· SECOND GENERATION ANTI-SKIMMING SENSOR (G2) ·

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TO EBRAX MULTIZONE

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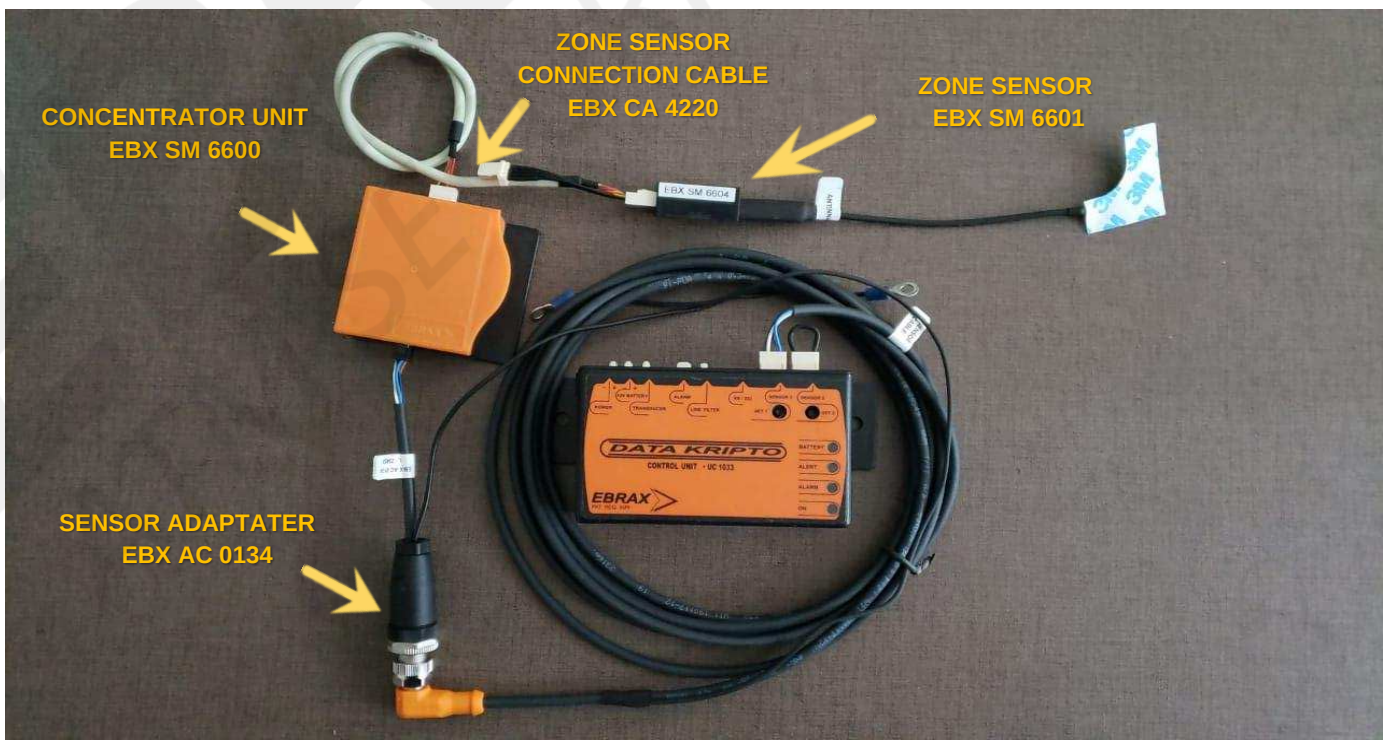
MASS SENSOR UPGRADE

B. Ebrax Multizone KIT



2. General Description

C. Overview

Introduced in 2017, generation 2 of the capacitive sensor was developed based on the Anti-Skimming Generation 1 (G1) solution.

It includes the same reliability as the G1 sensor, with the addition of new features and optimizations to its operating system, based on the knowledge acquired over the years of **EBRAX**.

The new generation was developed as a patented standalone solution providing greater flexibility for new versions, shorter production times, smart filters for external interferences such as: humidity, temperature, dust and mechanical wear.

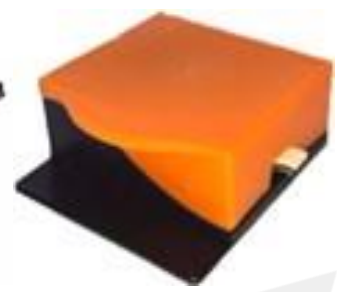
The Generation 2 Sensor (**G2**) is fully compatible with the Generation 1 Sensor (**G1**), and an upgrade installation can be performed easily, using the same Cables and Control Unit, without the need to access the Safe**.**

ASKM KIT – Family 1033/1032/1031 KIT (old version)

Figure 1

KIT to replace Sensor G1 by G2

EBX AC 0134



EBX SM 6600

EBX SM 6601

EBX CA 4220

EBX TS 6601

The replacement of Sensor G1 by G2 basically consists of replacing the Cylindrical Sensor (EBX SM 601x) and its corresponding Antenna with the Adapter (EBX AC 0134) and connecting it to the Concentrator Unit and the Capacitive Sensor, as we can see by comparing figure 1 with figure 2.

Anti-skimming KIT with G2 Sensor - Sensor Update KIT (New)

Figure 2

3. Capacitive Sensor and Antennas

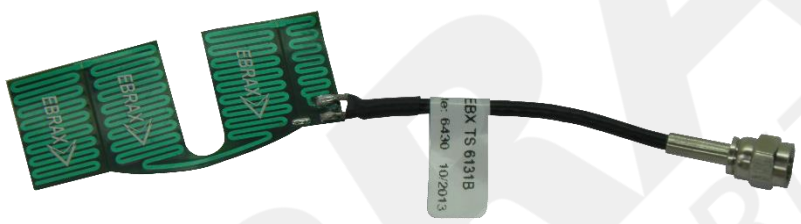
Capacitive Sensor

For EBRAX mass sensor operation, a capacitive antenna designed specifically for that situation is required. The antenna is developed to obtain the highest detection efficiency in the installed area.

Table 1 EBRAX Mass Sensor Electrical Specifications

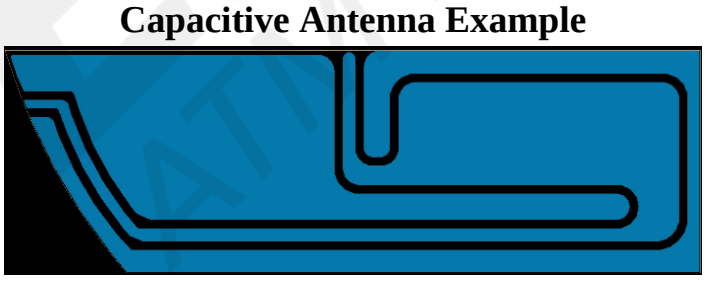
Capacitive Sensor EBRAX G2	
Input voltage	**8~ VDC**
Nominal Amperage	**10~15mA**
Operating temperature	**0°C ~ 50°C**
Maximum size of Antenna Cape	**25 CM**

Capacitive Antenna



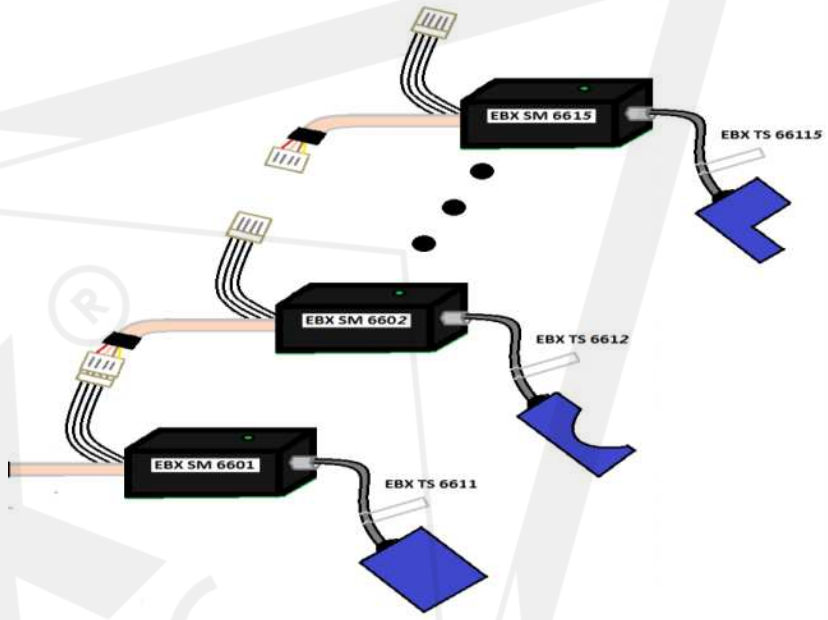
Capacitive field generation capacity is strongly influenced by two factors:
Sensitivity parameters recorded in the EBRAX ground sensor and geometric parameters of capacitive antennas.

Capacitive Antenna Example



With the advancement of technologies used in fraud, the need to monitor other areas of the ATM fascia, such as the keyboard, camera support, receipt output, envelope input, among others, became imperative.
The scalability concept was developed to monitor areas that are not covered by conventional capacitive sensors, being able to scale up to a maximum of 8 Generation 2 sensors in the same equipment.

Scalability example.

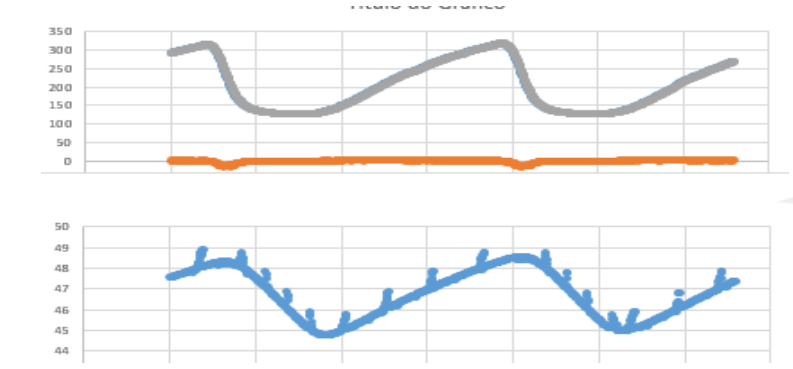


Scalability example Figure 3

Example of Overlay Fraud

The following graph represents the change in humidity during a day. The blue band represents the humidity change and the gray band represents the compensation for this variation. Thus, the parameters affected by humidity are automatically compensated to guarantee the safety of the measurement, avoiding a possible false alarm.

Graph 1 Adjustment in relation to humidity variation



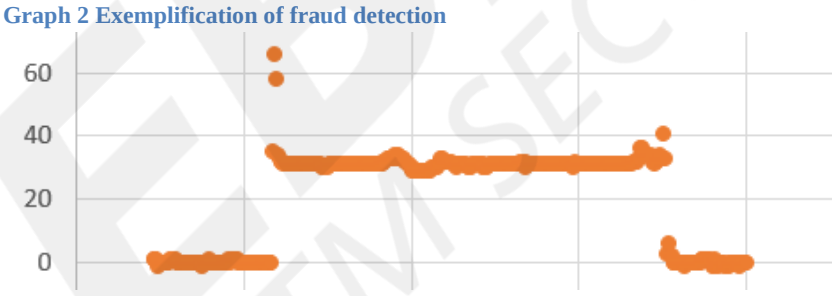
Sensor offset variation

Detection Level

Variation of humidity over time

The reaction of the Generation 2 Mass Sensor when detecting a foreign object can be analyzed in the graph below. After the first out-of-normal measurement point, the system is already in Alert. If the object remains stable for the configured alarm time, the mass sensor will activate the alarm state, causing the entire alarm system.

Graph 2 Exemplification of fraud detection



Detection Level

4. Installation Guide

A. Overview

All monitoring systems must be in adequate cleaning, installation, maintenance, operation and control conditions. Here we present some recommendations of good practices both for the installation and for the periodic maintenance of the Anti-Skimming equipment.

B. Materials used in installation

It is extremely important that the person responsible for the installation has the appropriate tools to access the regions where the Antennas and Sensors will be installed.

Cleaning the regions where the double-sided tape will be attached should be cleaned with clean cloths and isopropyl alcohol or ordinary alcohol. If any of the essential items are missing at the time of installation, avoid installing.

Clean cloths; (mandatory)
Isopropyl or common alcohol; (mandatory)
3M double sided tape;
Seals

C. Capacitive Antennas

1st Step: Have good access to the area to be installed;

Step 2: Clean the area where you will stick the double-sided tape. Make sure the area is free of dirt, grease, oil, dust, or any other residue.

Figure 3 – Example of Dirt

Step 3: With the area clean and free of impurities, use the double-sided tape and carefully place the antenna in place.

Press with your fingers, going over the entire surface of the Antenna, making sure that the entire area is well adhered. Attention, do not use your nails! This can cause the internal tracks of the antenna to break.

Figure 4 Antenna installation example

D. Capacitive Sensors

The installation of the generation 2 mass sensor requires special care, since a bad installation can compromise its operation and cause a false alarm or no alarm when necessary.

1st Step: After making sure that the antenna is correctly fixed, connect the ground sensor to the antenna through the coaxial connector.

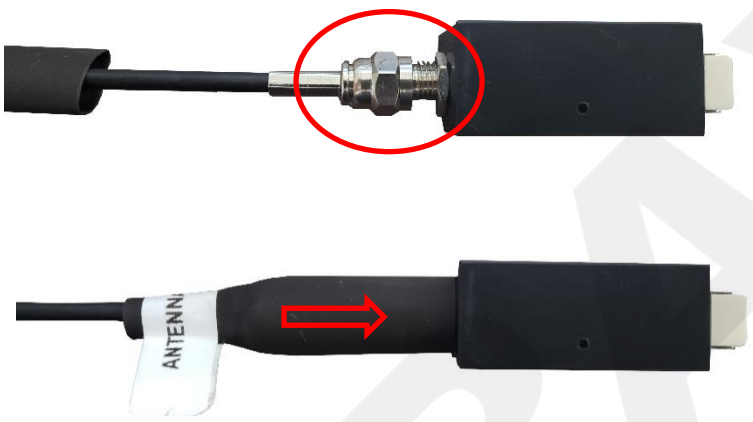


Figure 5 Sensor with Thermo-retractable

Step 2: Place the sensor in a region that does not cause tension on the top of the antenna cable. It cannot be too stretched or too loose. Cover the metal connector with the heat shrink as shown in figure 6.

Correct Example:

Figure 6 Correct Installation Example

INCORRECT EXAMPLES:

It is important that the mass sensor connection does not generate any unnecessary force on the top of the antenna. The cable should not be stretched too far or with an unnecessary bend.

Step 3: With the area clean and free of impurities, use the double-sided tape and carefully place the mass sensor in place.

Step 4: Connect Mass Sensor Cable.

E. Concentrator Unit

Step 1: Properly clean the area with alcohol to remove impurities.

2nd Step: With the region clean and free of impurities, use the double-sided tape and carefully place the G2 mass sensor in place.

Step 3: Make sure that the cables do not have unnecessary movements and that they are located in free movement areas.

Figure 7 Installation of the Concentrator Unit

F. Adjustment

The adjustment process is the most important step in the installation.

Adjustment can be made by remote adjustment or buttons on the control unit. In this process, the Sensor connected to the hub (EBX SM 6600) records the **current value of the environment** and saves it as a **default value**.

After the adjustment process, the G2 sensor continuously reads the current ambient value and compares it with the value stored in the adjustment process. If there is a difference between these values, the G2 Sensor will indicate to the concentrator unit, which will initiate an alert and flashing.

Attention: As the value read in the adjustment process will be the default value for the G2 sensor, it is important that the entire system remains static during this process. Any change in mass (movement of the fascia, an object approaching the monitored areas, etc.) may result in a standard value different from the actual value. This can cause a false alarm and / or a less sensitive condition in the system.

To start the adjustment process, press the Set button corresponding to the sensor input or use remote adjustment.

When the adjustment process begins, the Alert LED on the Concentrator Unit will begin to flash rapidly, as will the LED on the sensor.

The adjustment process takes approximately 10 to 30 seconds. The environment should not change during this process.

When the adjustment process is complete, the Alert LED will remain off and the Concentrator Unit will remain on.

5. Cautions and Risks

The cautions presented apply to both Generation 1 and Generation 2. The most common problems and their proper care are listed.

A. Bad cleanliness when gluing the tape

The area where the Antenna will be fixed using the double-sided tape must be clean and free of impurities. If the surface is not well cleaned, the tape will lose its characteristics over time and will not offer a good fixation causing the sensor to activate erroneously.

B. Incorrect placement of the Antenna (reader)

The positioning of the antenna is crucial for the correct operation of the Mass Sensor, since the Sensor was designed to detect variations in mass at specific points. Recommendation: always protect the data exchange between the magnetic track and the Card Reader. The area circled in red in Figure 9 is where the card's magnetic path passes and where cloning attacks occur.

Figure 8 Card Reader

C. Sensor misadjusted

The adjustment of the system ensures that the Sensors adapt correctly to the environment, it is important that it is done with the ATM in a normal operating position, that is, with the fascia closed. Occasionally it happens that someone makes a modification near or even on the reader, and forgets to adjust the Sensor.

D. Incorrect ground connection

Proper grounding is important to neutralize interference from harsh environments. Failure to ground may cause mass sensor instability. The ATM must have a resistance between the sensor ground connection and the center ground point of the machine, a measurement below 2 ohms.

E. Loose mechanical parts

The sensors are sensitive to small movements that come from loose parts or not properly adjusted. A very common example is an Incorrect adjustment between the card reader and the reader bracket and / or bezel.

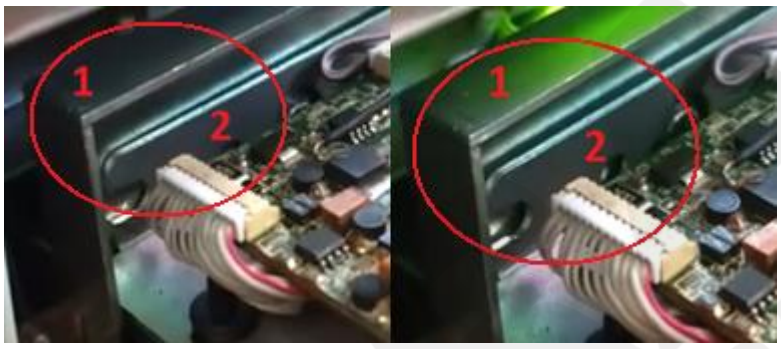


Figure 9 Example of mechanical movements near the reader area

F. Tension in the capacitive antenna cable

It is important that the antenna cable does not move after installation, but also cannot be over tightened to the point of breaking internal connections or damaging the connector.

You can see in figure 11 the wrong example and in figure 12 the correct example.

Incorrect Example:

Figure 10 Incorrect Installation Example

Correct Example

Figure 11 Correct Example in Installation

G. Reuse of damaged parts

We do not recommend reusing any damaged parts and especially Capacitive Antennas, since they are sensitive and fragile circuits. After placing the Capacitive Antenna, it should not be removed or moved, as it may break the internal tracks and compromise its operation.

H. Error selecting sensitivity

The sensitivity of the mass sensor is a set of parameters between the circuit of the capacitive antenna and the sensitivity parameters registered in the capacitive sensor, which are selected based on the known fraud for each area of the ATM. Therefore, some capacitive antennas are paired with some capacitive sensors. It is important to maintain the integrity of the whole.

6. Preventive maintenance

Preventive maintenance is a way to prevent false alarms and maintain the integrity of the equipment, ensuring that the sensors work at their best.

Using a clean cloth and isopropyl alcohol, remove accumulated dirt in the capacitive antenna area.

Verify that the Capacitive Antenna is still securely attached with a little pull and slight movements.

If it is not properly attached, replace the Capacitive Antenna with a new one, ensuring that it does not loosen over time and cause a false alarm.

Check that there is not a lot of dust on the reader. If so, clean it with an antistatic brush.

Check the order of the cables. It is important that the cables are placed in places with little movement.

When the Atm has been manipulated by several people, it is common for the KIT cables to be altered and incorrectly repositioned.

Check the connections of the mass sensors. Make sure they are connected correctly.

Example of wrong connection:

7. Operating modes

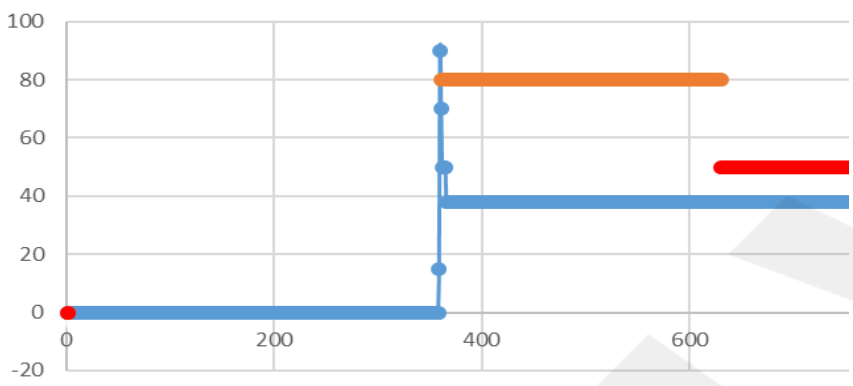
A. General Description

The operation of the Generation 2 Sensor detects any material placed in front of the Capacitive Antenna.

After detecting a constant mass variation that overlaps the monitored region, a configurable timer called **Alarm Time** will be activated, and once the timer expires, continuous messages will be transmitted through the equipment with the corresponding signaling.

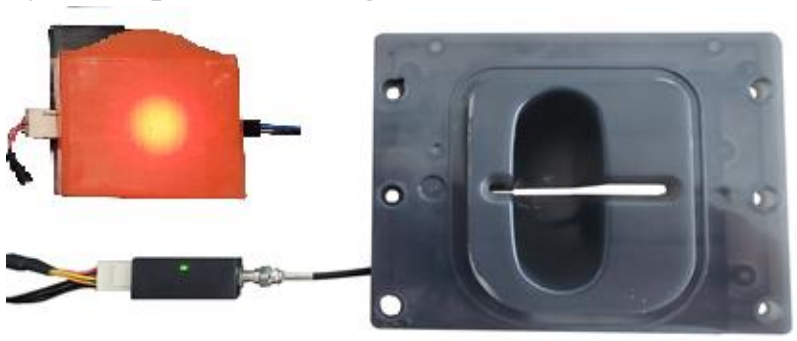
Capacitive Sensor

The following graph represents the performance of the mass sensor in a fraud detection.



* Sensor Detection Level;
* System Starts Alert Mode;
* System Starts Alarm Mode.

System up and running without fraud



Concentrator Unit LED	Mass Sensor LED
Constant Light	Constant Light

Fraud detected by the system

Concentrator Unit LED	Mass Sensor LED
Intermittent 1 Hz / s	Off (no light)