

Sample drawings of KALTGAS systems.

- 1) A KALTGAS system type TG-DD for continuous applications with a separate vaporizer Dewar. Temperature range from +20°C to -160°C.
- 2) A KALTGAS-temperature controlling unit to cool oil or other liquids. Temperature range from +60°C to -170°C.
- 3) A KALTGAS-temperature controlling unit type TG-L to cool gases or other liquids. Temperature range from +60°C to -170°C.
- 4) A KALTGAS system, similar to type TG-LKF for a temperature control of a conventionally insulated chamber. Temperature range from +20°C to -160°C.
- 5) A KALTGAS system, similar to type TG-LKF for a temperature control of a vacuum-insulated chamber, e.g. for a notched bar impact test. Temperature range from +80°C to -170°C.
- 6) A KALTGAS system, similar to type TG-LKF for a temperature control of a small reaction vessel. Temperature range from +80°C to -170°C.
- 7) A KALTGAS system for a temperature control of a vacuum-insulated chamber for metallic or ceramic samples; with removable sample holder. Temperature range from +80°C to -170°C.
- 8) A KALTGAS system type TG-LKF-H with a vacuum-insulated V2A-chamber. Temperature range from +80°C to -160°C.
- 9) A special KALTGAS system similar to type TG-LKF-H with a vacuum-insulated, corresponding Dewar chamber. Temperature range from +60°C to -170°C.
- 10) A KALTGAS system type TG-LKF-H with a vacuum-insulated glass chamber. Temperature range from +100°C to -180°C.
- 11) A KALTGAS system, similar to type TG-LKF-H for a temperature control of a conventionally insulated chamber placed on plates that can be cooled. Temperature range from +40°C to -120°C.
- 12) A KALTGAS system, similar to type TG-LKF-H for a temperature control inside of a non-magnetic, vacuum-insulated Dewar chamber. Temperature range from +80°C to -170°C.
- 13) A KALTGAS system type TG-L with a Swagelok-connection for a 10mm-tube. Temperature range from +80°C to -160°C.
- 14) A special KALTGAS system similar to type TG-LKF with angled vacuum-flange connection KF-NW40 and embedded chamber sensor. Temperature range from +10°C to -180°C.
- 15) A special KALTGAS system similar to type TG-LKF with frame, two-parted KALTGAS hose, a vacuum-insulated hood chamber and vacuum-insulated exhaust hose. Temperature range from +100°C to -100°C.
- 16) A special KALTGAS system similar to type TG-RID for applications inside of a laboratory-fume hood. Temperature range from +80°C to -170°C.
- 17) A special KALTGAS system type TG-KKK with a compact and removable chamber. Temperature range from +80°C to -180°C.
- 18) A KALTGAS system type TYP T-G for generating a cryogenic gas stream without temperature control. Temperature range down to approx. -170°C.

Automatic LN2 level control

Frame for KAL TGAS system

**Vaporizer Dewar with
hose and nozzle**

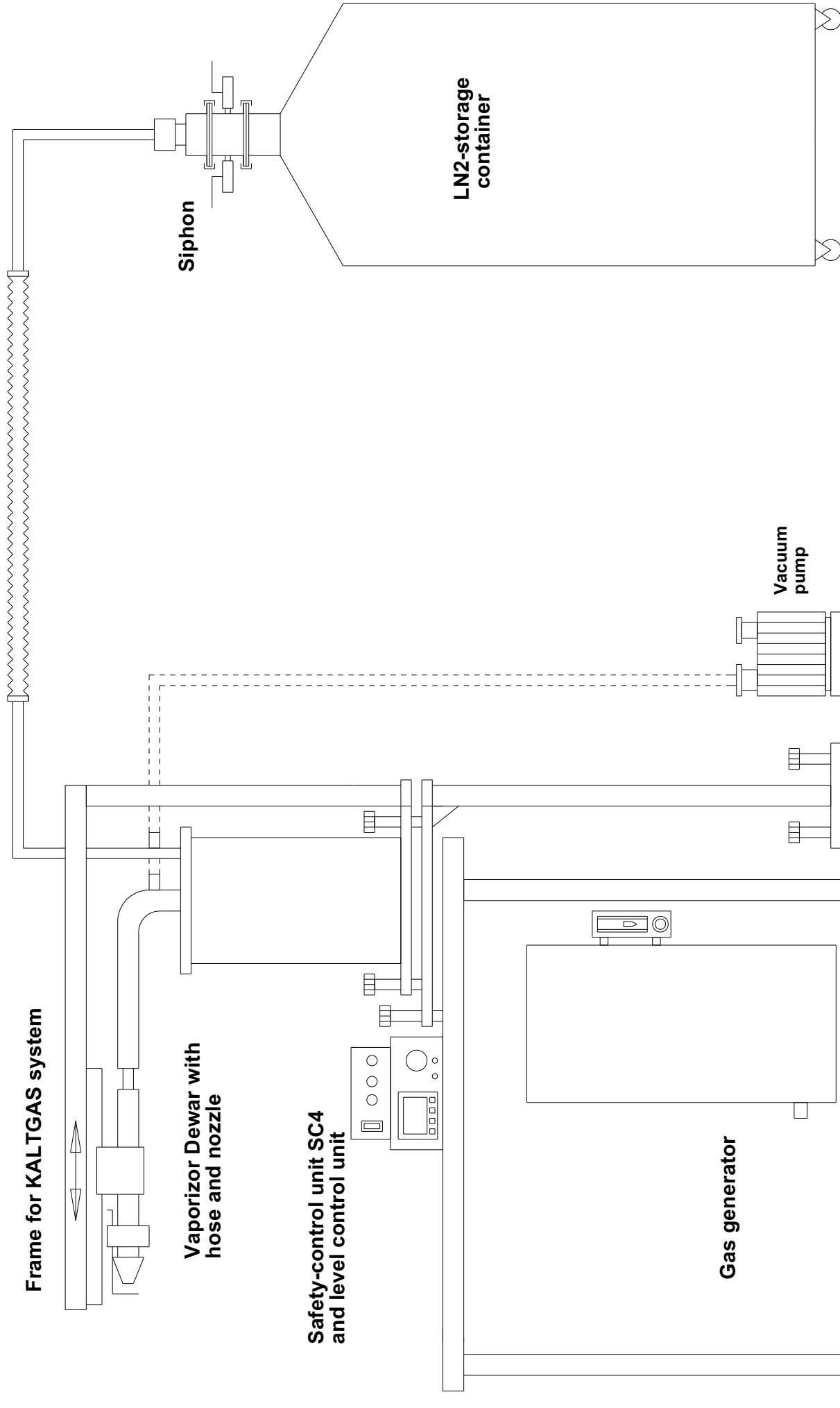
**Safety-control unit SC4
and level control unit**

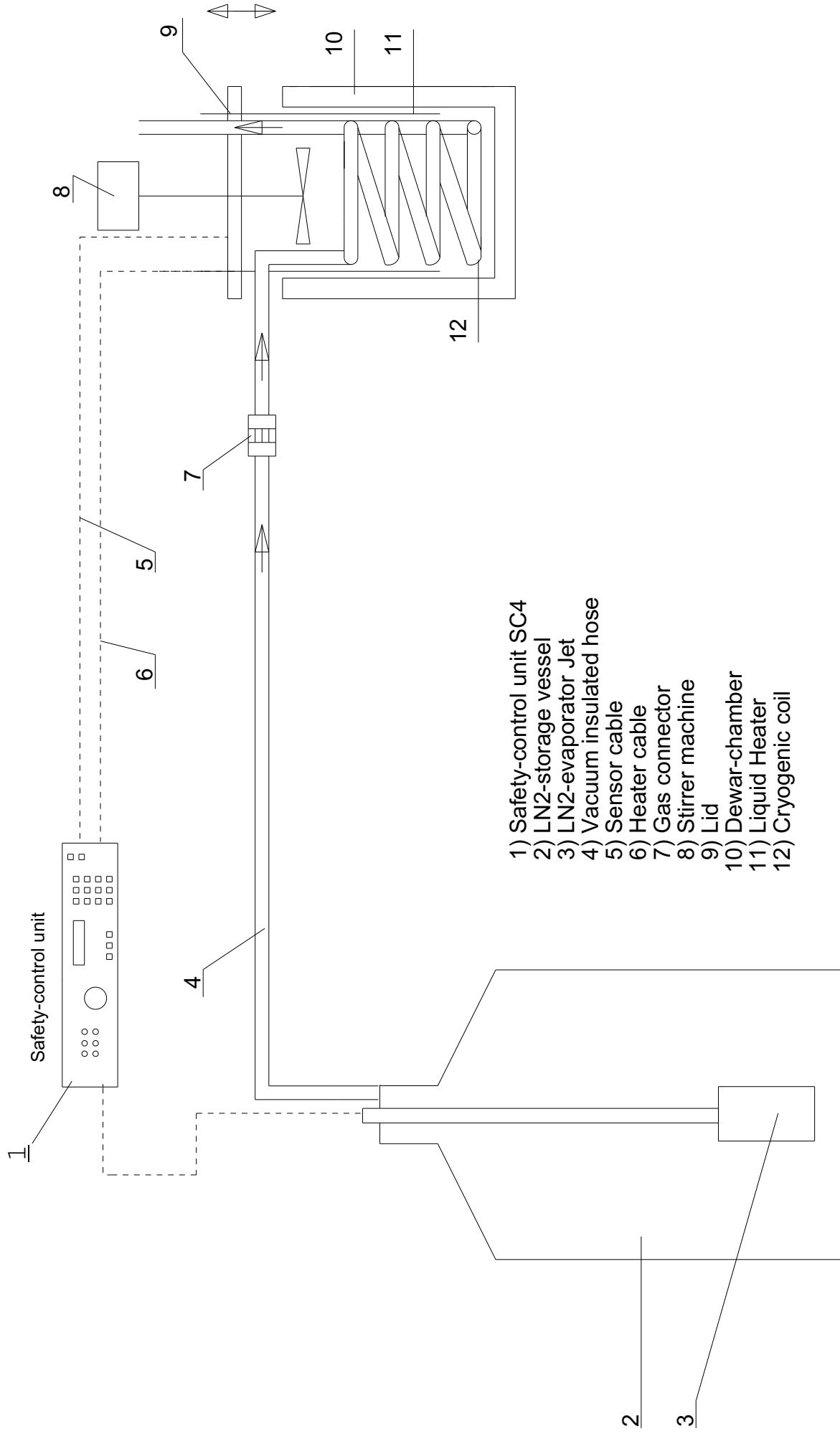
Gas generator

**Vacuum
pump**

Siphon

**LN2-storage
container**





- 1) Safety-control unit SC4
- 2) LN2-storage vessel
- 3) LN2-evaporator Jet
- 4) Vacuum insulated hose
- 5) Sensor cable
- 6) Heater cable
- 7) Gas connector
- 8) Stirrer machine
- 9) Lid
- 10) Dewar-chamber
- 11) Liquid Heater
- 12) Cryogenic coil

Oil bath
+60°C to -170°C

KALIGAS with chiller to cool down a oil bath

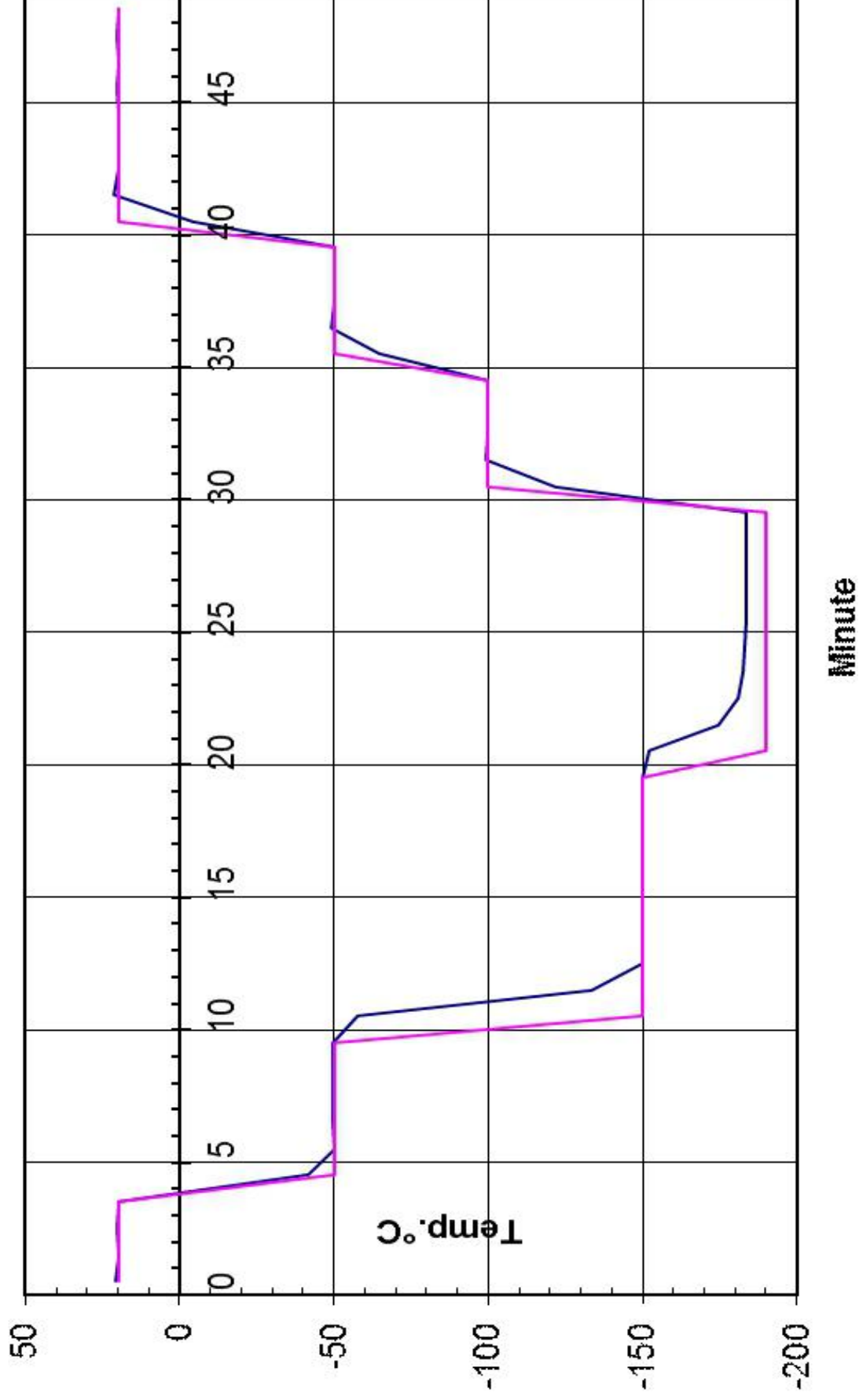
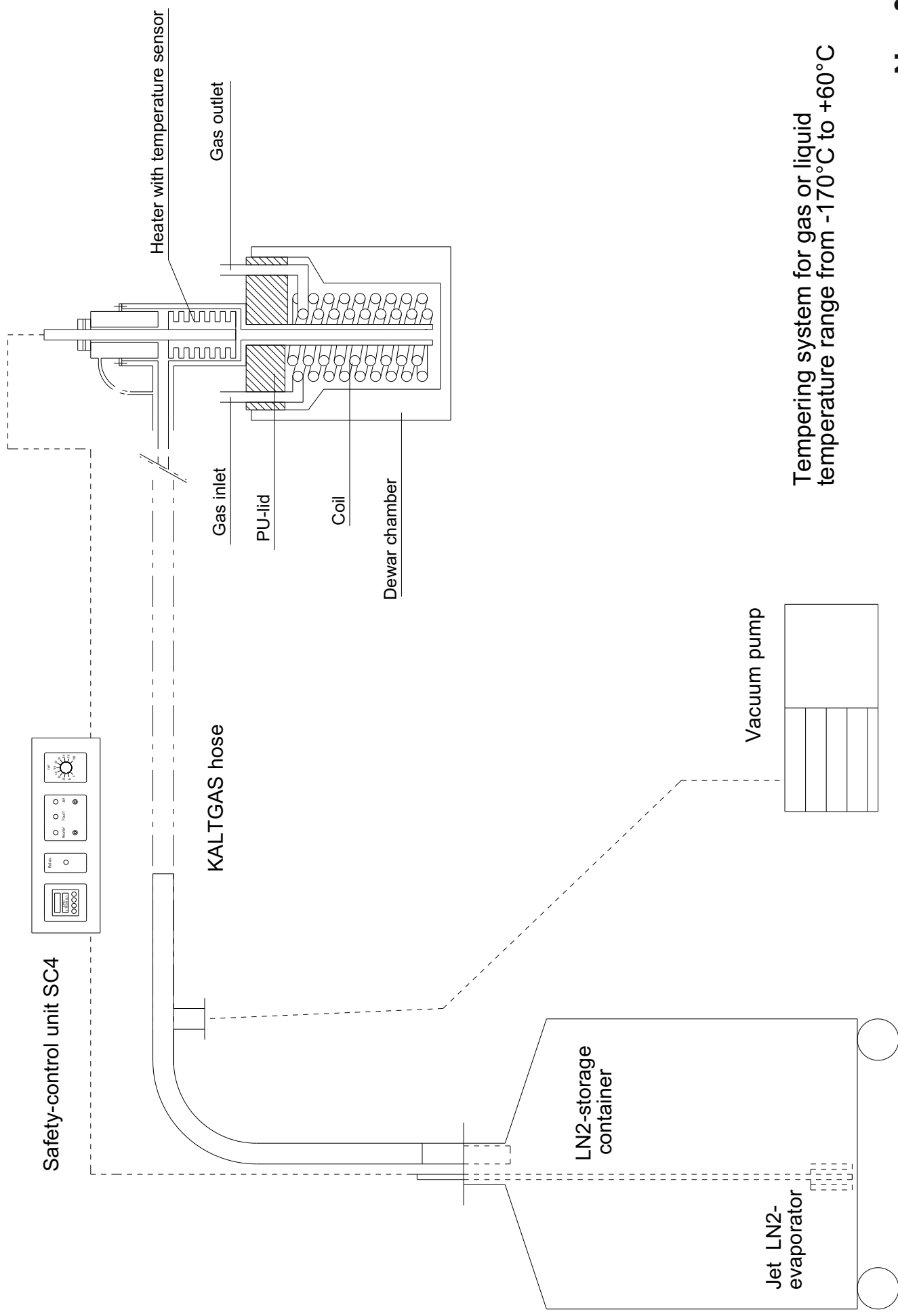
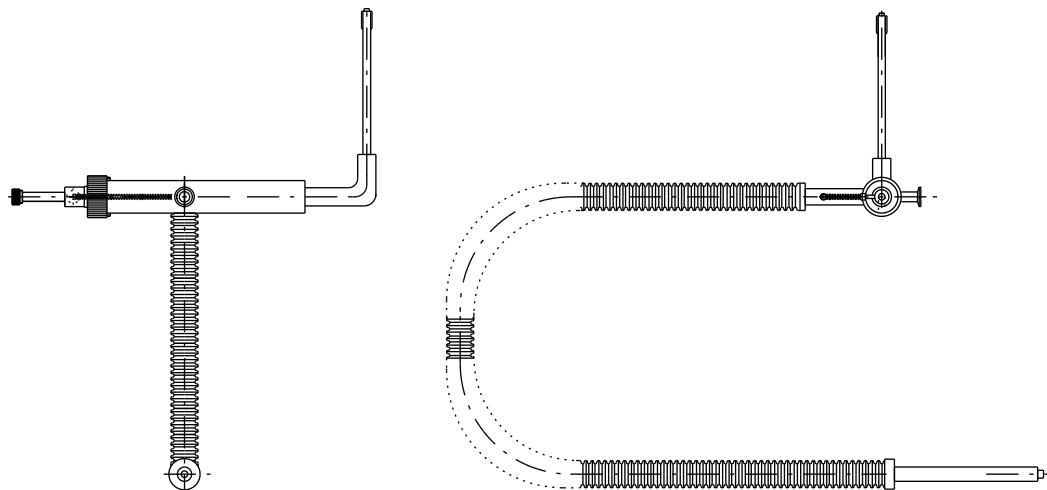


Diagram No. 2



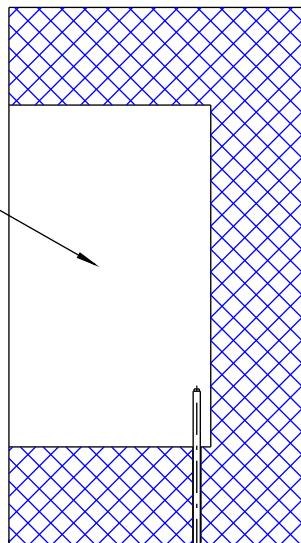
Tempering system for gas or liquid
temperature range from -170°C to +60°C

KALTGAS hose



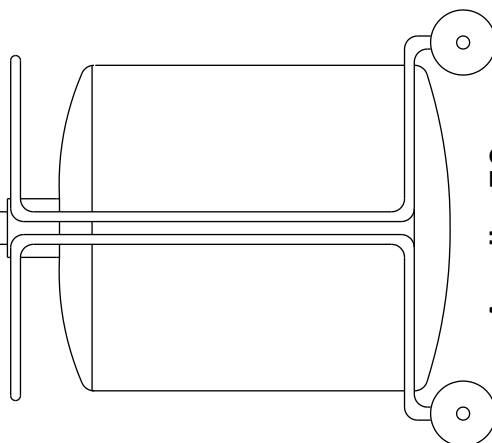
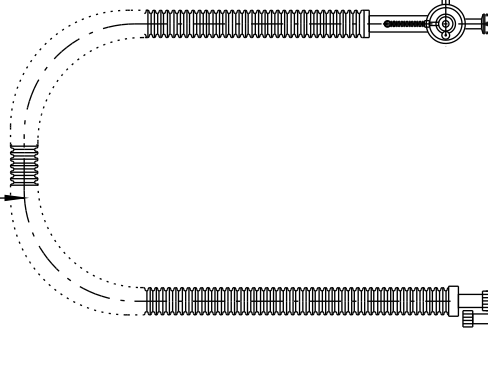
No. 4

Chamber



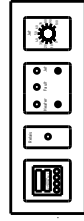
Vacuum
pump

KALTGAS hose
1800mm



Apollo 50

Sicherheits-Contoller
safety-control unit



Deckel mit Abgasrohr
Lid with gas-outlet tube

Temperaturanzeige Kammer
Temperature indicator
(external chamber sensor)

Kammer / chamber Di=100mm / H=400

Heberkopf mit LN2-Jet
Siphon with LN2-Jet

Kaltgas-Regelfühler
Temperature control
(internal KALTGAS sensor)

Heater

Rohre 2,5 x 300mm
tube 2,5 x 300mm

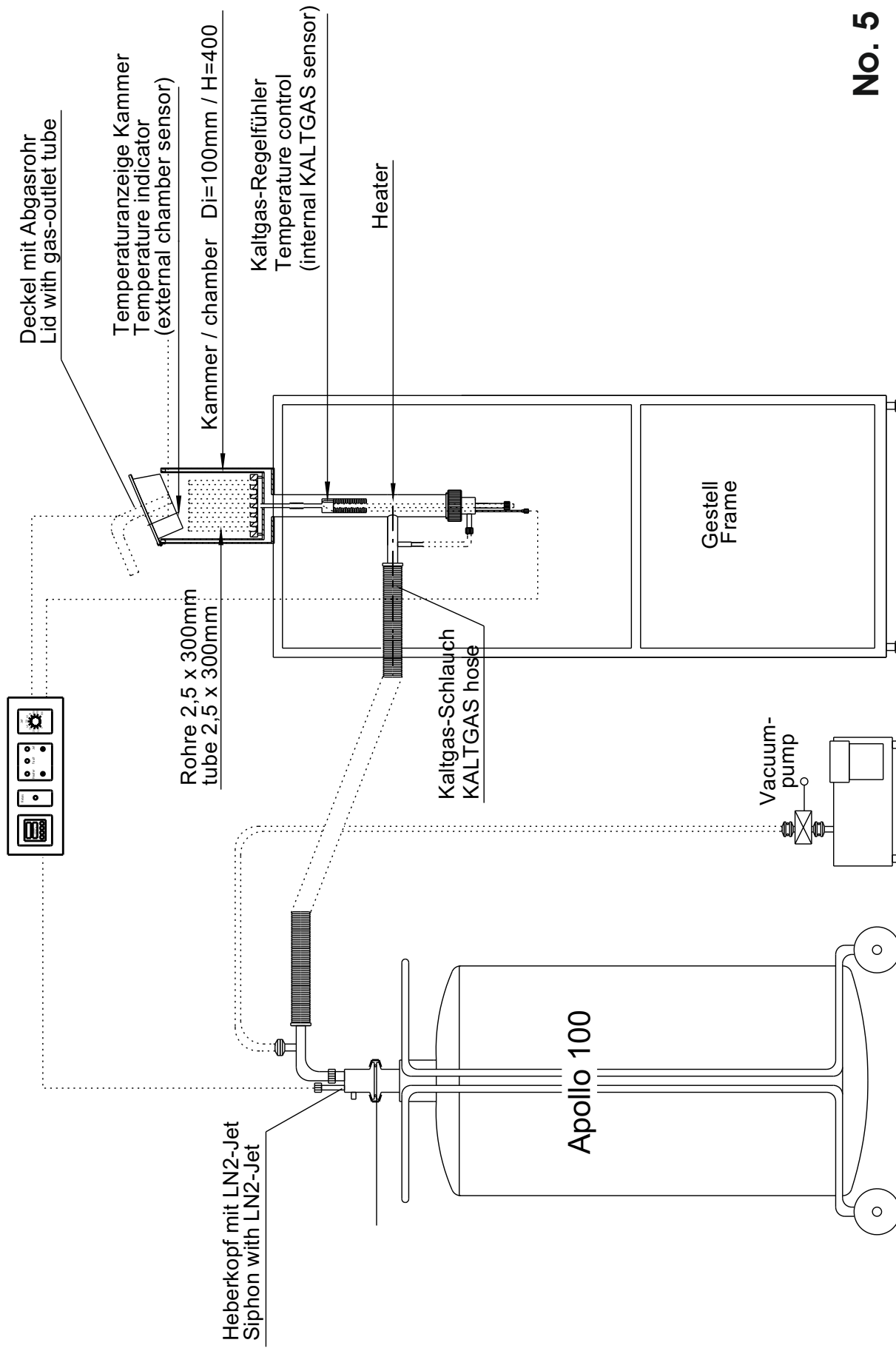
Kaltgas-Schlauch
KALTGAS hose

Apollo 100

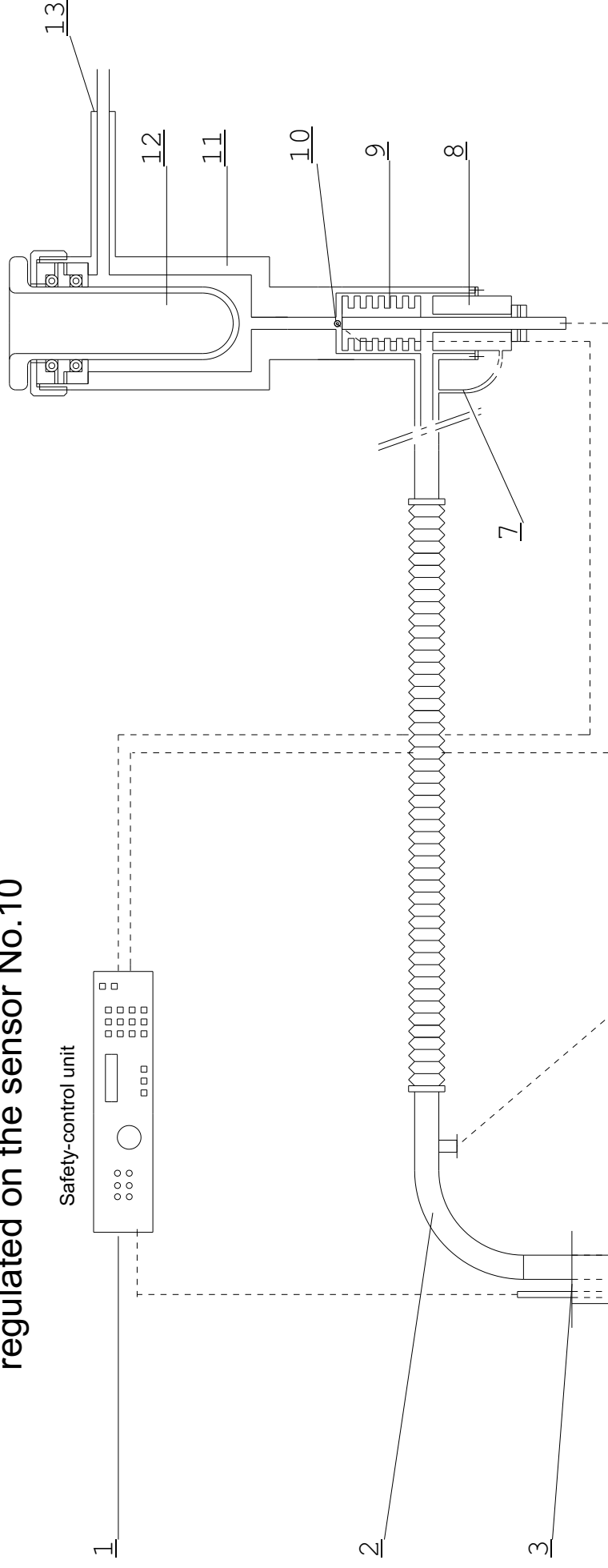
Gestell
Frame

Vacuum-
pump

No. 5

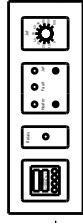


Temperature from -170°C to $+80^{\circ}\text{C}$
regulated on the sensor No.10



- 1) Safety-control unit SC4
- 2) Vacuum insulated hose
- 3) Siphon for vacuum insulated hose
- 4) LN2-storage vessel
- 5) LN2-evaporator Jet 300Watt
- 6) Vacuum pump
- 7) Vacuum connector
- 8) Vacuum insulated lid
- 9) Heater with 630 Watt
- 10) Temperature sensor
- 11) Vacuum insulated chamber
- 12) Reaction vessel
- 13) Gas outlet tube

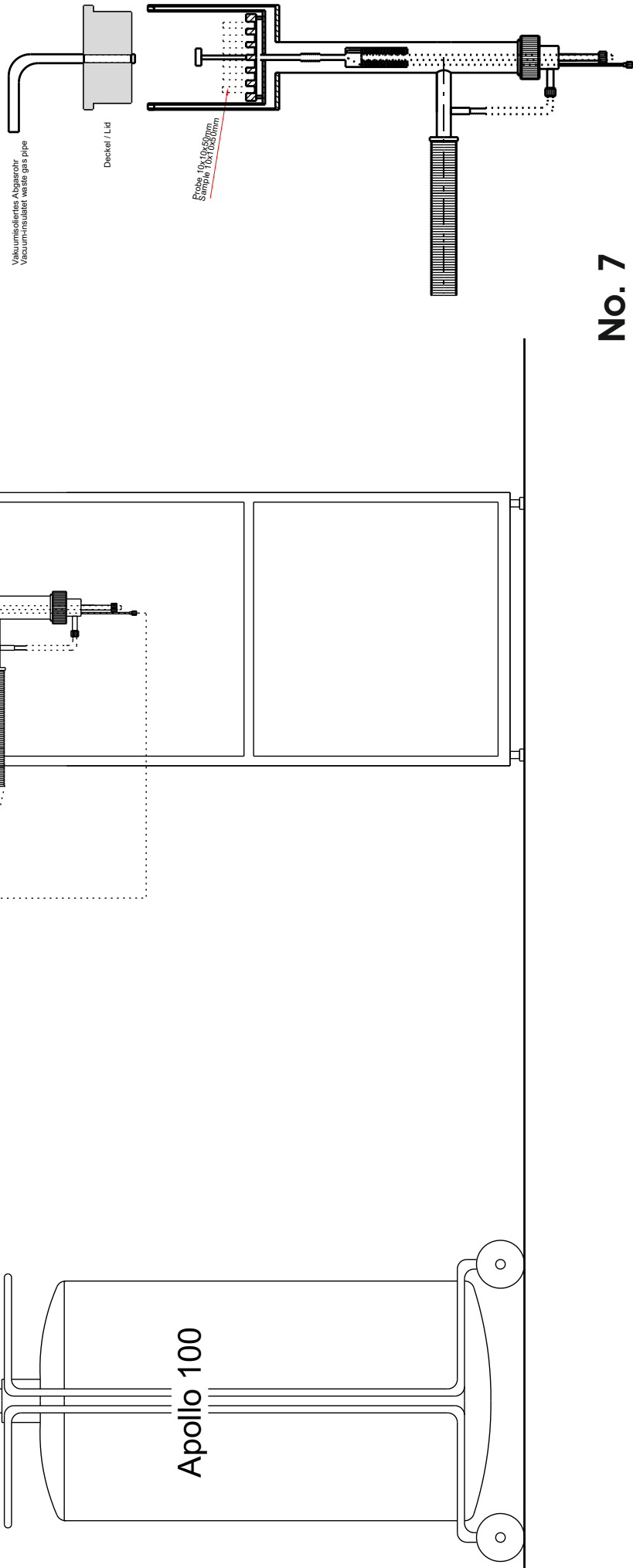
Safety-control unit



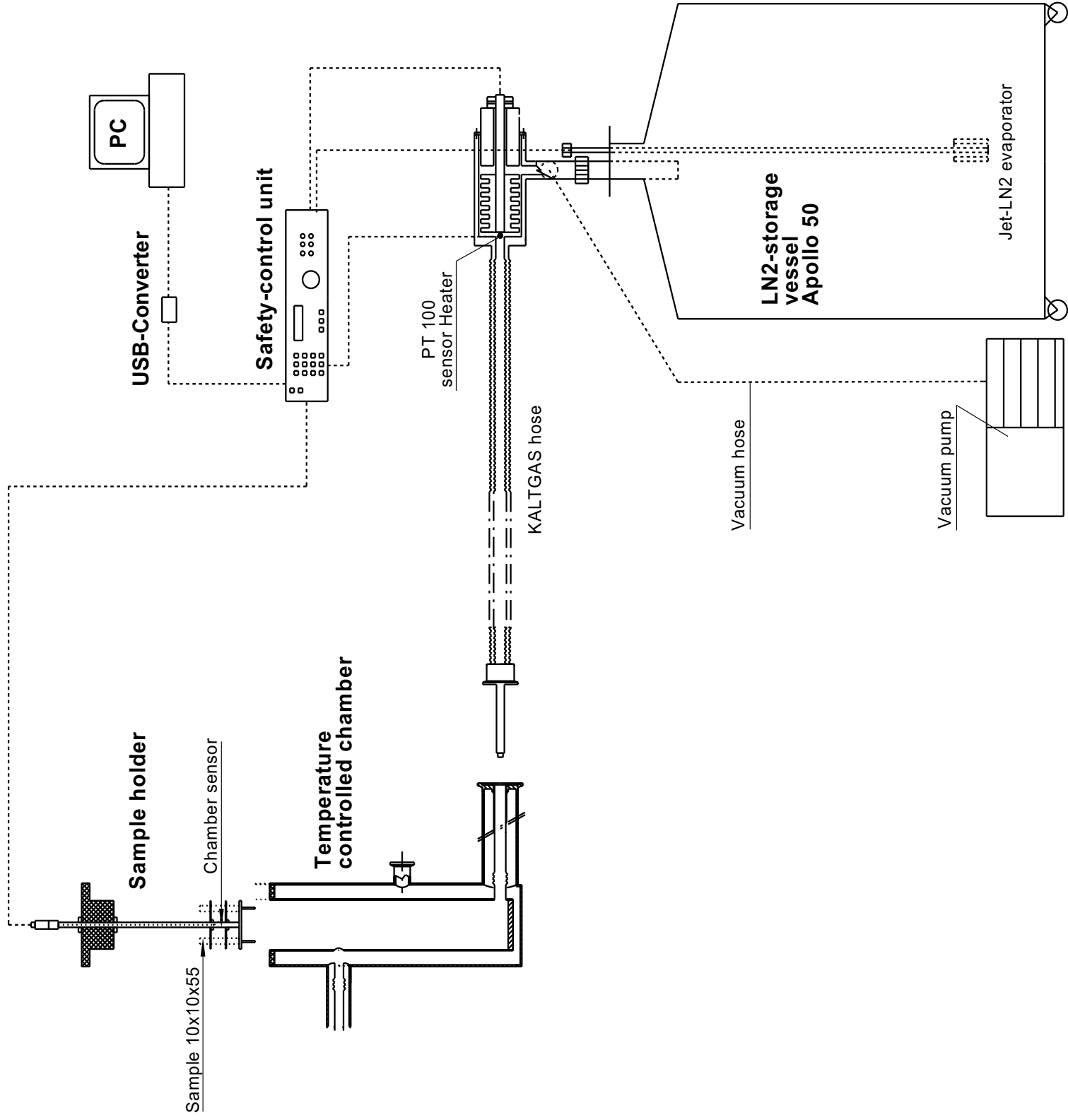
Temperaturanzeige Kammer
Temperature indicator
(external sensor)

Deckel verschiebbar
Lid movable

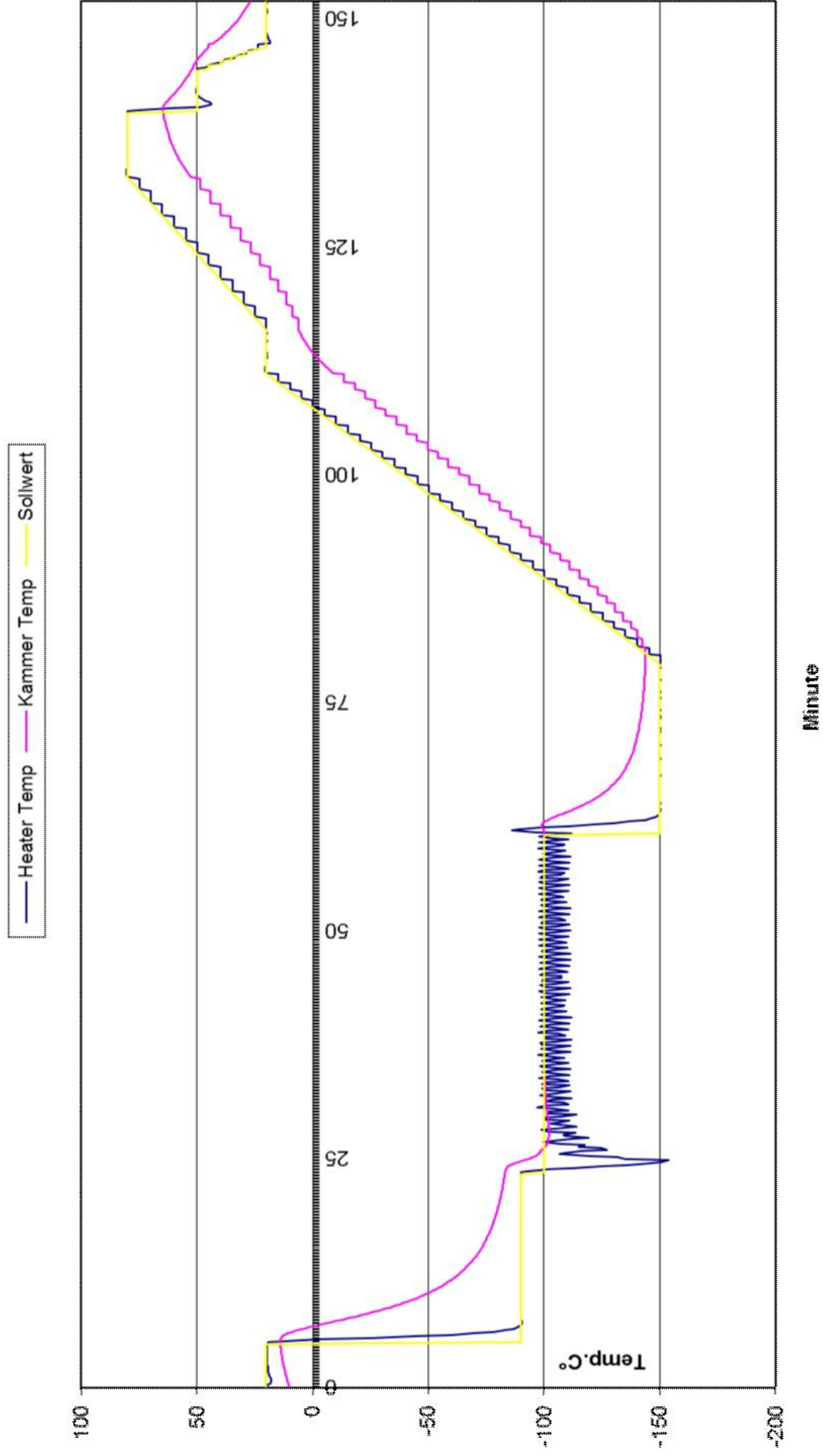
Kaltgas-Regelfühler
Temperature control
(internal sensor)

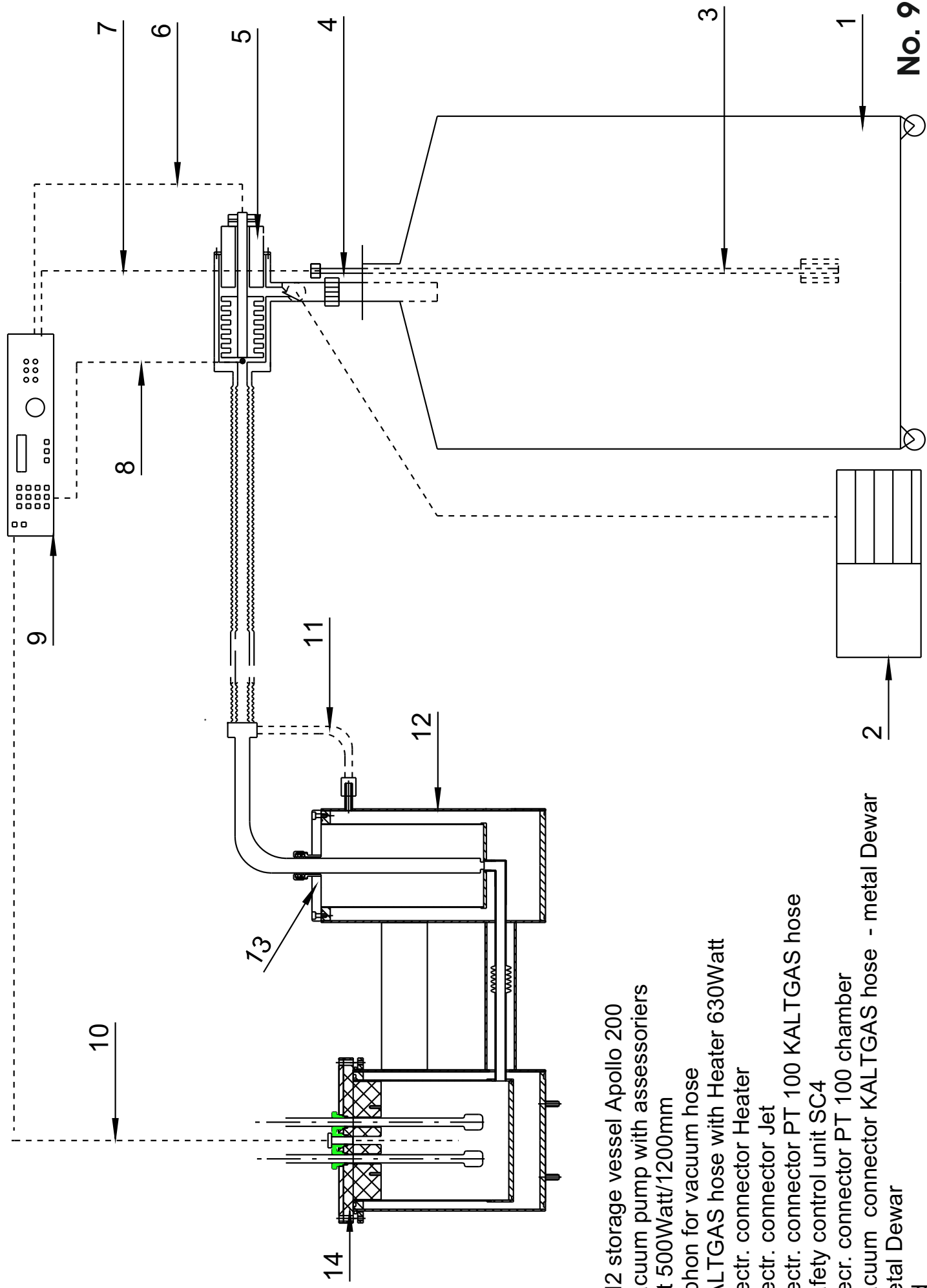


No. 7

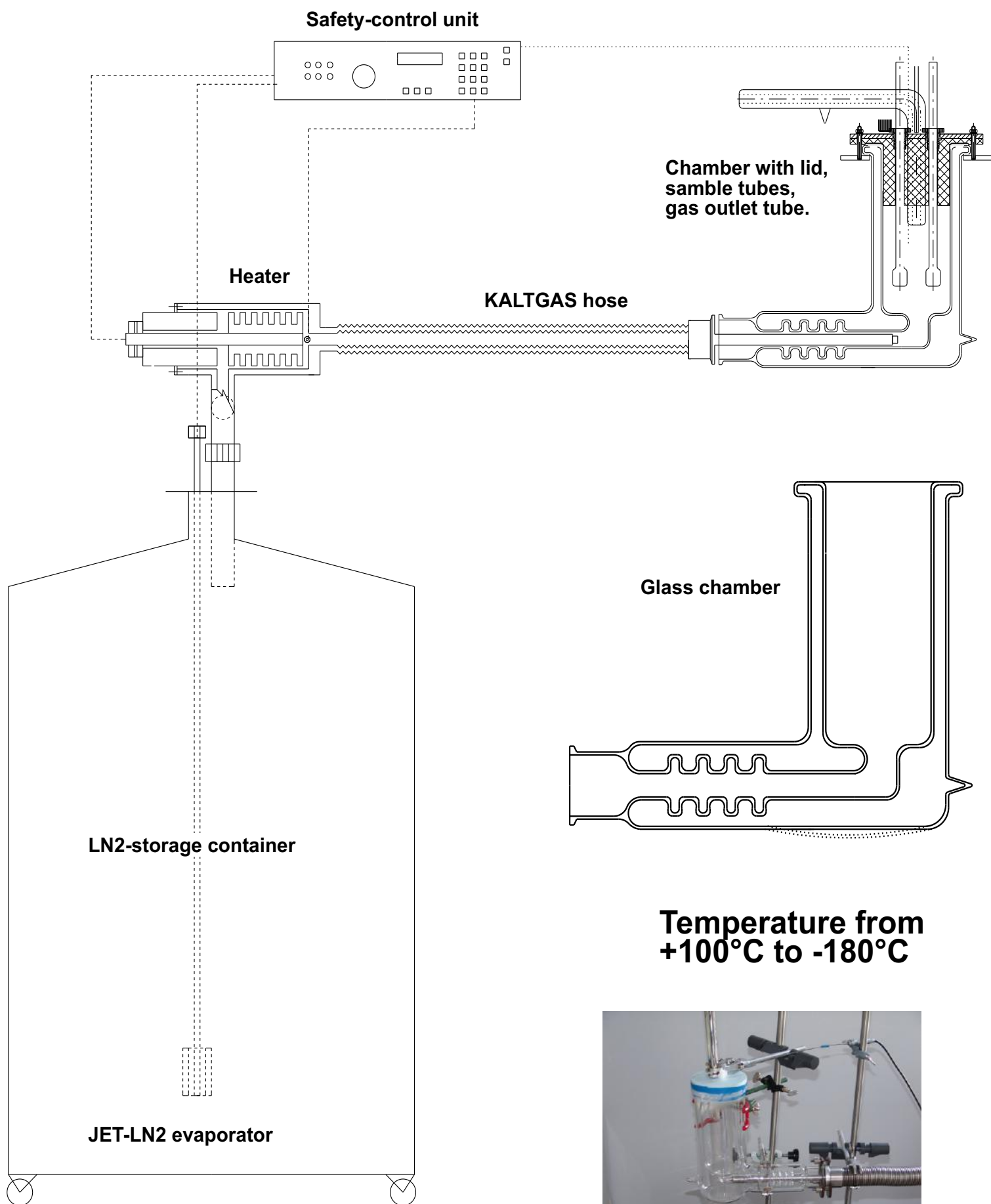


Test run with V2A chamber (Jet 50%)





- 1) LN2 storage vessel Apollo 200
- 2) Vacuum pump with assessoriers
- 3) Jet 500Watt/1200mm
- 4) Siphon for vacuum hose
- 5) KALTGAS hose with Heater 630Watt
- 6) Electr. connector Heater
- 7) Electr. connector Jet
- 8) Electr. connector PT 100 KALTGAS hose
- 9) Safety control unit SC4
- 10) Electr. connector PT 100 chamber
- 11) Vacuum connector KALTGAS hose - metal Dewar
- 12) Metal Dewar
- 13) Lid
- 14) Cryo chamber with sample tube and gas outlet tube



Test run with chamber, Jet 50% bei 500 Watt

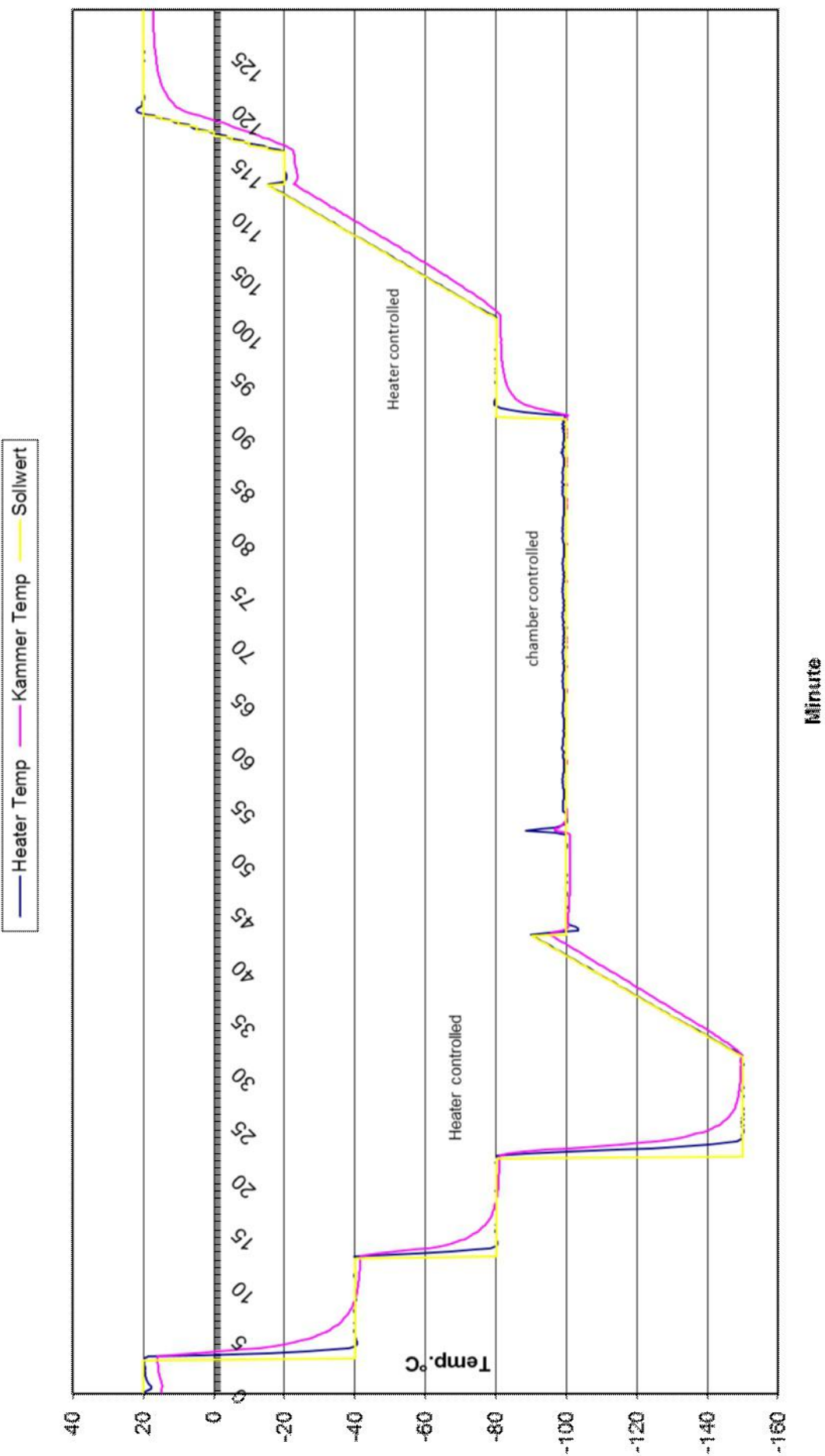
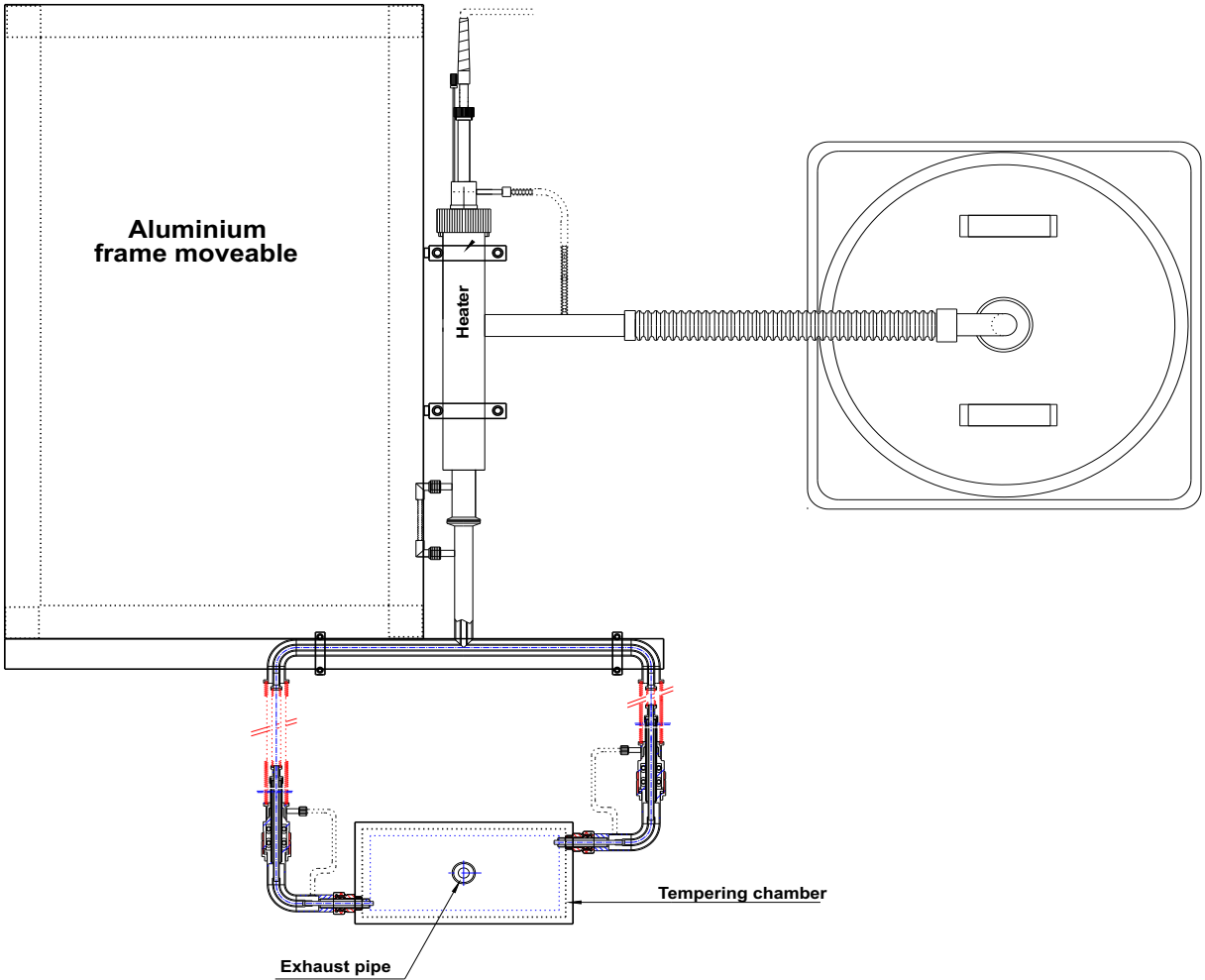
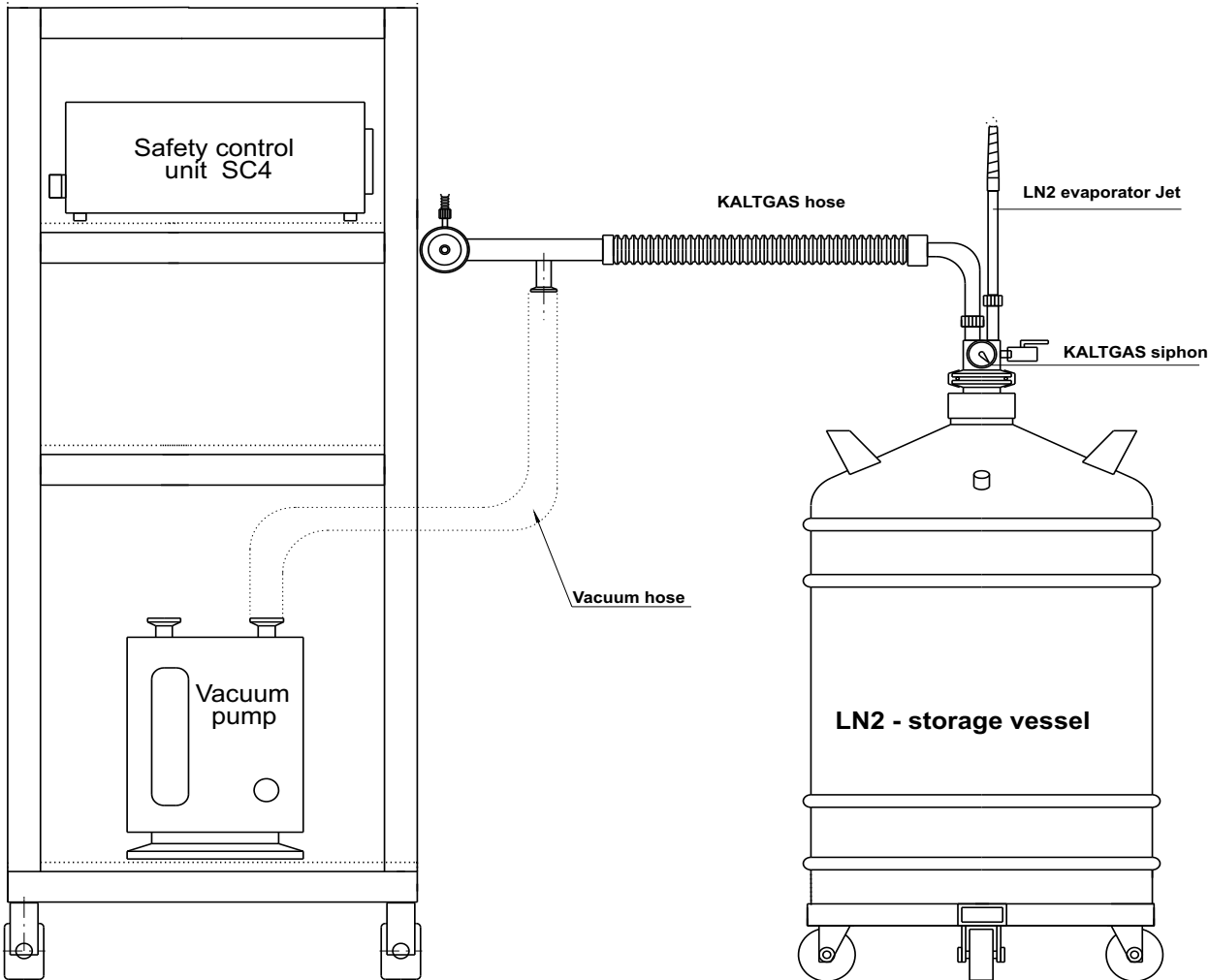
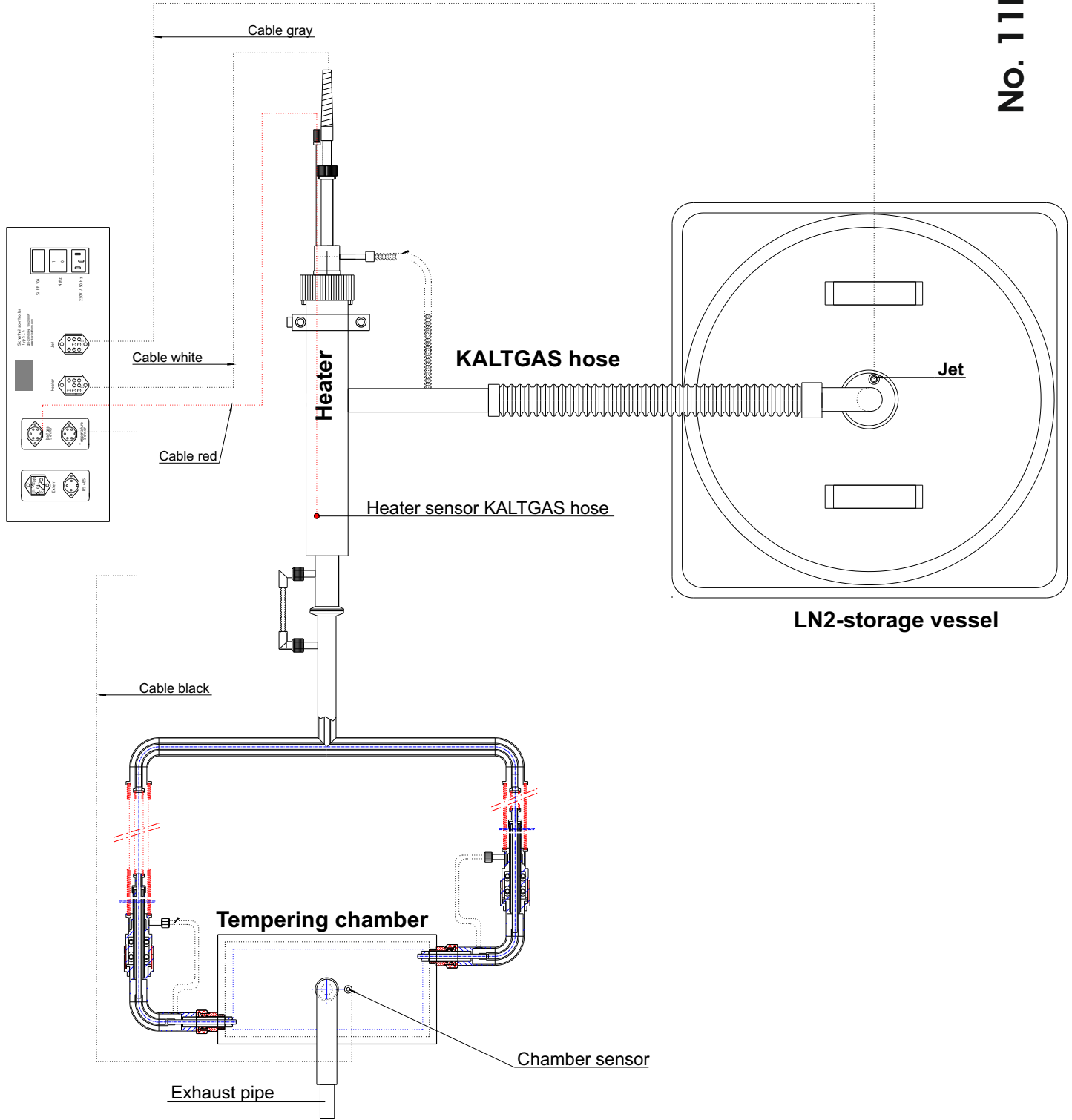
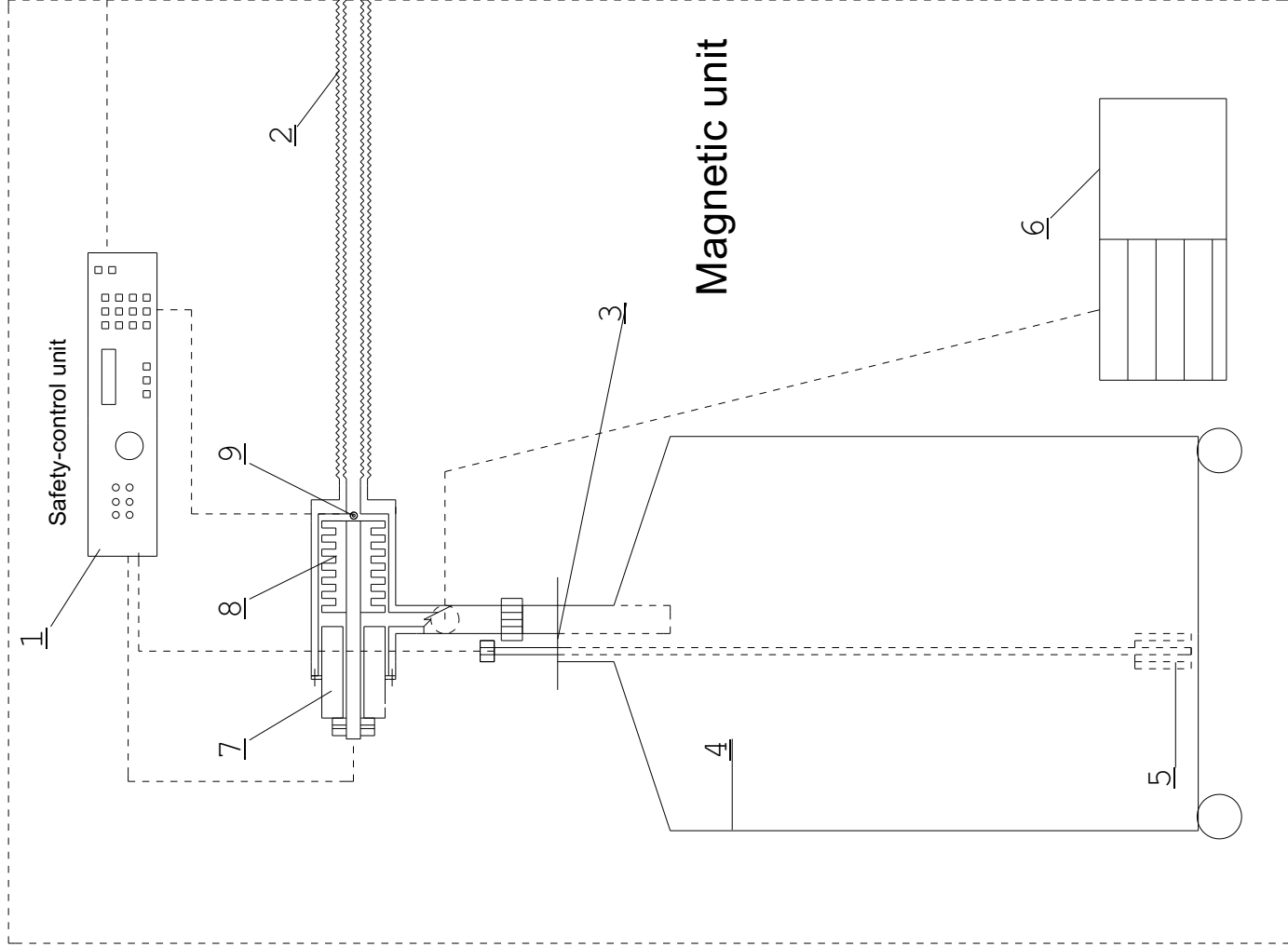


Diagram No. 10





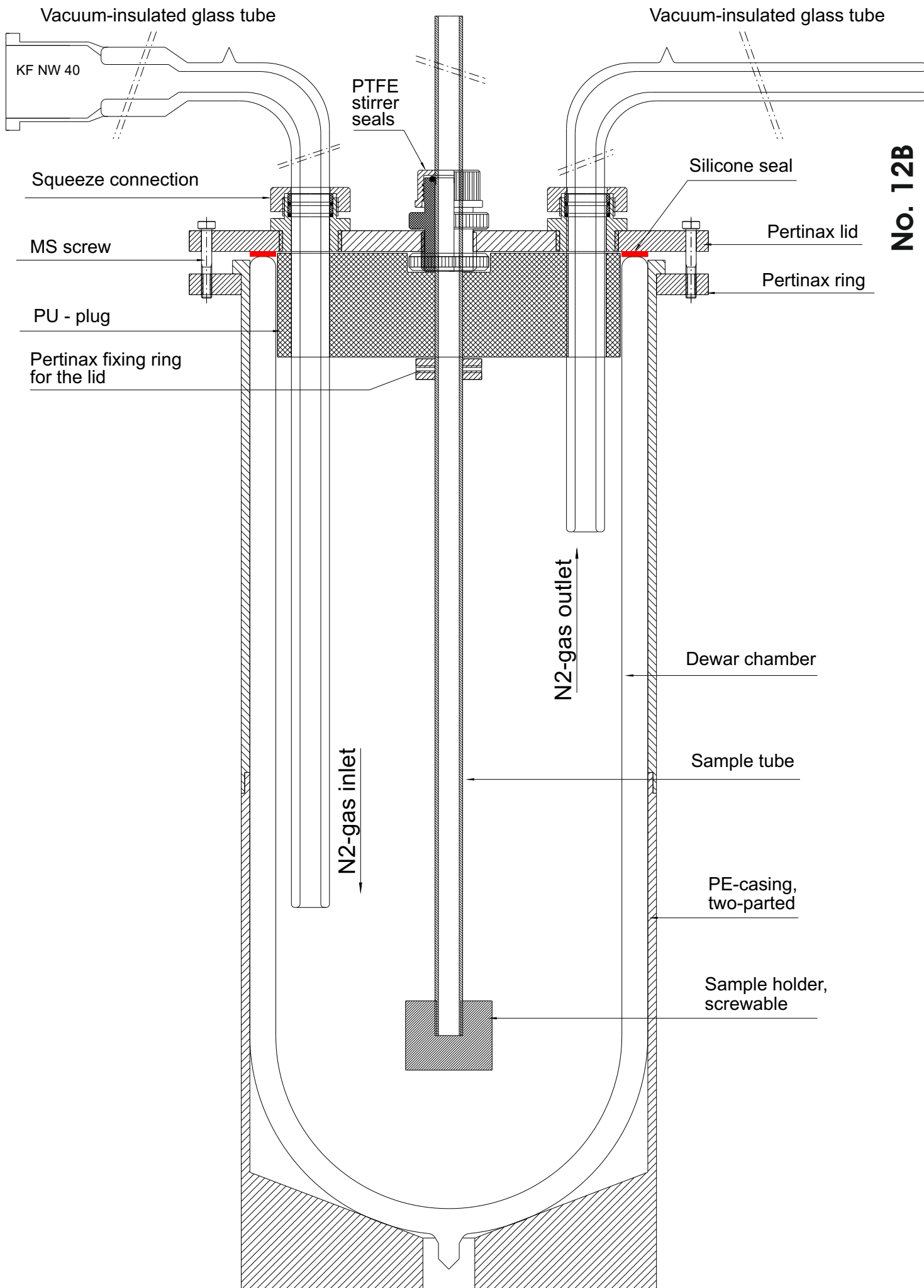
For a direct cooling of a chamber



Non-magnetic unit

Magnetic unit

- 1) Safety-control unit with temperature controller and interface
- 2) Vacuum-insulated gas hose
- 3) Transfer-siphon system
- 4) LN2 reservoir (Type Apollo)
- 5) LN2 evaporator, 500 W
- 6) Vacuum pump with accessories
- 7) Vacuum-insulated sealing
- 8) Heater with heat exchanger, 630 W
- 9) Temperature sensor (internal)
- 10) Vacuum-insulated gas-inlet tube made of glass
- 11) Chamber-temperature sensor (external)
- 12) Pertinax-lid with PE-insulation
- 13) Dewar flask type S 31 PE casing
- 14) Vacuum-insulated gas-outlet tube made of glass
- 15) Pertinax sample tube with holder
- 16) Locking ring



No. 12B

Test run with Dewar chamber, Jet 50%

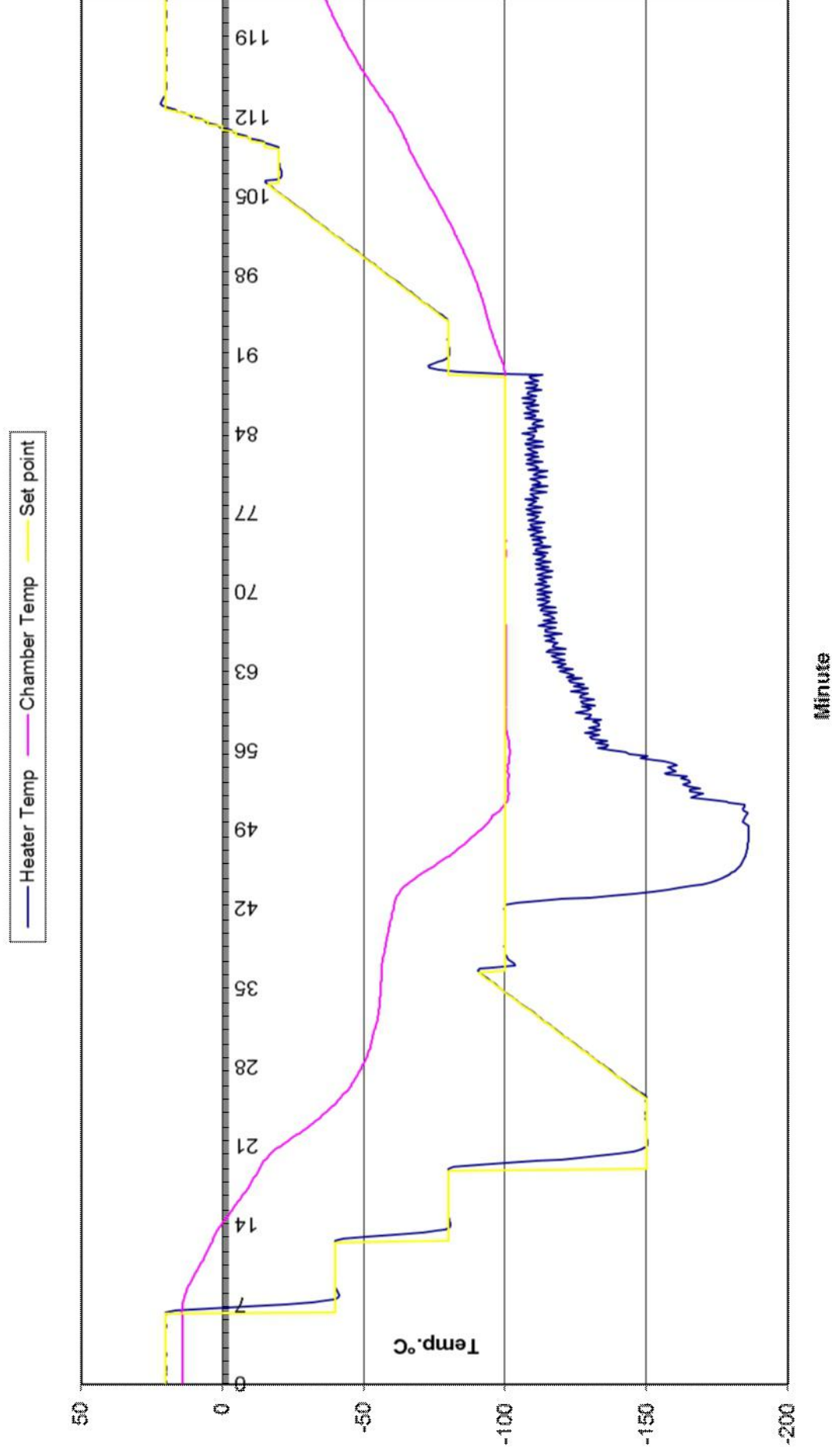
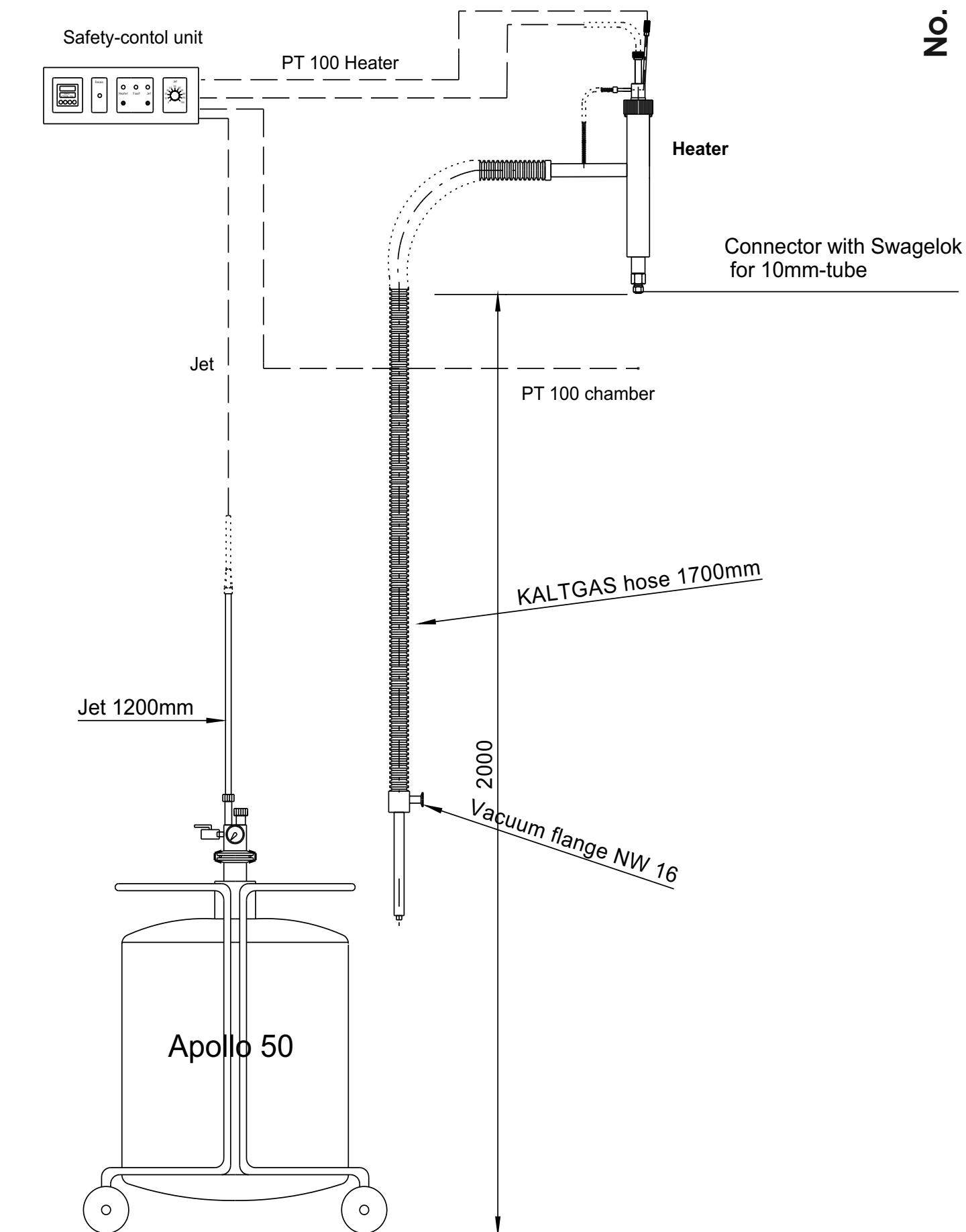
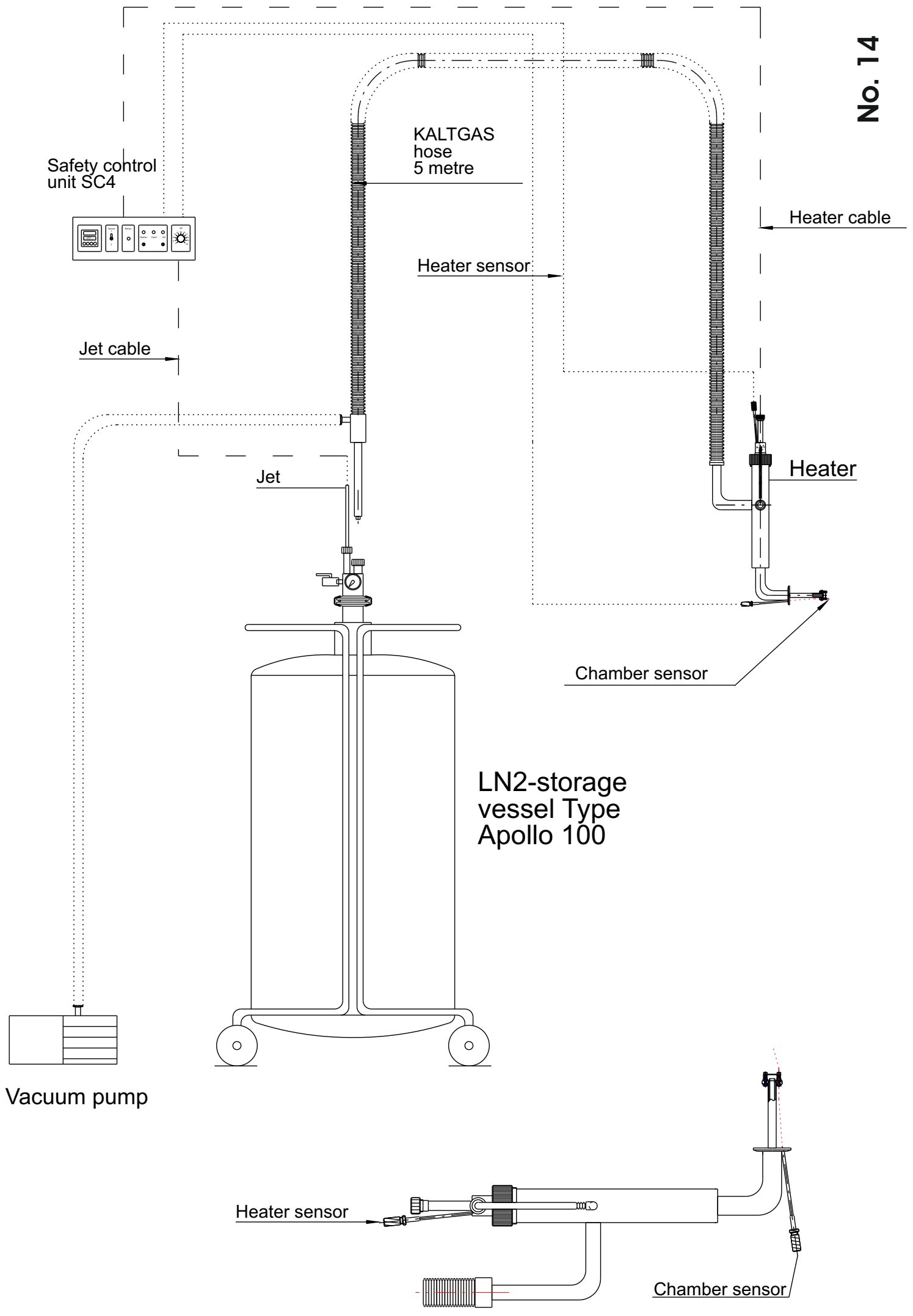
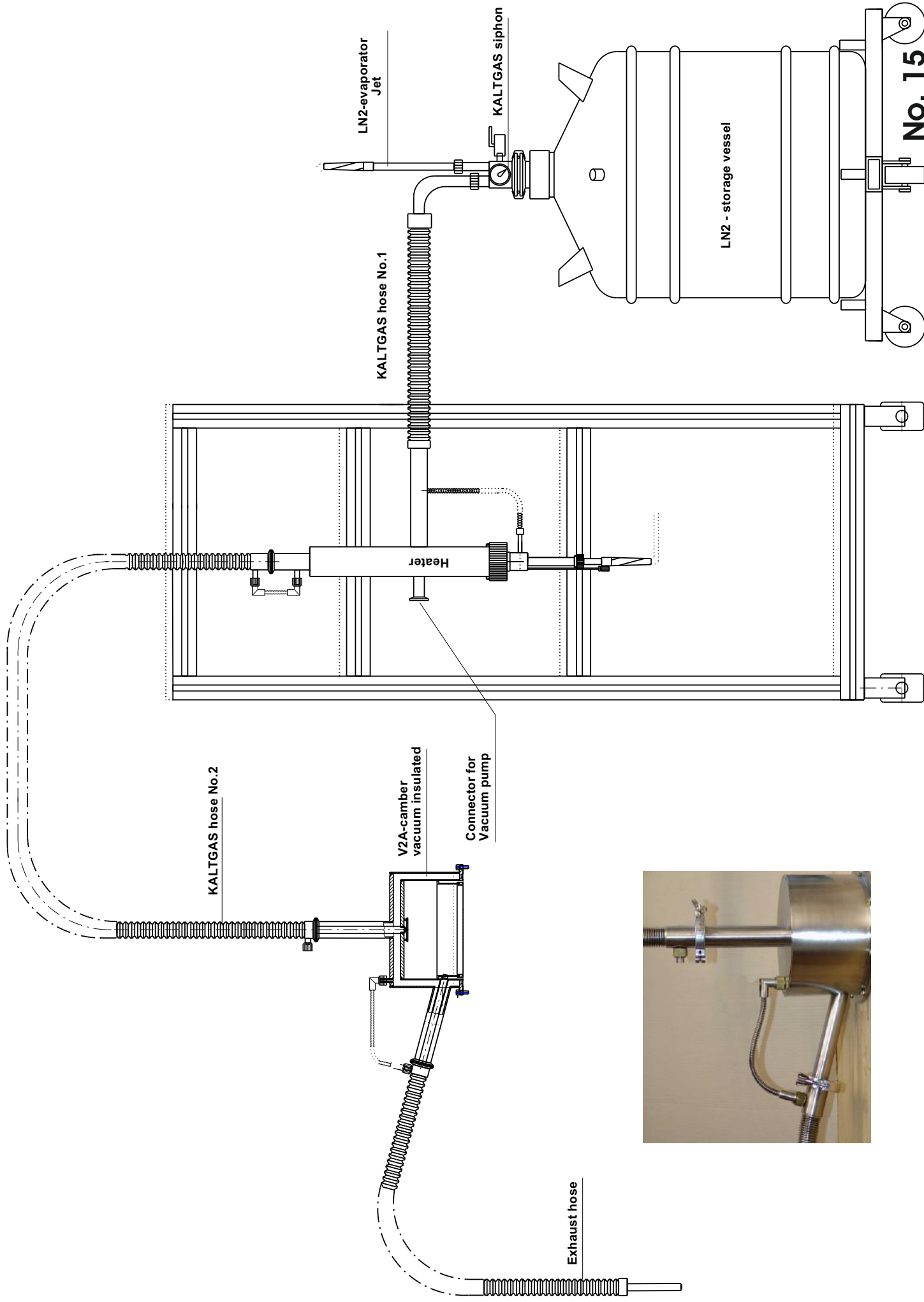


Diagram 12







Test run TG-LKF-H with vacuum insulated V2A chamber, Jet 50% von 500 Watt

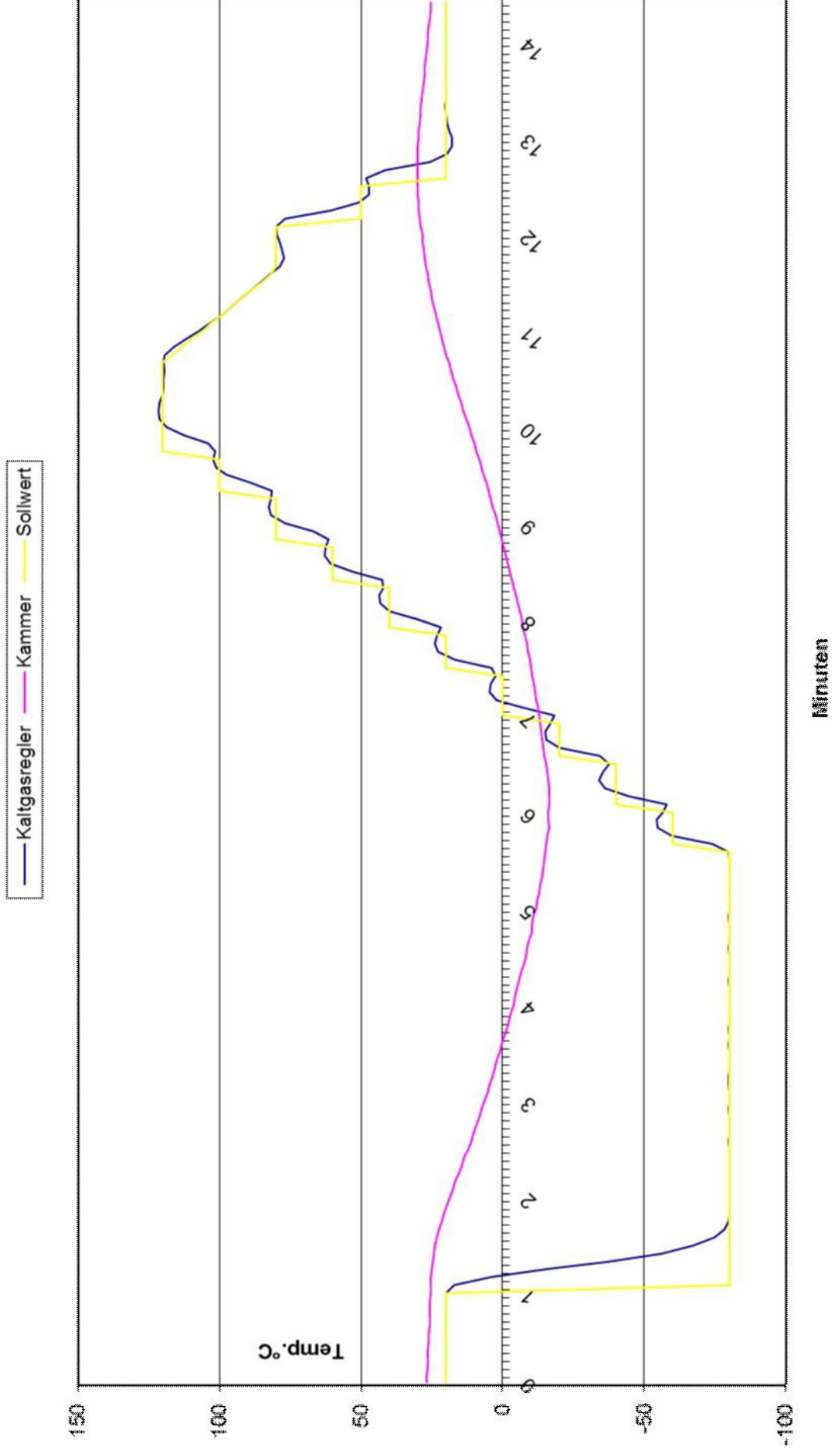
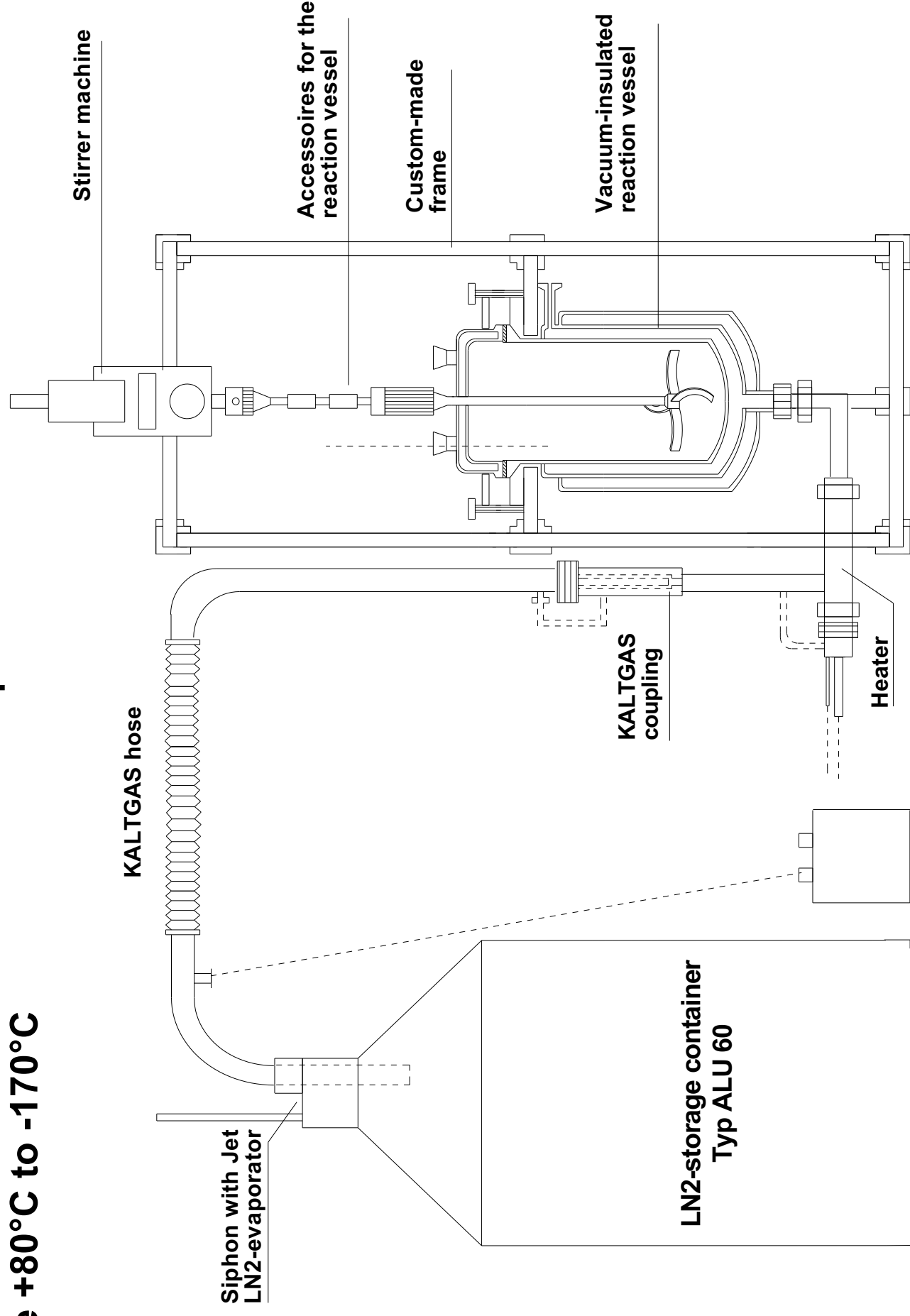
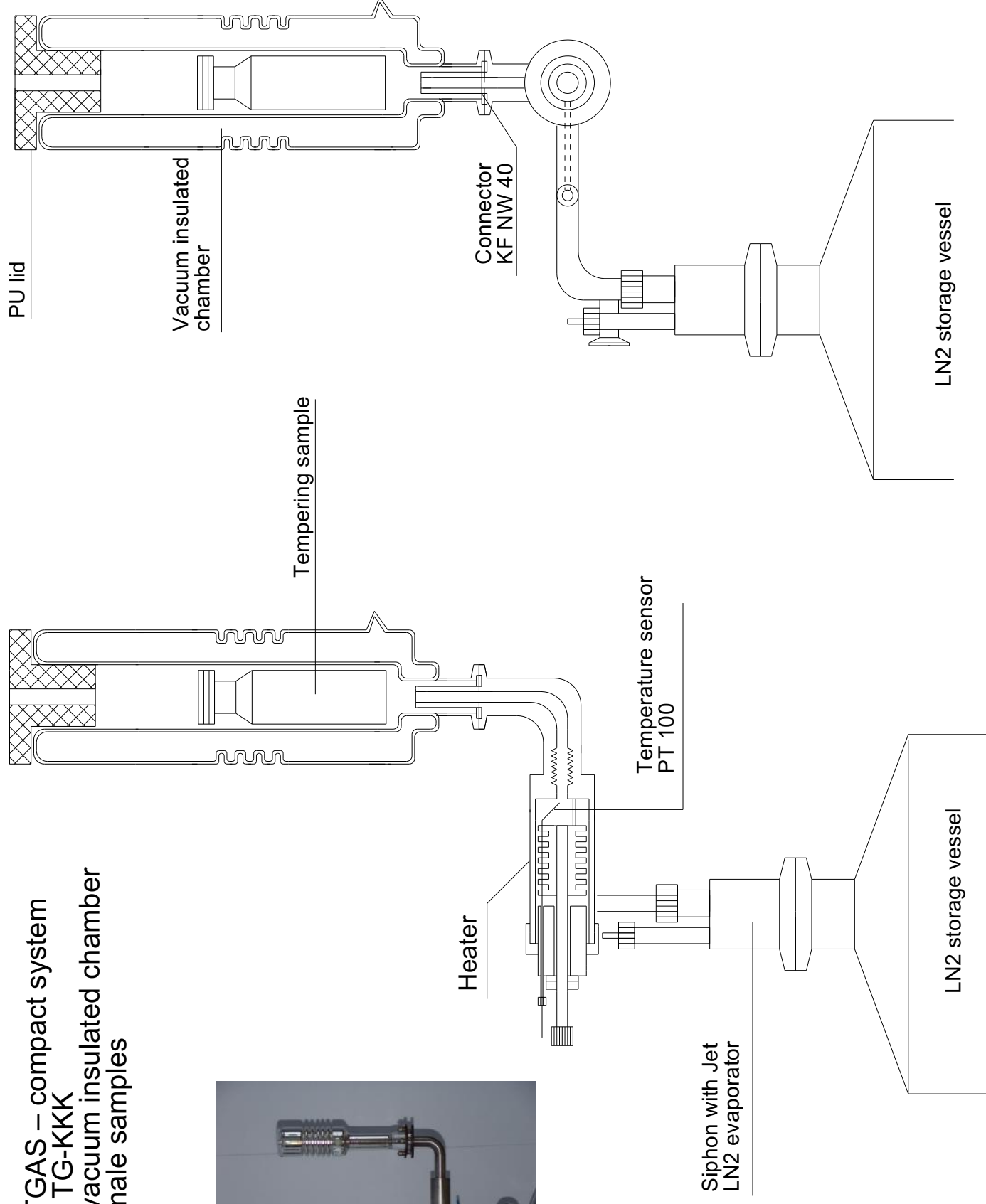


Diagram No. 15

Reaction vessel with indirect temperature control, custom-made for fume hood with a temperature range +80°C to -170°C



KALTGAS – compact system Type TG-KKK with vacuum insulated chamber for small samples



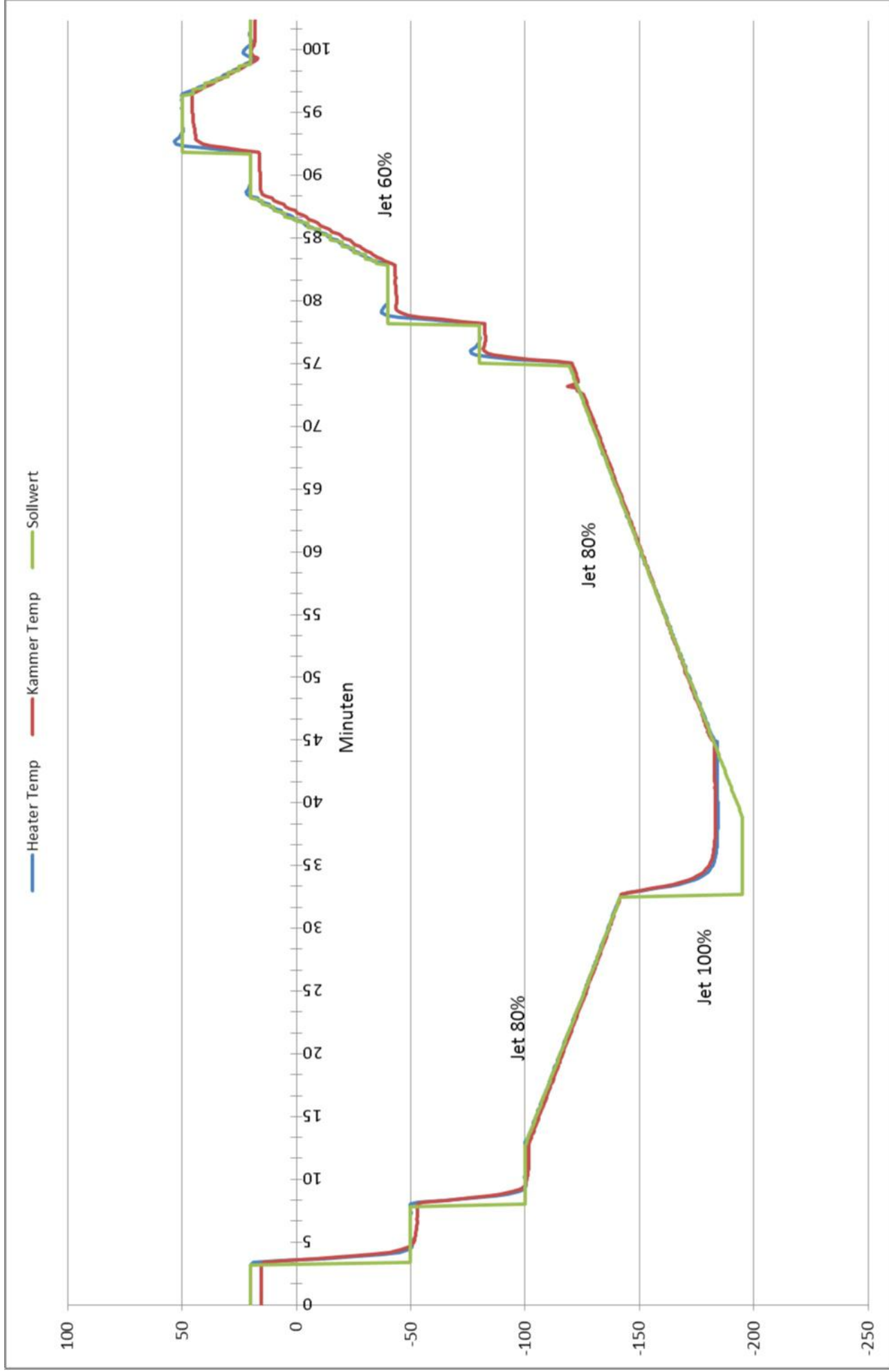


Diagram No. 17

Cooling system type T-G for temperatures down to -170°C

KALTGAS hose 2 metre

