

## PRODUCT DATASHEET

# ES-HG-S08-F20-R160

## Precision Transmission Component

Hat Harmonic Gearboxes | High-Torque Hat Unit Type II

### Product Overview

Precision Transmission Component with rated Torque 52 N·m, instantaneous Maximum Torque 191 N·m and start/Stop Peak Torque 120 N·m.

### Key Specifications

| PARAMETER                    | VALUE | UNIT    |
|------------------------------|-------|---------|
| Rated Torque                 | 52    | N·m     |
| Instantaneous Maximum Torque | 191   | N·m     |
| Start/Stop Peak Torque       | 120   | N·m     |
| Reduction Ratio              | 160   |         |
| Maximum Input Speed          | 6500  | r/min   |
| Allowable Average Torque     | 64    | N·m     |
| Backlash                     | ≤20   | arc sec |
| Frame Size                   | 20    |         |
| Weight                       | 0.72  | kg      |

## Technical Specifications

| PARAMETER                     | SPECIFICATION                    | UNIT    | NOTES                                                                                           |
|-------------------------------|----------------------------------|---------|-------------------------------------------------------------------------------------------------|
| <b>PERFORMANCE</b>            |                                  |         |                                                                                                 |
| Rated Torque                  | 52                               | Nm      | Frame Size: 20; Reduction Ratio: 160; Size: 20                                                  |
| Instantaneous Maximum Torque  | 191                              | Nm      | Frame Size: 20; Reduction Ratio: 160; Size: 20                                                  |
| Start/Stop Peak Torque        | 120                              | Nm      | Frame Size: 20; Reduction Ratio: 160; Size: 20                                                  |
| Backlash                      | ≤20                              | arc sec | Reduction Ratio: 160; Size: 20; Frame Size: 20                                                  |
| Allowable Average Torque      | 64                               | Nm      | Frame Size: 20; Reduction Ratio: 160; Size: 20                                                  |
| Starting Torque               | 3.6 / 0.036                      | Nm      | Frame Size: 20; Reduction Ratio: 160; Size: 20 / Reduction Ratio: 160; Size: 20; Frame Size: 20 |
| Angular Transmission Accuracy | 1                                | arcmin  | Frame Size: 20; Reduction Ratio: 160; Reduction Ratio Min: 50; Size: 20                         |
| Hysteresis Loss               | 1                                | arcmin  | Frame Size: 20; Reduction Ratio: 160; Reduction Ratio Min: 50; Size: 20                         |
| <b>MECHANICAL</b>             |                                  |         |                                                                                                 |
| Frame Size                    | 20                               |         | Frame Size: 20; Reduction Ratio: 160; Size: 20                                                  |
| Weight                        | 0.72                             | kg      | Frame Size: 20; Reduction Ratio: 160                                                            |
| Wave Generator Dimension T    | 9.4+0.10 / 16.3+0.10 / 12.8+0.10 | mm      | Varies by published configuration.                                                              |
| Wave Generator Bore U         | φ14H7 / φ11H7 / φ8H7             |         | Varies by published configuration.                                                              |
| Wave Generator Keyway W       | 5JS9/P9 / 4JS9/P9 / 3JS9/P9      |         | Varies by published configuration.                                                              |

## Technical Specifications

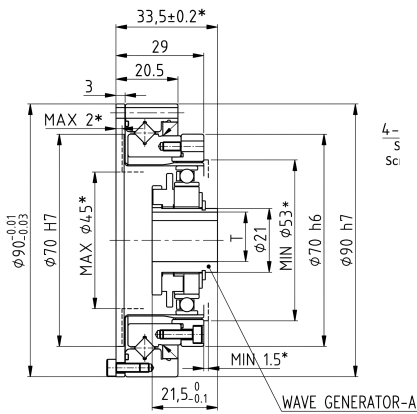
| PARAMETER                 | SPECIFICATION                                  | UNIT                    | NOTES                                                                   |
|---------------------------|------------------------------------------------|-------------------------|-------------------------------------------------------------------------|
| RELIABILITY               |                                                |                         |                                                                         |
| Design Life               | 15000                                          | h                       | Frame Size: 20; Reduction Ratio: 160; Size: 20                          |
| ADDITIONAL SPECIFICATIONS |                                                |                         |                                                                         |
| Reduction Ratio           | 160                                            |                         | Frame Size: 20; Reduction Ratio: 160; Size: 20                          |
| Maximum Input Speed       | 6500                                           | r/min                   | Frame Size: 20; Reduction Ratio: 160; Size: 20                          |
| Average Input Speed       | 3500                                           | r/min                   | Frame Size: 20; Reduction Ratio: 160; Size: 20                          |
| Wave Generator T          | $12.8^{+0.1}_0 / 16.3^{+0.1}_0 / 9.4^{+0.1}_0$ | mm                      | Varies by published configuration.                                      |
| Wave Generator U          | $\phi 11H7 / \phi 14H7 / \phi 8H7$             |                         | Varies by published configuration.                                      |
| Wave Generator W          | 3JS9/P9 / 4JS9/P9 / 5JS9/P9                    |                         | Varies by published configuration.                                      |
| Torsional Rigidity K2     | 2.5                                            | $\times 10^4$<br>Nm/rad | Frame Size: 20; Reduction Ratio: 160; Reduction Ratio Min: 50; Size: 20 |
| Torsional Rigidity K1     | 1.6                                            | $\times 10^4$<br>Nm/rad | Frame Size: 20; Reduction Ratio: 160; Reduction Ratio Min: 50; Size: 20 |
| Torsional Rigidity K3     | 2.9                                            | $\times 10^4$<br>Nm/rad | Frame Size: 20; Reduction Ratio: 160; Reduction Ratio Min: 50; Size: 20 |
| Torsional Rigidity T2     | 25                                             | Nm                      | Frame Size: 20; Reduction Ratio: 160; Reduction Ratio Min: 50; Size: 20 |
| Torsional Rigidity T1     | 7                                              | Nm                      | Frame Size: 20; Reduction Ratio: 160; Reduction Ratio Min: 50; Size: 20 |

## Dimensional & Integration Overview

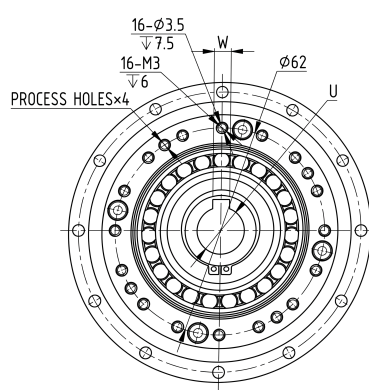
### Mechanical Overview

| PARAMETER                  | VALUE                            | UNIT |
|----------------------------|----------------------------------|------|
| Frame Size                 | 20                               |      |
| Weight                     | 0.72                             | kg   |
| Wave Generator Dimension T | 9.4+0.10 / 16.3+0.10 / 12.8+0.10 | mm   |
| Wave Generator Bore U      | φ14H7 / φ11H7 / φ8H7             |      |
| Wave Generator Keyway W    | 5JS9/P9 / 4JS9/P9 / 3JS9/P9      |      |

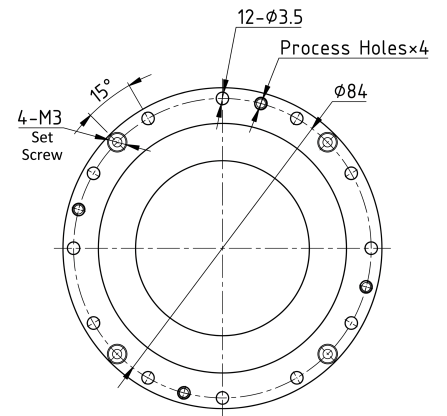
### Dimensional Drawings



Mechanical View 1



Mechanical View 2



Mechanical View 3

## 2D Drawing Dimensions & Callouts

| VIEW              | FIELD                                   | VALUE                                                            |
|-------------------|-----------------------------------------|------------------------------------------------------------------|
| Mechanical View 1 | Upper overall length                    | 33.5 ±0.2                                                        |
|                   | Upper step length                       | 29                                                               |
|                   | Upper inner length                      | 20.5                                                             |
|                   | Left small step length                  | 3                                                                |
|                   | Maximum clearance or protrusion         | MAX 2                                                            |
|                   | Maximum shaft or clearance diameter     | MAX diameter 45                                                  |
|                   | Minimum shaft or clearance diameter     | MIN diameter 53                                                  |
|                   | Outer diameter tolerance                | diameter 90 with upper deviation -0.01 and lower deviation -0.03 |
|                   | Bore fit diameter                       | diameter 70 H7                                                   |
|                   | Shaft fit diameter                      | diameter 70 h6                                                   |
|                   | Shaft outer fit diameter                | diameter 90 h7                                                   |
|                   | Inner diameter                          | diameter 21                                                      |
|                   | Minimum end clearance                   | MIN 1.5                                                          |
|                   | Bottom length with unilateral tolerance | 21.5 +0/-0.1                                                     |

## 2D Drawing Dimensions & Callouts

| VIEW              | FIELD                        | VALUE                            |
|-------------------|------------------------------|----------------------------------|
| Mechanical View 2 | Sixteen diameter 3.5 holes   | 16 holes, diameter 3.5           |
|                   | Depth for diameter 3.5 holes | Depth 7.5                        |
|                   | Sixteen M3 threaded holes    | 16 M3 threaded holes             |
|                   | Depth for M3 threaded holes  | Depth 6                          |
|                   | Diameter 62 circular feature | Diameter 62                      |
|                   | W dimension label            | Value not specified in this crop |
|                   | U interface label            | Label U, value not specified     |
|                   | Process holes, four places   | Process holes ×4                 |
| Mechanical View 3 | Twelve holes diameter 3.5    | 12 × Ø3.5 holes                  |
|                   | Process holes quantity       | 4 process holes                  |
|                   | Diameter 84 dimension        | Ø84                              |
|                   | M3 set screws                | 4 × M3 set screws                |

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**01** Specifications are subject to change without notice. Verify the current product configuration before final design release.

**02** 2D drawings, CAD files and integration documentation are controlled documents and are supplied separately on request.