

# AnomAlert\* Motor Anomaly Detector

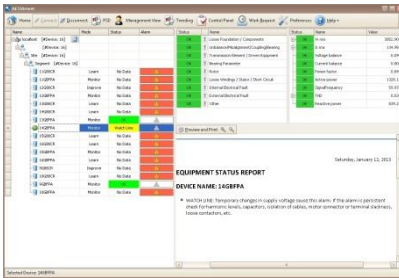
## Bently Nevada\* Asset Condition Monitoring

### Description

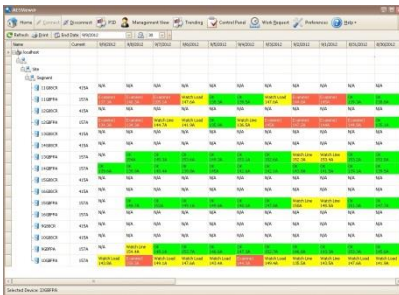


AnomAlert Motor Anomaly Detectors continuously identify existing and developing faults on electric motors and their driven equipment. AnomAlert utilizes an intelligent, model-based approach to provide anomaly detection by measuring the current and voltage signals from the electrical supply to the motor. It is permanently mounted, generally in the motor control center and is applicable to three phase AC, induction or synchronous, fixed or variable speed motors. Accompanying AnomAlert Software is used to view the data.

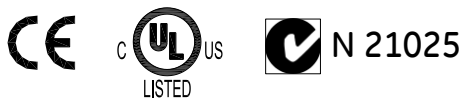
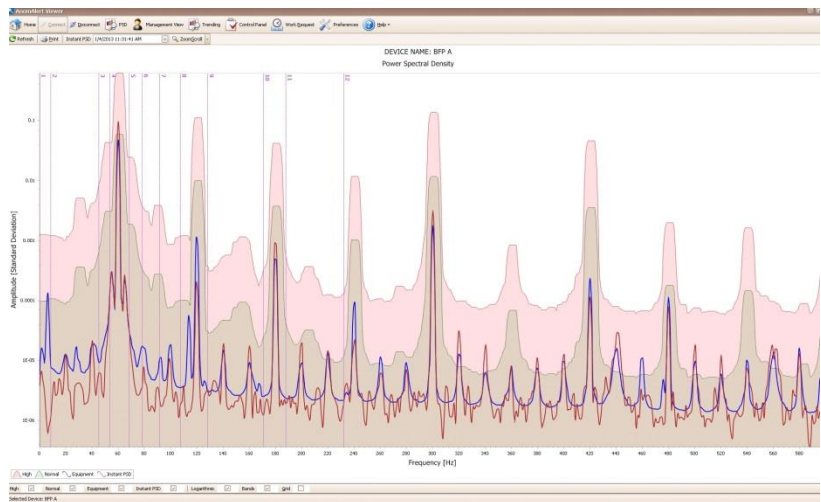
AnomAlert provides both mechanical (unbalance, misalignment, roller bearings, etc.) and electrical (loose windings, short circuits, etc.) anomaly detection as well as electrical parameters such as voltage and current imbalances and power factor. In addition, it can detect changes in the load the motor is experiencing due to anomalies in the driven equipment or process such as cavitations or plugged filters and screens. Since it doesn't require any sensor installation on the motor itself or associated load, AnomAlert is especially attractive for inaccessible driven equipment and is applicable to most types of pumps, compressors, and similar loads.



Each motor requires one AnomAlert and it can be configured entirely from the front panel. The AnomAlert Enterprise Software is necessary to obtain and display data in real-time from the device, to configure the performance of the device, and to save and subsequently retrieve data for display from its database. Networking protocols enable monitoring of motors and processes on remote machines using TCP/IP protocols over the Ethernet.



A System 1\* Software Extender is also available that enables adding motors and all their associated AnomAlert data to your overall machinery enterprise hierarchy. It offers viewing real-time data and generating sophisticated alerts and alarms and produces intelligent advisories that deliver Actionable Information to designated users.



Specifications and Ordering Information  
Part Number 286754-01  
Rev. K (07/15)

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## Specifications AnomAlert Hardware

### General Information

#### Motor Type

Three-phase, AC motors  
Fixed speed (line driven) or variable speed (inverter driven)  
If variable speed: inverter chopping frequency must be greater than 2 kHz; motor current load and speed should not vary by more than 15% during 6 sec intervals  
Not for use with soft-starter systems unless they are automatically bypassed immediately after motor start-up and during subsequent use

#### Operation Type

Continuous

#### Environmental

##### Operating Temperature

32 – 104° F (0 – 40° C)

##### Humidity

Up to 90% RH, non-condensing

#### Inputs

**Note:** Current and voltage transformers must meet local standards and regulations. For North America, transformers must be certified by an OSHA appointed NRTL to appropriate product safety standards such as UL or CSA.

#### Measurement Voltage Inputs

##### Voltage:

480 V<sub>rmsL-L</sub> / 277 V<sub>rmsL-N</sub>, max, CAT II

##### Impedance:

3.5 MΩ phase-to-phase

##### Frequency:

Varies by model number. Refer to Table 1.

*Low Voltage AnomAlert Models (≤480 Vac)*

Tap directly off voltage lines to motor

*Medium/High Voltage AnomAlert Models (>480Vac)*

Fixed speed or scalar controlled VFD: Three Potential Transformers (supplied by customer): 1% or better accuracy; 100 V, 110 V, or 120 V secondary voltages.

Vector controlled VFD: Voltage divider such that nominal input to AnomAlert is 100 V to 120 V.

#### Measurement Current Inputs

*Voltage, current, impedance:*

Varies by model number. Refer to Table 2

*Fixed Speed AnomAlert Models and 1A or 5A Variable Speed Models*

Three Current Transformers (supplied by customer): 1% or better accuracy, with either 5A or 1A secondary outputs depending on AnomAlert model selected.

*Variable Speed (Inverter Driven) AnomAlert Models*

3 Hall-effect Current Sensors (supplied by customer) with 50-400 mA secondary outputs; selection based on motor to be monitored and AA model chosen. Refer to Table 2.

Note: Hall-effect Current Sensors need external power sources, generally installed in the motor control panel, too.

**Power Input Required**

Use UL listed fuse with proper voltage rating:  
100-240 Vac (-15%, +10%), 47 – 64 Hz, 19 VA, 200 mA  
or  
120-300 Vdc, 19 VA, 200 mA

**Outputs****Alarms**

4 Alarm  
Parameters:

Line Change (unexpected change in incoming power)  
Load Change (unexpected change in process)  
Examine 1: plan maintenance  
Examine 2: perform maintenance

**Warnings**

Any measured or calculated parameter outside its expected range based on internal data base and learned mode.

**Relay**

One assignable relay output, user programmable; NC/NO contacts

**Communications**

RS422/485  
RS232 (with additional appropriate converter)  
Ethernet (with additional appropriate converter)

**Physical****Weight**

Line: 2.58 lb (1170 g)  
Inverter: 2.16 lb (980 g)

**Dimensions  
WxHxL**

3.78 in x 3.78 in x 5.51 in  
(96 mm x 96 mm x 140 mm)

**Mounting**

Front Panel Mounting (indoor)

**Protection Class**

Front Panel: IP 40  
Whole Unit: IP 20

**Indicators**

6 LEDs and LCD Readout

**Keypad**

6 tactile membrane keys

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**Compliance & Certifications****EMC:**

Europe:

EMC Directive 2004/108/EC

EN 61326-1: 2006  
Measurement Control and  
Laboratory Use for Industrial  
Environments

Australia/New Zealand:

C-tick

IEC 61326-1: 2005  
Measurement Control and  
Laboratory Use for Industrial  
Environments

**Electrical Safety:**

Europe:

Electrical Safety Directive 2006/95/EC

EN 61010-1 Safety  
Requirements for Electrical  
Equipment

North America:

UL Listed, Canada and US

UL 61010-1 Safety  
Requirements for Electrical  
Equipment

Australia/New Zealand:

C-Tick

IEC 61010-1 Safety  
Requirements for Electrical  
Equipment

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## Specifications AnomAlert Enterprise Software

AnomAlert Enterprise Software is a stand-alone system or serves as the gateway between AnomAlert units and System1. Simple configuration process covers set-up of system, devices, and connected machinery. Includes ability to change data presentation from English to Spanish, Portuguese, Russian or Turkish. Built-in OPC server provides all computed values and statuses and allows remote control of devices. Software DVD also includes step-by-step setup movies and manuals.

### System Features

#### AES

Artesis\*\* Enterprise Server

#### AAviewer

AnomAlert Display

#### Maximum Hardware Connections

Up to 200 AnomAlerts through serial and TCP/IP per computer (Refer to Figure 4)

10 AnomAlerts per serial or TCP/IP channel

Multiple AES instances can share a single SQL database and OPC server

100 AnomAlert units per System1

#### OPC Server

1 per system (on master AES instance)

#### Number of tags per AnomAlert

Over 180, supplying full range of measurement and status information

#### Tag update rate

90 seconds

### Communication

#### Network support

Ethernet and RS232 (with appropriate converter)

#### Protocols

Input: TCP/IP

Output: OPC DA 2.0

### Computer Requirements

#### Operating System

Microsoft Windows\*\* XP, Windows Server 2003, Windows Server 2008, Windows Vista, or Windows 7

#### Processor Speed

2 GHz recommended

#### Memory

2 GB RAM or higher

10 GB hard disk space

#### Peripherals

Super VGA (1024x768) or higher resolution video adapter and monitor

Keyboard and mouse or compatible pointing device

#### Database Software

Includes Microsoft SQL Express enabling enterprise with up to 20 AnomAlerts; for enterprises of greater than 20 the full version of SQL is required (purchased separately)

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## Ordering Information

For a detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (document 108M1756) located at the following website: [www.GEmeasurement.com](http://www.GEmeasurement.com).

Order one AnomAlert per motor to be monitored. Refer to Figure 1, Figure 2, and Figure 3.

The CTs, PTs, and CSs are customer supplied. Refer to Measurement Inputs section of Specifications Section above for requirements.

Order the type and number of converters as required for your network of AnomAlerts. Refer to Figure 4.

Order at least one version of the software. For integration into System1 refer to datasheet 174590-01 for the AnomAlert Extender.

For generator monitoring see AnomAlert datasheet 288496-01.

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### AnomAlert for Fixed Speed Motor

#### 390100 – AXX – B01 – CXX – D01

- A:** Motor Voltage
- 01** Low ( $\leq 480$  Vac)
  - 02** Medium/High ( $> 480$  Vac)
- B:** Motor Speed Type
- 01** Fixed (line driven)
  - 02** Variable (inverter driven)
- C:** Motor Nominal Current (CT secondary output)
- 01** 1 A
  - 02** 1 - 5 A
- D:** Language
- 01** English

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### AnomAlert for Variable Speed Motor

#### 390100 – AXX – B02 – CXX – D01

- A:** Motor Voltage
- 01** Low ( $\leq 480$  Vac)
  - 02** Medium/High ( $> 480$  Vac)
- B:** Motor Speed Type
- 01** Fixed (line driven)
  - 02** Variable (inverter driven)
- C:** Motor Nominal Current
- 01** up to 1 A
  - 02** 1 - 5 A
  - 03** 5 - 100 A
  - 04** 100 - 500 A
  - 05** 500 - 1000 A
  - 06** 1000 - 2000 A
- D:** Language
- 01** English

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### AnomAlert Enterprise Software

**Must be** ordered separately. Order 1 per enterprise computer. Refer to Figure 4. Includes ability to change data presentation from English to Spanish, Portuguese, Russian or Turkish. Includes step-by-step setup movies, manuals, quick install guides.

**390125-01** AnomAlert Enterprise Software

**Note:** To bring data into System 1 see datasheet 174590-01 to order S1 AnomAlert System Extender. Quick configuration tool for bringing data into S1 is available at BN technical support via the following website: [www.GEmeasurement.com](http://www.GEmeasurement.com).

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### Converter Kits

Up to 10 AnomAlert units can be connected through each converter to a computer. Refer to Figure 4.

#### 287127-01

RS 232/485 to RS 422 converter, with power supply and plug adapters. Kit includes sample cable for connection to AnomAlert, and sample cable for interconnection between converter and PC (1 required for each PC to which daisy-chained AnomAlerts will be connected).

#### 287128 – AXX

Moxa\* Nport\* DE-311 RS422 to TCP/IP Ethernet converter with null modem mini adapter and power supply. Kit includes sample cable for connection to AnomAlert and a sample cross-cable for Ethernet connection.

**A:** Power Plug Type

- 01** American (US, Canada, Japan, Mexico)
- 02** British (UK, Hong Kong)
- 03** European (Turkey, Germany, Russia...)
- 04** Australian
- 05** China

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### AnomAlert Manuals

Hardware and software manuals can be found in electronic format on the DVD that contains the software itself. However, the hardware manual can be ordered in hardcopy format using the following part number, if desired.

**286869-01** User's Manual

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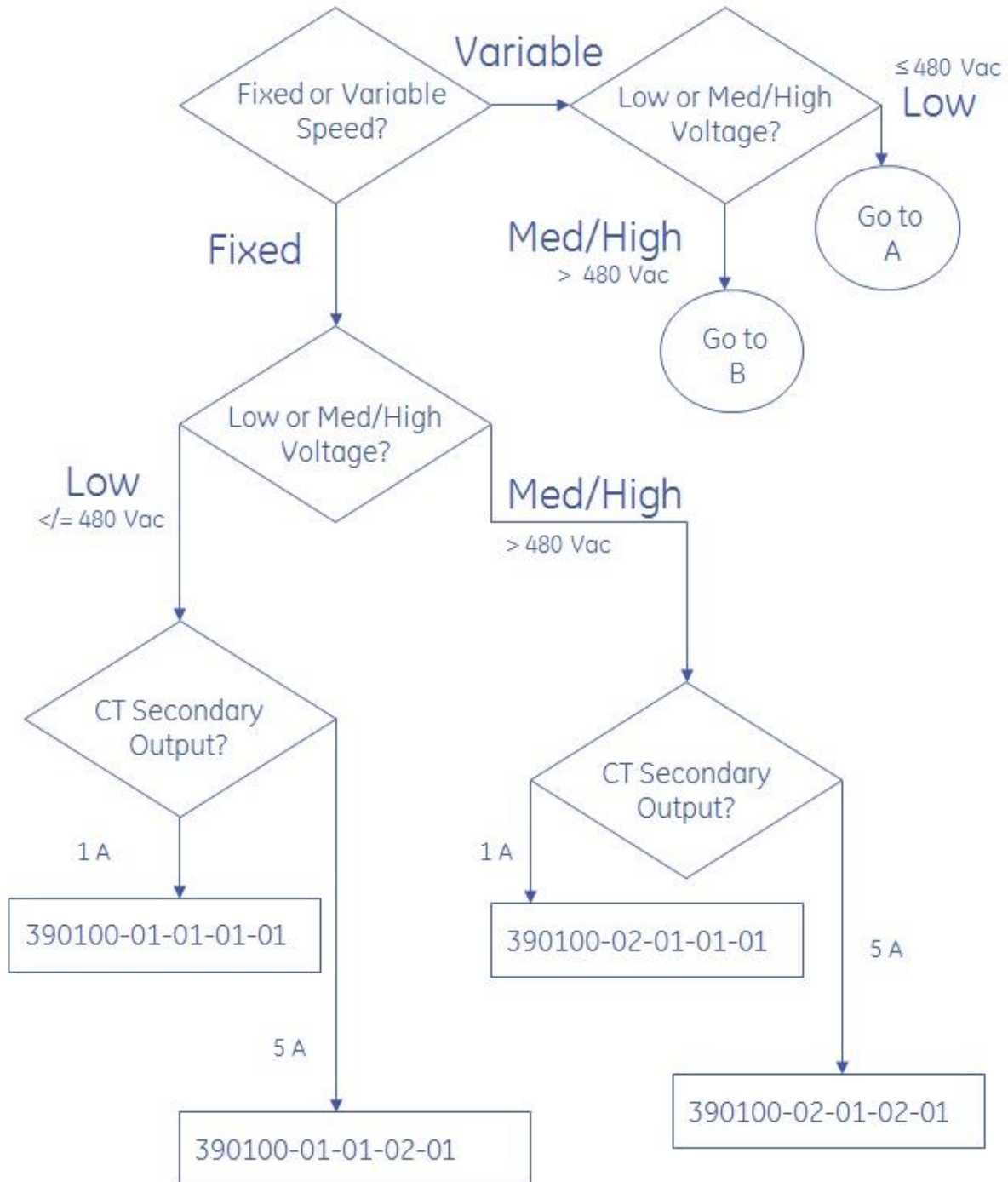
### **AnomAlert Quick Install Guides**

Not required to be ordered. Are included in electronic format on the AnomAlert Enterprise Software DVD and come in hardcopy with the appropriate monitors and converter kits. They can also be ordered as hardcopies using the following part numbers, if required.

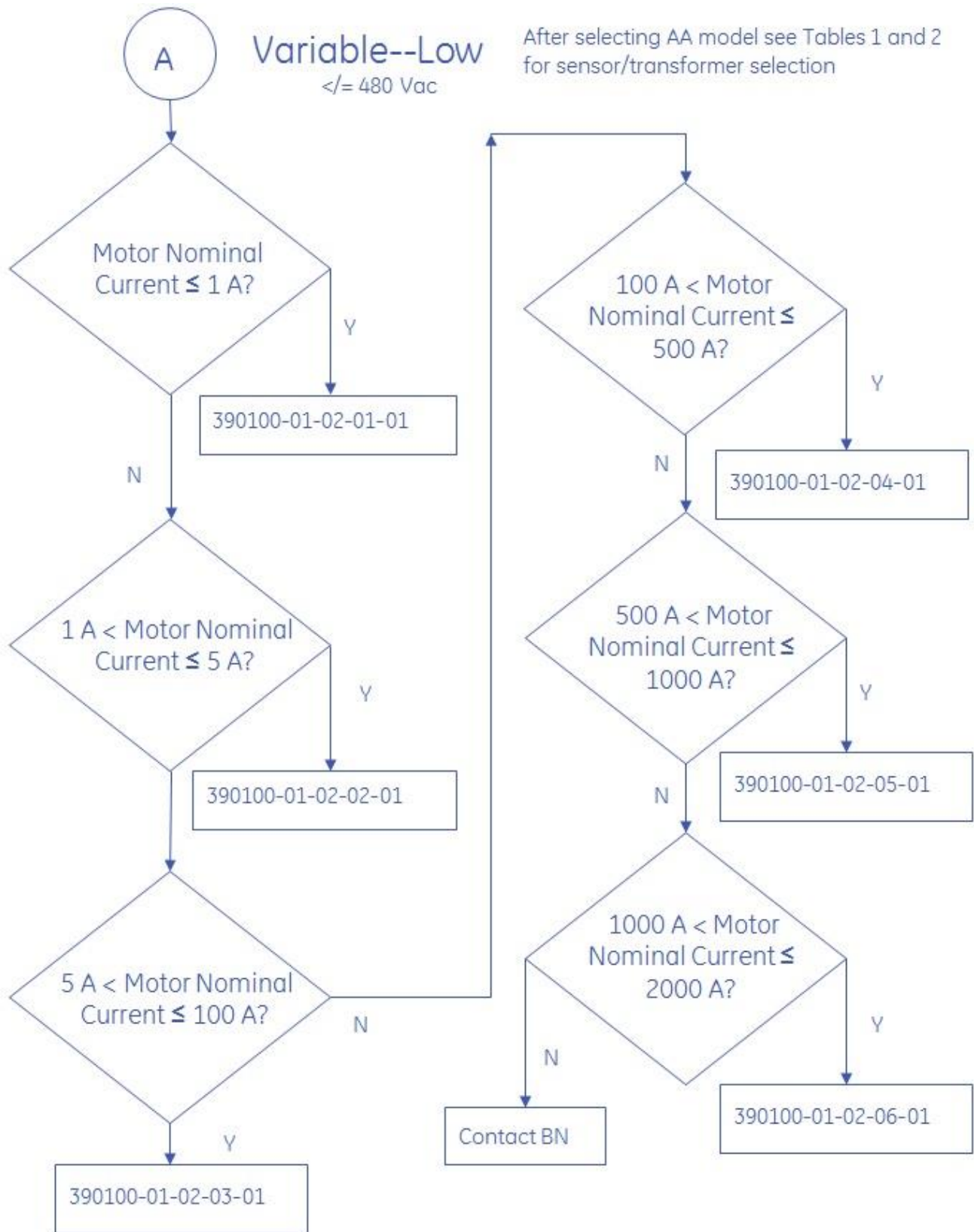
<b>286870-01</b>	Low Voltage, Line
<b>286871-01</b>	Low Voltage, Inverter
<b>286872-01</b>	Med/High Voltage, Line Model
<b>286873-01</b>	Med/High Voltage, Inverter Model
<b>286874-01</b>	RS485-RS422
<b>286875-01</b>	TCP/IP
<b>286876-01</b>	Software TCP/IP

## Figures and Tables

After selecting AA model see Tables 1 and 2  
for sensor/transformer selection

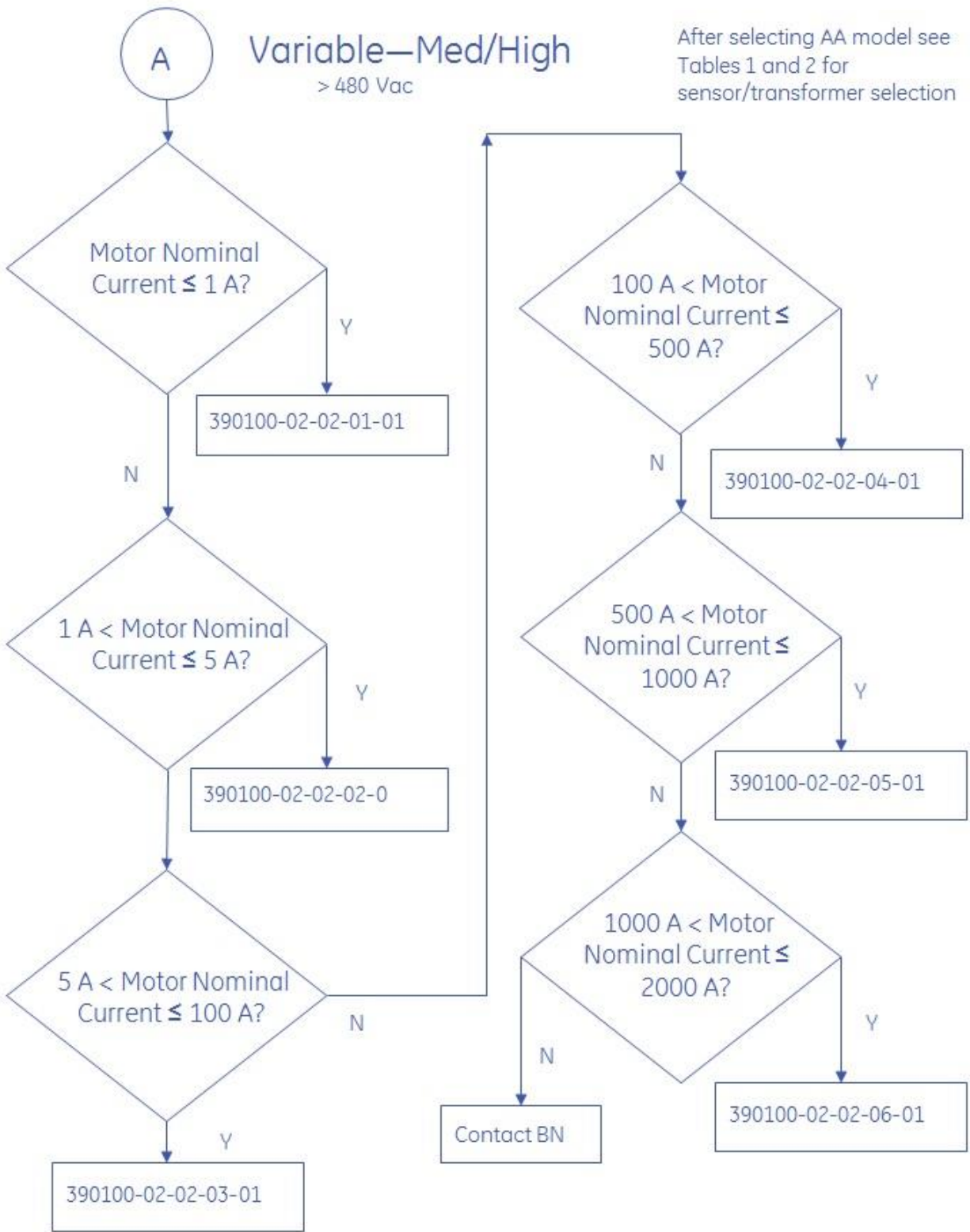


**Figure 1: Model Number Selection: Fixed Speed**



**Figure 2: Model Number Selection: Variable Speed, Low Voltage**





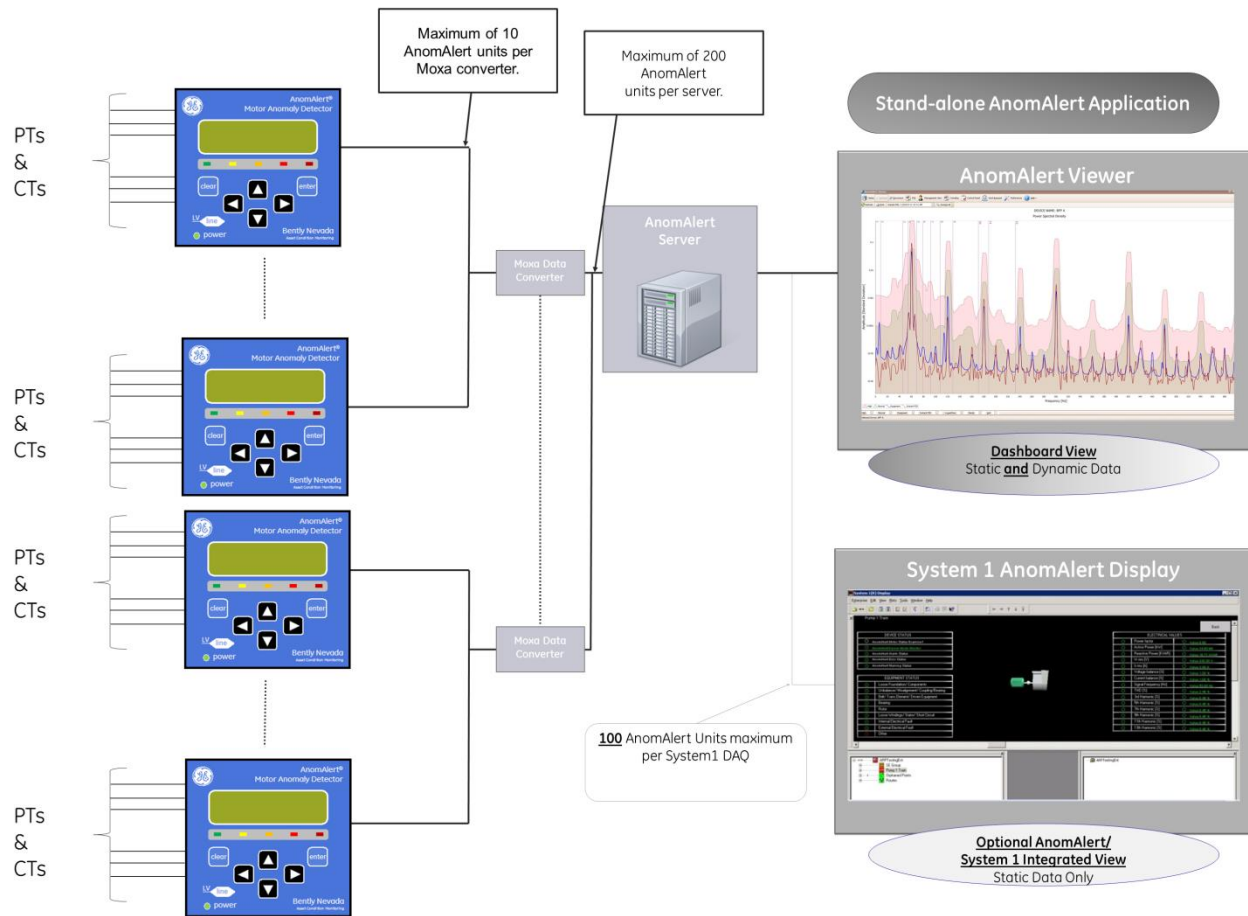
**Figure 3: Model Number Selection: Variable Speed, Medium Voltage**

Table 1: Voltage Measurement Inputs

AnomAlert Part Number	Application	Minimum Frequency (Hz)	Maximum Frequency (Hz)	Best Practice Interface Recommendation
	<b>Fixed Speed</b>			
390100-01-01-01-01	≤480 V, 1A	45	65	Motor supply voltage connected to AA without sensor
390100-01-01-02-01	≤480 V, 5A	45	65	Motor supply voltage connected to AA without sensor
390100-02-01-01-01	>480 V, 1A	45	65	PTs with 100-120V secondary
390100-02-01-02-01	>480 V, 5A	45	65	PTs with 100-120V secondary
	<b>Variable Speed</b>			
390100-01-02-01-01	≤480 V, 1A	45	65	Motor supply voltage connected to AA without sensor
390100-01-02-02-01	≤480 V, 1-5A	45	65	Motor supply voltage connected to AA without sensor
390100-01-02-03-01	≤480 V, 5-100A	25	90	Motor supply voltage connected to AA without sensor
390100-01-02-04-01	≤480 V, 100-500A	25	90	Motor supply voltage connected to AA without sensor
390100-01-02-05-01	≤480 V, 500-1000A	25	90	Motor supply voltage connected to AA without sensor
390100-01-02-06-01	≤480 V, 1000-2000A	25	90	Motor supply voltage connected to AA without sensor
390100-02-02-01-01	>480 V, 1A	45	65	PTs with 100-120V secondary if scalar controlled VFD, else use voltage dividers
390100-02-02-02-01	>480 V, 1-5A	45	65	PTs with 100-120V secondary if scalar controlled VFD, else use voltage dividers
390100-02-02-03-01	>480 V, 5-100A	25	90	PTs with 100-120V secondary if scalar controlled VFD, else use voltage dividers
390100-02-02-04-01	>480 V, 100-500A	25	90	PTs with 100-120V secondary if scalar controlled VFD, else use voltage dividers
390100-02-02-05-01	>480 V, 500-1000A	25	90	PTs with 100-120V secondary if scalar controlled VFD, else use voltage dividers
390100-02-02-06-01	>480 V, 1000-2000A	25	90	PTs with 100-120V secondary if scalar controlled VFD, else use voltage dividers

Table 2: Current Measurement Inputs

AnomAlert Part Number	Application	AA Nominal Current Input	AA Minimum Measurable Current Input	AA Maximum Measurable Current Input	Impedance	Maximum Voltage (Vac)	Best Practice Interface Recommendation
	<b>Fixed Speed</b>						
390100-01-01-01-01	≤480 V, 1A	1 A	0.04 A	1.4 A	50 mΩ	250	If motor current ≤ 1 A and motor voltage ≤ 250 Vac no CTs required, else use 1:1 CTs
390100-01-01-02-01	≤480 V, 5A	5 A	0.2 A	7 A	15.3 mΩ	250	If motor current ≤ 5 A and motor voltage ≤ 250 Vac no CTs required, else use 5:5 CTs
390100-02-01-01-01	>480 V, 1A	1 A	0.04 A	1.4 A	50 mΩ	250	CTs with 1 A secondary
390100-02-01-02-01	>480 V, 5A	5 A	0.2 A	7 A	15.3 mΩ	250	CTs with 5 A secondary
	<b>Variable Speed</b>						
390100-01-02-01-01	≤480 V, 1A	Up to 1 A	0.04 A	1.4 A	50 mΩ	250	If motor current ≤ 1 A and motor voltage ≤ 250 Vac no CTs required, else use 1:1 CTs
390100-01-02-02-01	≤480 V, 1-5A	1-5 A	0.2 A	7 A	15.3 mΩ	250	If motor current ≤ 5 A and motor voltage ≤ 250 Vac no CTs required, else use 5:5 CTs
390100-01-02-03-01	≤480 V, 5-100A	50 mA	1.5 mA	70 mA	50 Ω	30	LEM Current Sensors: LA100-S, 70A motor current, max
390100-01-02-04-01	≤480 V, 100-500A	100 mA	3 mA	140 mA	25 Ω	30	LEM Current Sensors: LA100-S, 140 A motor current, max LA205-S, 280 A motor current, max LA305-S, 350 A motor current, max LT505-S, 700 A motor current, max
390100-01-02-05-01	≤480 V, 500-1000A	200 mA	6 mA	250 mA	12.5 Ω	30	LEM Current Sensors: LT1005, 1250 A motor current, max
390100-01-02-06-01	≤480 V, 1000-2000A	400 mA	12 mA	500 mA	6.25 Ω	30	LEM CSS: LT2005, 2500 A motor current, max
390100-02-02-01-01	>480 V, 1A	1 A	0.04 A	1.4 A	50 mΩ	250	1:1 CTs
390100-02-02-02-01	>480 V, 1-5A	5 A	0.2 A	7 A	15.3 mΩ	250	5:5 CTs
390100-02-02-03-01	>480 V, 5-100A	50 mA	1.5 mA	70 mA	50 Ω	30	LEM Current Sensors: LA100-S, 70 A motor current, max
390100-02-02-04-01	>480 V, 100-500A	100 mA	3 mA	140 mA	25 Ω	30	LEM Current Sensors: LA100-S, 140 A motor current, max LA205-S, 280 A motor current, max LA305-S, 350 A motor current, max LT505-S, 700 A motor current, max
390100-02-02-05-01	>480 V, 500-1000A	200 mA	6 mA	250 mA	12.5 Ω	30	LEM Current Sensors: LT1005, 1250 A motor current, max
390100-02-02-06-01	>480 V, 1000-2000A	400 mA	12 mA	500 mA	6.25 Ω	30	LEM Current Sensors: LT2005, 2550 A motor current, max



**Figure 4: System Architecture**

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 AnomAlert  
 Bently Nevada

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