ENGINEERING DOCUMENTATION

High-Torque Hat Component Set

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S04-F20-R80	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

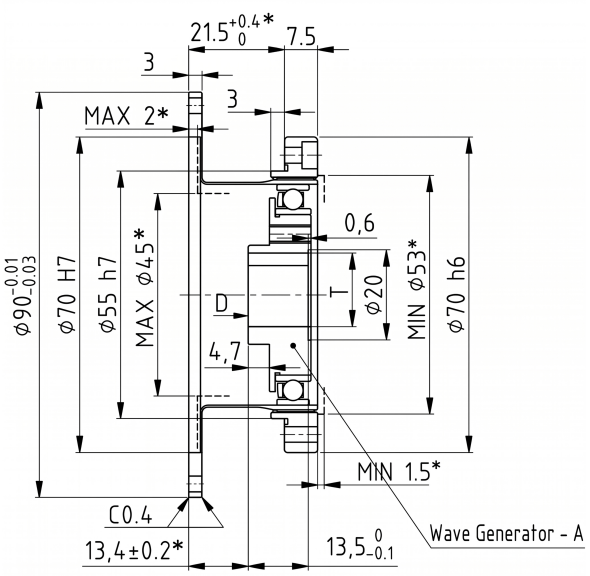
High-Torque Hat Component Set for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S04-F20-R80.

Key Integration Facts

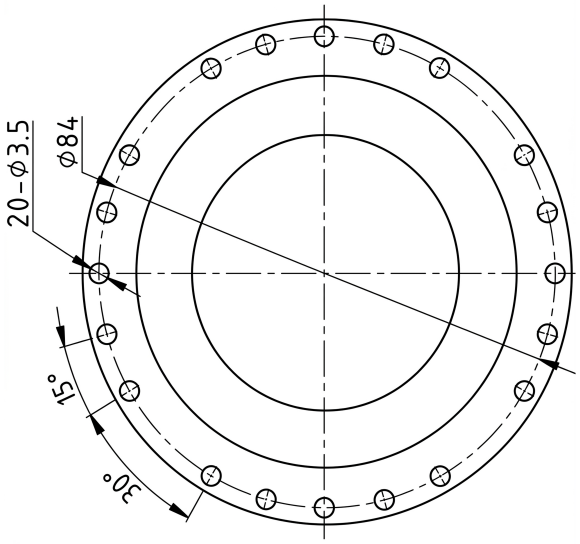
INTEGRATION ITEM	VALUE
Rated Torque	44 N·m
Instantaneous Maximum Torque	165 N·m
Start/Stop Peak Torque	96 N·m
Backlash	≤20 arc sec
Reduction Ratio	80
Maximum Input Speed	6500 r/min
Frame Size	20
Weight	0.27 kg

Product Structure & Views

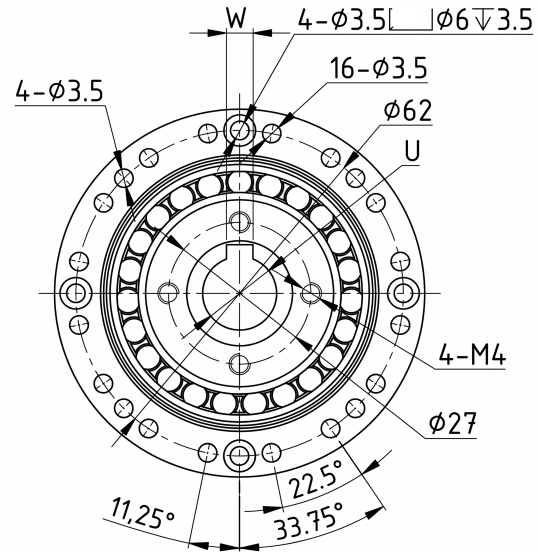
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



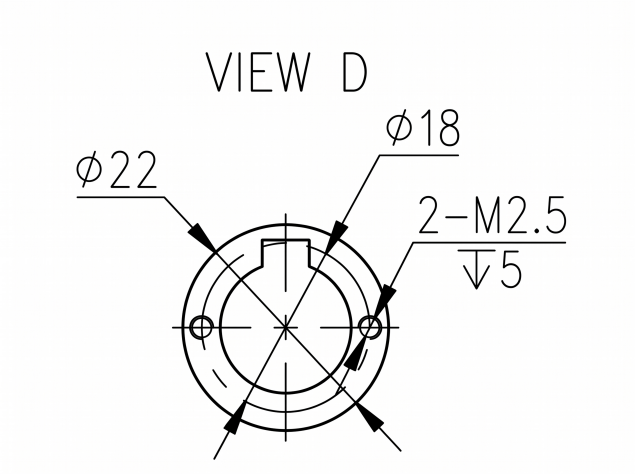
Mechanical View 1



Mechanical View 2



Mechanical View 3



Mechanical View 4

VIEW	FIELD	VALUE
Mechanical View 1	Mounting face width	21.5 +0.4/0 mm
	Boss length	7.5 mm
	Step depth	3 mm
	Boss height	3 mm
	Maximum boss height	MAX 2 mm
	Mounting hole diameter	ϕ90 -0.01/-0.03 mm
	Fit bore diameter	ϕ70 H7
	Output shaft diameter	ϕ55 h7
	Maximum shaft end diameter	MAX ϕ45 mm
	Radial runout	0.6 mm
	Center hole diameter	ϕ20 mm
	Minimum outer diameter	MIN ϕ53 mm
	Mating shaft diameter	ϕ70 h6
	Datum D	Datum D
	Feature dimension	4.7 mm
	Minimum mounting depth	MIN 1.5 mm
	Chamfer	C0.4 mm
	Mounting thickness	13.4±0.2 mm
	Wave generator reference	Wave Generator-A
	Axial Installation Dimension	13.4 ± 0.2*
	Mounting Height	13.5 0/-0.1 mm
	Datum T	Datum T
	Chamfer dimension	C0.4
Mechanical View 2	Outer diameter	Diameter 84 mm
	Quantity and diameter of mounting holes	20 holes, diameter 3.5 mm
	Hole angular spacing	15 degrees
	Hole angular spacing	30 degrees
Mechanical View 3	Width dimension W	W, value not specified in crop
	4 holes or slots diameter 3.5 with L designation	4 × ϕ3.5 L
	ϕ6 counterbore/countersink depth 3.5	ϕ6, depth 3.5
	16 holes diameter 3.5	16 × ϕ3.5
	4 holes diameter 3.5	4 × ϕ3.5
	Diameter 62 circle or outside diameter	ϕ62
	Dimension U	U, value not specified in crop
	4 M4 threaded holes	4 × M4
	Diameter 27 circle or feature diameter	ϕ27
	Angular spacing 22.5 degrees	22.5°
	Angular spacing 11.25 degrees	11.25°
	Angular spacing 33.75 degrees	33.75°
Mechanical View 4	View identifier	View D

VIEW	FIELD	VALUE
Diameter 18 circular feature	Diameter 18 mm	
Diameter 22 circular feature	Diameter 22 mm	
Two M2.5 threaded mounting holes with depth	2x M2.5 threaded holes, depth 5 mm	

Housing and Input Interface Dimensions

Housing Size: 20 **Reduction Ratio:** 80 **Weight:** 0.27 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	44	N·m
Allowable Average Torque	61	
Start/Stop Peak Torque	96	
Instantaneous Maximum Torque	165	
Maximum Input Speed	6500	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	44 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	61 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	96 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	165 N·m	Short-duration shock boundary only; do not use as a normal operating point.
Maximum Input Speed	6500 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-F20-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.