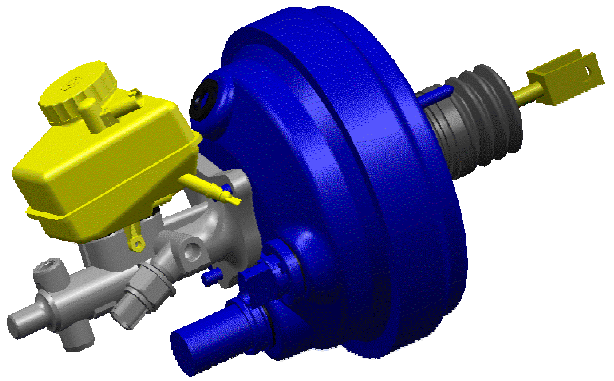
Original ATE brake boosters

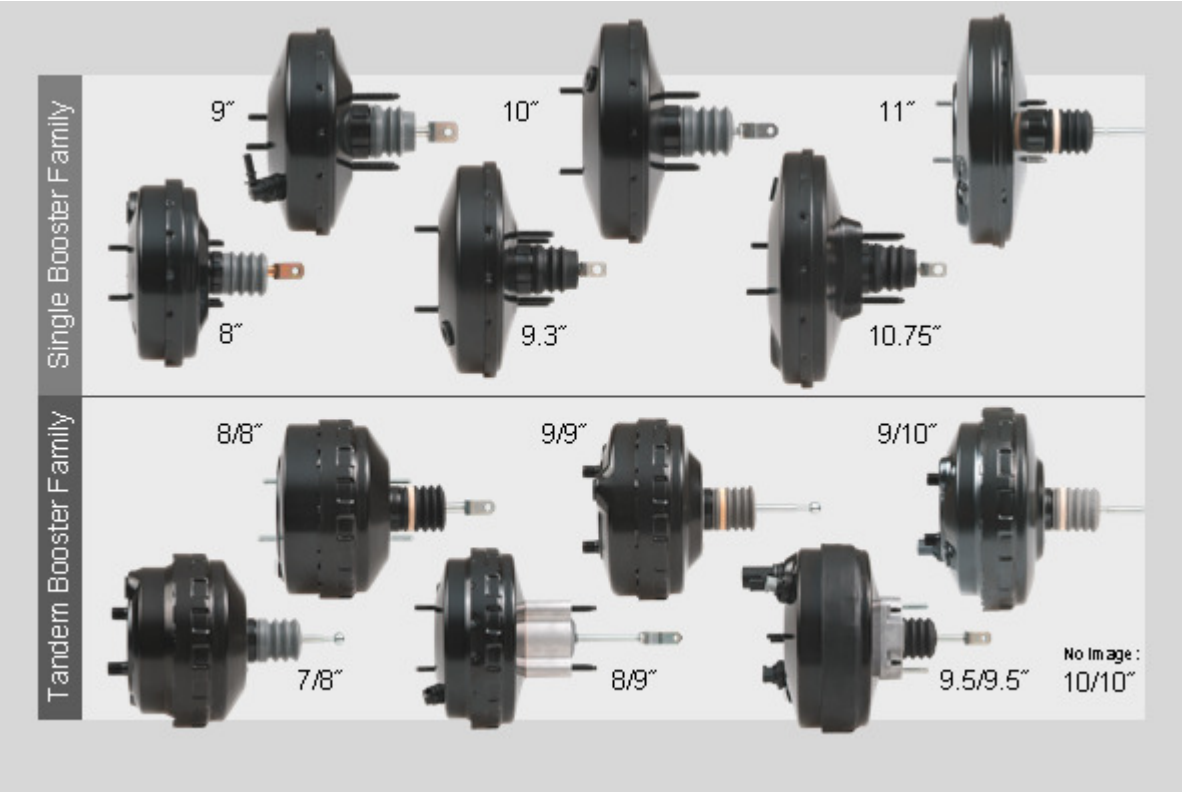
Continuous development for intelligent designs

- Boosters
- H 31 hydraulic booster
- Brake Assist systems



1.0. ATE brake boosters

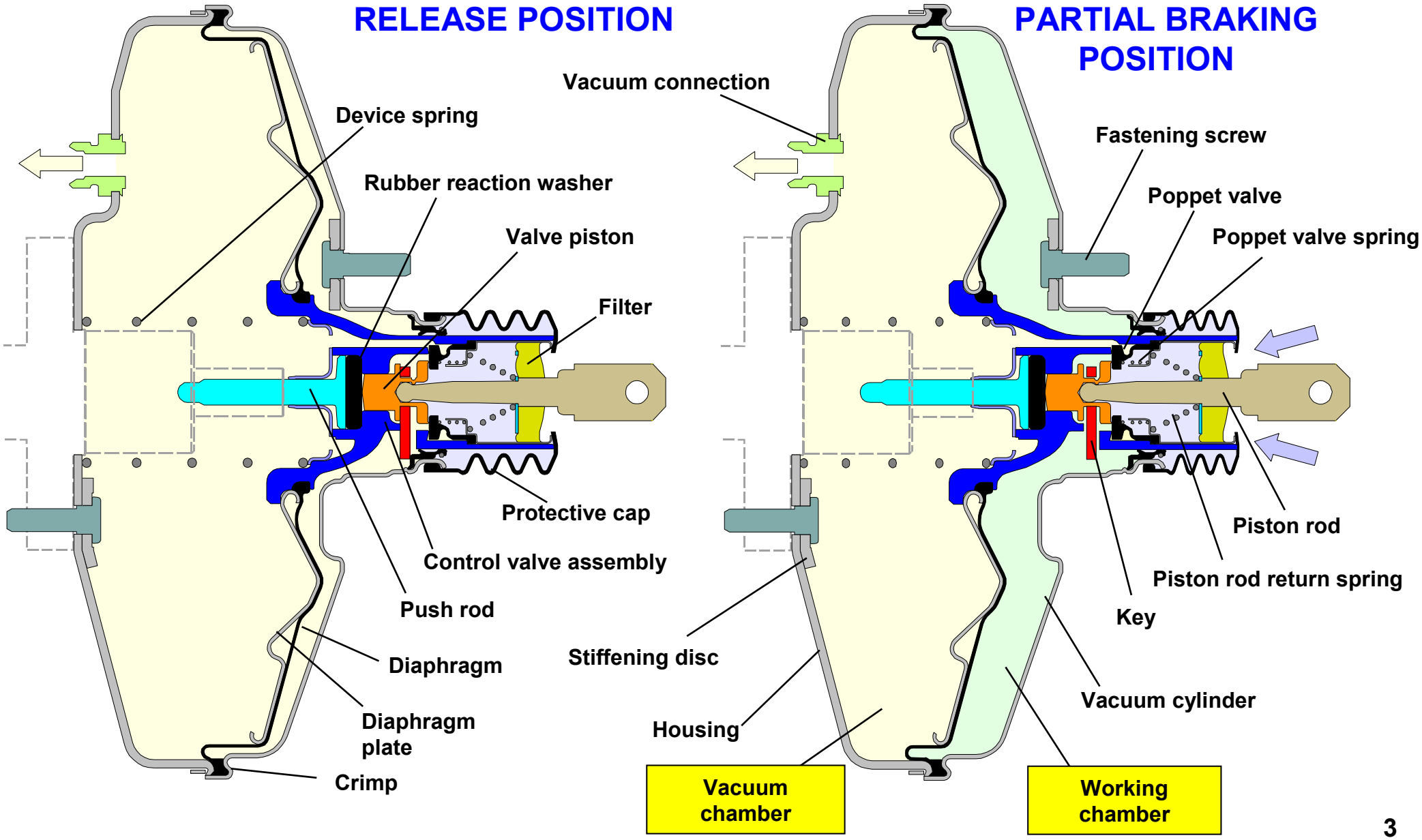
- ATE supplies boosters in single or tandem versions and in all desired sizes



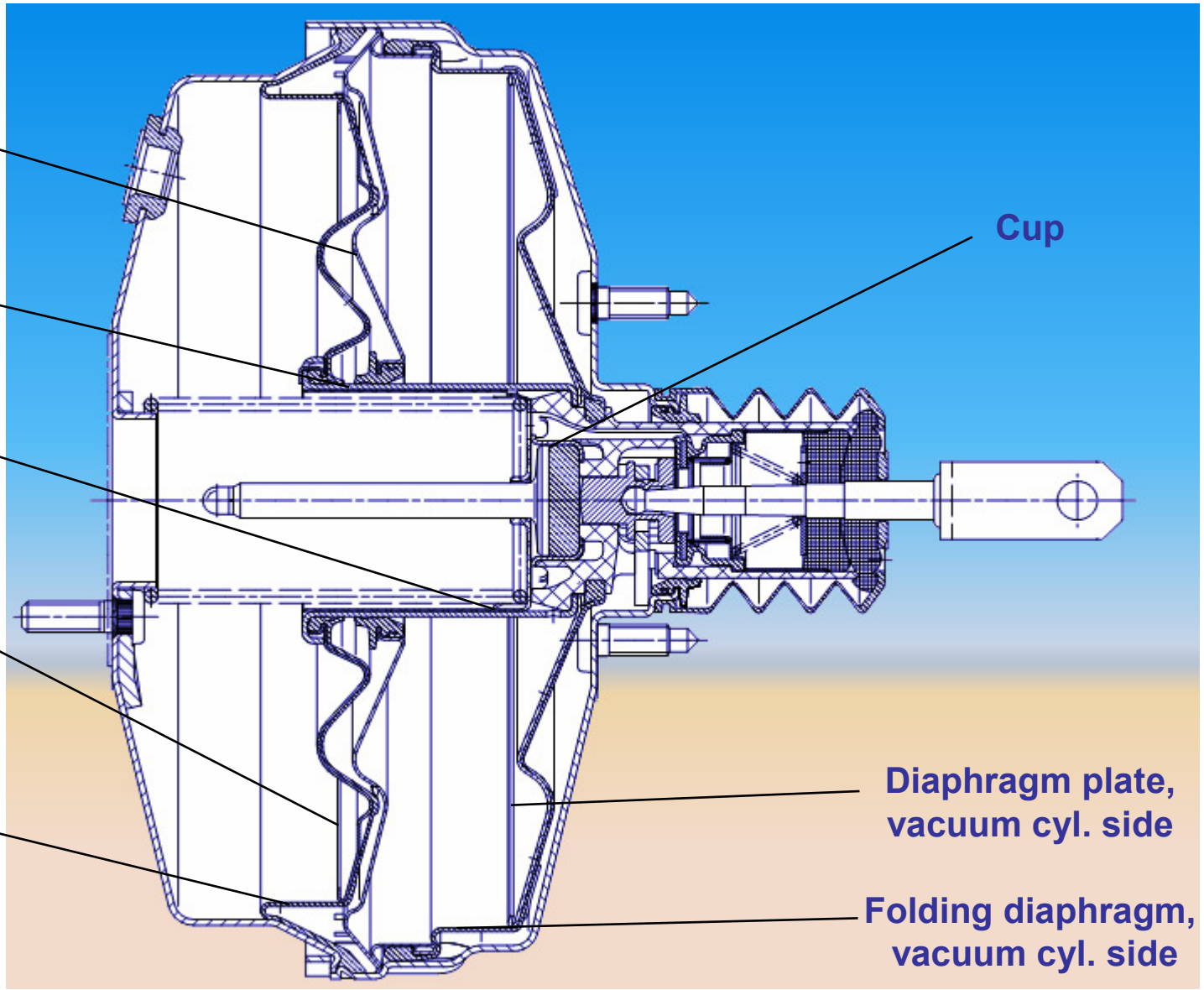
- Following models available:
  T 50, T 51, T 52, T 52/3, T 53
- The operation of these units is practically identical; however, depending on model a higher output and thus a higher outgoing force is made available
- The units normally are made of steel, but are also available in weight-reduced aluminum versions

- The tie rod version available for all designs affords further weight reduction and, in addition, optimized elongation characteristics
- »Front-bolt« concepts on tie-rod basis facilitate installation
- Electric and mechanical brake assist systems, sensors for OHB, ACC, ESC, etc., as well as measures designed to optimize crash behavior complete the product portfolio

1.1.0 Design of conventional ATE boosters -
Single booster



1.1.1. Design of conventional ATE boosters -
Tandem booster (example: T52/4/225-200)



1.2. ATE brake boosters T 50 / T 51 / T 52 / T 52/3 / T 53

1.2.1. Hydraulic booster T 50

- Hydraulically controlled auxiliary unit of pedal master cylinder
- Subsequent installation as auxiliary component possible in various vehicle models at any point in the vehicle
- The master cylinder as control cylinder is eliminated. The master cylinder, which can be designed as a tandem master cylinder for dual-circuit brake systems in the case of these boosters, is flanged directly on to the booster.
- These brake units are practically maintenance-free. Merely the replacement of the air filter is recommended after around 50,000 km in service.

1.2. ATE brake boosters T 50 / T 51 / T 52 / T 52/3 / T 53

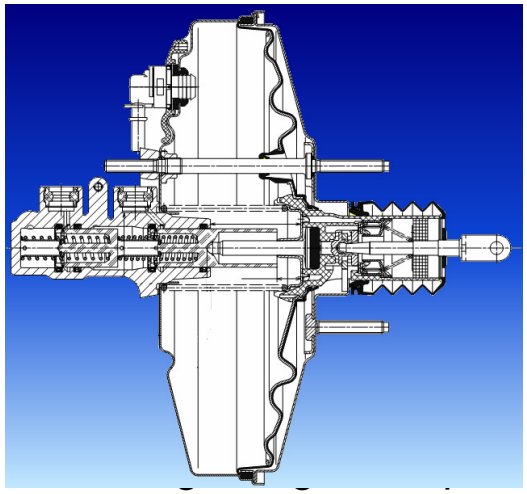
1.2.2.Vacuum booster with Mechanical Brake Assist T 51 / T 52

- Transmits control forces from pedal to tandem master cylinder
- Power cylinder sizes: 6“, 7“, 8“ and 9“
- In the case of diesel or two-stroke gasoline engines a vacuum pump operated by the engine must supply the necessary vacuum of 0.8 bar
- If vacuum assistance fails, the system continues to operate like a normal hydraulic brake system, but then requires higher leg force

1.2.3. T 52/3 Compact lightweight booster

- Distinctly reduced overall length and weight compared with predecessor
- Various parts of the unit have been given a new form, for example, the housing halves, the diaphragm plate and the control valve housing
- The optimized contours give the unit a greater inherent stability so that the thickness of the material could be appreciably reduced
- Use of high-strength plastic for the control valve housing. It could thus be made appreciably smaller and 50% lighter
- Shortened control valve housing extends into booster

1.2. ATE brake boosters T 50 / T 51 / T 52 / T 52/3 / T 53



1.2.4 ATE booster T 53 – Intelligently designed lightweight booster

- A central tube in the middle of the unit rigidly connects the stud bolts of the two flange sides of the unit (firewall and TMC side) with each other.
- Relieved of transmission forces in this way, the housing now only has to absorb the pressure differential between atmosphere (outside air) and vacuum. The housing halves thus can be made extremely thin and, of course, lighter, but the housing is still torsionally stiff and resistant to bending stress.

brake actuation is practically ruled out by the rigid internal connection.

- Compared with a conventional booster, this so-called tie rod booster, whose stability is distinctly enhanced by the incorporated steel bolts, permits a weight reduction of approximately 30 percent
- Application of the tie rod construction principle to the material aluminum (already developed) results in a further weight reduction of approximately 25 percent
- But even with the current steel design, the weight savings in absolute figures, depending on the size of the booster and its design, range between 150 and 1150 grams – That saves a great deal of CO_2 in a vehicle lifecycle and is an important step on the way to reducing the CO_2 emissions of vehicle fleets worldwide in the coming years.
- About a third of the length of the tandem master cylinder can be integrated in the booster
- Power cylinder sizes: 6“, 7“, 8“, 9“, 10“, 11“

2. ATE H 31 hydraulic booster

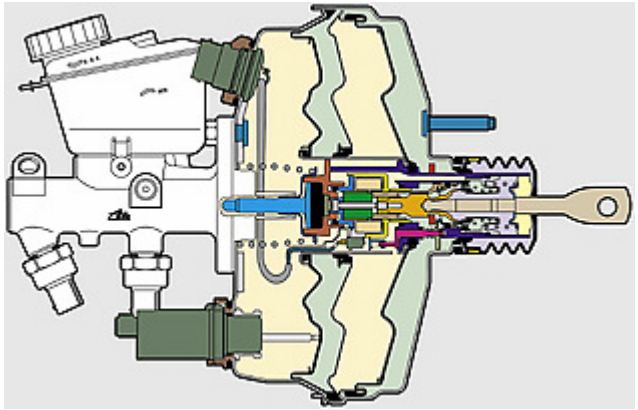
- Hydraulic brake boosters make rational use of the existing energy supply system in a vehicle. The hydraulic pump for the power steering, for instance, simultaneously supplies the hydraulic booster with the necessary pressure oil.
- The brake booster is about equal to a tandem master cylinder in size and weight.
- Compared with vacuum boosters it has a substantially higher runout pressure and is not dependent on a supply of vacuum so that it can also be used without any problems in diesel-engined vehicles or vehicles whose engines only produce low vacuum levels.
- The H31 hydraulic brake booster consists of the following individual units: hydraulic booster with flanged-on master cylinder or tandem master cylinder, pressure-controlled flow regulator with hydraulic pressure reservoir, and the pump-cum-reservoir already present in the vehicle.
- If the steering pump fails, the hydraulic pressure reservoir contains an adequate pressure reserve to apply the brakes several times with full boost effect. Once this pressure reserve is exhausted, brake application without boost effect still is possible, but requires considerably greater pedal force, of course.

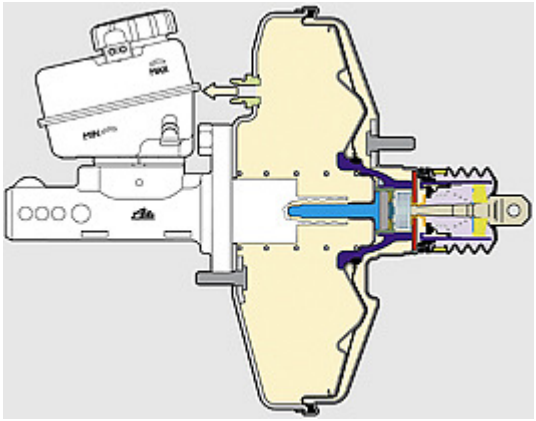
3. ATE braking power assist systems

Brake assist systems are an important aid in emergency braking situations - such as when the driver responds fast, but does not apply the brakes with sufficient pressure, which leads to dangerously long stopping distances. The brake assist recognizes the brake application speed to detect this type of panic situation and activates the brake booster or the EBS hydraulic unit.
So even with small pedal forces, maximum deceleration is achieved. We offer different technologies for this purpose :

Electronic Brake Assist (BA)

- Vacuum brake booster with electronic brake assist function and standard ABS-TMC interface. This type of active brake booster is also used to increase the response dynamics of ESC (Electronic Stability Control) systems and to realize the comfortable electronically controlled application of the brakes for an Adaptive Cruise Control system (ACC).





Mechanical Brake Assist (MBA)

- The MBA replaces the sensor required to detect pedal velocity in the electronically controlled system, utilizing the inertial effect of an intelligent mechanism. At high pedal speeds, this mechanism triggers the BA function.

4. ATE brake operating and brake assist systems

As one of the world's leading suppliers of brake control and brake assist systems, we offer a complete product range in this area: boosters, tandem master cylinders, brake fluid reservoirs, valves/regulators, supplementary functions.

- **Brake boosters**

We supply brake boosters in single or tandem design and in all desired sizes. Normally made of steel, the units also are available in weight-reduced aluminum versions.

- **Tandem master cylinder (TMC)**

We offer TMCs in central valve design and in the very compact plunger design, for all required diameters and strokes as well as for various brake circuit designs (smooth or stepped).

- **Brake fluid reservoirs**

We develop reservoirs for each specific use, but make use of standardized subassemblies such as covers and warning systems.

- **Our modular OEM concept**

All actuating and control components come from our modular system and can be easily combined with each other. In our OE business we are therefore able to implement individual application-specific solutions for every customer application without having to invest in cost-intensive tooling. Moreover, falling back on well-known components distinctly reduces development time. With this modular system we have optimum prerequisites for realizing reasonably priced, robust »high-performance« brake control systems.