

Refrigerant R 12

Type	107	114, 115
Charge in kg	1.0	1.2

Special Tools

Refrigerant cylinder with R 12 or Frigen baby (throwaway container) with R 12 (charge approx. 430 g)	conventional
Discharge valve for Frigen baby container	conventional
Wrench 1/2 X 9/16"	conventional
Ratchet spanner with square socket 6.5 mm in ratchet insert, for actuating service valves with spindles	conventional
Gauge set with 3 charging hoses and vacuum pump for evacuating and filling equipment for air-conditioning systems	conventional

Notes

The procedures for completely or partially charging the system are fundamentally the same. When adding a complete charge, evacuate system first (refer to Job No. 83.0–830).

Note: Charging the system requires a refrigerant supply cylinder; these cylinders are commercially available in the same way as oxygen or acetylen cylinders. There are also small sheet metal containers (Frigen babies) on the market containing approx. 1/2 liter of refrigerant R 12. If any difficulties are experienced in obtaining supplies we recommend to get in touch with a company specializing in the production or supply of refrigeration equipment. As the refrigerant is stored in the cylinder under pressure in liquid form, and as it is necessary that, when the system is charged **without** a charging cylinder, or a partial charge is added, the refrigerant should enter the system in vaporized form, we recommend (at least with cylinders that are part empty) placing the cylinder in a hot water bath **not exceeding 40°C**. If the system is completely discharged the refrigerant can, after evacuation of the system, also be added in liquid form through the discharge valve. Partial charges can only be added in the form of vapor with the system switched on.

For charging the system from a big 10 or 20 kg refrigerant cylinder it is necessary to use scales with 100 g graduation or a charging cylinder.

Caution! If refrigerant is added in the form of vapor, always keep the supply cylinder with its top upwards (Fig. 1).

Adding Refrigerant Vapor (through Suction Valve)

1 Connect hose (4) to supply cylinder (3) and send a small charge of refrigerant through hose to remove any residual dirt or moisture. Then connect line to

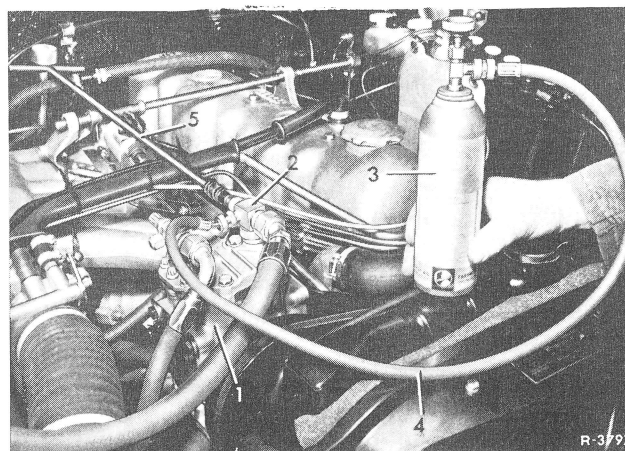


Fig. 1

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|-------------------------------|------------------------------------|
| 1 Refrigerant compressor | 4 Charging hose |
| 2 Service valve (suction end) | 5 Socket wrench or ratchet spanner |
| 3 Supply cylinder | |

83.0 Adding Refrigerant (Complete or Partial Charge) to the System

coupling nut on connection of service valve (suction end) (offset end with pressure pin of hose line) (Fig. 1).

2 Turn in spindle of service valve (2) approx. 2 turns; this will connect the refrigerant supply cylinder (3) to the system. Back out service valve spindle (discharge end) completely.

3 Run engine at approx. 1,000 rpm and set temperature control knob to maximum cooling and blower switch to full blower speed. In areas where the temperature exceeds 22°C use auxiliary blower to cool condenser; this will always speed up charging.

4 Slowly open supply cylinder valve. When adding a partial charge allow refrigerant to flow into the system until no more bubbles appear in the sight glass on the receiver. When adding a complete charge allow approx. 100–200 g of refrigerant to flow into the system. Then back out service valve spindle completely. On service valves with Schrader valve connect valve to supply cylinder and remove hose line from service valve. Then shutoff engine.

5 Check entire system for leaks using leak tester, seal any leaks. The full refrigerant charge may only be added after all the leaks have been eliminated.

6 Charge air-conditioning system completely as described under item 1 to 3.

7 Back out spindle of service valve (2) against stop.

8 Close valve on supply cylinder and turn off engine. Disconnect charging hose (4).

9 Screw plugs and caps to service valves.

10 Check performance of air-conditioning system. For details refer to Job No. 83.1–510.

Adding Refrigerant Using Charging Cylinder

The charging cylinder permits adding a precisely specified amount of refrigerant to the system.

If the temperature of a refrigerant contained in a closed cylinder increases, the pressure and the specific volume of the liquid refrigerant will increase as well.

If, therefore, a given **weight** of refrigerant is to be taken from a cylinder with sight glass, it is necessary to make up for the change in specific weight caused by temperature **variations**.

Any variations in **volume** caused by temperature changes can be compensated for by reading the pressure on the pressure gauge (15) and setting the same pressure on the upper scale of the rotatable plastic cylinder, and by making due allowance for the refrigerant brand as indicated on the lower edge of the rotatable plastic cylinder. Since the brand used is refrigerant R 12, set scale on the lower edge of the plastic cylinder to R 12 (Fig. 2).

Charging Procedure

1 Connect hose to bottom of valve (14) on charging cylinder (12) and to valve on refrigerant container. Then place refrigerant container (16) upside down with the valve facing downwards (Fig. 2).

2 Open the two valves (14 and 17) on the charging cylinder and the refrigerant container. Open top valve (13) on charging cylinder slightly to allow air and gas to escape from the cylinder.

3 As soon as refrigerant liquid appears in the sight glass close valve (14). Turn plastic cylinder so that the value indicated on its upper pressure scale corresponds to the pressure indicated on the pressure gauge (15); be sure to use the division for refrigerant R 12 on scale.

4 Open valve (14) and add specified refrigerant charge. After the specified amount has been added close valves (13 and 14) and valve on refrigerant container (16).

5 Disconnect hose from refrigerant container. Connect hose (10) to center connection of gauge set (2) (Fig. 2). If refrigerant vapor is added (through suction valve) connect hose (10) to valve (13), if liquid is added (through discharge valve) to valve (14).

6 Switch on electric heater incorporated in charging cylinder (12). Switching on the heater increases the pressure in the charging cylinder. If the system is charged with refrigerant liquid, a pressure of at least 7 atü is required. The higher the pressure, the faster and more completely will the refrigerant flow into the system.

7 Remove plugs (4) from connections and caps (5) from the two service valves (Fig. 1 or 2).

8 Evacuate system (for details refer to Job No. 83.0–830, evacuating with vacuum pump).

9a Liquid Charging:

Close valve A. Open valve B on gauge set (2) and valve (14) on charging cylinder (12). On service valves with spindles, turn in spindle on discharge end (7) by approx. 2 turns. Watch refrigerant level in charging cylinder sight glass until the specified amount of refrigerant has entered the system. Fully back out spindle of service valve (7). Open valve A and turn in spindle of service valve (6) approx. 2 turns. Switch on air-conditioning system and set to maximum cooling. As soon as the increased pressure in the pressure gauge is identical with the pressure in the low-pressure gauge (suction pressure), close valves A and B again. Opening valves A and (6) will

allow any refrigerant remaining in hose (10) to enter the system.

9b Vapor Charging:

Turn in spindle of service valve (6) approx. 2 turns. Run engine at approx. 1,000 rpm and set temperature control knob to maximum cooling and blower switch to full blower speed. Close valve B. Open valve A on gauge set (2) and valve (13) on charging cylinder (12). Watch refrigerant level in charging cylinder sight glass until the specified amount of refrigerant is in the system. Fully back out spindle of suction valve (6) and close valve A on gauge set.

10 Use leak tester to test entire system for leaks (refer to Job No. 83.0–830).

11 Test performance of air-conditioning system (for details refer to Job No. 83.1–510).

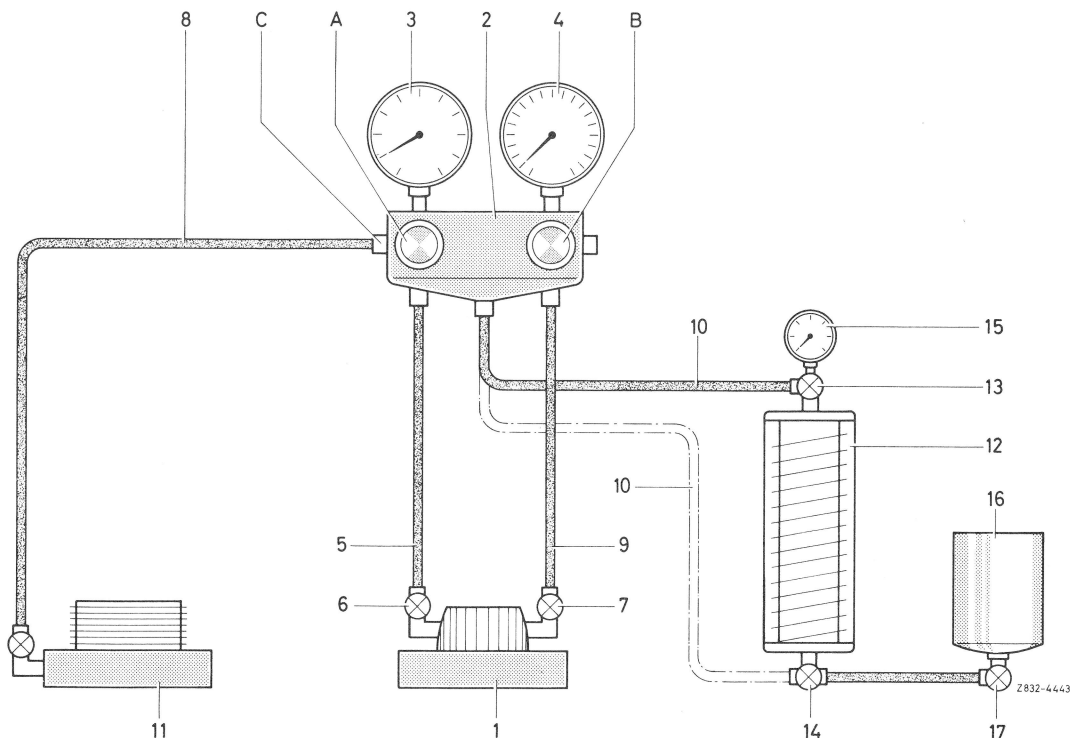


Figure 2

Gauge set and charging cylinder with all connections

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|--------------------------------|---------------------------------|----------------------|------------------------------------|
| A Valve on low-pressure gauge | 3 Low-pressure gauge | 8 Hose | 13 Valve, top |
| B Valve on high-pressure gauge | 4 High-pressure gauge | 9 Hose | 14 Valve, bottom |
| C Schrader valve on gauge set | 5 Hose | 10 Hose | 15 Pressure gauge |
| 1 Refrigerant compressor | 6 Service valve (suction end) | 11 Vacuum pump | 16 Container with refrigerant R 12 |
| 2 Gauge set | 7 Service valve (discharge end) | 12 Charging cylinder | 17 Valve on refrigerant container |