ENGINEERING DOCUMENTATION

Simple High-Torque Hollow Shaft Gear Unit

Dimensional & Integration Guide

DOCUMENT	REVISION / ISSUE	STATUS
DIG-ES-HG-S18-F25-R160	DRAFT-08 / 28 Aug 2026	Engineering Integration Reference

Integration Overview

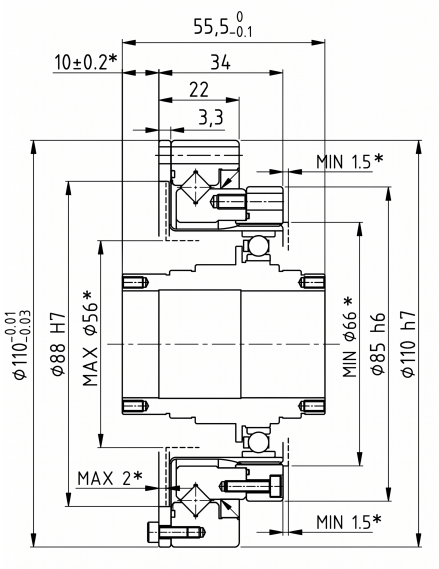
Simple High-Torque Hollow Shaft Gear Unit for compact, coaxial, high-ratio rotary-axis integration. This guide supports interface planning, mounting alignment, duty validation, torsional behavior, lubrication, sealing and commissioning for ES-HG-S18-F25-R160.

Key Integration Facts

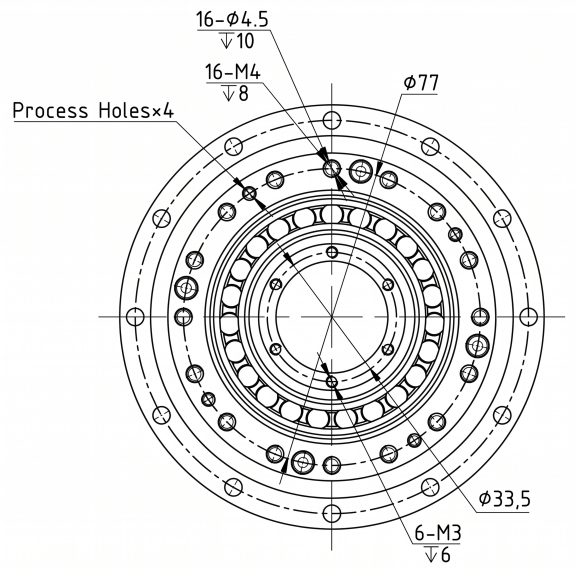
INTEGRATION ITEM	VALUE
Rated Torque	87 N·m
Instantaneous Maximum Torque	408 N·m
Start/Stop Peak Torque	229 N·m
Backlash	≤20 arc sec
Reduction Ratio	160
Maximum Input Speed	5600 r/min
Frame Size	25
Weight	1.4 kg

Product Structure & Views

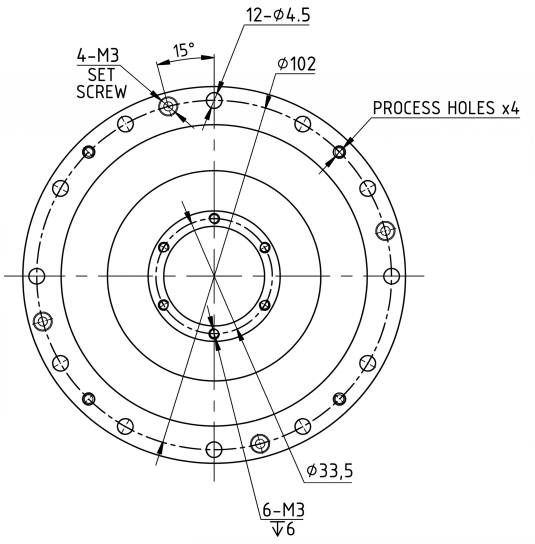
These views present the selected product structure, mounting interfaces and relevant integration geometry for this SKU.



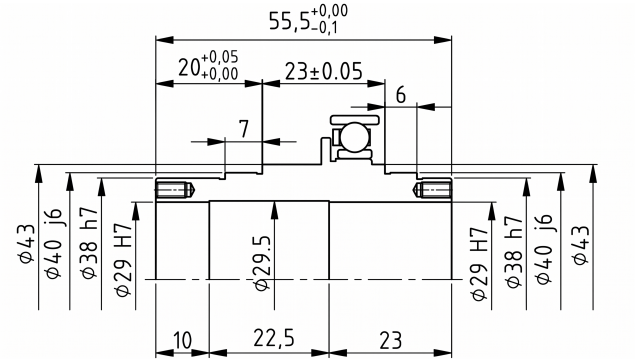
Mechanical View 1



Mechanical View 2



Mechanical View 3



Mechanical View 4

VIEW	FIELD	VALUE
Mechanical View 1	Overall width or mounting length	55.5 +0/-0.1
	Horizontal mounting spacing	34
	Position dimension	10 ±0.2
	Local horizontal spacing	22
	Small clearance or step dimension	3.3
	Minimum clearance	Minimum 1.5
	Height dimension	56 with asterisk note
	Diameter with unilateral tolerance	Diameter 110 -0.01/-0.03
	H7 bore diameter	Diameter 88 H7
	Minimum diameter clearance	Minimum diameter 66
	h6 shaft diameter	Diameter 85 h6
	h7 shaft diameter	Diameter 110 h7
	Maximum clearance	Maximum 2 with asterisk note
	Minimum clearance	Minimum 1.5 with asterisk note
Mechanical View 2	Through hole quantity and diameter	16 holes, diameter 4.5 mm
	Hole depth	Depth 10 mm
	Threaded hole quantity and thread size	16 threaded holes, M4
	Threaded hole depth	Depth 8 mm
	Process hole quantity	Process holes, quantity 4
	Pitch circle diameter	Diameter 77 mm
	Hole pattern pitch circle diameter	Diameter 33.5 mm
	M3 Tapped Holes	6-M3 6
Mechanical View 3	Outer bolt hole quantity and diameter	12 holes, diameter 4.5
	Angular spacing between holes	15 degrees
	Set screw threaded holes	4 M3 set screw holes
	Outer hole pitch circle diameter	Diameter 102
	Process hole quantity	Process holes, quantity 4
	Inner hole pitch circle diameter	Diameter 33.5
	Inner M3 threaded holes and depth	6 M3 threaded holes, depth 6

VIEW	FIELD	VALUE
Mechanical View 4	Overall length	55.5 +0.00/-0.10
	Left segment length	20 +0.05/+0.00
	Right segment length	23 ±0.05
	Local spacing	7
	Local spacing	6
	Left fit diameter	Diameter 38 h7
	Left bore fit diameter	Diameter 29 H7
	Right bore fit diameter	Diameter 29 H7
	Right fit diameter	Diameter 38 h7
	Right outside diameter	Diameter 43
	Left outside diameter	Diameter 43
	Intermediate diameter	29.5
	Bottom left segment length	10 mm
	Bottom center segment length	22.5 mm
	Bottom right segment length	23 mm
	Outer Fit Diameter	Ø40 j6
	Right Outer Fit Diameter	Ø40 j6

Overall Dimensions and Input Interface

PARAMETER	VALUE	UNIT
Frame Size	25	
Reduction Ratio	160	
Weight	1.4	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	87	N·m
Allowable Average Torque	140	
Start/Stop Peak Torque	229	
Instantaneous Maximum Torque	408	
Starting Torque	6.9	
Maximum Input Speed	5600	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	87 N·m	Use as the selected continuous output rating under validated duty and thermal conditions.
Allowable Average Torque	140 N·m	Calculate the actual time-weighted output torque over the complete cycle.
Start/Stop Peak Torque	229 N·m	Transient start/stop boundary; include acceleration and deceleration events.
Instantaneous Maximum Torque	408 N·m	Short-duration shock boundary only; do not use as a normal operating point.
Maximum Input Speed	5600 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	3.1	×10⁴N·m/rad
Torsional Rigidity K2	5	
Torsional Rigidity K3	5.7	
Torsional Rigidity T1	14	N·m
Torsional Rigidity T2	48	

- 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-F25-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.