



# 10 MICRON HPS MOUNTS

## TRUE PRECISION - FOR YOUR ASTRONOMICAL FUTURE

BUILT-IN ABSOLUTE ENCODERS: **UNGUIDED** imaging – even in field use

**NEW: COMBI**



**GM 1000 HPS**  
25 kg (55 lbs)  
load capacity



**GM 2000 HPS II C**  
50 kg (110 lbs)  
load capacity



**GM 3000 HPS**  
100 kg (220 lbs)  
load capacity



**GM 4000 HPS II**  
150 kg (330 lbs)  
load capacity

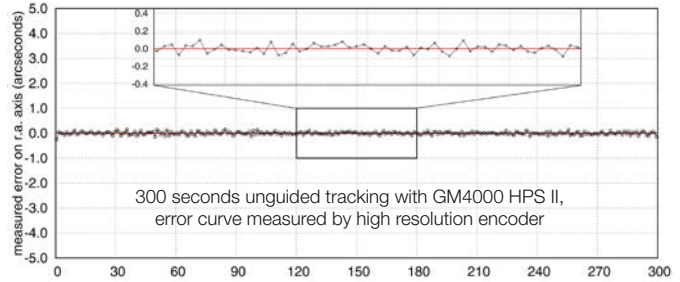
## FEATURES

### MECHANICS

- Premium materials and processing for high quality and durability.
- No casting parts, all pieces are CNC-milled.
- High-precision traditional worm-wheel drives and clutches for the best reliability.
- Internal wiring – no external mount cables.
- High torque brushless servo motors, maintenance free, allowing a pointing speed of up to 20°/s (GM2000).
- Proprietary motor drive electronic board for easy servicing.

### FIRMWARE

- Powerful firmware featuring advanced mount modeling, with several parameters computation (refraction, optical/mechanical flexures, leap second, mount orientation, object motion, clock synchronization, temperature etc.) and special functions (dual tracking, assisted polar alignment procedure etc.): the only way for perfect unguided tracking during long exposures (up to 0.6" RMS accuracy).
- Intuitively operated system, proprietary motor controller with temperature compensated clock, onboard industrial grade Linux computer – intelligence built-in.
- No external PC or laptop mandatory in the field – all functions in the onboard computer can be operated via stand-alone hand control unit (Keypad).
- Precise multistar pointing model, suitable for applications such as high precision spectroscopy, TLE manager for satellite tracking, orbital parameters management for minor planets and comets, individual observing sessions management and much more.
- Stable pointing models for safe East/West load reversal – recordable models database for different telescope setups and accessories configuration.
- Precise and fast polar alignment procedure, managed by the internal software and executable in minutes.
- Fully remote controlled via your observatory PC through 10/100/1000 LAN or WiFi, thanks to a well documented command protocol and drivers, via custom software or standard planetarium software.
- Manual-, Automatic- (ClockSync proprietary software) or GPS-based time; leap second support and full computation of the UT1 / UTC timescales.
- Electronic balance feature.
- Remote diagnostics web assist option with. dedicated server.



### PROFESSIONAL GRAPHIC DISPLAY INCLUDED

- Stand alone control unit – no PC required – includes all necessary functions for field use
- Rugged keypad with metal body and reliable industrial grade micro switches
- Large graphic display with up to five text lines and status icon, heated for low temperature operation, dimmable display and keyboard with LED backlight keys



„The quality will remain long after the price is forgotten“ – Henry Royce (founder of RollsRoyce)

### ELECTRONICS

- Closed loop system with on-axis encoders feedback.
- Absolute encoders directly mounted on both RA & Dec axes, featuring < 0.1 arcsec readout error, fully encapsulated and factory calibrated.
- Extremely low power consumption and micro format (20 x 15 x 8cm) electronics.
- Control box and keypad can be easily detached and safely stored after your observations – for a better protection of the electronic components or for servicing, no need to return your mount!
- Premium quality electric and electronic components for use in a wide range of operational temperatures.
- Virtual Keypad tool on PC available for remote control.



# BAADER PLANETARIUM

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GMBH



SPECIFICATIONS	GM 1000 HPS	GM 2000 HPS II	GM 3000 HPS	GM 4000 HPS II
Mount Type	German Equatorial Mount			
Weight (mount w/o acc.)	~ 19,5 kg – 43 lbs	~ 18,5 kg – 40 lbs + ~15 kg – 33 lbs (without accessories) Total = ~ 33,5 kg – 43 lbs	~ 65 kg – 143 lbs	~ 125 kg – 276 lbs
Instrument payload capacity	25 kg – 55 lbs	50 kg – 110 lbs	100 kg – 220 lbs	150 kg – 330 lbs
Latitude range	0° – 82° (90° optional)	20° – 70°	20° – 70°	20° – 70°
Azimuth fine adjustment range	+/- 7.5°	+/- 10°	+/- 10°	+/- 10°
Counterweight shaft	30 mm diameter, stainless steel, weight 1.7 kg – 3.7 lbs	40 mm diameter, stainless steel, weight 4 kg – 9 lbs	50 mm diameter, stainless steel, weight 8 kg – 18 lbs	60 mm diameter, stainless steel, weight 13 kg – 29 lbs
Axes	30 mm diameter, alloy steel	50 mm diameter, alloy steel	a.r. 80mm / dec. 50mm diameter, alloy steel	a.r. 85mm / dec. 80mm diameter, alloy steel
Bearings	Pre-loaded tapered roller bearings	Pre-loaded tapered roller bearing	Pre-loaded tapered roller bearing	Pre-loaded tapered roller bearing
Worm wheels	250 teeth, 125 mm diameter, B14 bronze	215 teeth, 172 mm diameter, B14 bronze	a.r. 315 teeth, 244 mm diameter, B14 bronze dec. 250 teeth, 192 mm diameter, B14 bronze	a.r. 430 teeth, 330 mm diameter, B14 bronze dec. 315 teeth, 244 mm diameter, B14 bronze
Worms	20mm diameter, tempered alloy steel, grinded and lapped	24mm diameter, tempered alloy steel, grinded and lapped	32mm / 24mm diameter, tempered alloy steel, grinded and lapped	32mm diameter, tempered alloy steel, grinded and lapped
Motors	2 axes AC servo brushless			
Power supply	24 V DC			
Power consumption	~ 0,5 A while tracking ~ 3 A at maximum speed ~ 4 A peak	~ 0,7 A while tracking ~ 3 A at maximum speed ~ 5 A peak	~ 1 A while tracking ~ 3 A at maximum speed ~ 5 A peak	~ 1.5 A while tracking ~ 5 A at maximum speed ~ 6 A peak
Go-to speed	Adjustable from 2°/s to 15°/s	Adjustable from 2°/s to 20°/s	Adjustable from 2°/s to 12°/s	Adjustable from 2°/s to 8°/s

## GENERAL SPECIFICATIONS

Transmission system	Backlash-free system with timing belt and automatic backlash recovery
Pointing accuracy	< 20" with internal 25-stars software mapping - max.100stars; possibility to use the Model Maker software for automated alignment operation.
Average tracking accuracy	~ 1" typical for 15 minutes ~ 0,6" RMS with internal 25-stars software mapping and compensation of system flexures and polar alignment errors
Security stop	+/- 30° past meridian in r.a. (software) +/- 45° past meridian in r.a. (mechanical)
Communication ports	RS-232 port; GPS port; autoguide ST-4 standard port; Ethernet 10/100/1000 port
Database	Stars: by Common Names, Bayer designation, Flamsteed designation, Bright Star Catalogue, SAO, HIP, HD, PPM, ADS, GCVS. Deep-sky: M, NGC, IC, PGC ,UGC limited up to mV = 16. Solar system: Sun, Moon, planets, asteroids, comets, artificial satellites. Equatorial and altazimuth coordinates. User defined objects. Quick slewing positions recalls for frequent focusing or useful operation.
Firmware features	User defined mount parking positions, 2stars and 3stars alignment function, up to 100 alignment stars for modeling, correction of polar alignment and orthogonality errors, estimate of average pointing error, storage of multiple pointing models, sidereal, solar and lunar tracking speed adjustable on both axes, declination-based autoguide speed correction, adjustable horizon height limit, pointing and tracking past meridian, assisted electronic balance adjustment, automatic (ClockSync proprietary software) manual or GPS time & site coordinates synchronization, leap seconds support and full accounting for the UT1-UTC timescale, configurable atmospheric refraction, direct Baader dome control via RS-232, network settings, comets and asteroids filter, multi-language interface. Remote Assist via Internet connection with dedicated server.
Keypad control	Rugged keypad with metal housing and reliable professional micro switches, Large graphic display – heated for operation under lowest temperatures, dimmable display and keyboard with back-lit keys, five information menu lines for coordinates, object information and symbols showing mount status and active external connections and accessories. All the functionality of the mount is available through the keypad without requiring an external PC
PC control	Remote control via RS-232, Ethernet, proprietary 10Micron ASCOM driver, LX200 compatible protocol, update of firmware and orbital elements of comets, asteroids and artificial satellites via RS-232 or Ethernet, PC virtual KeyPad control panel via RS-232 or Ethernet, Integrated Wi-Fi for connection with smartphones and tablets and any wireless network