

VTU

**Technical Manual
BCU05**

Version 006

BRUKER

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BCU05 HR applications

1

*This unit contains ozone friendly coolant R404A.
The unit may however only be discarded by authorized personnel.*

Sample temperature range -5°C to + 50°C

Input :

Taken from BVT3X00

- Dry air (dew point < - 50°C) or dry N₂
- Pressure 0,3 bar
- Flow Rate 300-2000 l/h (Probe dependant)

Ambient temperature range 20 to 32 °C

Mains connection 1x 208/220/240 Vac - 50/60 Hz - 450 Watts

Warm-up time 1/2 hour

Case dimensions 550 x 500 x 490 mm

Trunk lenght

- BCU05 3 meters
- BCU05 LT 4 meters

Weight

- BCU05 35 kg
- BCU05 LT 46 kg

Gas content 0,4 kg Freon R404A

Output

Cooled air or N₂ with temperature reduced by approx. 65°C.

Stability of output temperature

± 1°C under perfectly constant conditions of mains voltage, room temperature, air flow, etc.

Operating principle

The BCU05 is a cooling unit that reduces the temperature of an air input by typically 65°C.

Freon gas is circulating around an external heat exchanger. The system is completely sealed. The unit is designed to be operated in conjunction with the or BVT3X00. The VTU provides the gas input for the BCU05 as well as controlling the sample temperature. When operated in conjunction with a BTO2000, sample temperature stability of ± 0.01°C/°C can be achieved (with BVT3X00).

see **"BCU05 with BST Block diagram" on page 28**

- Mains breaker with power control light P/N 75370
- Heat exchanger
- Heat exchanger support stand P/N W1208509

Following parts are supplied :

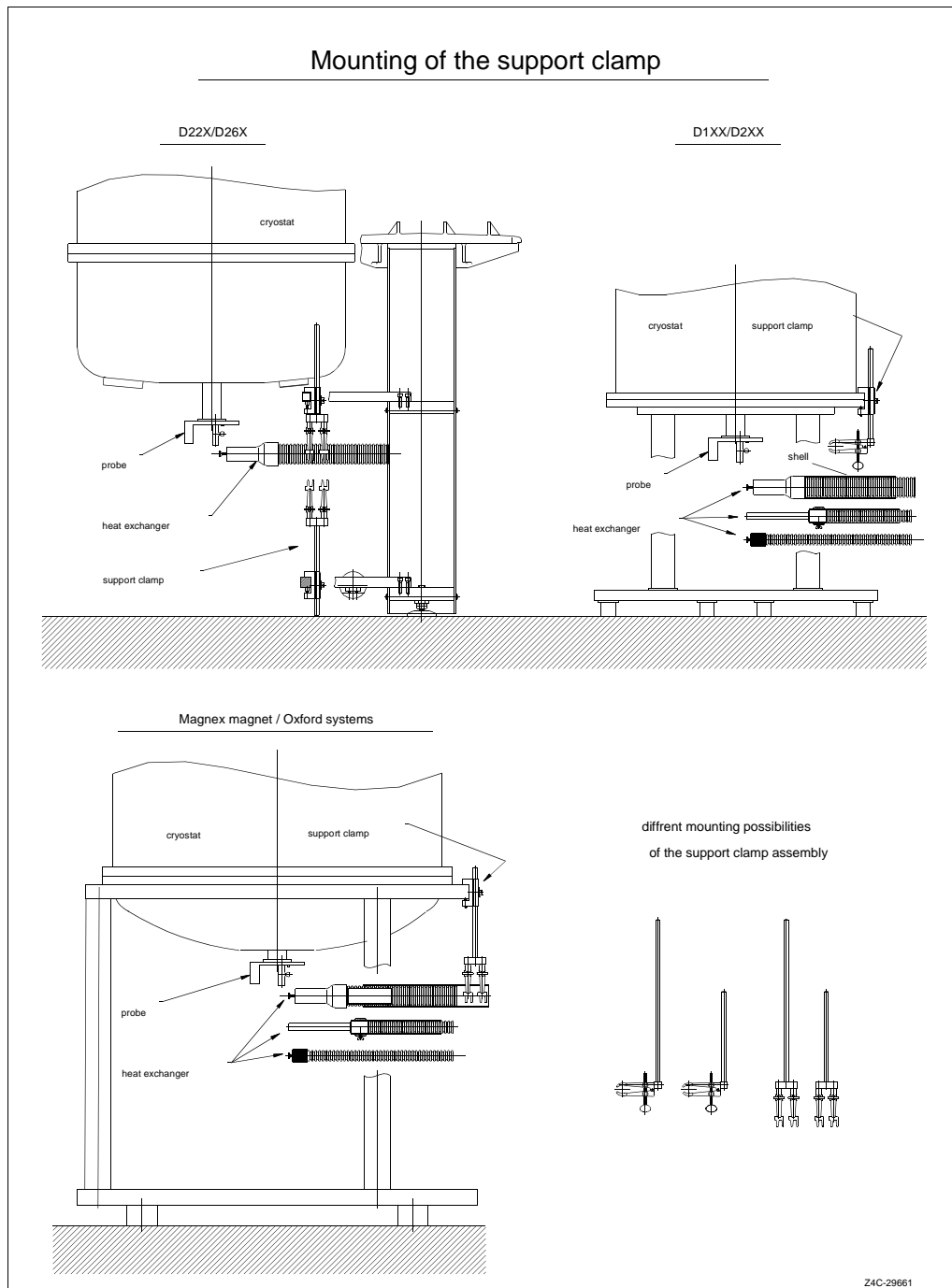
- BCU05 cooling unit with heat exchanger
- Heat exchanger support stand
- Plastic input air hose
- Two half shells for heater exchanger clamping,
see **"Mounting the support clamp" on page 10.**

See "**BCU05 with BST Block diagram**" on page 28

To install the system, proceed as follows :

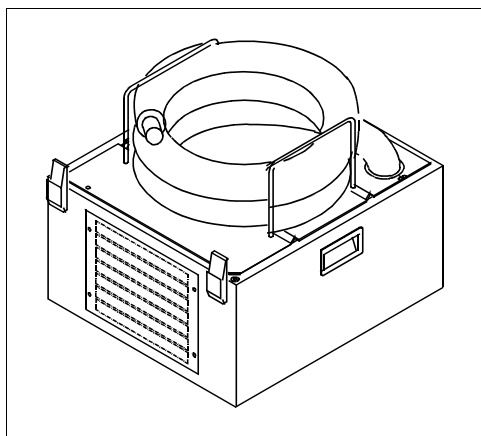
1. Attach the support clamp (supplied with magnet) to the magnet. Insert the two half shells between clamp and exchanger.

Figure 1.1. Mounting the support clamp



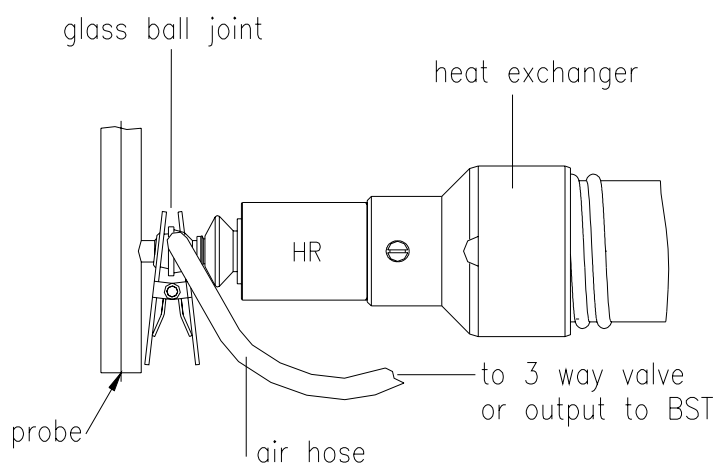
- Place the cooling unit at approximately 2 m from the magnet. Open the unit and carefully unroll the heat exchanger.

Figure 1.2. Heat exchanger (M151460A)



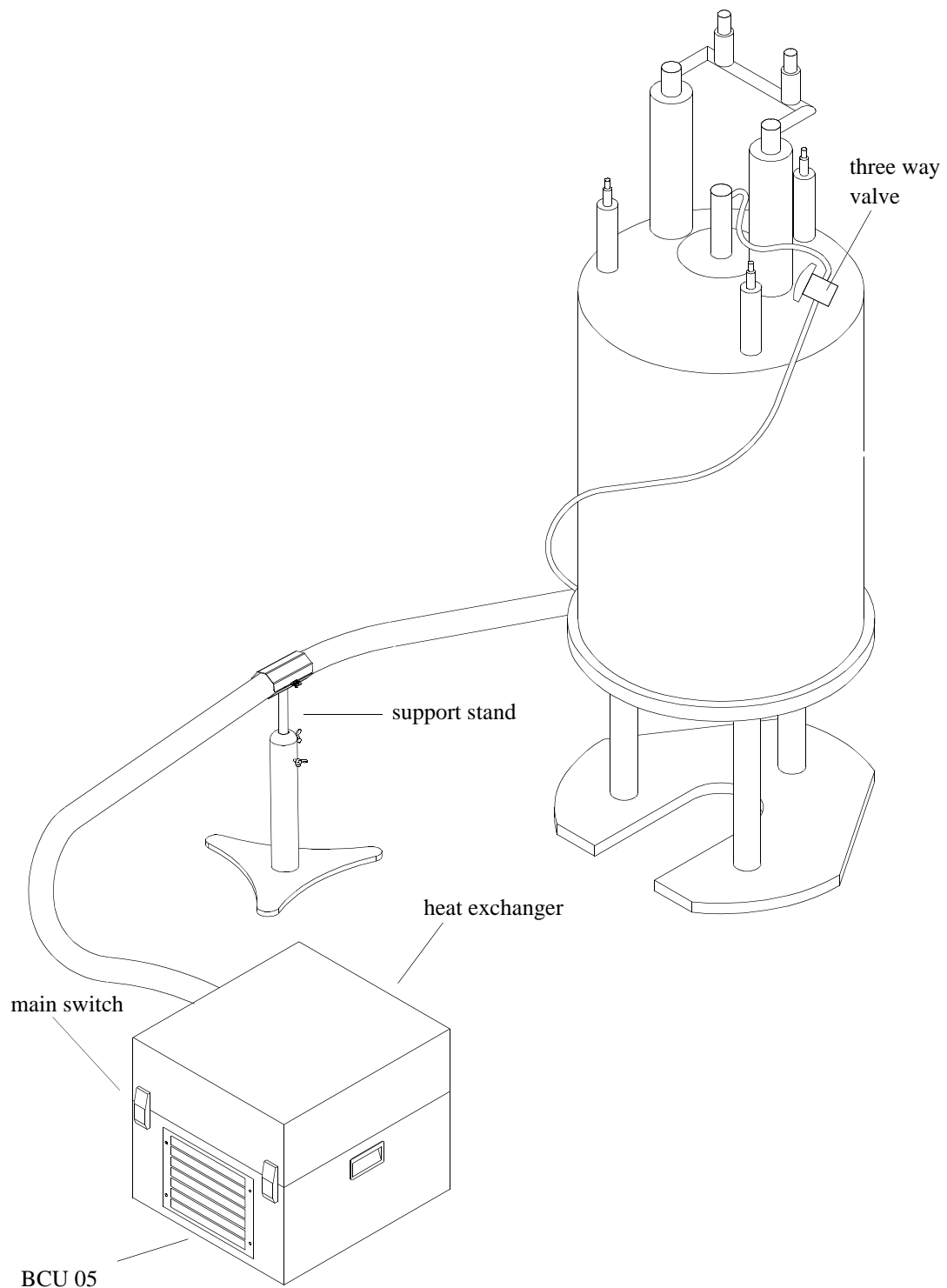
- Put some vacuum grease on glass ball-joint before clamping the heat exchanger. Take care to keep the right distance between the probe glass ball-joint and the support clamp. Connect the air hose to the three way valve exhaust.

Figure 1.3. Glass ball joint (M151454B)



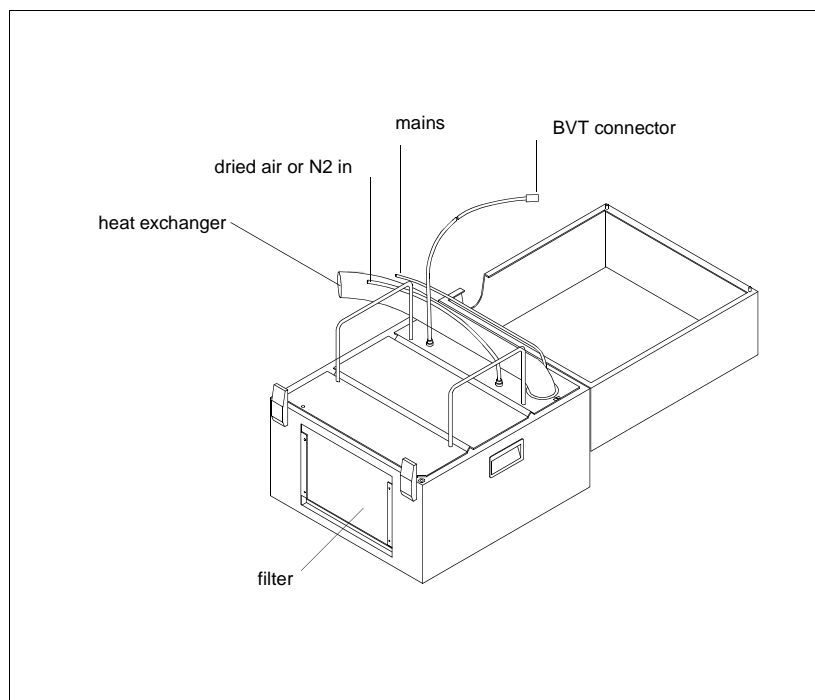
- Take the heat exchanger support stand and position it between the magnet and the unit. Adjust the height.

Figure 1.4. Heat Exchanger support stand (M151454B)



3. Position the cooling unit as far as possible from the magnet so as to minimise the effect of the magnet stray field.

Figure 1.5. BCU05 connections

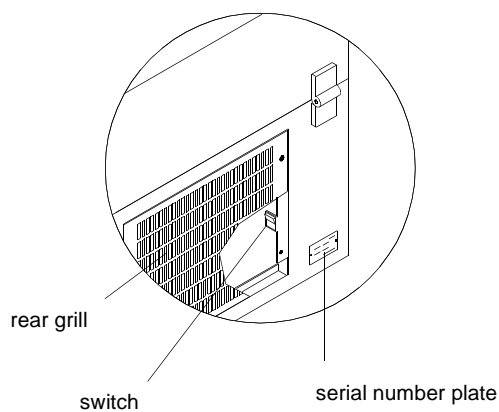


4. Connect the nitrogen (or dry air) input from the BVT.
5. Set the air flow rate to approximately 500 l/h at the BVT. Check that the sample spinning is not affected. If yes, decrease the air flow rate.

Note: Please install the unit only on a hard floor.

6. If the BCU05 is controlled by a BVT3000/3300, connect the BVT plug to the connector called «BCU05» located on the BVT's front panel.
7. In stand alone mode, don't connect the BVT plug and close the switch located behind the rear grill.

Figure 1.6. Rear grill



1. The BCU05 is powered by the BVT3000/3300 and is designed for 24 hours a day operation as long as the probe is not exchanged. If the probe is to be exchanged then switch off the unit and wait for 10 minutes before handling. The exchanger tip must be de-iced before connecting on probe. Put vacuum grease on glass ball joint.
2. Never operate the unit without first gas flowing through the heat exchanger. Otherwise ice may form and clog the heat exchanger. The input gas should be dry, oilless and dust free if not serious damage to the probe may result.
3. The BCU05 is designed to take its gas input from the BVT2000, or BVT3000/3300.
4. Output:

The temperature of the output gas is not directly controllable. Its temperature will depend on:

 - a) The input gas temperature
 - b) The ambient room temperature
 - c) The throughput i.e. flow rate.

A variation of one or more of the parameters above can bring along a variation of the output temperature.
5. Sample temperature range: The BCU05 guarantees to cool the sample within the magnet to at least -5°C for a room temperature of 25°C . Slightly lower temperatures may be possible depending upon the type of probe, input air temperature, room temperature.
6. Location: The BCU05 is designed to be positioned at approximately 2m from the magnet probe.
7. Dew point : for an input air and room temperature of 20°C the output temperature will be approximately -45°C . To avoid freezing/ice formation the input air dew point should be at least -50°C .

The BCU05 is not designed to be serviced in the field. Replacing the compressor, heat exchanger etc. must be carried out in the factory. The only servicing that should be carried out at the site is replacing the mains breaker.

The unit may however only be discarded by authorized personnel.

To replace mains breaker

Type: ETA F 551 Rated 2A

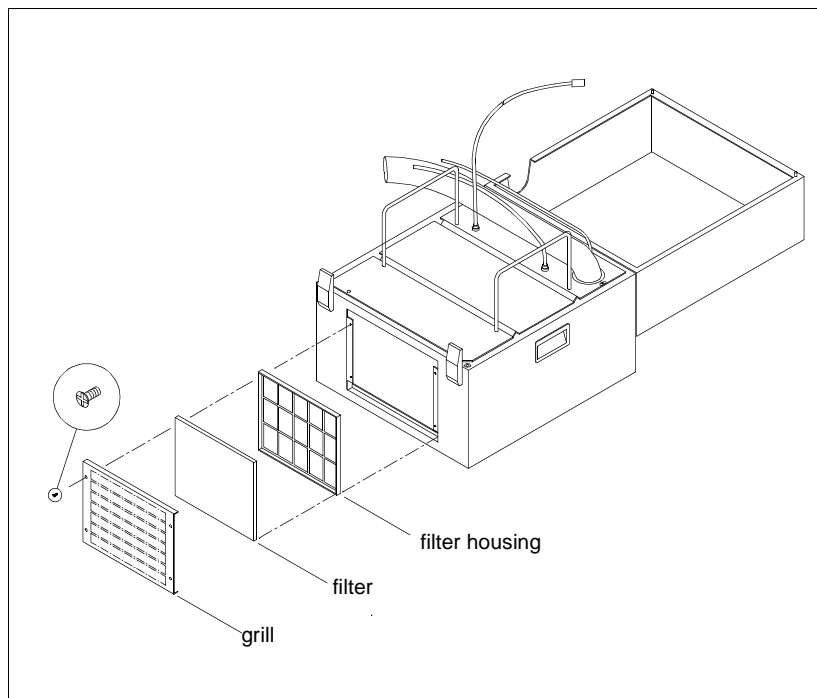
1. Switch off unit. Disconnect mains plug from supply.
2. Remove top cover plate by unscrewing the 4 screws.
3. Remove the 2 sets of LIVE / NEUTRAL cables on breaker.
4. Pull out the breaker and replace.
5. Reconnect cables.

Maintenance

Every 6 months :

1. Remove the air vent grill and clean the air filter with compressed air.
2. Stop the BCU05 for a few hours. Switch off and disconnect the unit from probe. Blow dry air through the unit without cooling for ten minutes to remove the moisture from the heat exchanger.

Figure 1.7. Filter removing (M151455A)



BCU05LT informations

1.6

Technical specifications

1.6.1

This version of BCU05 with a longer heat exchanger (LT= 4m) is used with the largest magnets 750-800 MHz. It has the same technical specifications as the standard BCU05 unit.

Identifications of parts

1.6.2

For part identification see **"BCU05LT in operation on 750/800 MHz" on page 31.**

Following parts are supplied :

- BCU05LT with heat exchanger
- Tripod
- two support stands.
- Plastic input gas hose.

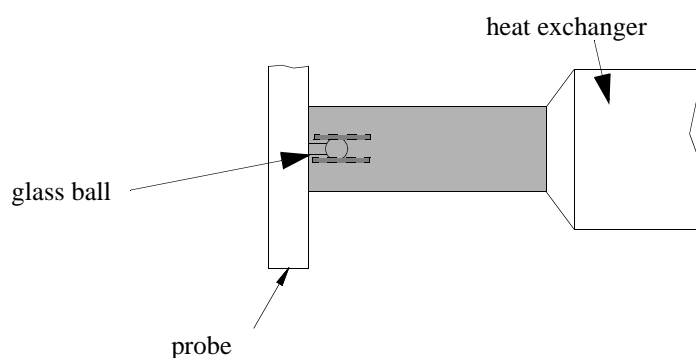
Installation

1.6.3

To install the system, proceed as follows.

1. Place the cooling unit approximately 3 meters away from the magnet. Open the unit and unroll carefully the heat exchanger. Open the 2 screws on the cover of the tripod.
2. Fill the tripod with sand and close it.
3. Take the support stands and position as see **"BCU05LT in operation on 750/800 MHz" on page 31** on 750/800 MHz spectrometer. Take care to keep the right distance between the probe glass ball joint and the clamping support stand.

Figure 1.8. Heat Exchanger mounting for BCU05LT



4. Position the cooling unit as far as possible from the magnet so as to minimize influence of stray field.

BCU05 does not cool

- Check the mains voltage
- Check if compressor is running (remove the cover, check the compressor and the fan).

BCU05 does not cool correctly

The heat exchanger may be clogged with ice:

- Switch off the BCU05 unit and wait for a period of 12 hours.
- Disconnect the exchanger from the probe.
- Put the exchanger on the floor.
- Take the thermocouple mounted in the probe and insert it approximately 5 cm into the output of the heat exchanger.
- Start the BCU05 unit again and control the temperature. It should be with 500 l/h gas flow lower than -22°C.

If you need more information or if you have some questions you can contact the author by sending us an E-Mail at the following address :
power-elec.support@bruker.fr

BCU05 HR-MAS applications

2

Technical specifications

2.1

Sample temperature range -15°C to + 50°C

Input :

Taken from BV3X00

- Dry air (dew point < - 50°C) or dry N₂
- Pressure 5 bar
- Flow Rate 300-2500 l/h (Probe dependant)

Ambient temperature range 20 to 32 °C

Mains connection 1x 208/220/240 Vac - 50/60 Hz - 450 Watts

Warm-up time 1/2 hour

Case dimensions 550 x 500 x 490 mm

Trunk lenght

- BCU05 3 meters
- BCU05 LT 4 meters

Weight

- BCU05 HR-MAS 40 kg
- BCU05 LT HR-MAS 46 kg

Gas content 0,4 kg Freon R404A

Output

Cooled air or N₂ with temperature reduced by approx. 65°C.

Stability of output temperature

± 1°C under perfectly constant conditions of mains voltage, room temperature, air flow, etc.

Operating principle

The BCU05 is a cooling unit that reduces the temperature of an air input by typically 65°C.

Freon gas is circulating around an external heat exchanger within a completely sealed system. The unit is designed to be operated in conjunction with the BVTXX00. The VTU provides the gas input for the BCU05 as well as controlling the sample temperature. When operated in conjunction with a BTO2000, sample temperature stability of ± 0.01°C/°C can be achieved (with BVT3X00).

Identification of parts

2.2

- Mains breaker with power control light P/N 75370
- Heat exchanger
- Heat exchanger support stand P/N W1208509

Following parts are supplied :

- BCU05 cooling unit with heat exchanger
- Heat exchanger support stand
- Plastic input air hoses
- Two half shells for heater exchanger clamping, see **"Mounting the support clamp" on page 10**

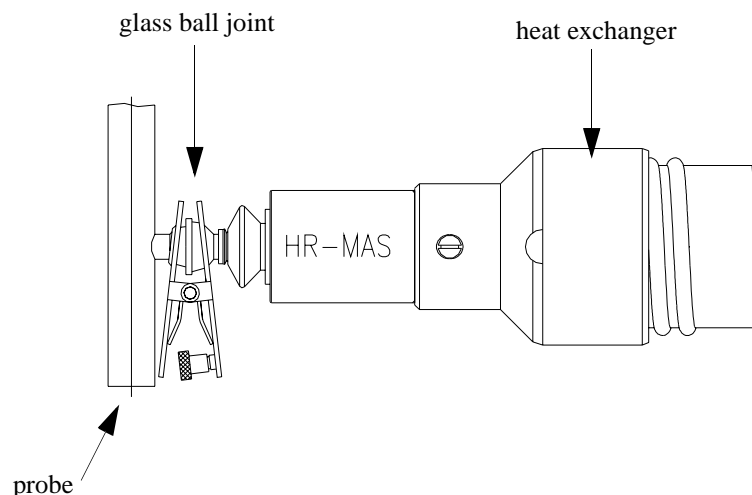
Installation

2.3

See Installation BCU05 HR **"Installation" on page 10**

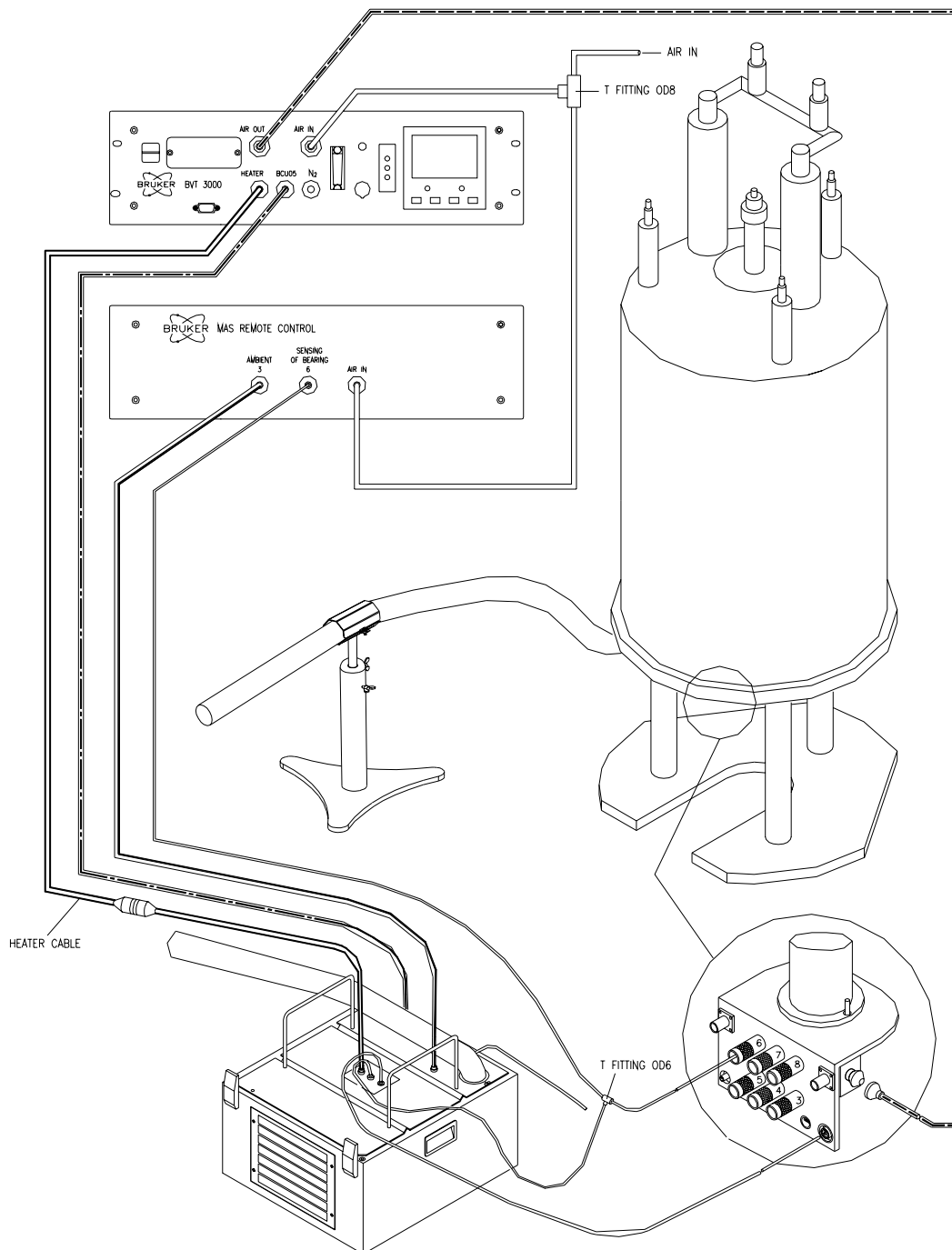
Put some vacuum grease on glass ball-joint before clamping the heat exchanger. Take care to keep the right distance between the probe glass ball-joint and the support clamp. Connect the air hoses to the three Mas Remote Control unit !

Figure 2.1. Glass ball joint (W4M123713A)



1. Take the heat exchanger support stand and position it between the magnet and the unit. Adjust the height.

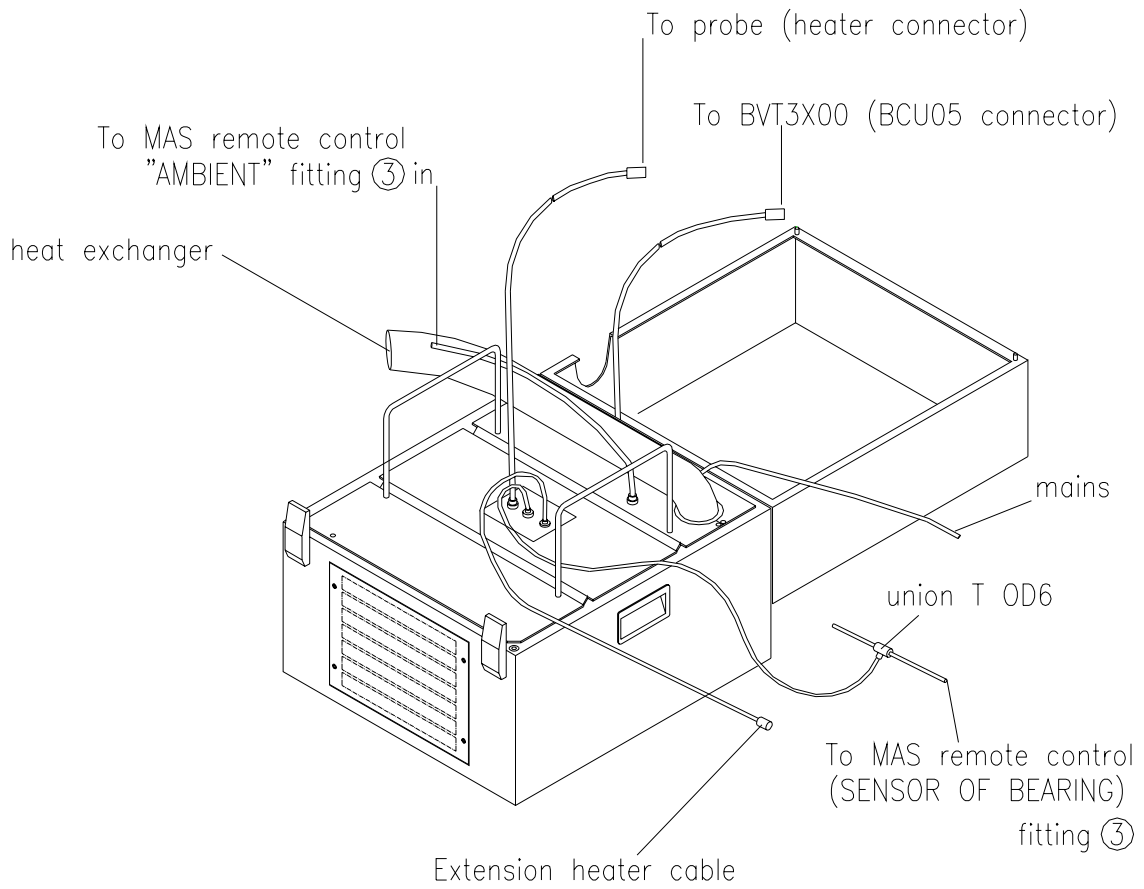
Figure 2.2. Heat Exchanger support stand (W4M123713A)



2. Position the cooling unit as far as possible from the magnet so as to minimise the effect of the magnet stray field.

BCU05 HR-MAS applications

Figure 2.3. BCU05 connections (W4M123712A)



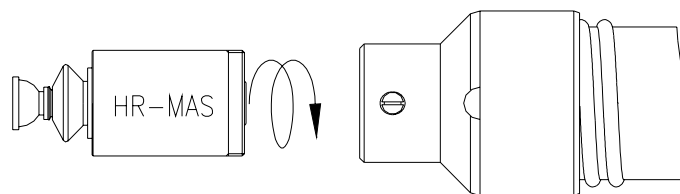
BCU05 HR to BCU05 HR-MAS

3

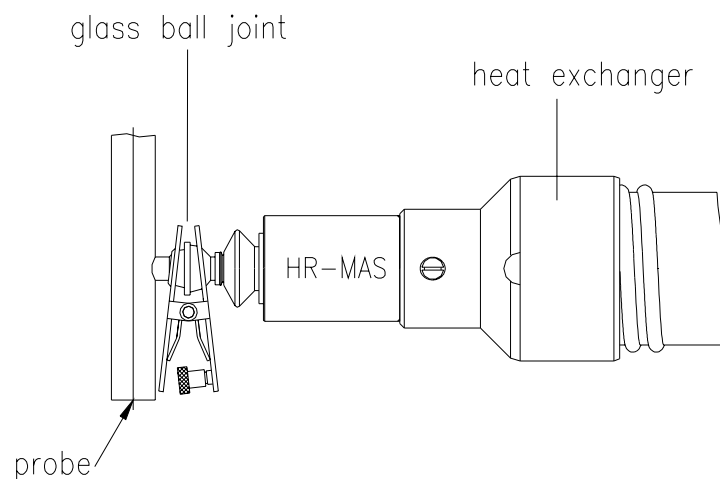
How to change from BCU05HR to HR-MAS

3.1

3. Unscrew the HR trump output coupling
4. Screw the HR-MAS coupling



5. Install the pressure switch box



6. Connect the hoses and cables as shown on drawing "**BCU05 HR-MAS Connection diagram**" on page 33 and "**BCU05 in operation**" on page 35.

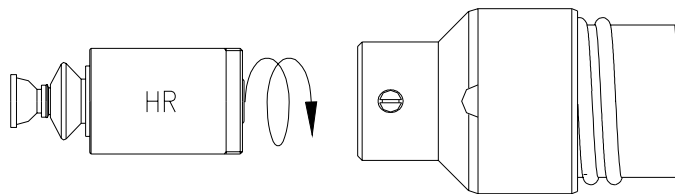
BCU05 HR-MAS to BCU05 HR

4

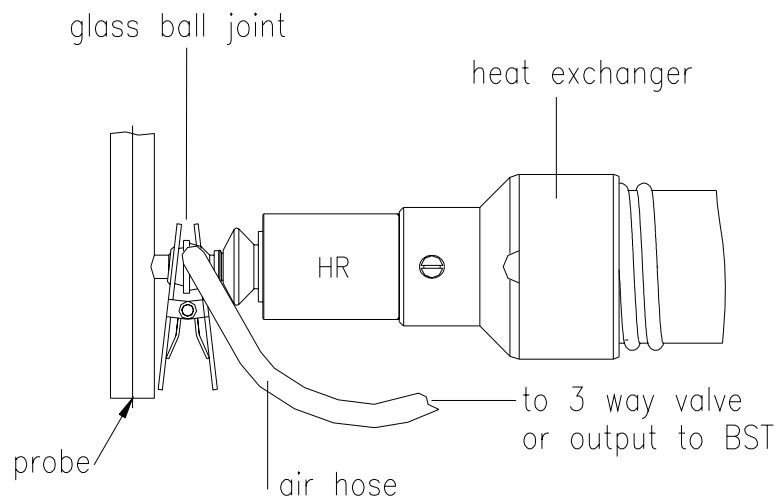
How to change from BCU05HR-MAS to HR

4.1

7. Unscrew the HR-MAS trump output coupling
8. Screw the HR coupling

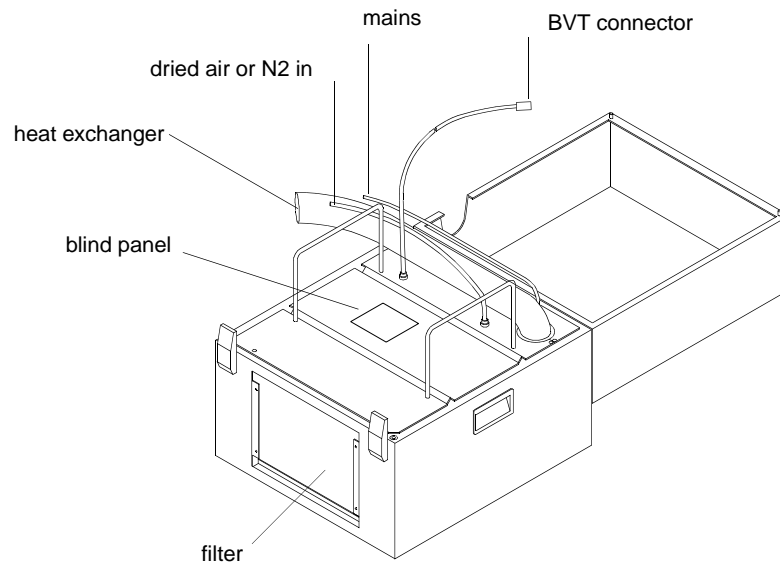


9. Install the pressure switch box

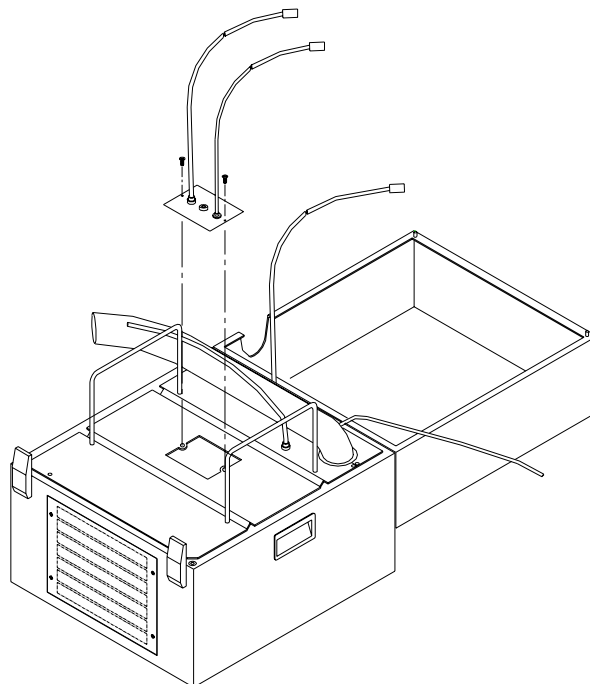


10. Connect the hoses and cables as shown on drawing "**BCU in operation (W4M123717A)**" on page 30 and "**BCU05 with BST Block diagram**" on page 28.

1. Unscrew the blind panel (see picture below)



2. Install the kit as shown in picture below



3. Connect the hoses and cables as shown on drawing **"BCU05 HR-MAS Connection diagram" on page 33** and drawing **"BCU05 in operation" on page 35**.
4. Change the HR coupling with HR-MAS coupling (see chapter **"How to change from BCU05HR to HR-MAS" on page 23**).

Schematics

5

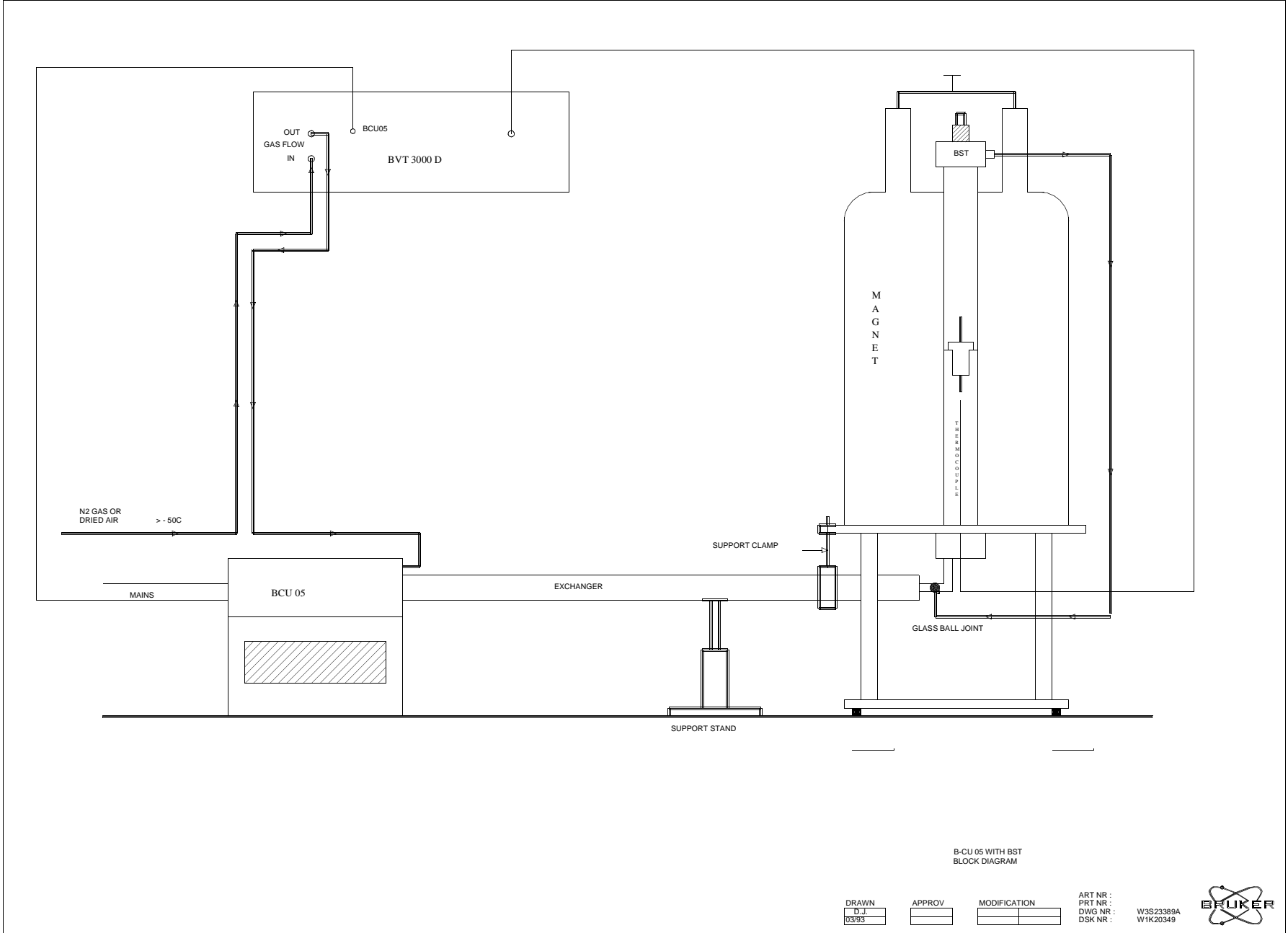


Figure 5.1. BCU05 with BST Block diagram

B-CU 05 WITH BST
BLOCK DIAGRAM

DRAWN
D.J.
02/93

APPROV

MODIFICATION

ART NR :	
PRT NR :	
DWG NR :	W3S23389A
DSK NR :	W1K20349



Figure 5.2. BCU Wiring diagram

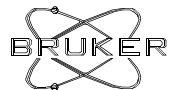
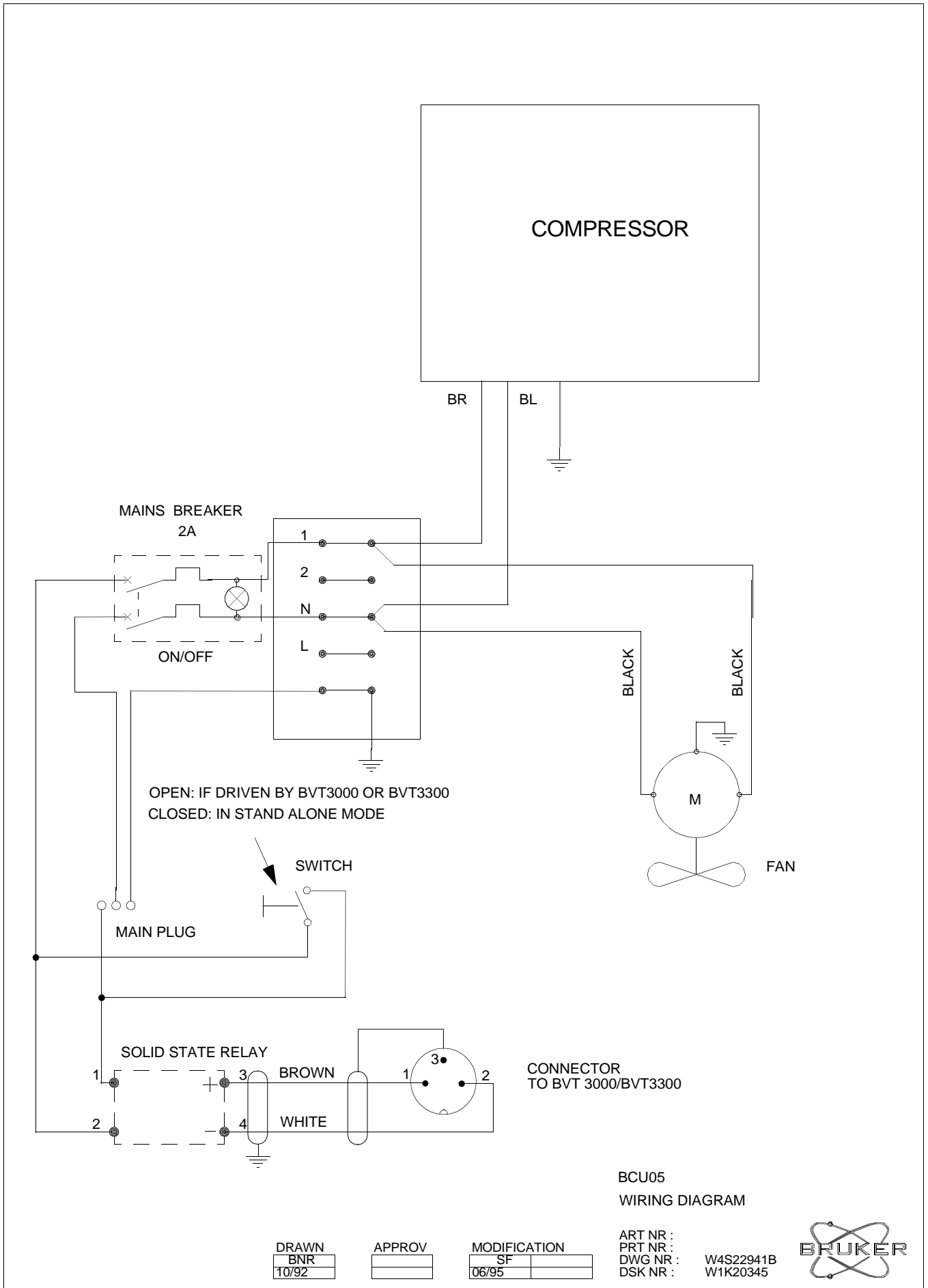


Figure 5.3. BCU in operation (W4M123717A)

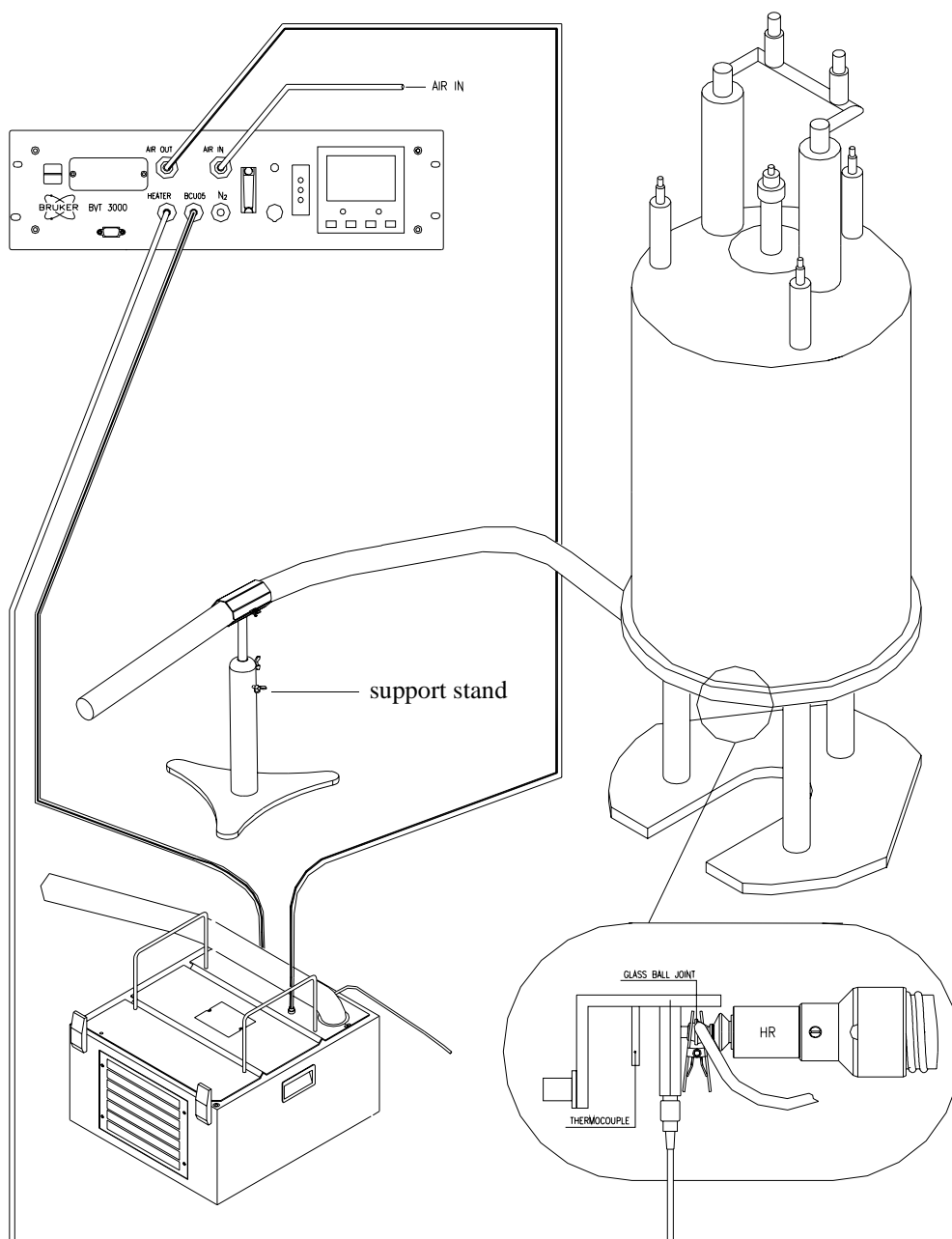
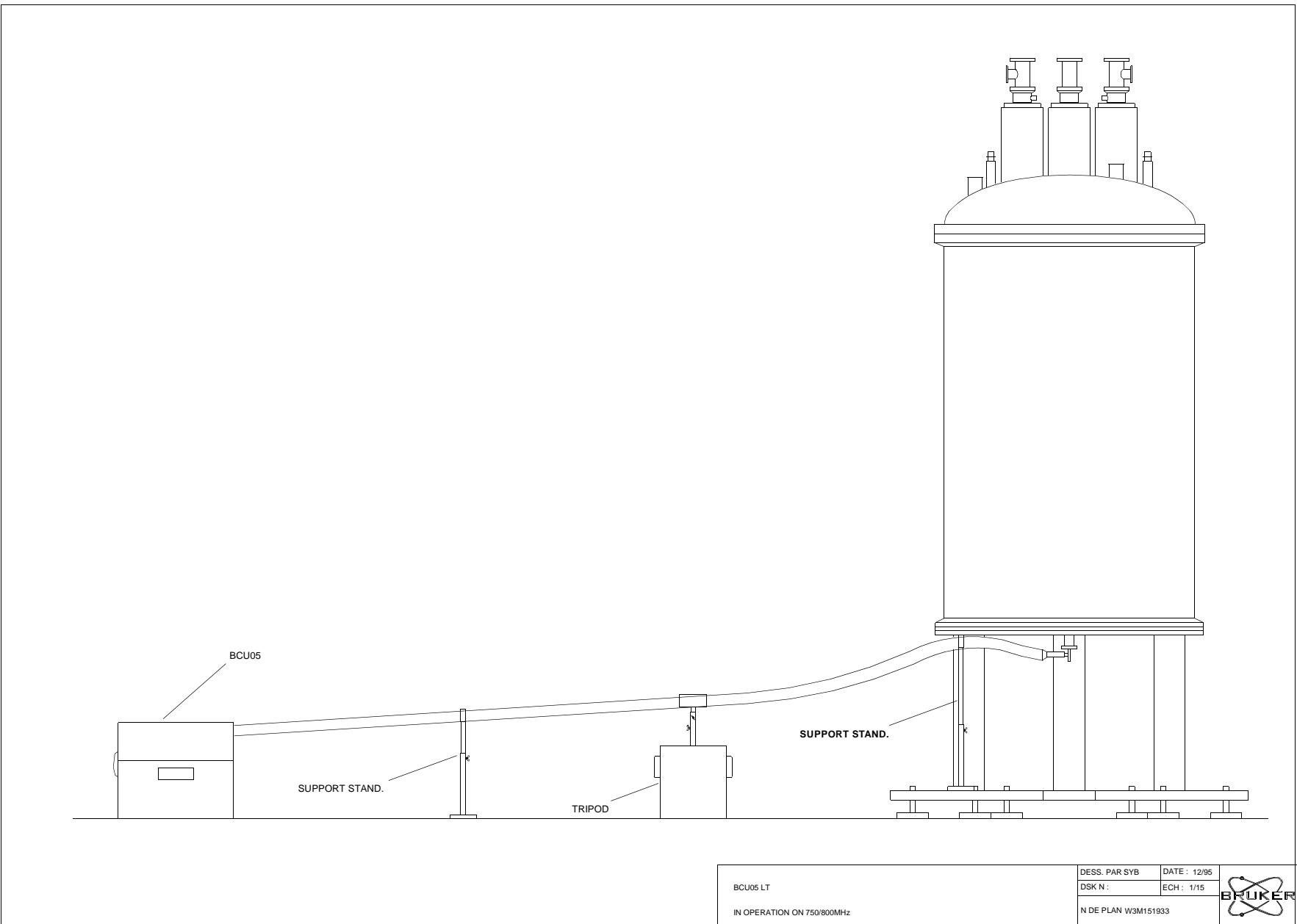


Figure 5.4. BCU05LT in operation on 750/800 MHz



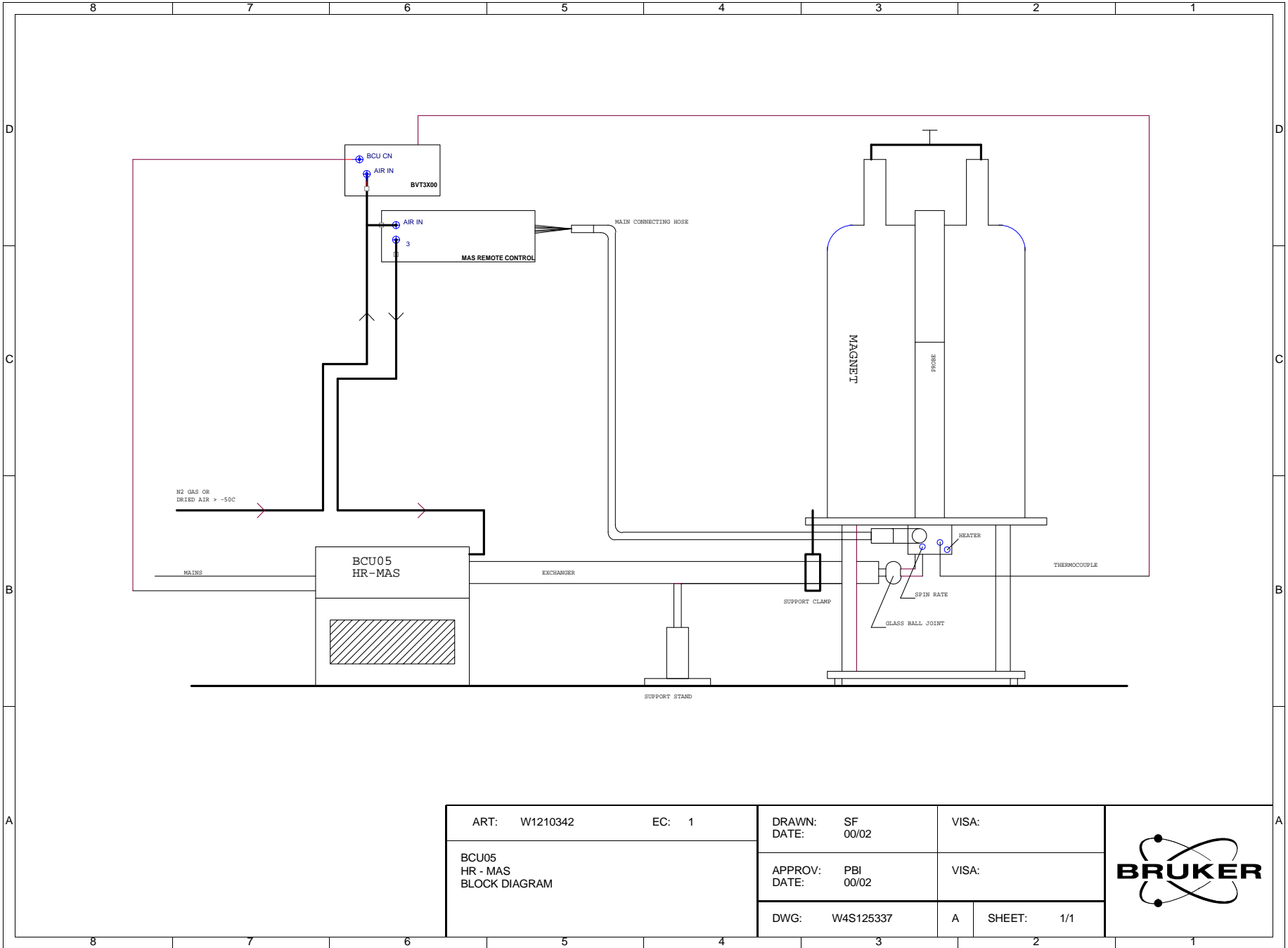


Figure 5.5. BCU05 Block diagram

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		DATE: 00/02	
BCU05 HR - MAS BLOCK DIAGRAM		APPROV: PBI	VISA:
		DATE: 00/02	
		DWG: W4S125337	A SHEET: 1/1



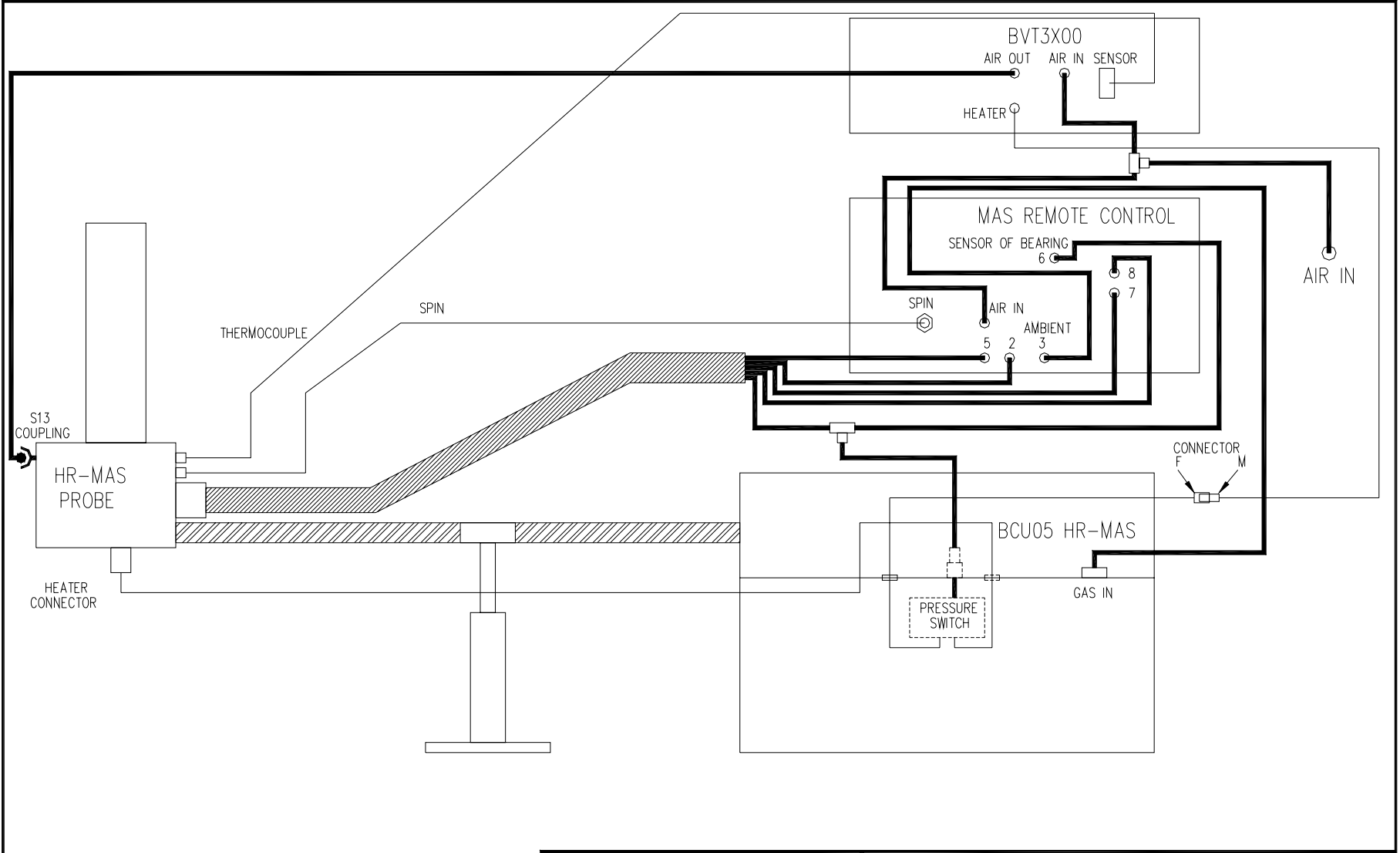


Figure 5.6. BCU05 HR-MAS Connection diagram

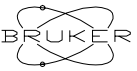
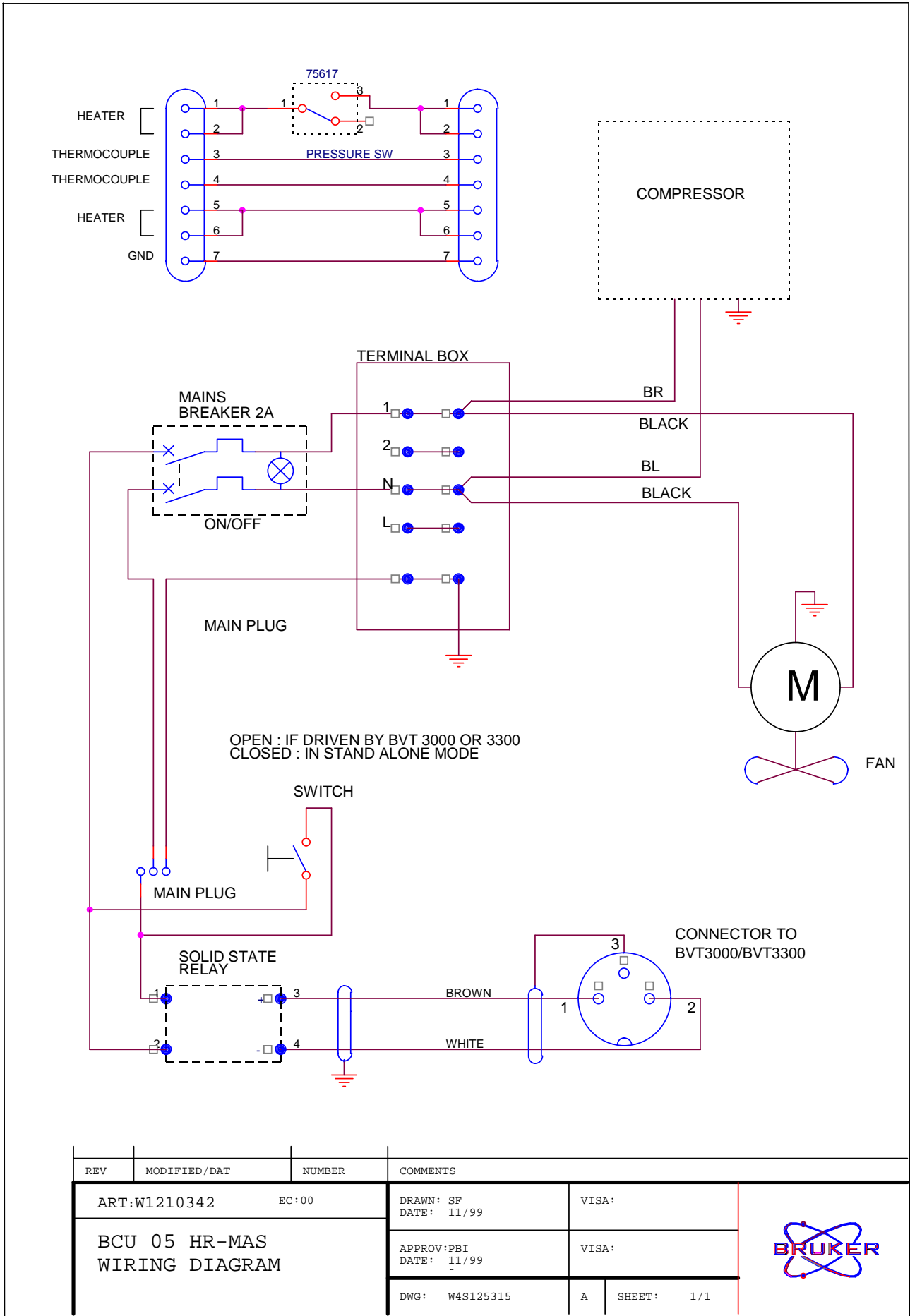
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			APPROUV: PBI	VISA:	
		DWG: W4D125211	A	SHEET: 1/1	

Figure 5.7. BCU05 HR-MAS Wiring diagram



REV	MODIFIED/DAT	NUMBER	COMMENTS
ART:W1210342	EC:00		DRAWN: SF DATE: 11/99
BCU 05 HR-MAS WIRING DIAGRAM			VISA:
			VISA:
DWG: W4S125315			A SHEET: 1/1

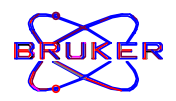
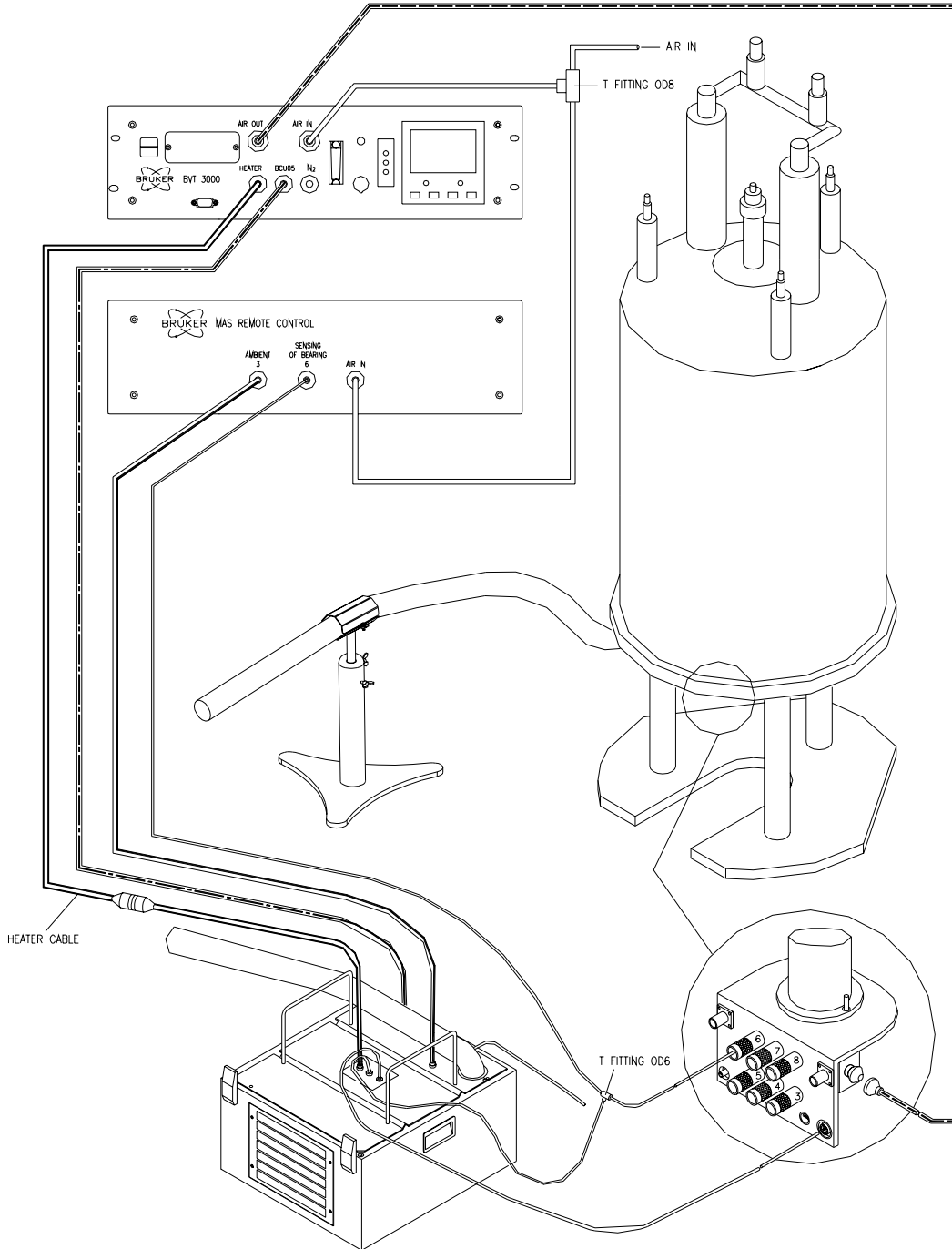


Figure 5.8. BCU05 in operation



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