# Modular 2DoF joints

Product specification

**Modular joints for robots**

The modular 2DoF joints are industrial electrical motors that include precised encoders and an electro-mechanical breaking system for safety purposes. The Modular Joints natively speak ROS 2 and interoperate seamlessly with other ROS 2 based robot parts, regardless of their original manufacturer. Moreover, thanks to the H-ROS robot bus, they provide time synchronization capabilities and other deterministic communications enabled by TSN standards.

Available manufacturers: HAN'S ROBOT

## Electrical characteristics

| | |
|---|---|
| Power input | 48 Vdc, 50-60Hz. |
| Nominal power consumption | <200W |
| Communications interface | IEEE 802.3 Gigabit Ethernet |
| Electrical connector | H-ROS connector A (docs) |
| Topology | Daisy-chained modules, fully distributed |

## Software characteristics

| | |
|---|---|
| Operating System | System Embedded real-time Linux |
| Robotics framework | ROS 2 Dashing Diademata |
| Communication middleware | Data Distribution Service (DDS) |
| Information model | Hardware Robot Information Model (HRIM), version 0.3.0, Coliza (docs) |
| Communication interface | 1 Gbps Ethernet<br>Compliant with TSN standards: 802.1 ASrev/AS, IEEE 1588, 802.1Qbv, 802.1Qci, 802.1CB, 802.1-Qcc. |
| Security (module-level) | - Dedicated crypto chip (tamper resistance, cryptographic key storage, SHA-256 Hash Algorithm with HMAC, ECDSA sign-verify authentication.<br>- Secure communications (SROS2, IPSec, TLS).<br>- File System encryption IEEE-1735-2014 Version 2<br>- Secure unique ID storage in cryptochip.<br>- Audited security through continuous penetration tests. |
| Simulation | Gazebo |
| Automatic updates | Over-the-Air (OTA) |

Release date: 14.05.2019

## Han's Robot modular joints

HAN'S ROBOT



| | T9.4 | T30 | T49 |
|---|---|---|---|
| Original | 14 series | 17 series | 20 series |
| Rated torque [Nm] | 9.4 | 30 | 49 |
| Peak torque [Nm] | 34 | 69 | 104 |
| Max. speed [°/s] | 118 | 118 | 90 |
| Rotation angle [°] | +/- 360° | +/- 360° | +/- 360° |
| Repeatability [arcsec] | 20 | 20 | 0.01 |
| Main material | Al | Al | Al |
| Weight [kg] | 2.8 | 3.8 | 5.8 |
| Sesing<br>**thanks to the H-ROS SoM* | Position<br>Velocity<br>Effort<br>Inertial position<br>Voltage<br>Power consumption<br>Lifecicle<br>Acceleration | | |

## Product Identification

Parts are numbered as ***Modular2DoFJoint-F-T-S***, where ***F*** corresponds with the original manufacturer, ***T*** is the rated torque and ***S*** is the serial number of that particular part.

**Modular2DoFJoint-F-T-S**
general identifier

| Characteristic | Value | Description | Identifier |
|---|---|---|---|
| Manufacturer (F) | Hans robot | D-modules | *H* |
| Torque rating (T) | 9.4 Nm | - | *X9.4* |
| | 30 Nm | - | *X30* |
| | 49 Nm | - | *X49* |
| Serial number (S) | - | Unique identifier | - |

Exemplary part numbers:

- **Modular2DoFJoint-H-X30-1232X3:** Module originally from Han's Robot with torque of 30 Nm and with serial number 1232X3.

To obtain more information, please contact Acutronic Robotics' sales representatives at *contact@acutronicrobotics.com*

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