

Filling capacity	kg
Refrigerant R 12	1.2
Refrigerant bottle R 12	approx. 7.5
One-way bottle Frigen-Baby R 12,	approx. 0.430

Conventional tools

Assembly tester with 3 filling hoses and vacuum pump or evacuating and filling unit (service unit) for air conditioning system

Line connection reduction piece 7/16"–1/4" for refrigerant bottle or tapping valve for Frigen-Baby bottle

e.g. made by Christof Fischer
Augsburger Straße 289, D-7000 Stuttgart 60

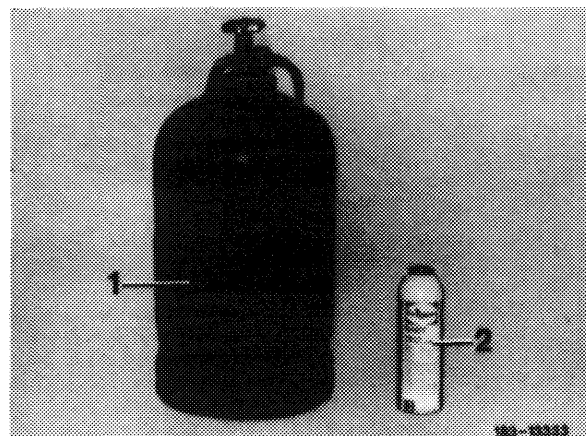
Filling aid type CH 200 and angle piece 90° with rapid screw connection 7/16"

Double open end wrench 1/2" x 9/16"

Note

The jobs for refilling and filling up of air conditioning system are in principle alike. When refilling, evacuate system first (83–512).

Note: Filling requires a supply bottle (1) with refrigerant, which is commercially available just like e.g. a supply bottle with oxygen or acetylene gas. In addition, there are small cans (2 [Frigen-Babys]), containing approx. 1/2 liter R 12. If hard to obtain, contact one of the specialist companies manufacturing or operating refrigerating units.



Since the refrigerant in the supply bottle is under pressure and liquid and will flow in the shape of gas when filling the air conditioning system **without** a filling cylinder or when refilling, it is recommended (at least when the supply bottle is already partially empty) to place the supply bottle in a water bath of **max. 40 °C**. If the system is completely empty, the refrigerant can also be filled-in in liquid shape via pressure end upon evacuation. Filling up can be done only in the shape of gas with the system switched on. **When filling the system from a refrigerant bottle of 10 kg or 20 kg capacity, a scale with 100 g graduation for the bottle or a filling cylinder will be required.**

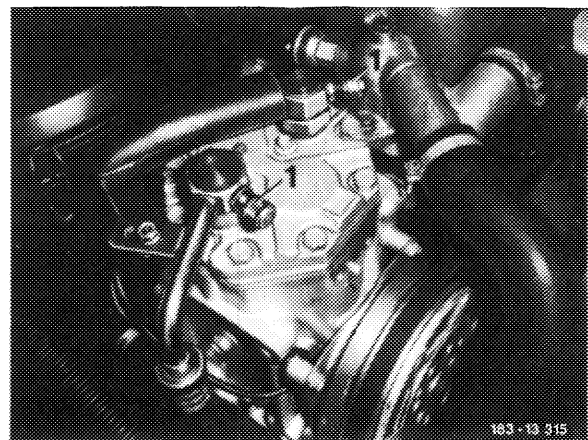
Attention!

If filling-up in the shape of gas, the supply bottle should always be set up with the lock in upward direction.

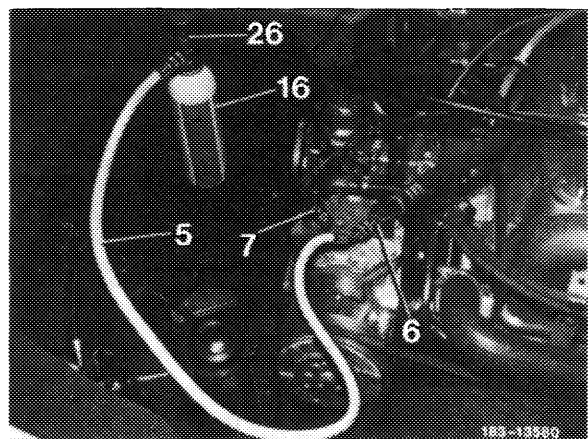
A. Filling system from supply bottle

Filling-in refrigerant in the shape of gas

1 Remove closing caps (1) from service valves.



2 Screw line connection reduction piece (26) on supply bottle (16). Connect filling hose (5) to reduction piece (26) and blow through for a short moment with refrigerant to remove remains of dirt and moisture, if any. Then connect filling hose (5) to connection (6 [suction end]) of service valve (offset end with pressure pin of hose line).



3 Run engine at approx. 1000/min and set temperature selector knob to the highest cooling capacity and blower switch to full blower speed. In rooms with temperatures above 20 °C blow at condenser with an additional blower. Blowing against condenser will always speed up filling.

4 Slowly open valve on supply bottle. When filling-up air conditioning system, continue until refrigerant flows free of bubbles past sightglass of receiver dehydrator.

5 When refilling, fill in approx. 100–200 g refrigerant. Then stop engine.

6 Check complete air conditioning system with leak tester for leaks and seal leaks, if any. Fill system with full quantity of refrigerant only when there are no more leaks.

7 Completely fill air conditioning system (item 1 to 3).

8 Close valve on supply bottle and stop engine. Disconnect filling hose (5).

9 Screw closing caps (1) to service valves.

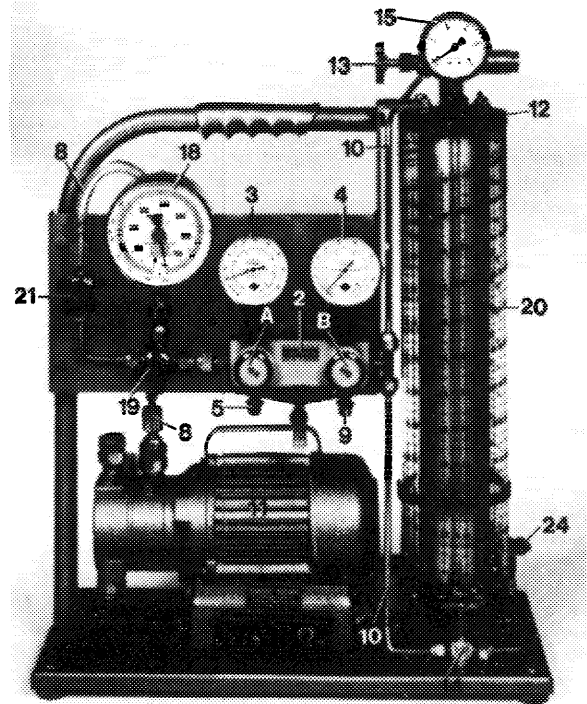
10 Check air conditioning system for function (83–510).

B. Filling system with filling cylinder or service unit

Note: The filling cylinder (12) serves for the accurate filling of the desired quantity by weight of refrigerant.

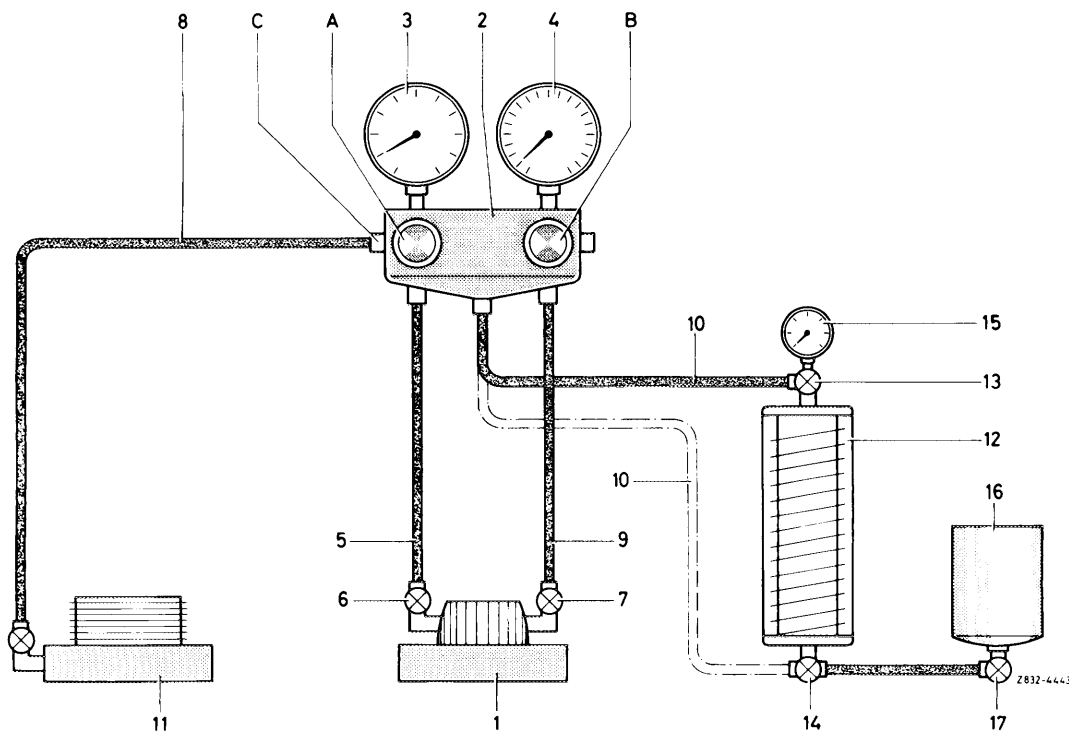
If the temperature of the refrigerant, which is inside the closed cylinder, is increased, the pressure and the specific volume of the liquid refrigerant will also be increased.

If an accurate quantity by weight is taken from a cylinder provided with a sightglass, it will be necessary to compensate the changes in specific weight caused by the change in temperature.



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By reading the pressure on the pressure gauge (15) and by adjusting this pressure on the upper scale of the rotatable plastic cylinder (20), and with reference to refrigerant to be filled in as stated on lower rim of rotatable plastic cylinder, the changes in volume under the influence of temperature can be compensated. Since the air conditioning system is filled with R 12, set scale for R 12, stated on lower rim of plastic cylinder, when filling up.



Assembly tester and filling cylinder with all connections

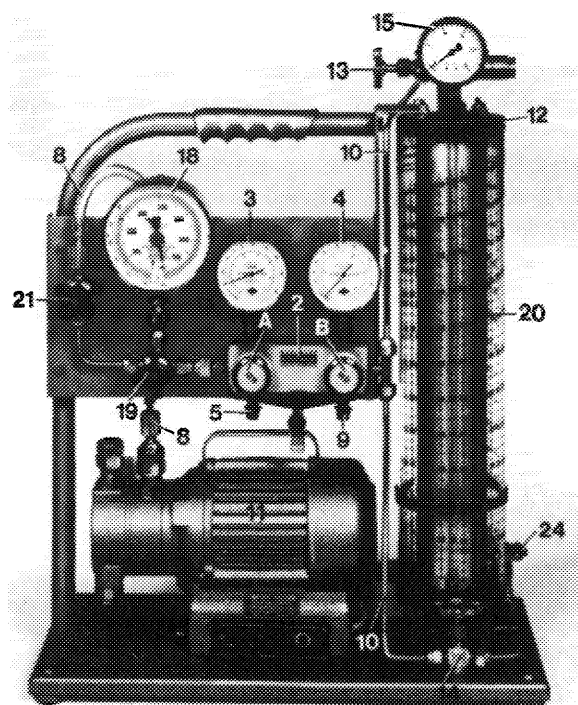
- | | | |
|--------------------------------|---------------------|-------------------------------------|
| 1 Refrigerant compressor | 8 Hose line | 15 Pressure gauge |
| 2 Assembly tester | 9 Hose line | 16 Refrigerant bottle with R 12 |
| 3 Suction pressure gauge | 10 Hose line | 17 Valve on refrigerant bottle |
| 4 High-pressure gauge | 11 Vacuum pump | A Valve on suction pressure gauge |
| 5 Hose line | 12 Filling cylinder | B Valve on high-pressure gauge |
| 6 Service valve (suction end) | 13 Upper valve | C Schrader valve on assembly tester |
| 7 Service valve (pressure end) | 14 Lower valve | |

Attention!

When filling the service unit, make sure that valve (19) for torr meter (vacuum meter) is closed.
If the torr meter is under a pressure of above 1.2 bar, meter is defective and can no longer be used.

a) Filling with filling cylinder

11 Connect a hose line to valve (24) at bottom on filling cylinder (12) and to valve (17) on refrigerant bottle. Then place refrigerant bottle (16) on its head (with valve in downward direction).



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12 Open valves (14, 17 and 24) on filling cylinder and on refrigerant bottle. Open valve (13) at top on filling cylinder for a short moment so that air and gas can escape from filling cylinder.

Note: Heating of refrigerant bottle in water bath up to **max. 40 °C** (for safety reasons other heat sources may not be used) will considerably accelerate the filling procedure.

13 As soon as liquid refrigerant shows up in sight-glass, close valve (14). Turn plastic cylinder in such a manner that the reading on its upper pressure scale agrees with pressure indication on pressure gauge (15), using graduated scale for R 12.

14 Open valve (14) again and add specified quantity of refrigerant. Then close valves (14, 17 and 24).

15 Unscrew hose line from refrigerant bottle.

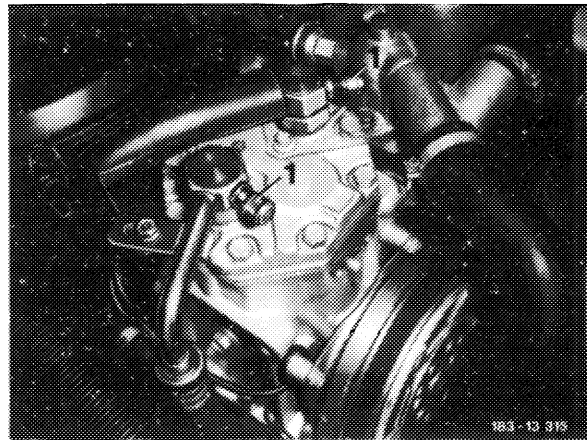
16 When working with filling cylinder and assembly tester.

Connect hose line (10) to center connection of assembly tester (2). When filling-in gas (via suction end) connect hose line (10) to valve (13), when filling-in liquid (via pressure end) connect hose line (10) to valve (14).

17 Switch-on electric heater installed in filling cylinder (12). The electric heat will increase the pressure in filling cylinder. When filling-in liquid refrigerant a pressure of at least 7 bar is required. The higher the pressure, the faster and more complete will the liquid refrigerant flow into system.

18 Remove closing caps (1) from service valves and connect hose lines (5 and 9).

19 Evacuate air conditioning system (83—512).



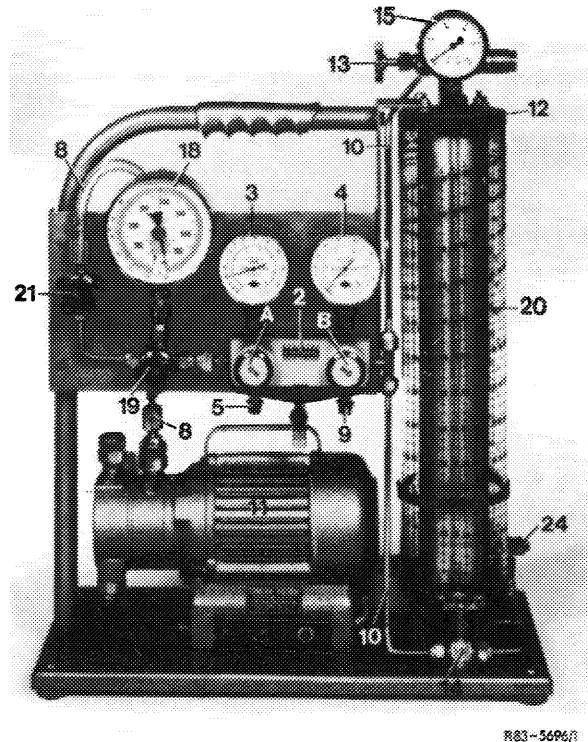
b) Filling-in liquid refrigerant

20 Close valve (A and 19). Open valve (B) on assembly tester (2) and open valve (14) on filling cylinder (12).

21 Watch refrigerant level in sightglass of filling cylinder until the specified quantity of refrigerant is completely in system. Open valve (A).

22 Switch-on air conditioning system and set to full refrigerant capacity.

23 As soon as the increased pressure in pressure gauge is identical with pressure in suction pressure gauge, close valves (A and B) again. Opening of valve (A) will deliver the refrigerant still in hose line (10) into system.



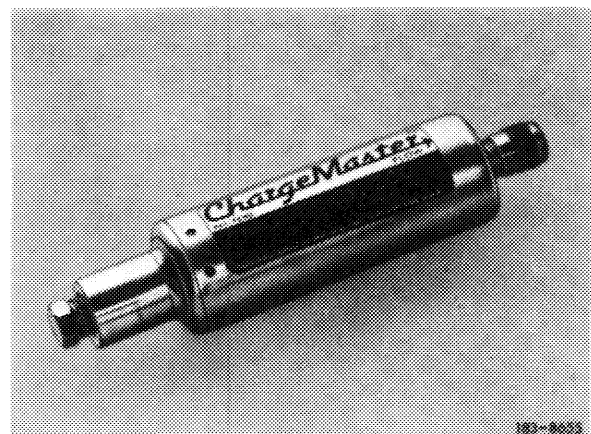
c) Filling-in gaseous refrigerant

- 24 Run engine at approx. 1000/min.
- 25 Set temperature vacuum governor to max. cooling capacity and blower switch to full blower speed.
- 26 Close valve (B and 19). Open valve (A) on assembly tester (2) and valve (13) on filling cylinder (12).
- 27 Watch refrigerant level in sightglass of cylinder until specified quantity of refrigerant is completely in system.
- 28 Close valve (A) on assembly tester.
- 29 Check air conditioning for leaks (83—512).
- 30 Check air conditioning for function (83—510).
- 31 Mount closing caps (1) on service valves.

C. Fill-up liquid refrigerant with filling aid

Note: Filling an air conditioning system with liquid refrigerant via pressure end and completing the filling procedure by adding gaseous refrigerant into suction end can be very time-consuming.

The filling aid (22 [charge master]) permits filling-up air conditioning system at suction end without a problem. During this process, liquid refrigerant will be taken from filling cylinder, with the engine running and will flow by way of the filling aid into the suction end of the air conditioning system. When flowing through the filling aid, the liquid refrigerant is converted to refrigerant vapor. This will protect the refrigerant compressor against fluid shock.



When removing liquid refrigerant from filling cylinder the formation of bubbles is so low that the filled-in quantity can be very accurately read. In addition, heating the filling cylinder for filling is not necessary. The normal bottle pressure is adequate.

The filling aid on valve (A [low pressure connection]) of assembly tester (2) is connected by means of an angle connection (23).

Filling procedure

32 Fill filling cylinder with refrigerant (item 11 to 16).

33 Perform filling procedure (corresponding to item 24 to 31). Open **valve (14)** on filling cylinder (12) (at item 26).

