ENGINEERING DOCUMENTATION

High-Torque Hat Unit Type I

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S07-F14-R80	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

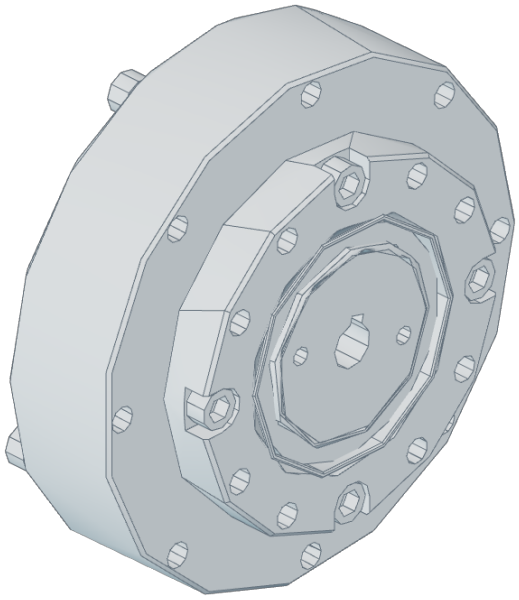
High-Torque Hat Unit Type I for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S07-F14-R80.

Key Integration Facts

INTEGRATION ITEM	VALUE
Rated Torque	10 N·m
Instantaneous Maximum Torque	61 N·m
Start/Stop Peak Torque	30 N·m
Reduction Ratio	80
Maximum Input Speed	8500 r/min
Frame Size	14
Weight	0.4 kg

3D Orientation Reference

This axonometric reference provides a quick orientation check for the reducer body, input interface and mounting relationship of ES-HG-S07-F14-R80.



Axonometric Orientation View

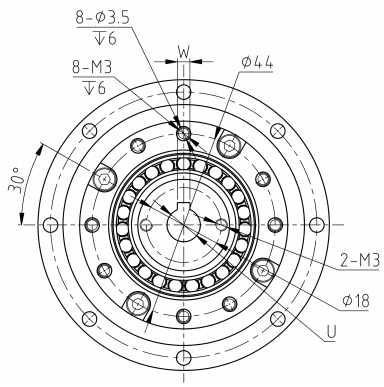
Orientation reference only. Use the exact-SKU parameter table and mechanical drawing for dimensions, hole geometry, fits and machining decisions.

Exact-SKU Interface Cross-Reference

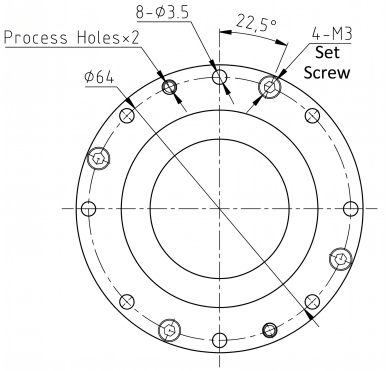
INTEGRATION TOPIC	EXACT-SKU REFERENCE
Reducer envelope and configuration	Frame Size: 14; Reduction Ratio: 80; Weight: 0.4 kg. Confirm hole geometry, datum features and fits in the exact-SKU mechanical drawing.
Torque and speed boundaries	Rated Torque: 10 N·m; Start/Stop Peak Torque: 30 N·m; Instantaneous Maximum Torque: 61 N·m; Maximum Input Speed: 8500 r/min. Confirm hole geometry, datum features and fits in the exact-SKU mechanical drawing.
Input and mounting interfaces	Wave Generator options A6 and A8 are defined in the housing and input interface matrix. Confirm hole geometry, datum features and fits in the exact-SKU mechanical drawing.

Product Structure & Views

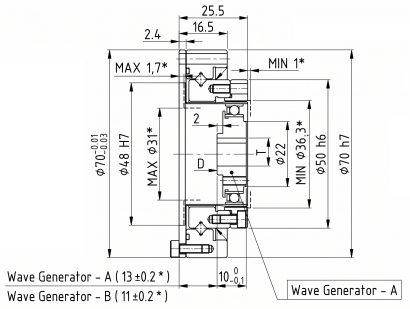
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



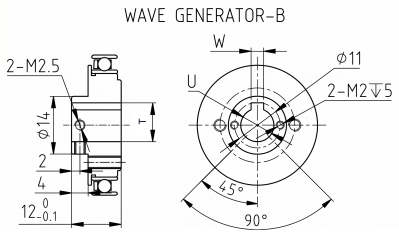
Mechanical View 1



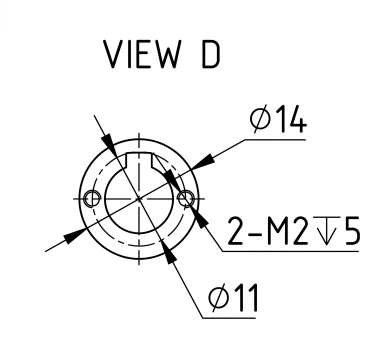
Mechanical View 2



Mechanical View 3



Mechanical View 4



Mechanical View 5

VIEW	FIELD	VALUE
Mechanical View 1	Eight diameter 3.5 holes	8 holes, diameter 3.5
	Depth callout for eight holes	Depth/countersink-style symbol 6 associated with 8- Ø3.5 callout
	Eight M3 threaded holes	8 threaded holes, M3
	Depth callout for eight M3 threaded holes	Depth/countersink-style symbol 6 associated with 8-M3 callout
	Width designation W	W dimension designated, numeric value not specified in this crop
	Diameter 44	Diameter 44
	Angle 30 degrees	30 degrees
	Two M3 threaded holes	2 threaded holes, M3
	Diameter 18 hole	Diameter 18
	Designation U	U designation, numeric value not specified in this crop

VIEW	FIELD	VALUE
Mechanical View 2	Hole quantity and diameter	8 holes, diameter 3.5 mm
	Hole angular spacing	22.5 degrees
	Threaded hole specification	4 M3 set screws
	Process hole quantity	2 process holes
	Diameter dimension	Diameter 64 mm
Mechanical View 3	Top overall length	25.5 mm
	Top internal length	16.5 mm
	Top step offset	2.4 mm
	Left maximum clearance	MAX 1.7 mm
	Right minimum clearance	MIN 1 mm
	Internal small spacing	2 mm
	Outer diameter with negative tolerance	Diameter 70 mm, upper deviation -0.01 mm, lower deviation -0.03 mm
	H7 bore diameter	Diameter 48 mm H7
	Maximum diameter limit	MAX diameter 31 mm
	Datum or section identifier D	D
	Hole diameter	Diameter 22 mm
	Minimum diameter limit	MIN diameter 36.3 mm
	h6 shaft diameter	Diameter 50 mm h6
	h7 shaft diameter	Diameter 70 mm h7
	Bottom length with unilateral tolerance	10 mm, upper deviation 0 mm, lower deviation -0.1 mm
	Wave Generator A specification note	Wave Generator-A, 13 ±0.2 mm
	Wave Generator B specification note	Wave Generator-A, 11 ±0.2 mm
	Datum T	Datum T
Mechanical View 4	Component name	Wave Generator-B
	W-direction width	W dimension, value not specified in crop
	Shaft bore diameter	Diameter 11
	Left view threaded holes	2 x M2.5 threaded holes
	Right view threaded holes	2 x M2D5 threaded holes
	Outer diameter	Diameter 14
	Step dimension	2
	Step dimension	4
	Overall height with tolerance	12 +0/-0.1
	Hole angular spacing	90 degrees
	Hole angular position	45°
	Datum T	Datum T
	Label U	U label; value not specified
Mechanical View 5	View designation	View D
	Diameter 14	Diameter 14 mm
	Two M2 threaded holes depth 5	2 × M2 threaded holes, depth 5 mm
	Diameter 11	Diameter 11 mm

Housing and Input Interface Dimensions

Housing Size: 14 **Reduction Ratio:** 80 **Weight:** 0.4 kg

WAVE GENERATOR	T (MM)	U	W
A6	7 +0.10	6 H7	2 JS9/P9
A8	9.4 +0.10	8 H7	3 JS9/P9

Note: Dimensions in mm unless otherwise specified. Refer to the dimensional drawing for feature locations and datum definitions.

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	10	N·m
Allowable Average Torque	14	
Start/Stop Peak Torque	30	
Instantaneous Maximum Torque	61	
Starting Torque	3.1	
Maximum Input Speed	8500	r/min
Average Input Speed	3500	
Design Life	15000	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	10 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	14 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	30 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	61 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	15000 h	Design reference only; actual life depends on torque, speed, shock, lubrication and installation.

Transmission Accuracy and Torsional Rigidity

PARAMETER	VALUE	UNIT
Angle Transmission Accuracy	1.5	arcmin
Hysteresis Loss	1	
Torsional Rigidity K1	0.47	×10⁴N·m/rad
Torsional Rigidity K2	0.61	
Torsional Rigidity K3	0.71	
Torsional Rigidity T1	2	N·m
Torsional Rigidity T2	6.9	

- 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-S07-F14-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.