ENGINEERING DOCUMENTATION

High-Torque Hat Component Set

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S04-F14-R80	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

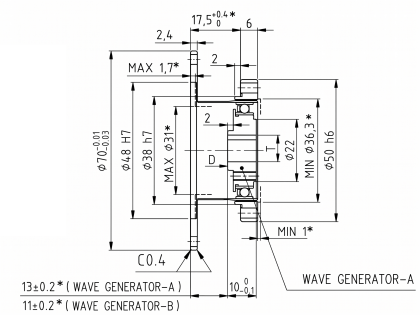
High-Torque Hat Component Set for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S04-F14-R80.

Key Integration Facts

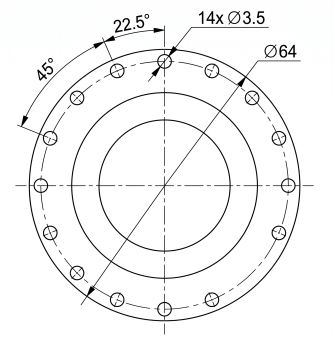
INTEGRATION ITEM	VALUE
Rated Torque	10 N·m
Instantaneous Maximum Torque	61 N·m
Start/Stop Peak Torque	30 N·m
Backlash	≤20 arc sec
Reduction Ratio	80
Maximum Input Speed	8500 r/min
Frame Size	14
Weight	0.14 kg

Product Structure & Views

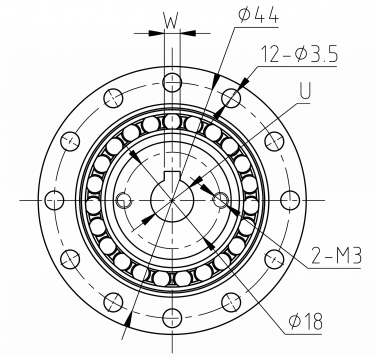
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



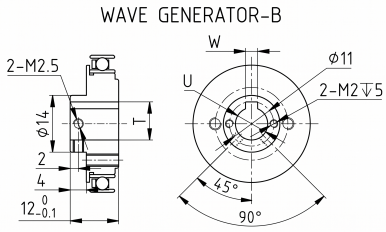
Mechanical View 1



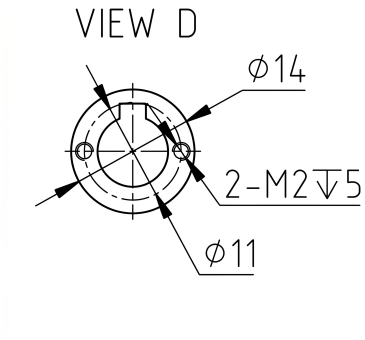
Mechanical View 2



Mechanical View 3



Mechanical View 4



Mechanical View 5

VIEW	FIELD	VALUE
Mechanical View 1	Overall length (type A)	17.5 +0.4/0
	Local segment width	6
	Local segment width	2.4
	Groove width	2
	Maximum boss height	MAX 1.7
	Outer diameter	ϕ70 -0.01/-0.03
	Inner diameter	ϕ48 H7
	Inner diameter	ϕ38 h7
	Maximum inner diameter	MAX ϕ31
	Datum D	Datum D
	Dimension label T	T
	Inner diameter	ϕ22
	Minimum inner diameter	MIN ϕ36.3
	Outer diameter	ϕ50 h6
	Minimum height	MIN 1
	Chamfer	C0.4
	Bottom height	10 0/-0.1
	Overall length (Wave Generator-A)	13±0.2
	Overall length (Wave Generator-B)	11±0.2
	Component name	Wave Generator-A
Mechanical View 2	Bolt Circle Array	14 holes × ϕ3.5mm
	Hole Array Angular Spacing	22.5°
	Bolt Circle Diameter	ϕ64mm
	Hole Array Starting Angle	45°
Mechanical View 3	Outer flange diameter	ϕ44
	Mounting holes pattern	12 holes × ϕ3.5
	Feature identifier W	W
	Feature identifier U	U
	Threaded mounting holes	2 × M3 threaded holes
	Center bore diameter	ϕ8
Mechanical View 4	Component Name	Wave Generator-B
	Mounting Holes (Left Side)	2 × M2.5 threaded holes
	Main Shaft Diameter	Φ4 mm
	Height Dimension 1	2 mm
	Height Dimension 2	4 mm
	Total Height with Tolerance	12 mm (+0/-0.1)
	Dimension Label W	W (dimension not specified)
	Dimension Label U	U (dimension not specified)
	Mounting Hole Circle Diameter	Φ1 mm
	Mounting Holes (Right Side)	2 × M2D5 threaded holes

VIEW	FIELD	VALUE
Angular Position 1	45°	
Angular Position 2	90°	
Datum T	Datum T	

VIEW	FIELD	VALUE
Mechanical View 5	Mounting hole diameter	Φ4
	Mounting threaded hole specification	2-M2 depth 5
	Center hole diameter	Φ1

Housing and Input Interface Dimensions

Housing Size: 14 **Reduction Ratio:** 80 **Weight:** 0.14 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
A14	16.3 +0.10	14 H7	5 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	
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
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-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.