ENGINEERING DOCUMENTATION

Standard Hat Unit Type I

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S24-F11-R80	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

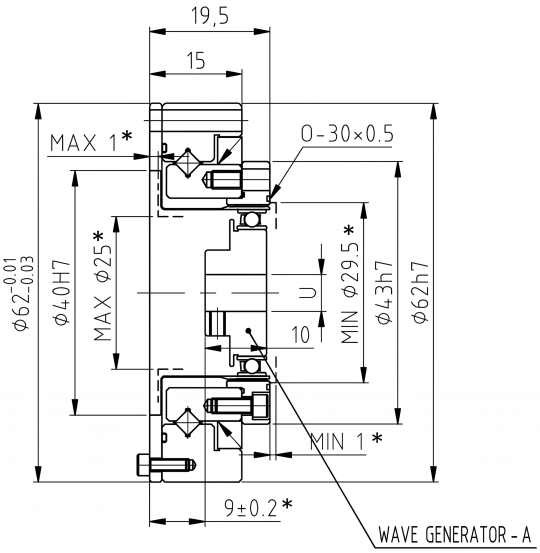
Standard Hat Unit Type I for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S24-F11-R80.

Key Integration Facts

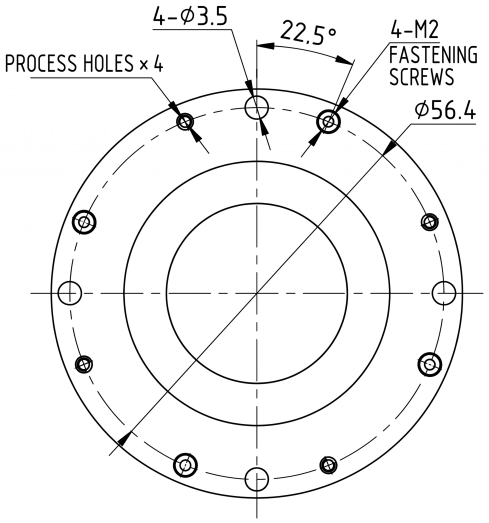
INTEGRATION ITEM	VALUE
Rated Torque	4.5 N·m
Instantaneous Maximum Torque	22.5 N·m
Start/Stop Peak Torque	9.9 N·m
Backlash	≤30 arc sec
Reduction Ratio	80
Maximum Input Speed	8500 r/min
Frame Size	11
Weight	0.27 kg

Product Structure & Views

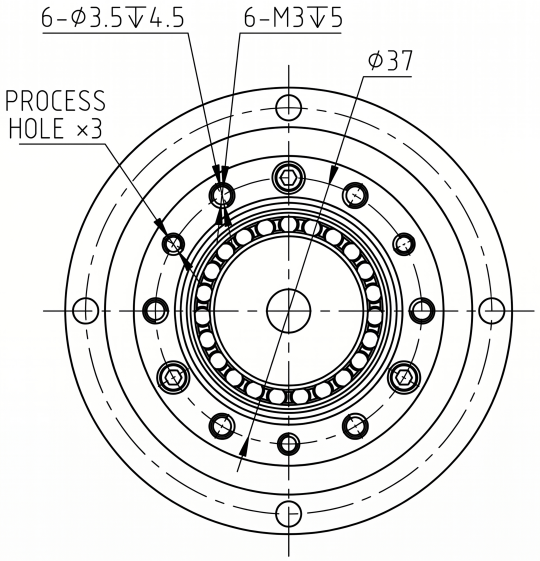
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



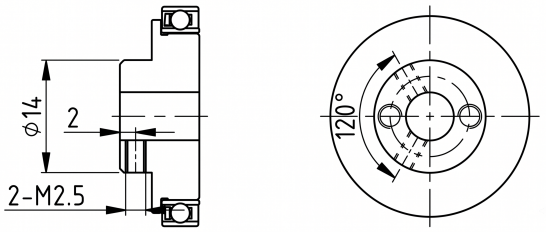
Mechanical View 1



Mechanical View 2



Mechanical View 3



Mechanical View 4

VIEW	FIELD	VALUE
Mechanical View 1	Top width	19.5 mm
	Inner width	15 mm
	Thread specification	0-30×0.5
	Maximum limit (top)	MAX 1 mm (reference dimension)
	Maximum inner diameter	MAX Ø25 mm (reference dimension)
	Minimum outer diameter	MIN Ø29.5 mm (reference dimension)
	Mounting hole diameter (H7 fit)	Ø40H7
	Middle shaft diameter (h7 fit)	Ø43h7
	Outer shaft diameter (h7 fit)	Ø62h7
	Diameter 62 tolerance range	Ø62 -0.01/-0.03
	Internal spacing	10 mm
	Datum reference U	Datum U
	Minimum limit (bottom)	MIN 1 mm (reference dimension)
	Bottom dimension (with tolerance)	9±0.2 mm (reference dimension)
	Wave generator reference	Wave generator-Datum A
Mechanical View 2	Process hole quantity and diameter	4 process holes, diameter 3.5 mm
	Fastening screw hole specification	4 M2 fastening screw holes
	Angular spacing between hole groups	22.5 degrees angular spacing
	Diameter callout	Diameter 56.4 mm
Mechanical View 3	Through hole diameter and depth	6 holes, Φ3.5mm, depth 4.5mm
	Threaded hole specification and depth	6 holes, M3 thread, depth 5mm
	Outer circle diameter	Φ87mm
	Process hole quantity	3 process holes
Mechanical View 4	Shaft diameter	Φ4
	Mounting hole specification (quantity-thread)	2× M2.5 threaded holes
	Number of mounting holes	2
	Mounting hole angular distribution	120°

Overall Dimensions and Input Interface

PARAMETER	VALUE	UNIT
Frame Size	11	
Reduction Ratio	80	
Weight	0.27	kg

Input Interface Design Guidance

- Confirm the selected series, frame size, ratio and product form before using dimensions or interface geometry.
- Design the input shaft, key, engagement and axial retention for the verified torque and assembly state.
- Reserve assembly, sealing, inspection and removal access around input, housing and output interfaces.

Mounting, Alignment and Fastener Control

- Keep mounting faces flat, clean and free of burrs, debris and coating buildup.
- Control concentricity, tilt and axial position of input and housing datums.
- Tighten fasteners in a staged diagonal sequence and verify free, even rotation during assembly.

Torque, Speed and Duty Boundaries

PARAMETER	VALUE	UNIT
Rated Torque	4.5	N·m
Allowable Average Torque	8	
Start/Stop Peak Torque	9.9	
Instantaneous Maximum Torque	22.5	
Maximum Input Speed	8500	r/min
Average Input Speed	3500	
Design Life	10000	h

- Calculate torque and speed from acceleration, constant-speed, deceleration, dwell and reversal portions of the complete cycle.
- Treat start/stop peak and instantaneous maximum torque as transient boundaries.
- Validate life against actual torque, speed, shock frequency, lubrication, temperature, alignment and external loading.

Torque, Speed and Life Boundaries

PARAMETER	VALUE	INTEGRATION REQUIREMENT
Rated Torque	4.5 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	8 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	9.9 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	22.5 N·m	Short-duration shock boundary only; do not use as a normal operating point.
Maximum Input Speed	8500 r/min	Maximum input-speed boundary; also verify motor and thermal limits.
Average Input Speed	3500 r/min	Validate the time-weighted average input speed over the complete duty cycle.
Design Life	10000 h	Design reference only; actual life depends on torque, speed, shock, lubrication and installation.

Transmission Accuracy and Torsional Rigidity

PARAMETER	VALUE	UNIT
Backlash	≤30	arc sec

- Installed positioning depends on reducer behavior, datum control, structural stiffness, motor and encoder errors and thermal growth.
- Use stiffness regions and transition torques when evaluating compliance, resonance, control gain and reversal.

Lubrication, Sealing and Thermal Control

- Use the specified lubricant, fill method and quantity for the exact configuration; do not mix incompatible lubricants.
- Provide compatible sealing at input, output and housing interfaces without distorting the reducer.
- Validate lubricant distribution and temperature for orientation, speed, load cycle and enclosure.
- Prevent chips, fibers, residue and moisture from entering gear or bearing cavities.

Output Bearing and External Load Path

- Calculate radial, axial and moment loads including offset, acceleration, gravity, process force, impact and emergency stops.
- Do not infer permissible external load from reducer torque capacity or frame size.
- Avoid forcing, impact, misalignment or host distortion through the output support during installation and operation.

Integration Checklist

01	Confirm the selected series, frame size, ratio and product form for this SKU.
02	Verify available dimensions and interface geometry without substituting a nearby configuration.
03	Check mounting-face flatness, concentricity, tilt, reliefs, cleanliness and support stiffness.
04	Verify input shaft, key, engagement length and axial retention.
05	Use staged diagonal tightening and verify free, even rotation.
06	Calculate average, start/stop peak and shock torque over the complete cycle.
07	Validate average and maximum input speed, design life and thermal condition.
08	Evaluate backlash, angular accuracy, hysteresis and stiffness for the control system.
09	Confirm lubricant, fill quantity, orientation, sealing and contamination controls.
10	Validate output radial, axial and moment loads using applicable bearing data.

View SKU Product Datasheet Request controlled 2D drawing Request controlled STEP review Request a Quote

Engineering Use and Verification Notice

01. This Dimensional & Integration Guide applies only to EmbodyStack SKU ES-HG-S24-F11-R80 and supports preliminary dimensional evaluation and integration. It is not a manufacturing drawing, reducer selection approval, bearing-load approval, lubrication specification, machinery risk assessment, safety validation or integration planning document. Before design freeze, assembly or commissioning, verify all dimensions, datum geometry, fits, interfaces, retention, fasteners, torque and speed duty, shock cases, torsional behavior, external loads, lubrication, sealing, temperature, contamination and maintenance requirements against the current EmbodyStack engineering data for this exact SKU. Validate the complete reducer, motor, host structure, output load, motion cycle, guarding, fault cases and applicable regulatory requirements under intended operating conditions.