

Advanced Pin Slide Brake Caliper for Off-Road Competition Vehicles

Further weight reduction and improved cooling performance

- **Lightest prototype pin slide brake caliper in its class for off-road competition vehicles**
- **Based on the concept model presented at EICMA 2024, the new model is lighter while maintaining high rigidity (resulting in a firm feeling to the hand) and improved cooling performance.**
- **Character lines are designed into the caliper body for design sense.**



At EICMA 2025, a prototype of a pin-slide brake caliper under development for off-road competition vehicles will be on display. Based on the concept model presented at EICMA 2024, the new model is lighter while maintaining high rigidity and improved cooling performance. Also on display will be a wide range of opposed 4-pot radial mount brake calipers for production vehicles, from flagship models to popular models, including highly rigid full monoblock bodies and those using FSW manufacturing methods.

The pin-slide front brake caliper for off-road competition vehicles is a model specifically designed for racing that has been developed over many years, reflecting the demands of riders in the top teams competing in the world's most prestigious races, such as MXGP (Motocross

World Championship) and AMA Supercross/Motocross.

The challenge has always been to improve braking power and control, and to reduce weight and heat. Brake calipers are mounted under the springs, and their weight affects handling. This is especially true for off-road competition vehicles, which are subject to severe suspension movement. To reduce this effect, lightweight and compact pin-slide brake calipers are used. These pin-sliding brake calipers are constantly evolving to solve problems.

At EICMA 2025, the latest prototype of a pin-slide brake caliper for such off-road competition vehicles will be presented.

The NISSIN brand/pin-slide front brake calipers used on the 2025 model year competition vehicles are designed to provide thorough heat countermeasures. Brakes, which produce braking force by frictional force, increase in temperature as braking operations are repeated. The heat is transferred to the caliper body and brake fluid, leading to deteriorated brake feel and reduced braking power, such as increased brake lever stroke. The pin-slide front brake caliper used on the 2025 model year competition-only vehicles reduces the amount of change in lever feeling due to heat by 50% compared to the 2024 model year and earlier.

The point of this evolution is a change in the material of the piston. It is made of iron, which has a better heat capacity than aluminum. It also utilizes the latest technology used in opposed piston calipers, which are mounted on road sports models and generate a large amount of heat. The groove shape of the piston seal and the shape of the dust seal were also modified.

The caliper for competition vehicles to be presented at EICMA 2025 incorporates two additional technologies.

First, a hole was formed in the middle of the bridge on the top surface of the caliper to reduce weight and allow air to pass through to improve the cooling effect.

The second is Astemo's proprietary patented technology, which optimizes the shape of the ribs that support the brake pads from the bridge to the piston. The pistons are of different sizes, $\phi 30$ mm and $\phi 27$ mm, with ribs on the larger diameter side, which has a higher load due to hydraulic pressure during operation, and the tip shape has been changed to improve response and stability during braking.

These technologies reduce the weight by approximately 45 g (6%).

The appearance of the brake caliper body was also redesigned. In addition to weight reduction, we pursued a design that embodies high performance as well as improved rigidity by designing character lines on the front of the calipers. Although used on competition-only vehicles for

which the top priority is function, the design sense of the brake calipers, which are functional parts, is enhanced, thereby improving the merchantability of the vehicle in which they are installed and enhancing the user's sense of ownership.

*Information contained in this Technical Information is current as of November 3, 2025, but may be subject to change without prior notice.