

Key Features

- ▶ Kinova Ready
- ▶ No external wiring
- ▶ Ingress protection
- ▶ Developer Friendly
- ▶ Robotiq gripper compatible
- ▶ High Precision Low Noise

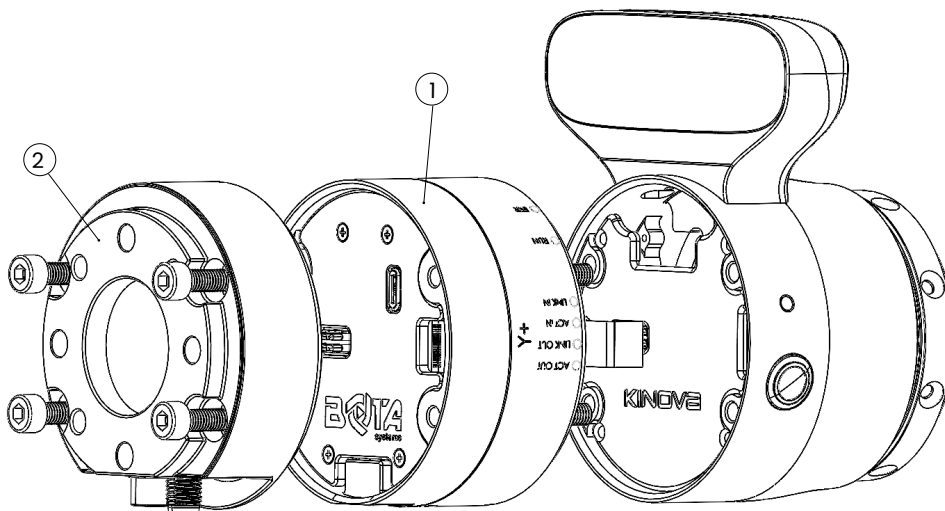


Configurations

The Kinova Sensor is offered in various kit configurations tailored to different needs. Each kit includes a predefined set of components, all of which are also available for individual purchase. Customers may order these components separately as spare parts or create a custom configuration as required. The kits and spare parts are available for purchase also in our store.

Ordering number	Description
KIT-FTS-KG32	6-axis force torque sensor kit for Kinova Gen3 robot, compatible with Robotiq gripper
KIT-FTS-KG32-ISO	6-axis force torque sensor kit for Kinova Gen3 robot, with ISO 50 end effector adapter

List of components



#	Component	Description	Included in configuration
1	BFT-KG32-IND2-SW	Kinova Gen3 6-axis F/T Sensor	All Configurations
2	ACC-KIN-GEN3	ISO 50 adapter for Kinova Gen3	KIT-FTS-KG32-ISO

Technical Specifications

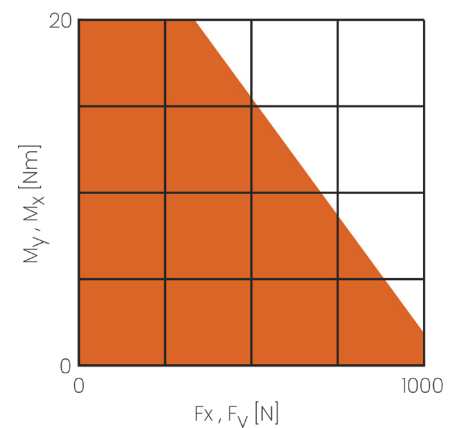
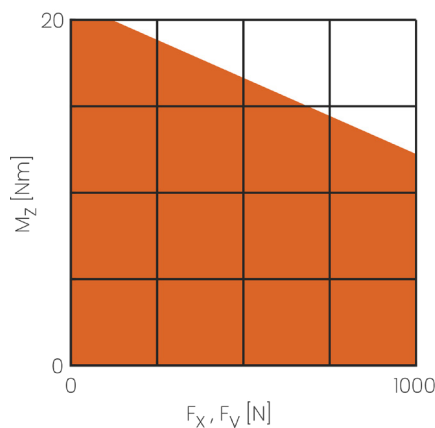
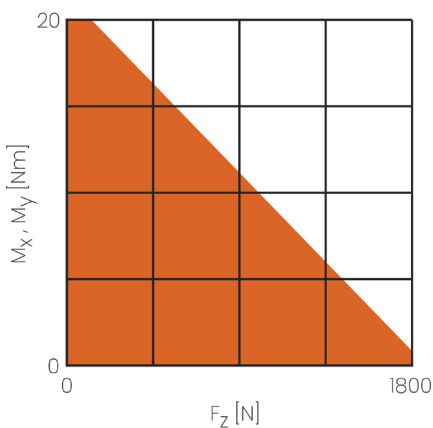
Please refer to the table for all sensor specifications. For additional information, feel free to consult our team of engineers at info@botasys.com.

	F_x	F_y	F_z	M_x	M_y	M_z
Range	1000 N	1000 N	1800 N	20 Nm	20 Nm	20 Nm
Overload limit*	2800 N	2800 N	7500 N	80 Nm	80 Nm	140 Nm
NFR**	0.15 N	0.15 N	0.15 N	0.008 Nm	0.008 Nm	0.001 Nm
Size (D x H)	75 mm x 40,8 mm					
Maximum sampling rate	3800 Hz					
IMU	6 DoF IMU					
Acceleration	±16g					
Gyroscope	±2000°/sec					
Power supply	5 – 60 V, 1,5 W					
Ingress protection	IP66					
Operating temperature	0°C – 55°C					
Communication	Ethernet***, (UART)					
Protocol	Bota protocol family, Modbus					

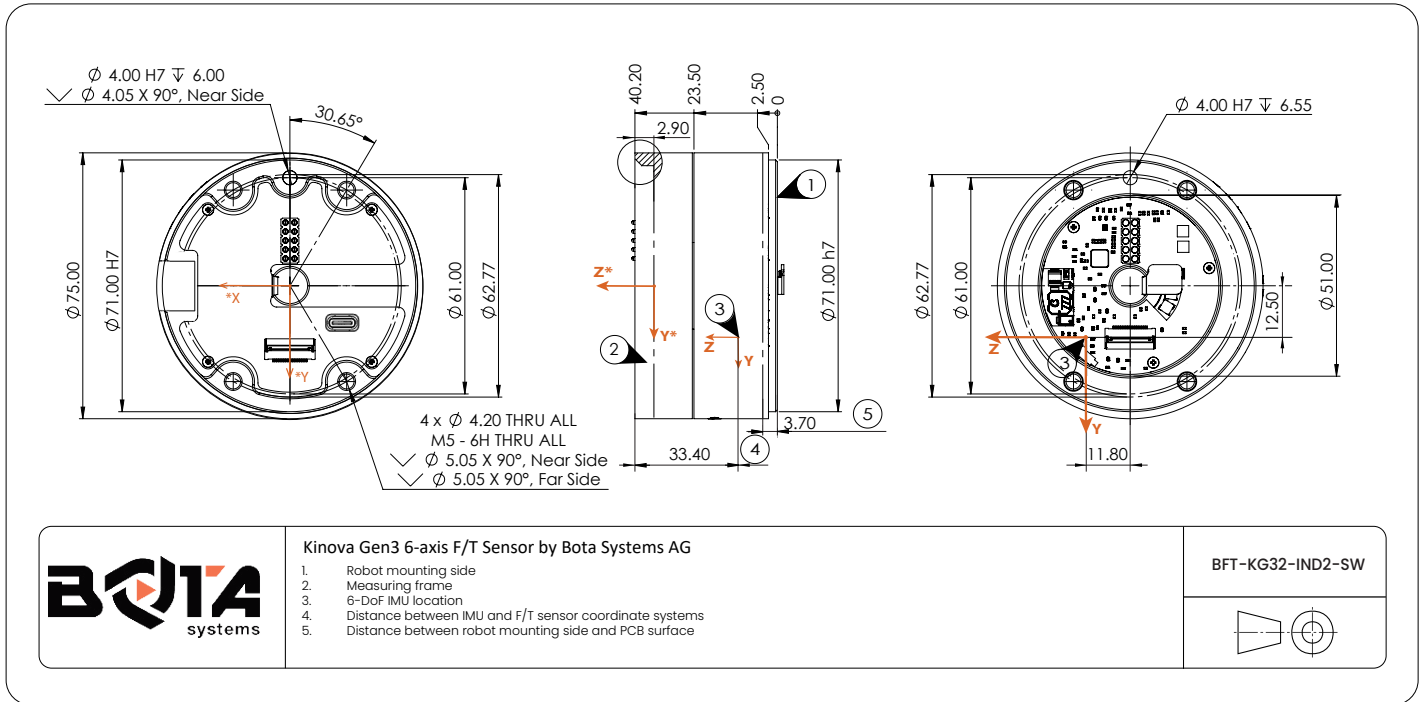
- * Overload limit values are simulated using FEA methods. Real-life results may deviate from simulation results.
- ** NFR (noise-free resolution) refers to (6σ) peak-to-peak noise distribution of sensor signal at 100 Hz.
- *** The sensor connects to the Ethernet port of the tool expansion module and includes an integrated Ethernet switch, enabling passthrough connectivity for user-designed tools.

Combined Loading Graphs

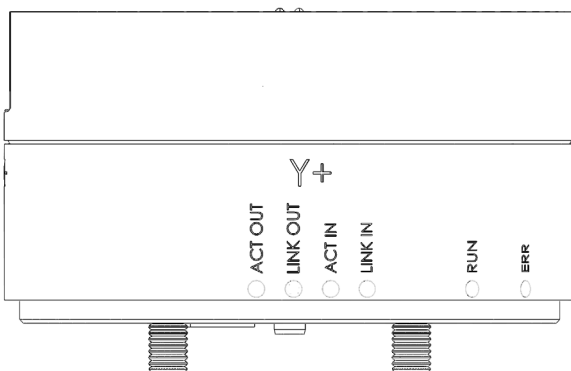
During single-axis loading, the sensor can operate up to its normal range. Above the sensor's normal range, the readings become inaccurate. The sensor should not work outside of its normal operating range. When more than one axis is loaded, it becomes a combined loading, and the range of the sensor reduces. The following graphs represent the combined loading scenarios, and the **orange area** represents the sensor's normal operating range.



Mechanical Dimensions

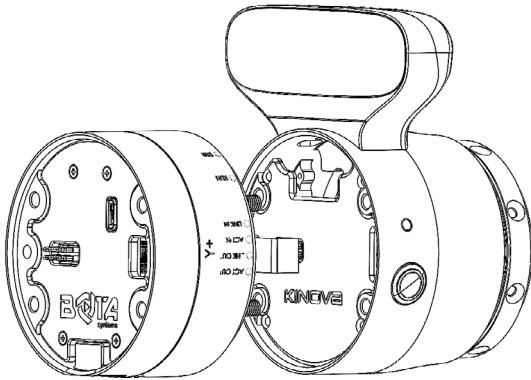


LEDs Indicators



- ACT OUT: Indicates Ethernet activity on the Tool END → Yellow
- LINK OUT: Indicates Ethernet link on the Tool END → Green
- ACT IN: Indicates Ethernet activity on the sensor → Yellow
- LINK IN: Indicates Ethernet link on the sensor → Green
- RUN: Shows the systems operational state → Green
- ERR: Shows the systems operational errors → Red

Robot Connection



The sensor connects with the robot via the 20-pin tool expansion connector of the robot using the provided ribbon cable. By default, it connects to the robot's ethernet network (VLAN 20) and provides the same connections as the tool expansion module of the robot. It features an integrated Ethernet switch so that user-developed tools can utilize ethernet connectivity.

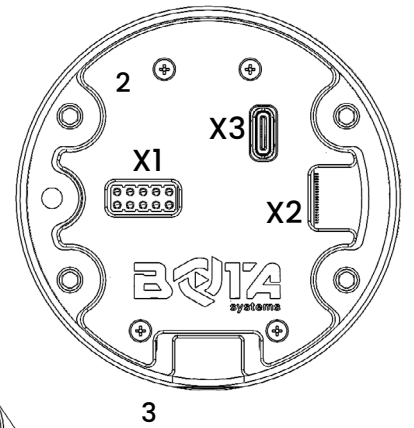
The user needs to enable the ethernet communication of the robot and the sensor will appear in the network with IP address 20.10.0.201. Additionally, the sensor connects to the 10-pin spring contacts (X1) for plug-and-play connection of the Robotiq gripper.

If the sensor is not accessible or a different IP is required, use a USB-C cable connected to the (X3) connector and configure the sensor's IP using the online [config tool](#) from the communication tab.

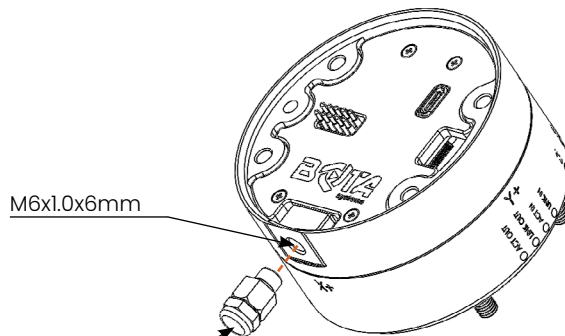
Tool Connection

The sensor repeats the robot flange connections, so it is directly compatible with all Kinova Gen3 tools including the gripper and Bota systems' ISO50 adapter. The sensor repeats the 10-pin spring contacts (X1) for plug-and-play connection of the Robotiq gripper.

Additionally below the plastic cover the 20-pin connector (X2) is repeating the robot's expansion module signals. The Kinova Web app or the API of the robot can be used for this purpose, refer to Kinova Gen3 User guide to enable and control these signals. On the table below the pinout of the X2 can be found.



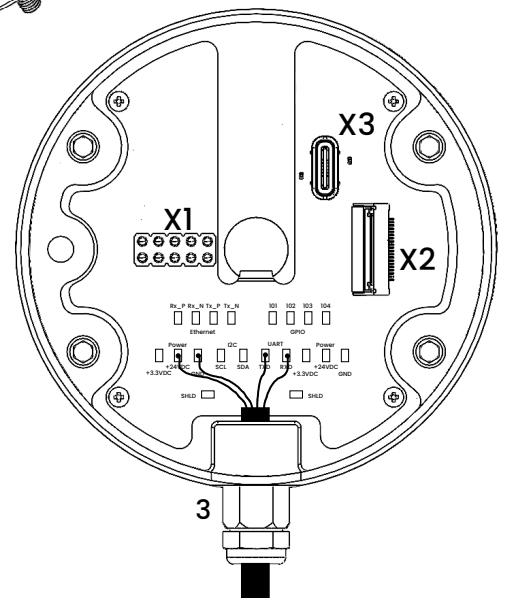
X2 Kinova interface module expansion			
P1	GPIO1	P11	GND
P2	GPIO2	P12	Ethernet TX -
P3	GPIO3	P13	Ethernet TX +
P4	GPIO4	P14	GND
P5	I2C SDA	P15	Ethernet RX -
P6	I2C SCL	P16	Ethernet RX +
P7	GND	P17	GND
P8	UART RXD	P18	GND
P9	UART TXD	P19	+24 VDC
P10	+3.3V 0.1A max	P20	+24 VDC



LAPP PN: 52001860
SKINDICHT MINI M6X1 NBR
Customer Supplied

Additionally to the X2 connector, the sensor provides, all signals as solder pads for fast and flexible customization. The user can connect directly tools using the UART, I2C, Ethernet or GPIOs of the robot.

To gain access to the solder pads the plastic cover (2) of the sensor has to be removed. In case the connections cannot be wired to the tool internally, a side cable opening (3) is available to route the cable externally. By removing the cover screw, an M6 cable gland can be attached to connect external devices without losing the IP66 protection.



Recommendation: Lapp M6x1 NBR SKINDICHT PN: 52001860

For more information, please refer to the [user manual](#).

Crosstalk

Crosstalk in multi-axis force-torque sensors refers to the measurements in other axes when the sensor is excited only in a single axis. Crosstalk is reported as the percentile deviation from reference with respect to the full scale of that axis. Bota Systems provides a crosstalk certificate for your sensor tested according to [ISO 21612:2021](#) standard upon request. An exemplary crosstalk table is provided below as a reference.

Affected axis	F_x	F_y	F_z	M_x	M_y	M_z
F_x (%)	-	0.00	0.05	0.02	1.17	0.18
F_y (%)	0.01	-	0.07	1.40	0.12	2.08
F_z (%)	0.08	0.03	-	1.66	0.32	0.01
M_x (%)	0.03	0.67	0.09	-	0.03	0.13
M_y (%)	0.13	0.36	0.22	0.85	-	0.07
M_z (%)	0.23	0.06	0.03	0.67	0.68	-

Signal Noise

Signal noise is any unwanted modification that may arise during capture, storage, transmission, processing, or conversion of a communication signal. The upper limits for the standard deviation of noise distribution are reported in the following tables.

Sampling rate	Component	In Kit	F_x	F_y	F_z	M_x	M_y	M_z
100 Hz	BFT-KG3-IND2-SW	All configurations	25 mN	25 mN	25 mN	1.33 mNm	1.33 mNm	0.16 mNm

Software

Bota Systems offers a complete software suite for rapid integration. C++ and Python drivers are available for seamless integration into existing codebases or systems. A ROS 2 driver is also provided, built on the ROS 2 control framework for quick deployment. This driver includes both the robot interface and pre-configured settings for the sensor.

By default, the sensor is configured as an Ethernet device with the IP address 20.10.0.201, designed to connect via the robot's tool expansion module. To enable network communication, Ethernet must be activated for the end effector through Kinova's web application or the Kortex API. Once enabled, the sensor can communicate using the provided software tools.

For additional interfaces such as GPIO, UART, or I²C, please refer to the robot's user guide. UART connectivity with the sensor can also be configured upon request.

