ENGINEERING DOCUMENTATION

High-Torque Hat Component Set

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S04-F17-R50	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

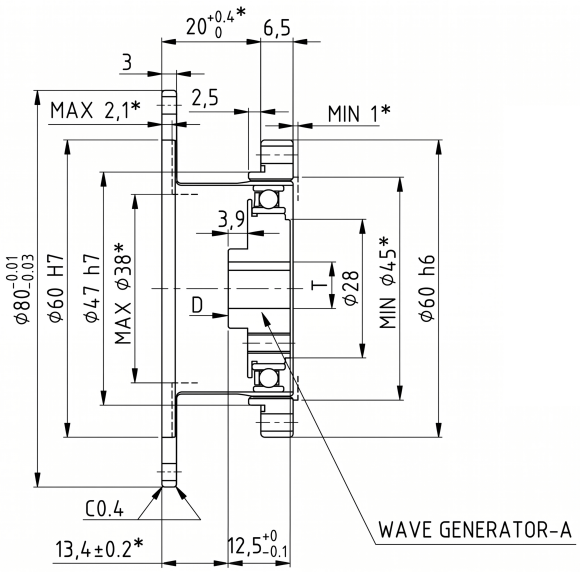
High-Torque Hat Component Set for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S04-F17-R50.

Key Integration Facts

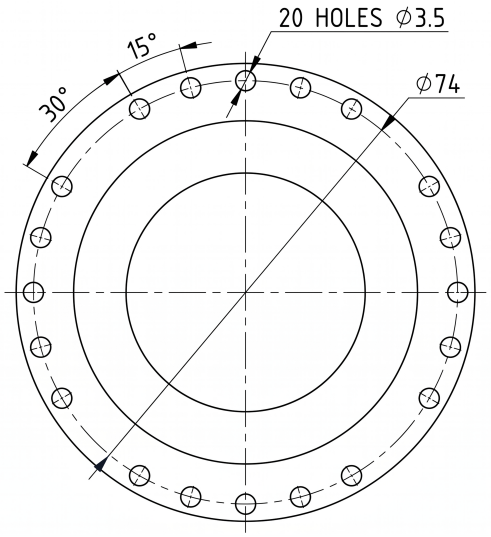
INTEGRATION ITEM	VALUE
Rated Torque	21 N·m
Instantaneous Maximum Torque	91 N·m
Start/Stop Peak Torque	44 N·m
Backlash	≤20 arc sec
Reduction Ratio	50
Maximum Input Speed	7300 r/min
Frame Size	17
Weight	0.19 kg

Product Structure & Views

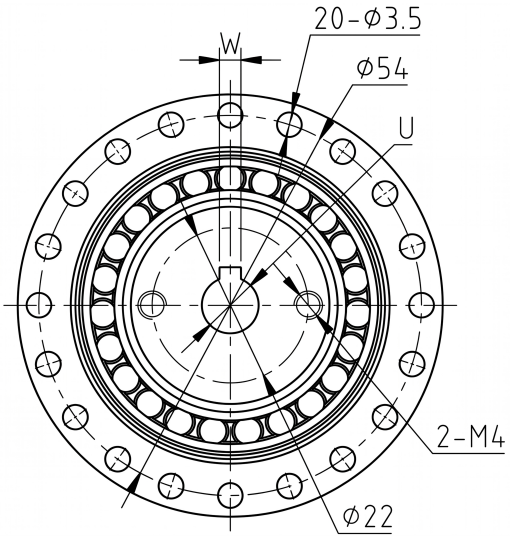
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



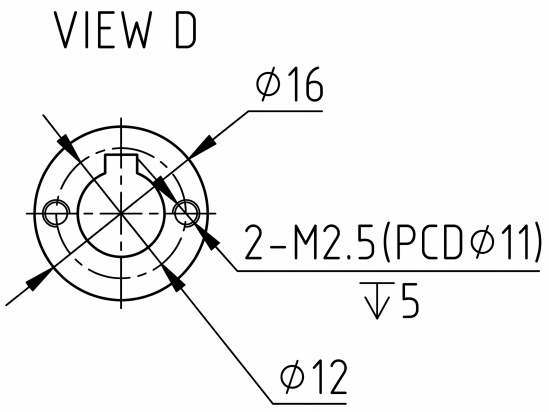
Mechanical View 1



Mechanical View 2



Mechanical View 3



Mechanical View 4

VIEW	FIELD	VALUE
Mechanical View 1	Overall length	20 +0.4/0 mm
	End section length	6.5 mm
	Protrusion length	3 mm
	Flange width	2.5 mm
	Maximum width	MAX 2.1 mm (reference)
	Minimum clearance	MIN 1 mm (reference)
	Internal feature dimension	3.9 mm
	Outer diameter with tolerance fit	Φ60 H7
	Inner diameter with tolerance fit	Φ47 h7
	Outer diameter with bilateral tolerance	Φ80 +0.01/-0.03
	Hole diameter	Φ28
	Maximum diameter	MAX Φ88 (reference)
	Minimum diameter	MIN Φ45 (reference)
	Chamfer dimension	C0.4
	Overall height	13.4±0.2 mm (reference)
	Local height	12.5 +0/-0.1
	Shaft diameter with tolerance fit	Φ60 h6
	Component name	Wave Generator-A
	Parameter D	D, value not specified in this crop
	Parameter T	T, value not specified in this crop
Mechanical View 2	Number of holes	20 holes
	Hole diameter	Φ3.5
	Hole angular spacing	15°
	Outer circle diameter	Φ74
	Hole angular sector	30°
Mechanical View 3	20 holes Φ3.5 on bolt circle	20 holes, Φ3.5
	Key width W	W (Not specified)
	Outer diameter	Φ54
	Label U	U (reference marker)
	2 threaded holes M4	2 × M4 threaded holes
	Center hole diameter	Φ22
Mechanical View 4	View D designation	View D
	Outer circle diameter	Φ16
	Thread hole specification and PCD	2-M2.5 (PCD Φ11)
	Number of holes	5 holes equally spaced
	Inner circle diameter	Φ12

Housing and Input Interface Dimensions

Housing Size: 17 **Reduction Ratio:** 50 **Weight:** 0.19 kg

WAVE GENERATOR	T (MM)	U	W
A8	9.4 +0.10	8 H7	3 JS9/P9
A11	12.8 +0.10	11 H7	4 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	21	N·m
Allowable Average Torque	34	
Start/Stop Peak Torque	44	
Instantaneous Maximum Torque	91	
Maximum Input Speed	7300	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	21 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	34 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	44 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	91 N·m	Short-duration shock boundary only; do not use as a normal operating point.
Maximum Input Speed	7300 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	≤20	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-S04-F17-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.