1. General

General function description of fuel systems.

2. Parts designation

1. Fuel tank (E38 steel, E39 plastic)	16. Float valve (USA only)
2. Electric fuel supply pump	17. Fuel return line
3. Surge chamber	18. Fuel feed line
4. Suction jet pump	19. Fuel filter
5. Pressure limiting valve	20. Pressure regulator
6. Outlet protection valve	21. 3/2-way valve (M52 USA only)
7. Pressure test line (USA only)	22. Fuel rail
7. Refueling vent line (worldwide)	23. Purge line
8. Non-return flap	24. Engine control unit
9. Filler pipe	25. Tank vent valve
10. Tank cap	26. Intake manifold
11. Tank expansion line	27. Vacuum line (LDP USA only)
12. Refueling vent line (USA only)	28. Carbon canister
12. Refueling vent line (worldwide)	29. Evaporation line
13. Service vent line	30. Leakage diagnosis pump (USA only)
14. Expansion tank	31. Tank leakage diagnostic module (USA only)
15. Roll-over valve	32. Dust filter (USA only)

3. Function description (see also drawing 5.1 / 5.2 / 5.3 / 5.4 / 5.5)

Fuel system

The saddle-shaped fuel tank contains the surge chamber with the electric fuel supply pump on its right side.

The surge chamber ensures that the fuel supply pump is properly supplied in all vehicle operating states. The suction jet pump installed in the base of the surge chamber supplies the surge chamber with fuel.

The fuel is repumped from the left side of the fuel tank into the surge chamber via the suction jet pump integrated in the tank expansion line. Both suction jet pumps are operated via the fuel feed line.

The pressure limiting valve controls the pressure required to operate the suction jet pumps. The outlet protection valve protects the fuel return line. The valve closes in the event of a pressure drop when the fuel return line is damaged or disconnected.

This prevents fuel from escaping from the fuel tank in extreme vehicle positions (overturning, inclined position).

The non-return flap prevents fuel from splashing back in the filler pipe after shutdown of the petrol/gas pump nozzle.

Fuel supply to engine

M52TU (see drawing 5.2, view A)

The fuel is routed from the electric fuel supply pump via the fuel feed line and the fuel filter to the fuel rail. The fuel returns to the fuel tank via the pressure regulator secured to the fuel rail and the fuel return line.

M52 USA and M73 (see drawing 5.2/ 5.3)

The fuel is routed from the electric fuel supply pump via the fuel feed line and the fuel filter to the fuel rail.

The fuel returns to the fuel tank via the 3/2-way valve (see view A), the pressure regulator and the fuel return line.

This engine fuel circuit with return from the fuel rail is then switched for engine starting and a defined time < 1 minute.

After this phase, the 3/2-way valve switches and interrupts the fuel return from the fuel rail. At the same time, the line branch directly at the fuel filter is activated by the 3/2-way valve to the pressure regulator (see view B).

The fuel rail is now return-free.

M62TU/54 (see drawing 5.1, view B, and drawing 5.4/ 5.5)

Pressure regulator and fuel filter are incorporated in a single unit.

The fuel is routed from the electric fuel supply pump via the fuel feed line and the fuel filter/pressure regulator unit to the fuel rail.

The fuel rail is return-free. The fuel flows directly from the fuel filter/pressure regulator unit back into the fuel tank.

Venting system USA (see drawing 5.3/ 5.4 / 5.5)

The fuel tank is vented during refueling via the refueling vent line.

Because of its large cross-section, the refueling vent line directs the displaced volume (fuel vapors) at high speed through the expansion tank to the carbon canister.

The activated carbon retains the fuel contained in the fuel vapors. The cleaned air is discharged to atmosphere via the evaporation line, the leakage diagnosis pump or the tank leakage diagnostic module and the dust filter.

During driving, the system tank is vented in the same way via the refueling vent line and service vent line.

The condensed constituents of the fuel vapors pass from the expansion tank via the service vent line back into the fuel tank.

The float valve in the refueling vent line (E39 only) is closed by the rising fuel if the tank is overfilled. This prevents overflowing of the expansion tank.

The roll-over valve on the upper side of the expansion tank closes in the event of the vehicle overturning. This prevents the fuel from escaping into the carbon canister.

The carbon canister is regenerated by purging with fresh air.

The engine control unit opens the tank vent valve. Thus the vacuum pressure of the engine intake manifold is applied at the purge line.

In this way, the carbon canister is purged by the supply of fresh air via the evaporation line, the leakage diagnosis pump or the tank leakage diagnostic module and the dust filter. The fuel constituents bound by the activated carbon are flushed out by the supplied air and directed via the purge line to the engine for combustion.

This operation is only possible while the engine is running.

Venting system worldwide (see drawing 5.1/ 5.2)

Refer to Venting system USA with following differences:

1. During refueling, the fuel tank is vented via the refueling vent line, which directs the displaced volume into the filler neck. There is a second service vent line with a smaller cross-section in place of the refueling vent line (USA) with large cross-section. There is no float valve.
2. The carbon canister has a smaller capacity.
3. There is no leakage diagnosis pump/tank leakage diagnostic module or dust filter.

Leakage detection for tank venting system USA (see drawing 5.3 / 5.4 / 5.5)

The leakage diagnosis pump (see drawing 5.3 / 5.4) or tank leakage diagnostic module (see drawing 5.5) serves to detect leakages for the tank venting system within the on-board diagnosis laid down by legislation.

The tank venting system is pressurized and the pressure loss is detected in the event of a leak.

With the leakage diagnosis pump, the pressure loss is measured by way of the repumping time. The pump is operated with vacuum pressure from the intake manifold via the vacuum line.

The tank leakage diagnostic module detects the pressure loss by way of the power consumption of the integrated pump. The air required for this purpose is supplied via the dust filter.

Both systems are activated by the engine control unit.

The pressure test line establishes the connection between fuel tank and filler neck. This enables a leak to be detected in the filler pipe - tank cap area.

Determining fill level in fuel tank

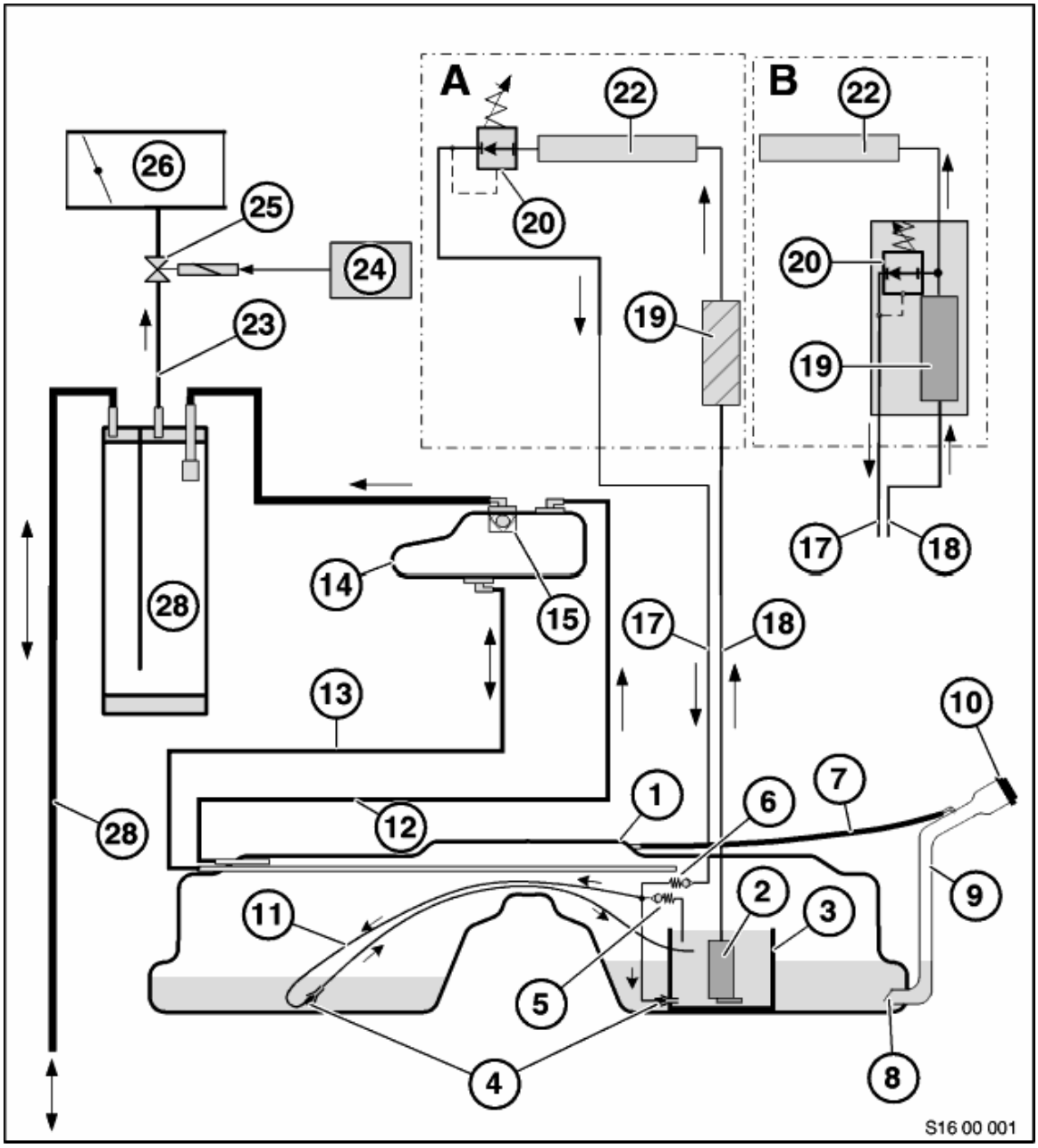
The fuel level is measured by means of lever-type sensors on both sides of the fuel tank. The right lever-type sensor is integrated in the fuel supply unit. The left lever-type sensor is located in the left sensor unit. The combination of the determined ohm values from the right and left lever-type sensors produces the actual level in the fuel tank.

4. Service data, fuel system

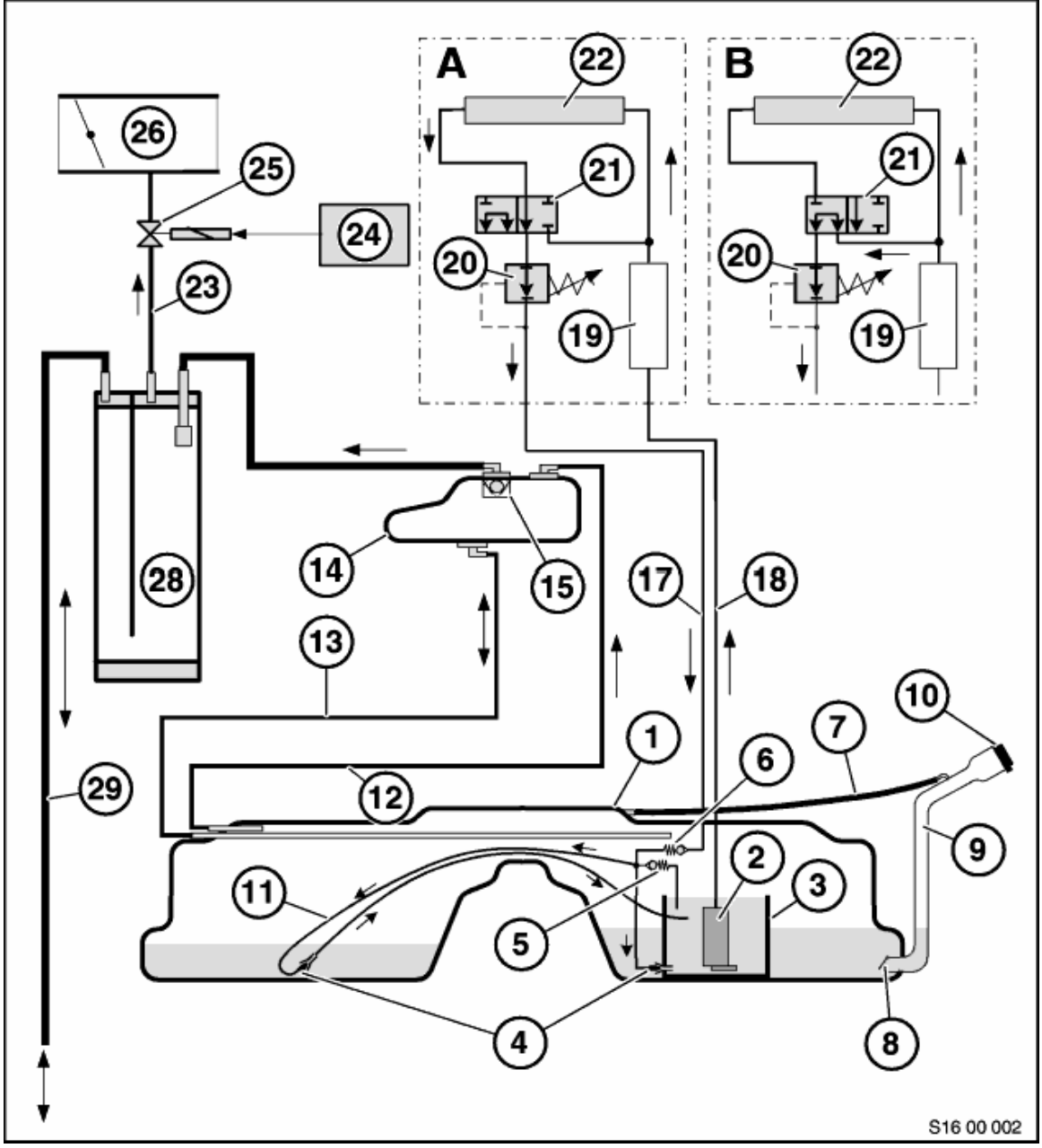
Pressure regulator: 3.5 bar (S62: 5 bar)

Working pressure of suction jet pumps: 1 - 1.3 bar

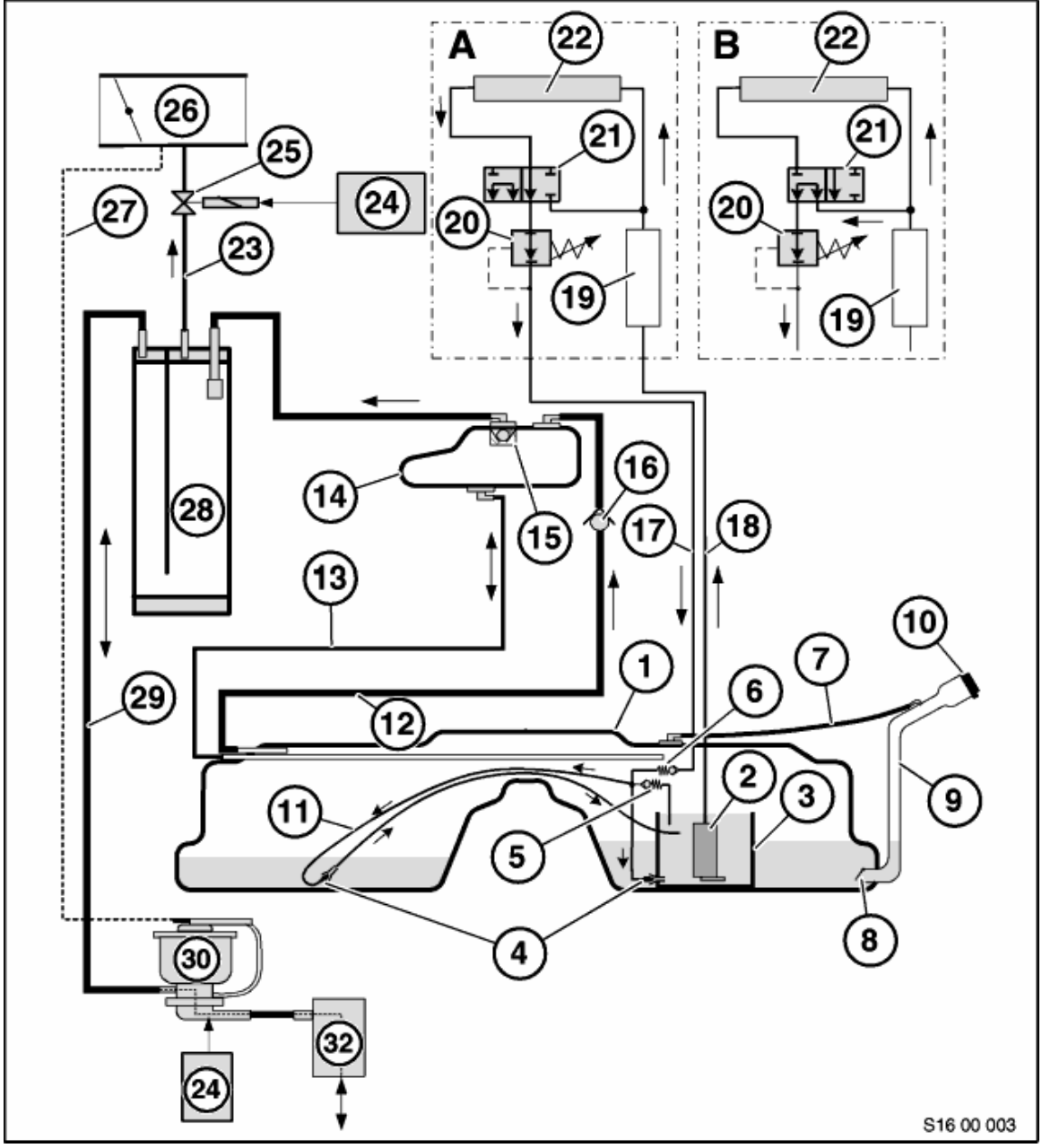
5. Schematic drawings of fuel supply systems



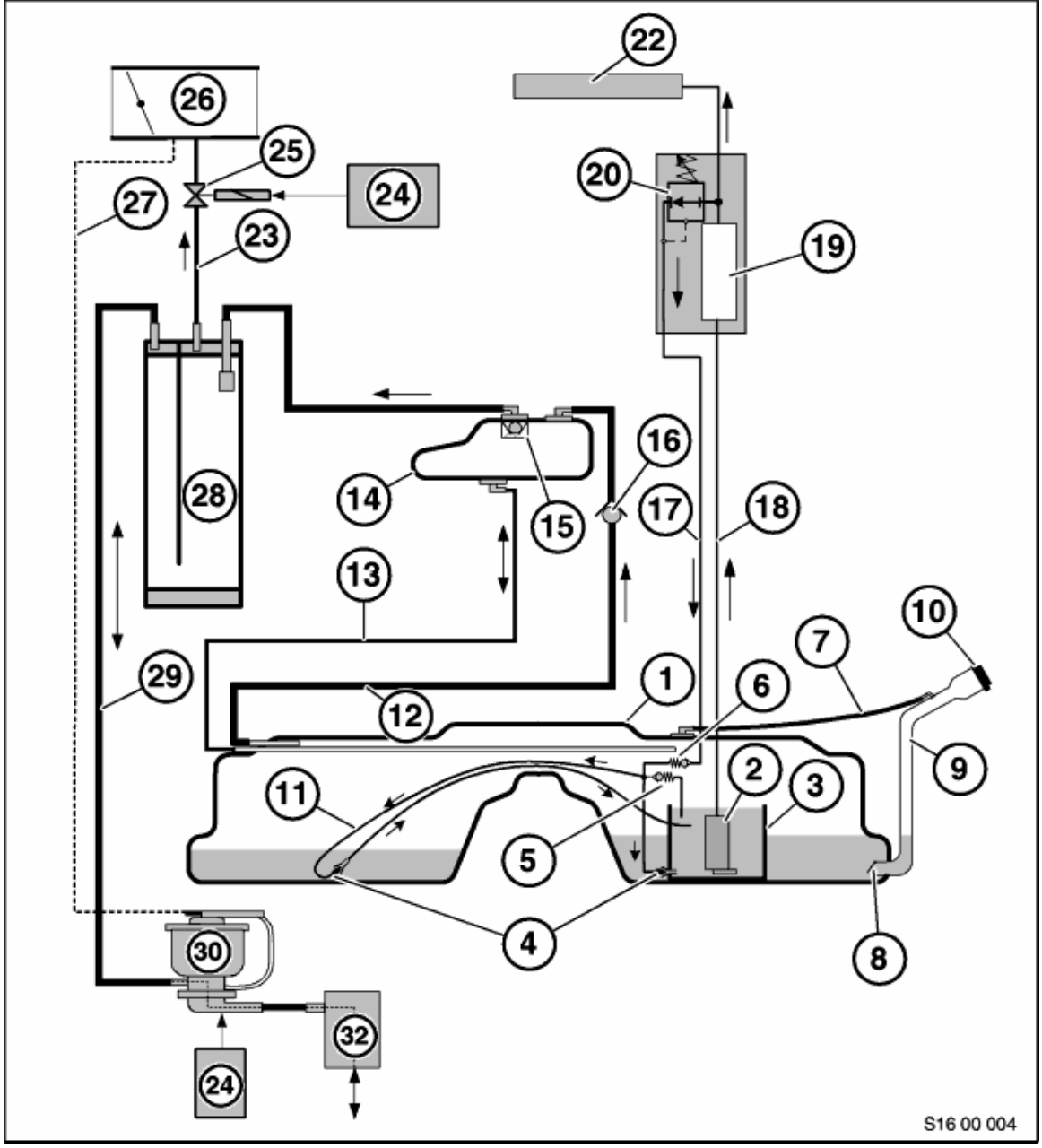
5.1 Fuel supply system E38 / E39 with M52TU / M54 / M62TU



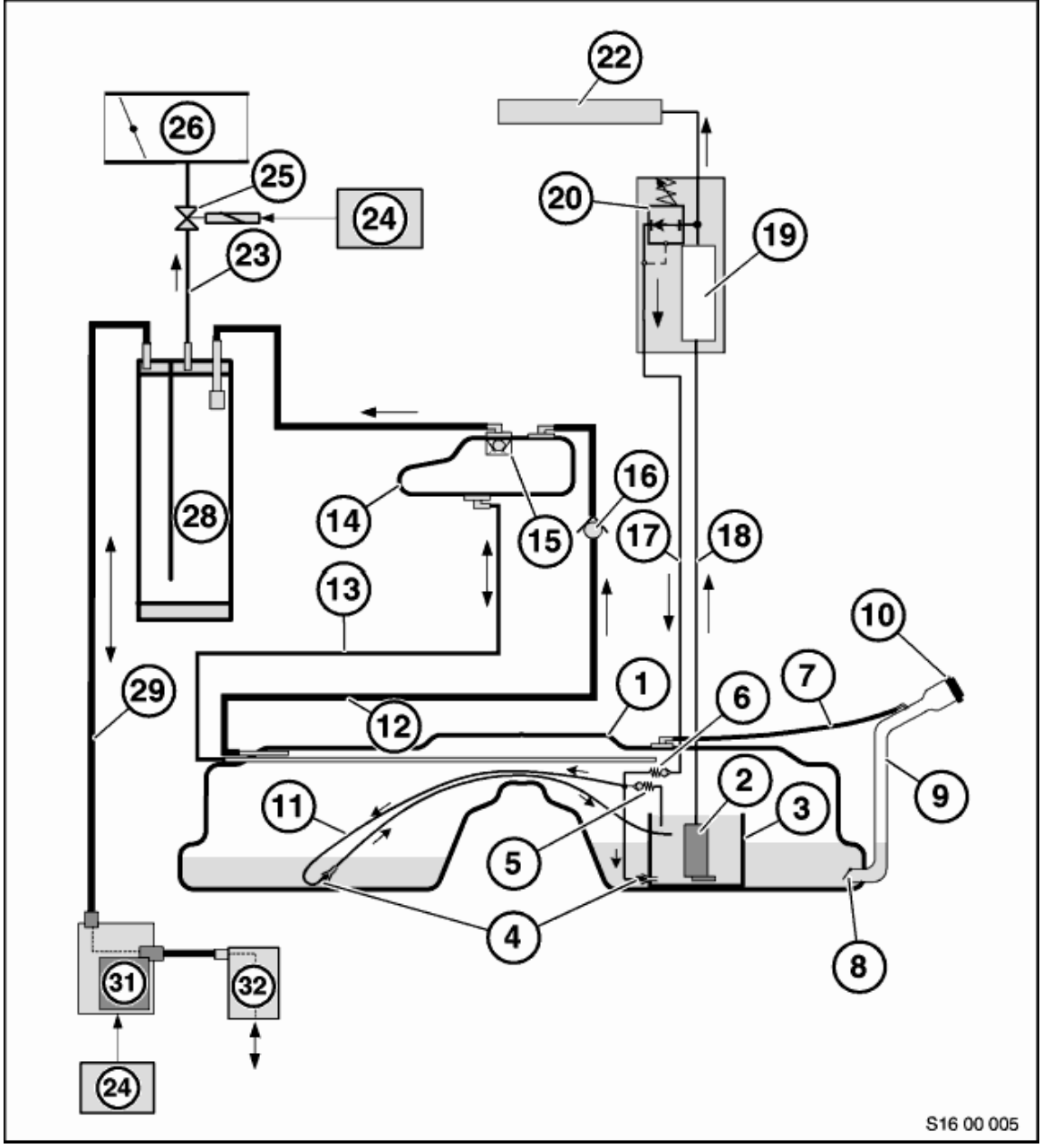
5.2 Fuel supply system E38 M73



5.3 Fuel supply system E38 / E39 with M52 / M73 USA



5.4 Fuel supply system E38 / E39 with M62 USA (LDP)



5.5 Fuel supply system E39 with M54 / M62 USA (DM-TL)