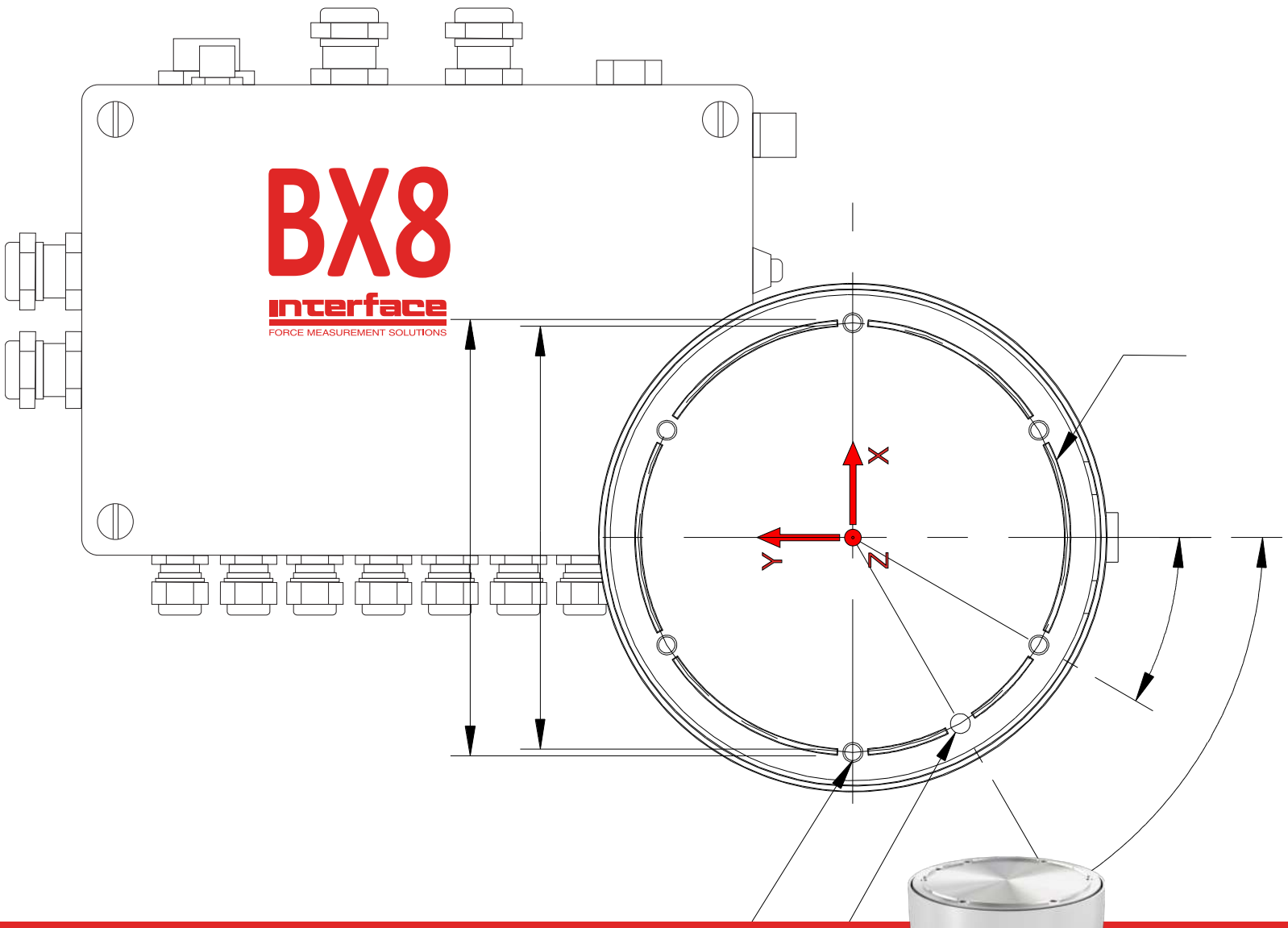
# BX8

8-Channel Data Acquisition System and Amplifier

# 6-Axis

6A Series 6-Axis Force and Torque Load Cell (Fx Fy Fz Mx My Mz)

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# BX8

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6A Series 6-Axis Force and Torque Load Cell (Fx Fy Fz Mx My Mz)

Interface has created the ideal 6-axis measurement system that combines powerful performance with reliability and can be operated by users of all experience levels. This solution has been successfully used in aerospace, automotive, industrial automation medical, product testing and more.


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# Introducing The Interface BX8/6-Axis Force & Torque Measurement System

A system comprised of Interface Models BX8 Data Acquisition Instrument and Model 6AXX 6-Axis Load Cell have been designed to streamline applications that require the measurement of 6 simultaneous axes and need the data captured and stored at a very fast rate. This solution is easy enough for the inexperienced user but powerful enough for the sophisticated test engineer.

**With this Interface product anyone can be up and measuring in minutes.**

The BX8 is ideally suited for use with 6-axis sensors requiring matrix math load calculations. The sensor's coefficient matrix can be loaded internally into the BX8 via the BlueDAQ software and the analog outputs are actively scaled according to the calculations. All channels are sampled simultaneously and fully synchronized. When the BX8 is purchased with a 6-axis sensor, the system can arrive pre-configured and ready to use.

## BX8-AS

- Industrial Enclosure
- M16, 24-pin Connector
- Alternate Connection through screw terminals
- 8 each scaled analog outputs

## BX8-HD15

- Lab Enclosure
- 8 each high density 15-pin DSub Connectors
- 8 each scaled analog outputs

## BX8-HD44

- Lab Enclosure
- 4 each high density 44-pin DSub Connectors
- 8 each scaled analog outputs

## 6-Axis

- Capacities available Force: 11.2 lbf to 22.5K lbf (50 N to 100K N).
  Torque: 8.85 lbf to 88.5K lbf (1 Nm to 10K Nm).
- Load in each axis is calculated as the cross-product between the output on each channel and the 36-term coefficient matrix.
- There is also a calculation to translate the calculated moments from the measurement origin to the point of application.

## BX8 Models Available

- BX8-AS
- BX8-HD15
- BX8-HD44

## 6-Axis Models Available

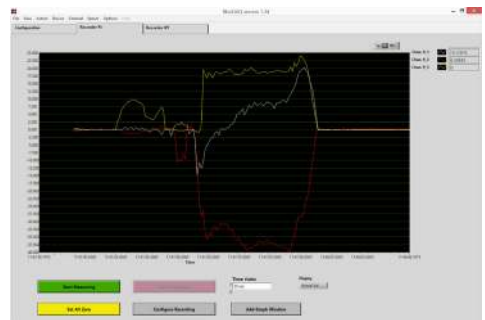
- 6A27
- 6A40
- 6A68
- 6A80
- 6A110
- 6A130
- 6A154
- 6A175
- 6A225

**BX8 6-Axis**

# The BX8/6-Axis System Consists Of The BX8, 6-Axis And BlueDAQ Software

The BX8 is the newest addition to Interface's family of measurement systems. Easy enough for the inexperienced user but powerful enough for the sophisticated test engineer, with the BX8 anyone can be up and measuring in minutes. Designed specifically for use with mV/V output sensors such as force, torque and pressure along with PT1000 thermocouples, and ±10V output sensors, the BX8 puts graphing, logging and display capabilities at a user's fingertips. The BX8 also includes 1/4 and 1/2 bridge completion for seamless integration of strain gage measurements. Eight independent, user configurable, 16-bit scalable analog outputs can be connected to external devices.

Interface's 6-Axis load cell measures forces simultaneously in 3 mutually perpendicular axes and 3 simultaneous torques about those same axis. Six full bridges provide mV/V output on 6 independent channels.



## BX8

- 8-Channel Synchronized Sampling
- 48K Samples/Sec/Channel
- 24-Bit Internal Resolution
- 16 digital Input/Outputs
- 8 scaled analog outputs

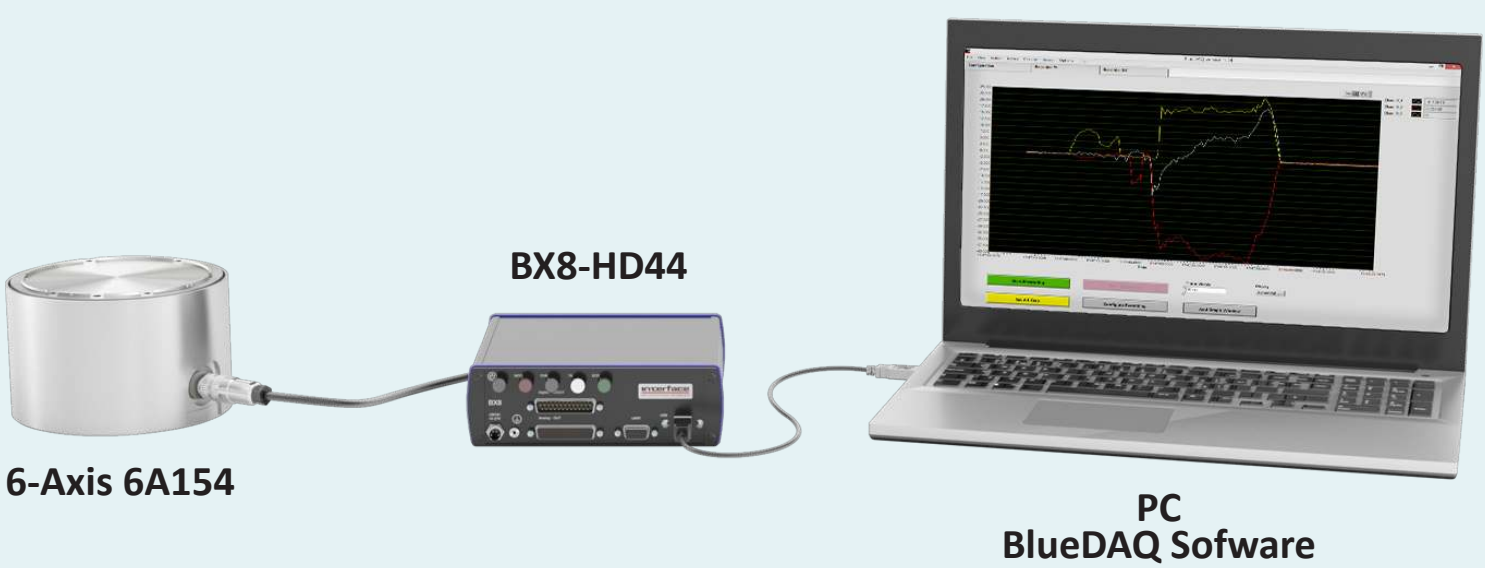
## 6-Axis

- Force and Torque in all 6 axes
- Compact Size
- Low Crosstalk
- Temperature Compensated

## BlueDAQ Software

- Scale Input/Output
- Graphing, logging, & display software
- Force and moment value calculation

## System Architecture




## Performance

| Model | BX8 (all models) |
|---|---|
| Accuracy Class - % | 0.05 |
| Nonlinearity - % range | +/- 0.02 |
| Sample Rate - per channel - samples/sec | 48,000 synchronous |
| Digital Output Data Rate - values/sec | 0.75 to 48,000 |
| Resolution - bit | 24 |
| Resolution - noise limited | > 100,000 parts @ 10/s data rate<br>> 20,000 parts @ 2000/s data rate<br>> 9,400 parts @ 12,000/s data rate |
| Signal Input Filter - (3dB) - Hz | 28, 850, 11.4k 1st order, switchable |
| Digital Onput Filter - (3dB) - Hz<br>Individually configurable for each channel | 0.18 to 15K includes high pass, low pass, band pass and band stop |

## Sensor Inputs

| Model | BX8 (all models) |
|---|---|
| Input Channels | 8 |
| Bridge Input Range - mV/V | 2.0, 3.5, or 7.0 |
| Bridge Input Impedance - MΩ - (pF) | > 20 (300) |
| Bridge Excitation Voltage - VDC | 8.75, 5, or 2.5 |
| Bridge Excitation Current - mA | 135 |
| Bridge Input Type - wire | 4 or 6 |
| Bridge Completion - Ω | ¼ and ½, 120, 350 or 1000 |
| CMMR - dB - DC - 100 Hz | >120, >100 |
| Analog Input Range - VDC | +/-10 |
| Analog Input Resistance - MΩ | 10 |
| PT1000 thermocouple - Ω | 1000 |

# Specifications

## Accuracy - (Max Error)

| Model | 6-Axis (all models) | BX8 (all models) |
|---|---|---|
| Nonlinearity – %FS | ± 0.1 | – |
| Hysteresis – %FS | ± 0.1 | – |
| Nonrepeatability – %RO | ± 0.5 | – |
| Creep, in 20 min – % | ± 0.1 | – |

## Temperature

| Model | | 6-Axis (all models) | BX8 (all models) |
|---|---|---|---|
| Effect on Zero – %RO / °C MAX | | ± 0.01 | – |
| Effect on Output – % / °C MAX | | ± 0.05 | – |
| Compensated Range | °C | -10 to +70* | -20 to +70 |
| | °F | +14 to +158* | -4 to +158 |
| Operating Range | °C | -10 to +85 | 0 to +50 |
| | °F | +14 to +185 | +32 to +122 |

* Temperature compensation not available on Models 6A27 and 6A40

## Electrical

| Model | 6-Axis (all models) | BX8 (all models) |
|---|---|---|
| Rated Output – mV/V (Nominal) | ±0.4 | – |
| Excitation Voltage – V MAX | 5 | – |
| Crosstalk – % | ±1 | – |
| Zero Balance – mV/V | < 2 | – |
| Input Resistance (6A27) – Ω | 1K ±10 | – |
| Output Resistance (6A27) – Ω | 1K ±10 | – |
| Input Resistance – Ω | 350 ±10 | – |
| Output Resistance – Ω | 350 ±10 | – |

## Power

| Model | 6-Axis (all models) | BX8 (all models) |
|---|---|---|
| Supply – VDC | - | 12-28 |
| Supply – Wat | - | < 12 |

## Mechanical

| Model | | 6-Axis (all models) | BX8 (all models) |
|---|---|---|---|
| Safe Overload – %CAP | | 150 | – |
| Ultimate Overload – %RO | | 300 | – |
| Protection Level | | – | IP67 |
| Connection Type | | – | 24-pin M16 |
| Cable Length | m | 5 | – |
| | ft | 16.4 | – |

## Analog Outputs

| Model | 6-Axis (all models) | BX8 (all models) |
|---|---|---|
| Outputs types – V – mA<br>Individually configurable for each channel | – | ±10, ±5, 0-5, 0-10, 4-20, 0-20 |
| Analog Output Scaling | – | Via software, active scaling capability |
| Analog Output Resolution – bit | – | 16 over scaled range |
| Analog Output Update Rate – Hz | – | Up to 48K |

## Digital Inputs/Outputs

| Model | 6-Axis (all models) | BX8 (all models) |
|---|---|---|
| DIOs | – | 16 configurable |
| AUSB - 8 channel packets – bit – / sec | – | 16 integer, 48K, raw data<br>24 integer, 24K, raw data<br>32 floating point, 9.6K, scaled data<br>6-axis sensor: 32 floating point, 6K scaled data |

## Dimensions

| Model | 6-Axis (all models) | BX8 (all models) |
|---|---|---|

* See data sheet for dimensions

# BX8 6-Axis

## Features & Benefits

**BX8 -**

- Internal Calculation of Axis Load Values for 6-Axis Sensors
- Active Scaling of Analog Outputs according to Internal Calculations
- ±5V, ±10V, 4-20mA, and 0-20 mA Outputs
- ZERO button for 8-channel simultaneous tare
- Galvanic isolation: Analog input, analog output, digital I/O, USB

**6-Axis -**

- Capacities: Force N(lbf) / Torque Nm(lbf-in) – 50(11.2)/1(8.85) to 500K(112K)/20K(177K)
- Force and moment values MUST be calculated using supplied 36-term coefficient matrix

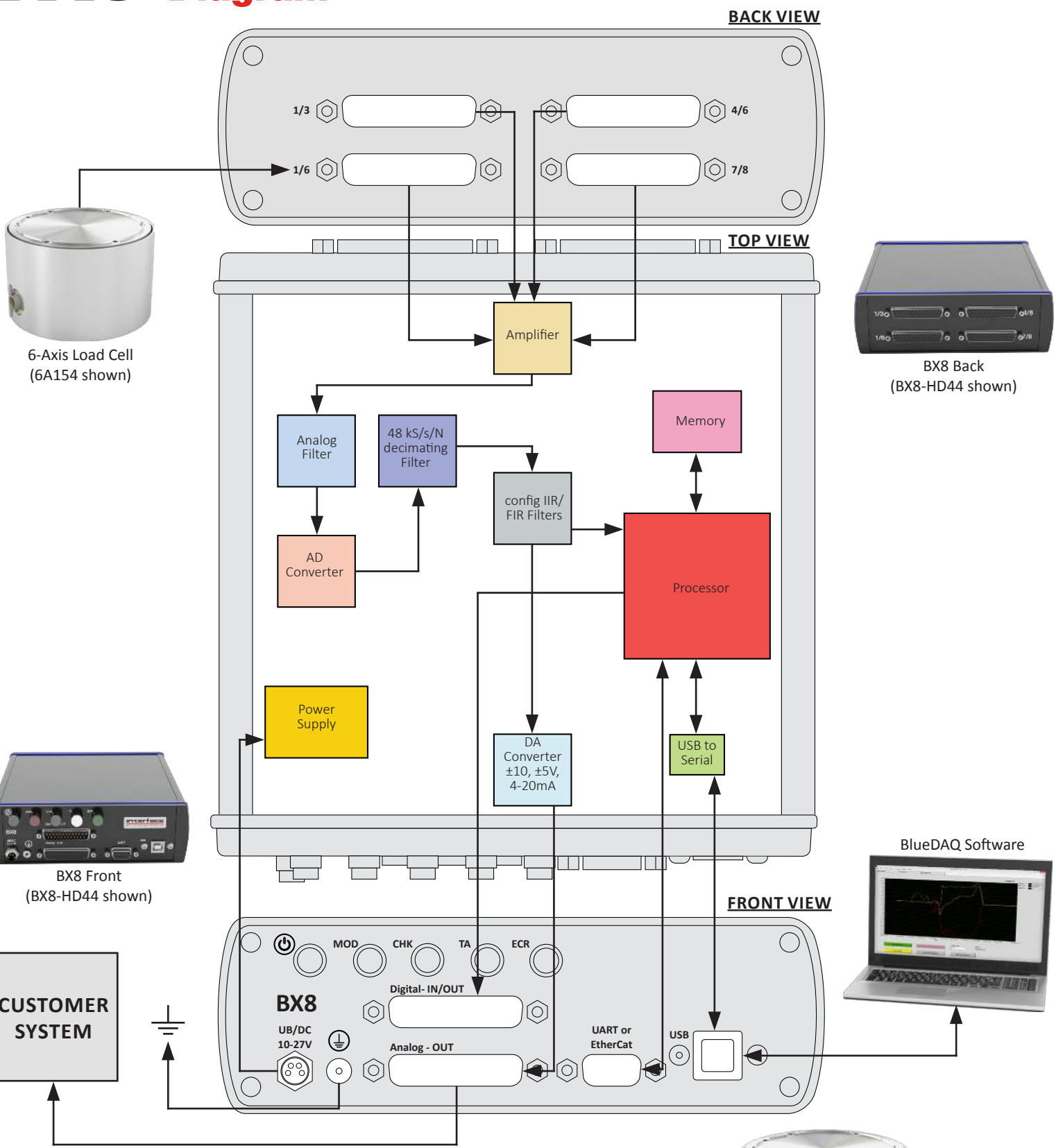
## Options

**BX8 -**

- EtherCat
- CANbus/CANopen

**To learn more about the Interface BX8/6-Axis Force & torque measurement system or other force measurement solutions call 480-948-5555.**

# BX8 Diagram




6-Axis Load Cell
(6A154 shown)



BX8 Back
(BX8-HD44 shown)



BX8 Front
(BX8-HD44 shown)

BlueDAQ Software



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# Calibration Matrices for Force/Torque Sensors

A lot of applications require that only one axis of a force/torque sensor is used from 50% to 100% of the nominal load, while the other axis of the sensor is used only up to 10% or even only up to 1% of the measuring range. Interface Inc. offers a special “Matrix-Plus” calibration procedure to ensure optimum accuracy even in these application-specific working points.

The tasks of the calibration matrix are:

a) Minimizing the measurement error in the loaded measuring axis and

b) Minimizing the crosstalk in the remaining (unloaded) 5 axes.

## Standard Calibration

In the case of low utilization of some measuring axes, the error can have a relatively strong effect in these measurement axes due to crosstalk, although it is significantly less than 1% based on 100% of the measuring range.

## Advanced Calibration “Matrix-Plus”

Interface Inc. has developed a new calibration method, which optimizes the display in the loaded measuring axis and in the unloaded measuring axes. The characteristic field of the 6-axis sensor is represented by two matrices. Matrix A describes the linear relationships, matrix B describes the non-linear relationships.

## Matrix Plus with “Standard Constraints”

Special conditions are defined in the determination of the matrices so that the measurement errors are minimized even at low forces and torques. Loads of 100%, 80%, 60%, 40% and 20% are mathematically optimized.

## Matrix-Plus with “Simulated Operating Point”

It is even possible to take the application (operating point) into account while determining the matrices: this process is called a “simulated operating point”. Thereby, accuracies of 1% to 0.2% of the actual value can usually be achieved. In addition to the actual calibration load 100%, the application-specific load vector is also taken into account mathematically.

## Matrix Plus with “Calibration in the Operating Point”

Alternatively, a calibration is also possible at the operating point of the application. Customer-specific calibration uses the actual loads and lever ratios of the customer-specific application. In one example, accuracies of 0.5% to 0.1% of the actual value can be achieved. Suitable devices may have to be produced for the calibration in order to display the special lever ratios of the application. This can result in additional costs and delivery times in individual cases.

**Interface is the world's trusted leader in technology, design and manufacturing of force measurement solutions. Our clients include a "who's who" of the aerospace, automotive and vehicle, medical device, energy, industrial manufacturing, test and measurement industries.**

Interface engineers around the world are empowered to create high-level tools and solutions that deliver consistent, high quality performance. These products include load cells, torque transducers, multi-axis sensors, wireless telemetry, instrumentation and calibration equipment.

Interface, Inc., was founded in 1968 and is a US-based, woman-owned technology manufacturing company headquartered in Scottsdale, Arizona.

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