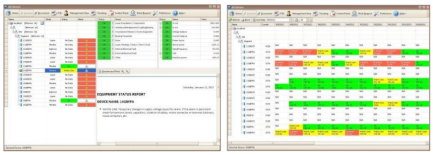
AnomAlert Motor Anomaly Detector

Datasheet

Cordant™

286754 Rev. P





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

Baker Hughes

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

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

Measurement Voltage Inputs	
Voltage	480 $Vrms_{L-L}$ / 277 $Vrms_{L-N}$, max, CAT II
Impedance	3.5 MΩ phase-to-phase
Frequency	Varies by model number. See Voltage Measurement Input on page 13.
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. See Current Measurement Inputs on page 14.

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	IP40
Whole Unit	IP 20
Indicators	6 LEDs and LCD Readout
Keypad	6 tactile membrane keys

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. See System Architecture on page 15. 10 AnomAlerts per serial or TCP/IP channel Multiple AES instances can share a single SQL database and OPC server 100 AnomAlert units per System 1
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)

Compliance and Certifications

FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

EMC

EN 61326-1

EN 61000-6-2

EN 61000-6-4

EMC Directive 2014/30/EU

Electrical Safety

EN 61010-1

LV Directive 2014/35/EU

RoHS

RoHS Directive 2011/65/EU

Ordering Information

For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from Bently.com.

Order one AnomAlert per motor to be monitored. Refer to the figures in the Graphs and Figures section.

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.

Order at least one version of the software. For integration into System1, refer to the System 1 datasheet 174590 for the AnomAlert Extender.

For generator monitoring see AnomAlert datasheet 288496.

AnomAlert for Fixed Speed Motor

390100 – AA–01–CC-01

A: Motor Voltage	
0 1	Low (≤ 480 Vac)
0 2	Medium/High (> 480 Vac)
B: Motor Speed Type	
0 1	Fixed (line driven)
0 2	Variable (inverter driven)
C: Motor Nominal Current (CT secondary output)	
0 1	1 A
0 2	1 - 5 A
D: Language	
0 1	English

AnomAlert for Variable Speed Motor

390100 – AA – B02 – CC - D01

A: Motor Voltage	
0 1	Low (≤ 480 Vac)
0 2	Medium/High (> 480 Vac)
B: Motor Speed Type	
0 1	Fixed (line driven)
0 2	Variable (inverter driven)
C: Motor Nominal Current	
0 1	up to 1 A
0 2	1 - 5 A
0 3	5 - 100 A
0 4	100 – 500 A
0 5	500 – 1000 A
0 6	1000 – 2000 A
D: Language	
0 1	English

AnomAlert Enterprise Software

Must be ordered separately. Order 1 per enterprise computer.Refer to .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

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: bently.com.

Converter Kits

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

287127-01

RS 232 to RS 422/485 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 – AA

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	
0 1	American (US, Canada, Japan, Mexico)
0 2	British (UK, Hong Kong)
0 3	European (Turkey, Germany, Russia…)
0 4	Australian
0 5	China

AnomAlert Manuals

286869-01 User Guide

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 above part number, if desired.

AnomAlert Quick Install Guides

- 286870-01 Low Voltage, Line
- 286871-01 Low Voltage, Inverter
- 288872-01 Med/High Voltage, Line Model
- 288873-01 Med/High Voltage, Inverter Model
- 286874-01 RS485-RS422
- 286875-01 TCP/IP
- 286876-01 Software TCP/IP

Not required to be ordered. They 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 above part numbers, if required.

Graphs and Figures

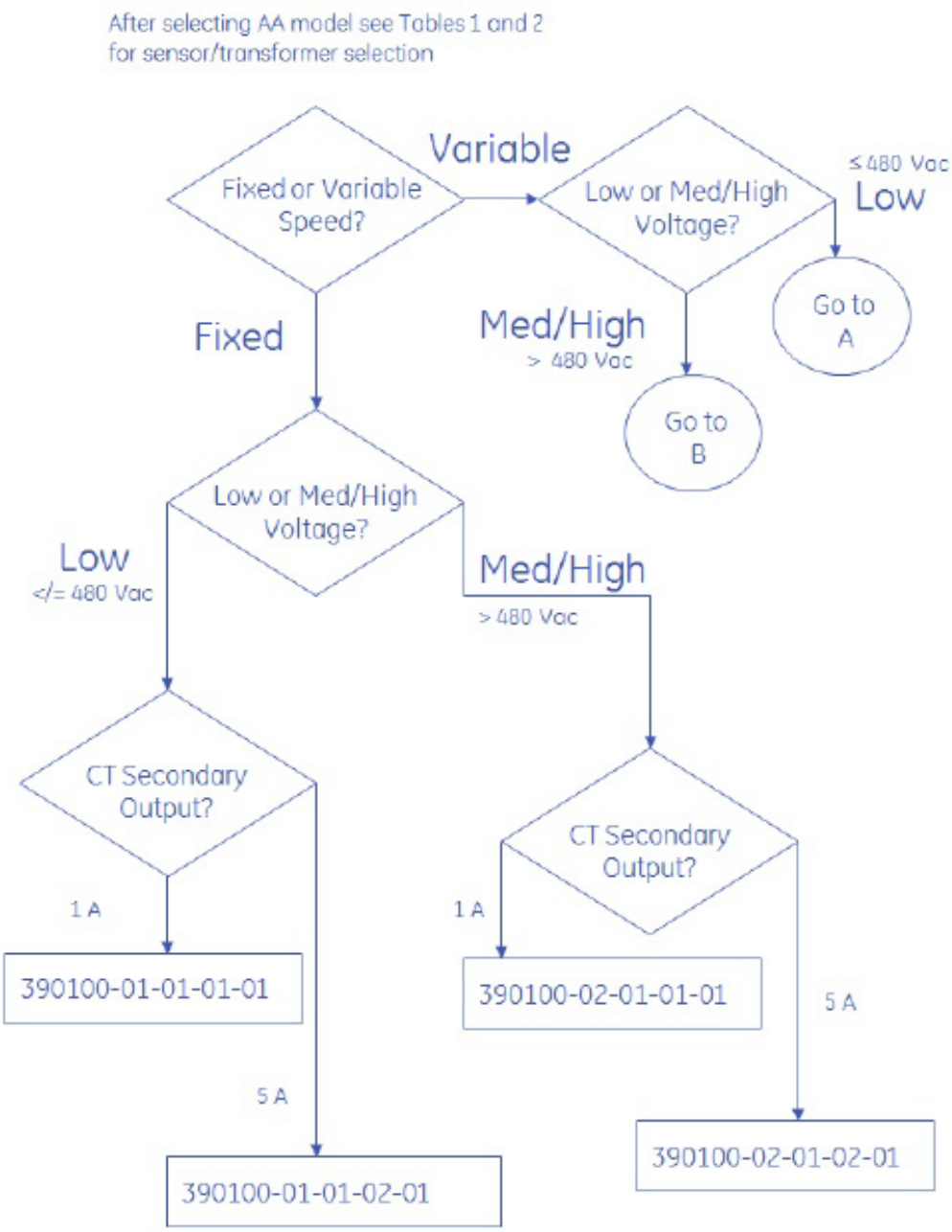


Figure 1: Model Number Selection: Fixed Speed

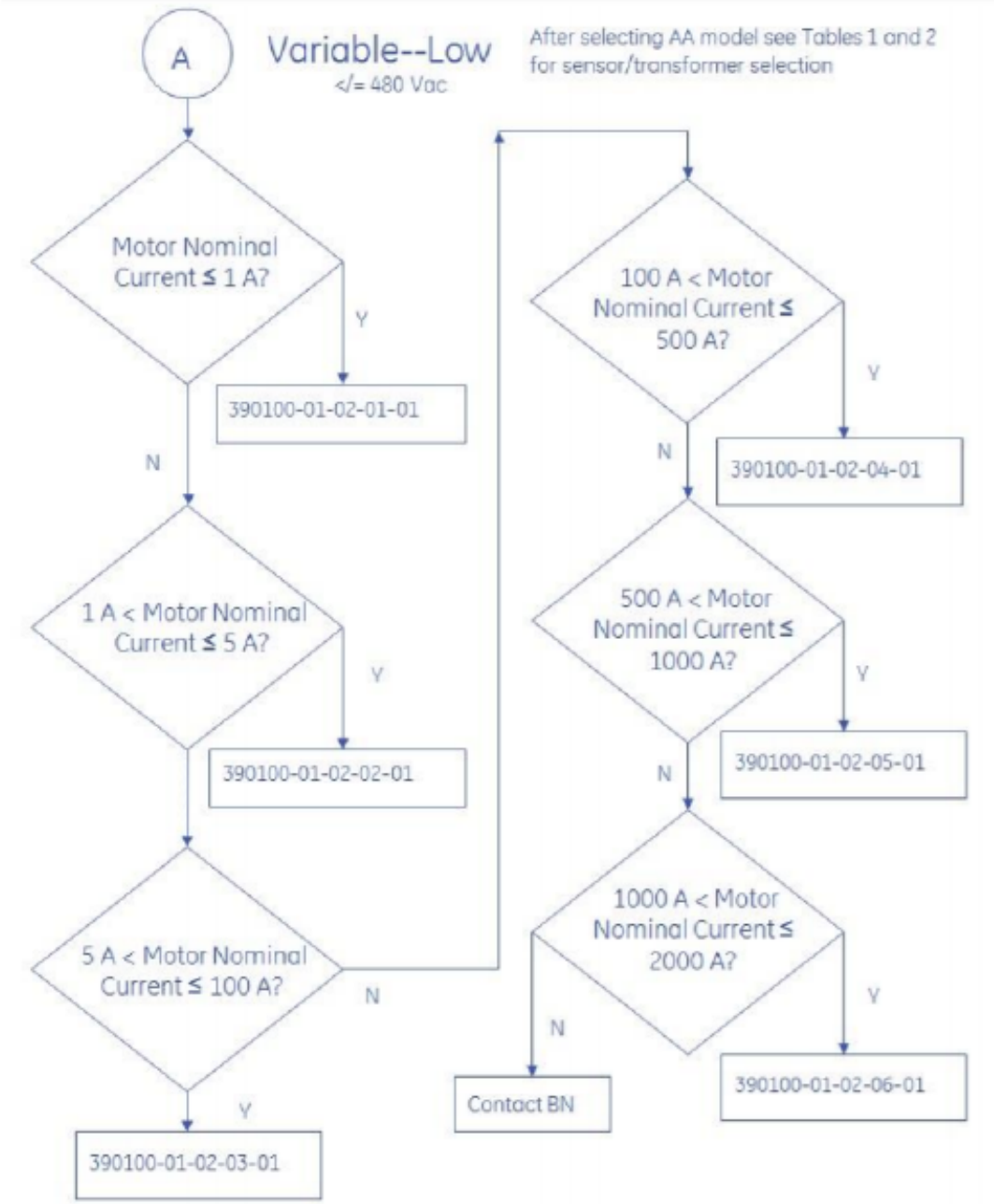


Figure 2: Model Number Selection: Variable Speed, Low Voltage

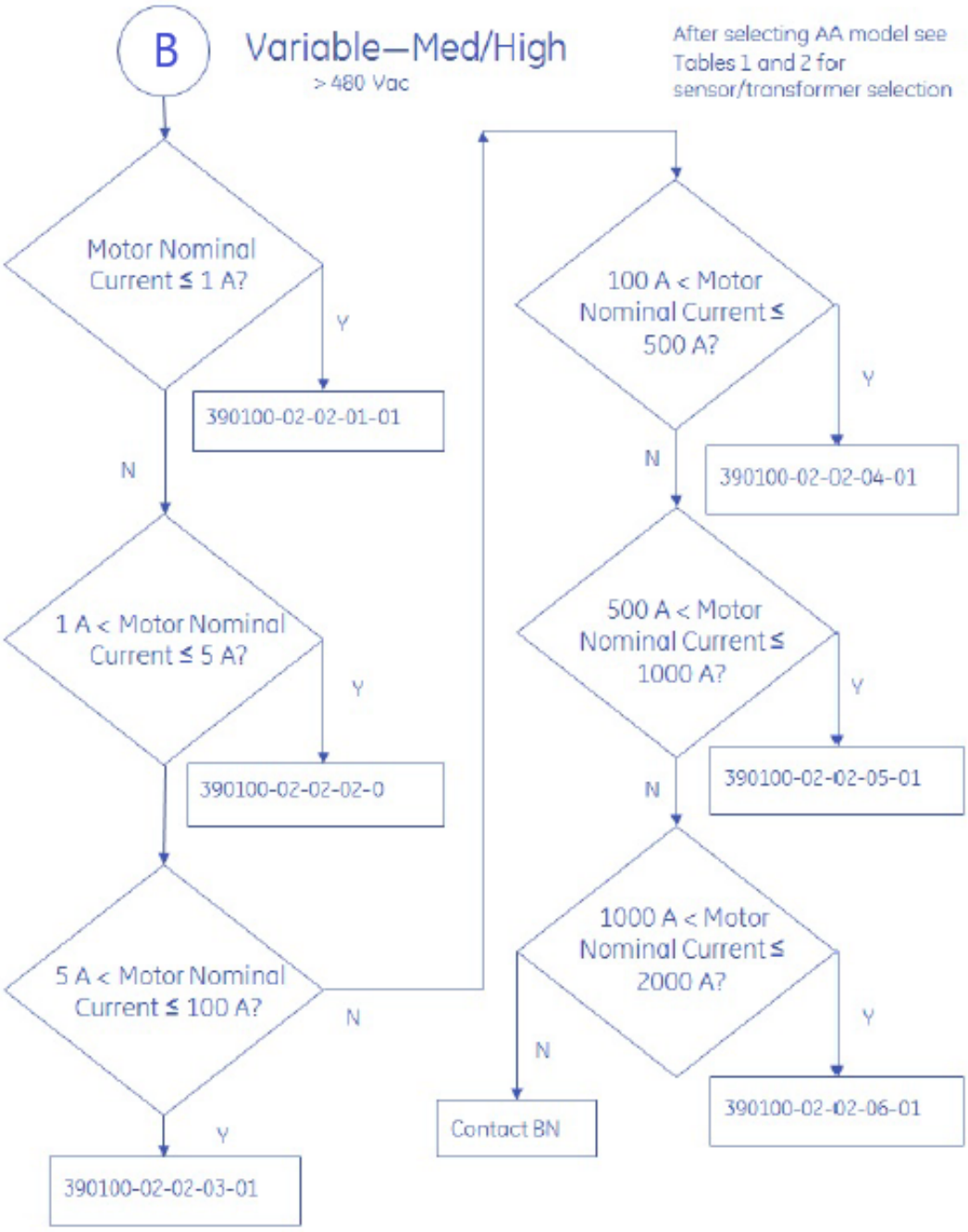


Figure 3: Model Number Selection: Variable Speed, Medium Voltage

Table 1: Voltage Measurement Input

Table 1: Voltage Measurement Inputs

AnomAlert Part Number	Application	Minimum Frequency (Hz)	Maximum Frequency (Hz)	Best Practice Interface Recommendation
	Fixed Speed			
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
	Variable Speed			
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

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
	Fixed Speed						
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	153 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	153 mΩ	250	CTs with 5 A secondary
	Variable Speed						
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	153 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	153 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

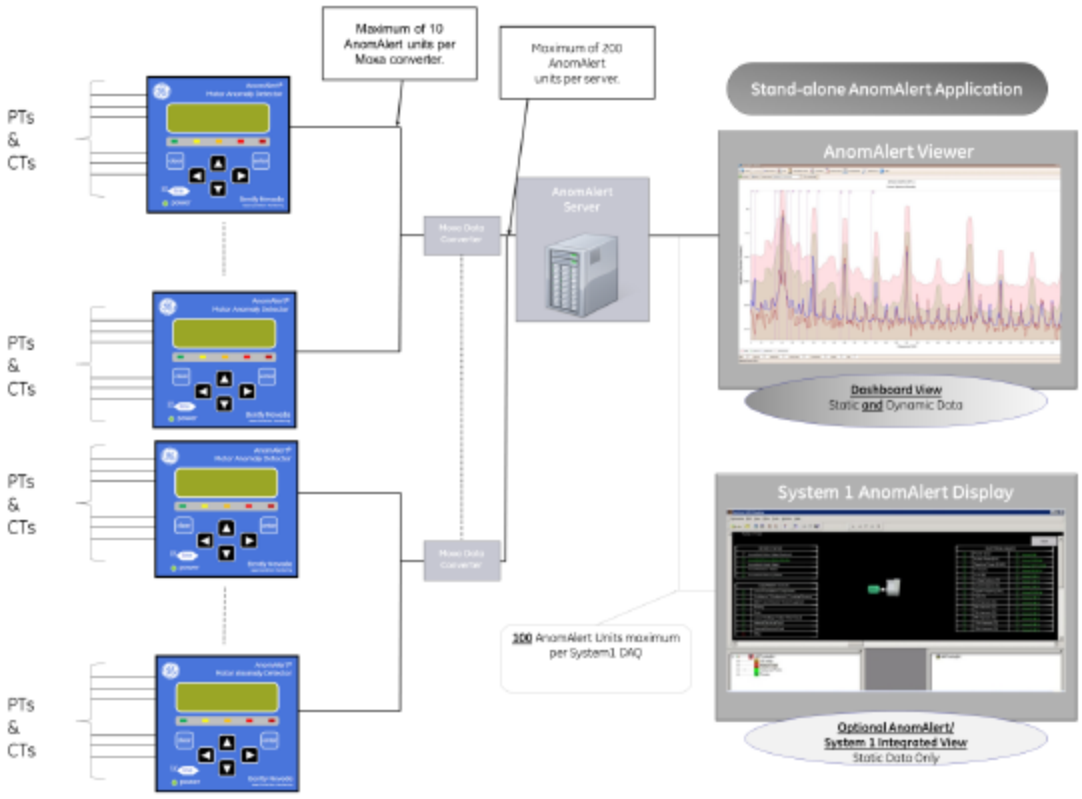


Figure 4: System Architecture

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