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KCF technologies V4 Base Station User Guide

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Revision History

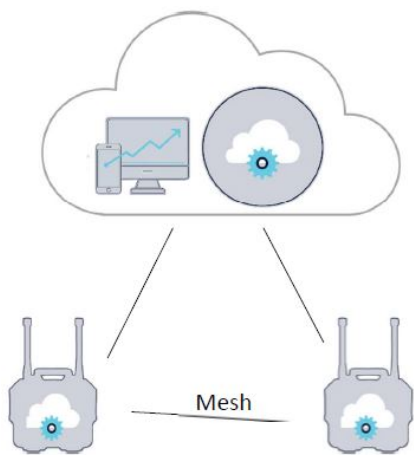| Date	Version	Author	Details
3/19/2021	A	M. Edwards	Document Published
8/24/2021	B	R. Tosto	Updated spec data, part numbers, installation reqs
11/10/2021	C	E. Adams	Updated section 3.2 LED 4/5 details
12/6/2021	D	R. Tosto	Updated section 3.2 LED details
1/19/2022	E	M. Gregory	Updated regulatory statements.
2/14/2022	F	R. Tosto	Added ICASA Type Approval
5/25/2022	G	R. Tosto	Updated accessories, dimensional views, certification status
11/28/2022	H	R. Tosto	Updated max power use; added PoE info; added mount dimensions and diagrams
12/21/2022	J	R. Tosto	Updated port information
1/19/2023	K	M. Gregory	Updated Industry Canada Statement

PRODUCT OVERVIEW

1. **Introduction**

   The Base Station is the central relay device between the SMARTdiagnostics IoT sensor networks and the internet. The Base Station has DARTwireless™ communication capabilities to interface with SMARTdiagnostics sensors while also having a combination of Ethernet, WIFI and/or Cellular connectivity to the SMARTdiagnostics cloud application.

2. How It Works

   The Base Station communicates with up to 100 wireless sensors at a time. It has two primary functions. First, it periodically pulls settings from the SMARTdiagnostics cloud application and ensures that the sensors

connected to it are operating properly and Second, it receives measurement data from those sensors, buffers the data locally and forwards the data to the cloud.

Additionally, the Base Station implements a 2.4GHz wireless mesh communication network between itself and its peers. This mesh provides the ability to communicate locally between Base Stations. This mesh creates multiple paths to the cloud such that not all Base Stations are required to be connected directly to the internet, but instead can forward their outbound traffic to a peer. The mesh also allows for running edge analytics algorithms.

PRODUCT SPECIFICATIONS

Base Station (SD-BASE-4)

General Specifications

Weight:	10lbs [4.5kg]
Enclosure Material:	Polycarbonate Alloy
Dimensions:	11.6 W x 15.5 H x 4.75 D [in] 295 W x 394 H x 121 D [mm]
Mounting:	Free standing (w/ tether) Universal Mount SD-MNT Magnet Mount SD-MNT-MAG (temporary)
Certifications:	UL, CE FCC CFR 47 Part 15 Subpart C Conforms to UL 62368-1 Cert. to CSA C22.2 No. 62368-1 Meets PTCRB and Verizon ODI Performance Requirements

Electrical Specifications

Input Power:	100 – 240VAC, 50/60 Hz, 20W max 802.3at PoE (eth1 port)
Power Cable:	2m, 5m, 10m lengths, STOOW NEMA 5-15P or 6-15P Optional: EU – CEE 7/7 UK – BS1363A
	Overvoltage Category II

Environmental Specifications

Operating & Storage Temperature:	-20ºC to 55ºC (-4ºF to 131º F)
IP Rating:	IP66 (in progress)
Hazardous Certification:	In progress
Use Case:	For UL compliance, indoor use only Outdoor rating in progress
Altitude:	2,000m:
Relative Humidity	0%-100%

Software and Connectivity

Operating System:	Linux
Network and Communications:	Ethernet (IEEE 802.3) Mesh WI-FI (IEEE 802.11) Cellular – LTE CAT12 Modem (call for specifics on supported Carriers)

Offline Data Caching During Network Outage: Example: 50 Vibration Sensors with one SD-BASE-4	• Stores up to 285,000 data samples • Automatic retransmission of cache when communication is restored	
	Collection Frequency	Days of Offline Storage
	1 minute	4 days
	10 minutes	40 days
	1 hour	238 days
Connectors:	2x Sealed ethernet (IP68, IP69) 1x Watertight 7/8-style AC power (IP68)	

Radio Approvals		
United States	FCC	Contains FCC IDs: Z5ISL1, N7NEM75, Z5IBMD345
Canada	IC	Contains ICs: 24664-SL1, 2417C-EM75, 24664-BMD345
South Africa	ICASA	TA-2021-3059

Port Information			
Destination	Port	Protocol	Purpose
c.kcftech.com	443	TCP (HTTPS)	SMARTdiagnostics Sensor Data REST API
connection.devicemanagement.kcftech.com	443	TCP (OpenSSL/VPN)	Remote Support and Management
certificates.devicemanagement.kcftech.com	443	TCP (HTTPS)	Certificate Renewal
updates.devicemanagement.kcftech.com	443	TCP (HTTPS)	Firmware and Security Updates
containers.devicemanagement.kcftech.com	443	TCP (HTTPS)	Edge Compute Container Deployment
time.devicemanagement.kcftech.com	123	UDP (NTPv4)	Time Synchronization
	4460	TCP (NTS-KE)	Time Synchronization
(Customer-specified DNS server IP)	53	TCP (DNS)	DNS Resolution
	53	UDP (DNS)	DNS Resolution

Part Numbers

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

SD-BASE-4-[cable length][location]-[country]					
Power Cable Length Options		**Location**		**Country Options**	
02	2-meter	**R**	Ordinary Location	**NA**	US/CAN/MEX
05	5-meter			**EU**	Europe
10	10-meter			**UK**	United Kingdom
				BR	Brazil
				SA	South Africa

Examples:

Base Station v4 w/ 2-meter power cable, ordinary location, for USA:
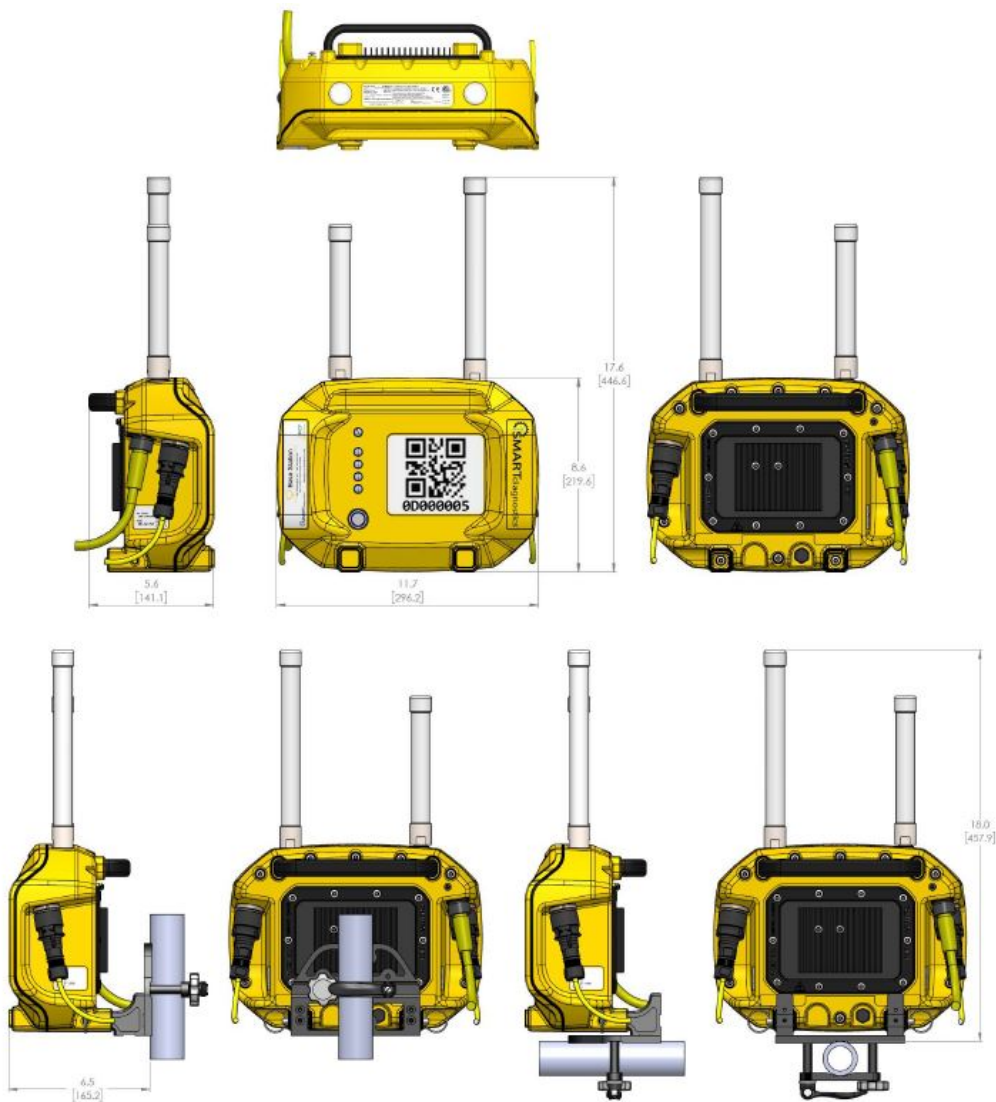SD-BASE-4-02R-NA
Base Station v4 w/ 5-meter power cable, ordinary location, for EU:
SD-BASE-4-05R-EU

Compatible Accessories

SD-MNT	Universal Mount (allows mounting to poles, walls, vehicles, etc.)
SD-MNT-MAG	Universal Mount, Magnet Variant (temporary use only)

Dimensions

Shown with SD-MNT in vertical and horizontal configurations

INSTALLATION AND SETUP

Installation Procedures
To install the Base Station, simply connect the provided power cable to the Base
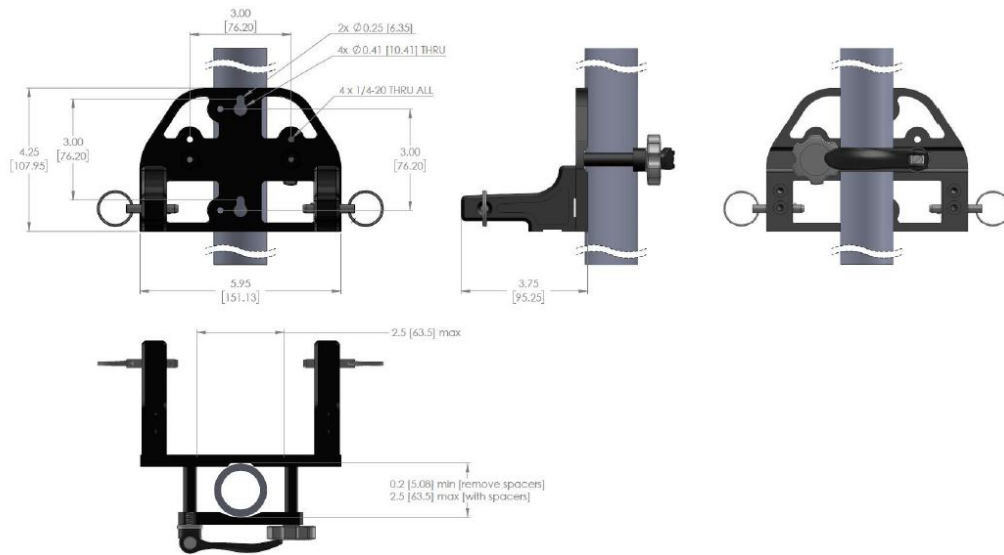Station and plug into an appropriate power source.
When the Base Station uses cellular or DHCP Ethernet connectivity to the cloud, it will connect automatically to the cloud and begin operating normally.
When connected to an Ethernet network requiring a static IP address or when connecting to WIFI additional configuration will be required. In these situations, work with the KCF Technical Product Center (TPC) to ensure proper configuration of the applicable network settings.

This product shall be securely mounted via:

- a Universal Mount (KCF Part Number SD-MNT)
- standing with antennas pointed up and retained with a safety strap through the handle and a fixed location to prevent drops (wire cable, safety wire, etc.)

This product must be serviced and installed by instructed persons only.
This product is intended for use in a restricted access area only.

SD-MNT Details Shown

Diagnostics
The Base Station has indicators on the front to aid in diagnosis connectivity and operations. The operation of these indicators is detailed here:

LED1 indicates hardware status
Blue, solid: Base Station is booting
Blue, pulsing: Base Station is running normally
Red, solid or blinking: Error

LED2 indicates the state of data collection

- **Green, solid:** Booting/startup
- **Blue, solid:** Delivering data
- **Blue, slow blinking:** Delivering data,but also caching
- **Blue, fast blinking:** Unable to deliver data, caching
- **Red, solid or blinking:** Error

LED3 indicates network connectivity

- **Green, solid:** Booting/startup

- **Blue, solid:** Can reach SmartDiagnostics
- **Red, solid or blinking:** Error

LED4 indicates connectivity to Mesh Network

- **Green, solid:** Booting/startup
- **Blue, solid:** Mesh Network is up and can see other BSv4s
- **Blue, blinking:** Mesh Network is up but cannot see other BSv4s
- **Red, solid or blinking:** Error

LED5 indicates environmental health of base station

- **Green, solid:** Booting/startup
- **Blue, solid:** Good
- **Blue, pulsing:** A health indicator is getting close to an extreme
- **Red, solid:** A health indicator is out of range
- **Red, blinking:** Error

PRODUCT SUPPORT, WARRANTY, AND CERTIFICATION INFORMATION

KCF Contact Information
If you need any assistance setting up and using your Base Station or
SMARTdiagnostics® system, please contact our team and we'll be happy to help!
KCF Technical Product Center: 814-867-4097 x2

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.

Certification Information

FCC STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
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 can void the user's authority to operate the equipment.

INDUSTRY CANADA STATEMENT
This device contains licence-exempt transmitter(s)/receiver(s) that comply with
Innovation, Science and Economic Development Canada's licence-exempt RSS(s).

Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

   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.

814.867.4097 (main office)
info@kcftech.com

Documents / Resources

KCF technologies V4 Base Station [pdf] User Guide
SL1, Z5ISL1, V4 Base Station, V4, Base Station, Station

References

- 🌐 **Machine Health Optimization | KCF Technologies**