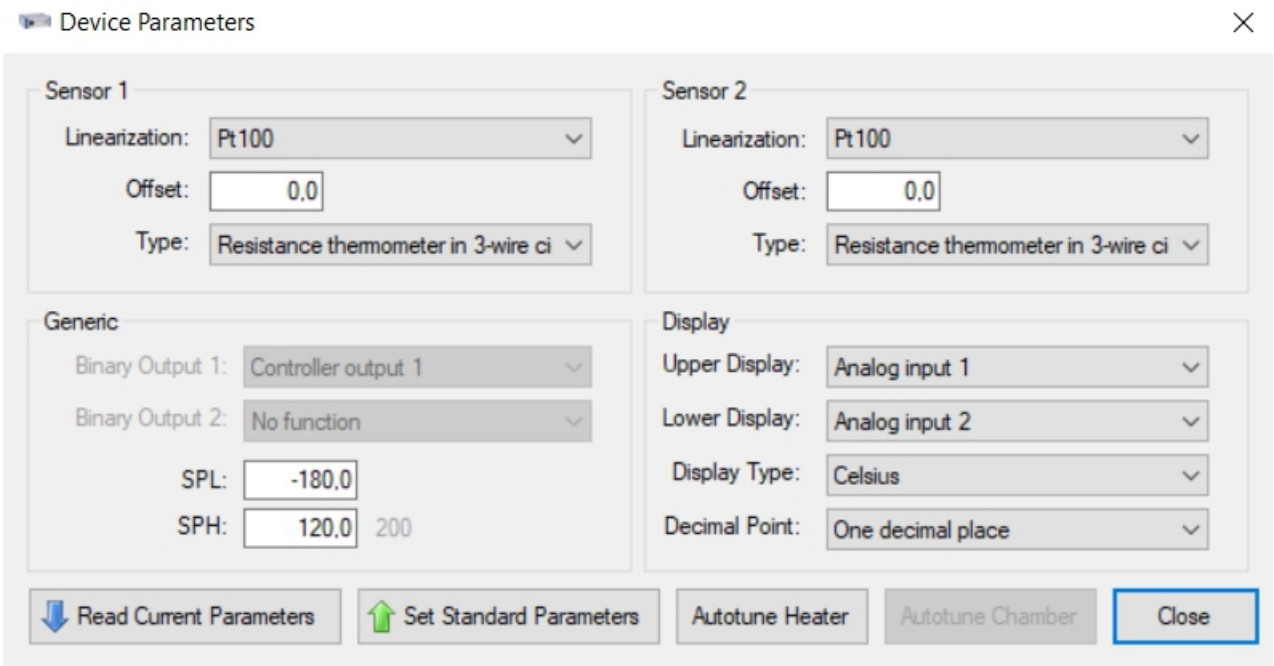
The user interface is shown in the following diagram:



Settings
Sensor and properties
a) Linearization
b) Offset: “0” spot offset
c) type of sensor

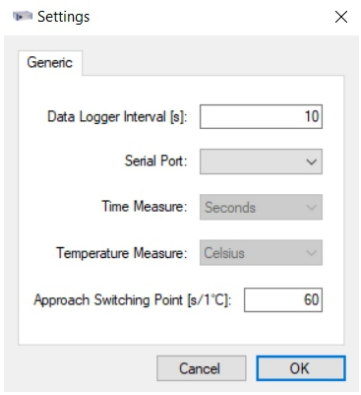
Display
set the upper prompt of controller
set the power prompt of controller
unit °C or K
Decimal place of the Display of Temperature

Abstract
define and set the desired value,
set the max lower desired value,
set the max upper desired value



KALTGAS TOOL
Software to control kaltgassystems

Options
Here you can choose the serialport. Make sure
that your controller is connected to the right port.
Additionally, you can preset the



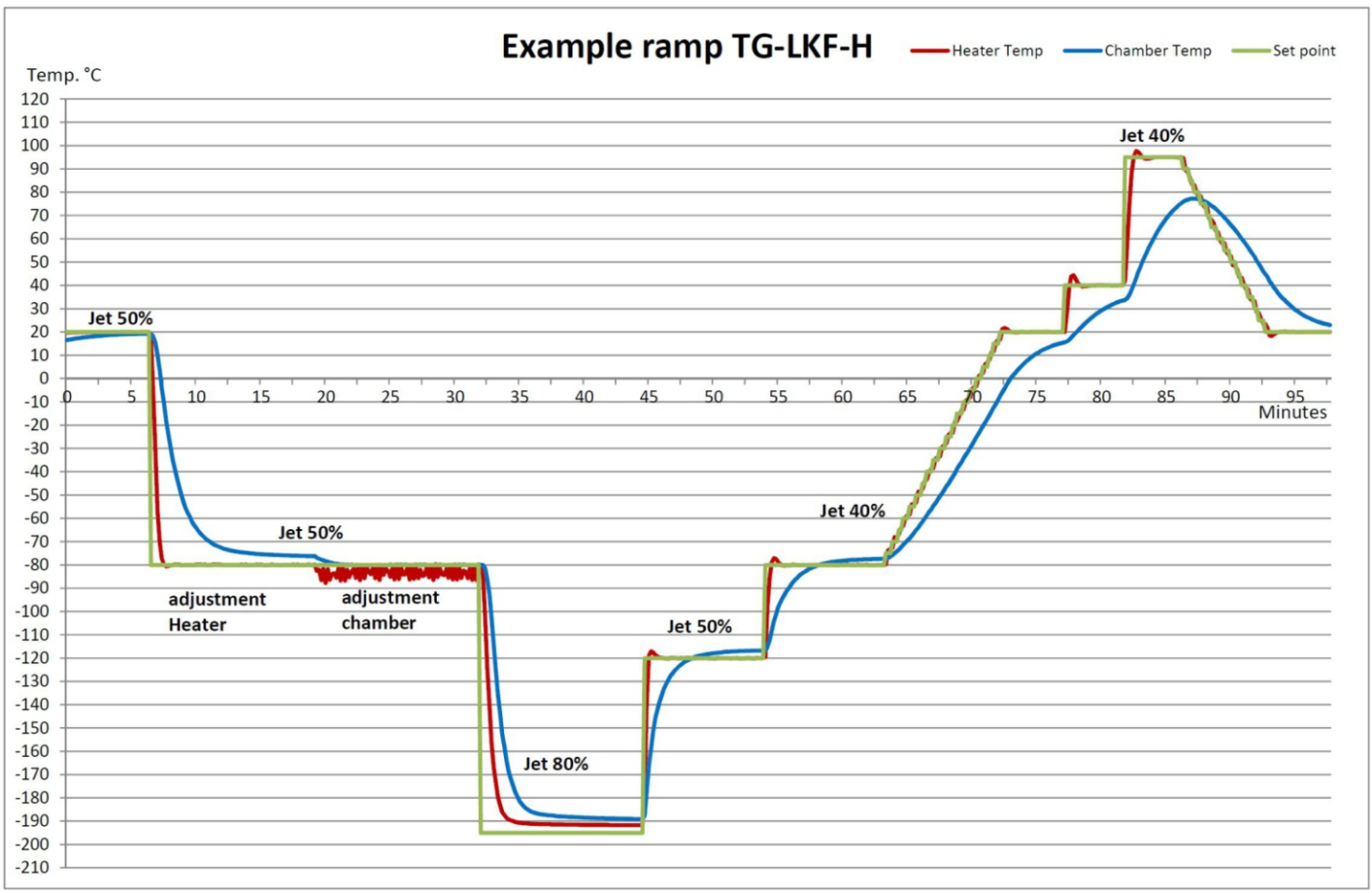
example program

Controller: Test 28062018

Load | Save | Clear | Run

	Command	Temp [°C]	Time [s]	Jet [%]
▸	Set Absolute Heater	20	400	50
	Set Absolute Heater	-80	1200	50
	Approach Chamber	-80	400	50
	Set Absolute Chamber	-80	1200	50
	Set Absolute Heater	-195	800	80
	Set Absolute Heater	-120	600	50
	Set Absolute Heater	-80	600	50
	Room Temp Heater			40
	Hold		300	40
	Set Absolute Heater	40	300	40
	Set Absolute Heater	80	300	40
	Room Temp Heater			40
	Hold		300	40
	Stop			

example ramp
(Excel data on request)



Safety control SC5 unit for cryogenic cooling systems with two temperature sensor connections for a temperature range from +100°C (+212°F) to -196°C (-320,8°F)

from
+/ 100°C
KALTGAS

+/-0°C
KALTGAS

to
-196°C
KALTGAS

SC 5 safety control unit

The SC 5 safety controller has three functional components. The first component is the temperature controller. It allows users to set the temperature set point of the gas flow at the front of the control unit. The temperature controller then shows the current and the set point temperatures separately. In addition, this controller has an RS 485 interface allowing users to address the controller with software and to specify temperature ramps. The controller also has an auto tuning function where the controller automatically searches for and reads in the control parameters required to reach a high level of control stability. The controller can either control the KALTGAS system using its own internal temperature sensor, or it can be manually switched to the second, internal temperature sensor (e.g., on the sample).
The second component is the heating element safety monitor. It monitors the two heating elements for overheating. Should the internal temperature of either of the two heating elements (LN2vaporizer (Jet) and heater) rise above the specified safety temperature, the safety controller shuts the KALTGAS system off and sounds an alarm. The only way to turn on the system again is manually.
The third component is the LN2 vaporizer (Jet). The gas rate is adjusted with a control knob, with possible manual settings for the gas rate ranging from 0 to 100 %. The resulting volume of cold N_2gas depends on the Jet power and the specified vaporizer rate. The Jet is available in ratings from 100 to 1000 watts. For an Jet with a rating of 1000 watts, that translates into a maximum N_2gas production of over 14,000 litres of cold gas per hour. (A Jet with 100 watts evaporates approx. 2 litres of LN2 per hour; 1 litre of LN2 produces approx. 700 litres of N_2gas.)

Compact cryogenic cooling for small sample chambers from +100°C (+212°F) to -180°C (-292°F)

from
+100°C
KALTGAS

+/-0°C
KALTGAS

to
-180°C
KALTGAS

Compact cryogenic cooling for small sample chambers from +100°C (+212°F) to -180°C (-292°F)

To obtain rapid cooling speeds and very low temperatures, sometimes you have to switch from conventional mechanical cooling to cryogenic cooling. With this scenario in mind, KGW ISOTHERM has developed a new KALTGAS system. In it, a sample chamber is filled with cryogenic nitrogen gas, enabling very low temperatures to be reached at high cooling speeds. The KALTGAS system is highly compact, featuring a flanged end for connecting a variety of glass or metal chambers directly to the gas outlet.

KALTGAS is a tempering system that utilizes the very low temperature of liquid nitrogen as a cooling agent. The Jet vaporizes the liquid nitrogen in a cryogenic container, producing a steady cryogenic gas flow. This LN2 vaporizer (Jet) can be adjusted to minimize liquid nitrogen consumption and to change both the cooling rate and the volume of the gas flow. The cryogenic gas flow is then piped through a vacuum-insulated metal line (N_2 gas line) to a heat exchanger (heater). The heat exchanger is designed to heat the cold gas flow to the desired temperature. The final product, a clearly quantified gas flow exiting the gas outlet at a clearly defined temperature, is ready for use as a cooling agent. A KALTGAS system needs only a few minutes to produce a cold gas flow with a temperature of -170°C (-274°F). Configuring the KALTGAS system to any customer's individual environment is possible thanks to various temperature controllers that can be embedded inside the safety control unit. Those temperature controllers are available with or without interfaces. By using an optimized temperature controller, a temperature stability of ± 0.1°C can be achieved. With the standard safety control unit (SC5), a temperature stability of better than ± 0.2°C can be achieved. This steady gas flow can then be used to temper a chamber flanged to the system.

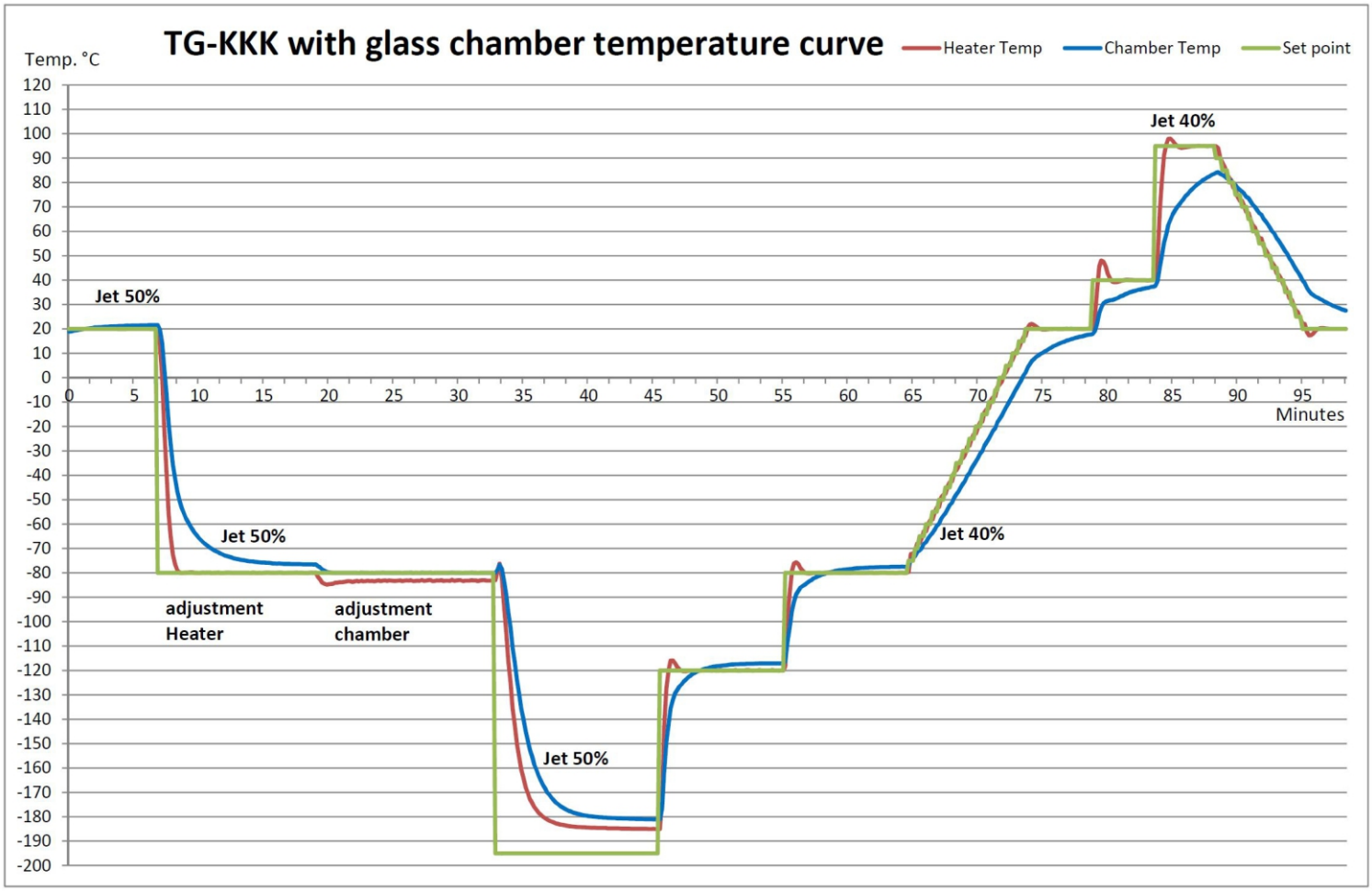
In addition to their high cooling speed and good control stability, another significant advantage of KALTGAS systems is their modular design. Sensors, electronic components, test tubes and all kinds of other items can be tempered simply by exchanging the tempering chamber.

The TG-KKK 63/50 KALTGAS system includes a standard safety control unit SC5 (a temperature controller with current value/set point display and a safety controller with interface), a KF-NW 50 siphon with an LN2 vaporizer (Jet), a removable, evacuable compact N_2 gas system with an integrated post-heating module (heater), a PT100 temperature sensor and a vacuum pump with accessories.

Technical data for	**Model TG-KKK 63/50**
	LN2 vaporizer (Jet)= 500 watts Heater = 630 watts LN2 consumption = 1.1l/h to 11l/h (liters per hour) N2 gas line = V2A, length 1.8 meters, removable, with vacuum pump for LN2 container with KF NW 50
	Order No.: TG-KKK 63/50
Accessories	- LN2 container with 20 to 300 liter capacity - glass chamber (size according to customer specifications) - stainless steel chamber (size according to customer specifications)

Further information on KALTGAS systems available.
Technical data subject to change.

Temperature curve with different JET power

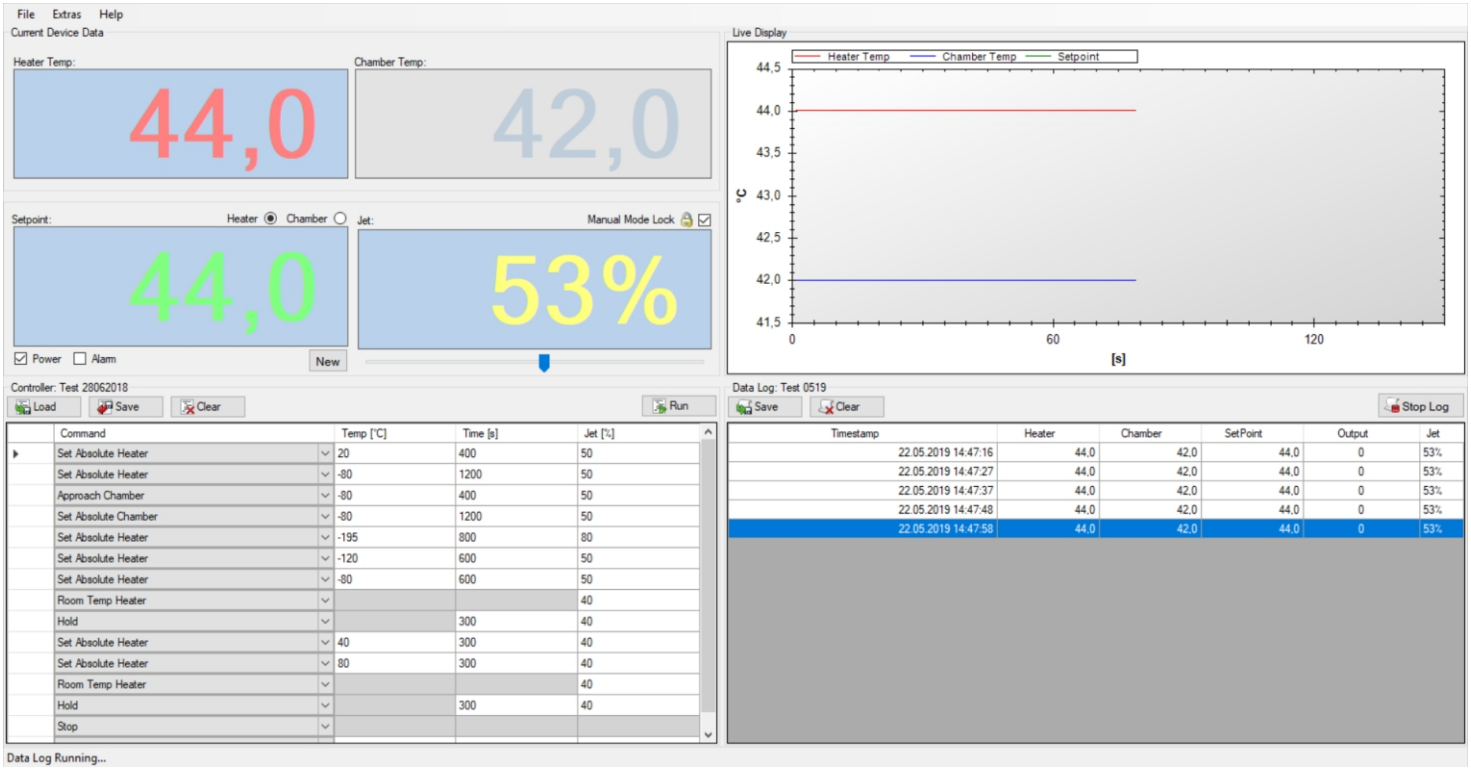


Excel data on request

Measuring point in the center of the chamber

KALTGAS TOOL
Software to control kaltgassystems

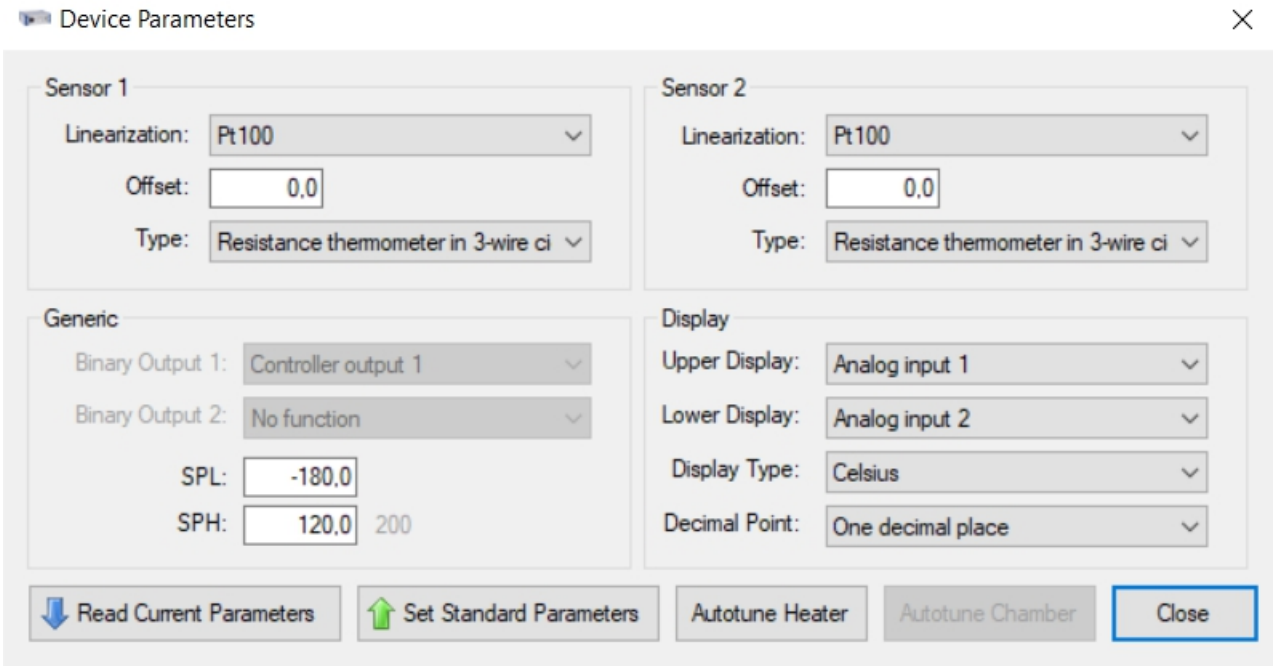
The user interface is shown in the following diagram:



Settings
Sensor and properties
a) Linearization
b) Offset: “0” spot offset
c) type of sensor

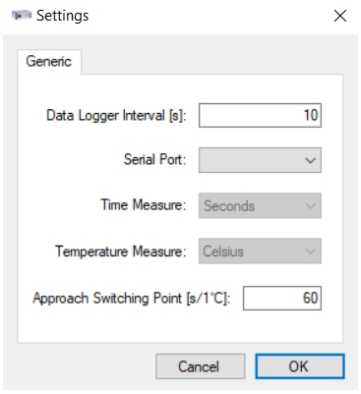
Display
set the upper prompt of controller
set the power prompt of controller
unit °C or K
Decimal place of the Display of Temperature

Abstract
define and set the desired value,
set the max lower desired value,
set the max upper desired value

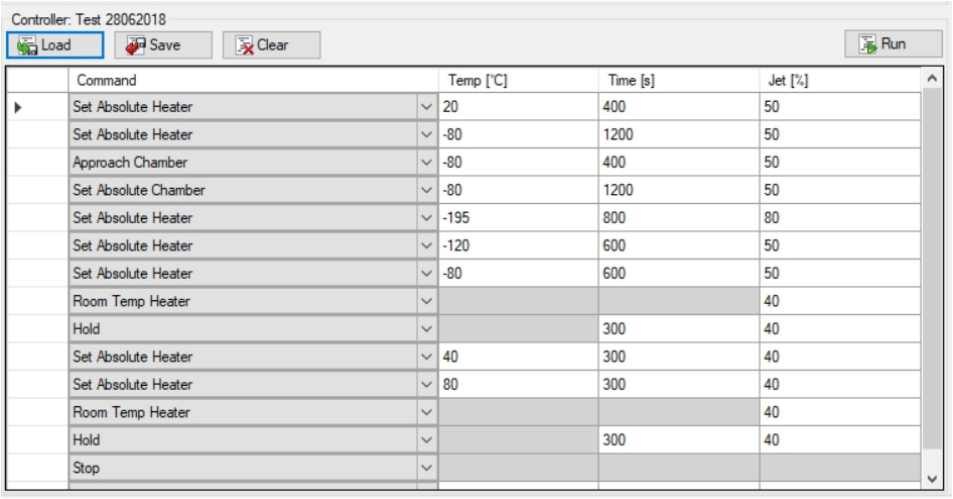


KALTGAS TOOL
Software to control kaltgassystems

Options
Here you can choose the serialport. Make sure
that your controller is connected to the right port.
Additionally, you can preset the

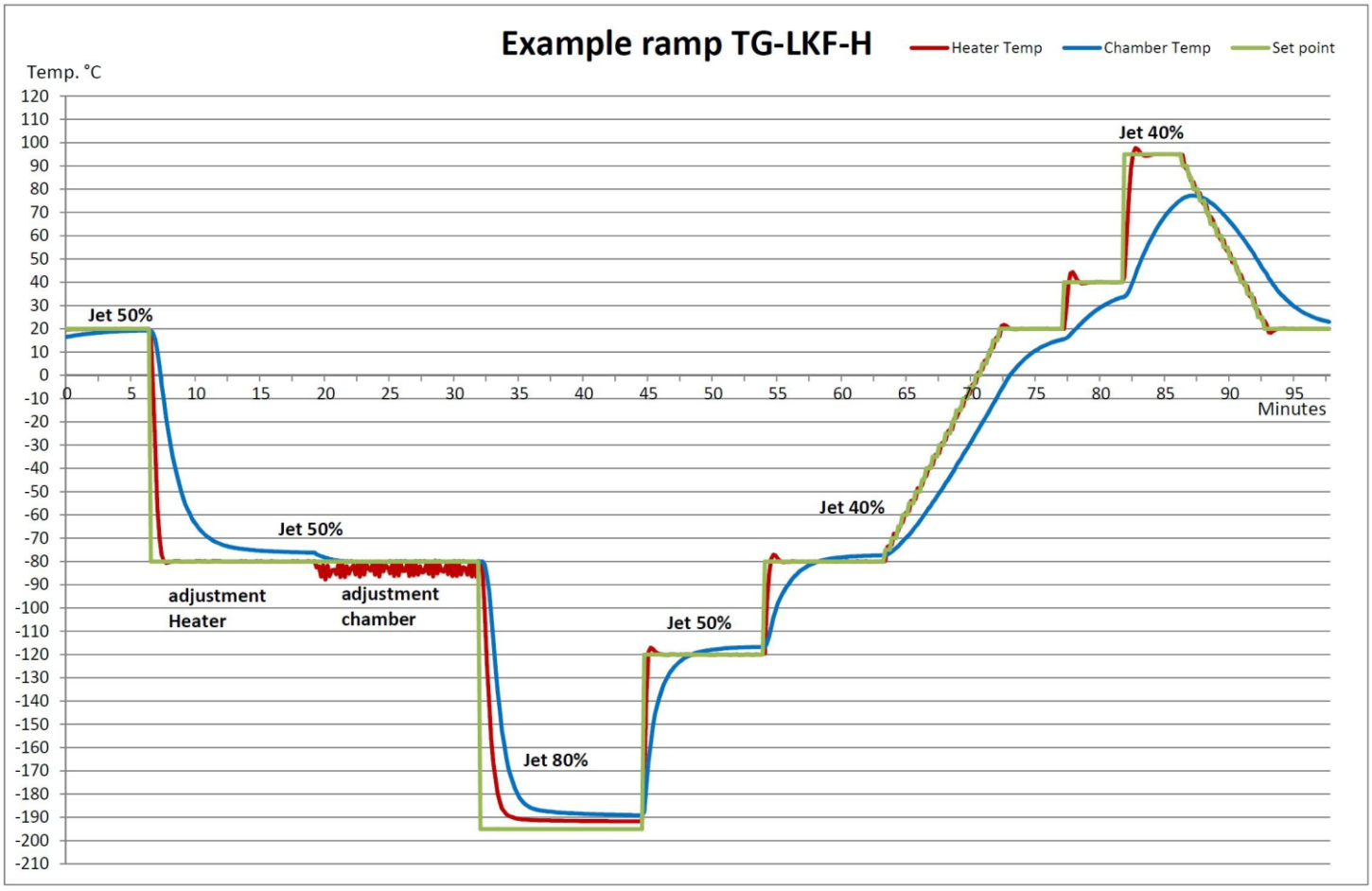


example program



	Command	Temp [°C]	Time [s]	Jet [%]
▶	Set Absolute Heater	20	400	50
	Set Absolute Heater	-80	1200	50
	Approach Chamber	-80	400	50
	Set Absolute Chamber	-80	1200	50
	Set Absolute Heater	-195	800	80
	Set Absolute Heater	-120	600	50
	Set Absolute Heater	-80	600	50
	Room Temp Heater			40
	Hold		300	40
	Set Absolute Heater	40	300	40
	Set Absolute Heater	80	300	40
	Room Temp Heater			40
	Hold		300	40
	Stop			

example ramp
(Excel data on request)



Safety control SC5 unit for cryogenic cooling systems with two temperature sensor connections for a temperature range from +100°C (+212°F) to -196°C (-320,8°F)

from
+/ 100°C
KALTGAS

+/-0°C
KALTGAS

to
-196°C
KALTGAS

SC 5 safety control unit

The SC 5 safety controller has three functional components. The first component is the temperature controller. It allows users to set the temperature set point of the gas flow at the front of the control unit. The temperature controller then shows the current and the set point temperatures separately. In addition, this controller has an RS 485 interface allowing users to address the controller with software and to specify temperature ramps. The controller also has an auto tuning function where the controller automatically searches for and reads in the control parameters required to reach a high level of control stability. The controller can either control the KALTGAS system using its own internal temperature sensor, or it can be manually switched to the second, internal temperature sensor (e.g., on the sample).
The second component is the heating element safety monitor. It monitors the two heating elements for overheating. Should the internal temperature of either of the two heating elements (LN2 vaporizer (Jet) and heater) rise above the specified safety temperature, the safety controller shuts the KALTGAS system off and sounds an alarm. The only way to turn on the system again is manually.
The third component is the LN2 vaporizer (Jet). The gas rate is adjusted with a control knob, with possible manual settings for the gas rate ranging from 0 to 100 %. The resulting volume of cold N_2 gas depends on the Jet power and the specified vaporizer rate. The Jet is available in ratings from 100 to 1000 watts. For an Jet with a rating of 1000 watts, that translates into a maximum N_2 gas production of over 14,000 litres of cold gas per hour. (A Jet with 100 watts evaporates approx. 2 litres of LN2 per hour; 1 litre of LN2 produces approx. 700 litres of N_2 gas.)

Cryogenic cooling Type TG-RD for reaction vessels from +100°C (+212°F) to -180°C (-292°F)

from +100°C KALTGAS

+/-0°C KALTGAS

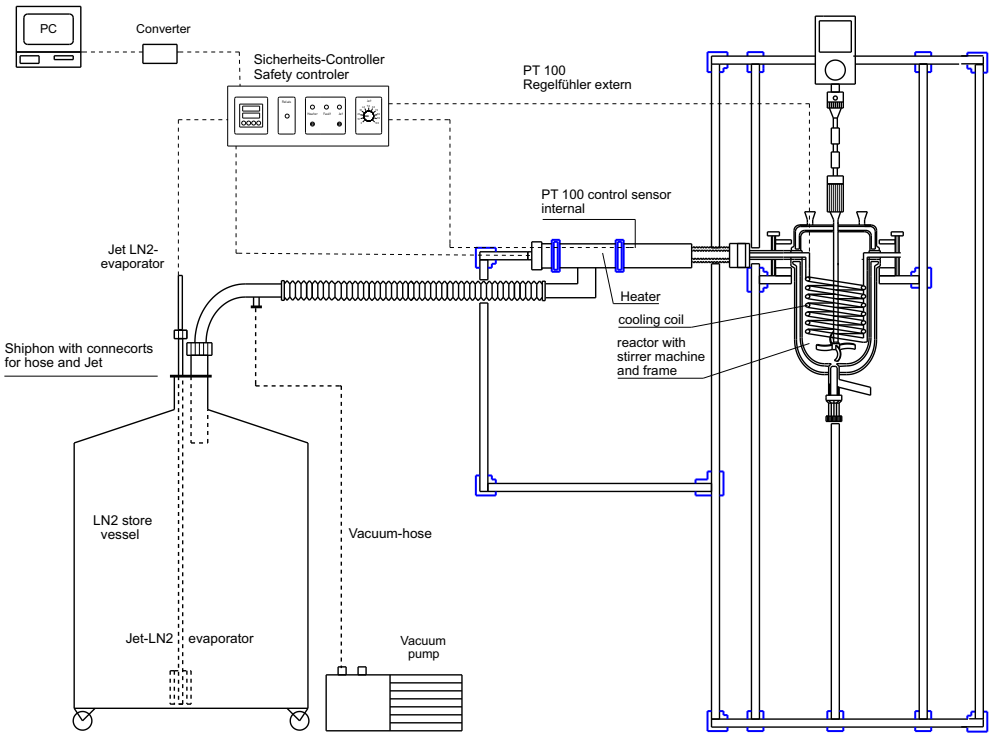
to -180°C KALTGAS

Cryogenic cooling for reaction vessels from +100°C (+212°F) to -180°C (-292°F)

To obtain rapid cooling speeds and very low temperatures, sometimes you have to switch from conventional mechanical cooling to cryogenic cooling. With this scenario in mind, KGW-ISOTHERM has developed a new KALTGAS system. In it, the reactor is cooled with cryogenic nitrogen gas, resulting in a high cooling speed.

KALTGAS is a tempering system that utilizes the very low temperature of liquid nitrogen as a cooling agent. The Jet vaporizes the liquid nitrogen in a cryogenic container, producing a steady cryogenic gas flow. This LN2vaporizer (Jet) can be adjusted to minimize liquid nitrogen consumption and to change both the cooling rate and the volume of the gas flow. The cryogenic gas flow is then piped through a vacuum-insulated flexible metal line (N_2gas line) to a heat exchanger (heater). The heat exchanger is designed to heat the cold gas flow to the desired temperature. The final product, a clearly quantified gas flow exiting the heat exchanger at a clearly defined temperature, is ready for use as a cooling agent. The steady gas flow is directed through a cooling coil suspended in the reaction vessel, where it cools the medium contained in the vessel. The cooling coil can be connected to the KALTGAS system with a quick-lock mechanism, providing for quick and effortless assembly. This is a type of KALTGAS system that tempers reaction vessels directly.
The KALTGAS system cools the medium in the reaction vessel at an extremely high speed because of the great differences in temperature between the cold gas and the medium to be tempered.
A KALTGAS system needs only a few minutes to produce a cold gas flow with a temperature of -180°C (-292°F). This extremely cold gas flow makes it possible to rapidly cool down the medium in the reaction vessel. With the standard safety control unit (SC5), a temperature stability of better than ± 0.2°C can be achieved.
A cascade control system can also be used. With it, you can control the temperature of both the gas and the medium in the reaction vessel. As the current temperature approaches the temperature set point, the difference in temperature is continuously reduced by the temperature controller. That means that a temperature stability of approx. ± 0.1°C can be achieved at steady state.

In addition to their high cooling speed and good control stability, another significant advantage of KALTGAS systems is their modular design. Both the cooling rate and the cooling speed can be changed simply by replacing individual modules such as the N_2gas line, the LN2vaporizer (Jet) or the heater. The basic modules, including the LN2 container, the vacuum pump and the safety control unit, remain unchanged. Another advantage lies in the cooling agent itself. Since liquid nitrogen gas is inert, reaction vessels can be switched without the usual problems associated with the thermostat oil. Furthermore, cleaning the reaction vessel is limited to the vessel's reaction chamber and no longer entails cleaning the thermal jacket.



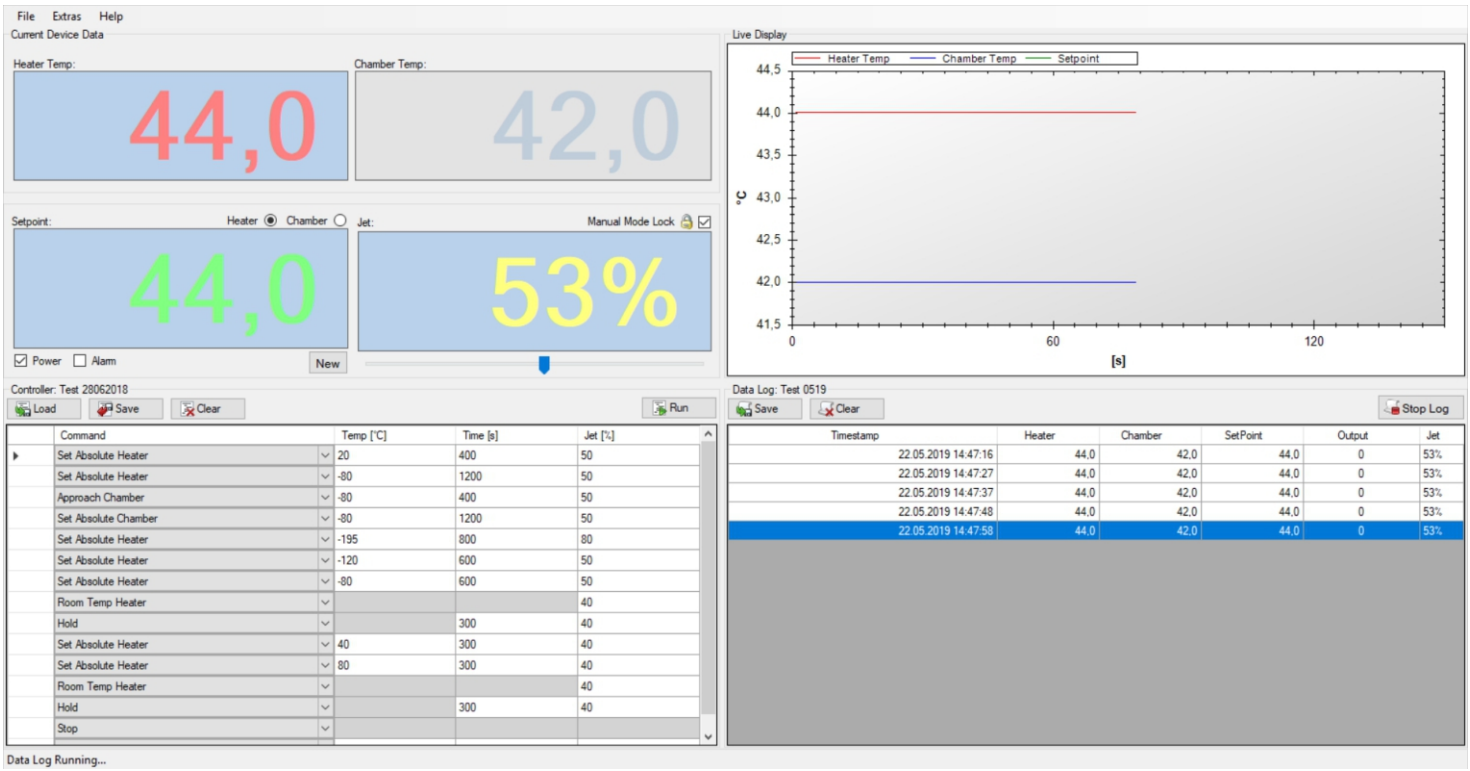
In a reaction vessel, 1.5 liters of methanol are cooled from +20°C (+68°F) to -95°C (-139°F) within approx. 50 minutes. During the cooling phase, about 5 to 6 liters of LN2 are consumed. To maintain the methanol at -95°C (-139°F), the reactor needs only about 1.2 liters of LN2 per hour.

Technical data for	**Model TG-RD**
	Ln2 vaporizer = 500 watts
	Heater = 630 watts
	Reactor = 2 liters volume vacuum insulated with viewing stips
	Reactor lid = 3 x NS 29/32 on sides and middle; vacuum insulated
Fame = Aluminum / V2A	
	N2 gas line = V2A, length 1.5 meters, with vacuum pump
	Standard safety control unit = Constancy +/-0,2°C
	Siphon Lever = for LN2 container with KF NW 50
	Order No.: TG-RD 63/50
Accessories	LN2 container with 20 to 300 liter capacity
	Stirrer, stirring machine and dynamic stirrer seal

Further reactor and cooling system information available.
Technical data subject to change.

KALTGAS TOOL
Software to control kaltgassystems

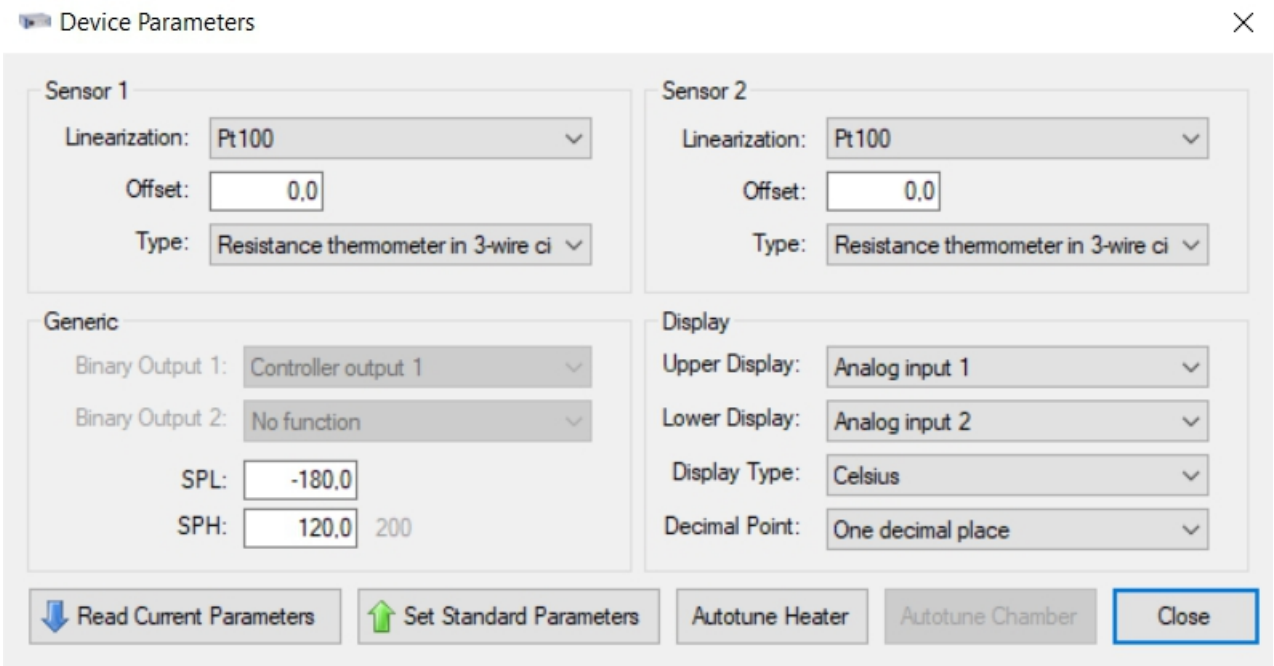
The user interface is shown in the following diagram:



Settings
Sensor and properties
a) Linearization
b) Offset: “0” spot offset
c) type of sensor

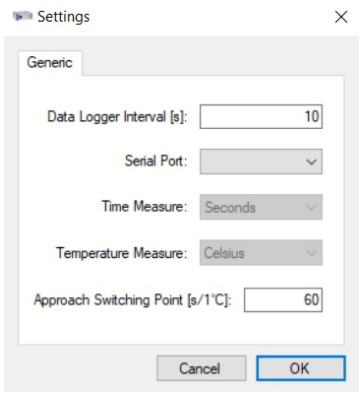
Display
set the upper prompt of controller
set the power prompt of controller
unit °C or K
Decimal place of the Display of Temperature

Abstract
define and set the desired value,
set the max lower desired value,
set the max upper desired value

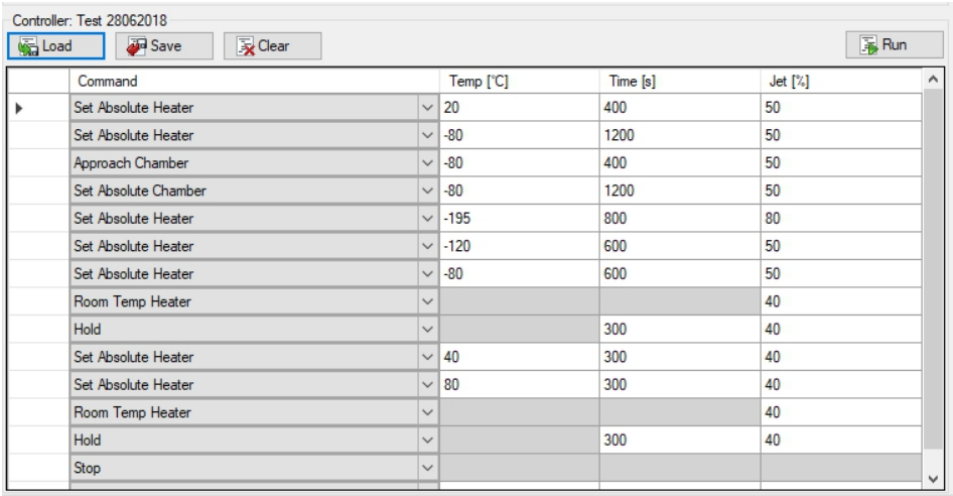


KALTGAS TOOL
Software to control kaltgassystems

Options
Here you can choose the serialport. Make sure
that your controller is connected to the right port.
Additionally, you can preset the

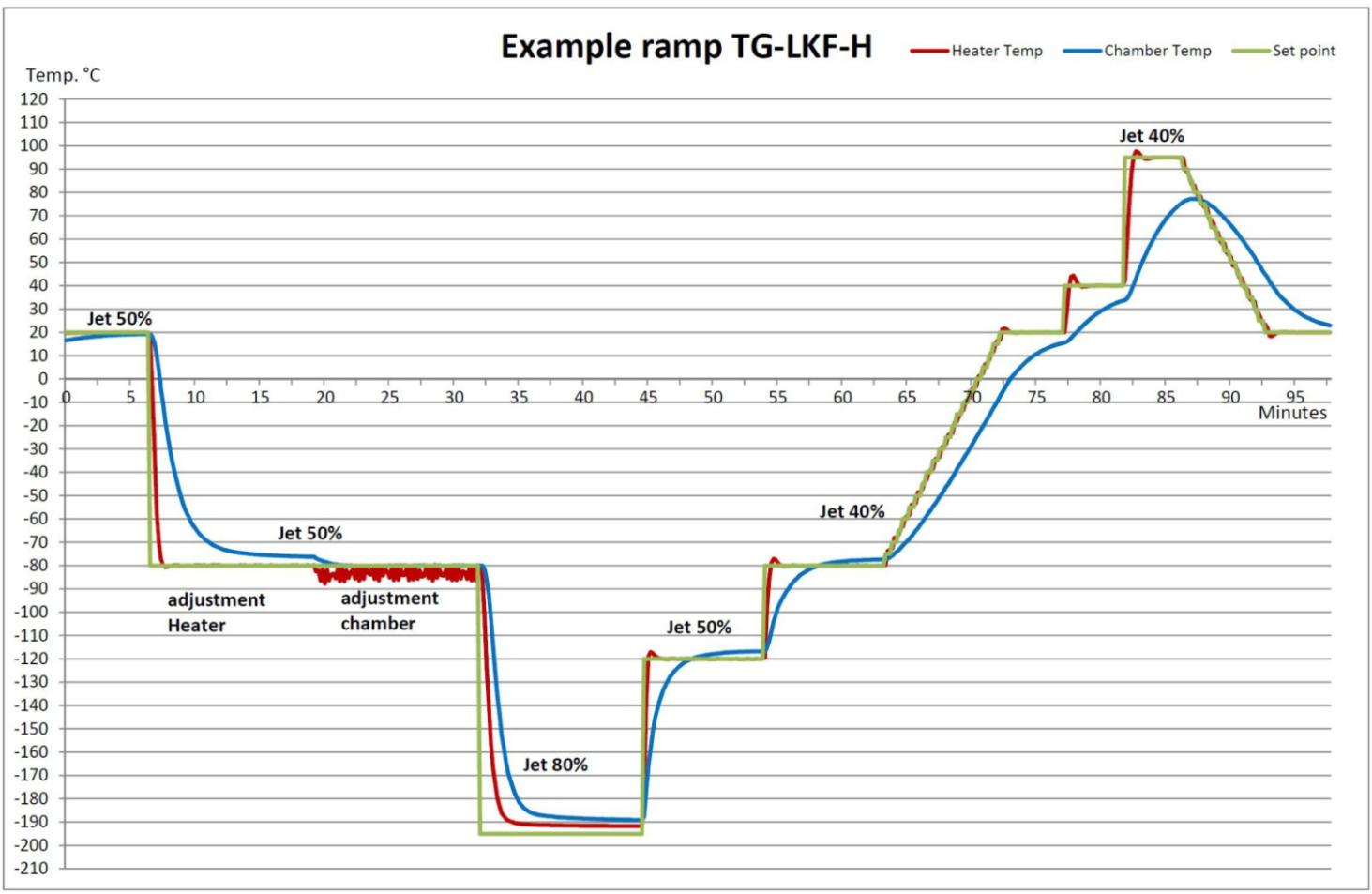


example program



	Command	Temp [°C]	Time [s]	Jet [%]
▸	Set Absolute Heater	20	400	50
	Set Absolute Heater	-80	1200	50
	Approach Chamber	-80	400	50
	Set Absolute Chamber	-80	1200	50
	Set Absolute Heater	-195	800	80
	Set Absolute Heater	-120	600	50
	Set Absolute Heater	-80	600	50
	Room Temp Heater			40
	Hold		300	40
	Set Absolute Heater	40	300	40
	Set Absolute Heater	80	300	40
	Room Temp Heater			40
	Hold		300	40
	Stop			

example ramp
(Excel data on request)



Safety control SC5 unit for cryogenic cooling systems with two temperature sensor connections for a temperature range from +100°C (+212°F) to -196°C (-320,8°F)

from
+/ 100°C
KALTGAS

+/-0°C
KALTGAS

to
-196°C
KALTGAS

SC 5 safety control unit

The SC 5 safety controller has three functional components. The first component is the temperature controller. It allows users to set the temperature set point of the gas flow at the front of the control unit. The temperature controller then shows the current and the set point temperatures separately. In addition, this controller has an RS 485 interface allowing users to address the controller with software and to specify temperature ramps. The controller also has an auto tuning function where the controller automatically searches for and reads in the control parameters required to reach a high level of control stability. The controller can either control the KALTGAS system using its own internal temperature sensor, or it can be manually switched to the second, internal temperature sensor (e.g., on the sample).
The second component is the heating element safety monitor. It monitors the two heating elements for overheating. Should the internal temperature of either of the two heating elements (LN2vaporizer (Jet) and heater) rise above the specified safety temperature, the safety controller shuts the KALTGAS system off and sounds an alarm. The only way to turn on the system again is manually.
The third component is the LN2 vaporizer (Jet). The gas rate is adjusted with a control knob, with possible manual settings for the gas rate ranging from 0 to 100 %. The resulting volume of cold N_2gas depends on the Jet power and the specified vaporizer rate. The Jet is available in ratings from 100 to 1000 watts. For an Jet with a rating of 1000 watts, that translates into a maximum N_2gas production of over 14,000 litres of cold gas per hour. (A Jet with 100 watts evaporates approx. 2 litres of LN2 per hour; 1 litre of LN2 produces approx. 700 litres of N_2gas.)

Cryogenic cooling Type TG-RID for reaction vessels from +100°C (+212°F) to -180°C (-292°F)

from +100°C KALTGAS

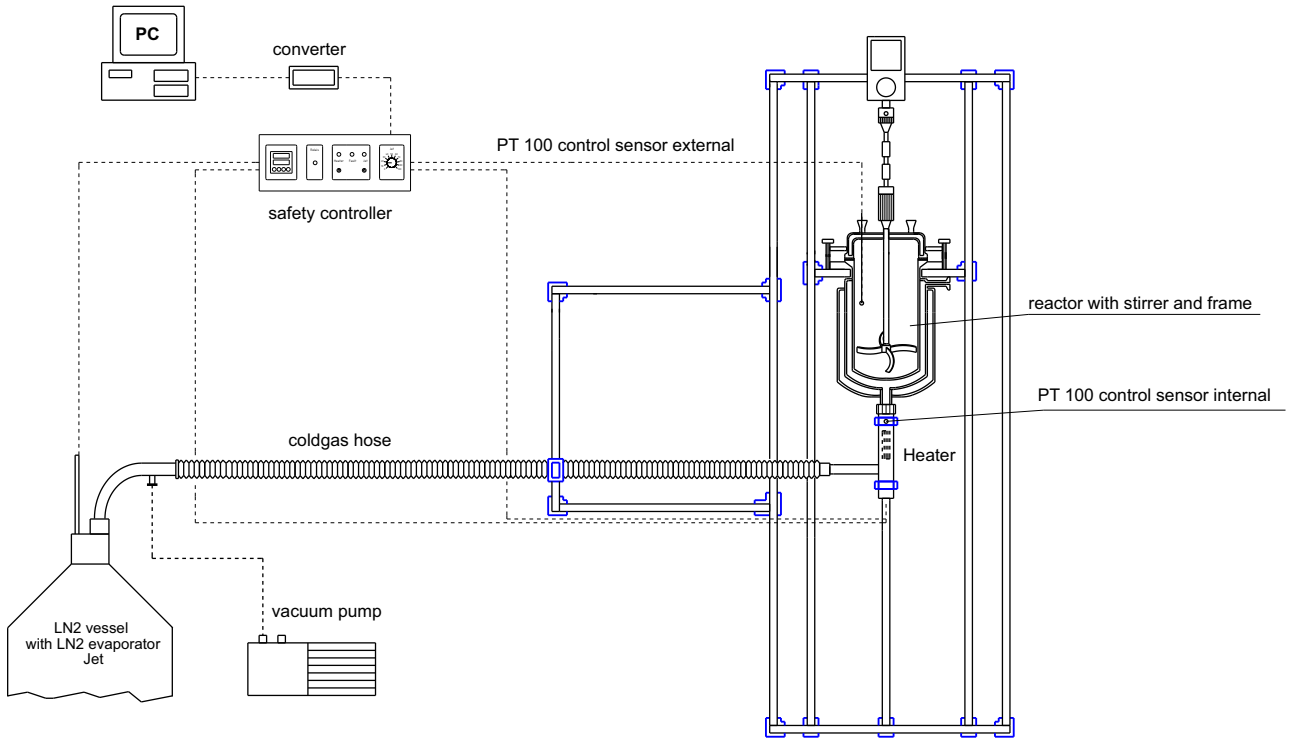
+/-0°C KALTGAS

to -180°C KALTGAS

Indirect cryogenic cooling for reaction vessels from +100°C (+212°F) to -180°C (-292°F)

To obtain rapid cooling speeds and very low temperatures, sometimes you have to switch from conventional mechanical cooling to cryogenic cooling. With this scenario in mind, KGW-ISOTHERM has developed a new KALTGAS system. In it, the reactor is cooled with cryogenic nitrogen gas, resulting in a high cooling speed. This cooling technology has low entry barriers thanks to its ease of use and high operational safety.

KALTGAS is a tempering system that utilizes the very low temperature of liquid nitrogen as a cooling agent. The Jet vaporizes the liquid nitrogen in a cryogenic container, producing a steady cryogenic gas flow. This LN2vaporizer (Jet) can be adjusted to minimize liquid nitrogen consumption and to change both the cooling rate and the volume of the gas flow. The cryogenic gas flow is then piped through a vacuum-insulated flexible metal line (N_2gas line) to a heat exchanger (heater). The heat exchanger is designed to heat the cold gas flow to the desired temperature. The final product, a clearly quantified gas flow exiting the heat exchanger at a clearly defined temperature, is ready for use as a cooling agent. The steady gas flow is directed through the reaction vessel's thermal jacket and cools the medium contained in the vessel. This is a type of KALTGAS system that tempers reaction vessels indirectly.
The KALTGAS system cools the medium in the reaction vessel at an extremely high speed because of the great differences in temperature between the cold gas and the medium to be tempered.
A KALTGAS system needs only a few minutes to produce a cold gas flow with a temperature of -180°C (-292°F). This extremely cold gas flow makes it possible to rapidly cool down the medium in the reaction vessel. With the standard safety control unit (SC5), a temperature stability of better than ± 0.2°C can be achieved.
A cascade control system can also be used. With it, you can control the temperature of both the gas and the medium in the reaction vessel. As the current temperature approaches the temperature set point, the difference in temperature is continuously reduced by the temperature controller. That means that a temperature stability of approx. ± 0.2°C can be achieved at steady state.
In addition to their high cooling speed and good control stability, another advantage of KALTGAS systems is their modular design. By swapping out individual modules such as the N_2gas line, the LN2vaporizer (Jet) or the heater, it is possible to change the cooling speed, LN2 consumption as well as the application. The basic modules, including the LN2 container, the vacuum pump and the safety control unit, remain unchanged. Another advantage lies in the cooling agent itself. Since liquid nitrogen gas is inert, reaction vessels can be switched without the usual problems associated with the thermostat oil. Furthermore, cleaning the reaction vessel is limited to the vessel's reaction chamber and no longer entails cleaning the thermal jacket.



In a reaction vessel, 1.5 liters of methanol are cooled from +20°C (+68°F) to -95°C (-139°F) within approx. 60 minutes. During the cooling phase, about 5 to 6 liters of LN2 are consumed. Maintaining the methanol at a temperature of -95°C (-140°F) requires only about 1.2 liters of LN2 per hour.

Technical data for **Model TG-RID**

LN2 vaporizer = 500 watts
Heater = 400 watts
Reactor = 2 liters volume vacuum insulated with control window
Reactor lid = 3 x NS 29/32 on sides and middle; vacuum jacketed
Frame = Aluminum / V2A
N2 gas line = V2A, length 1.5 meters, with vacuum pump
Standard safety control unit = Constancy +/-0,2°C
Siphon for LN2 container with KF NW 50

Order No.: TG-RID 40/50

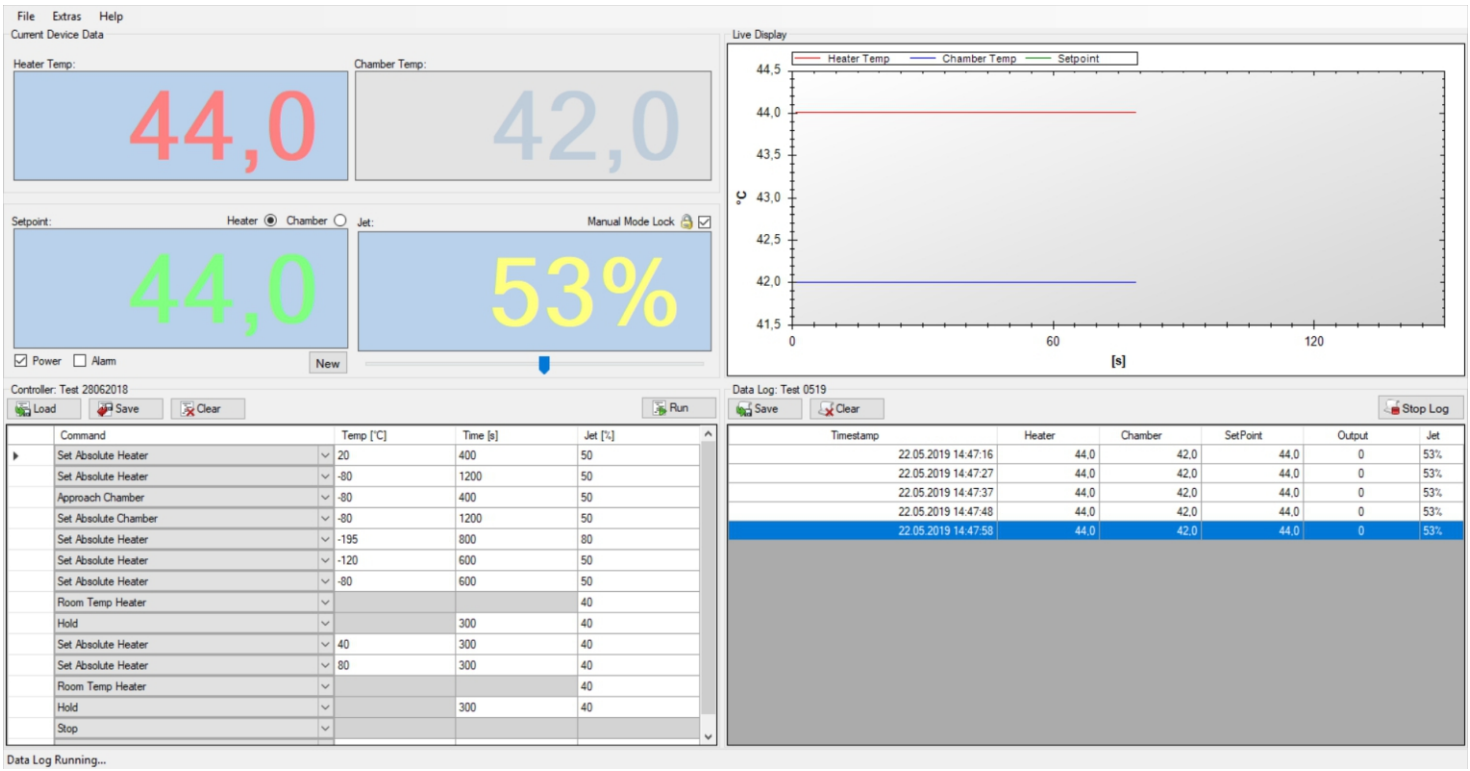
Accessories

LN2 container with 20 to 300 liter capacity
Stirrer, stirring machine and dynamic stirrer seal

Further reactor and cooling system information available.
Technical data subject to change.

KALTGAS TOOL
Software to control kaltgassystems

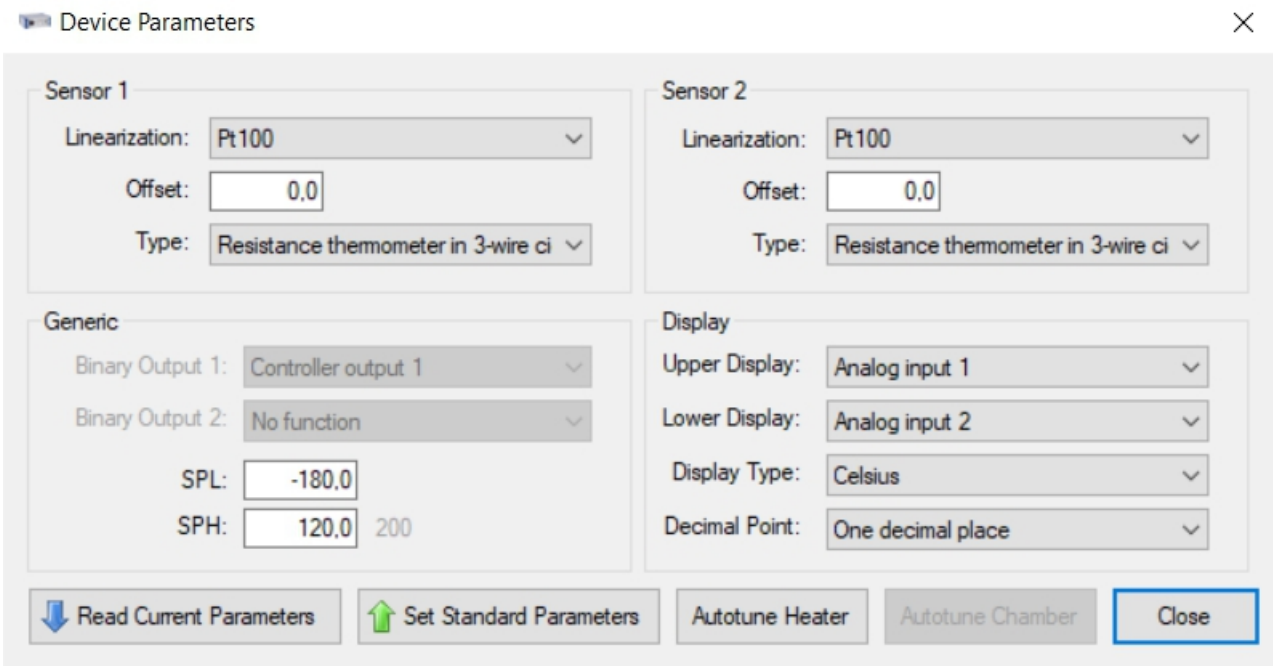
The user interface is shown in the following diagram:



Settings
Sensor and properties
a) Linearization
b) Offset: “0” spot offset
c) type of sensor

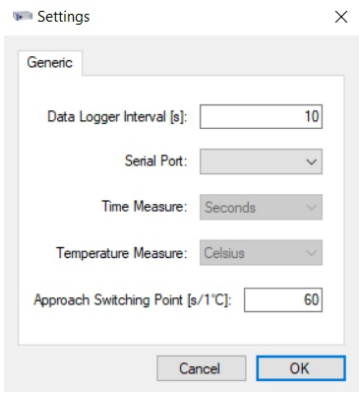
Display
set the upper prompt of controller
set the power prompt of controller
unit °C or K
Decimal place of the Display of Temperature

Abstract
define and set the desired value,
set the max lower desired value,
set the max upper desired value

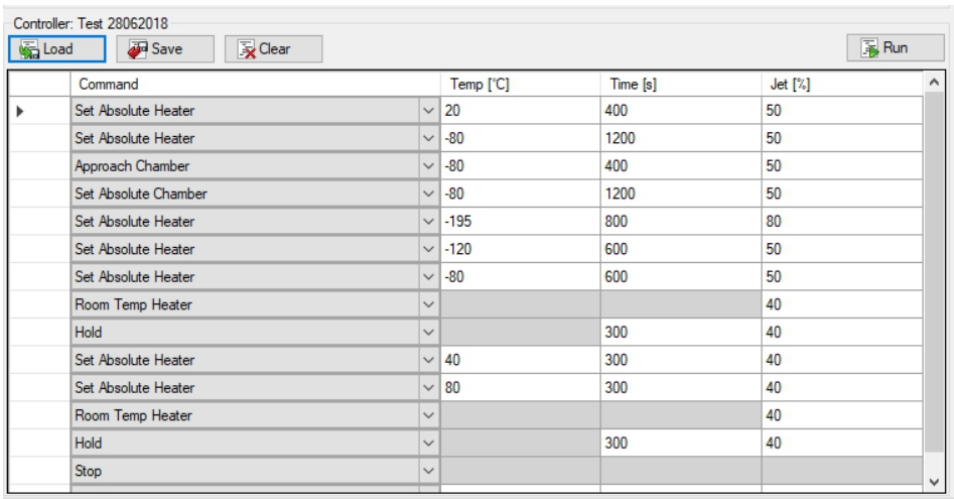


KALTGAS TOOL
Software to control kaltgassystems

Options
Here you can choose the serialport. Make sure
that your controller is connected to the right port.
Additionally, you can preset the

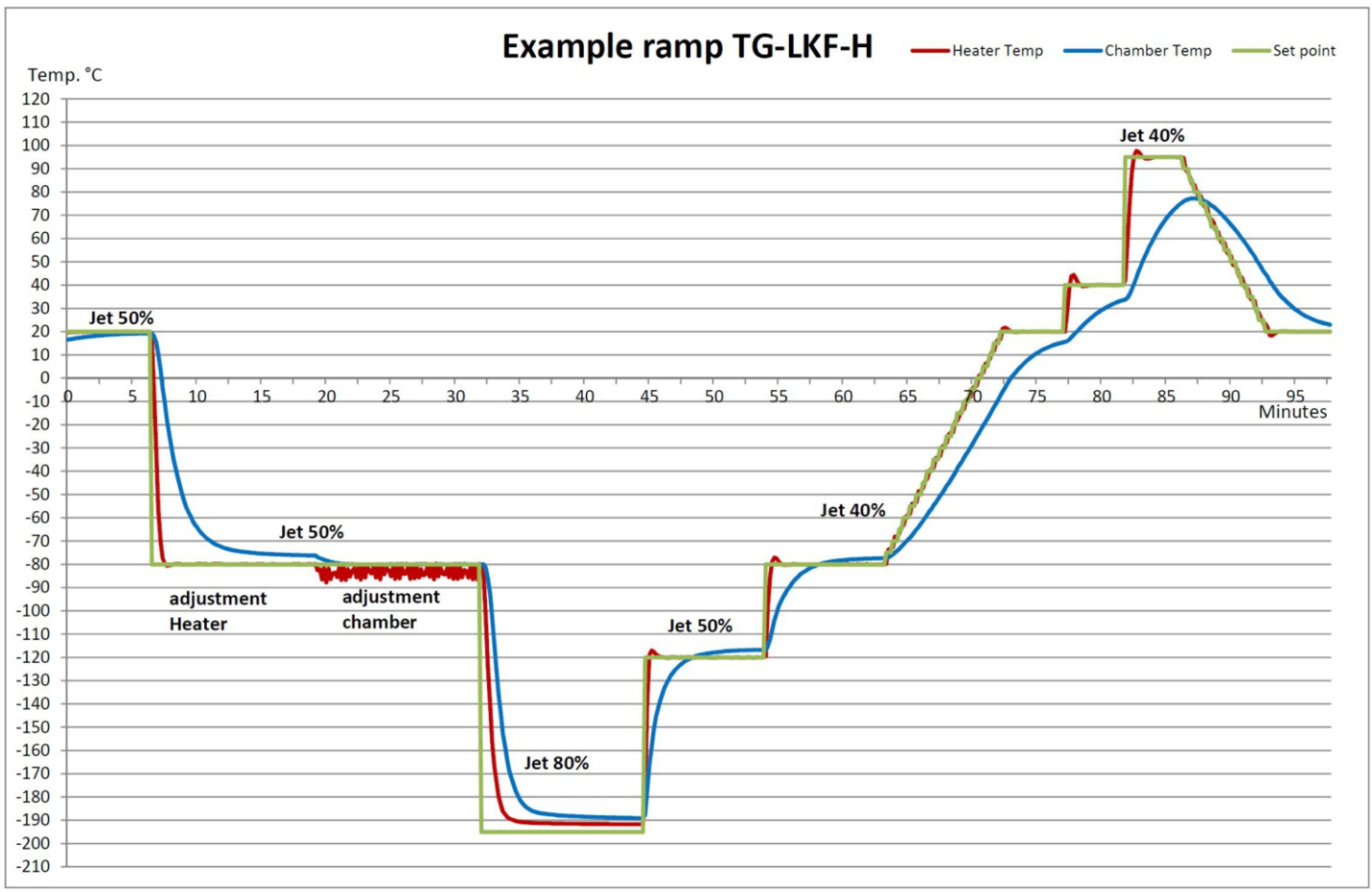


example program



	Command	Temp [°C]	Time [s]	Jet [%]
▶	Set Absolute Heater	20	400	50
	Set Absolute Heater	-80	1200	50
	Approach Chamber	-80	400	50
	Set Absolute Chamber	-80	1200	50
	Set Absolute Heater	-195	800	80
	Set Absolute Heater	-120	600	50
	Set Absolute Heater	-80	600	50
	Room Temp Heater			40
	Hold		300	40
	Set Absolute Heater	40	300	40
	Set Absolute Heater	80	300	40
	Room Temp Heater			40
	Hold		300	40
	Stop			

example ramp
(Excel data on request)



Safety control SC5 unit for cryogenic cooling systems with two temperature sensor connections for a temperature range from +100°C (+212°F) to -196°C (-320,8°F)

from
+/ 100°C
KALTGAS

+/-0°C
KALTGAS

to
-196°C
KALTGAS

SC 5 safety control unit

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special Kaltgas systems

Typ TG-LKF-H-S1

Kaltgas system with reactor in a compact design applied in laboratory hood,
in a temperature range from +100°C to -180°C measured at a internal sensor.

Typ TG-LKF-H-S2

Kaltgas system with a vacuum insulated chamber for tests. for example :
notched impact test, Kryo-ampoules, small technical elements
in a temperature range from +100°C to -180°C measured at the control sensor.