SMARTdiagnostics®

IoT Hub Product Line Guide & Installation Manual

IoT Hub, Wired Vibration Sensor, Wired Analog Adapter, Wired IEPE Adapter

KCF technologies

Contents

Revision History

Date	Version	Author	Details
5/4/2020	1.0	R. Korte, E. Sankey	Document Published
10/28/2021	2.0	R. Tosto, M. Gregory	Updated; Hub installation requirements, Hub specs for material, mounting, certifications, AC power, operating and storage temps, environmental use. Added Wired Analog Adapter
1/5/2022	2.0	R. Tosto	Typographical updates
1/18/2022	2.0	J. Conklin	Typographical updates
1/28/2022	B	R. Tosto	Corrected SD-WVS-1 part numbers, typographical updates
3/29/2022	C	E. Adams	Added Description and Features for Analog and IEPE Adapters
4/18/2022	D	R. Tosto	Added dimensional views of all products, renamed document
5/24/2022	E	R. Tosto	Updated certification information
6/10/2022	F	M. Gregory	Clarification on power specifications
8/31/2022	G	R. Tosto	Updated temperature specs, WVS
9/23/2022	H	M. Gregory	Added pin numbers to WAA connection info
1/06/2023	J	R. Tosto	Updated certification and operating info
3/23/2023	K	R. Tosto	Updated certification info

1 Product Overview

1.1 Introduction

The IOT Hub is the central part of a product system that is designed to meet the following needs in the industries we serve:

- Fill the gap where deploying KCF's wireless vibration sensors is not feasible due to access, size, environment, etc.
- Update the KCF's General Input Nodes' capability to ingest standard, 3rd-party transducer data into SMARTdiagnostics®
- Extend our monitoring capability with the ability to collect data at the same time across multiple sensors
- Extend our monitoring capability with the ability to "trigger" data collection so that we can collect data when it matters - when a machine is running or at specific times during a machine's cycle

1.2 How It Works

The Hub controls up to seven sensors that are connected to the Hub with a cable. In this way, the Hub can both power the sensors and control how and when those sensors collect data. When data is collected, it is transferred from the sensor to the Hub over-the-wire. The Hub subsequently transmits that data wirelessly to a Base Station or Repeater (using DARTwireless™) which then sends it to SMARTdiagnostics® software for analysis. While the sensors can be installed on multiple or single assets, the ability of the Hub to coordinate/synchronize data collection across multiple sensors on a single asset allows for full understanding of the asset's overall health.

1.3 Applications

The IOT Hub was designed to address several unique challenges.

KCF's Wireless Vibration Sensor has a wide operating temperature range that is limited primarily by the battery that powers it. Some industrial applications require sensors that can operate at even more extreme temperatures. Rated for -40ºC to 125ºC, the Wired Vibration Sensor in the Hub ecosystem can withstand some of the harshest environments.

Many assets are either partially or fully enclosed in shielding for safety reasons; this can present space constraints where the sensor needs to be installed. Safety enclosures can also be an issue for wireless connectivity and battery maintenance. The Hub's Wired Vibration Sensor is a much lower profile and smaller footprint than its wireless counterpart, making it ideal for such locations.

Collecting data on a timed interval with KCF's Wireless Vibration Sensors is a great way to continuously monitor equipment that is running all the time. For machines that operate intermittently however, such as conveyors or other machines on a fixed cycle, a sensor operating on a timed interval may collect data even when the machine is not running and will collect data at a different place in the cycle when it does. The Hub resolves this issue by allowing an external process to tell the Hub when the asset is running through trigger signals.

Finally, it is desirable to collect other data from an asset in addition to vibration data. Examples are pressure, fluid quality, temperature, power consumption, etc. The Hub's Analog Adapter is designed to accommodate any type of sensor. Primarily, the Hub Analog Adapter supports all sensors that output 4-20mA or 0-10V. As the Hub ecosystem grows, adapters will be added for piezoelectric accelerometers, thermal probes, and other common transducers. With a full suite of sensors to collect a wide variety of data from an asset, the Hub will enable unprecedented ability to provide real-time asset health information.

2 Product Specifications

2.1 IoT Hub (SD-HUB-1)

2.1.1 SD-HUB-1 General Specifications

Weight:	672 g (Battery Power Version) 621 g (AC Power Version)
Enclosure Material:	Polycarbonate Alloy
Mounting: Maximum Mounting Bolt Torque:	#10 or M5 Socket Head 15 in·lb [1.7 N·m] Temporary Magnet Mounting

2.1.2 SD-HUB-1 Electrical Specifications

	SD-HUB-1-_A (AC/DC Version)	**SD-HUB-1-_B (Battery/DC Version)**
Input Power:	100-240 VAC, 50/60Hz 0.45 Amp max. < 1 Watt typ. Overvoltage Cat. II	3.6 VDC Nom. (2.8–3.7 VDC operating) D-Size Lithium (Saft LSH-20 non-rechargeable only) <2.5 A pk., <1 mA typ.
DC Input Power:	Class 2 Power Supply: 10-30 VDC Nom.[1], 1 Amp max. (fused[2])	
Accessory Power Output: (Total provided by Hub for all attached transducers/adapters)	<u>AC Powered</u> 24 VDC ± 10%, 250 mA <u>External DC Powered</u> DC Input Voltage, up to 1 A	<u>Battery Powered</u> None <u>External DC Powered</u> DC Input Voltage, up to 1 A
External Trigger Signal Level:	24V Nom., 10 mA max., 10 ms minimum pulse width	
Power Cable:	NEMA 5-15P Optional: EU - CEE 7/7 UK - BS1363A	

[1] Any accessories (such as the analog adapter) that are configured to provide pass-thru power will utilize this power source for attached transducers. Ensure your transducers operate satisfactorily with your provided external input voltage.

[2] Self-resetting fuse.

2.1.3 SD-HUB-1 Environmental Specifications

	SD-HUB-1-_A (AC/DC Model)	**SD-HUB-1-_B (Battery/DC Model)**
Operating Temperature Range:	-25 to 65 ºC (-13 to 149 ºF)	
IP Rating:	IP66 (IEC60529)	IP64 (IEC60529)
Use Case:	Indoor and outdoor use Suitable for wet location Pollution Degree 4	
Altitude:	2,000m	
Relative Humidity:	0% - 100%	

2.1.4 SD-HUB-1 Wireless Radio Specifications

Radio:	KCF DARTwireless™ 2.4GHz ISM band
Antenna:	Internal dipole antenna

See Section 4 for Wireless Radio Certification Statements

2.1.5 SD-HUB-1 Input Options

Collection Mode:	Timed Interval Triggered
Input Types:	24 VDC edge trigger (optional) 7 KCF Sensor Ports (caps available for unused ports)
Sensor Types:	KCF Wired Vibration Sensor (SD-WVS-1) KCF Analog/IEPE Adapter

2.1.6 SD-HUB-1 Part Numbers

The following variants are available for the IoT Hub:

SD-HUB-1-[magnet][power]-[country]					
Magnet Options		**Power Options**		**Country Options**	
M	Magnet	**B**	Battery & 24VDC	**NA**	US/CAN/MEX
X	No Magnet	**A**	100-240VAC & 24VDC	**EU**	Europe
				UK	United Kingdom
				BR	Brazil
				SA	Southern Africa
HUB w/ magnets, battery & DC power:				**SD-HUB-1-MB**	
HUB w/out magnets, AC & DC power, for North America:				**SD-HUB-1-XA-NA**	

2.1.7 SD-HUB-1 Dimensions

2.2 Wired Vibration Sensor (SD-WVS-1)

2.2.1 SD-WVS-1 General Specifications

Weight:	100 g
Enclosure Material:	Polycarbonate Alloy and 303 Stainless Steel
Mounting: Maximum Mounting Bolt Torque:	#10 or M5 Socket Head (5/16in or 8mm long minimum) 30 in·lb max [3.4 N·m] Temporary magnet mounting

2.2.2 SD-WVS-1 Environmental Specifications

Operating Temperature Range	
Sensor and cable, fixed install:	-30°C to 105°C (-22°F to 221°F)
Sensor and cable, flexible install:	-5°C to 105°C (23°F to 221°F)
M12 Connector:	-25°C to 90°C (-13°F to 194°F)
IP Rating:	IP66 (in progress)
Altitude:	2,000m
Relative Humidity:	0%-100%

2.2.3 SD-WVS-1 Acceleration

Range:	±16 g minimum, ±19 g typical
Resolution:	0.866 mg nominal
Noise Floor:	1.496 mg RMS @ 64 Hz / 13.01 mg RMS @ 8192 Hz
Transverse Sensitivity:	10% typical
Frequency Response:	±5% 0-2700 Hz ±3% 2700-4000 Hz
Samples per Acquisition:	Up to 4096
Spectral Lines:	Up to 2048
Anti-Aliasing Filter:	4000 Hz low-pass cut-off, 3rd order Sallen-Key
Sampling Frequency:	64 Hz – 8192 Hz configurable

2.2.4 SD-WVS-1 Temperature Sensor

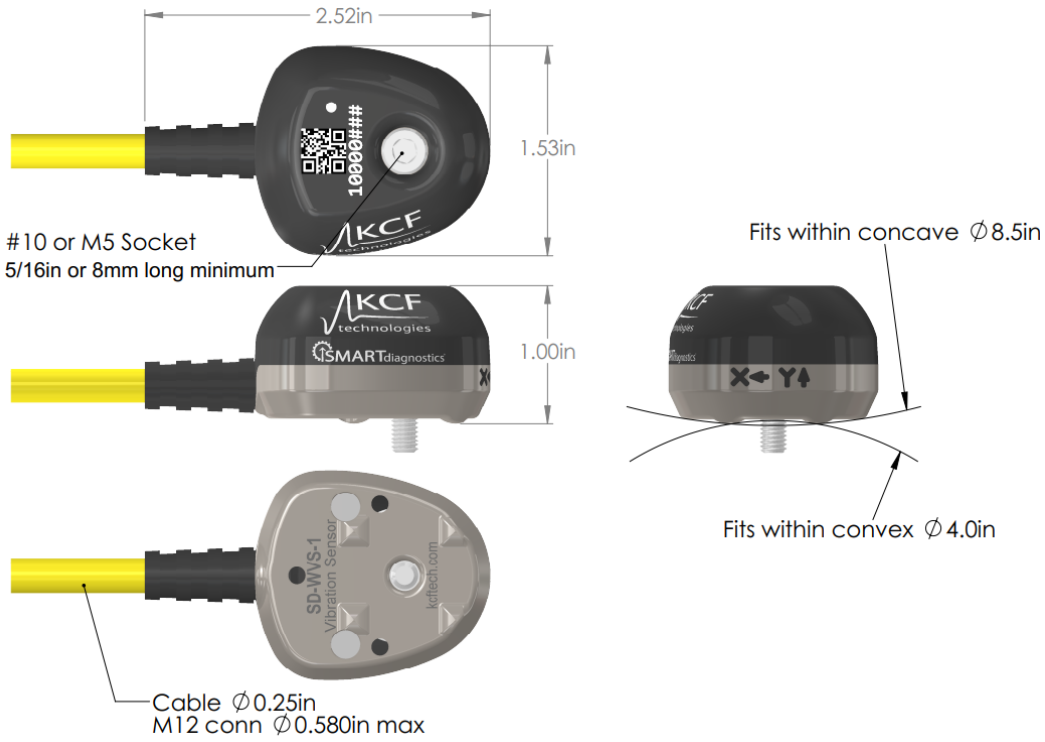
Range:	–30 to +105 ºC (–22 to +221 ºF)
Resolution:	±0.5 ºC (±1 ºF)

2.2.5 SD-WVS-1 Part Numbers

The following variants are available for wired vibration sensor. Please use the complete part number for all components to ensure the correct product and configurations are shipped.

SD-WVS-1-[cable][magnet][location]-[temperature][foot][connector]											
Cable		**Magnet**		**Location**		**Temperature**		**Foot Type**		**Connector**	
00	0.54 meter	**M**	Magnet	**R**	Ordinary Location	**T**	Standard	**A**	Pointed Feet	**C**	Standard M12 male 8-pin
05	5 meter	**X**	No Magnet					**B**	Flat Feet		
10	10 meter										
5m cable, magnet, industrial temp, pointed feet, M12 connector:										**SD-WVS-1-05MR-TAC**	
10m cable, w/out magnet, industrial temp, flat feet, M12 connector:										**SD-WVS-1-10XR-TBC**	

2.2.6 SD-WVS-1 Dimensions



2.3 Wired Analog Adapter (SD-WAA-1)

2.3.1 SD-WAA-1 Description

Now your IoT Hub can monitor nearly any common process signal adding significant utility to your condition monitoring arsenal. The analog adapter measures voltage or current signals and allows you trend and alert with these values just like traditional vibration data. In addition, analytics models (in development) will enable enhanced diagnostics and monitoring tools for special applications.

2.3.2 SD-WAA-1 Applications

- Pressure monitoring
- Temperature monitoring
- Energy consumption
- Motor current analysis
- Speed monitoring
- Object detection
- Oil quality analysis
- Ultrasonic monitoring

2.3.3 SD-WAA-1 Features

- Provides power for most types of transducers[1]
- Software selectable voltage or current input mode
- Accepts common 0—10 V, -10 to +10 V, and 4-20 mA signals
- Configurable sampling frequency of 62 Hz to 8192kHz
- 4096-sample memory
- 16-bit high-performance Analog-to-Digital converter
- Internal temperature sensor
- Operating temperature of -40 to +85 °C (-40 to +185 °F)
- Chemical-resistant polycarbonate alloy case with stainless steel cable entries
- Offered with standard M12 4-Pin A-coded Male connector[2]
- Designed and assembled in the United States with global components

Notes:

1. Requires AC-powered Hub or +24V external power through Hub Trigger/Power port
2. M12-4A Connector Pinout:
    a. Brown (Pin 1): +24VDC aux
    b. White (Pin 2): Signal In
    c. Blue (Pin 3): Ground
    d. Black (Pin 4): N/C (Do Not Connect)

2.3.4 SD-WAA-1 General Specifications

Weight:	~50g
Enclosure Material:	Polycarbonate Alloy
Mounting:	Inline w/ cable

2.3.5 SD-WAA-1 Electrical Specifications

Input Power: (provided by Hub)	3.3 VDC at 60 mA max
Access. Power: (provided by Hub)	Up to 36 VDC max. at 100mA max*

* Typically 24 VDC. Passed to attached transducer/sensor via PTC self-resetting fuse

2.3.6 SD-WAA-1 Environmental Specifications

Operating Temperature Range	
Adapter & cable, fixed install:	-30°C to 80°C (-22°F to 176°F)
Adapter & cable, flexible install:	-5°C to 80°C (23°F to 176°F)
M12 connector:	-25°C to 90°C (-13°F to 194°F)
IP Rating:	IP66 (in progress)
Altitude:	2,000m
Relative Humidity:	0% - 100%

2.3.7 SD-WAA-1 Input and Acquisition

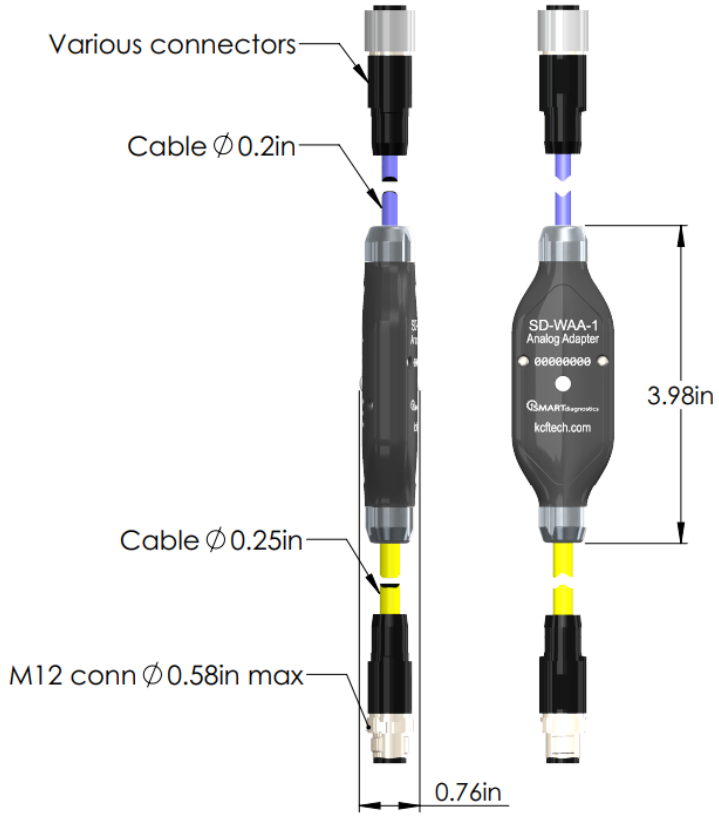
Collection Mode:	Timed Interval Triggered	
Input modes:	Voltage or Current (Software Selectable)	
Voltage Input Mode*:	Measurement Range: Input Impedance: Maximum Input Voltage:	–11 to +11 V minimum 100 kΩ minimum ±20 V
Current Input Mode*:	Measurement Range: Input Impedance (Loop burden): Maximum Input current:	–22 to +22 mA minimum 100 Ω ±40 mA
Frequency Response:	DC – 4.0 kHz @ +0.5/–3 dB (Voltage or Current Mode)	
Sampling Frequency:	64 Hz – 8192 Hz configurable	
Supported Sensor Types:	0–10 V –10 V to +10V 4-20mA	
Typical Applications:	Temperature transducers Pressure transducers Current transformers Voltage measurement (direct or via transformer) Oil quality sensors Proximity/position sensors Flow meters/transducers Turbidity transducers Load cells/scales	

* Note that wired adapter analog inputs are not isolated. Input grounds are shared between adapters and the 24 VDC external input on the IoT HUB (if used). Ensure that no ground loops will occur in your transducer setup, especially in multi-device 4-20 mA current loops. Consult a KCF Technologies field engineer for installation questions.

2.3.8 SD-WAA-1 Part Numbers

SD-WAA-1-[location][analog connector]			
Location		**Analog Connector**	
R	Ordinary Location	**C**	Standard M12 female 4-pin
Analog adapter, 0.5m cable, ordinary location, standard connector:			**SD-WAA-1-RC**

2.3.9 SD-WAA-1 & SD-WIA-1 Dimensions



2.4 Wired IEPE Adapter (SD-WIA-1)

2.4.1 SD-WIA-1 Description

Bring your existing or add new integrated electronics piezo-electric (IEPE) accelerometers or dynamic pressure sensors to SmartDiagnostics! The IEPE Adapter allows your IoT Hubs to power and collect data from these commonly used transducers that may already be installed on your equipment. IEPE accelerometers are commonly used for route-based preventative maintenance and monitoring, however, now you can take advantage of 24/7 vibration data from these high-performance devices.

The IEPE adapter can monitor a single-axis accelerometer/transducer and provide up to 8 kHz measurement bandwidth, nearly twice the frequency range of the current IoT Hub wired accelerometer (SD-WVS-1) for early onset detection of potential machine failures.

2.4.2 SD-WIA-1 Features

- Integrated 4 mA constant-current source to power IEPE devices[1]
- Configurable sampling frequency of 125 Hz to 16 kHz
- 4096-sample memory
- 16-bit high-performance Analog-to-Digital converter
- Integrated 0–2.0V auxiliary analog input for IEPE devices with temperature output
- Transducer short- and open-circuit detection for easy troubleshooting
- Internal temperature sensor
- Operating temperature of -40 to +85 °C (-40 to +185 °F)
- Chemical-resistant polycarbonate alloy case with stainless steel cable entries
- Offered with pigtail leads[2] to accommodate various customer installations, standard connectors (e.g. 2-Pin MIL-C-5015) available at time of order
- Designed and assembled in the United States with global components

Notes:

1. Requires AC-powered Hub or +24V external power through Hub Trigger/Power port
2. Brown: +24VDC aux, White: Source Out / Signal In, Blue: Ground, Black: Auxiliary analog input

2.4.3 SD-WIA-1 General Specifications

Weight:	~50g
Enclosure Material:	Polycarbonate Alloy
Mounting:	Inline w/ cable

2.4.4 SD-WIA-1 Electrical Specifications

Input Power: (provided by Hub)	3.3 VDC at 60 mA max
Access. Power: (provided by Hub)	Up to 36 VDC max. at 100mA max*

* Typically 24 VDC. Passed to attached transducer/sensor via PTC self-resetting fuse

2.4.5 SD-WIA-1 Environmental Specifications

Operating Temperature Range	
Adapter & cable, fixed install:	-30°C to 80°C (-22°F to 176°F)
Adapter & cable, flexible install:	-5°C to 80°C (23°F to 176°F)
M12 connector:	-25°C to 90°C (-13°F to 194°F)
IP Rating:	IP66 (in progress)
Altitude:	2,000m
Relative Humidity:	0% - 100%

2.4.6 SD-WIA-1 Input and Acquisition

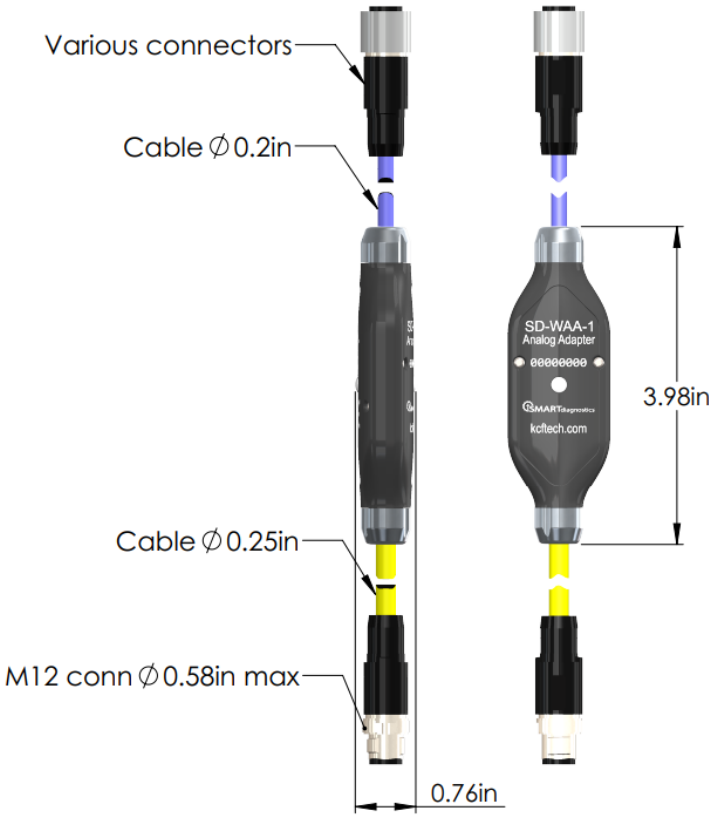
Collection Mode:	Timed Interval Triggered	
Input Modes:	AC-coupled voltage-reading with integrated constant current bias	
Input Range:	Voltage:	-8 to 8V minimum
Frequency Response:	2 Hz – 5.8kHz @ -3dB	
Sampling Frequency:	62.5Hz to 16kHz configurable	
IEPE Bias Current:	4mA +/-5% fixed (+24V external or AC-Powered Hub required	
Typical Applications:	Accelerometer Dynamic Pressure Sensor	

* Note that wired adapter analog inputs are not isolated. Input grounds are shared between adapters and the 24 VDC external input on the IoT HUB (if used). Ensure that no ground loops will occur in your transducer setup, especially in multi-device 4-20 mA current loops. Consult a KCF Technologies field engineer for installation questions.

2.4.7 SD-WIA-1 Part Numbers

SD-WIA-1-[location][analog connector]			
Location		**Analog Connector**	
R	Ordinary Location	**C**	Standard Flying Leads
Analog adapter, 0.5m cable, ordinary location, standard connector:			**SD-WIA-1-RC**

2.4.8 SD-WIA-1 & SD-WAA-1 Dimensions



3 Installation and Setup

3.1 Hardware Installation Procedures

Installation of the IoT Hub, Wired Vibration Sensors, Wired Analog Adapter and Wire IEPE Adapter shall be conducted by trained Field Operations staff to ensure optimal performance for your Hub solution.

IoT Hub and Wired Vibration Sensor hardware shall be installed by fixed mounting, utilizing a commonly available M5 or #10 socket head cap screw and hex wrench, threaded into a tapped hole or secured with a nut via a clearance hole.

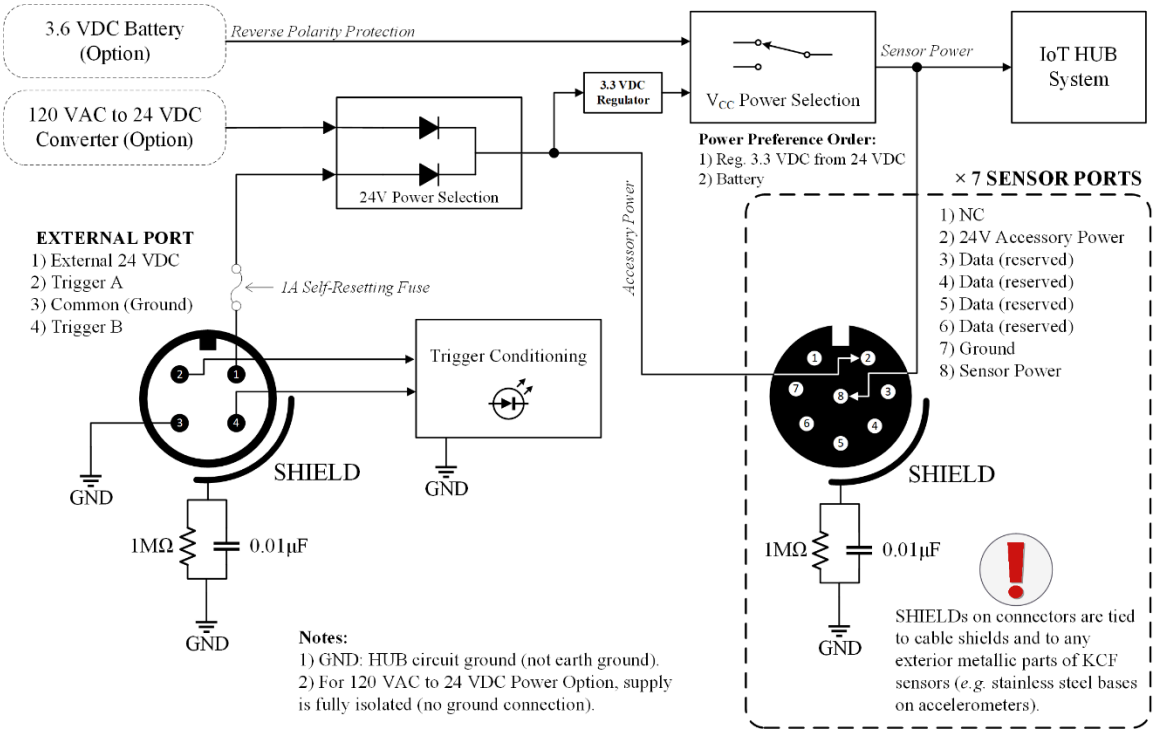
IoT Hub mounting torque shall not exceed 15 inlbs

Wired Vibration Sensor mounting torque shall not exceed 30 inlb

Wired Analog Adapters and Wired IEPE Adapters are inline with the cable and do not require fixed mounting. Securing the cable on either side of the Adapter is recommended.

3.1.1 Internal Connection Diagram

Connection to the 24VDC M12 port of the Hub is available on both AC and Battery versions of the Hub. Connections are to be made as shown below. Refer to Section 2.1.2 for specific electrical information.



3.1.2 Special Tools Needed

In additional to standard tools used for an installation, it is strongly recommended that you have the following tools on hand for installing the Hub, specifically needed for keeping the wires for the sensors safe and organized.

- Cable Ties: used to secure and attach cables from the wired sensors to the asset and away from moving parts that could pinch/damage cables or pose a tripping risk.
- Cable Tie Gun: easily tightens cable ties and clips the ends neatly without sharp edges.
- Wire Snips/Snippers/Nippers: used to cut cable ties apart

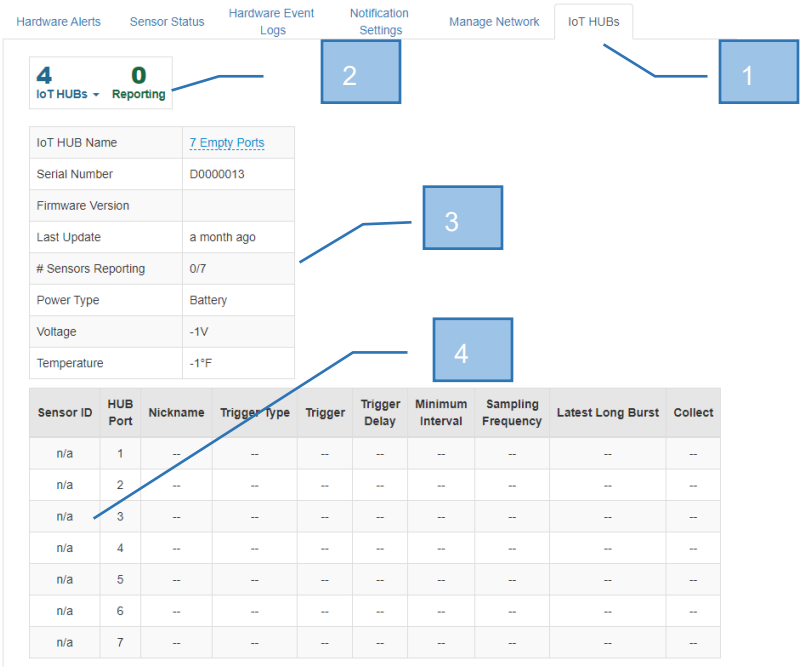
3.2 Software Setup Procedures

The software setup procedures for the Hub in SMARTdiagnostics® are similar to those for V3 sensors.

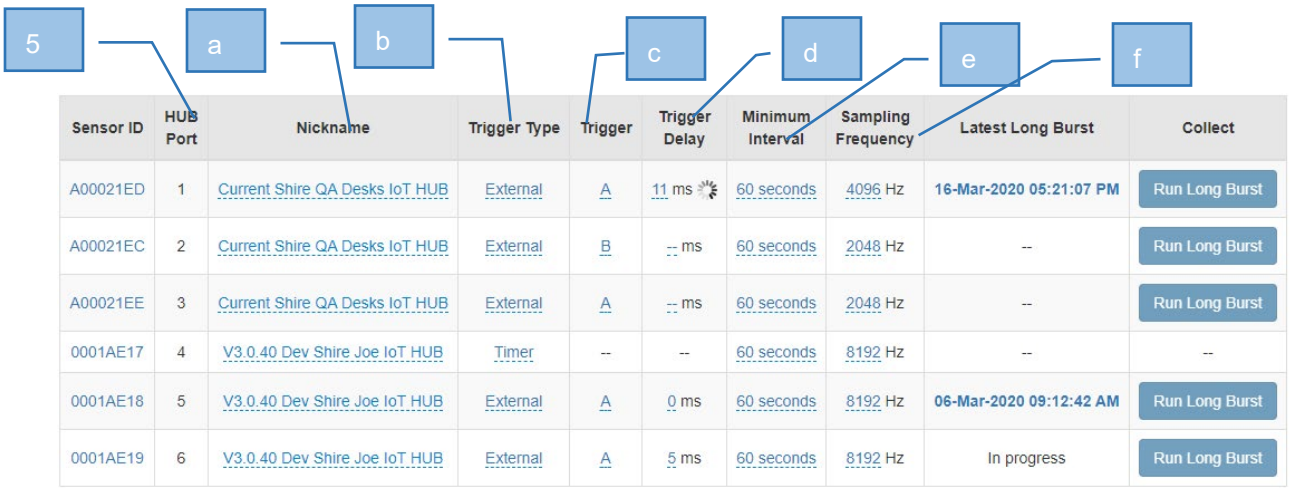
3.2.1 Adjusting Hub and Sensor Settings

1. Once a Hub has been added to SMARTdiagnostics®, it appears in the Location Network settings under the IoT Hubs tab on the screen.
2. The Hardware Status Overview displays the number of Hub at the Location as well as their current Reporting Status. To view details for a specific Hub, use the dropdown to select the hardware for which you want to view. The screen updates to display settings for the selected Hub.
3. The Hub settings are automatically updated for the selected device, including the Serial Number, Firmware Version, Last Update, Number of Sensors Reporting and Power Type. For the initial release, the Voltage and Temperature values in this table are set to a default value of -1 and will not update, therefore users should ignore these values for the time being. The IoT Hub Name is editable if you want to rename the Hub.
4. When the Hub checks into the network to report status, the Sensors attached to the Hub will also check in and populate the Sensor table at the bottom of the screen.
5. Each Sensor has configuration settings that can be adjusted.
    a. Nickname – Rename the sensor for easier reference.
    b. Trigger Type – Triggers can be set to External or Timer-based
    c. Trigger – If the Trigger Type is set to External, select whether the sensor's trigger will be off Trigger A or Trigger B
    d. Trigger Delay – Triggers can be set to a specific delay. Enter the delay in milliseconds
    e. Minimum Interval – Select the appropriate Minimum Interval from the dropdown list. Intervals can range from 60 seconds up to 24 hours.
    f. Sampling Frequency – Select the appropriate Sampling Frequency from the dropdown list. Frequency can range from 64 Hz to 8192 Hz.

IoT Hub Hardware Overview in SMARTdiagnostics



IoT Hub Hardware Overview in SMARTdiagnostics

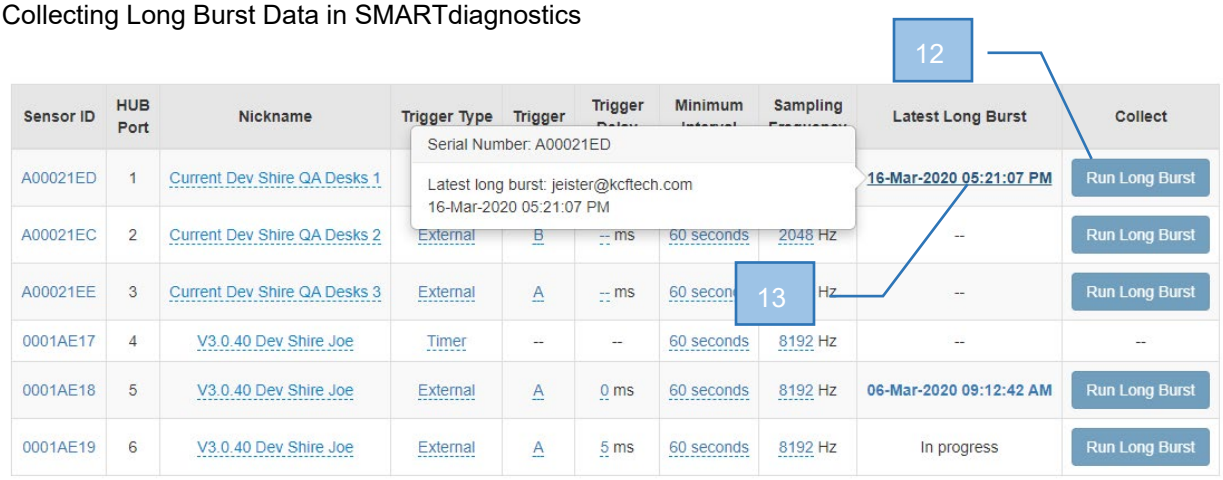


Sensor ID	HUB Port	Nickname	Trigger Type	Trigger	Trigger Delay	Minimum Interval	Sampling Frequency	Latest Long Burst	Collect
A00021ED	1	Current Shire QA Desks IoT HUB	External	A	11 ms	60 seconds	4096 Hz	16-Mar-2020 05:21:07 PM	Run Long Burst
A00021EC	2	Current Shire QA Desks IoT HUB	External	B	-- ms	60 seconds	2048 Hz	--	Run Long Burst
A00021EE	3	Current Shire QA Desks IoT HUB	External	A	-- ms	60 seconds	2048 Hz	--	Run Long Burst
0001AE17	4	V3.0.40 Dev Shire Joe IoT HUB	Timer	--	--	60 seconds	8192 Hz	--	--
0001AE18	5	V3.0.40 Dev Shire Joe IoT HUB	External	A	0 ms	60 seconds	8192 Hz	06-Mar-2020 09:12:42 AM	Run Long Burst
0001AE19	6	V3.0.40 Dev Shire Joe IoT HUB	External	A	5 ms	60 seconds	8192 Hz	In progress	Run Long Burst

3.2.2 Collecting Long Burst Data

6. A long burst allows you to capture readings over a longer period of time in order to determine where to set your Trigger Delays and Intervals. To start a long burst collection, click the Run Long Burst button. The Latest Long Burst column displays “In Progress” to indicate that a long burst is being collected.
7. Once the long burst is complete, a link to the long burst data appears in the Latest Long Burst column. Hovering over the value in this table displays the username that collected this long burst and the date/timestamp of the collection. Click on this cell to download an Excel file of the long burst data.

Collecting Long Burst Data in SMARTdiagnostics



Sensor ID	HUB Port	Nickname	Trigger Type	Trigger	Trigger Delay	Minimum Interval	Sampling Frequency	Latest Long Burst	Collect
A00021ED	1	Current Dev Shire QA Desks 1						16-Mar-2020 05:21:07 PM	Run Long Burst
A00021EC	2	Current Dev Shire QA Desks 2	External	B	-- ms	60 seconds	2048 Hz	--	Run Long Burst
A00021EE	3	Current Dev Shire QA Desks 3	External	A	-- ms	60 secon	Hz	--	Run Long Burst
0001AE17	4	V3.0.40 Dev Shire Joe	Timer	--	--	60 seconds	8192 Hz	--	--
0001AE18	5	V3.0.40 Dev Shire Joe	External	A	0 ms	60 seconds	8192 Hz	06-Mar-2020 09:12:42 AM	Run Long Burst
0001AE19	6	V3.0.40 Dev Shire Joe	External	A	5 ms	60 seconds	8192 Hz	In progress	Run Long Burst

4 Product Support, Warranty, and Certification Information

4.1 SD-HUB-1 & SD-WVS-1 Certifications and Approvals

4.1.1 SD-HUB-1 Certifications

United States:	Intertek 4008627 Conforms to UL/EN/IEC 61010-1:2012/2010 Ed. 3
Canada:	CSA C22.2#61010-1-12:2012Ed.3+U1;U2
EU:	Conforms to IEC 61010-1:2010Ed.3+A1 Radio Equipment Directive (RED) 2014/53/EU Low Voltage Directive (LVD) 2014/35/EU
	RoHS EN IEC 63000:2018
UK:	UKCA
Australia & New Zealand:	
Mexico:	NOM NYCE

4.1.2 SD-HUB-1 Radio Approvals

United States:	FCC	Contains FCC ID: Z5IHB1
		FCC CFR 47 Part 15 Subpart C
Canada:	IC	Contains IC: 24664-HB1
Australia & New Zealand:	RCM	
Argentina:	ENACOM	RAMATEL C-29124 (SD-HUB-1-MA)
Guyana:	Telecommunications Authority	No. 334-20221220-166

4.1.3 SD-WVS-1 Certifications

EU:	  EN IEC 63000:2018
Australia & New Zealand:	

4.2 Compliance Statements

FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body. Changes or modifications not expressly approved by KCF Technologies could void the user's authority to operate the equipment.

INDUSTRY CANADA STATEMENT

The term IC before the Certification/Registration number only signifies that the Industry Canada technical specifications were met. This device complies with Industry Canada's license-exempt RSSs Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareilsradio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with the IC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

FVIN: 3.2.0

4.3 KCF Contact Information

If you need any assistance setting up and using your IoT Hub or SMARTdiagnostics® system, please contact our team and we'll be happy to help!

KCF Support Team: 814-867-4097 x2

4.4 Product Warranty and Return Policy

KCF Technologies, Inc. ("Seller") warrants that (i) all products (except spare parts, replacement parts and spare kits) shall be free from material defects in workmanship for a period of one (1) year from the date shipped from Seller's distribution center; and (ii) all spare parts, replacement parts, and spare kits shall be free from material defects in workmanship for a period of ninety (90) days from the date of invoice issued by Seller or its authorized distributor. Seller warrants that it will implement commercially reasonable measures consistent with generally accepted practices to safeguard the software and Buyer's data contained in it against accidental or unlawful loss, access, or disclosure; provided, however, that Buyer is responsible for properly configuring and using products and taking Buyer's own steps to maintain appropriate security, privacy, and backup of your data.

The foregoing limited warranties are void with respect to (i) any product which, in Seller's sole judgment, has been subjected to abuse, accident, alteration, modification, tampering, negligence, misuse, faulty installation, lack of reasonable care, repair, or service by anyone other than Seller that is in any way not contemplated in the documentation for such product; (ii) any product, of which the model or serial number has been altered, tampered with, defaced, or removed; (iii) operational adjustments not covered in the operating manual for such product; (iv) maintenance, calibration, or recalibration of any product by anyone other than Seller; (v) damage occurring in shipment or due to acts of nature, failures due to power surges, or other force majeure causes beyond Seller's control; (vi) cosmetic damage; (vii) any product or service provided or furnished by anyone other than Seller; (viii) any product that has been installed or used outside Seller's technical specifications as provided on the product datasheets and care and handling application notes; (ix) refurbished products and services; (x) the failure to install any required software or firmware update; and (xi) products that have been purchased through an inventory clearance or liquidation sale or other sale specifying that such product is being sold "as is."

The foregoing limited warranties are the only warranties made by Seller under this Agreement. Except as otherwise set forth explicitly herein, Seller does not make, and hereby disclaims, any representations or warranties, express, implied, or statutory, regarding (i) products and services (including hardware, software, and related services) and (ii) the acts or omissions of users of the products and services, including (without limitation) implied warranties of merchantability, fitness for a particular purpose, title, non-infringement of third party rights, and any warranties arising by course of dealing or custom of trade. Seller makes no representation or warranty that any products or services are accurate, complete, appropriate, reliable, or timely. Seller also makes no representations or warranties that the products and services will meet Buyer's requirements, or that Buyer's access to and use of the products and services will be uninterrupted or error-free, free of viruses, malicious code, or other harmful components, or otherwise will be secure.

By accepting delivery of any product, Buyer acknowledges and agrees that (i) the value and use of such product is unrelated to the value or cost of any real or personal property in connection with which such product may be used or any services related to such product which are furnished by any person; (ii) Seller makes no warranty that such product will avert, detect, or prevent occurrences or the consequences thereof which such products may have been designed to detect, avert, or prevent, or that such product may not be compromised, disabled, or circumvented; (iii) Seller has made no representations or warranties, express or implied, to Buyer or for Buyer's benefit that contradict any of the foregoing; and (iv) "false alarms" and "false readings" from Seller's products may occur for any number of reasons, and Seller does not warrant against such false results.

Some jurisdictions do not allow the exclusion of certain warranties. Accordingly, some of the above exclusions may not apply to Buyer.

Seller's sole obligation with respect to any product which is found to contain any material defect in workmanship within the applicable warranty period shall be, at Seller's sole discretion, either to repair or replace such product at no charge to the Buyer, or to refund the purchase price upon return of the

defective product to Seller. The replacement product need not be new (i.e., it may be used or reconditioned) nor be of identical make, model or part, so long as Seller has reasonably determined that it is substantially equivalent or superior in all material respects to the product being replaced. Repaired or replacement products will be warranted for the remainder of the original applicable warranty period. All products (including any part thereof) replaced by Seller or for which the purchase price is refunded shall become the property of Seller upon replacement or refund. Unless otherwise designated in writing by Seller, Seller is the only party authorized to perform warranty service on Seller products and services.

If a product is believed to be defective and is still in warranty, or if Seller has otherwise agreed to accept return of a product, Buyer shall (unless otherwise instructed in writing by Seller) (i) if the product is alleged to be defective, provide Seller with a written description in sufficient detail to allow Seller to confirm such defect; (ii) obtain a Return Merchandise Authorization ("RMA") number from Seller; (iii) if requested by Seller, provide written proof of purchase of the product (such as a copy of the dated purchase invoice for the product); (iv) after an RMA number is issued, package the product securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, with the RMA number prominently marked on the outside of the package; and (v) within fifteen (15) days of issuance of the RMA, ship the product at Buyer's sole expense to Seller or its distribution center, as indicated by Seller. In addition:

1. If the product is being returned for maintenance, calibration, recalibration or repair, Buyer must not include any manuals or accessories in the shipping package. Seller will only replace the defective portion of the product and will not ship back any accessories.
2. Buyer is responsible for all shipping charges to Seller. No Cash on Delivery ("COD") is allowed. Products sent COD will either be rejected by Seller or become the property of Seller, at Seller's sole discretion.
3. Buyer shall fully insure any product for return to Seller, and Seller shall in no event be responsible for any shipment lost in transit.
4. Repaired or replaced products will be shipped to Buyer via UPS Ground or any common carrier selected by Seller, with shipping charges prepaid by Seller. Expedited shipping is available if shipping charges are prepaid by Buyer and only upon request.
5. Seller may reject or return any product that is not packaged and shipped in strict compliance with the foregoing requirements or for which an RMA number has not been obtained or is not visible from the outside of the package. The product owner agrees to pay Seller's reasonable handling and return shipping charges for any product that is not packaged and shipped in accordance with the foregoing requirements or that is determined by Seller not to be defective or nonconforming.

SELLER'S LIABILITY FOR ALL CLAIMS, WHETHER BASED ON BREACH OF CONTRACT, NEGLIGENCE, PRODUCT LIABILITY, OR OTHERWISE, SHALL NOT EXCEED THE PRICE PAID BY BUYER FOR SUCH DEFECTIVE PRODUCT. IN NO EVENT WILL SELLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOSS OF USE, LOSS OF PROFIT, AND CLAIMS OF THIRD PARTIES), HOWEVER CAUSED, WHETHER BY THE NEGLIGENCE OF SELLER OR OTHERWISE.