ENGINEERING DOCUMENTATION

Simple High-Torque Hollow Shaft Gear Unit

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S18-F20-R160	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

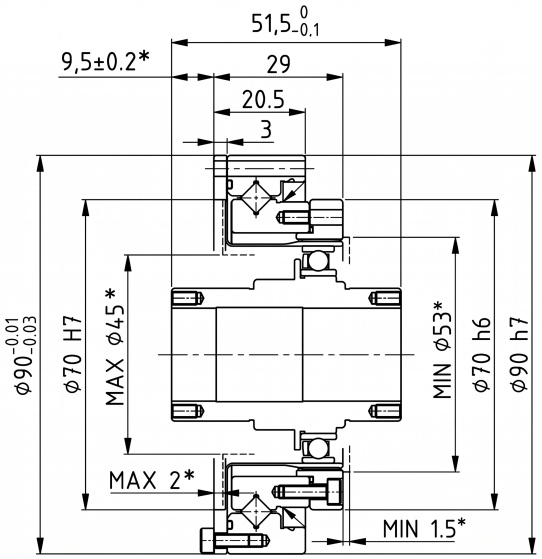
Simple High-Torque Hollow Shaft Gear Unit for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S18-F20-R160.

Key Integration Facts

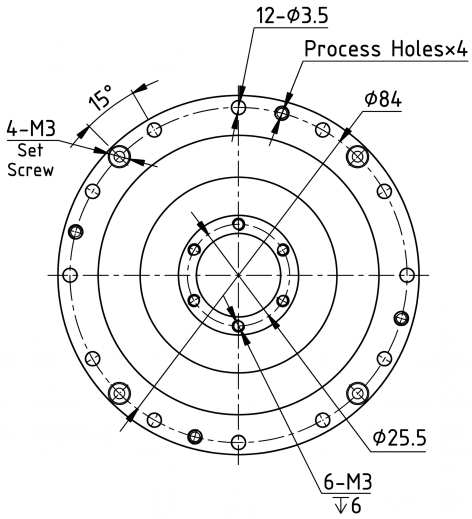
INTEGRATION ITEM	VALUE
Rated Torque	52 N·m
Instantaneous Maximum Torque	191 N·m
Start/Stop Peak Torque	120 N·m
Backlash	≤20 arc sec
Reduction Ratio	160
Maximum Input Speed	6500 r/min
Frame Size	20
Weight	0.82 kg

Product Structure & Views

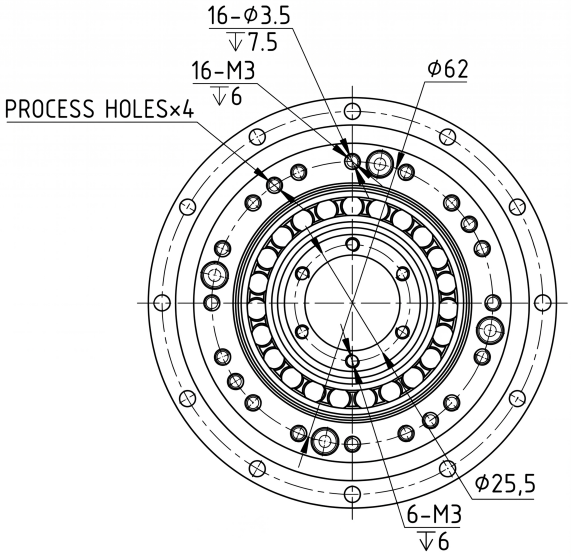
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



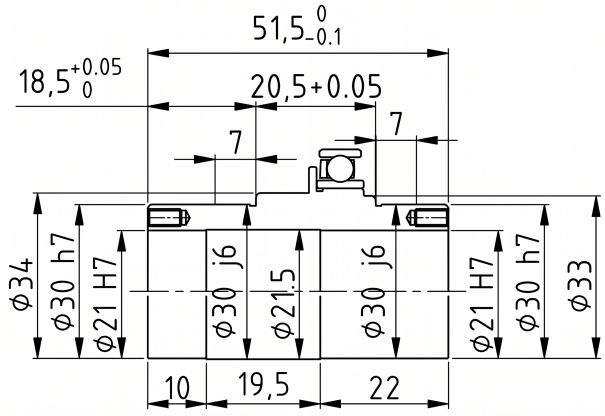
Mechanical View 1



Mechanical View 2



Mechanical View 3



Mechanical View 4

VIEW	FIELD	VALUE
Mechanical View 1	Upper overall width	51.5 +0/-0.1
	Upper-left horizontal offset	9.5 ±0.2, marked with asterisk
	Upper horizontal distance	29
	Local horizontal distance	20.5
	Small step distance	3
	Left-side diameter limit	Diameter 45, marked with asterisk
	Right-side diameter limit	Diameter 53, marked with asterisk
	Outer diameter with tolerance	Diameter 90 +0.01/-0.03
	Hole diameter fit	Diameter 70 H7
	Maximum diameter limit	Maximum diameter 45
	Shaft diameter fit	Diameter 90 h7
	Shaft diameter fit	Diameter 70 h6
	Maximum clearance	Maximum 2, marked with asterisk
	Minimum clearance	Minimum 1.5, marked with asterisk
Mechanical View 2	12 holes diameter 3.5	12 × Ø3.5 holes
	Process holes quantity	Process holes ×4
	Outer diameter	Ø84
	4 M3 set screw holes	4 × M3 set screw holes
	Pitch circle diameter	Ø25.5 pitch circle or feature diameter
	6 M3 threaded holes	6 × M3 threaded holes
	Machining symbol associated with 6-M3 callout	6
	Hole Angular Position	15°
Mechanical View 3	Sixteen hole diameter	16 holes, diameter 3.5
	Sixteen hole depth or counterbore depth	Depth/countersink-style value 7.5 for associated 16- Ø3.5 holes
	Sixteen M3 threaded holes	16 threaded holes, M3
	Sixteen M3 threaded hole depth	Depth/countersink-style value 6 for associated 16-M3 holes
	Process hole quantity note	Process holes x4
	Mounting hole pitch circle diameter	Diameter 62
	Central interface diameter	Diameter 25.5
	Six M3 threaded holes	6 threaded holes, M3
	Six M3 threaded hole depth	Depth/countersink-style value 6 for associated 6-M3 holes

VIEW	FIELD	VALUE
Mechanical View 4	Overall length	51.5 +0/-0.1
	Left step length	18.5 +0.05/0
	Middle step length	20.5 +0.05
	Local axial distance	7
	Local height or offset	7
	Hole diameter fit	21 H7
	Hole diameter fit	Diameter 21 H7
	Hole diameter	Diameter 21.5
	Left outside diameter	Diameter 34
	Right outside diameter	Diameter 33
	Bottom left segment length	10 mm
	Bottom center segment length	19.5 mm
	Bottom right segment length	22 mm
	Right shaft diameter h7	⌀30 h7
	Left shaft diameter h7	⌀30 h7
	Center shaft diameter j6	⌀30 j6
	Right shaft diameter j6	⌀30 j6

Overall Dimensions and Input Interface

PARAMETER	VALUE	UNIT
Frame Size	20	
Reduction Ratio	160	
Weight	0.82	kg

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	52	N·m
Allowable Average Torque	64	
Start/Stop Peak Torque	120	
Instantaneous Maximum Torque	191	
Starting Torque	3.6	
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	52 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	64 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	120 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	191 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
Angle Transmission Accuracy	1	arcmin
Hysteresis Loss		
Torsional Rigidity K1	1.6	×10⁴N·m/rad
Torsional Rigidity K2	2.5	
Torsional Rigidity K3	2.9	
Torsional Rigidity T1	7	N·m
Torsional Rigidity T2	25	

- 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-S18-F20-R160 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.