ENGINEERING DOCUMENTATION

Special Standard Cup Unit

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S21-F14-R50	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

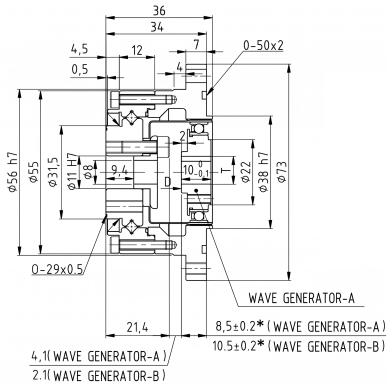
Special Standard Cup Unit for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S21-F14-R50.

Key Integration Facts

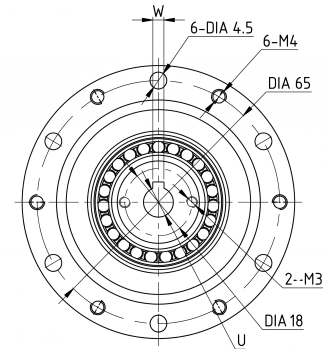
INTEGRATION ITEM	VALUE
Rated Torque	5.4 N·m
Instantaneous Maximum Torque	35 N·m
Start/Stop Peak Torque	18 N·m
Backlash	≤20 arc sec
Reduction Ratio	50
Maximum Input Speed	8500 r/min
Frame Size	14
Weight	0.25 kg

Product Structure & Views

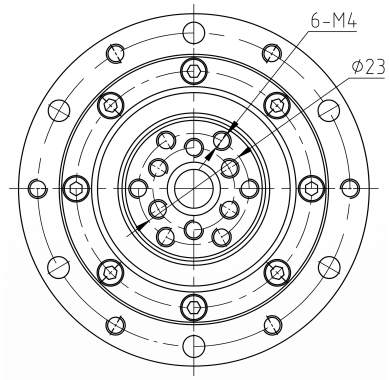
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



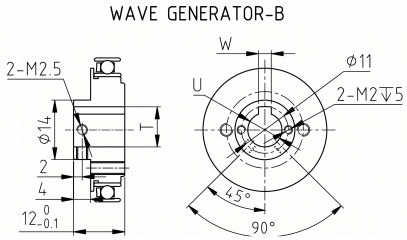
Mechanical View 1



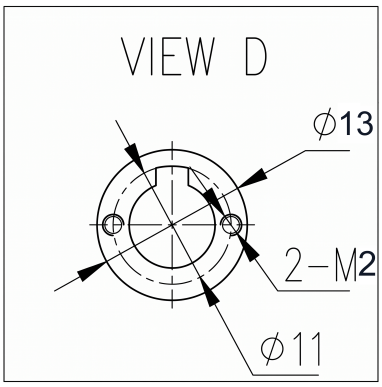
Mechanical View 2



Mechanical View 3



Mechanical View 4



Mechanical View 5

VIEW	FIELD	VALUE
Mechanical View 1	Overall length	36 mm
	Inner length	34 mm
	Right section length	7 mm
	Thread specification	0-50x2
	Left horizontal offset	4.5 mm
	Center section length	12 mm
	Left vertical offset	0.5 mm
	Inner hole diameter	Φ31.5 mm
	Center hole diameter	Φ8 mm
	Middle section outer diameter	Φ55 mm
	Maximum outer diameter	Φ73 mm
	Left shaft diameter	Φ56 h7
	Left shaft shoulder height	31.5 mm
	Right hole diameter	Φ22 mm
	Right shaft diameter	Φ38 h7
	Center section height tolerance	10 0/-0.1
	Small hole diameter	Φ1 mm
	Thread specification	0-29x0.5
	Reference label	WAVE GENERATOR-A
	Bottom length	21.4 mm
	Wave Generator-A related dimension	8.5±0.2 mm (WAVE GENERATOR-A)
	Wave Generator-B related dimension	10.5±0.2 mm (WAVE GENERATOR-B)
	Wave Generator-A related dimension	4.1 mm (WAVE GENERATOR-A)
	Wave Generator-B related dimension	2.1 mm (WAVE GENERATOR-B)
	Letter label D	D
	Datum T	Datum T
	Upper Step Axial Width	4 mm
	Left-Side Axial Length	9.4 mm
	Middle Axial Face Distance	2 mm
Mechanical View 2	Width designation W	W, value not specified in this crop
	Six diameter 4.5 holes	6 × Φ4.5
	Six M4 threaded holes	6 × M4
	Diameter 65	Φ65
	Two M3 threaded holes	2 × M3
	Diameter 18 hole	Φ18
	U designation	U, value not specified in this crop
Mechanical View 3	Mounting threaded hole quantity and size	6 × M4 threaded holes
	Mounting hole pitch circle diameter	PCD Φ23

VIEW	FIELD	VALUE
Mechanical View 4	Mounting hole thread specification	2× M2.5 threaded holes
	Mounting hole thread specification	2× M2.5 threaded holes depth 5mm
	Hole diameter	Φ1 mm
	Axial dimension	2 mm
	Overall height with tolerance	12 mm (+0/-0.1)
	Angular position	90°
	Outer Diameter	Ø14 mm
	Datum T	Datum T
	Slot Width W	W
	Hole Position Parameter U	U
	Angular Position	45°
	Local axial dimension	Local axial dimension 4 mm
Mechanical View 5	View label	View D
	Hole diameter	Diameter 13 mm
	Threaded hole quantity and size	2 × M2 threaded holes
	Hole diameter	Diameter 11 mm

Housing and Input Interface Dimensions

Housing Size: 14 **Reduction Ratio:** 50 **Weight:** 0.25 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	5.4	N·m
Allowable Average Torque	6.9	
Start/Stop Peak Torque	18	
Instantaneous Maximum Torque	35	
Maximum Input Speed	8500	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	5.4 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	6.9 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	18 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	35 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	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-S21-F14-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.