

1. What is a 3-axis force sensor?

Three-component force usually arises on the surface of contact (X, Y and Z directions). Besides the normal force perpendicular to the surface of contact (Z direction), there is shear force component in the direction of X and Y. It is considered to be very important. For instance, significant force arises on the ground when you strike the ground. Also, when you hold an object with your fingers, the gravitational force to the ground arises. Either of them is shear force, which is frictional force. In order to measure them, low-profile and high-precision 3-axis force sensors are indispensable in the measuring field.



Fig 1 3-axis force sensor

2. Our product features

We achieved the following features for the multipurpose sensor.

- (1) High precision -Excellent in linearity and repeatability.
- (2) High stability under temperature changes.
- (3) A wide range of measurement covering from static to dynamic changes.
- (4) Low-profile and lightweight design (5 mm thick)

Product name	Small-sized 3-axis force sensor		
Rated capacity	See table.2		
Non linearity	Within ±1% RO		
Hysteresis	Within ±1% RO		
Safe temperature range	10 to 60°C		
Recommended excitation voltage	1 to 3 VDC		
Bridge resistance	F _x ,F _y	120Ω±5%	
	F _z	240Ω±5%	
Cable	8-conductor shielded cable terminated with a connector plug. 2 m long.		
Dimensions mm	20 (W)×20 (D)× 5 (H)		

Table.1 Specifications

Model(s)	Rated capacity		
	F _x	F _y	F _z
USL06-H5-50N	±25N	±25N	+50N
USL06-H5-100N	±50N	±50N	+100N
USL06-H5-200N	±100N	±100N	+200N
USL06-H5-500N	±250N	±250N	+500N

Table.2 Model(s)



Fig.2 Measurement system structure

3. Our product line

The low profile 3-axis force sensor technology is applied to the following force plates.

- (1) The sensor is used for the force plate of 3D gait analysis system. The system analyzes human motion by putting the two force plates on the toes and heel. This explains why the force plate is small, slim, and lightweight. (9 mm thick and 100 g in weight)



Fig. 3 Force plate



Fig.4 Image

- (2) The sensor is used for the compact force plate designed for small rated capacity. The force plate features small and lightweight design. (36 mm thick). The size is 300 × 400 mm with a built-in amplifier. Maximum load is 1kN. The range is switchable. It is possible to measure with a full scale of 300 N. The force plate is designed to measure primarily standing up motion, human body motion and seating surface force in a car, and children's body motion.



Fig.5 Compact force plate for small rated capacity

4. Sales performance

Our USL series 3-axis force sensors have been sold more than 500 units in five years, our force plate 70 units in three year, and our M3D gait analysis system 10 units in one year, since they went on sale. Our USL series 3-axis force sensor and M3D gait analysis system are unrivaled in the industry. Our force plate, which was released three years ago, is gradually penetrating the international market.

5. Conclusion

We will focus on force sensors and develop unique products with innovative ideas to strengthen our presence in the market and contribute to the world.