

Key Features

- ▶ Plug & Play
- ▶ All-in-One design
- ▶ Dust and water resistant
- ▶ Negligible temperature drift
- ▶ Up to 2000 Hz sampling rate
- ▶ ISO 9409-1-50-4-M6 mounting
- ▶ Compatible with ROS®, TwinCAT®, LabVIEW®, MATLAB®, Python®
- ▶ Support for Kinova®, Staubli®, UR+®, KUKA®, and more



Configurations

Ordering number	Description
BFT-SENS-SER-M8	T 15 SensONE 6-axis F/T sensor with Serial interface
BFT-DENS-SER-M8	T 5 high sensitivity SensONE 6-axis F/T sensor with Serial interface
BFT-SENS-ECAT-M8	T 15 SensONE 6-axis F/T sensor with EtherCAT interface
BFT-DENS-ECAT-M8	T 5 high sensitivity SensONE 6-axis F/T sensor with EtherCAT interface

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	BFT-SENS	500 N	500 N	1200 N	15 Nm	15 Nm	12 Nm
	BFT-DENS	400 N	400 N	500 N	5 Nm	5 Nm	8 Nm
Overload limit*	BFT-SENS	2500 N	2500 N	4500 N	35 Nm	35 Nm	40 Nm
	BFT-DENS	1000 N	1000 N	2000 N	12 Nm	12 Nm	15 Nm
Serial NFR**	BFT-SENS-SER	350 mN	350 mN	250 mN	7.2 mNm	7.2 mNm	3.0 mNm
	BFT-DENS-SER	180 mN	180 mN	70 mN	3.0 mNm	3.0 mNm	1.2 mNm
EtherCAT NFR**	BFT-SENS-ECAT	200 mN	200 mN	150 mN	4.0 mNm	4.0 mNm	2.0 mNm
	BFT-DENS-ECAT	100 mN	100 mN	50 mN	2.0 mNm	2.0 mNm	0.6 mNm
Accuracy		<2.0%	<2.0%	<2.0%	<2.0%	<2.0%	<2.0%

Nonlinearity	<2.0%	<2.0%	<2.0%	<2.0%	<2.0%	<2.0%
Drift	<100 mN/h	<100 mN/h	<500 mN/h	<3 mNm/h	<3 mNm/h	<3 mNm/h
Size (D x H)	70 mm x 35 mm					
Ingress protection	Dust and water resistant					
Operating temperature	0°C – 55°C					
	Serial			EtherCAT		
Communication	USB, RS422			CANopen over EtherCAT		
Maximum sampling rate	800 Hz			2000 Hz		
IMU	-			6 DoF IMU		
Acceleration	-			±2g, 4g, 8g, 16g		
Gyroscope	-			±250°/sec, ±500°/sec, ±1000°/sec, ±2000°/sec		
Power supply	5 V, 1.0 W			9 – 48 V, 1.5 W		
Weight	230 grams			235 grams		

* Overload limit values are simulated using FEA methods. Real-life results may deviate from simulation results.

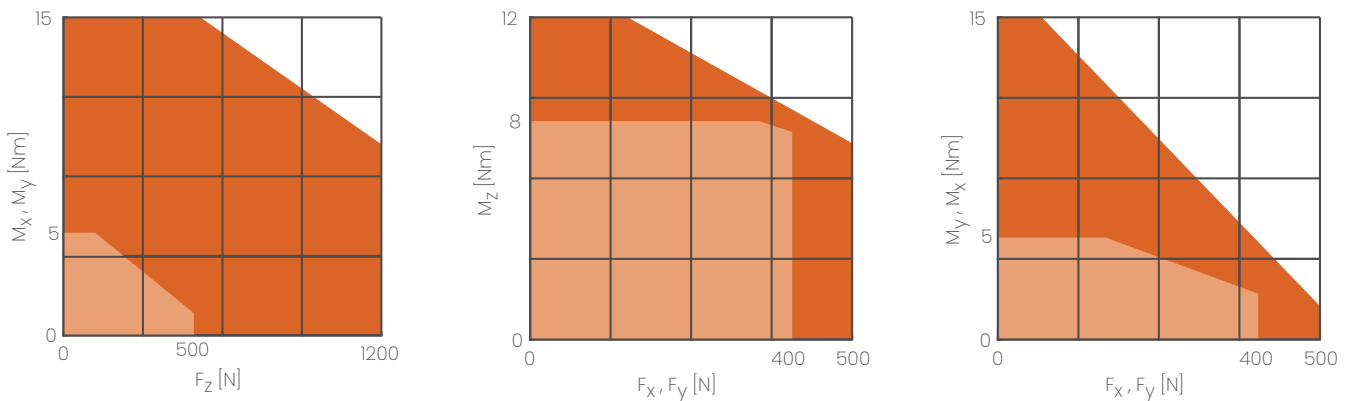
** NFR (noise-free resolution) refers to (6σ) peak-to-peak noise distribution of sensor signal at 100 Hz.

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.

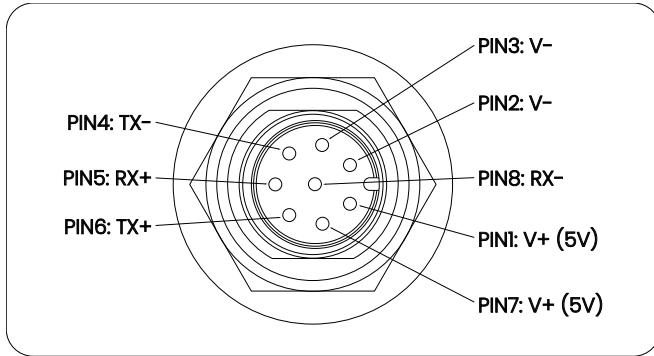


- SensONE 6-axis F/T sensor [BFT-SENS-XXX]
- High sensitivity DensONE 6-axis F/T sensor [BFT-DENS-XXX]

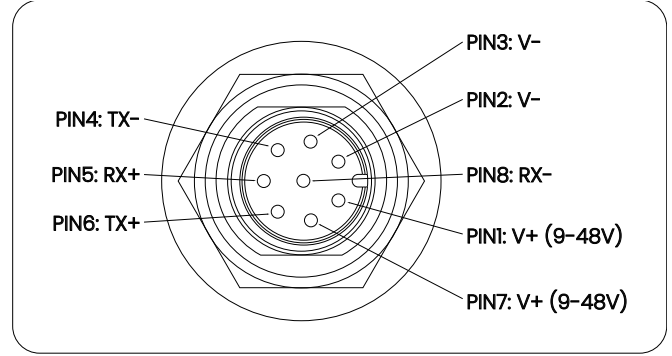
Connector Pinout

Serial	BFT-SENS-SER-M8
	BFT-DENS-SER-M8

EtherCAT	BFT-SENS-ECAT-M8
	BFT-DENS-ECAT-M8

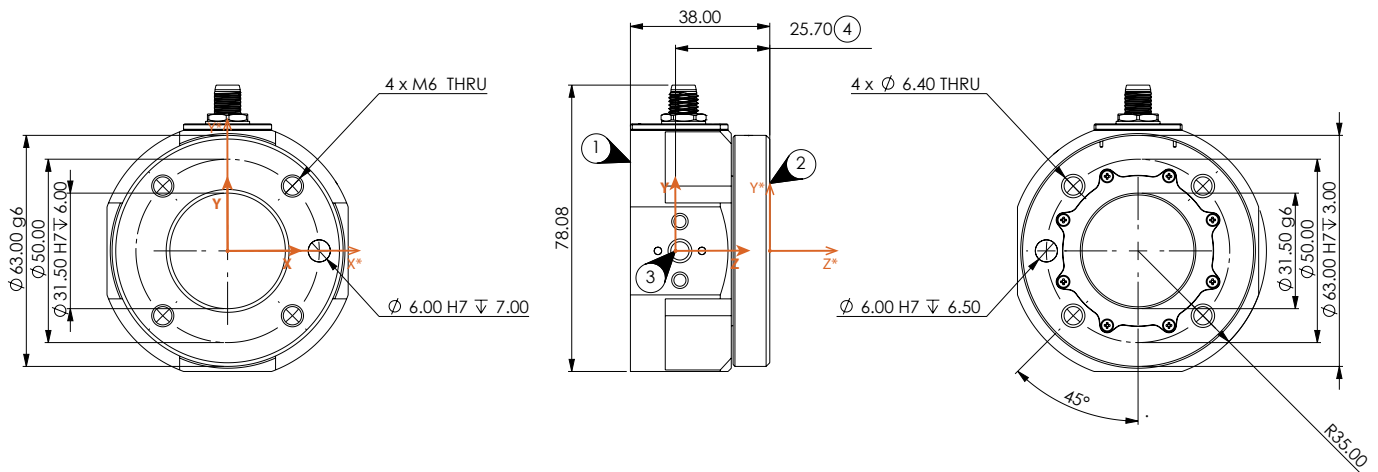


View from Top



View from Top

Mechanical Dimensions



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 peak-to-peak (6σ) noise distribution are reported in the following tables.

Sampling rate		F_x	F_y	F_z	M_x	M_y	M_z
100 Hz	BFT-SENS-SER-M8	55 mN	55 mN	40 mN	1.2 mNm	1.2 mNm	0.5 mNm
	BFT-SENS-ECAT-M8	26 mN	26 mN	20 mN	0.7 mNm	0.7 mNm	0.2 mNm
	BFT-DENS-SER-M8	30 mN	30 mN	15 mN	0.4 mNm	0.4 mNm	0.1 mNm
	BFT-DENS-ECAT-M8	15 mN	15 mN	8 mN	0.3 mNm	0.3 mNm	0.1 mNm
200 Hz	BFT-SENS-SER-M8	80 mN	80 mN	50 mN	1.5 mNm	1.5 mNm	0.5 mNm
	BFT-SENS-ECAT-M8	31 mN	31 mN	27 mN	0.7 mNm	0.7 mNm	0.2 mNm
	BFT-DENS-SER-M8	40 mN	40 mN	20 mN	0.6 mNm	0.6 mNm	0.2 mNm
	BFT-DENS-ECAT-M8	17 mN	17 mN	9 mN	0.3 mNm	0.3 mNm	0.1 mNm
400 Hz	BFT-SENS-SER-M8	110 mN	110 mN	85 mN	2.0 mNm	2.0 mNm	0.8 mNm
	BFT-SENS-ECAT-M8	43 mN	43 mN	35 mN	0.8 mNm	0.8 mNm	0.3 mNm
	BFT-DENS-SER-M8	50 mN	50 mN	25 mN	0.8 mNm	0.8 mNm	0.3 mNm
	BFT-DENS-ECAT-M8	23 mN	23 mN	11 mN	0.3 mNm	0.3 mNm	0.1 mNm
600 Hz	BFT-SENS-SER-M8	160 mN	160 mN	110 mN	3.0 mNm	3.0 mNm	1.1 mNm
	BFT-DENS-SER-M8	75 mN	75 mN	38 mN	1.2 mNm	1.2 mNm	0.5 mNm
800 Hz	BFT-SENS-ECAT-M8	61 mN	61 mN	48 mN	1.2 mNm	1.2 mNm	0.4 mNm
	BFT-DENS-ECAT-M8	30 mN	30 mN	15 mN	0.5 mNm	0.5 mNm	0.2 mNm
1000 Hz	BFT-SENS-ECAT-M8	65 mN	65 mN	54 mN	1.3 mNm	1.3 mNm	0.4 mNm
	BFT-DENS-ECAT-M8	32 mN	32 mN	16 mN	0.5 mNm	0.5 mNm	0.2 mNm

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