

CO₂ SERVICE KIT

R-744 (CO₂) system maintenance kit



WARNING!



Please read this manual carefully, especially the safety instructions, before using this maintenance kit. It contains a series of useful and important instructions that must be read and understood by each user. Please store it and keep it at hand attached to the product so that it is always available.

1. Safety rules for handling the R-744 (CO₂) refrigerant

Product properties:

Carbon Dioxide-CO₂ is a natural gas, non-toxic, non-flammable and highly available in the environment. In case of leakage in the refrigerant circuit, it can then be easily released into the natural cycle.

The physical and chemical characteristics of this gas allow a low environmental impact performance with an excellent refrigeration performance. Carbon dioxide belongs to transcritical refrigerants since it can exist in solid, liquid, gaseous, and supercritical states; however, only gaseous, liquid, and supercritical states occur in vehicle air conditioning systems. Dry ice formation can occur if the gas is released too quickly, and the pressure drop rate is too high. The instructions for use should be always carefully observed because the formation of dry ice in the system can destroy the internal components.

Air conditioning systems with CO₂ operate with a pressure of about 10 times higher than air conditioning systems with standard synthetic refrigerants.

Only competent personnel trained in the management of transcritical refrigerants can work on air conditioning systems or CO₂ heat pumps!

The refrigerant circuit must be specifically designed for tightness, since CO₂ molecules are smaller than synthetic refrigerant molecules. CO₂ refrigerant is a natural substance not covered by the Recycling and Waste Act. It can be discharged into the environment and is not covered by F-gas regulations.

The refrigerant comes in purity 4.0 with a residual moisture content of less than 15 ppm.

As a gas, carbon dioxide is about 1.5 times heavier than air in the environment and therefore accumulates in lower areas (e.g. assembly wells, underground premises, etc.).

Carbon dioxide is considered non-toxic. However, higher concentrations in the air (3-5%) can cause headaches, dizziness, drowsiness, and nausea.

Concentrations above 5% in the air can lead to loss of coordination and unconsciousness.

Concentrations above 8% in the air can lead to respiratory arrest and death.

Wearing gloves and goggles

Refrigerant leakage absorbs heat from the environment, very low temperatures can be reached, the result can be localized freezing of the skin and eyes (boiling point of CO₂: -78.7° C).



General safety at work - first aid

In case of contact with eyes or mucous membranes, immediately rinse with plenty of running water and consult an ophthalmologist. In case of skin contact, immediately remove used clothing and rinse the skin with water. If one inhales high concentrations of refrigerant vapors, immediately take the affected person to the open air, and consult a doctor. Give oxygen in case of respiratory distress.

Handling of pressure vessels

Be careful when handling refrigerant containers. The bottles must be transported and stored in such a way that they do not risk falling or rolling, since, if damaged or deformed, the containers can open. In this case the refrigerant evaporates instantly, generating forces that can cause detachment of parts of the bottle and cause serious injury. If improperly transported, the cylinder valve may break.

Don't overheat the tanks!

Keep away from heat sources, hot surfaces, sparks, open flames or other heat sources.



Close empty containers tightly!

Empty refrigerant cylinders must always be closed to prevent moisture from entering.

Notice to the user:

This manual has been created exclusively for competent service personnel. ***It is not suitable for amateurs or non-technical users!***

Service personnel shall be trained in the handling of transcritical refrigerants and shall use their judgement and take responsibility for their actions during the performance of general maintenance and repairs.

2. CO2 Service Kit Components

Our CO2 Service Kit consists of the following components:

P/N	description
35165071	4-way manifold for CO2
35149211	3x 1500mm R-744 (CO2) black service hose F/F 1/4" SAE
35165472	LP R-744 (CO2) quick coupler
35165474	HP R-744 (CO2) quick coupler



To be purchased separately:

P/N	description
33147541	R-744 (CO2) refrigerant charge cylinder for VW
33147542	R-744 (CO2) refrigerant charge cylinder for MEB

Optional accessories:

P/N	description
36150750	Used oil container
35149924	Oil injector and 90° LP quick coupler for R-134a
33147543	250 ml PAG 68 oil for R-744 (CO2)



3. Fields of application

The CO2 SERVICE KIT was developed with the aim of providing automotive professionals with a simple and economical procedure for the maintenance and refilling of CO2 air conditioning systems and heat pumps.



The following operations may be carried out:

- Controlled refrigerant discharge
- Evacuation by external vacuum pump
- System refill with pre-filled CO2 cylinders
- A/C system pressure test

With optional accessories:

- Manual control of drained oil
- Manual oil injection by injector

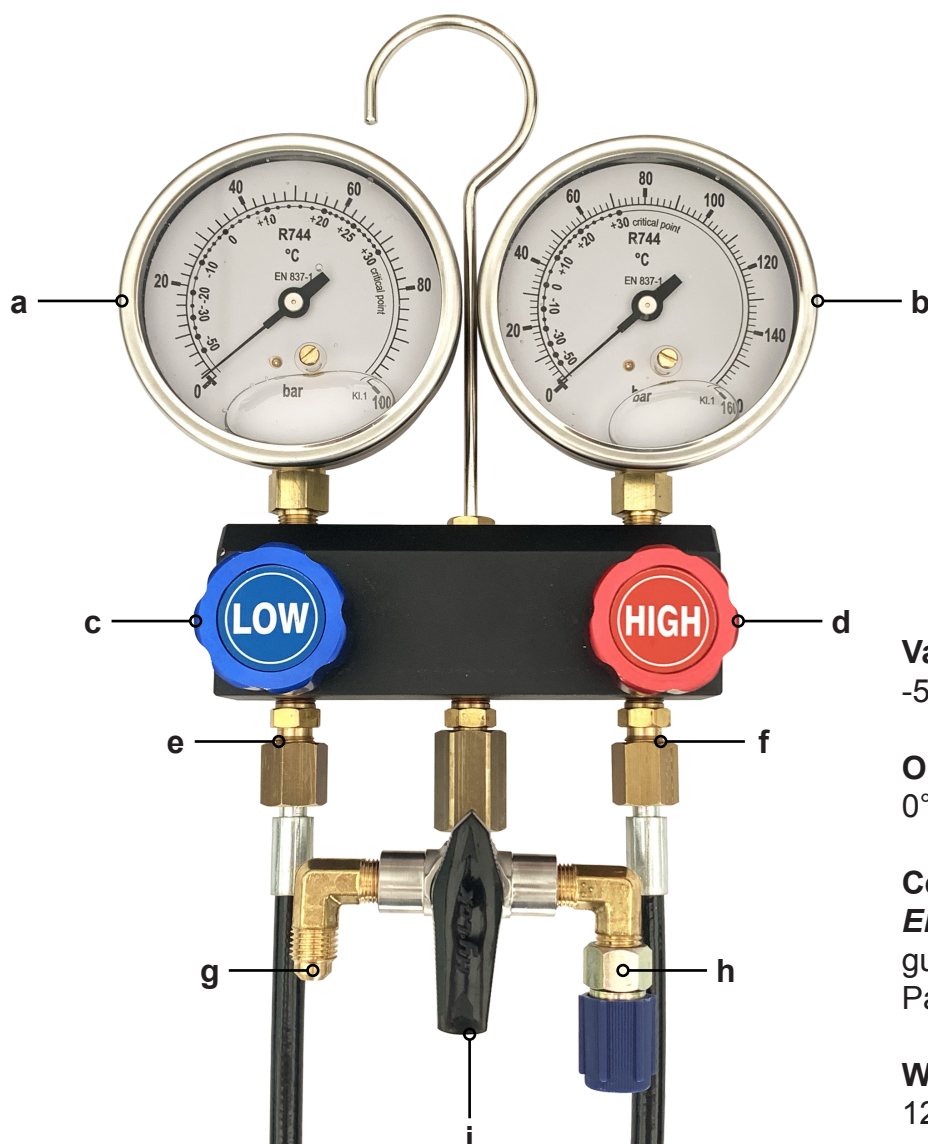
The CO2 SERVICE KIT complies with **Directive 2014/68/EU** on pressure equipment and **Directive 2010/35/EU** for approved and labeled compressed gas containers.

Safe use in the workshop is guaranteed if you follow the following safety measures:

- Only to be used by qualified personnel
- PPE must always be used
- Proceed according to the operating instructions provided with the kit

4. Kit assembly

figure	description
a	LP manometer - max. 100 bars (1450 psi), class 1
b	HP manometer - max. 160 bars (2300 psi), class 1
c	LP valve
d	HP valve
e	LP service hose fitting
f	HP service hose fitting
g	Refrigerant charge and discharge connection
h	R-134a fitting for LP quick coupler
i	Ball valve



Vapor temperature scale
 -55°C ≈ 30°C (-60°F ≈ 80°F)

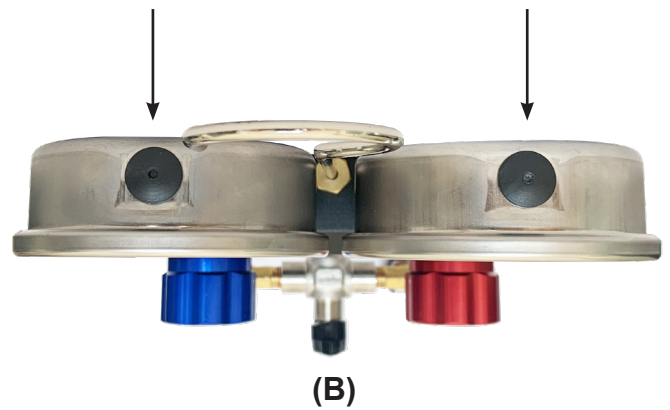
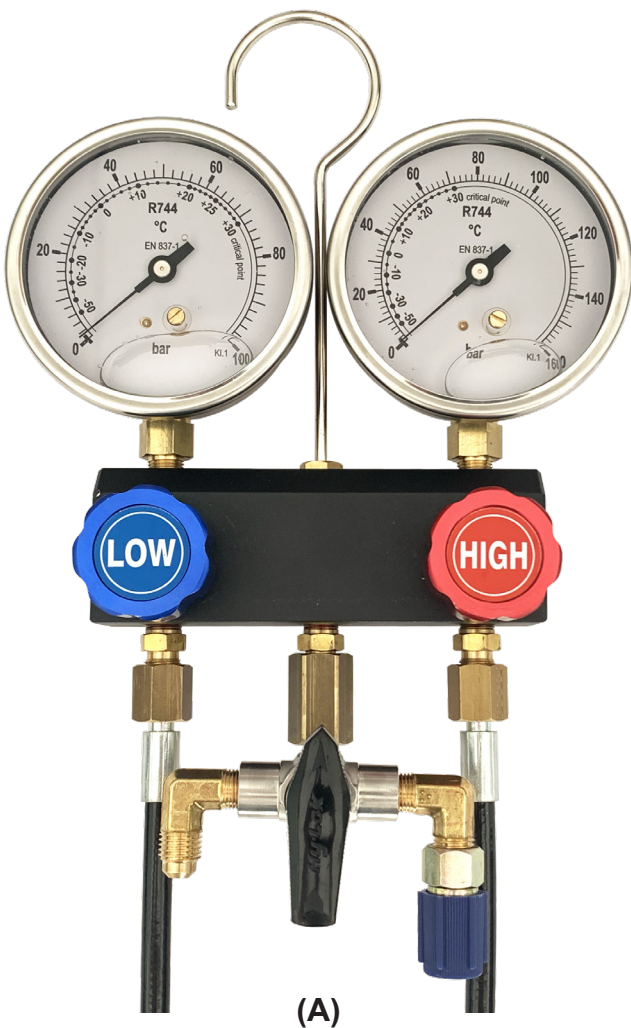
Operating temperature range
 0°C ≈ 35°C (3°F ≈ 95°F)

Certifications
EN 472/EN 837 Manometer re-
 gulation and **2014/68/EU** Article 4
 Paragraph 3

Warranty
 12 months from date of purchase.

5. Setting the zero of the manometer

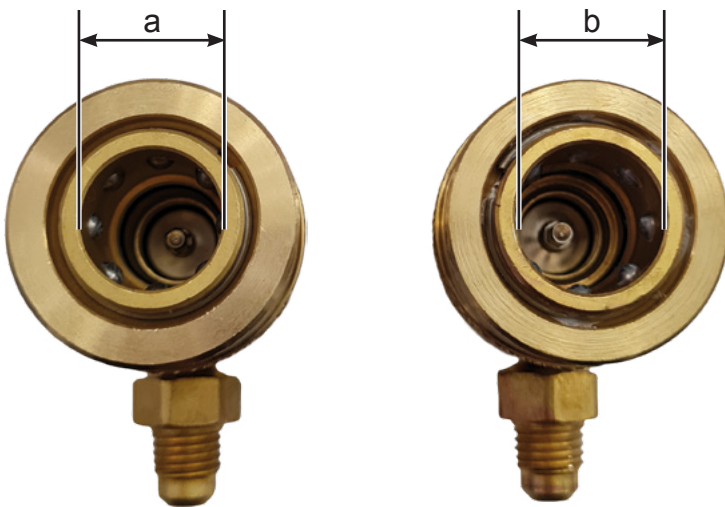
1. Check the zero-point adjustment of the manometer as shown in figure A.
2. Open the LP valve and the HP valve on the pressure gauge.
3. Turn the ball valve to the left to completely drain the residual gases from the service hoses and fittings.
4. HP/LP gauge pointers should now be zero.
5. If necessary, adjust the pointers to ZERO using the adjustment screws on top (figure B).



6. High and low pressure quick couplers

Quick couplers for R-744 (CO₂) air conditioning systems or heat pumps are standardized and are therefore designed to ensure connection without confusing the LP with the HP connection.

<i>figure</i>	<i>P/N</i>	<i>description</i>	<i>Ø size</i>
a	35165474	HP quick coupler for R-744	18,1 mm
b	35165472	LP quick coupler for R-744	16,6 mm

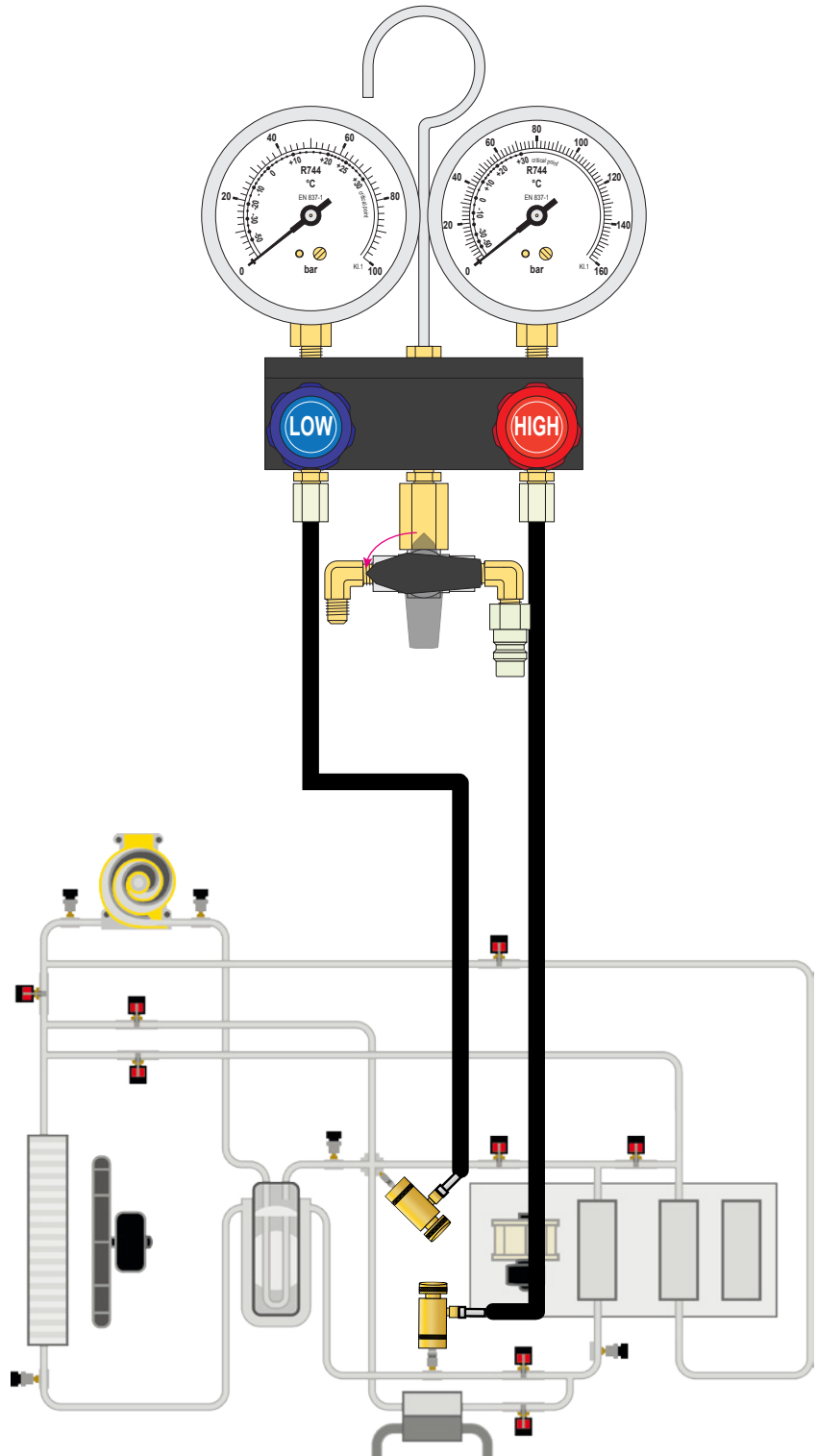


7. Discharging the refrigerant from the A/C system

1. Check that the LP and HP valves are closed and that the ball valve is in vertical position.
2. Connect the service fittings to the LP and HP connections of the R-744 (CO₂) A/C system.
3. If you are working on a R-744 (CO₂) system of the VW group, the electromagnetic valves in the heat pump must be opened by self-diagnosis before discharging the refrigerant (see manufacturer's specifications).
4. Check the refrigerant pressures for leaks in the system.
5. Open the LP and HP valves on the CO₂ SERVICE KIT.
6. Drain the refrigerant from the system by **SLOWLY** turning the ball valve to the left.

7. PLEASE ATTENTION! Make sure that the refrigerant is released VERY SLOWLY because, if the pressure loss occurs too fast, there is a chance that dry ice will form inside the system, resulting in damage to the components.

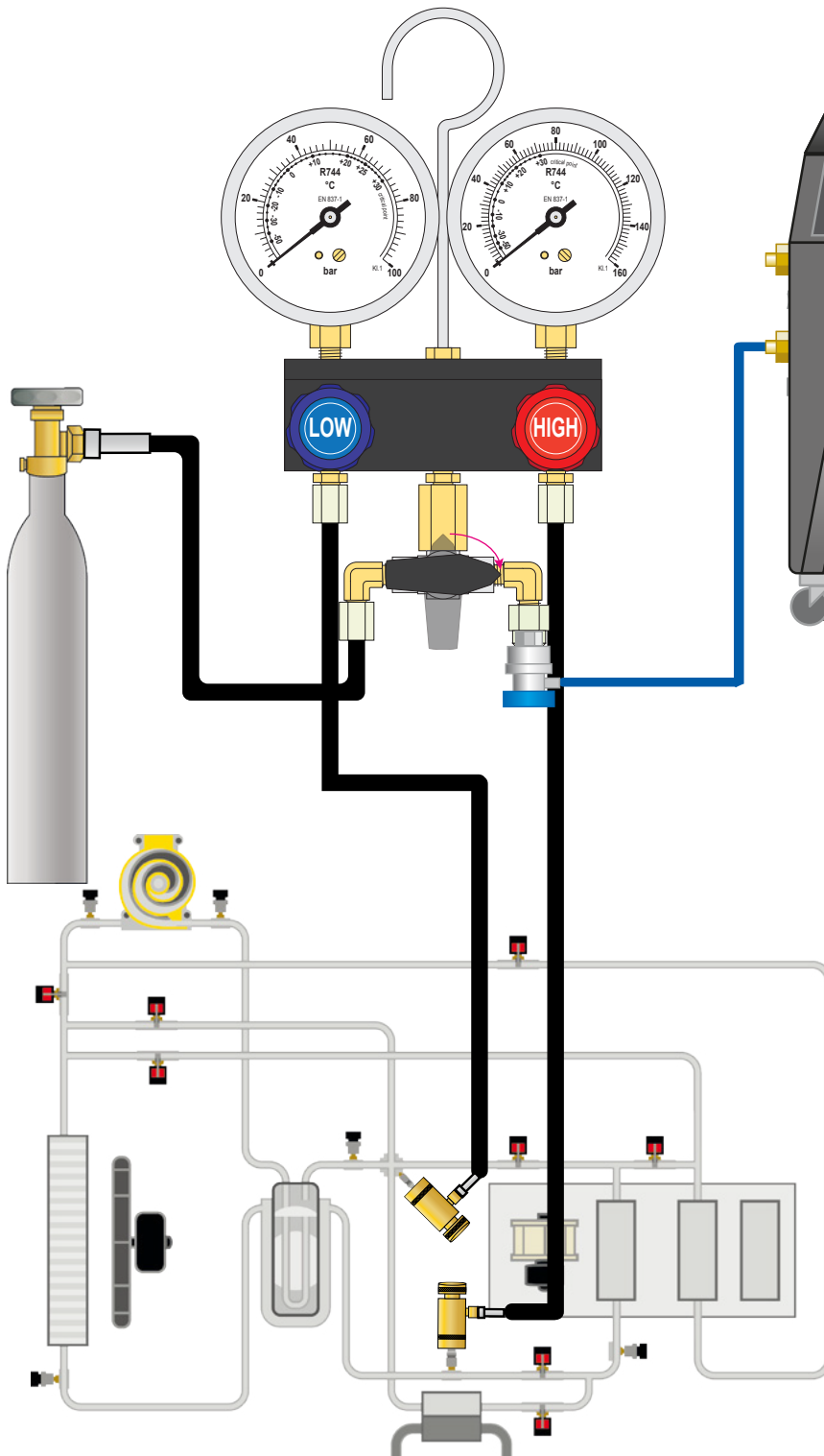
8. Once the system has been completely emptied of refrigerant, close the LP and HP valves again and place the ball valve in a vertical position.



8. Making the vacuum of the A/C system

1. Before starting the system vacuum process, check with LP and HP pressure gauges for residual pressures. In this case, the remaining pressure can be released by opening the LP and HP valves by turning the ball valve to the left.

2. Connect the CO2 cylinder to the charge connection. Choose the CO2 cylinder according to the type of car on which you operate (VW or Mercedes).



3. Connect the charging station R134a to the fitting for high-pressure quick coupler located to the right of the ball valve.

4. Turn the ball valve clockwise and open the LP and HP valves on the CO2 SERVICE KIT.

5. Set the vacuum time on the charging station and start the vacuum program. If you are working on a CO2 system of the VW group, the electromagnetic valves must be activated by self-diagnosis.

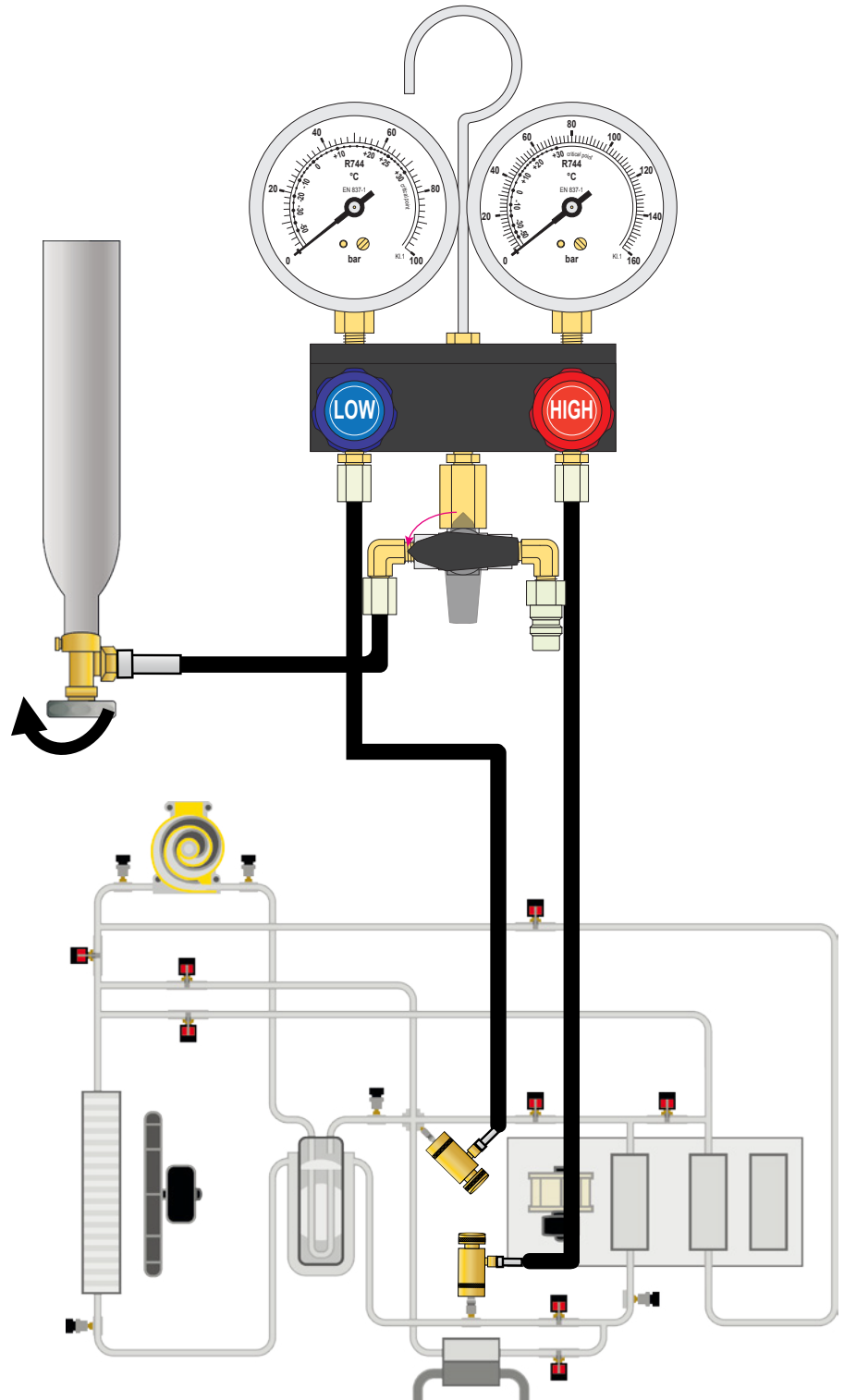
6. CAUTION: During the vacuum program, the ball valve must be rotated several times from right to left to remove air from the CO2 cylinder charging hose.

7. At the end of the operation, verify that the vacuum level is maintained.

8. At this point, the R134a charging station can be disconnected.

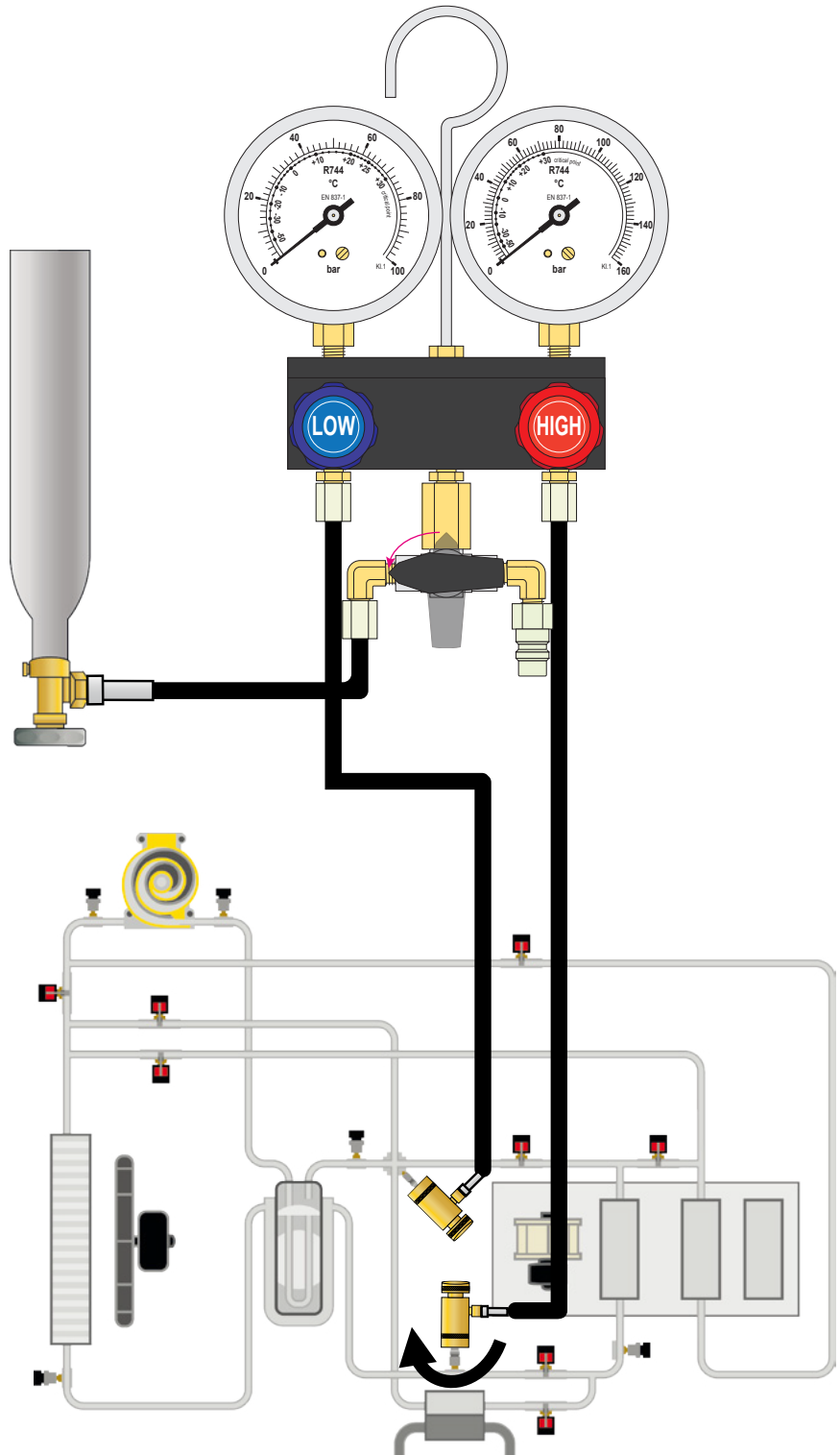
9. Charging the AC system with CO2 refrigerant (part 1)

1. Before charging the CO2, make sure that the LP and HP valves are closed and that the ball valve is in a vertical position.
2. If you are working on a CO2 system of the VW group, the electromagnetic valves must be activated by self-diagnosis.
3. Open the LP and HP valves on the CO2 SERVICE KIT.
4. Turn the CO2 filling cylinder upside down and open the CO2 cylinder valve.
5. Allow the refrigerant to gradually enter the system by turning the ball valve counterclockwise.
6. After equalising the pressures between the CO2 charge cylinder and the AC system, close the LP and HP valves. The ball valve remains rotated to the left. The cylinder valve also remains open.
7. The pressure gauges show the refrigerant pressure in the resting system.



9. Charging the AC system with CO2 refrigerant (part 2)

1. If you are working on a CO2 system of the VW group, turn off the electromagnetic valves.
2. Start the air conditioner and set the system to the minimum temperature.
3. Check the operating pressures LP and HP in the system. Low pressure should be about 30-35 bars.
4. In order for the system to be filled correctly, the compressor of the AC system must suck all the residual refrigerant present inside the hoses and the CO2 filling cylinder. To do this, close the tap of the high-pressure coupler on the vehicle.
5. Open the LP and HP valves on the CO2 SERVICE KIT so that the residual refrigerant in the hoses and the CO2 filling cylinder can be sucked into the system by the compressor.
6. The residual refrigerant will be fully drawn in by the charging cylinder and the CO2 SERVICE KIT, when the pressure between the HP pressure gauge and the LP pressure gauge is equalized at about 30 - 35 bars. A small amount of vaporized CO2 refrigerant may remain inside the cylinder.
7. Now close the tap of the low-pressure quick coupler of the vehicle.
8. Turn off the car's air conditioning.
9. Disconnect the LP/HP quick couplers from the system.



10. Close the valve of the CO2 filling cylinder. Turn the ball valve vertically and carefully release the service hose from the CO2 filling cylinder and the CO2 SERVICE KIT.

11. Finally, turn the ball valve to the left again to allow the drain of the remaining gas from the service hoses.

12. Then close all valves again, the system is now filled correctly.