

## 10.0.1 Air Conditioning System CM1650

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## 10.0.1 Air Conditioning System

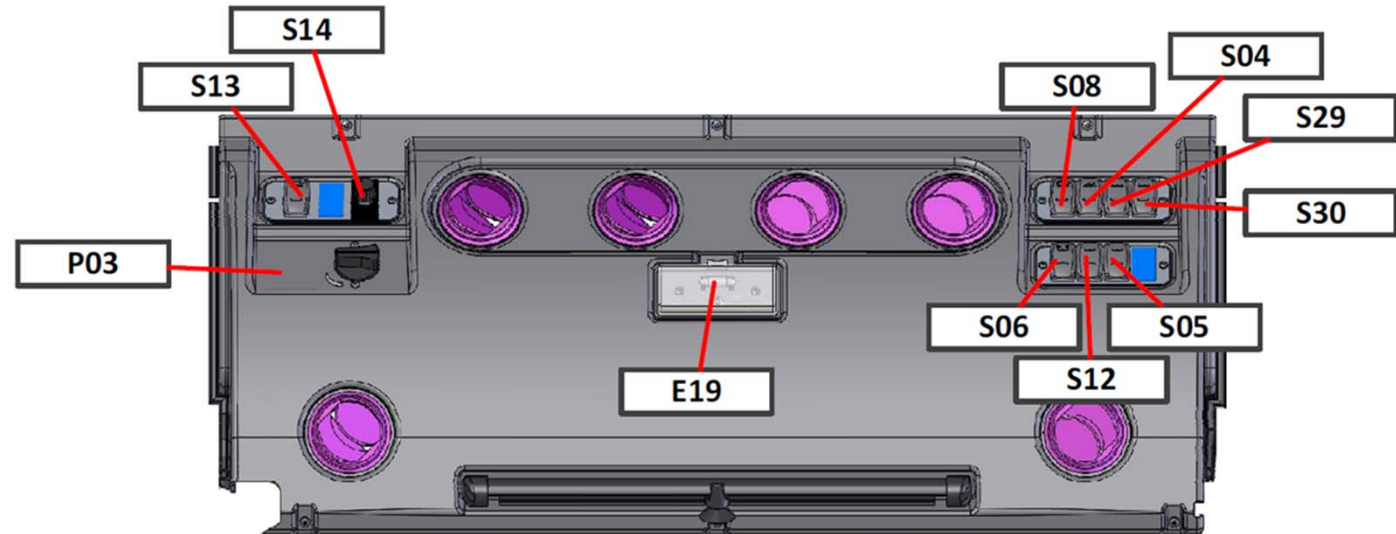
### Controls of the air conditioning system in the roof console

**P03**, control panel auxiliary heating

**S13**, Switch A/C

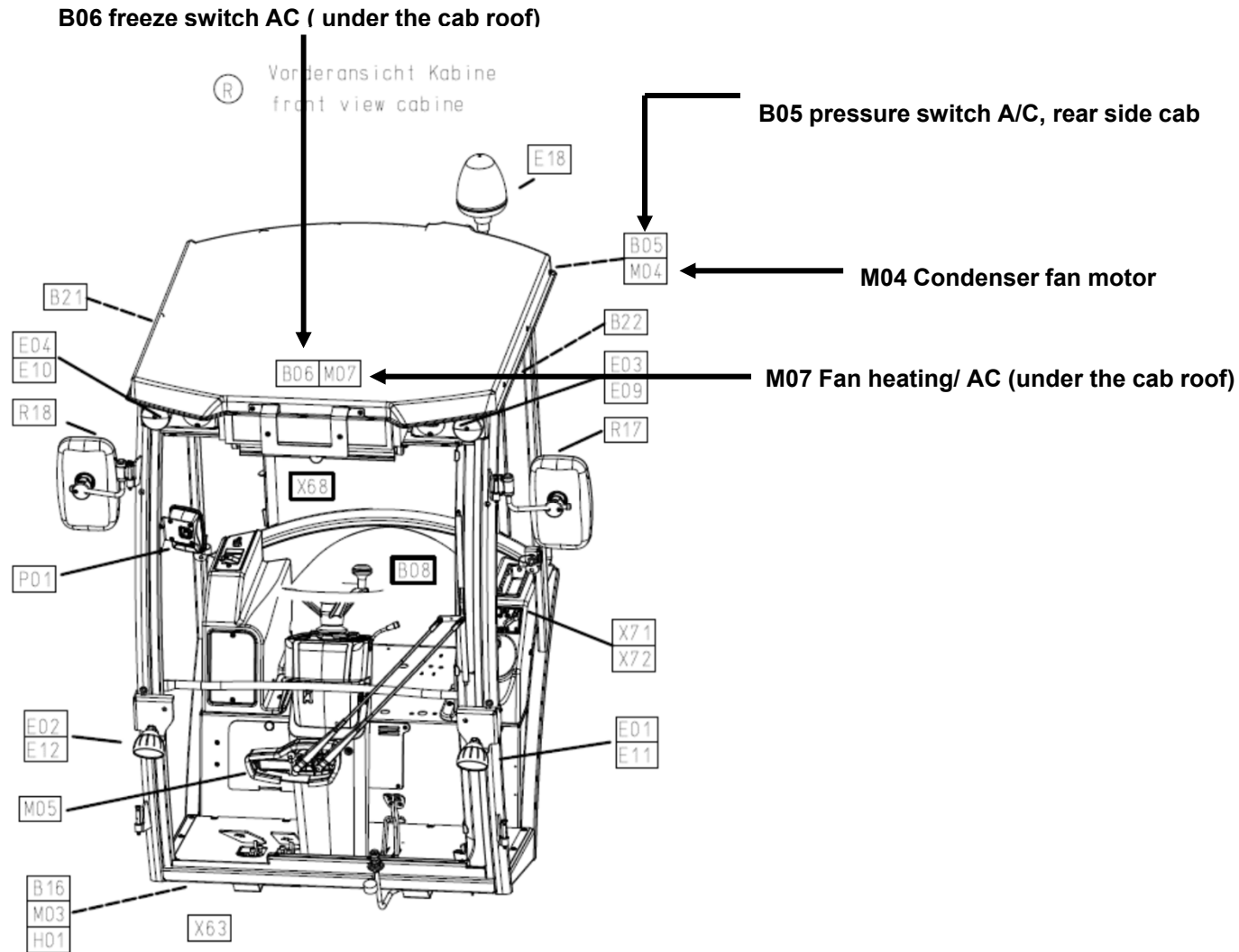
**S14**, Knob heating fan

**E19**, interior light



# 10.0.1 Klimaanlage CM 1650

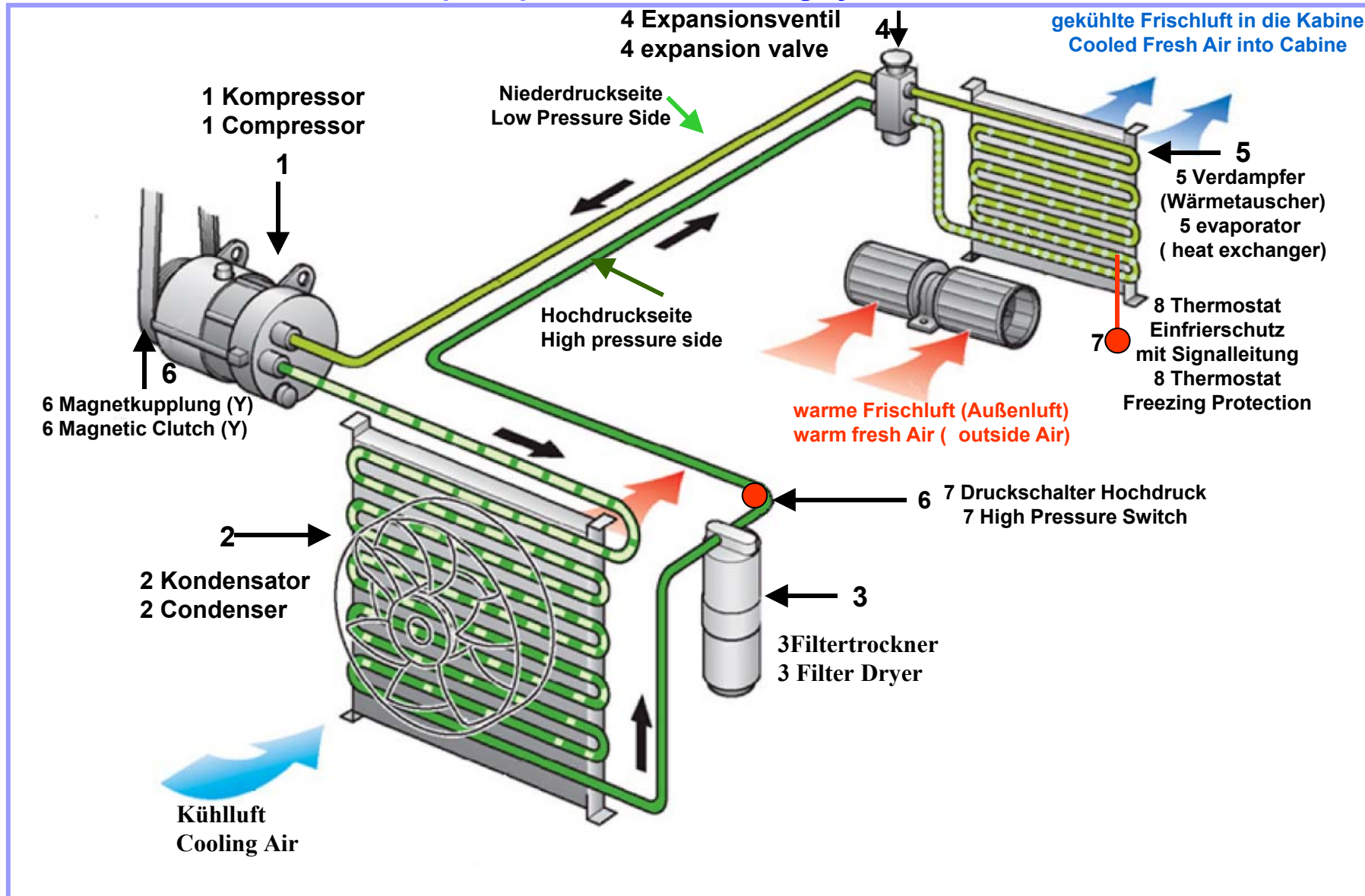
## Location of the electrical components of the air conditioning system at the cabin





### 10.0.1 Klimaanlage

#### Functional principle of air conditioning systems in vehicles



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### Functional description of the electrical components of the air conditioning system Hako Citymaster CM 1650

**1. Fan switch (S14)**

The fan switch is used to switch on the suction fan in step 1 to 3.

**2. On-Off switch of the air conditioning system (S13)**

The air conditioning system (magnetic coupling) is switched on or off by the switch S13.

**3. Magnetic coupling (Y09) of the compressor**

The magnetic coupling is switched on as soon as the electrical connection from the suction fan switch (S14), thermostat switch (B6) and the pressure switch (B5) is closed. When the magnetic coupling is energised, it engages and the compressor is driven by the internal combustion engine.

**4. Pressure switch (B05)**

The pressure switch interrupts the connection to the magnetic coupling Y09 of the compressor when the pressure on the high-pressure side exceeds a maximum pressure (approx 20-30 bar depending on the manufacturer of the air conditioning system). The pressure switch protects the hose lines of the air conditioning system. Note: The pressure switch is frequently designed as high-pressure and low-pressure switch. If the system pressure is too low, i.e. no or too little coolant is in the system, the low-pressure switch interrupts the connection to the magnetic coupling of the compressor. This switch protects the compressor (not designed this way in the example).

**5. Thermostat switch (B06)**

The thermostat switch protects the system against icing up. When the temperature at the evaporator reaches approx. 1°C, the thermostat switch interrupts the connection to the magnetic coupling Y14 of the compressor. The compressor is no longer driven and coolant is no longer transported. When the temperature rises again, the connection to the magnetic coupling of the compressor is switched back in. Coolant is transported again.



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### Maintenance of the air conditioning system

Notes on maintenance of air conditioning systems

Connectors: At the condenser connections of the hoses from the compressor

Power: At 2400 rpm 3,45KW

Coolant: R134 A

Fill volumes: 1000g refrigerant

Compressor oil: ZXL 100PG PAG

Fill volumes 150ccm at all

Refill after replace components:

- Refrigerant 90ccm
- Evaporator 50cc
- Condenser 30ccm
- Filter / Dryer 10ccm
- Compressor is filled (60ccm)

Working pressure: 8 bar to 10 bar pressure during operation



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### Maintenance of the air conditioning system

Notes on maintenance of air conditioning systems

#### Maintenance

##### Weekly:

Clean condensers in air conditioning systems with separately installed condensers (installation location behind the cab).

**Note:** Clean condensers with compressed air. Never use a high-pressure cleaner! Also put the air conditioning system into operation in the winter for at least 5 minutes, to prevent the seals on the compressor drying out and coolant escaping.

##### Monthly:

Clean the filter or filter mat in front of the suction fan (filter for outside air)

Clean the evaporator (heat exchanger) with compressed air.

Check the V-belt tension of the compressor.

Visual inspection of the fastening, tightness and running of the coolant hoses.

##### Annually:

Checking the complete system by the Hako workshop.

##### Every 2 years:

The filter drier (collector drier) and the coolant must be replaced every 2 years or at every intervention in the coolant circuit.

## Filling the air conditioning system



Filling quantity 1000 gr. R134a

Filling must be carried out by an expert (according to EC Regulation No. 307/2008) or an external service provider.

## Air conditioning system - troubleshooting

### Insufficiently cooled air:

If the air conditioning system has been adjusted optimally, the temperature difference between the inlet temperature (upstream of the filter mat at the top of the cab) and the outlet temperature (downstream of the evaporator at the top of the cab) will be approximately 15°C.

Clear deviations can have the following causes:

- Filter mat is clogged
- Evaporator is contaminated (clean it) or iced up (check anti-freeze protection)
- Compressor is not in operation (check electrical system, check V-belt)
- Compressor does not work correctly (check filling, see *Checking the refrigeration process*, check compressor)

**Checking the refrigeration process:** *a pressure testing/filling kit for air conditioning systems is required for this purpose.*

With normal filling and properly functioning components, the pressure levels are approx. 0.3 to 1 bar in the **Low-Pressure** range and approx. 10 to 16 bar in the **High-Pressure** range. Deviations can have the following causes:

- LP too high, HP too high => too much refrigerant, condenser does not cool / is not cooled, expansion valve does not close
- LP normal, HP high => moisture in refrigerant, anti-freeze protection is not working properly
- LP low, HP normal => too little refrigerant
- LP too low, HP normal => blocking on high-pressure side
- LP too low, HP too low => expansion valve blocked / does not open, filter/dryer clogged, refrigerant expands upstream of expansion valve
- LP too high, HP too low => compressor defective, drive belt is slipping, magnetic coupling defective
- LP normal, HP normal => anti-freeze protection is not working properly