ENGINEERING DOCUMENTATION

High-Torque Cup Unit Type I

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S05-F40-R50	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

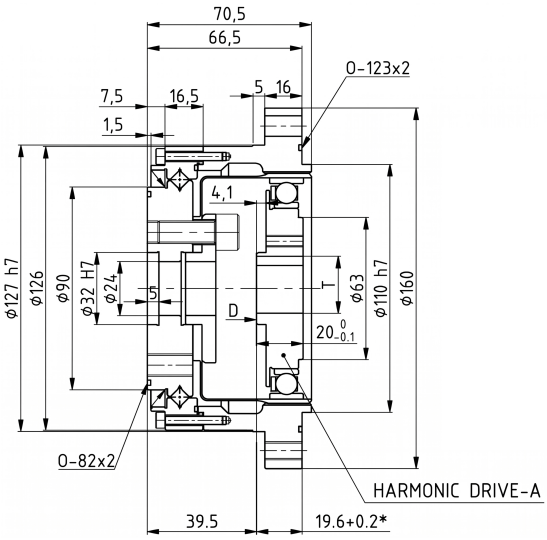
High-Torque Cup Unit Type I for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S05-F40-R50.

Key Integration Facts

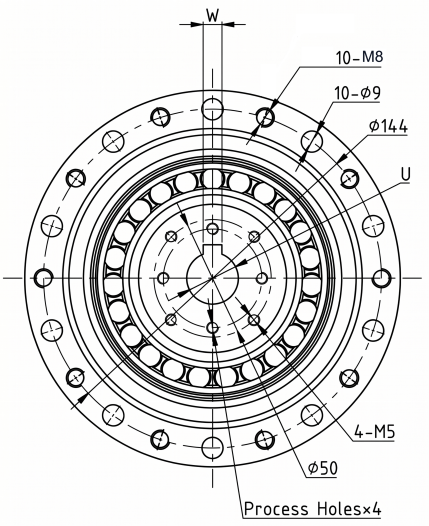
INTEGRATION ITEM	VALUE
Rated Torque	178 N·m
Instantaneous Maximum Torque	892 N·m
Start/Stop Peak Torque	523 N·m
Backlash	≤20 arc sec
Reduction Ratio	50
Maximum Input Speed	4000 r/min
Frame Size	40
Weight	4.6 kg

Product Structure & Views

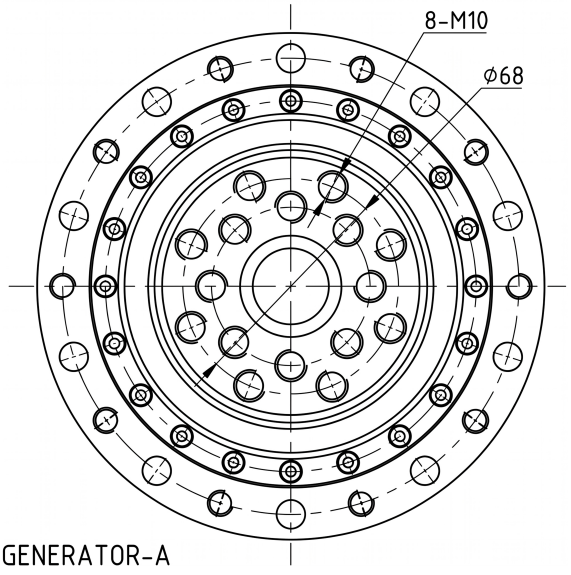
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



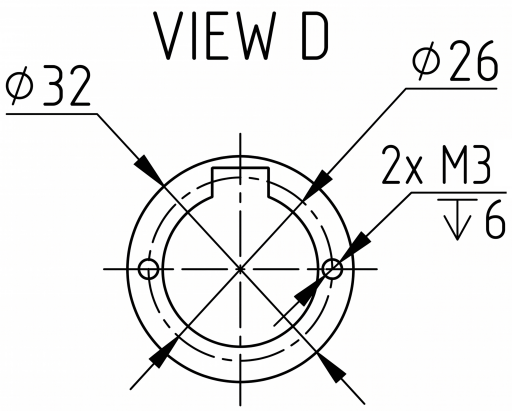
Mechanical View 1



Mechanical View 2



Mechanical View 3



Mechanical View 4

VIEW	FIELD	VALUE
Mechanical View 1	Upper overall length	70.5 mm
	Upper inner length	66.5 mm
	Upper right leader callout	0-123×2
	Upper right step length	16 mm
	Upper right small step length	5 mm
	Upper left offset length	7.5 mm
	Upper left step length	16.5 mm
	Upper left small offset length	1.5 mm
	Connector local clearance	4.1 mm
	Left outer diameter fit	Diameter 127 mm, tolerance class h7
	Left bore diameter fit	Diameter 32 mm, tolerance class H7
	Right outer diameter fit	Diameter 110 mm, tolerance class h7
	Left diameter 90	Diameter 90 mm
	Right diameter 63	Diameter 63 mm
	Left diameter 126	Diameter 126 mm
	Right diameter 160	Diameter 160 mm
	Left shaft diameter 24	Diameter 24 mm
	Letter D marker	D
	Right step width with unilateral tolerance	20 mm +0/-0.1
	Lower left leader callout	0-82×2
	Component label	HARMONIC DRIVE-A
	Bottom left length	39.5 mm
	Bottom right length with positive tolerance	19.6 mm +0.2*
	Letter T marker	T
	Local Length	5mm
Mechanical View 2	W dimension designation	W
	M8 threaded hole count	10 x M8 threaded holes
	9 mm diameter hole count	10 x Ø9 holes
	mounting hole pitch circle diameter	Ø144 pitch circle diameter
	U dimension designation	U
	M5 Tapped Holes	4-M5
	Hole Pitch Circle Diameter	Ø50
	Process Holes	Process Holes ×4
Mechanical View 3	Mounting hole pattern	8 holes, M10 thread
	Pitch circle diameter	ϕ68 mm
Mechanical View 4	View Designation	View D
	Outer Circle Hole Diameter	Φ82
	Inner Circle Hole Diameter	Φ26
	Threaded Hole Specification and Quantity	2×M3
	Surface Roughness Requirement	6

Housing and Input Interface Dimensions

Housing Size: 40 **Reduction Ratio:** 50 **Weight:** 4.6 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	178	N·m
Allowable Average Torque	255	
Start/Stop Peak Torque	523	
Instantaneous Maximum Torque	892	
Starting Torque	61	
Maximum Input Speed	4000	r/min
Average Input Speed	3000	
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	178 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	255 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	523 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	892 N·m	Short-duration shock boundary only; do not use as a normal operating point.
Maximum Input Speed	4000 r/min	Maximum input-speed boundary; also verify motor and thermal limits.
Average Input Speed	3000 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	≤20	arc sec
Angle Transmission Accuracy	1	arc min
Hysteresis Loss	2	
Torsional Rigidity K1	10	N·m/rad
Torsional Rigidity K2	14	
Torsional Rigidity K3	18	
Torsional Rigidity T1	54	N·m
Torsional Rigidity T2	196	

- 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-S05-F40-R50 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.