

Manual for Sigfox Sensors - Type 2

Sigfox Sensors - Type 2 are Tilt sensor, Soil moisture, Humidity... the sensor with Blue box housing.

- [Manual for Sigfox-Ready AC Current Sensor - WSSFC-AC | FW1](#)
- [Manual for Sigfox-Ready Air/Gas Flow Sensor - WSSFC-M12F-AFD | FW1](#)
- [Manual for Sigfox-Ready Single-Axis Vibration Sensor - WSSFC-V1A | FW2](#)
- [Manual for Sigfox-Ready AC Current Sensor - WSSFC-AC | FW3](#)
- [Manual for Sigfox-Ready Single-Axis Vibration Sensor - WSSFC-V1A | FW3](#)

Manual for Sigfox-Ready AC Current Sensor - WSSFC-AC | FW1

THIS IS OBSOLETE MANUAL

Please access <https://www.iot.daviteq.com/wireless-sensors> for updated manual

Thank you very much for choosing Daviteq Wireless Sensors. We are the leading wireless sensor manufacturer in the World. We have a wide range of wireless sensors which support different connectivity like LoRaWAN, Sigfox, Sub-GHz, NB-IoT...Please find out more information at [this link](#).

This manual is applied to the following products

Item code	HW Version	Firmware Version	Remarks
WSSFC-AC-11	1.0	1.0	

Information Changes in this version v.s previous version

Item	Changes	Changed by	Changed Date	Approved by	Approved Date
1	Initial version	D.Q.Tuan	09-04-2022	N.V.Loc	28-06-2022

To use this product, please refer step by step to the below instructions.

[Operating Principle](#)

[Battery](#)

[Installation](#)

[Configuration](#)

[Specification](#)

[Uplink Payload](#)

[Connect to Sigfox Network](#)

[Troubleshooting](#)

[Calibration](#)

[Warranty and Support](#)

1. Quick Guide

Reading time: 10 minutes

i Finish this part so you can understand and put the sensor in operation with the default configuration from the factory.

1.1 What is the Sigfox-Ready AC Current Sensor and its principle of operation?

WSSFC-AC is a Sigfox-Ready sensor with an integrated AC current measuring transducer that can measure the AC current from a current transformer with max 5A AC current. It is compatible with any brand of current transformer (CT) on the market which gives an output max of 5A AC. The CT ratio will be selected based on the load current.

It is battery-operated and able to connect to any Sigfox network in the World. It supports all frequency zones such as RC1, RC2, RC3c, RC4, RC5, RC6, and RC7.

For the principle operation of the AC current sensor, please refer to [this link](#).


1.1.1 What are the typical applications of this sensor?

Please refer to [this link](#) for typical applications.


1.1.2 When does the device send uplink messages?

The device will send uplink messages in the following cases:

- **Case 1:** After power-up in the 60s, the device will send the first message called START_UP. The payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 2:** Then, in every interval time (pre-configured), for example, 10 minutes, it will send the message called CYCLIC_DATA. The payload will tell the user the following data like measured value (AC current value), battery level, alarm status...

 To change the cycle of data sending, you can change the value of the parameter: CYCLIC_DATA_PERIOD (default is 600 seconds).

- **Case 3:** In case the Alarm function was enabled (in the configuration of the sensor), if the measured value passed the threshold, it will send the uplink message immediately. This message is called ALARM. The payload also tells the user the data like measured value (AC current value), battery level, alarm status...

 The alarm thresholds can be changed via downlink or offline tools.

- **Case 4:** The HEART_BEAT uplink message will be sent once a day (the default setting, can be changed in configuration) to allow the Sigfox back-end system can send the downlink message for changing the configuration of the sensor. Please refer to the downlink section for more details. The uplink payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 5:** During commissioning, testing, or calibration sensor, the user can force the device to send the uplink message so that they can get the data immediately. This message is called FORCE_DATA. The payload will provide data like raw measured value, scaled measured value, battery level, alarm status... It can be forced by applying the magnet key on the reed switch in 1s;
- **Case 6:** In case users want to change the configuration immediately, they don't need to wait up to 1 day for the HEART_BEAT message, instead they can force the device to send a special uplink message so that the device can get the new downlink message. This uplink message is named PARAMETERS_UPDATE. It can be forced by applying the magnet key in more than 5s.

1.1.3 The important configuration parameters

The sensor was pre-configured at the factory with default values for configuration parameters that meet the most use cases. However, depending on the specific use case, the customer can adjust those parameters. Please refer to [section 3.2](#) for more details.

1.1.4 What kind of battery is used for this sensor?

The sensor is powered by 2 x AA 1.5V batteries for many years of operation. We do recommend using Energizer L91 battery which is very popular and high performance. This battery has a capacity of up to 3500mAh with a working temperature range from -40 to +60 oC. The instruction for installing the batteries is in [this link](#).




For Battery life estimation, please refer to [this link](#).

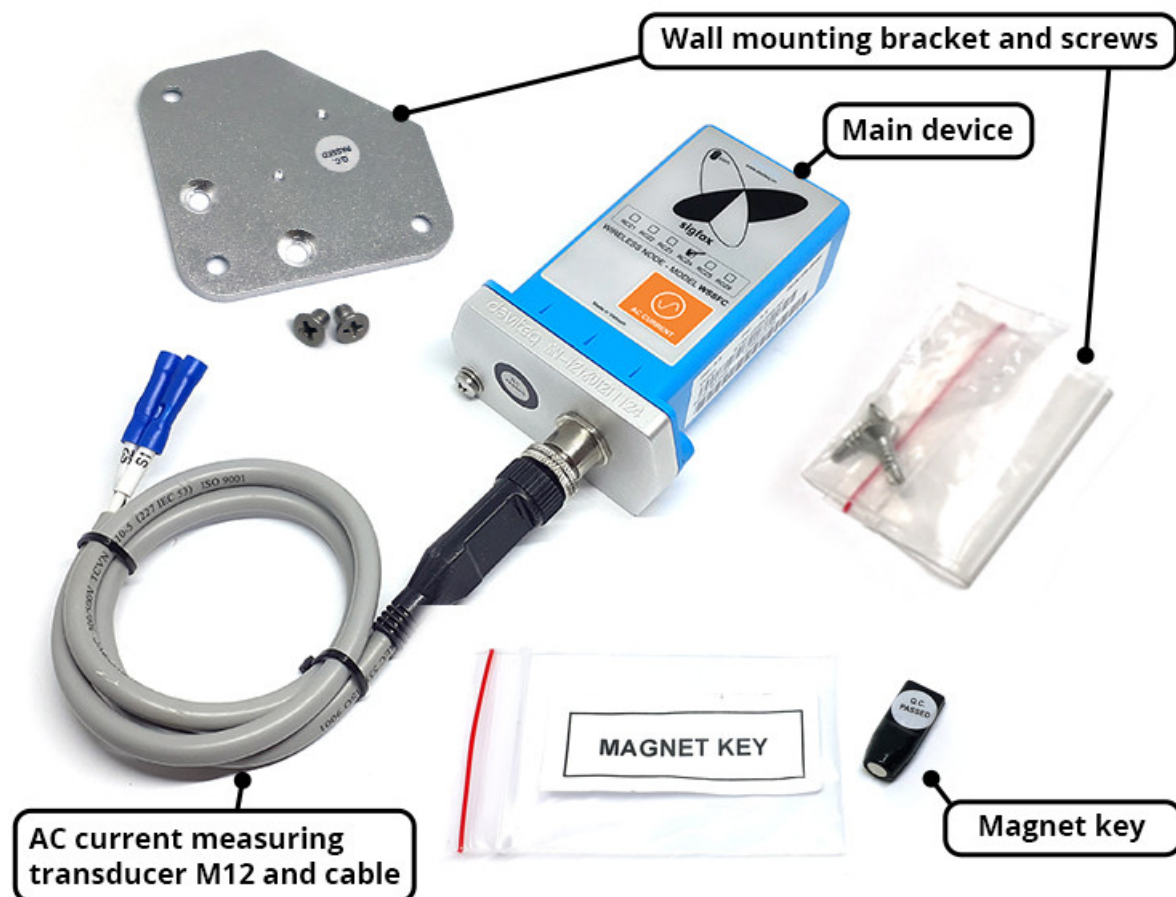
1.2 What's in the package?

The package includes:

01 x Main device

 01 x AC current measuring transducer M12 and cable

01 x Magnet key



1.3 Quick Test

With the default configuration, the device can be connected quickly to the Sigfox Network by the following steps.

Step 1: Prepare the values of communication settings:

Device ID	Get Device ID on the device nameplate
Device PAC	Get Device PAC on the device nameplate

Note: All Sigfox sensors are pre-configured with the correct RC before delivery. The settings of Device ID, **i** Device PAC, and RC could be also read from the device memory map. Please reference section **3.2 Sensor configuration** for details.

Step 2: Add the device to Sigfox Backend

Please refer to [this link](#) for details

Step 3: Install the batteries to the device

Please refer to [this link](#) for instructions on battery installation.

After installing the battery in 60 seconds, the first data packet will be sent to the Sigfox network. After receiving **✓** the first data packet, the time of another packet depends on the value of the parameter: **CYCLIC_DATA_PERIOD**. Additionally, you can use a Magnet Key to force the device to send data instantly.

Step 4: Decode the payload of receiving package

Please refer to section **1.4 Uplink Payload and Data Decoding** for details of decoding the receiving packet to get

the measured values.

1.4 Uplink Payload and Data Decoding

For the Uplink Payload structure, please refer to [this link](#).

 **Note:** Please select the right Payload document to suit the FW version of the sensor

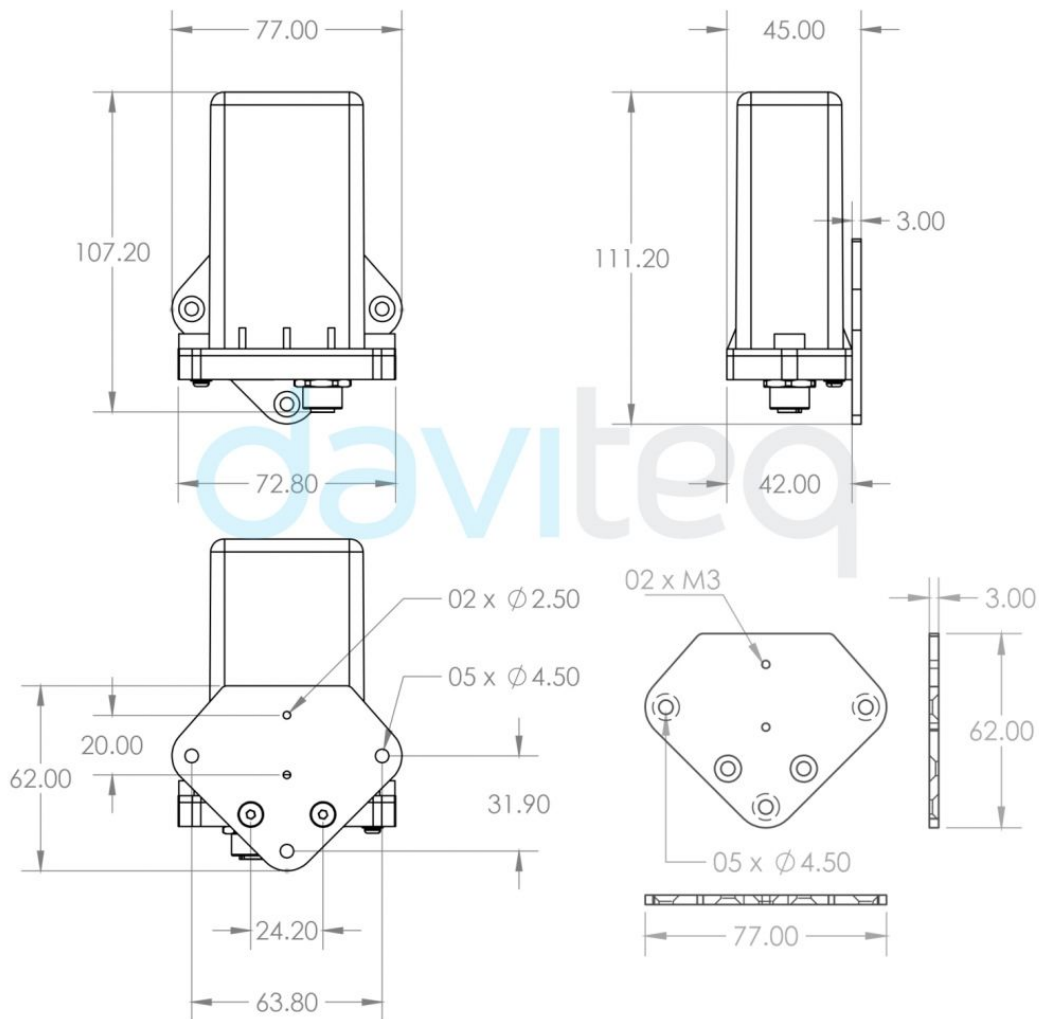
1.5 Sensor Installation

SAFETY ATTENTION:

- TO REPLACE BATTERIES OR SERVICE THE MAIN DEVICE, PLEASE PAY ATTENTION TO THE ELECTRICAL SHOCK THAT MAY HAPPEN DUE TO THE PROBLEM OF THE AC CURRENT CABLE OR FAILURE OF THE CURRENT TRANSFORMER. FOR SAFETY REASONS, REMOVE THE AC CURRENT TRANSDUCER OUT OF THE MAIN DEVICE BY UN-SCREWING THE M12 CONNECTOR BEFORE OPENING THE PLASTIC HOUSING OF THE MAIN DEVICE;
- ONLY QUALIFIED ELECTRICAL TECHNICIANS CAN HANDLE THIS DEVICE FOR INSTALLATION, MAINTENANCE, AND OPERATION;
- USE THE HEAT-SHRINK PVC TUBE TO PROTECT THE CONNECTIONS ON THE CABLE OF THE AC CURRENT AND AVOID THE WATER CONTACT WITH THOSE ELECTRICAL CONNECTIONS.

DIMENSIONS OF PRODUCT

DIMENSION DRAWING OF WIRELESS SENSOR (Unit: mm)



WSSFC-AC-H4.JPG

The Sigfox-Ready AC current sensor is a combination of a wireless transmitter and an AC current transducer. Therefore, the installation will be divided into 02 parts:

- Installation for the wireless transmitter: these steps are to make sure the device sends data successfully;
- Installation for AC current circuit: these steps are to make sure the device to measure correctly.

⚠ Please follow the orders of steps strictly as below.

1.5.1 Preparation of the locations

- Locate the place to mount the CT, the place that is to measure the load current;
- Locate the place to mount the Wireless transmitter to get the best RF signal. As the AC current transducer will be attached to the wireless transmitter, please make sure the cable length is enough for the distance from CT to the wireless transmitter;

i To get a strong RF signal please refer to [this link](#).

1.5.2 Wireless Transmitter Installation

- Mount the wireless transmitter on the wall or outside the wall of the electrical panel. The antenna part must be higher than the highest point of the electrical panel. Then connect the grounding wire from the base of the wireless transmitter (if available) to the grounding system of the facility. Please check this link for the [mounting](#)

guide;

- Insert the batteries into the wireless transmitter and check the system to see whether the wireless transmitter already sent the first message to the system? Please follow this link to know how to [install the batteries](#).

ATTENTION:



REVERSED POLARITY OF BATTERIES IN 10 SECONDS CAN DAMAGE THE SENSOR CIRCUIT!!!

1.5.3 CT Installation

⚠ Shut down the main load before installing the CT

- For closed-type CT, please shut down the main load before installing the CT.
- For clamp-type CT, it is possible to install the CT onto the load wire, however, we highly recommend shutting down the main load for safety reasons.

⚠ Danger: be aware of electrical shock with AC voltage!

1.5.4 Connect the CT with the AC current transducer

Use the crimping tool to make the connection and protect the connection with a PVC heat shrink tube as [this link](#).

1.5.5 Connect the AC transducer to Wireless Transmitter

Connect the AC transducer to the wireless transmitter via the M12 connector as [this link](#).

1.5.6 Device calibration

The Sigfox-Ready AC current transducer is produced with accuracy as published in the [specification](#) of the product and is ready to use. However, the user can re-calibrate the sensor again when necessary, please follow the steps in [this link](#).

1.5.7 Turn on the Main load again

After connecting, the sensor will send the data to the system with the value = zero (no AC current). Then you can turn ON the main load again to put the system into the operation.

You can use a clamp-type ampere meter to validate the value reading from the system. Please make sure the two comparison values must be collected at the same time.

2. Maintenance

2.1 Troubleshooting

- **Problems with Sigfox communication** like not receiving the packets...please refer to [this link](#) to troubleshoot the device.
- **Problems with the sensor functions** like not measuring, or inaccurate measuring....please refer to [this link](#) to troubleshoot the sensor part.

2.2 Sensor maintenance

Maintenance works	Yes/No	Descriptions
Consumable parts replacement	No	The Sigfox-Ready AC current sensor has no consumable part, so there is no need to replace any parts.
Cleaning sensor or device	No	

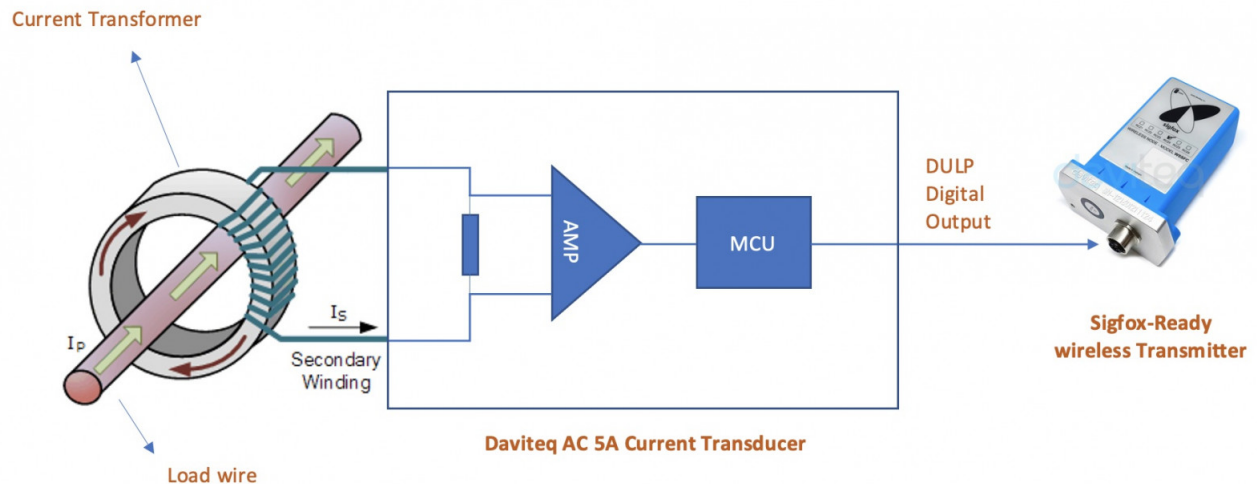
3. Advanced Guide

3.1 Operating principle of the Sigfox-Ready AC current sensor

3.1.1 Operating principle of the complete device

The Daviteq Sigfox-Ready AC current sensor comprises 02 parts connected together as shown below picture.

- The Daviteq Sigfox-Ready wireless transmitter;
- The Daviteq AC 5A current Transducer;



The AC current transducer is to measure the actual AC current of the secondary winding of the CT.

The Sigfox-Ready is to read the AC current value from the transducer and perform the scaling (A and B values, during calibration). The scaled current will be multiplied by the CT ratio to deliver the final value which is the actual load current that the user wants to measure.

$$\text{Scaled_CT_Current} = A \times \text{CT_Current} + B$$

$$\text{Actual_Load_Current} = \text{Scaled_CT_Current} \times \text{CT}$$

Where:

A : Constant A

B : Constant B

CT_current: the measured current from the transducer (Secondary winding current of the CT)

✓ For example: the CT_current = 1.5A, the CT ratio = 20 (the CT is 100/5), A=1, B=0 ==> then the Actual_Load_Current = 1.5 x 20 = 30A

⚠ **Note:** the Low cut value of Actual_Load_Current is 0.5A. That meant the device can not measure the current load less than 0.5A

3.1.2 Operating principle of AC current transducer

To understand how the AC current transducer can measure AC current, please refer to [this link](#) for a complete understanding of this measuring technique.

3.1.3 Some important configuration parameters

Below are some important configuration parameters which affect the operation of the device like battery life, measurement accuracy, and alert threshold.

For Battery life estimation, please refer to this link.

- **measure_period | Default = 600s**

This is the time period for the wireless transmitter to wake up and take the measurement from the transducer. The default value is 600s. Users can reduce this value, but smaller value, shorter battery life!

- **cyclic_data_period | Default = 600s**

Interval time to send an uplink message regardless of any conditions

- **sensor_boot_time | Default = 1000mS**

This value will affect the measurement accuracy. **DO NOT change this value!**

Those configuration parameters can be changed by downlink or offline tools. For more other configuration parameters, please refer to the next section.

3.2 Sensor Configuration

3.2.1 How to configure the Sigfox-Ready AC Current Sensor?

Sensor configuration can be configured in 02 methods:

- **Method 1:** Configuring via Downlink message. Please find the instructions in [this link](#), but please take note of the **FW version of the Document**.
- **Method 2:** Configuring via [offline cable](#).

Note: THE SENSOR IS ONLY ACTIVE FOR OFFLINE CONFIGURATION IN THE FIRST 60 SINCE POWER UP BY BATTERY OR PLUGGING THE CONFIGURATION CABLE.

3.2.2 What parameters of the device are configured?

- Some parameters are read-only, and some are read and writeable.
- To read the parameters, use the off-line cable as above instruction.
- Via uplink message, users can read only one parameter, which is the CURRENT_CONFIGURATION.


Below tables are the lists of the parameters of the device.

Read-only Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	No. of Registers	Description	Range	Format	Property	Comment
2	2	3	4	FW_VERSION		string	Read	
6	6	3	2	HW_VERSION		string	Read	
8	8	3	2	DEVICE_ID		hex	Read	Product ID
10	A	3	4	DEVICE_PAC		hex	Read	Product PAC
14	E	3	1	SENSOR_TYPE	1-255	uint16	Read	Sensor or Input Type

Read/Write Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	Function Code (Write)	No. of Register	Description	Range	Default	Format	Property	Comment
270	10E	3	16	4	CURRENT			hex	Read/Write	Check the Payload Decoding section: <i>5.Payload for downlink message</i> for more information
274	112	3	16	1	SERVER_C			uint16	Read/Write	0: Send to Sigfox Network 1: Send to Dongle
276	114	3	16	1	RADIO_CO	1-4	4	uint16	Read/Write	RC zones selection 1, 2, 3, 4 is RC1, RC2, RC3s, RC4
277	115	3	16	1	TX_POWER		20	int16	Read/Write	RF Tx power
278	116	3	16	2	CONSTAN		1	float	Read/Write	Constant a for scaling measured value
280	118	3	16	2	CONSTAN		0	float	Read/Write	Constant b for scaling measured value
282	11A	3	16	2	HIGH_CUT		1E+09	float	Read/Write	High cut value for the calculated value
284	11C	3	16	2	LOW_CUT		0,5	float	Read/Write	Low cut value for the calculated value
286	11E	3	16	2	SENSOR_I		1000	uint32	Read/Write	Boot time of sensor/input in ms

306	132	3	16	2	CT		40	float	Read/Wri	CT of current transformer
										

3.3 Calibration for Sigfox-Ready AC current transducer

Please refer to [this link](#).

4. Product specification

Please refer to the detailed specifications in [this link](#).

5. Warranty and Support

For warranty terms and support procedures, please refer to [this link](#).

6. References

Use-cases:

Case studies:

White-papers:

END.

Manual for Sigfox-Ready Air/Gas Flow Sensor - WSSFC-M12F-AFD | FW1

THIS IS OBSOLETE MANUAL

Please access <https://www.iot.daviteq.com/wireless-sensors> for updated manual

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This manual is applied to the following products

Item code	HW Version	Firmware Version	Remarks
WSSFC-M12F-AFD		1	

Product Features

Connectivity Type	Sigfox
Product Type	2 parts
Mounting Type	Direct process mounting for the whole set
Powered by	2 x AA batteries 1.5V

Information Changes in this version v.s previous version

Item	Changes	Changed by	Changed Date	Approved by	Approved Date
1	Initial version	D.Q.Tuan	26-08-2022	N.V.Loc	05-09-2022

To use this product, please refer step by step to the below instructions.

[Operating Principle](#)

[Battery](#)

[Installation](#)

[Configuration](#)

[Specification](#)

[Uplink Payload](#)

[Connect to Sigfox Network](#)


[Troubleshooting](#)

[Calibration](#)

[Warranty and Support](#)

1. Quick Guide

Reading time: 10 minutes

 Finish this part so you can understand and put the sensor in operation with the default configuration from the factory.

1.1 What is the Sigfox-Ready AFD Air/Gas Flow Sensor and its principle of operation?

WSSFC-M12F-AFD is a Sigfox-Ready node to work with an AFD probe for measuring the Air/Gas Flow in a pipe or duct.

It is battery-operated and able to connect to any Sigfox network in the World. It supports all frequency zones such as RC1, RC2, RC3c, RC4, RC5, RC6, and RC7.

For the principle operation of the AFD probe, please refer to [this link](#).

1.1.1 What are the typical applications of this sensor?

Please refer to [this link](#) for typical applications.

1.1.2 When does the device send uplink messages?

The device will send uplink messages in the following cases:

- **Case 1:** After power-up in the 60s, the device will send the first message called START_UP. The payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 2:** Then, in every interval time (pre-configured), for example, 10 minutes, it will send the message called CYCLIC_DATA. The payload will tell the user the following data like measured value (AC current value), battery level, alarm status...

i To change the cycle of data sending, you can change the value of the parameter: CYCLIC_DATA_PERIOD (default is 600 seconds).

- **Case 3:** If the Alarm function was enabled (in the configuration of the sensor), if the measured value passed the threshold, it will send the uplink message immediately. This message is called ALARM. The payload also tells the user the data like measured value (AC current value), battery level, alarm status...

i The alarm thresholds can be changed via downlink or offline tools.

- **Case 4:** The HEART_BEAT uplink message will be sent once a day (the default setting can be changed in configuration) to allow the Sigfox back-end system can send the downlink message for changing the configuration of the sensor. Please refer to the downlink section for more details. The uplink payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 5:** During commissioning, testing, or calibration sensor, the user can force the device to send the uplink message to get the data immediately. This message is called FORCE_DATA. The payload will provide data like raw measured value, scaled measured value, battery level, alarm status... It can be forced by applying the magnet key on the reed switch in 1s;
- **Case 6:** If users want to change the configuration immediately, they don't need to wait up to 1 day for the HEART_BEAT message, instead they can force the device to send a special uplink message so that the device can get the new downlink message. This uplink message is named PARAMETERS_UPDATE. It can be forced by applying the magnet key in more than 5s.

1.1.3 The important configuration parameters

The sensor was pre-configured at the factory with default values for configuration parameters that meet most use cases. However, depending on the specific use case, the customer can adjust those parameters. Please refer to [section 3.2](#) for more details.

1.1.4 What kind of battery is used for this sensor?

The sensor is powered by 2 x AA 1.5V batteries for many years of operation. We do recommend using Energizer L91 battery which is very popular and high performance. This battery has a capacity of up to 3500mAh with a working temperature range from -40 to +60 oC. The instruction for installing the batteries is in [this link](#).



Figure 1. Battery Energizer L91

For Battery life estimation, please refer to this link.

1.2 What's in the package?

The package includes:

- 01 x Main device
- 01 x Magnet key
- 01 x Wall mounting bracket and screws
- 01 x AFD flow sensor probe (order separately with item code AFD-....)



Figure 2. Product package of WSSFC-M12F-AFD



Figure 3. Product package of AFD-....

1.3 Quick Test

With the default configuration, the device can be connected quickly to the Sigfox Network by the following steps.

Step 1: Prepare the values of communication settings:

Device ID	Get Devive ID on the device nameplate
-----------	--

Device PAC	Get Devive PAC on the device nameplate
------------	---

Note: All Sigfox sensors are pre-configured with the correct RC before delivery. The settings of Device ID, Device PAC, and RC could also be read from the device memory map. Please reference section **3.2 Sensor configuration** for details.

Step 2: Add the device to Sigfox Backend

Please refer to [this link](#) for details

Step 3: Install the batteries to the device

Please refer to [this link](#) for instructions on battery installation.

After installing the battery in 60 seconds, the first data packet will be sent to the Sigfox network. After receiving the first data packet, the time of another packet depends on the value of the parameter: **CYCLIC_DATA_PERIOD**. Additionally, you can use a Magnet Key to force the device to send data instantly.

Step 4: Decode the payload of receiving package

Please refer to section **1.4 Uplink Payload and Data Decoding** for details of decoding the receiving packet to get the measured values.

1.4 Uplink Payload and Data Decoding

For the Uplink Payload structure, please refer to [this link](#).

Note: Please select the right Payload document to suit the FW version of the sensor

1.5 Sensor Installation

DIMENSIONS OF PRODUCT

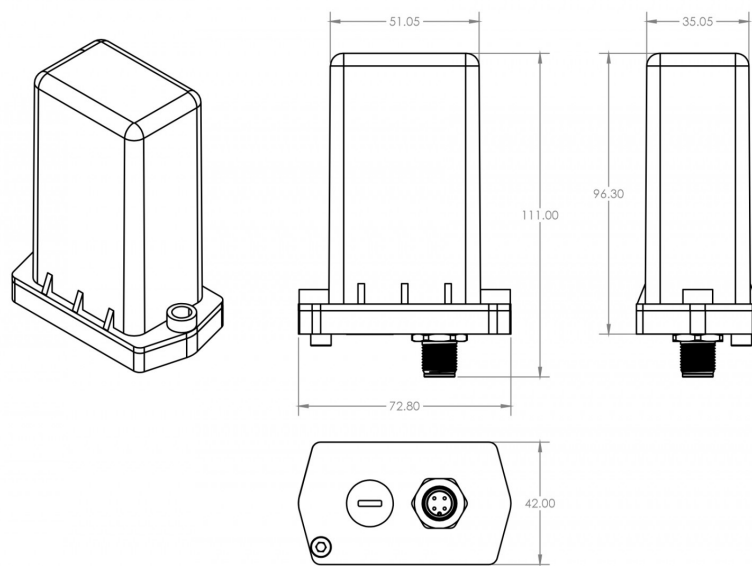


Figure 4. Dimensions of WSSFC-M12F-AFD

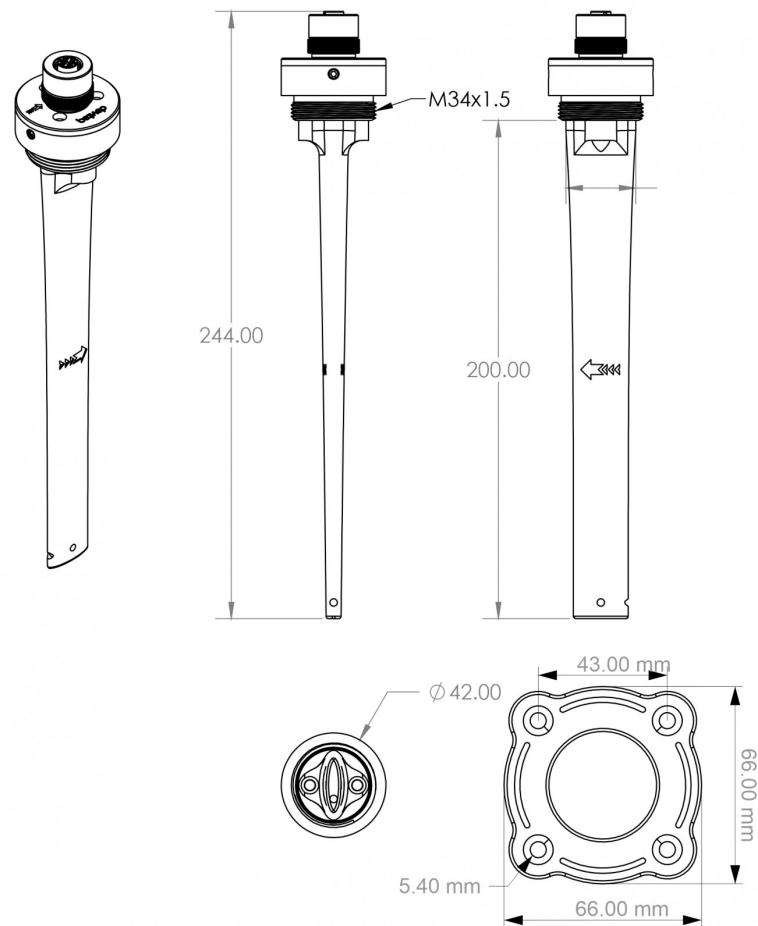


Figure 5. Dimensions of AFD-0200

1.5.1 Installation

The Sigfox-Ready AFD Air/Gas flow sensor combines a wireless transmitter WSSFC-M12F-AFD and an AFD Air/Gas Flow Sensor. Therefore, the installation will be divided into 02 parts:

+ Installation for AFD Air/Gas Flow Sensor: these steps are to make sure the device to measure correctly. Please follow [this link](#).

+ Installation for the wireless transmitter: these steps ensure the device sends data successfully. Please see below the steps

- Insert the batteries into the wireless transmitter and check the system to see whether the wireless transmitter already sent the first message to the system. Please follow this link to learn how to [install the batteries](#).

ATTENTION:



REVERSED POLARITY OF BATTERIES IN 10 SECONDS CAN DAMAGE THE SENSOR CIRCUIT!!!

- Attach the wireless transmitter to the AFD probe as below figures.



Figure 6. Complete set of WSSFC-M12F-AFD and AFD-0200

1.5.2 Device calibration & configuration

Please refer to [this link](#).

2. Maintenance

2.1 Troubleshooting

- **Problems with Sigfox communication** like not receiving the packets...please refer to [this link](#) to troubleshoot the device.
- **Problems with the sensor functions** like not measuring or inaccurate measuring....please refer to [this link](#) to troubleshoot the sensor part.

2.2 Device maintenance

2.2.1 Maintenance for Wireless transmitter WSSFC-M12F-AFD

Maintenance works	Yes/No	Descriptions
Consumable parts replacement	Yes	The battery is the only part need to check the lifetime to replace. Check the battery status on the back-end system.
Cleaning device	No	
Re-calibration / Re-validation	No	No calibration is required for the wireless transmitter.

2.2.2 Maintenance for AFD flow probe

Please refer to [this link](#).

3. Advanced Guide

3.1 Operating principle of the Sigfox-Ready AFD Air/Gas Flow Sensor

3.1.1 Operating principle of the complete device

The Daviteq Sigfox-Ready AFD Air/Gas Flow sensor comprises 02 parts connected together as shown below picture.

- The Daviteq Sigfox-Ready wireless transmitter WSSFC-M12F-AFD
- The Daviteq AFD Air/Gas Flow Sensor AFD-...



Figure 7. Complete set of WSSFC-M12F-AFD and AFD-0200

The AFD Air/Gas Flow Sensor measures pressure and temperature... in the duct or pipe.

The Sigfox-Ready wireless transmitter is to read the parameters of the probe like differential pressure, temperature, and error code... and performs the scaling and calculation to deliver the fluid velocity in the duct or pipe.

3.1.2 Operating principle of AFD Air/Gas Flow Sensor

To understand how the AFD Air/Gas Flow Sensor works, please refer to [this link](#) for a complete understanding of this measuring technique.

3.1.3 Some important configuration parameters

Below are some important configuration parameters which affect the operation of the device like battery life, measurement accuracy, and alert threshold.

For Battery life estimation, please refer to this link.

- **measure_period | Default = 600s**

This is the time period for the wireless transmitter to wake up and take the measurement from the transducer. The default value is 600s. Users can reduce this value, but smaller value, shorter battery life!

- **cyclic_data_period | Default = 1800s**

Interval time to send an uplink message regardless of any conditions

- **sensor_boot_time | Default = 200mS**

This value will affect the measurement accuracy. **DO NOT change this value!**

- **density_of_fluid | Default = 1.225 (Air)**

This value will affect the measurement accuracy.

Those configuration parameters can be changed by downlink or offline tools. For more other configuration parameters, please refer to the next section.

3.2 Sensor Configuration

3.2.1 How to configure the Sigfox-Ready AFD Air/Gas Flow Sensor?

Sensor configuration can be configured in 02 methods:

- **Method 1:** Configuring via Downlink message. Please find the instructions in [this link](#), but please take note of the **FW version of the Document**.
- **Method 2:** Configuring via **offline cable**.



Note: THE SENSOR IS ONLY ACTIVE FOR OFFLINE CONFIGURATION IN THE FIRST 60 SINCE POWER UP BY BATTERY OR PLUGGING THE CONFIGURATION CABLE.

3.2.2 What parameters of the device are configured?

- Some parameters are read-only, and some are read and writeable.
- To read the parameters, use the off-line cable as above instruction.
- Via uplink message, users can read only one parameter, which is the CURRENT_CONFIGURATION.

Below tables are the lists of the parameters of the device.

Read-only Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	No. of Registers	Description	Range	Format	Property	Comment
2	2	3	4	FW_VERSION		string	Read	
6	6	3	2	HW_VERSION		string	Read	
8	8	3	2	DEVICE_ID		hex	Read	Product ID
10	A	3	4	DEVICE_PAC		hex	Read	Product PAC
14	E	3	1	SENSOR_TYPE	1-255	uint16	Read	Sensor or Input Type

Read/Write Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	Function Code (Write)	No. of Register	Description	Range	Default	Format	Property	Comment
270	10E	3	16	4	CURRENT			hex	Read/Wri	Check the Payload Decoding section: <i>5.Payload for downlink message</i> for more information
274	112	3	16	1	SERVER_C		0	uint16	Read/Wri	0: Send to Sigfox Network 1: Send to Dongle
276	114	3	16	1	RADIO_CO	1-4	4	uint16	Read/Wri	RC zones selection 1, 2, 3, 4 is RC1, RC2, RC3s, RC4
277	115	3	16	1	TX_POWER		20	int16	Read/Wri	RF Tx power
278	116	3	16	2	CONSTAN		1	float	Read/Wri	Constant a for scaling measured value
280	118	3	16	2	CONSTAN		0	float	Read/Wri	Constant b for scaling measured value
282	11A	3	16	2	HIGH_CUT		1E+09	float	Read/Wri	High cut value for the calculated value
284	11C	3	16	2	LOW_CUT		0	float	Read/Wri	Low cut value for the calculated value
286	11E	3	16	2	SENSOR_I		200	uint32	Read/Wri	Boot time of sensor/input in ms

307	133	3	16	1	TEMPERA		0	int16	Read/Wri	Offset adjustment for measured temperature value
308	134	3	16	2	DENSITY_		1.225	float	Read/Wri	Fluid Density, default is Air

3.3 Calibration for Sigfox-Ready AFD Air/Gas Flow Sensor

Please refer to [this link](#).

4. Product specification

Please refer to the detailed specifications in [this link](#).

5. Warranty and Support

For warranty terms and support procedures, please refer to [this link](#).

6. References

Use-cases:

Case studies:

White-papers:

END.

Manual for Sigfox-Ready Single-Axis Vibration Sensor - WSSFC-V1A | FW2

THIS IS OBSOLETE MANUAL

Please access <https://www.iot.daviteq.com/wireless-sensors> for updated manual

Thank you very much for choosing Daviteq Wireless Sensors. We are the leading wireless sensor manufacturer in the World. We have a wide range of wireless sensors which support different connectivity like LoRaWAN, Sigfox, Sub-GHz, NB-IoT...Please find out more information at [this link](#).

This manual is applied to the following products

Item code	HW Version	Firmware Version	Remarks
WSSFC-V1A-025		2	

Product Features

Connectivity Type	Sigfox
Product Type	2 parts
Mounting Type	Direct process mounting for sensor, wall mount for transmitter
Powered by	2 x AA batteries 1.5V

Information Changes in this version v.s previous version

Item	Changes	Changed by	Changed Date	Approved by	Approved Date
1	Initial version	D.Q.Tuan	29-08-2022	N.V.Loc	05-09-2022

To use this product, please refer step by step to the below instructions.

[Operating Principle](#)

[Battery](#)

[Installation](#)

[Configuration](#)

[Specification](#)

[Uplink Payload](#)

[Connect to Sigfox Network](#)

[Troubleshooting](#)

[Calibration](#)

[Warranty and Support](#)

1. Quick Guide

Reading time: 10 minutes

- Finish this part so you can understand and put the sensor in operation with the default configuration from the factory.

1.1 What is the Sigfox-Ready V1A Single-Axis Vibration Sensor and its principle of operation?

WSSFC-V1A is a cost-effective, single-axis vibration sensor designed for condition monitoring and preventive maintenance applications. The piezo-electric accelerometer is available in ranges $\pm 25g$ or $50g$ and features a flat frequency response up to $>10kHz$. Its accelerometer feature a stable piezo-ceramic crystal in shear mode with low-power electronics, sealed in a fully hermetic package. The Piezo Electric technology incorporated in the WSSFC-V1A accelerometer has a proven track record for offering the reliable and long-term stable output required for condition monitoring applications. The accelerometer is designed and qualified for machine health monitoring and has superior Resolution, Dynamic Range, and Bandwidth to MEMS devices. Besides that, it can also measure the temperature at the mounting point.

It is battery-operated and able to connect to any Sigfox network in the World. It supports all frequency zones such as RC1, RC2, RC3c, RC4, RC5, RC6, and RC7.

For the principle operation of the V1A single-axis vibration sensor, please refer to [this link](#).


1.1.1 What are the typical applications of this sensor?

Please refer to [this link](#) for typical applications.


1.1.2 When does the device send uplink messages?

The device will send uplink messages in the following cases:

- **Case 1:** After power-up in the 60s, the device will send the first message called START_UP. The payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 2:** Then, in every interval time (pre-configured), for example, 10 minutes, it will send the message called CYCLIC_DATA. The payload will tell the user the following data like measured values, battery level, alarm status...

 To change the cycle of data sending, you can change the value of the parameter: CYCLIC_DATA_PERIOD (default is 600 seconds).

- **Case 3:** If the Alarm function was enabled (in the configuration of the sensor), if the measured value passed the threshold, it will send the uplink message immediately. This message is called ALARM. The payload also tells the user the data like measured values, battery level, alarm status...

 The alarm thresholds can be changed via downlink or offline tools.

- **Case 4:** The HEART_BEAT uplink message will be sent once a day (the default setting can be changed in configuration) to allow the Sigfox back-end system can send the downlink message for changing the configuration of the sensor. Please refer to the downlink section for more details. The uplink payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 5:** During commissioning, testing, or calibration sensor, the user can force the device to send the uplink message to get the data immediately. This message is called FORCE_DATA. The payload will provide data like raw measured value, scaled measured value, battery level, alarm status... It can be forced by applying the magnet key on the reed switch in 1s;
- **Case 6:** If users want to change the configuration immediately, they don't need to wait up to 1 day for the HEART_BEAT message, instead they can force the device to send a special uplink message so that the device can get the new downlink message. This uplink message is named PARAMETERS_UPDATE. It can be forced by applying the magnet key in more than 5s.

1.1.3 The important configuration parameters

The sensor was pre-configured at the factory with default values for configuration parameters that meet most use cases. However, depending on the specific use case, the customer can adjust those parameters. Please refer to [section 3.2](#) for more details.

1.1.4 What kind of battery is used for this sensor?

The sensor is powered by 2 x AA 1.5V batteries for many years of operation. We do recommend using Energizer L91 battery which is very popular and high performance. This battery has a capacity of up to 3500mAh with a working temperature range from -40 to +60 oC. The instruction for installing the batteries is in [this link](#).



Figure 1. Battery Energizer L91

For Battery life estimation, please refer to this link.

1.2 What's in the package?

The package includes:

- 01 x Main device with 2m M12 cable
- 01 x Magnet key
- 01 x Wall mounting bracket and screws
- 01 x Vibration sensor module V1A



Figure 2. Product package of WSSFC-V1A-025

1.3 Quick Test

With the default configuration, the device can be connected quickly to the Sigfox Network by the following steps.

Step 1: Prepare the values of communication settings:

Device ID	Get Device ID on the device nameplate
Device PAC	Get Device PAC on the device nameplate

- Note:** All Sigfox sensors are pre-configured with the correct RC before delivery. The settings of Device ID, Device PAC, and RC could also be read from the device memory map. Please reference section [3.2 Sensor configuration](#) for details.

Step 2: Add the device to Sigfox Backend

Please refer to [this link](#) for details

Step 3: Install the batteries to the device

Please refer to [this link](#) for instructions on battery installation.

After installing the battery in 60 seconds, the first data packet will be sent to the Sigfox network. After receiving the first data packet, the time of another packet depends on the value of the parameter: **CYCLIC_DATA_PERIOD**. Additionally, you can use a Magnet Key to force the device to send data instantly.

Step 4: Decode the payload of receiving package

Please refer to section **1.4 Uplink Payload and Data Decoding** for details of decoding the receiving packet to get the measured values.

1.4 Uplink Payload and Data Decoding

For the Uplink Payload structure, please refer to [this link](#).

Note: Please select the right Payload document to suit the FW version of the sensor

1.5 Sensor Installation

1.5.1 Dimension drawings

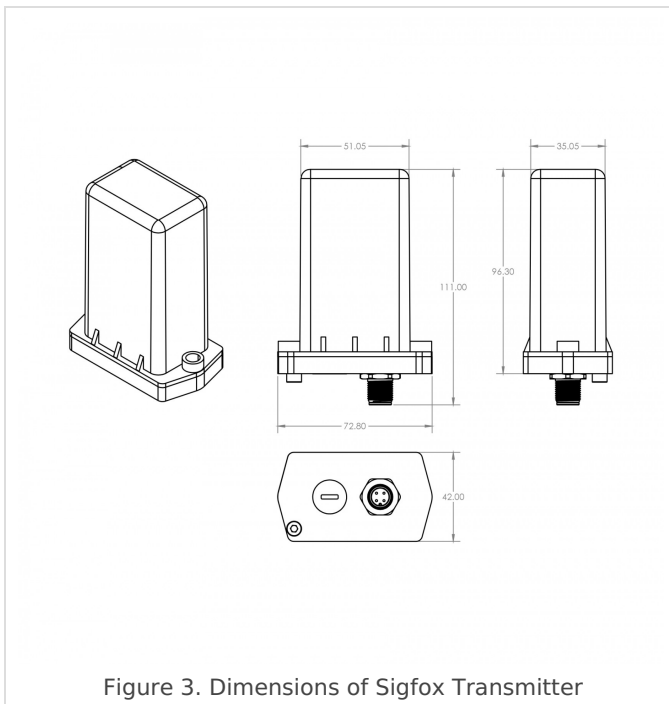


Figure 3. Dimensions of Sigfox Transmitter

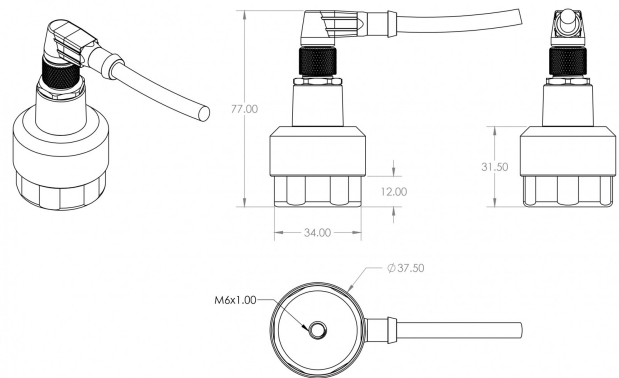


Figure 4. Dimensions of V1A vibration sensor module

1.5.2 Installation

The Sigfox-Ready V1A vibration sensor combines a wireless transmitter WSSFC and a V1A vibration sensor. Therefore, the installation will be divided into 02 parts:

INSTALLATION GUIDE FOR V1A SENSOR MODULE

INSTALLATION GUIDE FOR WIRELESS TRANSMITTER. PLEASE SEE THE BELOW STEPS.

- Mount the wireless transmitter on the wall or a pole nearby the object to monitor the vibration. The wireless transmitter must be mounted at the minimum level of 2m from the ground for a better RF signal. To get the strongest RF signal, please follow [this link](#).
- How to mount it with a mounting bracket? please check [this guide](#).
- Insert the batteries into the wireless transmitter and check the system to see whether the wireless transmitter already sent the first message to the system. Please follow this link to learn how to [install the batteries](#).

ATTENTION:



- Connect the M12 cable to the V1A sensor module as below figure.

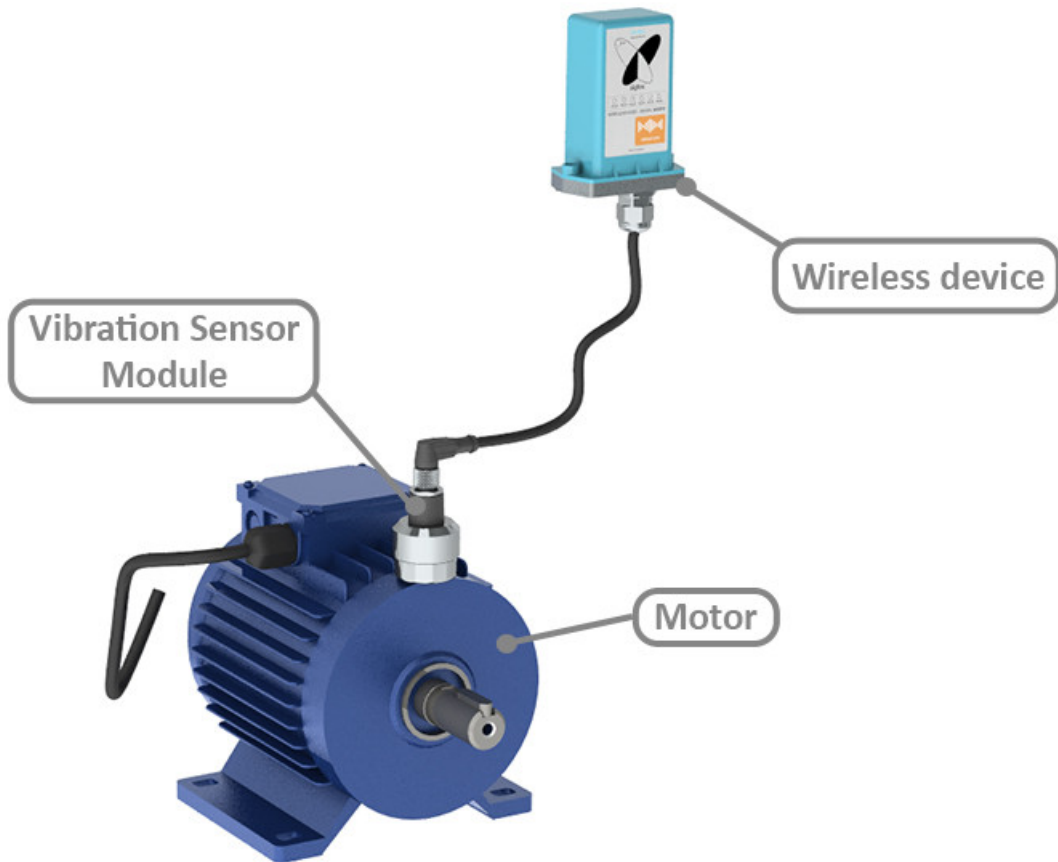


Figure 5. Complete set of WSSFC-V1A-025 vibration sensor

1.5.3 Device calibration & configuration

Please refer to [this link](#).

2. Maintenance

2.1 Troubleshooting

- **Problems with Sigfox communication** like not receiving the packets...please refer to [this link](#) to troubleshoot the device.
- **Problems with the sensor functions** like not measuring or inaccurate measuring....please refer to [this link](#) to troubleshoot the sensor part.

2.2 Device maintenance

2.2.1 Maintenance for Wireless transmitter

Maintenance works	Yes/No	Descriptions
Consumable parts replacement	Yes	The battery is the only part need to check the lifetime to replace. Check the battery status on the back-end system.

Cleaning device	No	
Re-calibration / Re-validation	No	No calibration is required for the wireless transmitter.

2.2.2 Maintenance for V1A sensor module

Please refer to [this link](#).

3. Advanced Guide

3.1 Operating principle of the Sigfox-Ready V1A Single-axis Vibration Sensor

3.1.1 Operating principle of the complete device

The Daviteq Sigfox-Ready V1A Single-axis Vibration Sensor comprises 02 parts connected together as shown below picture.

- The Daviteq Sigfox-Ready wireless transmitter
- The Daviteq V1A vibration sensor module

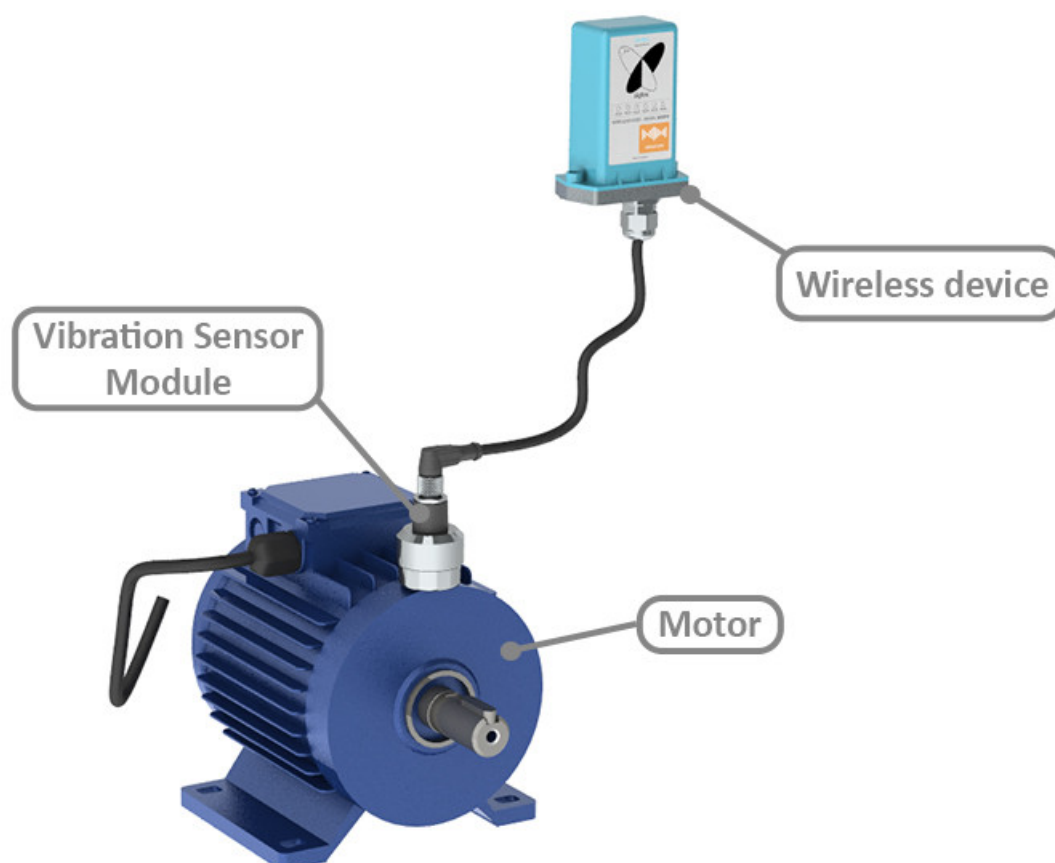


Figure 6. Complete set of WSSFC-V1A-025 vibration sensor mounted on the motor

The V1A single-axis vibration sensor measures the vibration of the object.

The Sigfox-Ready wireless transmitter is to read the measurement values from the V1A sensor and performs the scaling and calculation to deliver accurate outputs.

3.1.2 Operating principle of V1A single-axis vibration sensor

To understand how the V1A single-axis vibration sensor works, please refer to [this link](#) for a complete understanding of this measuring technique.

3.1.3 Some important configuration parameters

Below are some important configuration parameters which affect the operation of the device like battery life, measurement accuracy, and alert threshold.

For Battery life estimation, please refer to this link.

- **measure_period | Default = 3600s**
This is the time period for the wireless transmitter to wake up and take the measurement from the transducer. The default value is 3600s. Users can reduce this value, but smaller value, shorter battery life!
- **cyclic_data_period | Default = 3600s**
Interval time to send an uplink message regardless of any conditions
- **constant_A | Default = calibrated value by factory**
This value will affect the measurement accuracy. **DO NOT change this value!**

Those configuration parameters can be changed by downlink or offline tools. For more other configuration parameters, please refer to the next section.

3.2 Sensor Configuration

3.2.1 How to configure the Sigfox-Ready V1A Sing-axis Vibration Sensor?

Sensor configuration can be configured in 02 methods:

- **Method 1:** Configuring via Downlink message. Please find the instructions in [this link](#), but please take note of the **FW version of the Document**.
- **Method 2:** Configuring via **offline cable**.

Note: THE SENSOR IS ONLY ACTIVE FOR OFFLINE CONFIGURATION IN THE FIRST 60 SINCE POWER UP BY BATTERY OR PLUGGING THE CONFIGURATION CABLE.

3.2.2 What parameters of the device are configured?

- Some parameters are read-only, and some are read and writeable.
- To read the parameters, use the off-line cable as above instruction.
- Via uplink message, users can read only one parameter, which is the CURRENT_CONFIGURATION.

Below tables are the lists of the parameters of the device.

Read-only Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	No. of Registers	Description	Range	Format	Property	Comment
2	2	3	4	FW_VERSION		string	Read	
6	6	3	2	HW_VERSION		string	Read	
8	8	3	2	DEVICE_ID		hex	Read	Product ID
10	A	3	4	DEVICE_PAC		hex	Read	Product PAC
14	E	3	1	SENSOR_TYPE	1-255	uint16	Read	Sensor or Input Type

Read/Write Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	Function Code (Write)	No. of Registers	Description	Range	Default	Format	Properties	Comment
270	10E	3	16	4	CURRENT_CONFIGUR			hex	Read/W	Check the Payload Document section: 5. <i>Payload for downlink message</i> for more information
274	112	3	16	1	SERVER_CONFIG		0	uint16	Read/W	0: Send to Sigfox Network 1: Send to Dongle
276	114	3	16	1	RADIO_CONFIG	1-4	4	uint16	Read/W	RC zones selection 1, 2, 3, 4 is RC1, RC2, RC3s, RC4
277	115	3	16	1	TX_POWER		20	int16	Read/W	RF Tx power
278	116	3	16	2	CONSTANT_A		1	float	Read/W	Constant a for scaling measured value
306	132	3	16	1	ENB_DATGRAM		1	uint16	Read/W	bit0: enable datagram 0 bit1: enable datagram 1 bit2: enable datagram 2
307	133	3	16	1	TEMPERATURE_OFFSET		0	int16	Read/W	Offset adjustment for measured temperature value

3.3 Calibration for Sigfox-Ready V1A Vibration Sensor

Please refer to [this link](#).

4. Product specification

Please refer to the detailed specifications in [this link](#).

5. Warranty and Support

For warranty terms and support procedures, please refer to [this link](#).

6. References

Use-cases:

Case studies:

White-papers:

END.

Manual for Sigfox-Ready AC Current Sensor - WSSFC-AC | FW3

THIS IS OBSOLETE MANUAL

Please access <https://www.iot.daviteq.com/wireless-sensors> for updated manual

Thank you very much for choosing Daviteq Wireless Sensors. We are the leading wireless sensor manufacturer in the World. We have a wide range of wireless sensors which support different connectivity like LoRaWAN, Sigfox, Sub-GHz, NB-IoT...Please find out more information at [this link](#).

This manual is applied to the following products

Item code	HW Version	Firmware Version	Remarks
WSSFC-AC-11	2H	3F	

Information Changes in this version v.s previous version

Item	Changes	Changed by	Changed Date	Approved by	Approved Date
1	Initial version	D.Q.Tuan	24-06-2023	N.V.Loc	28-06-2023

To use this product, please refer step by step to the below instructions.

[Operating Principle](#)

[Uplink Payload](#)

[Battery](#)

[Connect to Sigfox Network](#)

[Installation](#)

[Troubleshooting](#)

[Configuration](#)

[Calibration](#)

[Specification](#)

[Warranty and Support](#)

1. Quick Guide

Reading time: 10 minutes

i Finish this part so you can understand and put the sensor in operation with the default configuration from the factory.

1.1 What is the Sigfox-Ready AC Current Sensor and its principle of operation?

WSSFC-AC is a Sigfox-Ready sensor with an integrated AC current measuring transducer that can measure the AC current from a current transformer with max 5A AC current. It is compatible with any brand of current transformer (CT) on the market which gives an output max of 5A AC. The CT ratio will be selected based on the load current.

It is battery-operated and able to connect to any Sigfox network in the World. It supports all frequency zones such as RC1, RC2, RC3c, RC4, RC5, RC6, and RC7.

For the principle operation of the AC current sensor, please refer to [this link](#).

1.1.1 What are the typical applications of this sensor?

Please refer to [this link](#) for typical applications.

1.1.2 When does the device send uplink messages?

The device will send uplink messages in the following cases:

- **Case 1:** After power-up in the 60s, the device will send the first message called START_UP. The payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 2:** Then, in every interval time (pre-configured), for example, 10 minutes, it will send the message called CYCLIC_DATA. The payload will tell the user the following data like measured value (AC current value), battery level, alarm status...

i To change the cycle of data sending, you can change the value of the parameter: CYCLIC_DATA_PERIOD (default is 600 seconds).

- **Case 3:** In case the Alarm function was enabled (in the configuration of the sensor), if the measured value passed the threshold, it will send the uplink message immediately. This message is called ALARM. The payload also tells the user the data like measured value (AC current value), battery level, alarm status...

i The alarm thresholds can be changed via downlink or offline tools.

- **Case 4:** The HEART_BEAT uplink message will be sent once a day (the default setting, can be changed in configuration) to allow the Sigfox back-end system can send the downlink message for changing the configuration of the sensor. Please refer to the downlink section for more details. The uplink payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 5:** During commissioning, testing, or calibration sensor, the user can force the device to send the uplink message so that they can get the data immediately. This message is called FORCE_DATA. The payload will provide data like raw measured value, scaled measured value, battery level, alarm status... It can be forced by applying the magnet key on the reed switch in 1s;
- **Case 6:** In case users want to change the configuration immediately, they don't need to wait up to 1 day for the HEART_BEAT message, instead they can force the device to send a special uplink message so that the device can get the new downlink message. This uplink message is named PARAMETERS_UPDATE. It can be forced by applying the magnet key in more than 5s.

1.1.3 The important configuration parameters

The sensor was pre-configured at the factory with default values for configuration parameters that meet the most use cases. However, depending on the specific use case, the customer can adjust those parameters. Please refer to [section 3.2](#) for more details.

1.1.4 What kind of battery is used for this sensor?

The sensor is powered by 2 x AA 1.5V batteries for many years of operation. We do recommend using Energizer L91 battery which is very popular and high performance. This battery has a capacity of up to 3500mAh with a working temperature range from -40 to +60 oC. The instruction for installing the batteries is in [this link](#).



For Battery life estimation, please refer to this link.

1.2 What's in the package?

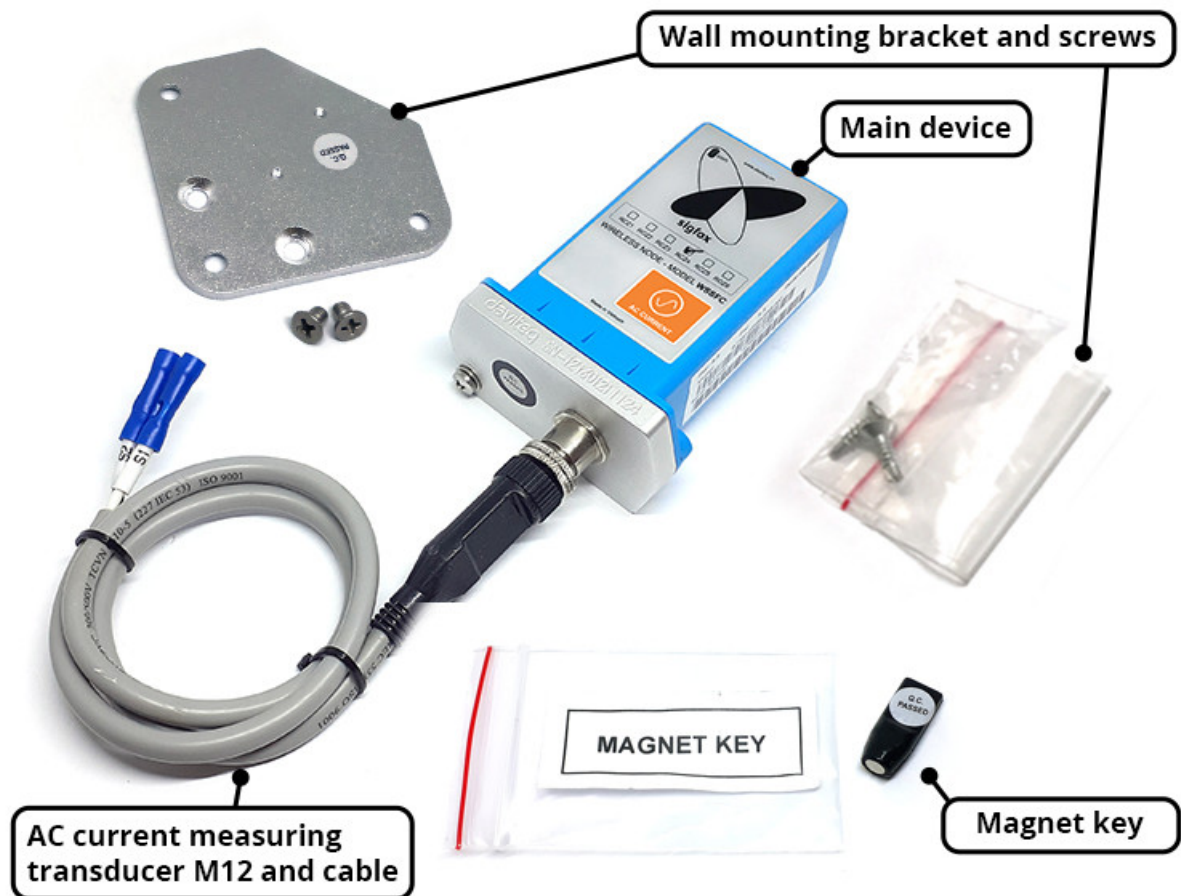
The package includes:

01 x Main device

i 01 x AC current measuring transducer M12 and cable

01 x Magnet key

01 x Wall mounting bracket and screws



1.3 Quick Test

With the default configuration, the device can be connected quickly to the Sigfox Network by the following steps.

Step 1: Prepare the values of communication settings:

Device ID	Get Device ID on the device nameplate
Device PAC	Get Device PAC on the device nameplate

Note: All Sigfox sensors are pre-configured with the correct RC before delivery. The settings of Device ID, Device PAC, and RC could be also read from the device memory map. Please reference section **3.2 Sensor configuration** for details.

Step 2: Add the device to Sigfox Backend

Please refer to [this link](#) for details

Step 3: Install the batteries to the device

Please refer to [this link](#) for instructions on battery installation.

After installing the battery in 60 seconds, the first data packet will be sent to the Sigfox network. After receiving the first data packet, the time of another packet depends on the value of the parameter: **CYCLIC_DATA_PERIOD**. Additionally, you can use a Magnet Key to force the device to send data instantly.

Step 4: Decode the payload of receiving package

Please refer to section **1.4 Uplink Payload and Data Decoding** for details of decoding the receiving packet to get the measured values.

1.4 Uplink Payload and Data Decoding

For the Uplink Payload structure, please refer to [this link](#).

 **Note: Please select the right Payload document to suit the FW version of the sensor**

1.5 Sensor Installation

SAFETY ATTENTION:

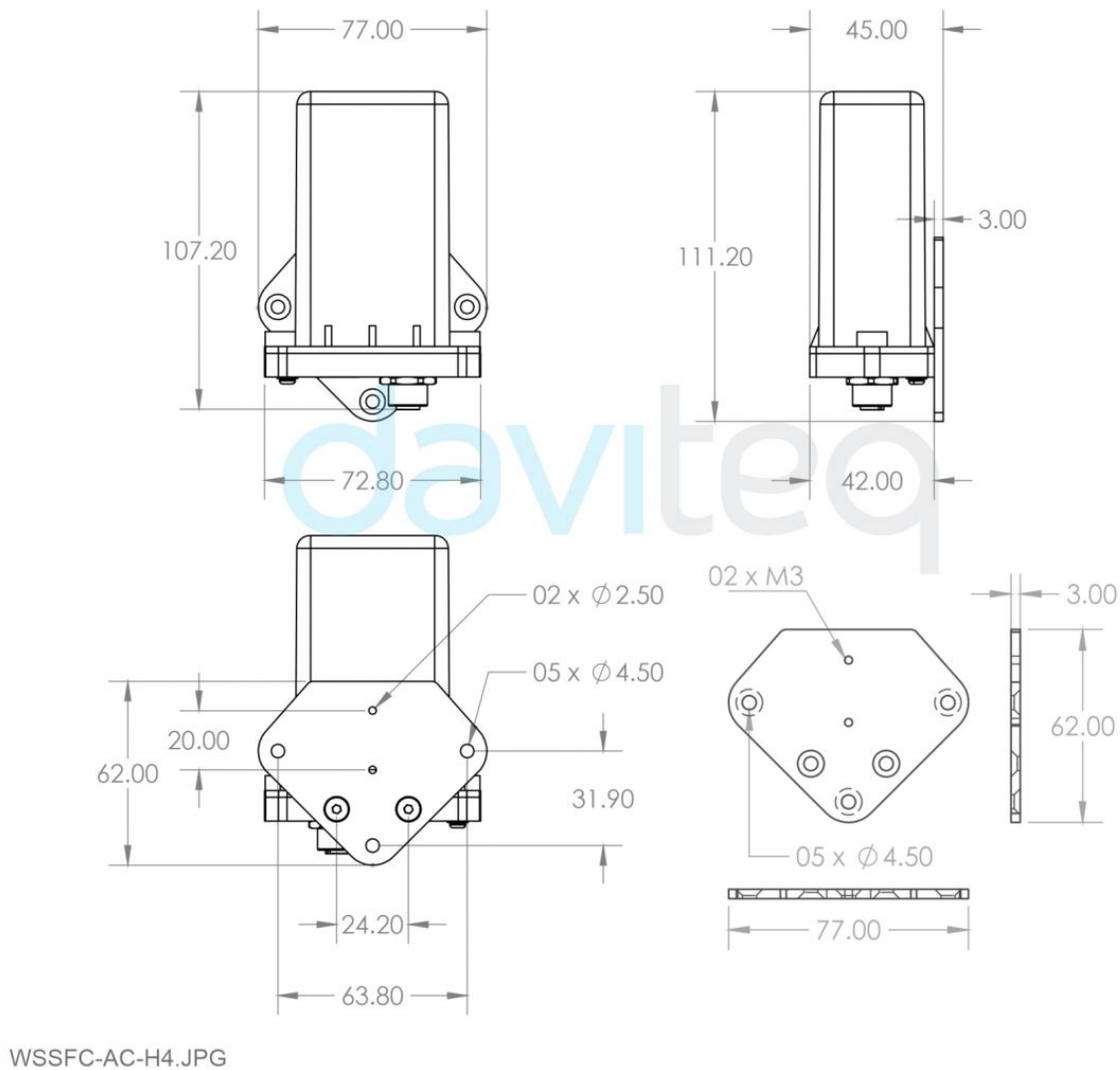
- TO REPLACE BATTERIES OR SERVICE THE MAIN DEVICE, PLEASE PAY ATTENTION TO THE ELECTRICAL SHOCK THAT MAY HAPPEN DUE TO THE PROBLEM OF THE AC CURRENT CABLE OR FAILURE OF THE CURRENT TRANSFORMER. FOR SAFETY REASONS, REMOVE THE AC CURRENT TRANSDUCER OUT OF THE MAIN DEVICE BY UN-SCREWING THE M12 CONNECTOR BEFORE OPENING THE PLASTIC HOUSING OF THE MAIN DEVICE;

- ONLY QUALIFIED ELECTRICAL TECHNICIANS CAN HANDLE THIS DEVICE FOR INSTALLATION, MAINTENANCE, AND OPERATION;

- USE THE HEAT-SHRINK PVC TUBE TO PROTECT THE CONNECTIONS ON THE CABLE OF THE AC CURRENT AND AVOID THE WATER CONTACT WITH THOSE ELECTRICAL CONNECTIONS.

DIMENSIONS OF PRODUCT

DIMENSION DRAWING OF WIRELESS SENSOR (Unit: mm)



The Sigfox-Ready AC current sensor is a combination of a wireless transmitter and an AC current transducer. Therefore, the installation will be divided into 02 parts:

- Installation for the wireless transmitter: these steps are to make sure the device sends data successfully;
- Installation for AC current circuit: these steps are to make sure the device to measure correctly.

⚠ Please follow the orders of steps strictly as below.

1.5.1 Preparation of the locations

- Locate the place to mount the CT, the place that is to measure the load current;
- Locate the place to mount the Wireless transmitter to get the best RF signal. As the AC current transducer will be attached to the wireless transmitter, please make sure the cable length is enough for the distance from CT to the wireless transmitter;

i To get a strong RF signal please refer to [this link](#).

1.5.2 Wireless Transmitter Installation

- Mount the wireless transmitter on the wall or outside the wall of the electrical panel. The antenna part must be higher than the highest point of the electrical panel. Then connect the grounding wire from the base of the wireless transmitter (if available) to the grounding system of the facility. Please check this link for the [mounting](#)

guide;

- Insert the batteries into the wireless transmitter and check the system to see whether the wireless transmitter already sent the first message to the system? Please follow this link to know how to [install the batteries](#).

ATTENTION:



REVERSED POLARITY OF BATTERIES IN 10 SECONDS CAN DAMAGE THE SENSOR CIRCUIT!!!

1.5.3 CT Installation

⚠ Shut down the main load before installing the CT

- For closed-type CT, please shut down the main load before installing the CT.
- For clamp-type CT, it is possible to install the CT onto the load wire, however, we highly recommend shutting down the main load for safety reasons.

⚠ Danger: be aware of electrical shock with AC voltage!

1.5.4 Connect the CT with the AC current transducer

Use the crimping tool to make the connection and protect the connection with a PVC heat shrink tube as [this link](#).

1.5.5 Connect the AC transducer to Wireless Transmitter

Connect the AC transducer to the wireless transmitter via the M12 connector as [this link](#).

1.5.6 Device calibration

The Sigfox-Ready AC current transducer is produced with accuracy as published in the [specification](#) of the product and is ready to use. However, the user can re-calibrate the sensor again when necessary, please follow the steps in [this link](#).

1.5.7 Turn on the Main load again

After connecting, the sensor will send the data to the system with the value = zero (no AC current). Then you can turn ON the main load again to put the system into the operation.

You can use a clamp-type ampere meter to validate the value reading from the system. Please make sure the two comparison values must be collected at the same time.

2. Maintenance

2.1 Troubleshooting

- **Problems with Sigfox communication** like not receiving the packets...please refer to [this link](#) to troubleshoot the device.
- **Problems with the sensor functions** like not measuring, or inaccurate measuring....please refer to [this link](#) to troubleshoot the sensor part.

2.2 Sensor maintenance

Maintenance works	Yes/No	Descriptions
Consumable parts replacement	No	The Sigfox-Ready AC current sensor has no consumable part, so there is no need to replace any parts.
Cleaning sensor or device	No	

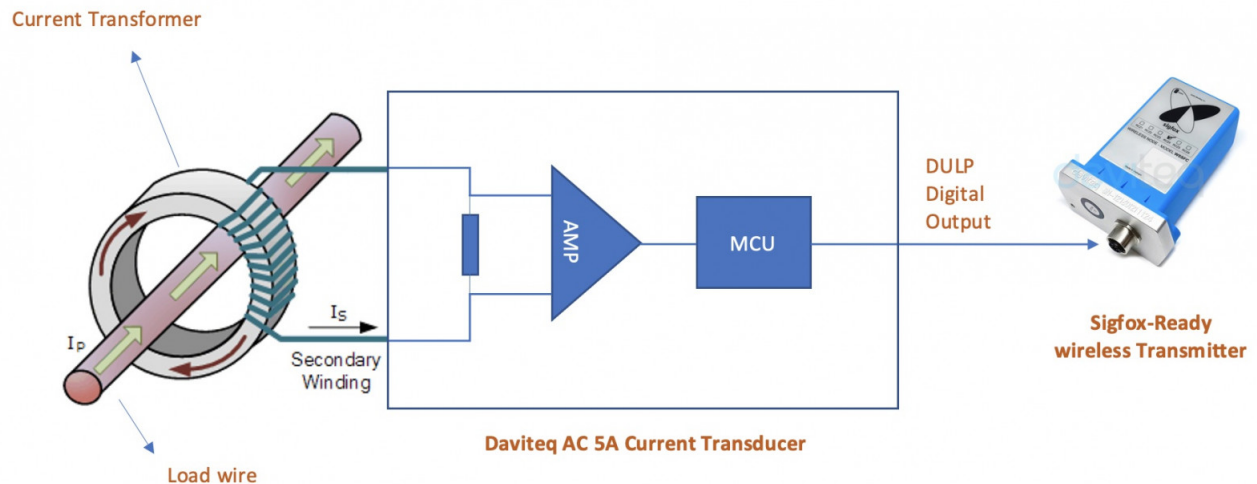
3. Advanced Guide

3.1 Operating principle of the Sigfox-Ready AC current sensor

3.1.1 Operating principle of the complete device

The Daviteq Sigfox-Ready AC current sensor comprises 02 parts connected together as shown below picture.

- The Daviteq Sigfox-Ready wireless transmitter;
- The Daviteq AC 5A current Transducer;



The AC current transducer is to measure the actual AC current of the secondary winding of the CT.

The Sigfox-Ready is to read the AC current value from the transducer and perform the scaling (A and B values, during calibration). The scaled current will be multiplied by the CT ratio to deliver the final value which is the actual load current that the user wants to measure.

$$\text{Scaled_CT_Current} = A \times \text{CT_Current} + B$$

$$\text{Actual_Load_Current} = \text{Scaled_CT_Current} \times \text{CT}$$

Where:

A : Constant A

B : Constant B

CT_current: the measured current from the transducer (Secondary winding current of the CT)

For example: the CT_current = 1.5A, the CT ratio = 20 (the CT is 100/5), A=1, B=0 ==> then the Actual_Load_Current = 1.5 x 20 = 30A

Note: the Low cut value of Actual_Load_Current is 0.5A. That meant the device can not measure the current load less than 0.5A

3.1.2 Operating principle of AC current transducer

To understand how the AC current transducer can measure AC current, please refer to [this link](#) for a complete understanding of this measuring technique.

3.1.3 Some important configuration parameters

Below are some important configuration parameters which affect the operation of the device like battery life, measurement accuracy, and alert threshold.

For Battery life estimation, please refer to this link.

- **measure_period | Default = 600s**

This is the time period for the wireless transmitter to wake up and take the measurement from the transducer. The default value is 600s. Users can reduce this value, but smaller value, shorter battery life!

- **cyclic_data_period | Default = 600s**

Interval time to send an uplink message regardless of any conditions

- **sensor_boot_time | Default = 1000mS**

This value will affect the measurement accuracy. **DO NOT change this value!**

Those configuration parameters can be changed by downlink or offline tools. For more other configuration parameters, please refer to the next section.

3.2 Sensor Configuration

3.2.1 How to configure the Sigfox-Ready AC Current Sensor?

Sensor configuration can be configured in 02 methods:

- **Method 1:** Configuring via Downlink message. Please find the instructions in [this link](#), but please take note of the **FW version of the Document**.
- **Method 2:** Configuring via [offline cable](#).

Note: THE SENSOR IS ONLY ACTIVE FOR OFFLINE CONFIGURATION IN THE FIRST 60 SINCE POWER UP BY BATTERY OR PLUGGING THE CONFIGURATION CABLE.

3.2.2 What parameters of the device are configured?

- Some parameters are read-only, and some are read and writeable.
- To read the parameters, use the off-line cable as above instruction.
- Via uplink message, users can read only one parameter, which is the CURRENT_CONFIGURATION.


Below tables are the lists of the parameters of the device.

Read-only Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	No. of Registers	Description	Range	Format	Property	Comment
259	103	3	9	SERIAL NUMBER		string	Read	Sensor serial number
2	2	3	4	FW_VERSION		string	Read	
6	6	3	2	HW_VERSION		string	Read	
8	8	3	2	DEVICE_ID		hex	Read	Product ID
10	A	3	4	DEVICE_PAC		hex	Read	Product PAC
14	E	3	1	SENSOR_TYPE	1-255	uint16	Read	Sensor or Input Type

Read/Write Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	Function Code (Write)	No. of Register	Descriptor	Range	Default	Format	Property	Comment
270	10E	3	16	4	CURRENT			hex	Read/Wri	Check the Payload Decoding section: <i>5.Payload for downlink message</i> for more information
274	112	3	16	1	SERVER_C			uint16	Read/Wri	0: Send to Sigfox Network 1: Send to Dongle
276	114	3	16	1	RADIO_CO	1-4	4	uint16	Read/Wri	RC zones selection 1, 2, 3, 4 is RC1, RC2, RC3s, RC4
277	115	3	16	1	TX_POWER		20	int16	Read/Wri	RF Tx power
278	116	3	16	2	CONSTAN		1	float	Read/Wri	Constant a for scaling measured value
280	118	3	16	2	CONSTAN		0	float	Read/Wri	Constant b for scaling measured value
282	11A	3	16	2	HIGH_CUT		1E+09	float	Read/Wri	High cut value for the calculated value
284	11C	3	16	2	LOW_CUT		0,5	float	Read/Wri	Low cut value for the calculated value
286	11E	3	16	2	SENSOR_I		1000	uint32	Read/Wri	Boot time of sensor/input in ms

306	132	3	16	2	CT		40	float	Read/Wri	CT of current transformer
										

3.3 Calibration for Sigfox-Ready AC current transducer

Please refer to [this link](#).

4. Product specification

Please refer to the detailed specifications in [this link](#).

5. Warranty and Support

For warranty terms and support procedures, please refer to [this link](#).

6. References

Use-cases:

Case studies:

White-papers:

END.

Manual for Sigfox-Ready Single-Axis Vibration Sensor - WSSFC-V1A | FW3

THIS IS OBSOLETE MANUAL

Please access <https://www.iot.daviteq.com/wireless-sensors> for updated manual

Thank you very much for choosing Daviteq Wireless Sensors. We are the leading wireless sensor manufacturer in the World. We have a wide range of wireless sensors which support different connectivity like LoRaWAN, Sigfox, Sub-GHz, NB-IoT...Please find out more information at [this link](#).

This manual is applied to the following products

Item code	HW Version	Firmware Version	Remarks
WSSFC-V1A-025	2H	3F	

Product Features

Connectivity Type	Sigfox
Product Type	2 parts
Mounting Type	Direct process mounting for sensor, wall mount for transmitter
Powered by	2 x AA batteries 1.5V

Information Changes in this version v.s previous version

Item	Changes	Changed by	Changed Date	Approved by	Approved Date
1	Initial version	D.Q.Tuan	02-06-2023	N.V.Loc	09-06-2023

To use this product, please refer step by step to the below instructions.

[Operating Principle](#)

[Battery](#)

[Installation](#)

[Configuration](#)

[Specification](#)

[Uplink Payload](#)

[Connect to Sigfox Network](#)

[Troubleshooting](#)

[Calibration](#)

[Warranty and Support](#)

1. Quick Guide

Reading time: 10 minutes

-  Finish this part so you can understand and put the sensor in operation with the default configuration from the factory.

1.1 What is the Sigfox-Ready V1A Single-Axis Vibration Sensor and its principle of operation?

WSSFC-V1A is a cost-effective, single-axis vibration sensor designed for condition monitoring and preventive maintenance applications. The piezo-electric accelerometer is available in ranges $\pm 25g$ or $50g$ and features a flat frequency response up to $>10kHz$. Its accelerometer feature a stable piezo-ceramic crystal in shear mode with low-power electronics, sealed in a fully hermetic package. The Piezo Electric technology incorporated in the WSSCF-V1A accelerometer has a proven track record for offering the reliable and long-term stable output required for condition monitoring applications. The accelerometer is designed and qualified for machine health monitoring and has superior Resolution, Dynamic Range, and Bandwidth to MEMS devices. Besides that, it can also measure the temperature at the mounting point.

It is battery-operated and able to connect to any Sigfox network in the World. It supports all frequency zones such as RC1, RC2, RC3c, RC4, RC5, RC6, and RC7.

For the principle operation of the V1A single-axis vibration sensor, please refer to [this link](#).


1.1.1 What are the typical applications of this sensor?

Please refer to [this link](#) for typical applications.


1.1.2 When does the device send uplink messages?

The device will send uplink messages in the following cases:

- **Case 1:** After power-up in the 60s, the device will send the first message called START_UP. The payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 2:** Then, in every interval time (pre-configured), for example, 10 minutes, it will send the message called CYCLIC_DATA. The payload will tell the user the following data like measured values, battery level, alarm status...

 To change the cycle of data sending, you can change the value of the parameter: CYCLIC_DATA_PERIOD (default is 600 seconds).

- **Case 3:** If the Alarm function was enabled (in the configuration of the sensor), if the measured value passed the threshold, it will send the uplink message immediately. This message is called ALARM. The payload also tells the user the data like measured values, battery level, alarm status...

 The alarm thresholds can be changed via downlink or offline tools.

- **Case 4:** The HEART_BEAT uplink message will be sent once a day (the default setting can be changed in configuration) to allow the Sigfox back-end system can send the downlink message for changing the configuration of the sensor. Please refer to the downlink section for more details. The uplink payload will tell the user the HW version, FW version, and current configuration of the device;
- **Case 5:** During commissioning, testing, or calibration sensor, the user can force the device to send the uplink message to get the data immediately. This message is called FORCE_DATA. The payload will provide data like raw measured value, scaled measured value, battery level, alarm status... It can be forced by applying the magnet key on the reed switch in 1s;
- **Case 6:** If users want to change the configuration immediately, they don't need to wait up to 1 day for the HEART_BEAT message, instead they can force the device to send a special uplink message so that the device can get the new downlink message. This uplink message is named PARAMETERS_UPDATE. It can be forced by applying the magnet key in more than 5s.

1.1.3 The important configuration parameters

The sensor was pre-configured at the factory with default values for configuration parameters that meet most use cases. However, depending on the specific use case, the customer can adjust those parameters. Please refer to [section 3.2](#) for more details.

1.1.4 What kind of battery is used for this sensor?

The sensor is powered by 2 x AA 1.5V batteries for many years of operation. We do recommend using Energizer L91 battery which is very popular and high performance. This battery has a capacity of up to 3500mAh with a working temperature range from -40 to +60 oC. The instruction for installing the batteries is in [this link](#).



Figure 1. Battery Energizer L91

For Battery life estimation, please refer to this link.

1.2 What's in the package?

The package includes:

- 01 x Main device with 2m M12 cable
- 01 x Magnet key
- 01 x Wall mounting bracket and screws
- 01 x Vibration sensor module V1A



Figure 2. Product package of WSSFC-V1A-025

1.3 Quick Test

With the default configuration, the device can be connected quickly to the Sigfox Network by the following steps.

Step 1: Prepare the values of communication settings:

Device ID	Get Device ID on the device nameplate
Device PAC	Get Device PAC on the device nameplate

Note: All Sigfox sensors are pre-configured with the correct RC before delivery. The settings of Device ID, Device PAC, and RC could also be read from the device memory map. Please reference section [3.2 Sensor configuration](#) for details.

Step 2: Add the device to Sigfox Backend

Please refer to [this link](#) for details

Step 3: Install the batteries to the device

Please refer to [this link](#) for instructions on battery installation.

After installing the battery in 60 seconds, the first data packet will be sent to the Sigfox network. After receiving the first data packet, the time of another packet depends on the value of the parameter: **CYCLIC_DATA_PERIOD**. Additionally, you can use a Magnet Key to force the device to send data instantly.

Step 4: Decode the payload of receiving package

Please refer to section **1.4 Uplink Payload and Data Decoding** for details of decoding the receiving packet to get the measured values.

1.4 Uplink Payload and Data Decoding

For the Uplink Payload structure, please refer to [this link](#).

Note: Please select the right Payload document to suit the FW version of the sensor

1.5 Sensor Installation

1.5.1 Dimension drawings

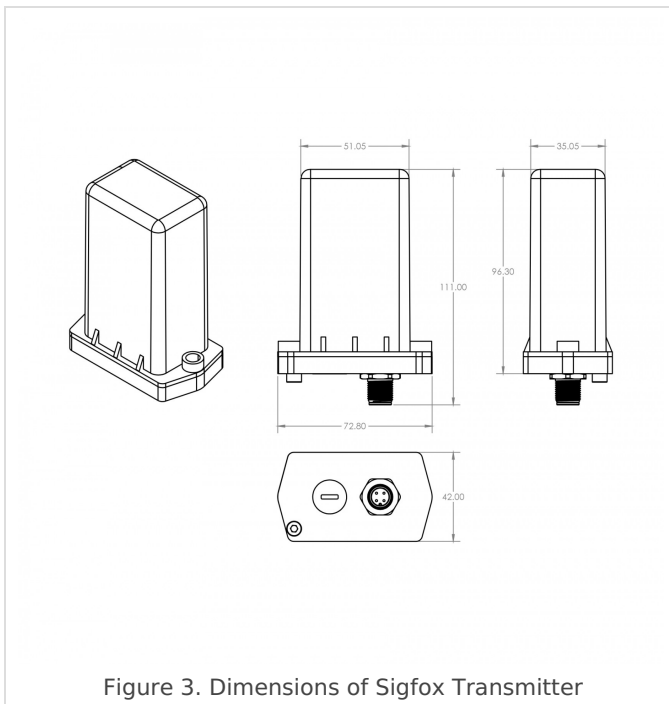


Figure 3. Dimensions of Sigfox Transmitter

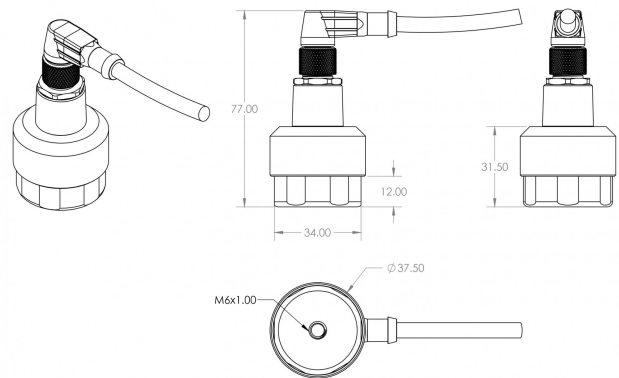


Figure 4. Dimensions of V1A vibration sensor module

1.5.2 Installation

The Sigfox-Ready V1A vibration sensor combines a wireless transmitter WSSFC and a V1A vibration sensor. Therefore, the installation will be divided into 02 parts:

INSTALLATION GUIDE FOR V1A SENSOR MODULE

INSTALLATION GUIDE FOR WIRELESS TRANSMITTER. PLEASE SEE THE BELOW STEPS.

- Mount the wireless transmitter on the wall or a pole nearby the object to monitor the vibration. The wireless transmitter must be mounted at the minimum level of 2m from the ground for a better RF signal. To get the strongest RF signal, please follow [this link](#).
- How to mount it with a mounting bracket? please check [this guide](#).
- Insert the batteries into the wireless transmitter and check the system to see whether the wireless transmitter already sent the first message to the system. Please follow this link to learn how to [install the batteries](#).

ATTENTION:



- Connect the M12 cable to the V1A sensor module as below figure.

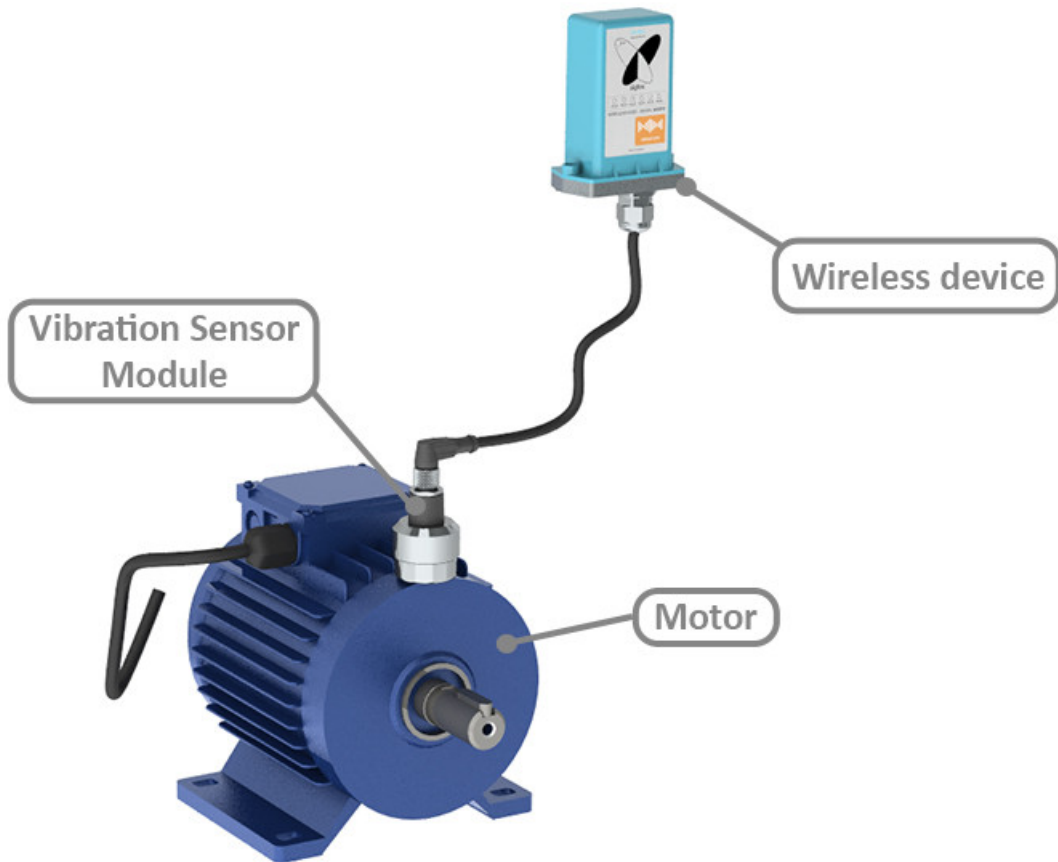


Figure 5. Complete set of WSSFC-V1A-025 vibration sensor

1.5.3 Device calibration & configuration

Please refer to [this link](#).

2. Maintenance

2.1 Troubleshooting

- **Problems with Sigfox communication** like not receiving the packets...please refer to [this link](#) to troubleshoot the device.
- **Problems with the sensor functions** like not measuring or inaccurate measuring....please refer to [this link](#) to troubleshoot the sensor part.

2.2 Device maintenance

2.2.1 Maintenance for Wireless transmitter

Maintenance works	Yes/No	Descriptions
Consumable parts replacement	Yes	The battery is the only part need to check the lifetime to replace. Check the battery status on the back-end system.

Cleaning device	No	
Re-calibration / Re-validation	No	No calibration is required for the wireless transmitter.

2.2.2 Maintenance for V1A sensor module

Please refer to [this link](#).

3. Advanced Guide

3.1 Operating principle of the Sigfox-Ready V1A Single-axis Vibration Sensor

3.1.1 Operating principle of the complete device

The Daviteq Sigfox-Ready V1A Single-axis Vibration Sensor comprises 02 parts connected together as shown below picture.

- The Daviteq Sigfox-Ready wireless transmitter
- The Daviteq V1A vibration sensor module

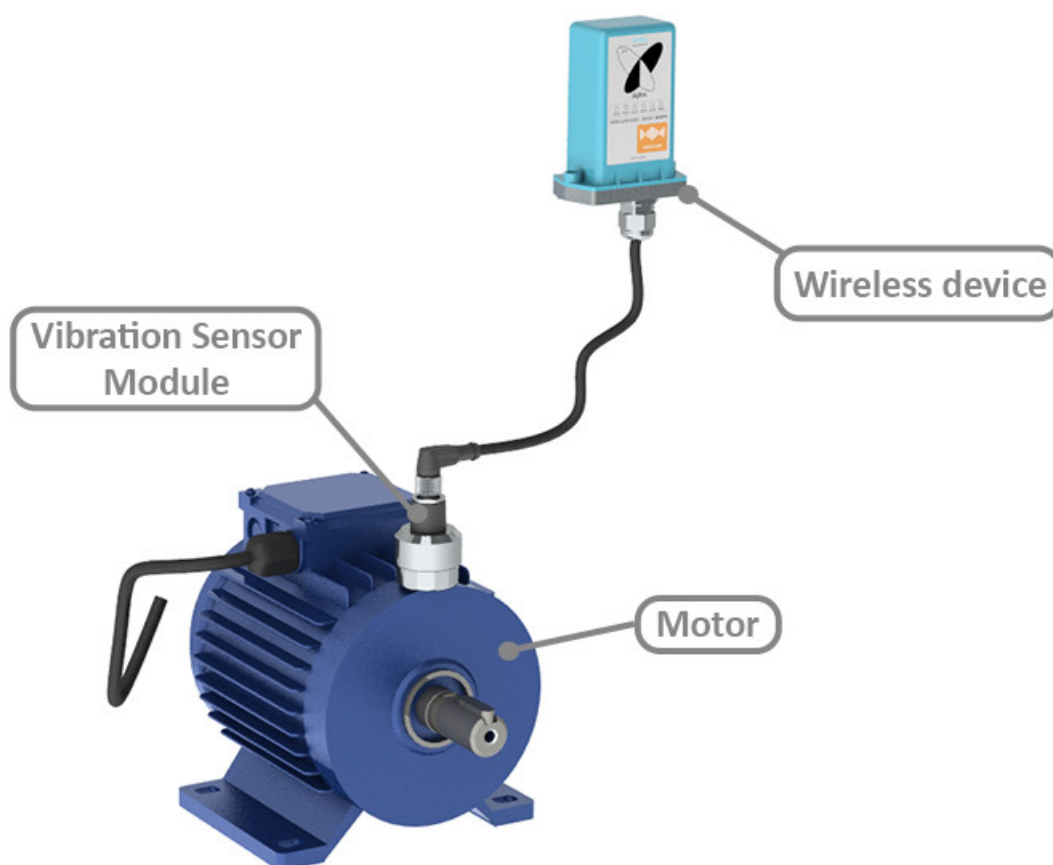


Figure 6. Complete set of WSSFC-V1A-025 vibration sensor mounted on the motor

The V1A single-axis vibration sensor measures the vibration of the object.

The Sigfox-Ready wireless transmitter is to read the measurement values from the V1A sensor and performs the scaling and calculation to deliver accurate outputs.

3.1.2 Operating principle of V1A single-axis vibration sensor

To understand how the V1A single-axis vibration sensor works, please refer to [this link](#) for a complete understanding of this measuring technique.

3.1.3 Some important configuration parameters

Below are some important configuration parameters which affect the operation of the device like battery life, measurement accuracy, and alert threshold.

For Battery life estimation, please refer to this link.

- **measure_period | Default = 3600s**
This is the time period for the wireless transmitter to wake up and take the measurement from the transducer. The default value is 3600s. Users can reduce this value, but smaller value, shorter battery life!
- **cyclic_data_period | Default = 3600s**
Interval time to send an uplink message regardless of any conditions
- **constant_A | Default = calibrated value by factory**
This value will affect the measurement accuracy. **DO NOT change this value!**

Those configuration parameters can be changed by downlink or offline tools. For more other configuration parameters, please refer to the next section.

3.2 Sensor Configuration

3.2.1 How to configure the Sigfox-Ready V1A Sing-axis Vibration Sensor?

Sensor configuration can be configured in 02 methods:

- **Method 1:** Configuring via Downlink message. Please find the instructions in [this link](#), but please take note of the **FW version of the Document**.
- **Method 2:** Configuring via **offline cable**.

Note: THE SENSOR IS ONLY ACTIVE FOR OFFLINE CONFIGURATION IN THE FIRST 60 SINCE POWER UP BY BATTERY OR PLUGGING THE CONFIGURATION CABLE.

3.2.2 What parameters of the device are configured?

- Some parameters are read-only, and some are read and writeable.
- To read the parameters, use the off-line cable as above instruction.
- Via uplink message, users can read only one parameter, which is the CURRENT_CONFIGURATION.

Below tables are the lists of the parameters of the device.

Read-only Parameter Table

Modbus Register (Decimal)	Modbus Register (Hex)	Function Code (Read)	No. of Registers	Description	Range	Format	Property	Comment
259	103	3	9	SERIAL NUMBER		string	Read	Sensor serial number
2	2	3	4	FW_VERSION		string	Read	
6	6	3	2	HW_VERSION		string	Read	
8	8	3	2	DEVICE_ID		hex	Read	Product ID

10	A	3	4	DEVICE_PAC		hex	Read	Product PAC
14	E	3	1	SENSOR_TYPE	1-255	uint16	Read	Sensor or Input Type

Read/Write Parameter Table

Modbus Regist (Decim	Modbus Regist (Hex)	Function Code (Read)	Function Code (Write)	No. of Regist	Description	Range	Default	Format	Operation	Comment
270	10E	3	16	4	CURRENT_CONFIGUR			hex	Read/W	Check the Payload Document section: 5. <i>Payload for downlink message</i> for more information
274	112	3	16	1	SERVER_CONFIG		0	uint16	Read/W	0: Send to Sigfox Network 1: Send to Dongle
276	114	3	16	1	RADIO_CONFIG	1-4	4	uint16	Read/W	RC zones selection 1, 2, 3, 4 is RC1, RC2, RC3s, RC4
277	115	3	16	1	TX_POWER		20	int16	Read/W	RF Tx power
278	116	3	16	2	CONSTANT_A		1	float	Read/W	Constant a for scaling measured value
306	132	3	16	1	ENB_DATGRAM		1	uint16	Read/W	bit0: enable datagram 0 bit1: enable datagram 1 bit2: enable datagram 2
307	133	3	16	1	TEMPERATURE_OFFSET		0	int16	Read/W	Offset adjustment for measured temperature value
308	134	3	16	1	V1A_RANGE_MODE		1	uint16	Read/W	Mode of vibration frequency range Mode 0: 10Hz - 10KHz Mode 1: 2Hz - 10KHz

309	135	3	16	1	MEASUREMENT_CYCL		5	uint16	Read/W	Number of measurement cycle for communication timeout between sensor module and lorawan module
										

3.3 Calibration for Sigfox-Ready V1A Vibration Sensor

Please refer to [this link](#).

4. Product specification

Please refer to the detailed specifications in[this link](#).

5. Warranty and Support

For warranty terms and support procedures, please refer to[this link](#).

6. References

Use-cases:

Case studies:

White-papers:

END.