ENGINEERING DOCUMENTATION

High-Torque Hat Unit Type I

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S07-F32-R80	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

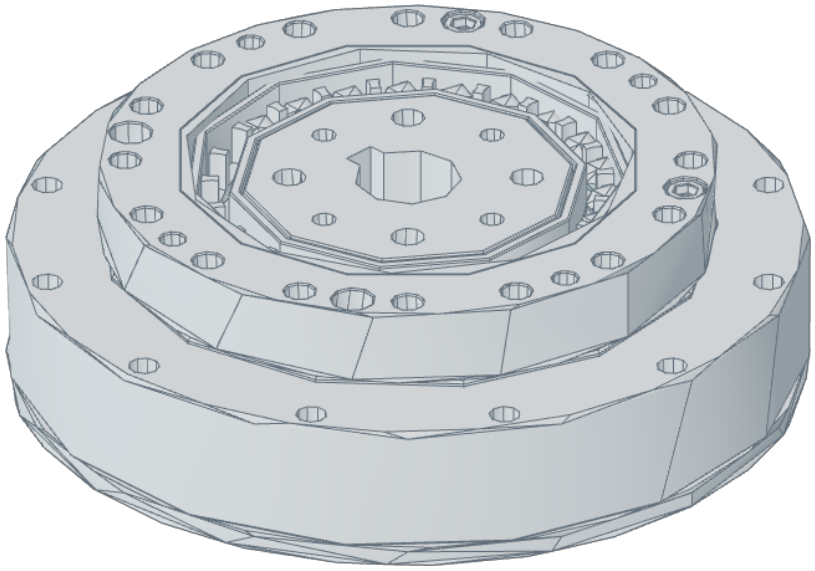
High-Torque Hat Unit Type I for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S07-F32-R80.

Key Integration Facts

INTEGRATION ITEM	VALUE
Rated Torque	153 N·m
Instantaneous Maximum Torque	738 N·m
Start/Stop Peak Torque	395 N·m
Reduction Ratio	80
Maximum Input Speed	4800 r/min
Frame Size	32
Weight	2.54 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-F32-R80.



Axonometric Orientation View

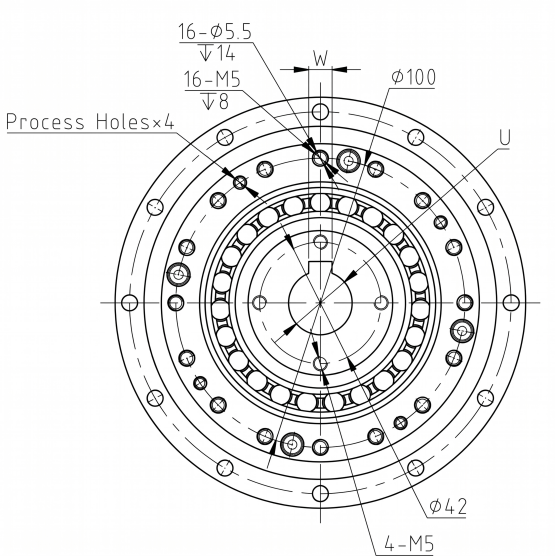
Orientation reference only. Use the exact-SKU parameter table and mechanical drawing for dimensions, hole geometry, fits and machining decisions.

Exact-SKU Interface Cross-Reference

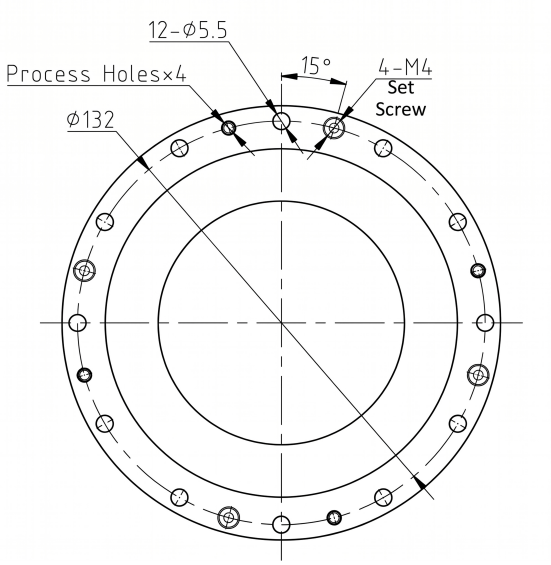
INTEGRATION TOPIC	EXACT-SKU REFERENCE
Reducer envelope and configuration	Frame Size: 32; Reduction Ratio: 80; Weight: 2.54 kg. Confirm hole geometry, datum features and fits in the exact-SKU mechanical drawing.
Torque and speed boundaries	Rated Torque: 153 N·m; Start/Stop Peak Torque: 395 N·m; Instantaneous Maximum Torque: 738 N·m; Maximum Input Speed: 4800 r/min. Confirm hole geometry, datum features and fits in the exact-SKU mechanical drawing.
Input and mounting interfaces	Wave Generator options A14 and A19 and A22 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

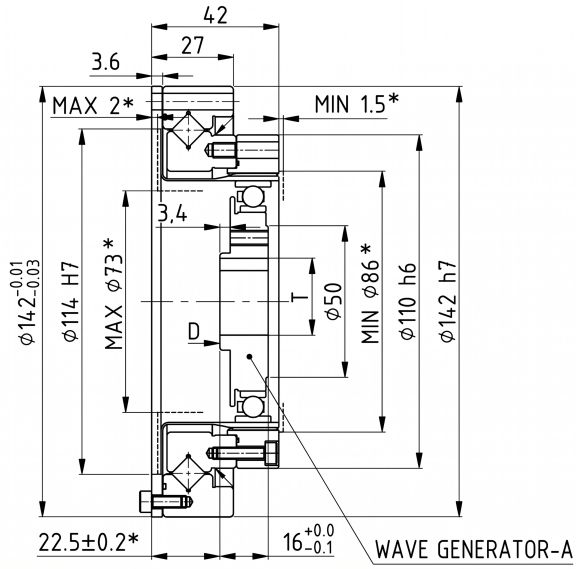
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



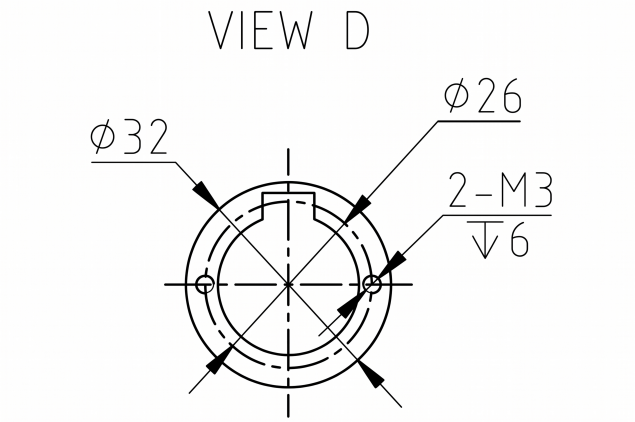
Mechanical View 1



Mechanical View 2



Mechanical View 3



Mechanical View 4

VIEW	FIELD	VALUE
Mechanical View 1	Sixteen through/process hole diameter and depth	16 holes, diameter 5.5, depth 14
	Sixteen M5 threaded holes and depth	16 M5 threaded holes, depth 8
	Process hole quantity	Process holes quantity: 4
	W dimension code	W dimension, value not specified in this crop
	Outer diameter	Outer diameter 100
	U dimension code	U dimension, value not specified in this crop
	Central bore or shaft interface diameter	Diameter 42
	Four M5 holes	4 M5 threaded holes

VIEW	FIELD	VALUE
Mechanical View 2	12 holes diameter 5.5	12 holes, diameter 5.5 mm
	Process hole quantity	Process holes quantity 4
	Hole pitch circle diameter	Pitch circle diameter 132 mm
	Angular position	15 degrees
	Set screw holes	4 M4 set screw holes
Mechanical View 3	Top overall width	42
	Top partial width	27
	Upper step offset	3.6
	Right minimum clearance	Minimum 1.5
	Left maximum clearance	Maximum 2
	Local step offset	3.4
	Diameter with negative tolerance	Diameter 142, upper deviation -0.01, lower deviation -0.03
	Hole diameter fit	Diameter 114 H7
	Maximum diameter limit	Maximum diameter 73
	Datum or interface label D	D
	Shaft diameter	Diameter 50
	Minimum diameter limit	Minimum diameter 86
	Shaft diameter fit	Diameter 110 h6
	Outer diameter fit	Diameter 142 h7
	Bottom width with bilateral tolerance	22.5 ±0.2
	Bottom local width with unilateral tolerance	16, upper deviation +0.0, lower deviation -0.1
	View title	Wave generator-A
	Datum or interface label T	T
Mechanical View 4	View identifier	View D
	Hole diameter	Diameter 26
	Outer diameter	Diameter 32
	Threaded hole quantity and size	2 × M3 threaded holes
	Quantity or directional callout	6

Housing and Input Interface Dimensions

Housing Size: 32 **Reduction Ratio:** 80 **Weight:** 2.54 kg

WAVE GENERATOR	T (MM)	U	W
A14	16.3 +0.10	14 H7	5 JS9/P9
A19	21.8 +0.10	19 H7	6 JS9/P9
A22	24.8 +0.10	22 H7	
	25.3 +0.10		8 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	153	N·m
Allowable Average Torque	217	
Start/Stop Peak Torque	395	
Instantaneous Maximum Torque	738	
Starting Torque	21	
Maximum Input Speed	4800	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	153 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	217 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	395 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	738 N·m	Short-duration shock boundary only; do not use as a normal operating point.
Maximum Input Speed	4800 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	arcmin
Hysteresis Loss		
Torsional Rigidity K1	6.7	×10⁴N·m/rad
Torsional Rigidity K2	11	
Torsional Rigidity K3	12	
Torsional Rigidity T1	29	N·m
Torsional Rigidity T2	108	

- 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-F32-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.