

INSTALLATION MANUAL

TURBOPACK TC3-500 & TC4-500

CARTRIDGE

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Contents

1. INTRODUCTION.....	4
2. GENERAL INSTRUCTIONS.....	4
3. FIRST INSTALLATION OF A CARTRIDGE.....	4
3.1 EXPANDER STATUS	4
3.2 REMOVAL OF THE CLEANING TOOL	4
3.3 INSTALLATION OF THE CARTRIDGE	5
4. EXCHANGE OF A CARTRIDGE	6
4.1 EXPANDER STATUS	6
4.2 REMOVAL OF A CARTRIDGE	6
4.3 INSERTION OF A NEW CARTRIDGE	6

1. INTRODUCTION

This document gives the instructions of installation for the DTA expanders, serial TC3-500 and TC4-500.

It includes:

- The first installation of the cartridge
- Further cartridge removal and installation.

2. GENERAL INSTRUCTIONS

Always comply with the local safety regulations.

Any intervention on the expander must be approved by the plant manager, or his representative.

It is recommended that all unused parts be located in a clean area.

3. FIRST INSTALLATION OF A CARTRIDGE

3.1 EXPANDER STATUS

At this stage, the expander casing is welded on the cold box, and all pipes are connected. The links to the DCS/ESD have been fully checked.

The cleaning tool is inside the casing, in place of the cartridge (state of delivery from Air Liquide DTA).

The cold box has been fully cleaned.

The expander environment is therefore such that the expander could be safely started.

3.2 REMOVAL OF THE CLEANING TOOL

The turbine has to be isolated:

- Close the turbine upstream, downstream cryogenic valves and the utility inlet circuit valves,
- Close valves on utility line exhausts circuits,

- Check that the system inside pressure is the same as the atmospheric pressure on the local pressure gauges

[Fig. TC4001](#) Dismount the pressurization tube of the brake loop

[Fig. TC4002](#) and [TC4003](#): Dismount the cooler, and remove it from the casing

[Fig. TC4004](#) : view of the casing.

[Fig. TC4005](#) : Disconnect the pressure pick-off.

[Fig. TC4006](#) and [TC4007](#) and [TC4008](#) : Dismount the dummy rotor cartridge. and remove the dummy from the turbine casing.

[Fig. TC4009](#): Clean the inside surfaces of the turbine casing, together with all sealing surfaces (gasket grooves, etc.). Install the O’ring gasket after **slightly** greasing them with vacuum grease.

[Fig. TC4010](#): Install the cryogenic gasket after **slightly** greasing them with vacuum grease.

3.3 INSTALLATION OF THE CARTRIDGE

[Fig. TC4027](#): Check that all the gaskets are placed properly.

[Fig. TC4011](#): Remove the container front protective plate.

Identify the rotor cartridge.

[Fig. TC4012](#): and [TC4013](#): Adjust the orientation of the rotating cartridge and install it.

[Fig. TC4014](#) and [TC4015](#) : Remove the rear protective plate.

[Fig. TC4016](#) : Mount the cooling system of the casing.

[Fig. TC4017](#) : Mount the pressurization tube of the brake loop.

[Fig. TC4018](#): Connect the pressure pick-off.

[Fig. TC4019](#) and [TC4020](#) : Install the speed measuring well.

[Fig. TC4021](#): Install the temperature measuring well.

[Fig. TC4022](#) and [TC4023](#) : Install the low pressure bearing temperature transmitter.

[Fig. TC4024](#) : Install the cooling temperature transmitter.

[Fig. TC4025](#) and [TC4026](#) : Install and connect the optical fiber.

4. EXCHANGE OF A CARTRIDGE

4.1 EXPANDER STATUS

The procedure is to be used if there is a necessity to remove the cartridge.

The expander must imperatively been warmed up to room temperature, and all pipes vented with Nitrogen if the process gas is dangerous.

4.2 REMOVAL OF A CARTRIDGE

The turbine has to be isolated:

- Close the turbine upstream, downstream cryogenic valves and the utility inlet circuit valves,
- Wait until the rotor is completely stopped. The local speed indicator must be read zero.
- Close valves on utility line exhausts circuits.
- Check that the system inside pressure is the same as the atmospheric pressure on the local pressure gauges.

[Fig. TC4001](#) Dismount the pressurization tube of the brake loop

[Fig. TC4002](#) and [TC4003](#): Dismount the cooler, and remove it from the casing

[Fig. TC4005](#) : Disconnect the pressure pick-off.

[Fig. TC4019](#) and [TC4020](#) : Dismount the speed measuring well.

[Fig. TC4021](#): Dismount the temperature measuring well.

[Fig. TC4022](#) and [TC4023](#) : Dismount the low pressure bearing temperature transmitter.

[Fig. TC4006](#) and [TC4007](#) : Dismount the rotor cartridge. and remove the cartridge from the turbine casing.

4.3 INSERTION OF A NEW CARTRIDGE

[Fig. TC4009](#): Clean the inside surfaces of the turbine casing, together with all sealing surfaces (gasket grooves, etc.). Install the O’ring gasket after **slightly** greasing them with vacuum grease.

[Fig. TC4010](#): Install the cryogenic gasket after **slightly** greasing them with vacuum grease

[Fig. TC4027](#): Check that all the gaskets are placed properly.

Identify the rotor cartridge.

[Fig. TC4011](#): Remove the container front protective plate.

[Fig. TC4012](#): and [TC4013](#): Adjust the orientation of the rotating cartridge and install it.

[Fig. TC4014](#) and [TC4015](#) : Remove the rear protective plate.

[Fig. TC4016](#) : Mount the cooling system of the casing.

[Fig. TC4017](#) : Mount the pressurization tube of the brake loop.

[Fig. TC4018](#): Connect the pressure pick-off.

[Fig. TC4019](#) and [TC4020](#) : Install the speed measuring well.

[Fig. TC4021](#): Install the temperature measuring well.

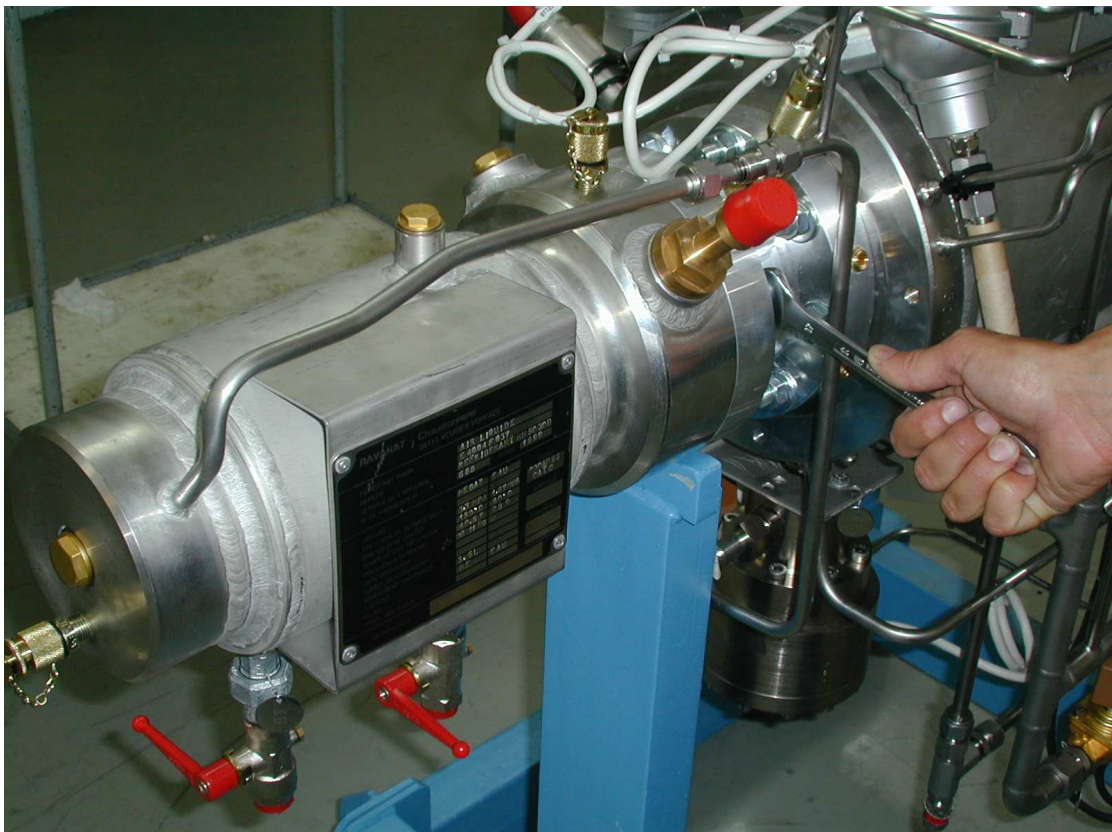
[Fig. TC4022](#) and [TC4023](#) : Install the low pressure bearing temperature transmitter.

[Fig. TC4024](#) : Install the cooling temperature transmitter.

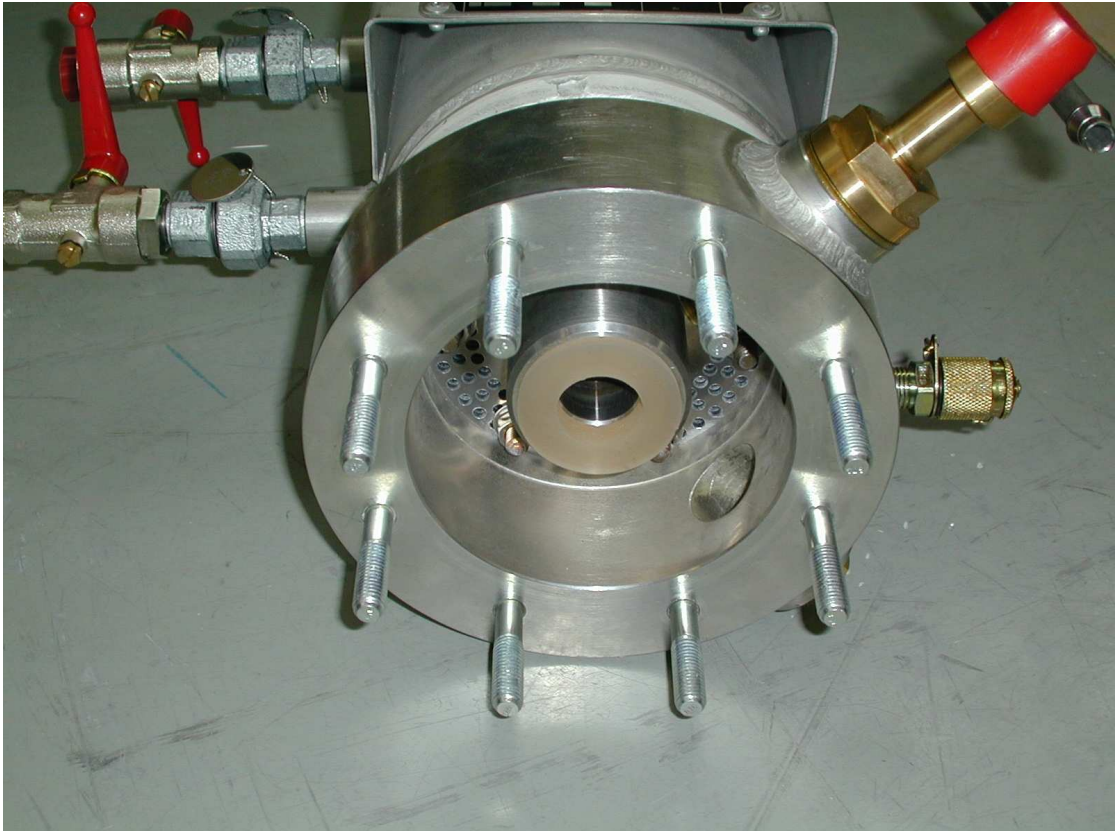
[Fig. TC4025](#) and [TC4026](#) : Install and connect the optical fiber.



TC4001



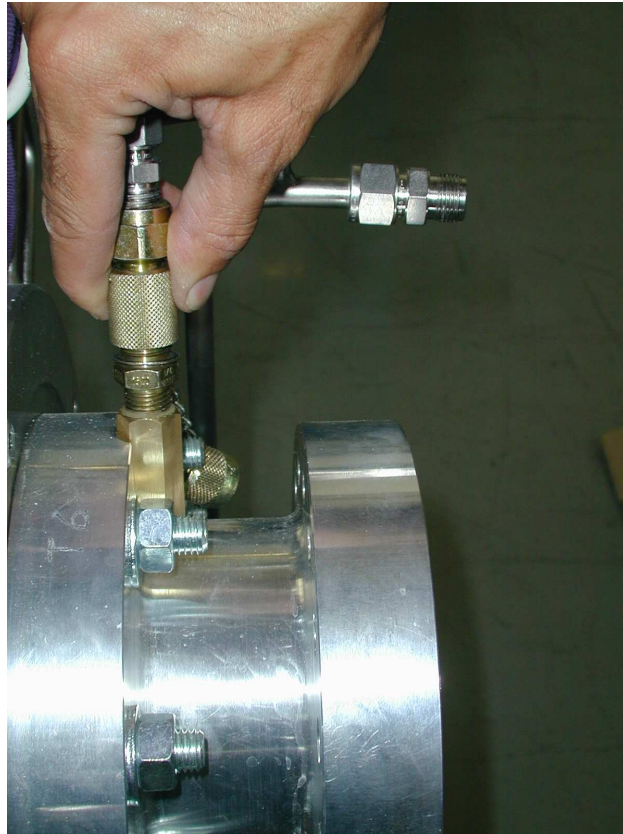
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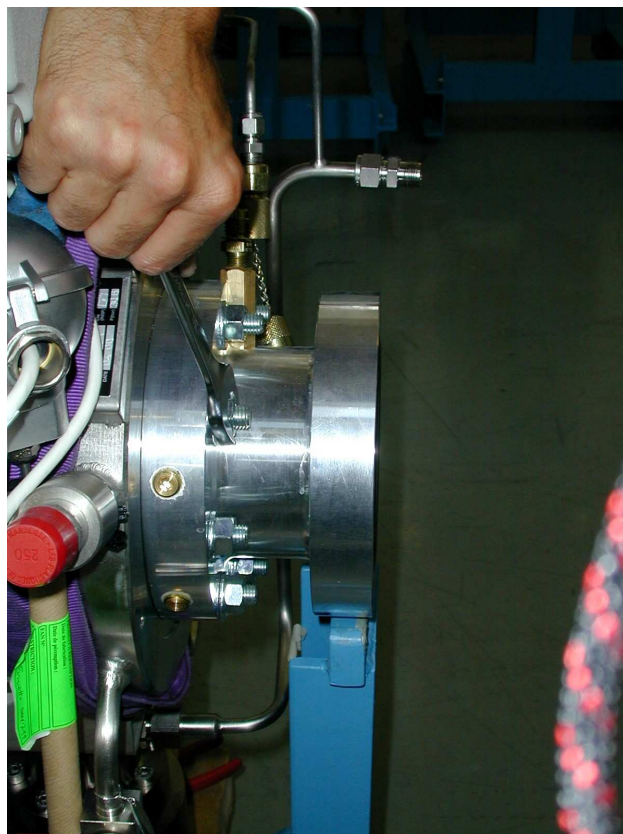
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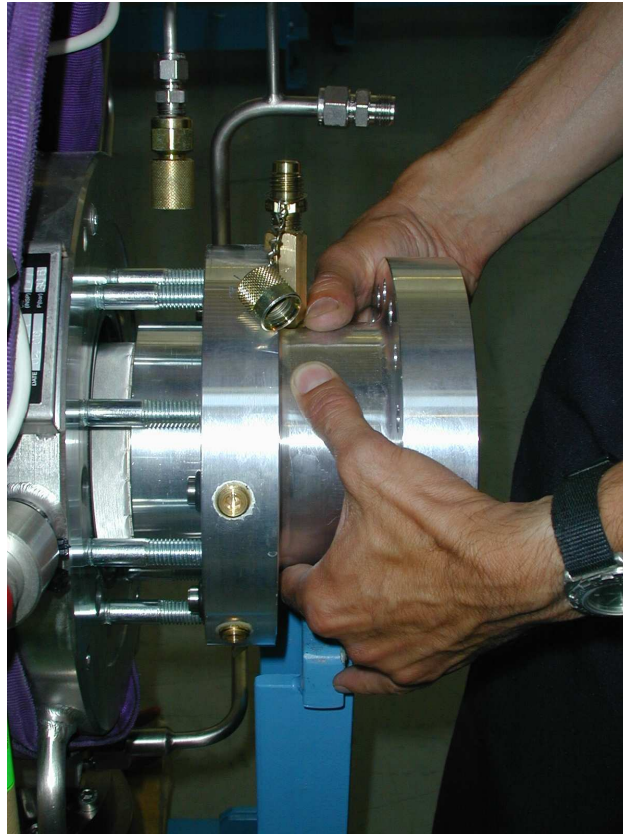
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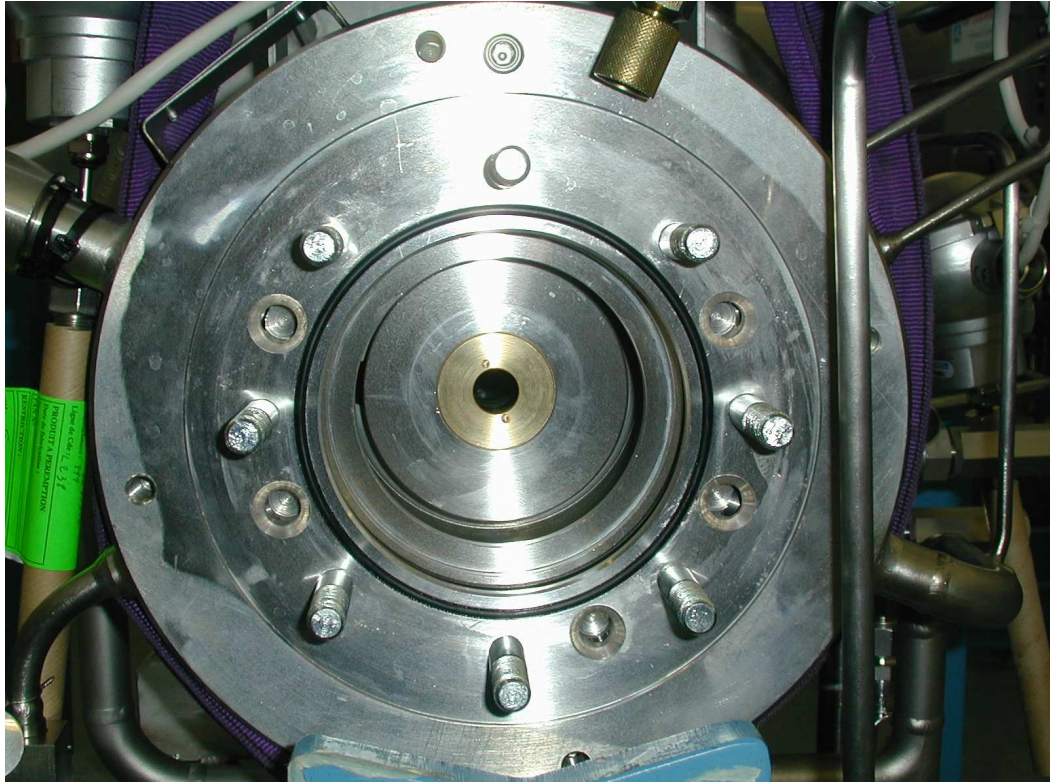
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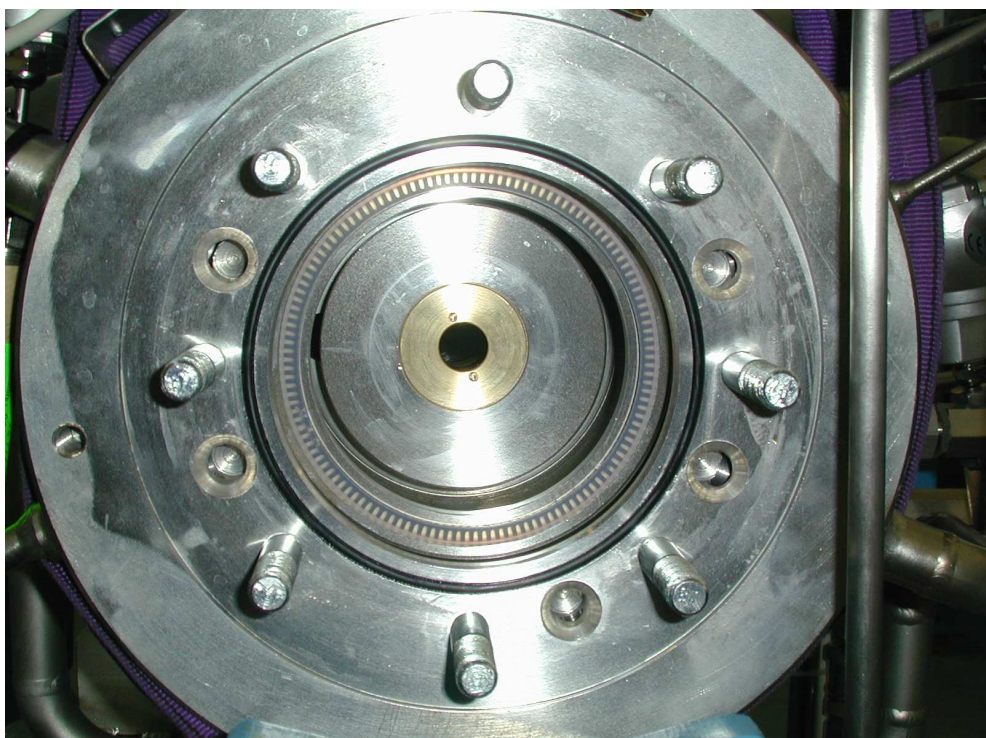
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TC4008



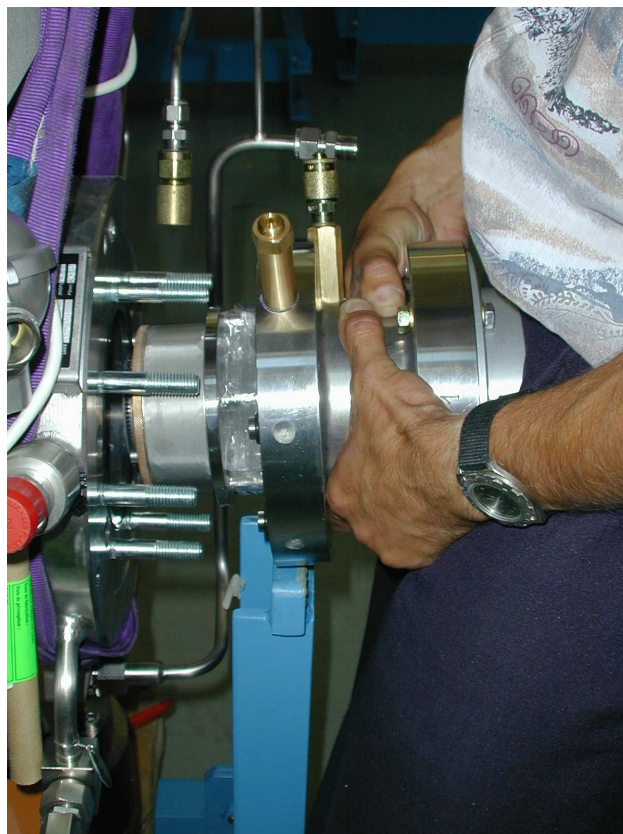
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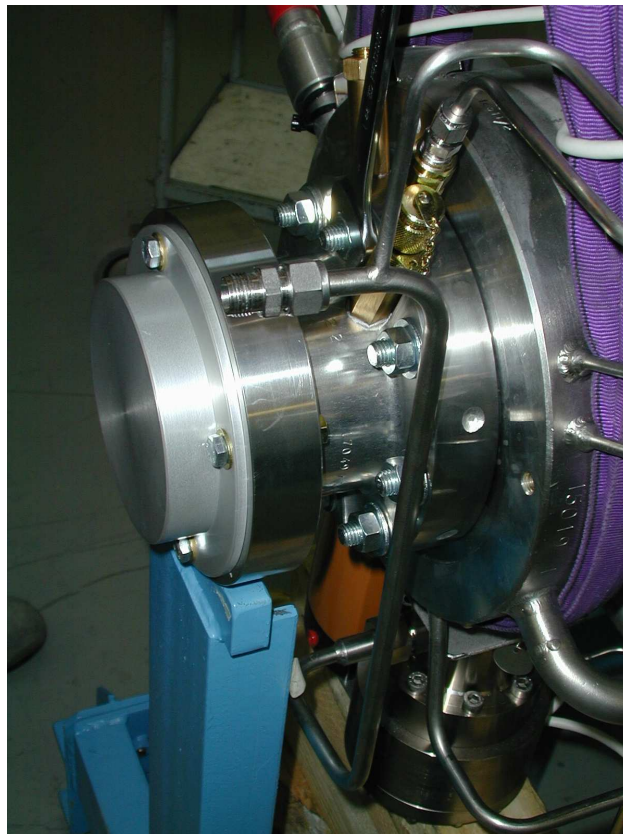
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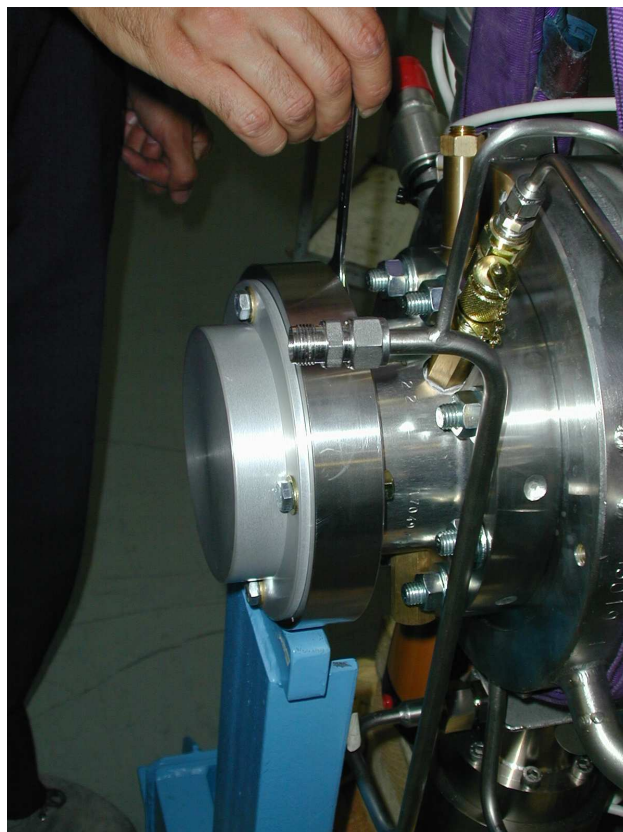
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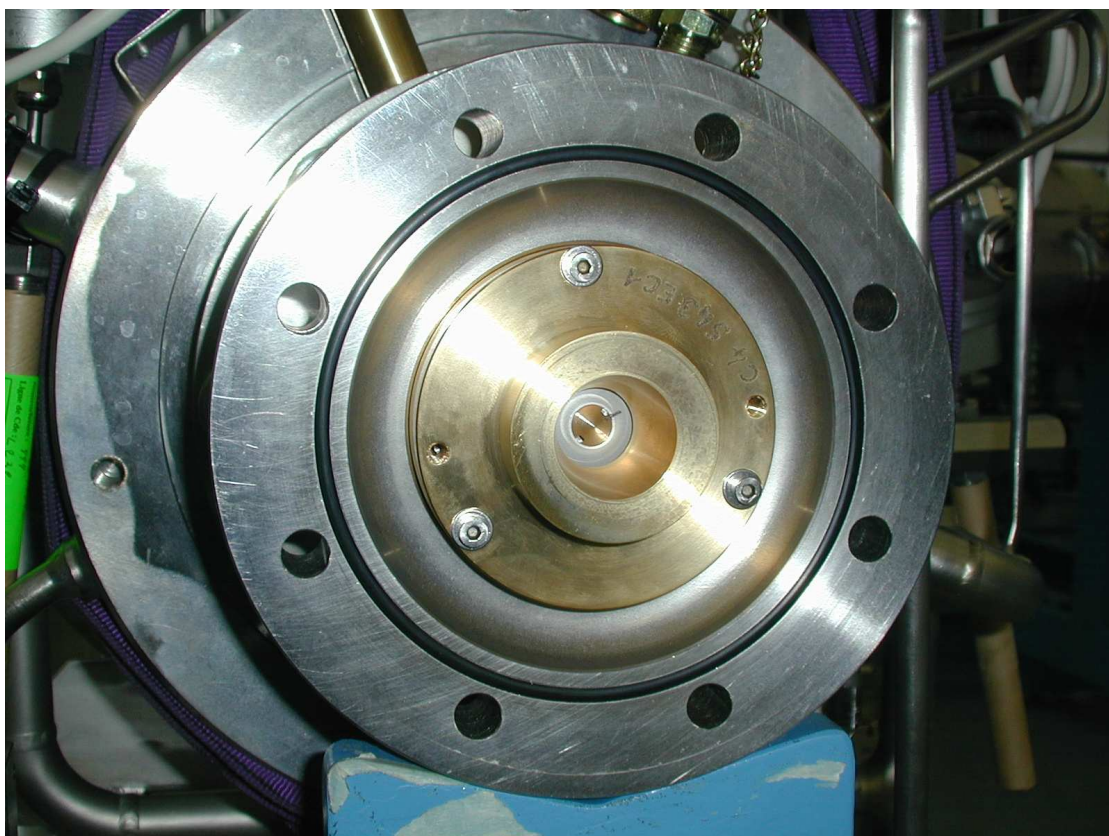
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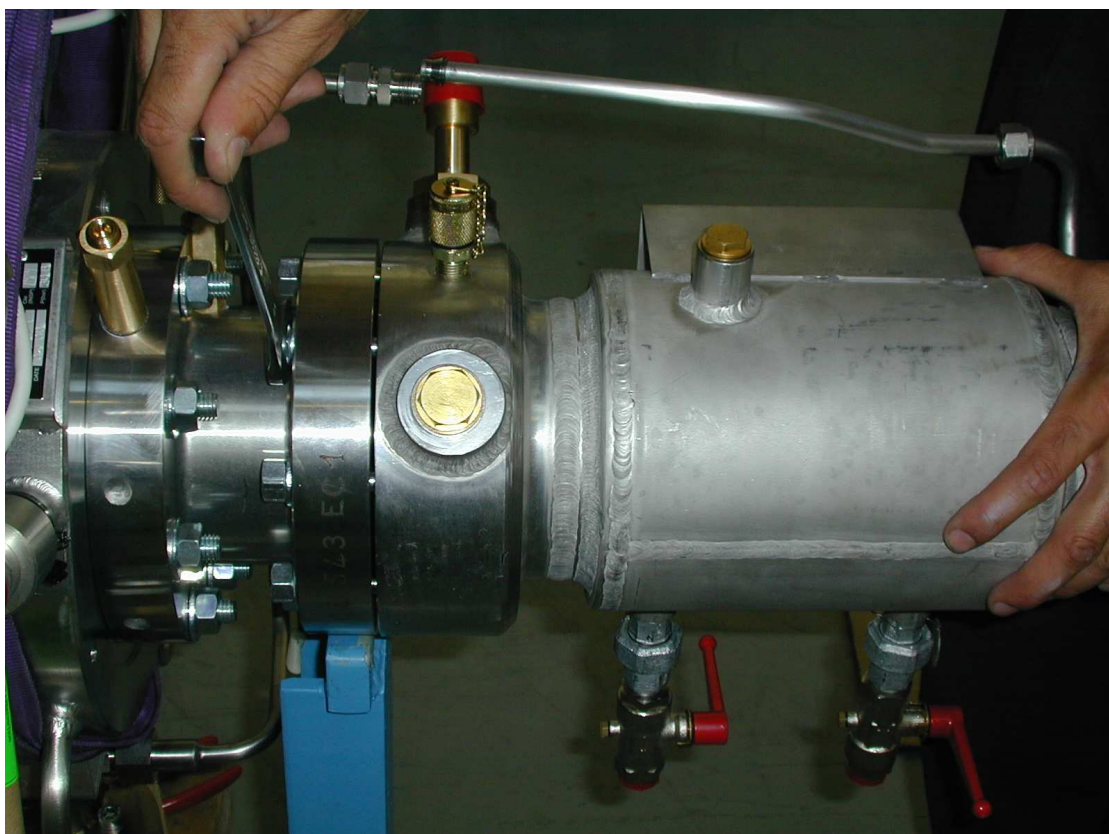
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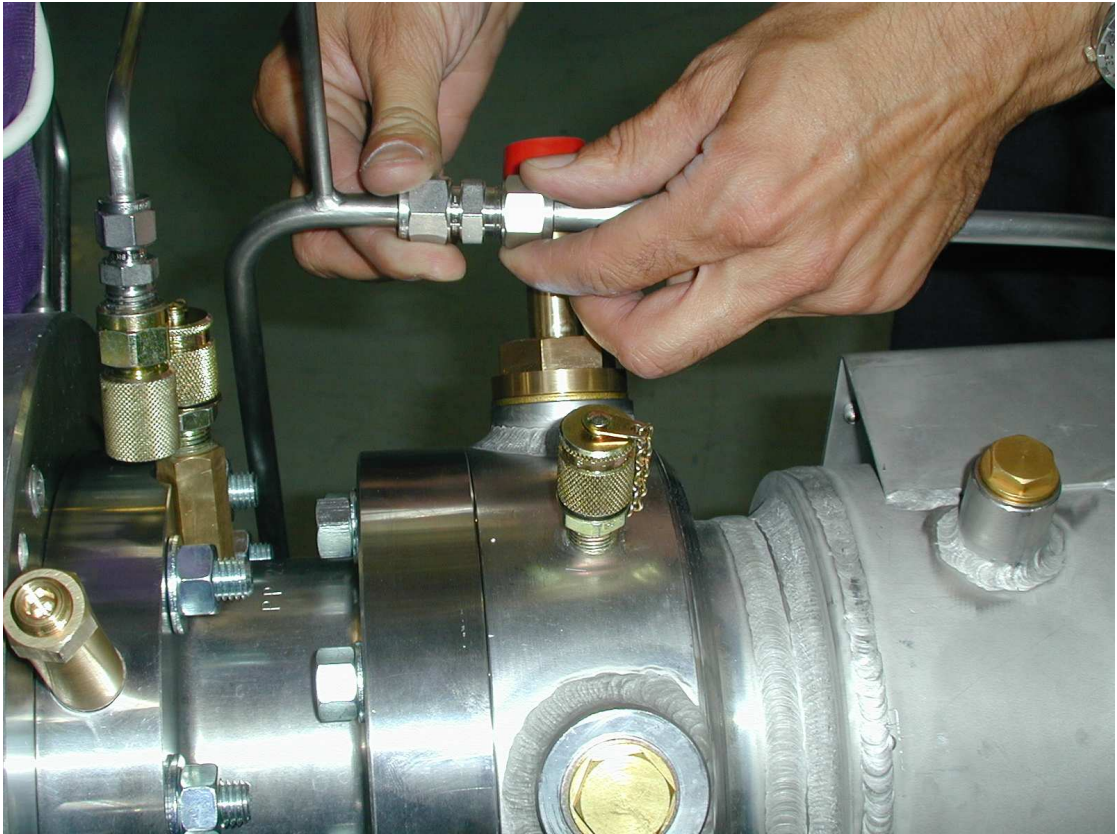
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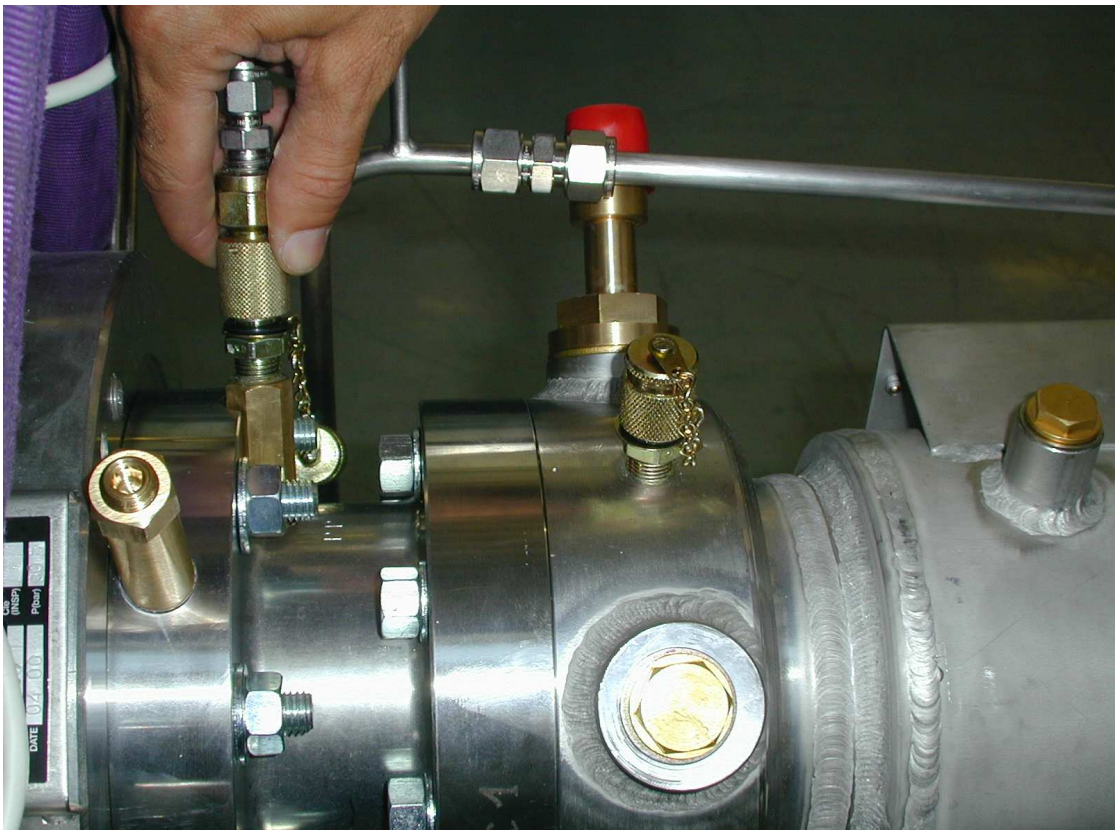
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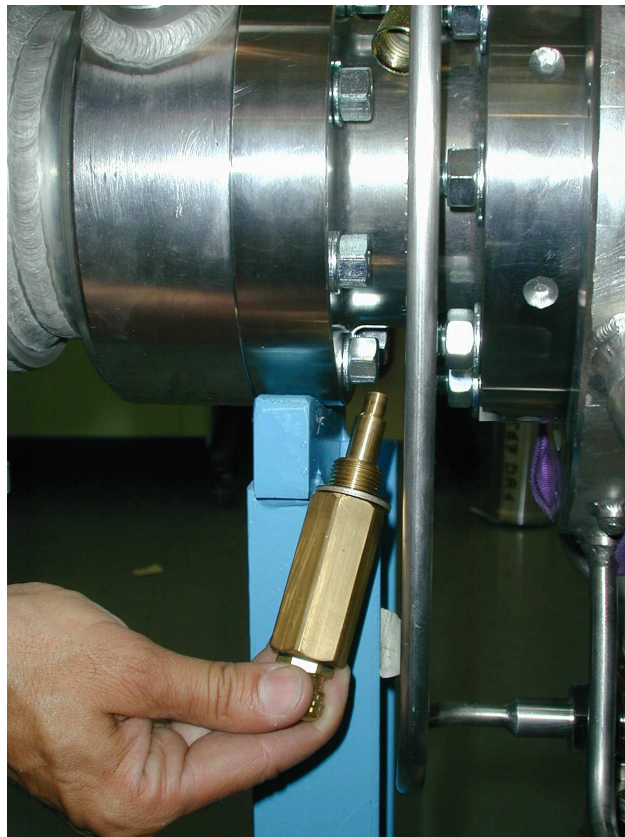
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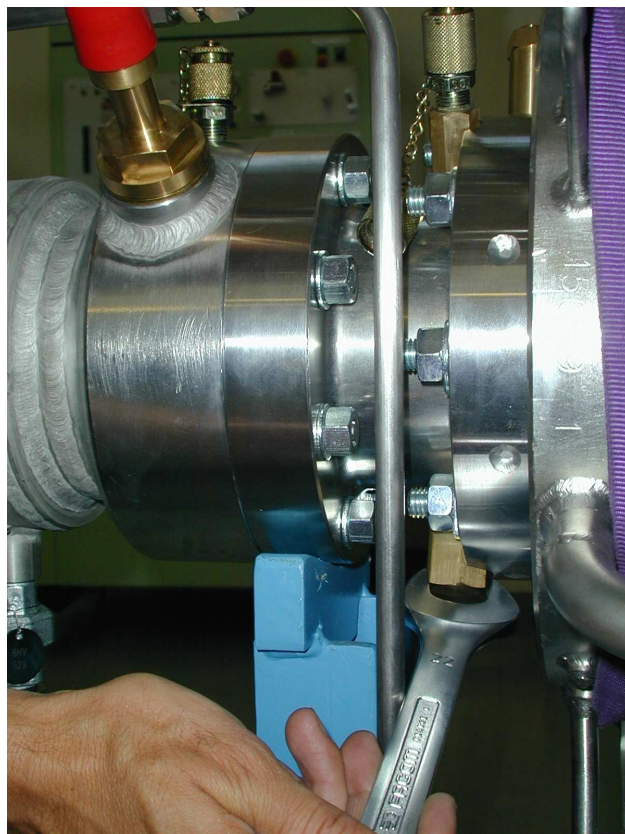
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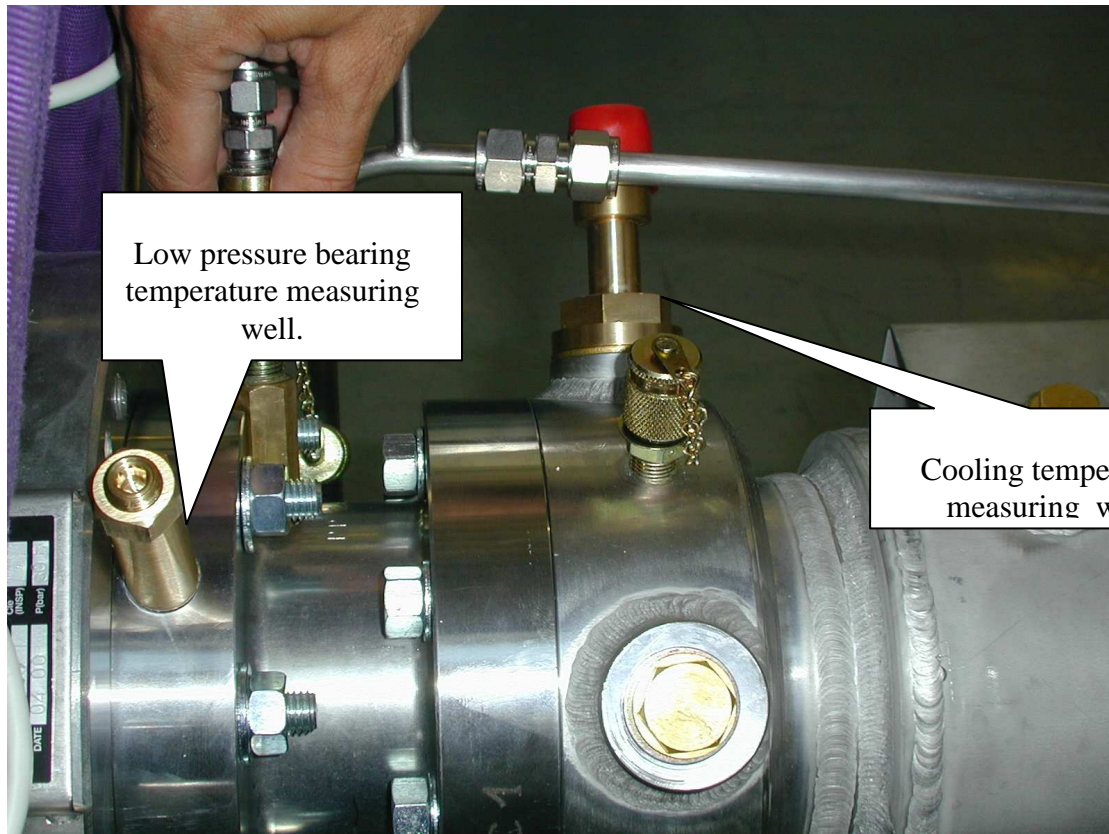
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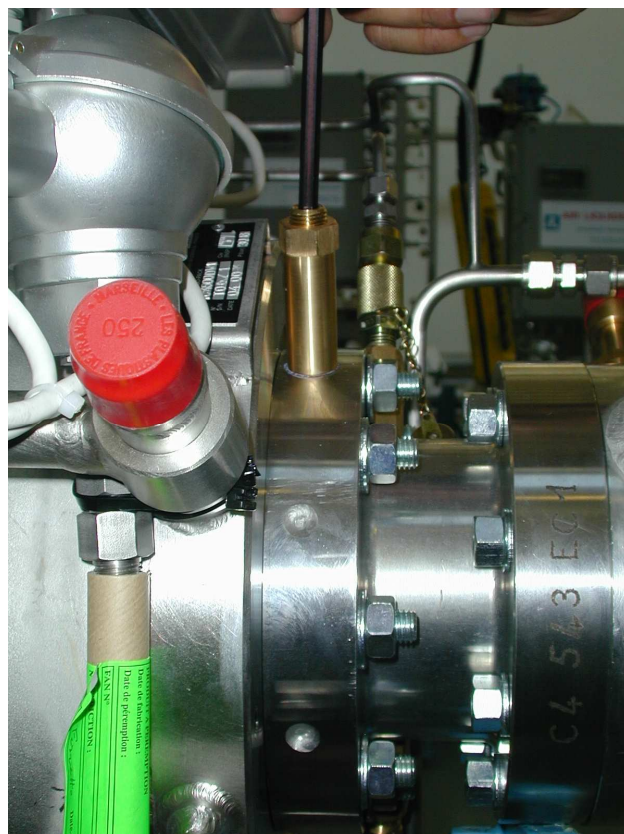
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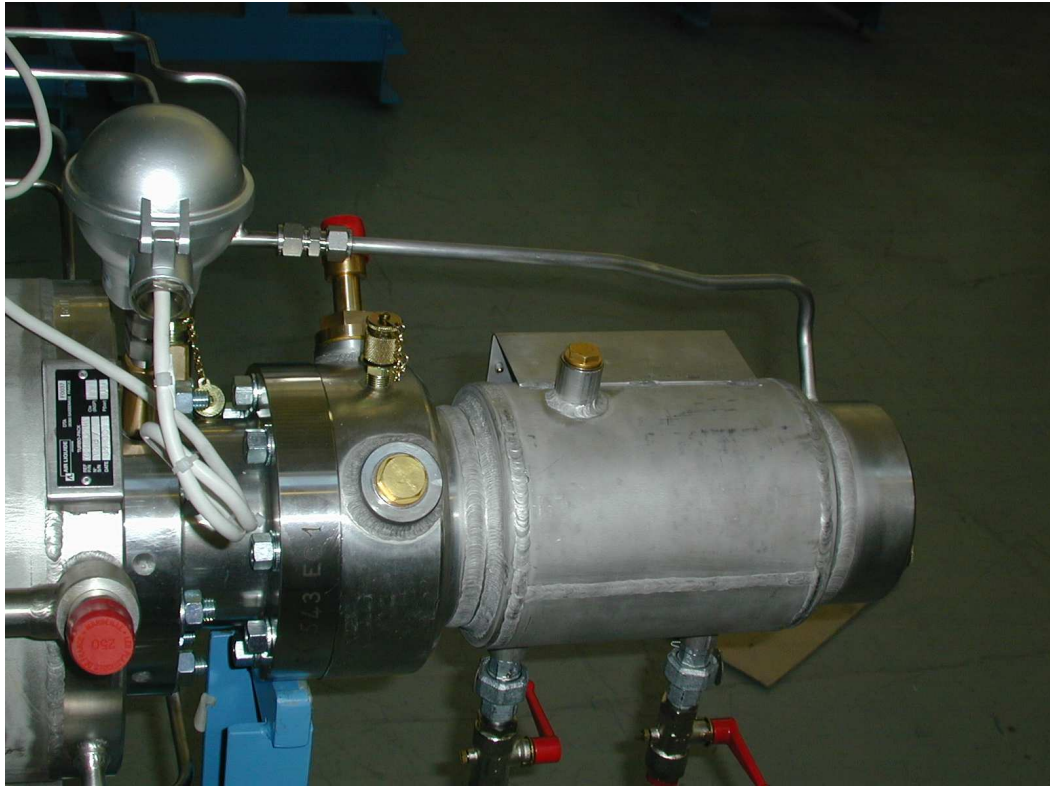
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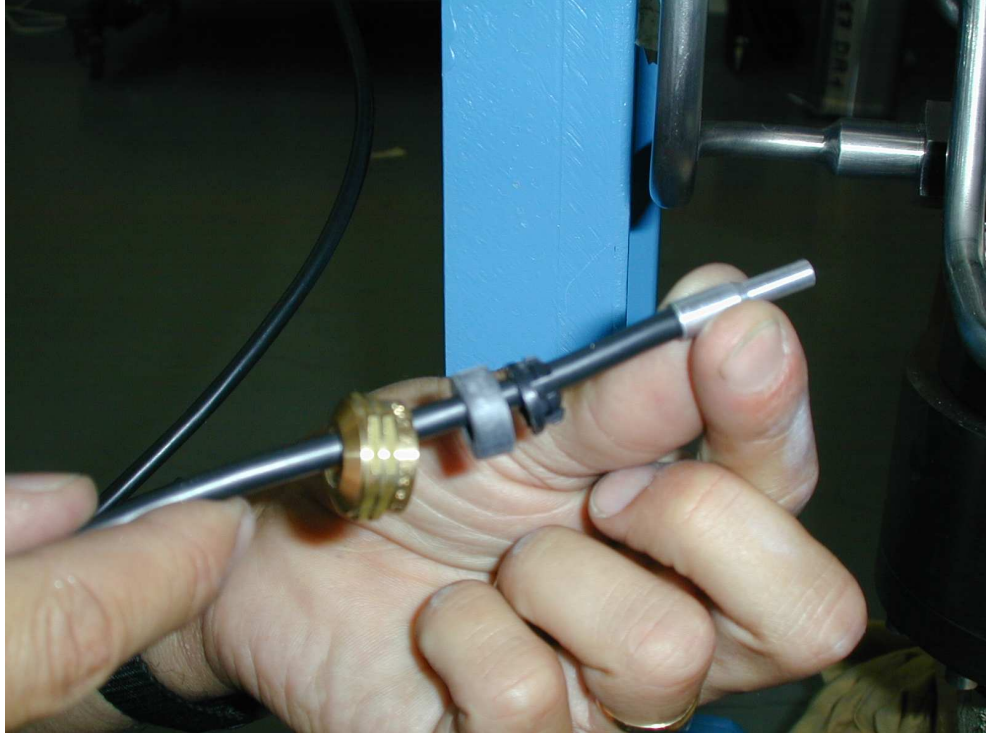
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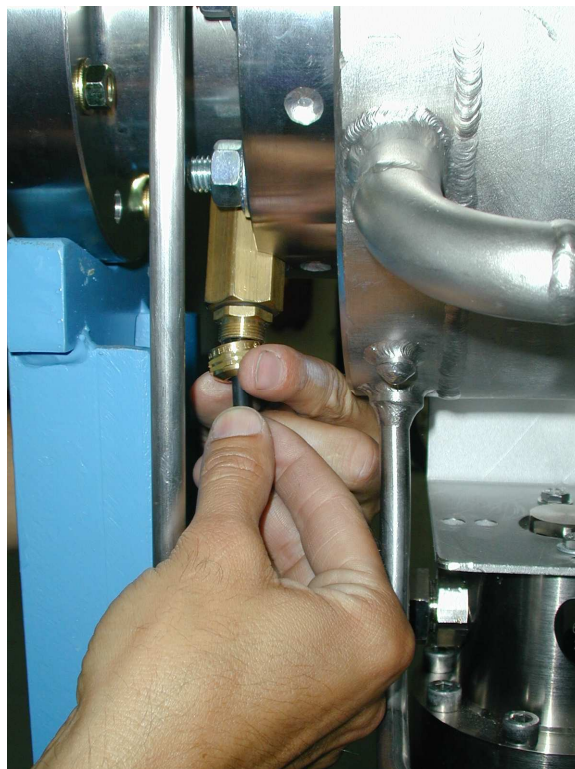
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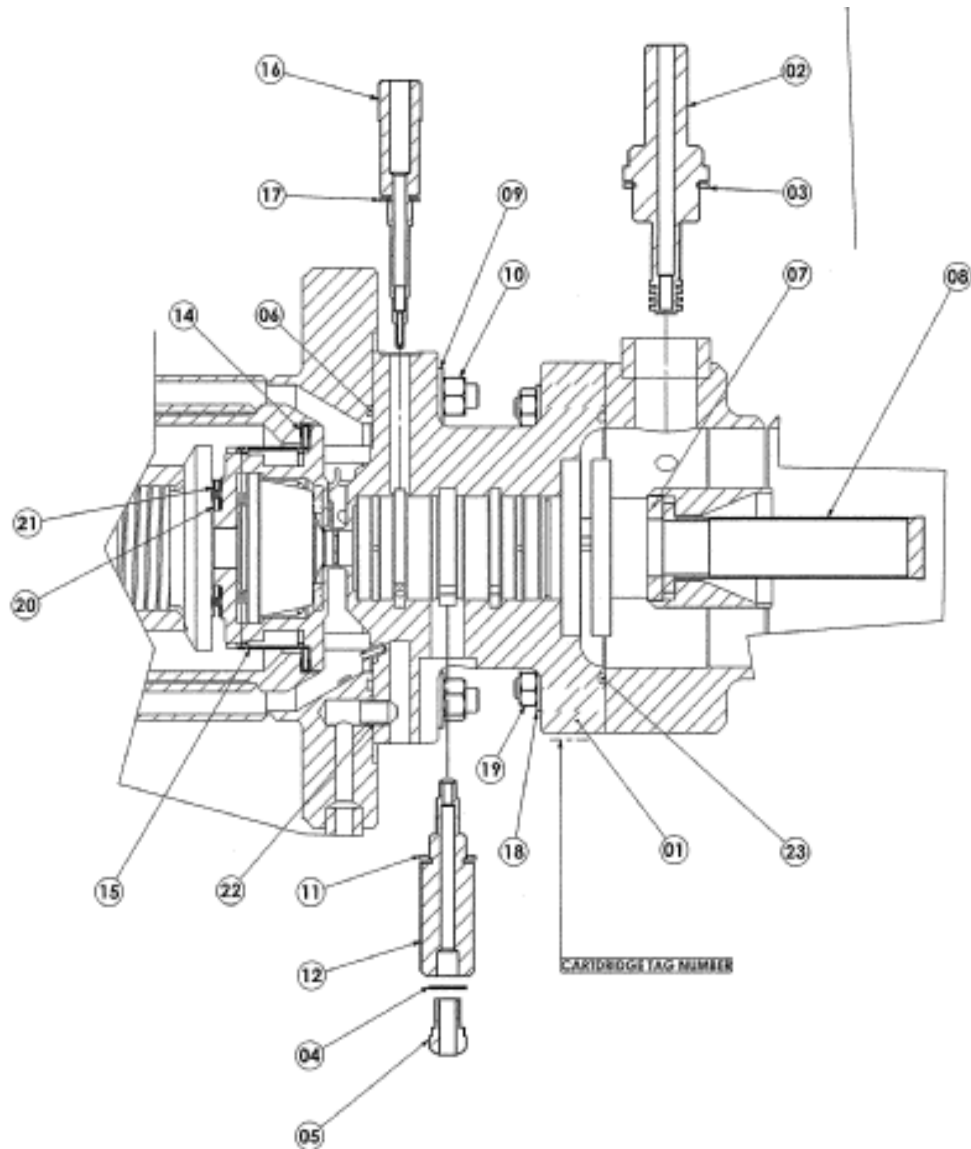
TC4024



TC4025



TC4026



TC4027