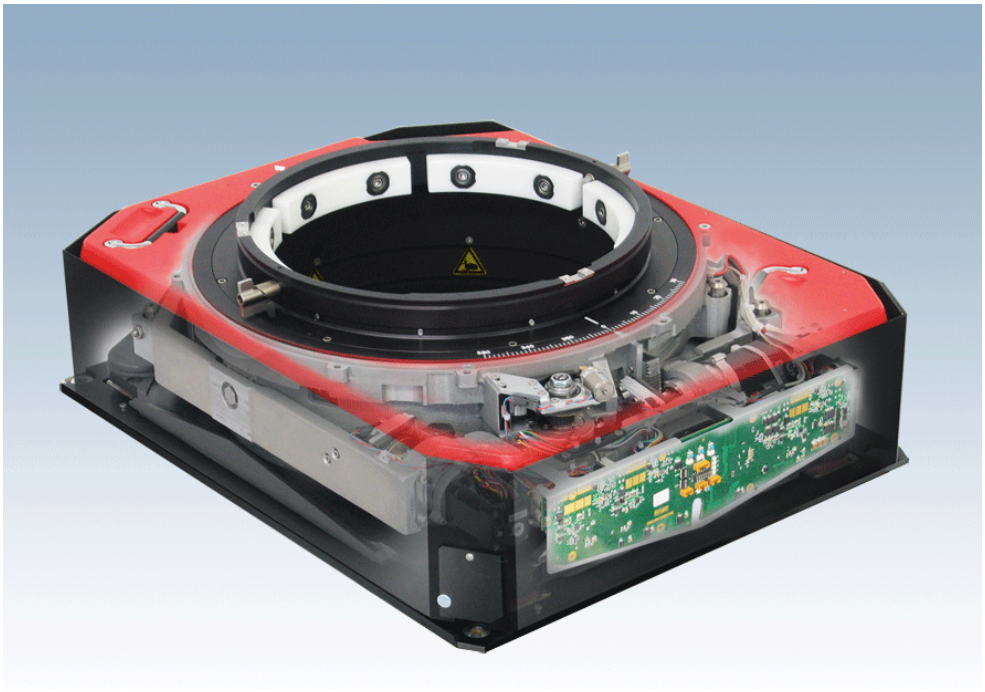
Product Description Leica PAV80
Gyro-stabilized Sensor Mount

Best Stabilization

Any Sensor

Any Flight Condition

The Leica PAV80 Gyro-stabilized Sensor Mount provides angular motion compensation, perfect vertical photography and automatic drift control for a wide range of airborne sensors. It is the successor of the well known Leica PAV30. The Leica PAV80 utilizes the latest stabilization technology providing very fast and smooth angular compensation in any flight condition. Plus, the Leica PAV80 has an extended stabilization range in pitch and roll. The universal mechanical sensor interface enables straightforward adaptation for sensors with different dimensions. Selectable control loops - optimized for different sensor weights - ensure perfect stabilization.



Leica PAV80 cut-away diagram

Leica PAV80 Key Benefits

Cost savings

- More efficient photo flights
- Less stress on the flight crew
- Fewer flight lines due to perfect drift compensation and accurate side lap

Best Stabilization

- Automatic correction for angular motion
- Perfect vertical photography
- Superior image quality
- Automatic drift setting
- Wide stabilization range

Any System

- Leica ADS80
- Leica Leica ALS70, ALS60, ALS50-II with Leica RCD30 or RCD105
- Leica RCD30
- Film frame cameras
- Digital frame cameras
- Line scanners
- Hyperspectral scanners
- Airborne thermal imager
- LIDAR sensors
- Any other airborne sensor

Any Flight Condition

- Fast, wide-range angular motion compensation as required during turbulent flights
- High-accuracy stabilization to stabilize during smooth flights
- Operates in a wide environmental range

Leica PAV80

Leica PAV80 Gyro-stabilized Sensor Mount

Best Stabilization - Any Sensor - Any Flight Condition

The Leica PAV80 is a reliable, highest-quality gyro-stabilized sensor/camera mount conforming to international airborne system standards. Leica PAV80 modularity and ease of integration provide the perfect mount for Leica ADS80, Leica ALS70/60/50-II with Leica RCD30 or RCD 105 and third-party sensor systems.

Leica PAV80 Features

- Angular motion compensation
- Automatic perfect vertical photography
- Fully automated operation
- Automatic drift setting
- Automatic initialization and system test during startup
- Remotely controlled operation via FCMS (Leica Flight & Sensor Control Management System) or command interface to 3rd party FMS
- PAV80 Control Software for simple initial setup and diagnosis
- Outputs gimbal data at high data rates
- Intelligent high-speed bifurcated control loop provides best stabilization
- Stabilization range in roll from –7° to + 7 °
- Stabilization range in pitch from –8° to + 6 °
- Stabilization range in drift from –30° to + 30 °
- Reliable, high-quality hardware conforming to ISO 7137, RTCA DO-160F, EUROCAE-14E and FAR§23.561
- Direct interchange with Leica PAV30 installations
- Fully integrated in the Leica Geosystems Airborne Sensor workflow, including Leica IPAS20 (Inertial Position & Attitude System) operation
- Proven gimbal suspension design with high torque motors
- Flexible mechanical interfaces support various sensor types
- Adaptable to sensor weight from 5 kg up to 100 kg **without the need for mass compensators**
- Gimbal suspension design and motors with high torque to stabilize even unbalanced sensors

Global service and support

Leica Geosystems' worldwide network of support provides professional service 24 hours per day, 7 days per week. Service engineers are available from Leica Geosystems Service Centers located in all main regions around the world to ensure high uptime of the airborne systems for all Leica Geosystems users.

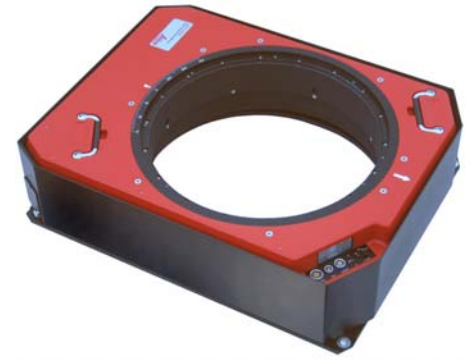
Leica PAV80 configuration options

- Leica PAV80 with standard protection cover *)
  Sensors from 5 kg to 65 kg, full PAV80 rotation range
- Leica PAV80 heavy load with standard protection cover.
  Sensors from 65 kg to 100 kg, full PAV80 rotation range
- Leica PAV80 with low height protection cover *)
  Sensors with 'exotic' shapes from 5 kg to 65 kg, +/- 5° pitch and roll rotation range
- Leica PAV80 heavy load with low height protection cover
  Sensors with 'exotic' shapes from 65 kg to 100 kg, +/- 5° pitch and roll rotation range

*) 'Standard' and 'low height' protection cover see section Leica PAV80 installation drawings

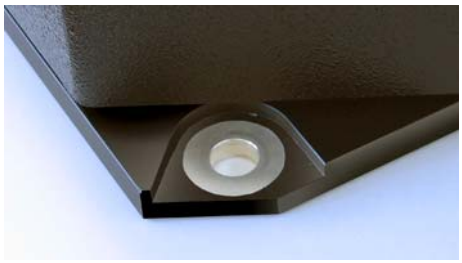
Overview of the Leica PAV80

Leica PAV80 Gyro-stabilized Sensor Mount



The Leica PAV80 Gyro-stabilized Sensor Mount has been developed by Leica Geosystems' engineers for compensation of angular movements to improve the quality of airborne sensor data. Fully automated operation increases survey flight efficiency.

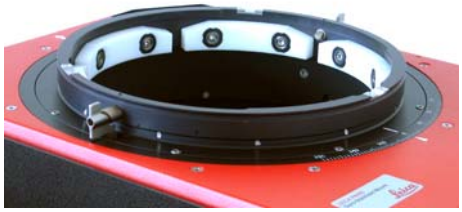
The Leica PAV80 continues Leica Geosystems' tradition of excellence in design, combining high performance with long-term reliability. The Leica PAV80 features a gimbal suspension design with high-dynamic and high-torque brushless electro-motors. Therefore there are no hydraulic components that can leak.



The Leica PAV80 replaces existing Leica mounts and is fully integrated into the Leica Geosystems airborne sensor concept.

The Leica PAV80 overall size is 1cm less in length and 3 cm less in width than the size of the Leica PAV30. The mounting holes are at the same location for both mount types. Therefore, the Leica PAV80 is directly interchangeable with Leica PAV30 installations. No aircraft modification is required.

Folding handles allow convenient carrying for installation into the aircraft.



Sensor-specific adapter rings with spring locks allow convenient insertion and secure locking of the sensor in the Leica PAV80.

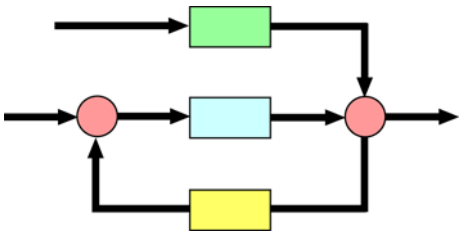
Power switch and all connectors are combined in the interface panel.

The power switch offers a 'Remote' position which allows remote control of the power by an external device.

All connectors are LEMO-type to ensure foolproof and reliable connection for Power, for the remote control interface and for the GNSS IMU system.

The integrated protection cover assures safe operation for the user over the wide range of rotation in all axes.

Intelligent high-speed bifurcated control loop



The intelligent high-speed bifurcated control loop takes internal sensor data and external IMU data into account. The result is a fast and accurate stabilization with perfect vertical alignment and drift reference.
Several control loops optimized for different sensor weights can be selected:

Leica Geosystems sensors:

- Leica ADS80 Airborne Digital Sensor
- Leica ALS70, 60 and 50-II Laser Scanners
- Leica RCD30 Digital Camera System

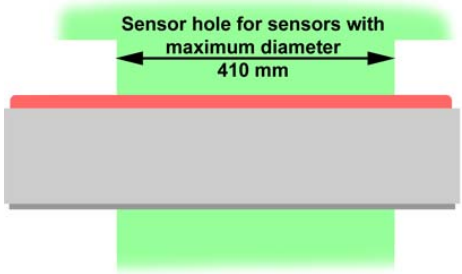
3rd party sensors

- Vexel UltraCamXp
- Range 1: 5 kg to 30 kg
- Range 2: 25 kg to 50 kg
- Range 3: 45 kg to 75 kg
- Range 4: 70 kg to 100 kg

Motors with high torque

The new Leica PAV80 has motors with 5 times higher torque than the Leica PAV30 at a lower power consumption. This allows even unbalanced sensors to be installed into the Leica PAV80.

Large sensor hole and flexible mechanical interface for all types of sensors



The Leica PAV80 has a large sensor hole and can hold sensors with a diameter at the sensor hole of up to 410mm.

The robust and stiff gimbal suspension design of the Leica PAV80 accommodates sensors with a total weight from 5 kg up to 100 kg without the need for a mass compensator.

The Leica PAV80 has a universal mechanical interface. For Leica sensors, adapter rings are available with spring locks for convenient insertion or removal of the sensor.

For 3rd party sensors, either one of the Leica adapter rings or a sensor-type-specific adapter that fits to the Leica PAV80 universal mechanical interface is used.

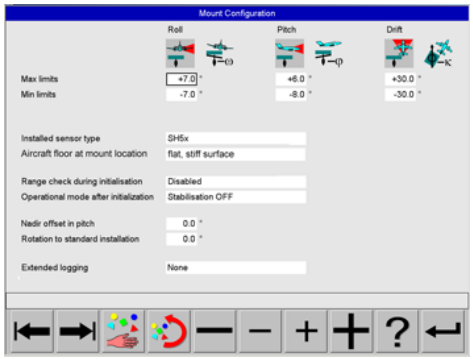
Spacer to adapt the installation height

The Leica Geosystems' spacer is a very robust adapter frame with a height of 150mm. It ensures vibration-free installation of the sensor mount in cases where the mount has to be installed above the aircraft floor to position a sensor head above a port glass or camera door.
The spacer is fixed under the Leica PAV80 baseplate.

Fully-automated operation - Leica PAV80 controller software

Turnkey

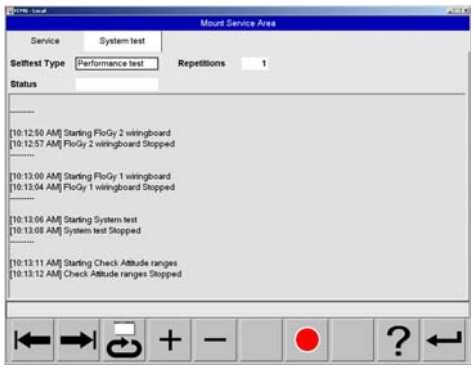
Leica PAV80 is a simple, turnkey system. After installation in the aircraft, only an initial configuration has to be entered to define the sensor system in use and to set user preferences for Leica PAV80 operation. After that, Leica PAV80 operates fully automatically or remotely controlled by the flight management system. Not even the power switch has to be switched if the Leica PAV80 power is remotely controlled by the sensor system.



Configuration

For initial setup and configuration, the Leica PAV80 controller software is used. This software is embedded in Leica FCMS.

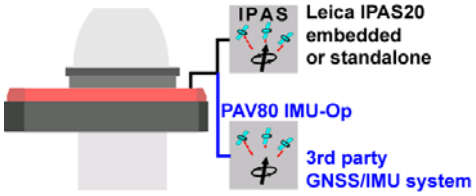
For 3rd party sensors, a standalone user-friendly Windows-based version of the Leica PAV80 controller software is standard delivery. The FCMS-style graphical user interface of the Leica PAV80 controller software simplifies mount setup and configuration.



Remote performance analysis

The Leica PAV80 supervises itself during operation and logs relevant internal status information. A user can execute automatically running self tests to collect status and performance information of the Leica PAV80. This logged data allows remote system analysis by Leica Geosystems' Service Engineers.

Leica PAV80 IMU interface

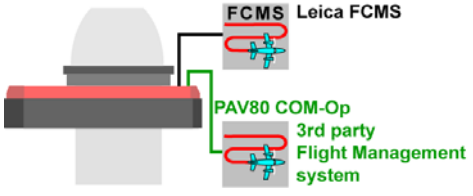


The intelligent high-speed bifurcated control loop of the Leica PAV80 takes external IMU data into account. For Leica ADS80, Leica ALS70,60 and 50-II and Leica RCD30, the GNSS/IMU system embedded into these sensor systems provides the IMU data to the Leica PAV80.

For 3rd party sensor system, the standalone Leica IPAS20 system is required.

Also, 3rd party GNSS/IMU systems such as POS or AeroControl can provide the required IMU data to the Leica PAV80. In this setup, the interface option 'PAV80 IMU-Op' is required.

Leica PAV80 command interface for remote control



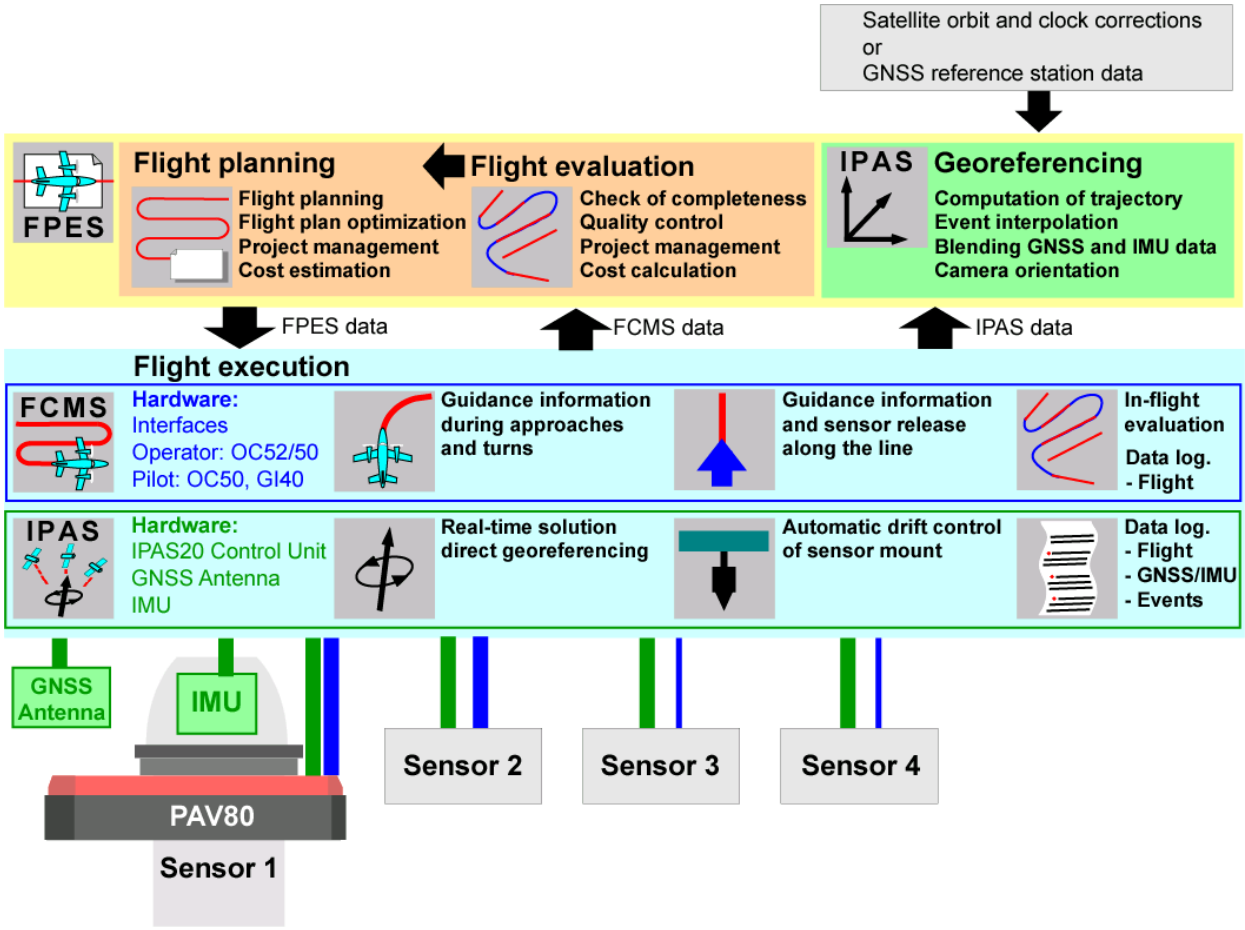
The Leica PAV80 is fully remotely controllable. During all phases of flight execution, Leica FCMS controls the Leica PAV80 according to the flight plan. Leica FCMS also displays the status of the Leica PAV80 to the user.

3rd party flight management systems can also fully remotely control the Leica PAV80. In this setup, the interface option 'PAV80 COM-Op' is required.

System integration and the optimal Leica Geosystems workflow

Perfect integration of hardware and software into one complete system is the key for effective airborne sensing projects. Leica Geosystems has decades of experience in this field and provides system solutions which are highly integrated, while also flexible and modular, when used as standalone components. In a complete airborne sensor system, the Leica PAV80 Gyro-stabilized Sensor Mount with Leica IPAS20 and Leica IPAS TC and Leica IPAS CO software, permit data acquisition and direct georeferencing of airborne sensor data and camera orientation. Leica FPES (Flight Planning & Evaluation Software) is used for optimized flight planning, flight evaluation and project management. Leica FCMS performs flight guidance and sensor control, as well as in-flight data evaluation, recording and reporting.

Leica PAV80 integrated in the Leica Geosystems airborne sensing workflow



Green: Leica IPAS Hardware and Software, airborne and office components
Brown: Leica FPES, Flight Planning & Flight Evaluation, office components
Blue: Leica FCMS, Flight & Sensor Control Management System, airborne components

Details about Leica FPES, Leica FCMS, Leica IPAS, Leica IPAS TC and Leica IPAS CO are given in their corresponding brochures, product descriptions and equipment lists.

Leica PAV80 with 3rd party sensors

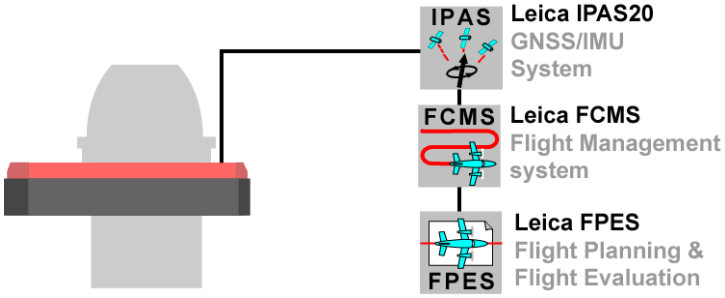
The Leica PAV80 has motors with a very high torque. This allows a large variety of sensor types in the range of 5 kg up to 100 kg to be installed into the Leica PAV80 without the need for a mass compensator. The Leica PAV80 is so robust that it stabilizes even unbalanced sensors. The limitations can be calculated by using the rule of thumb formulas below:

Sensor weight [kg]	x	Offset roll [cm]	< 400
Sensor weight [kg]	x	Offset pitch [cm]	< 600
Sensor weight [kg]	x	Offset Z [cm]	< 800

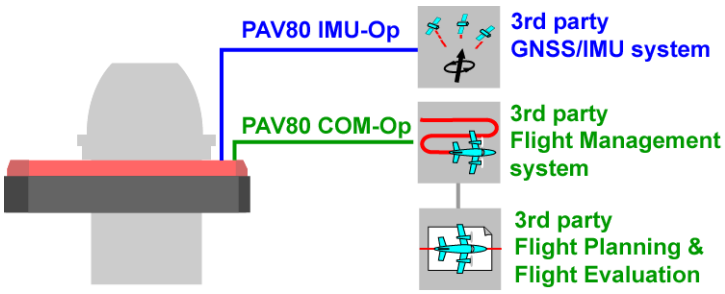
Offset (roll, pitch, Z) = sensor center of gravity to Leica PAV80 rotation axis center

The intelligent high-speed bifurcated control loop takes sensor parameters into account. Optimized control loops are available for 3rd party sensors. If required, the Leica PAV80 passive dampers can be exchanged to optimize the mount for a different sensor weight.

Leica PAV80 software interfaces



Leica PAV80 configuration and workflow for a 3rd party sensor system completed with Leica Geosystems' components.



Configuration and workflow for a 3rd party sensor system that is completed with 3rd party components.

Leica PAV80 sensor interfaces

Use either one of the Leica adapter rings or design a sensor-type-specific adapter that fits to the universal mechanical interface of the Leica PAV80.
See drawings at the end of this document.

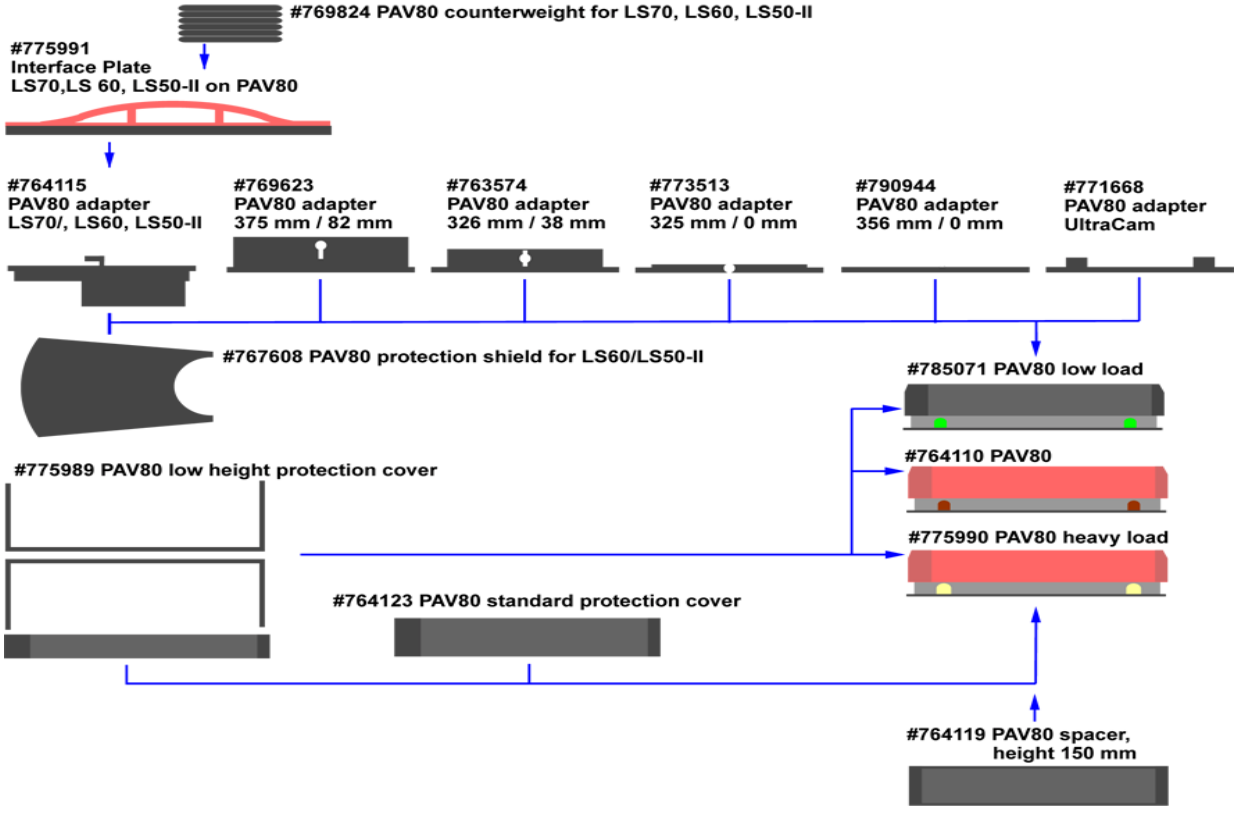
Article # 771668
Leica PAV80 adapter ring for UltraCam

Leica PAV80 Product Specifications

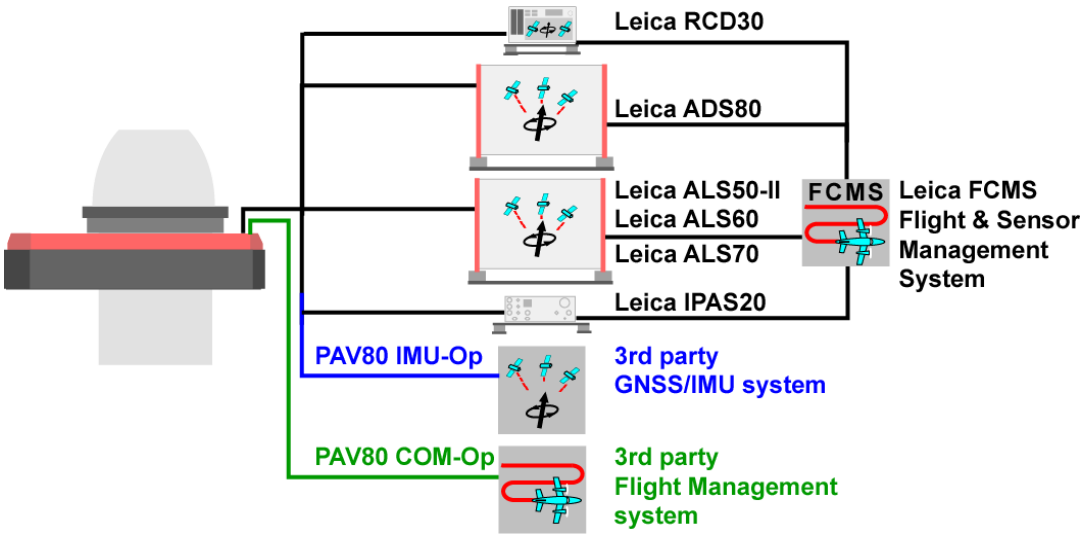
Operational	***Protection cover***	***# 764123 standard***		***# 775989 low height***
	Stabilization range in roll	- 7 ° to ° + 7 °		- 5 ° to ° + 5 °
	Stabilization range in pitch	- 8 ° to ° + 6 °		- 5 ° to ° + 5 °
	Stabilization range in drift	- 30 ° to ° 30 °		
	Mount type	***#785071 RCD30***	***#764110***	***#775990 heavy load***
	Sensor weight	5 to 35 kg	5 to 70 kg	65 to 100 kg
	Typical residual deviation from vertical *	< 0.02° RMS		
	Typical residual deviation from drift *	< 0.02° RMS, depends on GNSS/IMU		
Interfaces	Command interface	RS232		
	GNSS/IMU System	Leica IPAS20, SPAN, POS, AeroControl		
Electrical	Voltage input	22.0 to 30.3 VDC		
	Power Consumption at 28 VDC	Average ** 30 W, Peak 250 W <0.3 sec		
	Pre-fuse rating	15 A		
Mechanical	Mechanical sensor interfaces	SH81/82,91/92 LS50-II/60,70 with RCD105, RCD30, Ultra Cam XP, Generic		
	Sensor hole dimension	410 mm		
	Dimension PAV80	673 mm x 532 mm x 168 mm		
	Weight excluding sensor adapters	36.0 kg		
Environmental	Operating Temperature	- 20°C to +55°C		
	Storage Temperature	- 40°C to +85°C		
	Pressure	ICAO 50,000 ft		
	Humidity	0% RH to 95% RH according to ISO 7137		
Applied Standards	General	ISO 7137, RTCA DO-160-F, EUROCAE-14E		
	Emergency Landing	FAR 23.561		
Conformity to national regulations		CE, FCC Part 15		

* For photo flight situations, i.e. aircraft angular motion <10°/s and with typical aircraft photo flight frequency spectrum
** For balanced weight

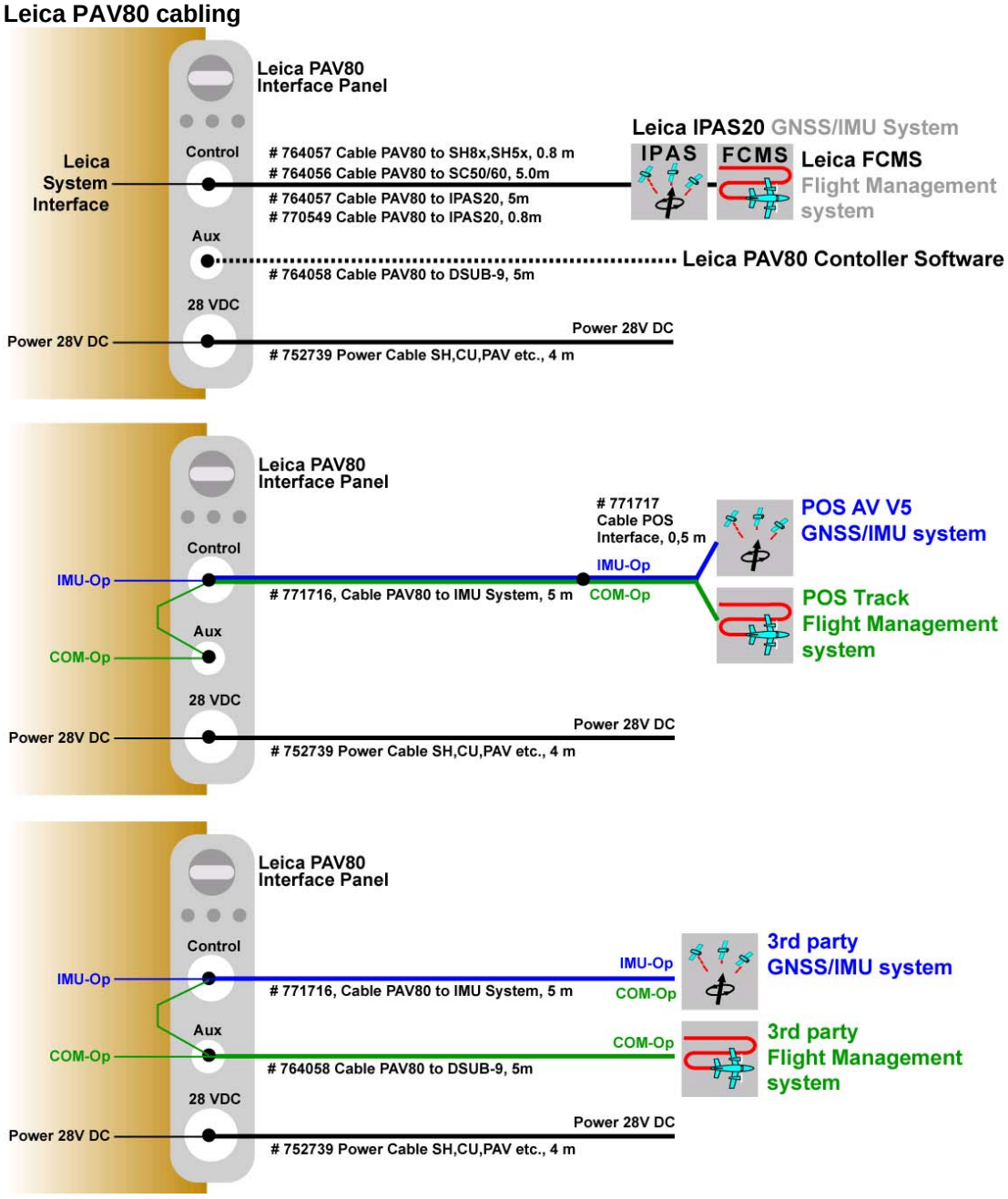
Leica PAV80 hardware configuration



Leica PAV80 interface to IPAS and FCMS and 3rd party IMU and FMS



Leica PAV80 cabling



Leica PAV80 configuration chart

Article #	Article	Leica ADS80 SH91 SH92	Leica ALS70 ALS60 ALS50-II	Leica RCD30	3rd party Sensor, IPAS20 FCMS	UltraCam with POS and PosTrack	3rd party Sensor, 3rd party GNSS
Hardware							
785071	PAV80 gyro-stabilized mount for RCD30	-	-	1	(1) *	-	(1) *
764110	PAV80 gyro-stabilized mount	1	-	-	(1) *	1	(1) *
775990	PAV80 gyro-stabilized mount, heavy load	-	1	-	(1) *	-	(1) *
773513	PAV80 adapter 325 mm / 0 mm	1		-	-	-	-
790944	PAV80 Adapter RCD30	-	-	1	-	-	-
763574	PAV80 adapter 326 mm / 38 mm	-	-	-	option	-	option
769623	PAV80 adapter 375 mm / 82 mm	-	-	-	option	-	option
764115	PAV80 adapter for LS60 and LS50-II	-	(1) *	-	-	-	-
790497	PAV80 Adapter for LS60-70 CH6x		(1) *				
769824	PAV80 counterweight for LS50/60/70	-	1	-	-	-	-
775991	Interface Plate LS60/LS50-II on PAV80	-	(1) **	-	-	-	-
790080	Interface Plate LS50/60/70 CH6x on PAV80		(1) **				
764123	PAV80 standard protection cover	1	-	1	(1) **	1	(1) **
775989	PAV80 low height protection cover	-	1	-	(1) **	-	(1) **
767608	PAV80 protection shield for LS50/LS60	-	1	-	-	-	-
771668	PAV80 adapter for UltraCam	-	-	-	-	1	-
764119	PAV80 spacer, height 155 mm	option	option	option	option	option	option
Cables							
763797	Cable PAV80 to SH81/82,SH91/92, 0.8 m	1	-	-	-	-	-
764056	Cable PAV80 to SC50/60/70, 5.0m	-	1	-	-	-	-
784811	Cable PAV80 to CC31/32, 3.0 m	-	-	1	-	-	-
764057	Cable PAV80 to IPAS20, 5m	-	-	-	1	-	-
771716	Cable PAV80 to 3rd party GNSS/IMU system	-	-	-	-	1	1
764058	Cable PAV80 to DSUB-9, 5m	-	-	-	-	-	1
752739	Power Cable SH,CU,PAV etc., 4 m	1	-	1	(1) ***	1	(1) ***
764054	Power Cable, 90°, 4.0m	-	1	-	(1) ***	-	(1) ***
771717	Cable POS interface 0.5m	-	-	-	-	1	-
Firmware licenses and software maintenance							
764114	PAV80-SH8x,SH5x FW lic	1	-	-	-	-	-
764116	PAV80-LS50/60/70 FW lic.	-	1	-	-	-	-
784810	PAV80- RCD FW lic	-	-	1	-	-	-
769441	PAV80-Generic FW lic	-	-	-	1	1	1
5302670	PAV80 SWM for ADS/ALS/Generic lic.	1	1	-	1	1	1
5302671	PAV80 SWM for RCD lic.	-	-	1	-	-	-
Licensed interface options for 3rd party							
764117	PAV80 COM-Op lic.	-	-	-	-	1	option
764118	PAV80 IMU-Op, lic	-	-	-	-	1	1
Standard accessories							
764111	PAV80 Standard Accessories and Tools	1	1	1	1	1	1
764112	PAV80 docu. and Controller SW on CD	1	1	1	1	1	1
764113	PAV80 User Manual, Hardcopy	1	1	1	1	1	1
764120	PAV80 shipping case	1	1	1	1	1	1
776813	PAV80 shipping.case insert for LSxx adapter	-	1	-	-	-	-

Alternative selection within a column

*, **, *** select either one, according to system or preference

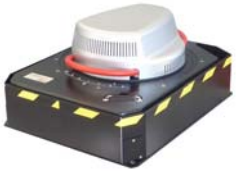
Leica PAV80 equipments

6002883 Leica PAV80 for Leica ADS80 with SH81/82

6005069 Leica PAV80 for leica ADS80 with SH91/92

6003662 Leica PAV80 for ALS50-II/60/70 with CH39

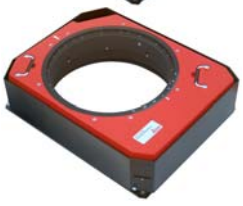
6006353 Leica PAV80 for ALS50-II/60/70 and RCD30



6006340 Leica PAV80 for RCD30

6003164 Leica PAV80 for UltraCam/POS

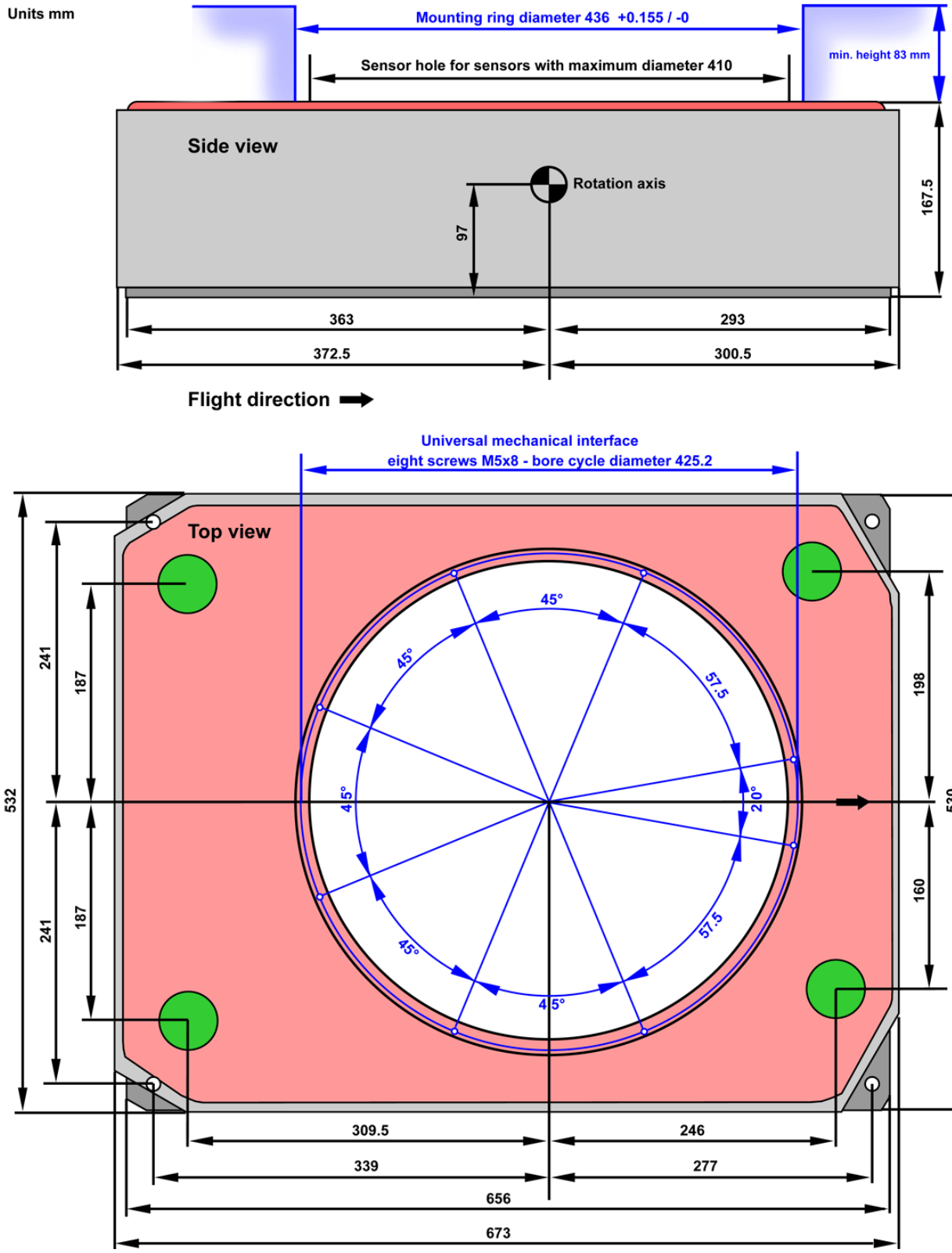
6004398 Leica PAV80 for 3rd party sensor with Leica IPAS20



6004397 Leica PAV80 for 3rd party sensor with POS or Aerocontrol

Leica PAV80 installation drawings

Leica PAV80 with standard protection cover

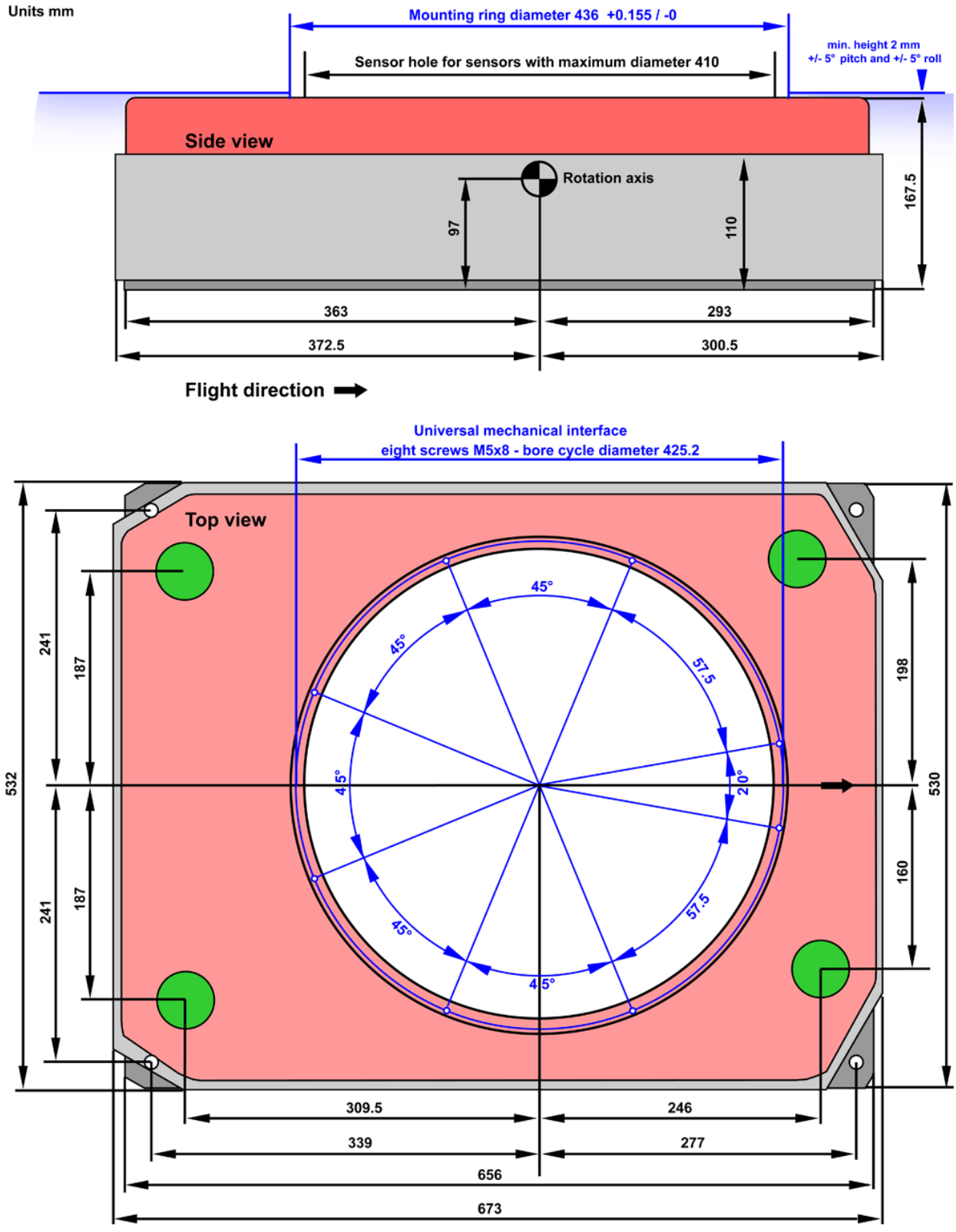


Mechanical interface to 3rd party sensors

The dimensions of the universal mechanical interface of the Leica PAV80 are given above in blue.
Lift the 3rd party sensor 83mm if the width exceeds the maximum mounting ring diameter. This is required to ensure that the sensor does not limit the Leica PAV80 rotation range during operation.

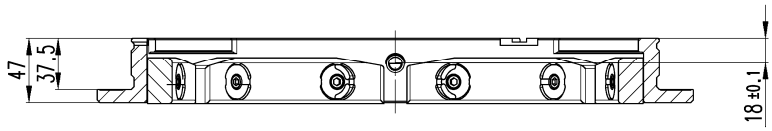
Leica PAV80 with low height protection cover

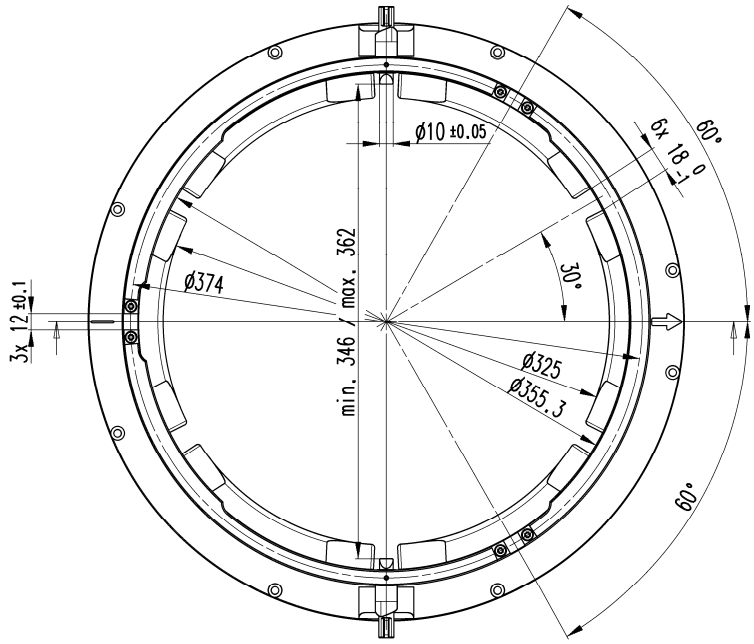
This configuration allows to operate in the Leica PAV80 sensors with exotic shapes. The part of the sensor above the Leica PAV80 can be flush with the Leica PAV80 top body. The Leica PAV80 rotation in pitch and roll is limited to +/- 5 ° in this configuration.



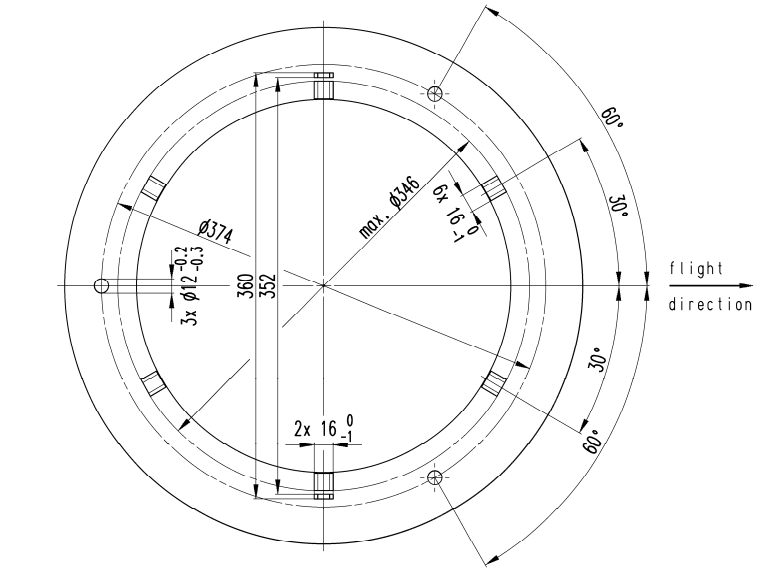
Article #763574 -Leica PAV80 adapter 326mm / 38 mm

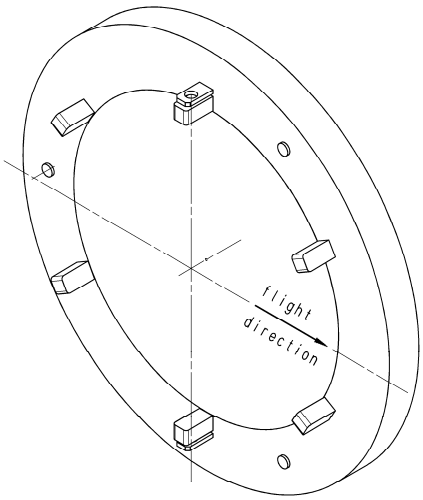
This ring is attached to the universal interface. The ring features spring locks for convenient installation. It is designed for Leica ADS80 Sensor Heads, but can be used for 3rd party sensors as well.

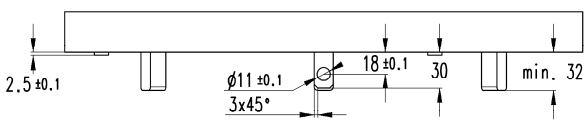




Counter part to Article #763574

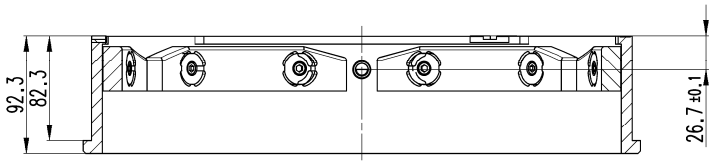


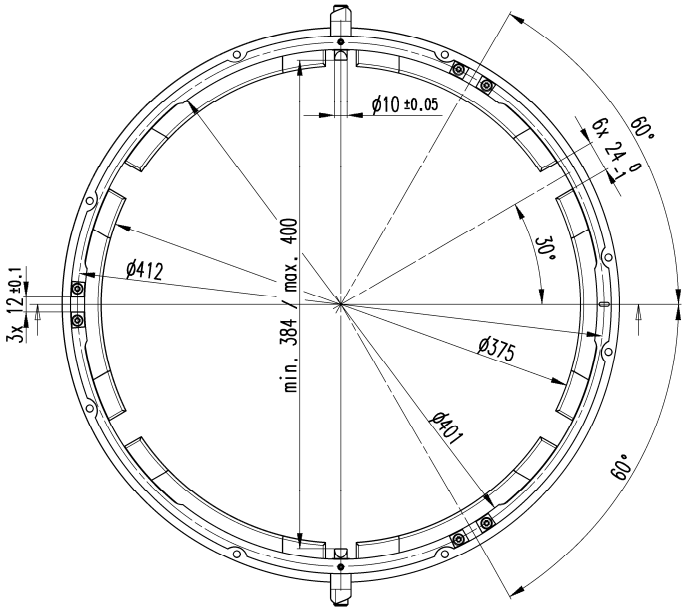




Article #769023 - Leica PAV80 adapter 375 mm / 82 mm

This ring is attached to the universal interface. The ring features spring locks for convenient sensor installation. It is designed for a wide sensor type which has to be lifted 82 mm to ensure full rotation range of the mount.





Counter part to Article #769023