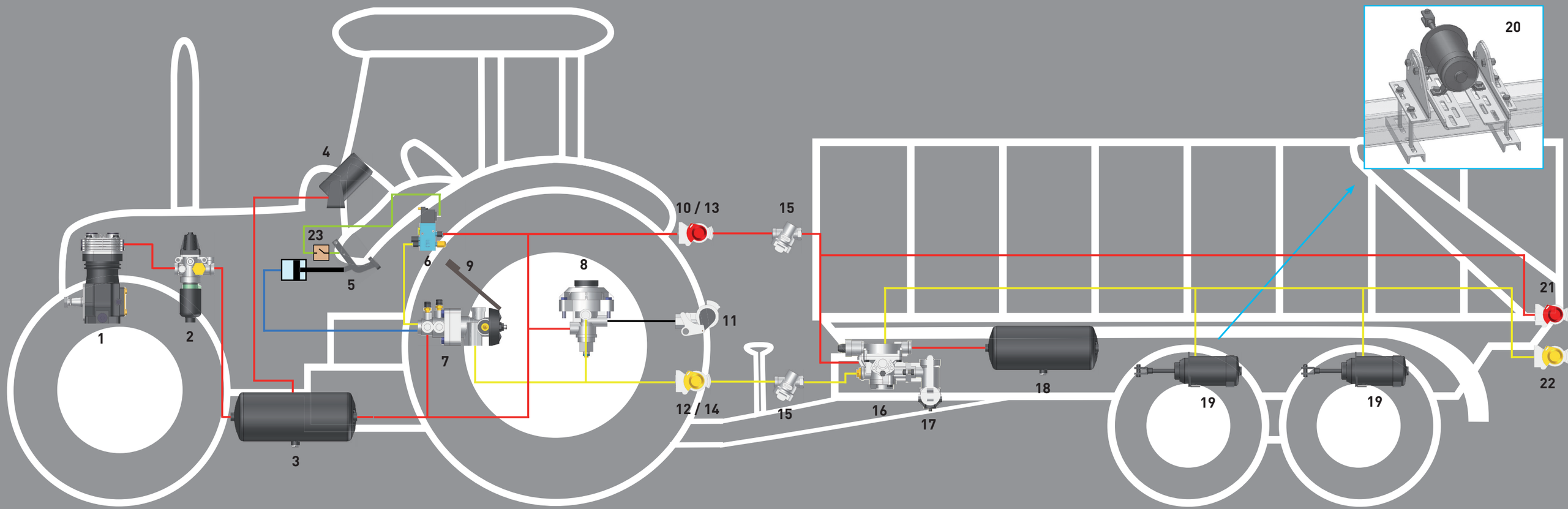
Design and Function of an Air Brake System



1 Compressor
2 Pressure Regulator
3 Air Reservoir
4 Manometer
5 Brake Pedal
6 Solenoid Valve
7 Trailer Control Valve 2-Line
8 Trailer Control Valve 1-Line
9 Hand Brake
10 /13 Coupling Head 2-Line (red, Supply)
11 Coupling Head 1-Line
12 /14 Coupling Head 2-Line (yellow, Brake)
15 Pipe Filter
16 Trailer Brake Valve with Release Valve
17 Brake Pressure Regulator
18 Air Reservoir with Drain Valve
19 Brake Cylinder
20 Console for Brake Cylinder
21 Coupling Head 2-Line (red, Supply)
22 Coupling Head 2-Line (yellow, Brake)
23 Brake Light Switch (mechanical)

Function

Driving Position

The compressed air of the compressor (1) flows in the air reservoir (3) via the pressure regulator (2) which automatically regulates the operating pressure in the tractor's air brake system. The supply pressure can be read on the pressure gauge (4).

From the air reservoir (3) the air flows to the solenoid vale (6), to the 2-line trailer control valve (7), to the 1-line trailer control valve (8) and finally to the red coupling head (10). In the 1-line trailer control valve (8) the pressure is limited to 5,3 bar and is available on this level on the coupling head 1-line (11).

If a trailer with a 2-line air brake system is connected, the supply pressure of 8,1 bar flows via the red coupling heads (10+13) to the trailer. At this connection the compressed air passes through the pipe filter (15) and the trailer brake valve (16) and reaches the air reservoir (18).

To supply a second trailer with compressed air, the trailer is equipped with two more coupling heads / supply and brake (21+22). These are directly connected to the supply line and the control line in front of the trailer brake valve (16).

Function

Brake Position (with precontrol)

Upon actuation of the brake pedal the mechanical brake light switch (23) transfers a signal to the 4/2-way solenoid valve (6) which then opens. The 2-line trailer control valve (7) is pressurized with supply pressure. Depending on the modification of the 2-line trailer control valve (7) a low pressure reaches the yellow coupling head (12) via the control line. The precontrol of the trailer is guaranteed. On further actuation of the brake pedal a pressure is built-on in the brake master cylinder. This increases the pilot pressure at the 2-line trailer control valve (7). According to the level of the hydraulic pressure, the 2-line trailer control vale (7) increases the pressure in the trailer's control line (12).

If a trailer is connected the compressed air flows through the yellow coupling heads (12 /14) through the pipe filter (15) to the trailer brake valve (16).

Depending on how the brake pressure regulator (17) is set (full-, half-, empty loaded) the air gets to the brake cylinders (19) of the trailer.

Info: A load sensing valve is used for automatic control of the braking force of pneumatic cylinders depending on the load condition of the vehicle. This prevents the trailer from braking either too hard or too soft.

When the hydraulic brake pressure in the tractor's service brake system has been reduced the air pressure in the control line to the brake valve is also reduced. This causes the brake cylinders (19) to ventilate via the trailer brake valve (16).
The passage in 4/2-way solenoid valve is now closed again. The supply pressure of 5,3 bar (1-line) begins to build up in the line between 1-line trailer control valve (8) and the black coupling head (11).