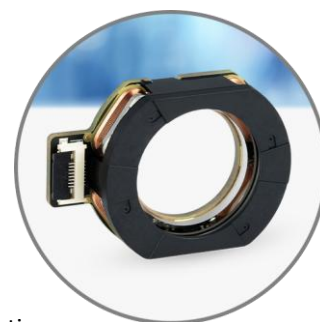




Tunable Prism TP-17-25

Optotune's TP-17-25 provides precise transmissive beam steering by dynamically adjusting the relative tilt of two optical windows enclosing a high-performance optical fluid. It is particularly suited for optical image stabilization (OIS), where fast and precise adjustment of the optical path is required.

With its large clear aperture, high optical tilt range, and dynamic actuation, the TP-17-25 offers strong performance in compact optical systems. Its smooth and quiet operation also supports a more stable and comfortable user experience, especially in handheld devices.

Advantages:

- Large clear aperture
- Compact body
- High optical tilt angle
- Fast, smooth and noiseless movement
- Freedom in optical system design
- Integrated inertia measurement unit

Mechanical specifications

Width	25	mm
Diameter (without connector)	30	mm
Length (with connector)	35.8	mm
Height	9.3	mm
Weight	12	g
Magnetic shielding	No	

Optical specifications

Clear aperture	17	mm
Transmission from 420nm to 980nm	≥96	%
Wavefront RMS error (WFE) ¹	≤0.13	λ (532nm)
Optical liquid refractive index (n _D)	1.45	
Abbe number of optical liquid (v)	55	
Tilting angle at zero current in all orientations	≤0.1	° (optical)
Optical tilt range of a standalone device	1	° (optical)

¹ Wavefront error RMS at 80% aperture. Wavefront error is extrapolated based on measurement at 76% aperture

Electrical specifications

Control interface	Analog interface for driver coils and digital for feedback, IMU and EEPROM	
Driving voltage (coils)	3.3-9.5	V
Channel resistance (two coils)	19	Ω
Nominal driving current	≤ 200	mA
Absolute maximum driving current	500	mA
Typical RMS OIS current (optical gain = 1, 25°C)	30-70	mA
Typical RMS OIS current (optical gain = 3, 25°C) ²	110-180	mA
Voltage for Hall sensors, IMU & EEPROM	3.3	V
Output format Hall sensor	digital	16-Bit

Performance specifications

Static motor constant (mean, both axes)	≥ 5	°/A (linearized full range)
Open loop full scale bandwidth at 21°C & 350mA	7	Hz

Environmental specifications

Operating temperature	-10 to +65	°C
Storage temperature	-40 to +85	°C

Environmental testing

TP-17-25 has passed the following reliability tests:

Test	Test procedure	Remark
Mechanical cycling	Circular pattern, 5 Hz, room temperature	10 million cycles
Temperature shock	-40 to 55 °C, 1 h/cycle, <20 s transition time, 5 cycles	ISO 9022-15-03-1
Dry heat	85°C, 45% relative humidity, 1 week	ISO 9022-11-06-1
Cold Storage	-40°C, 0% relative humidity, 1week	ISO 9022-11-08
HTHH	55°C, 90% relative humidity, 16h	ISO 9022-12-07
UV exposure	55°C, 10d, UV density: 1kWh/m ²	ISO 9022-20-04
Mechanical shock	1500m/s ² , 6ms, 3 shocks in each direction per axis	ISO 9022-30-X-1

Overview of available standard products

Product Number	Product Name	Description
187-104-00	TP-17-25-VIS-1D	TP-17-25, Calibrated VIS coating (420-680nm, 905nm) in Optotune-branded box packaging
187-104-01	TP-17-25-VIS-1D (Tray)	TP-17-25, Calibrated VIS coating (420-680nm, 905nm) in ESD-safe, stackable tray packaging

² Optical gain 1 is achieved by placing the tunable prism at the entrance aperture of the device.

Mechanical layout and mounting

A mechanical drawing of the envelope along with the coordinate system is shown in Figure 1. The PCB is the envelope defining element. The dimensions and tolerances are set, that it can fit into a 30 mm diameter barrel with the D-cut giving a width of 25mm max.

To mount the prism, the movement needs to be restricted in the XY-Plane as well as the Z-direction. To lock the movement of the prism it can be aligned using three points on the PCB. The position can then be locked by applying a force in Z-direction. The top part of the prism is already designed that the force will be applied in the strongest areas. However, as also shown in Figure 2, we recommend applying the force on the outer perimeter of the cover.

If glue is used to lock the prism into position, Optotune recommends GB2102.

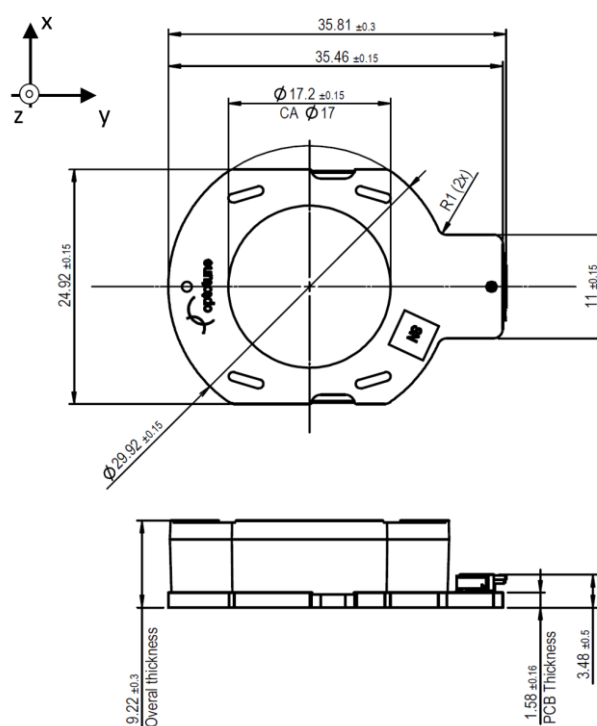


Figure 1 - Mechanical drawing of the TP-17-25 (unit: mm) including the coordinate system

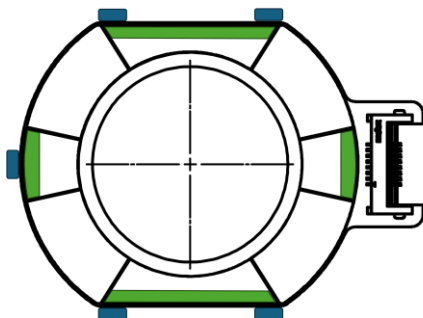


Figure 2 - Preferred mounting zones highlighted in green for the force in Z-axis

Electrical layout

The TP-17-25 features three digital three-axis hall sensors, one IMU as well as an EEPROM (see Table 1). The sensors can be addressed using I2C with 1Mhz clock-speed. The connection is via a 0.5 mm pitch, 8-pin FPC cable. The pinout is shown in Figure 3.

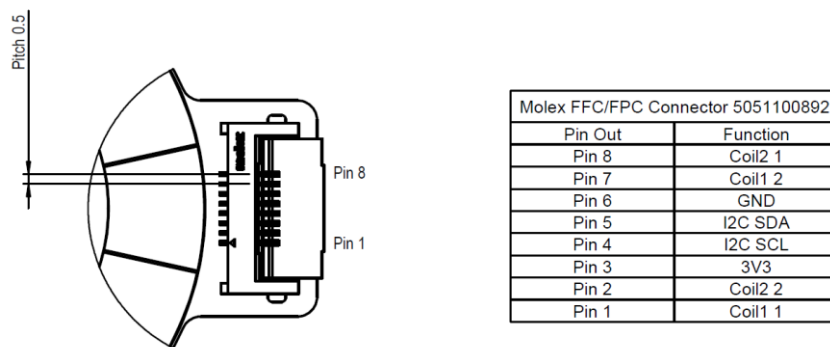


Figure 3 - Pins and naming

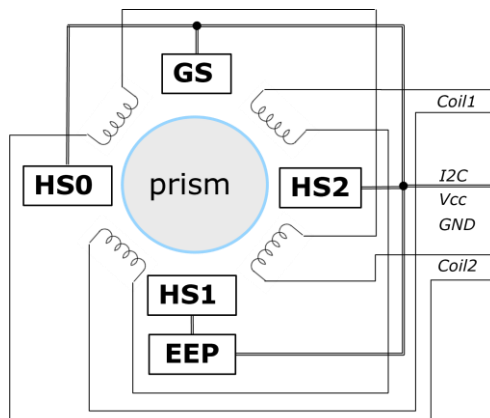


Figure 4 - Schematic visualizing the electronics position

Table 1: Sensors type and I2C address

Name	Type	I2C address
EEPROM ³	M24C08 or equivalent	I2C-addresses: 0x50 to 0x53 (+R/W bit)
GS	ICM-42670-P or equivalent	I2C-address: 0x68
Hall_0	TMAG3001A1 or equivalent	I2C-address: 0x34
Hall_1	TMAG3001A1 or equivalent	I2C-address: 0x35
Hall_2	TMAG3001A1 or equivalent	I2C-address: 0x36

Packaging and labeling

Single TP-17-25 units ship in cardboard boxes. Larger volumes ship in ESD-safe and stackable PET trays of 18 units⁴, sealed in a vacuum bag.

³ EEPROM content definition is available upon request.

⁴ For easier handling of the trays and to prevent samples sticking on the bottom of the tray, only every second position is used.

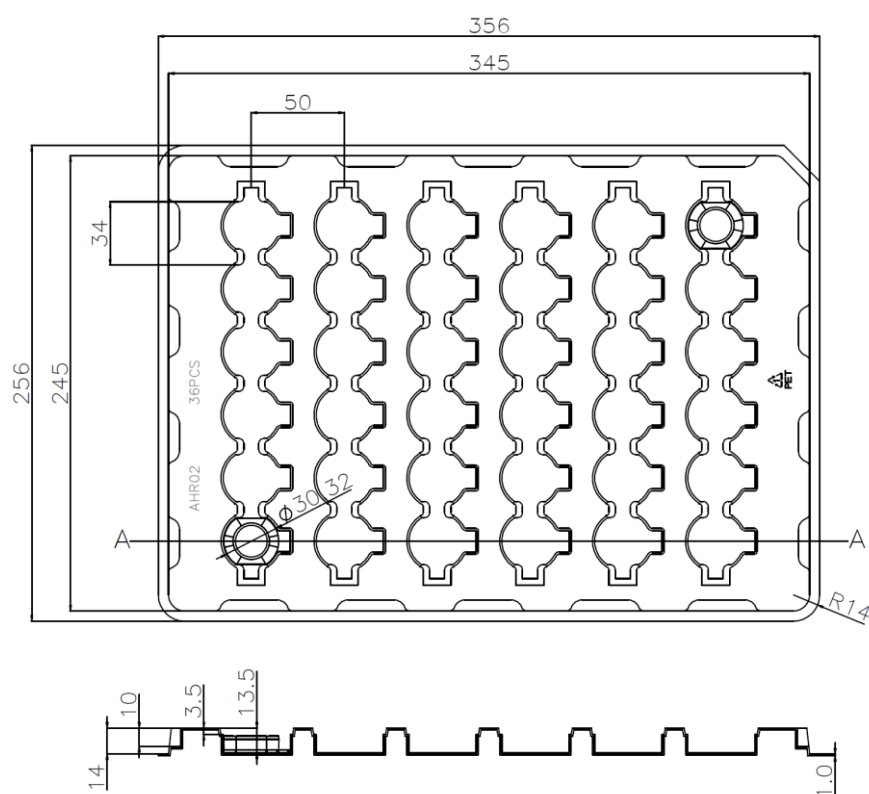


Figure 5 - Drawing of the stackable PET Tray

Safety and compliance

The product fulfills the RoHS, REACH, CE and flammability UL94 V-0 compliance standards. The customer is solely responsible for complying with all relevant safety regulations for integration and operation, including EMC compliance.

For more information on optical, mechanical, and electrical parameters, please contact sales@optotune.com.