



surf-k & surf-km

LTE Primary Alarm Communicators

General Installation Guide

V1.6

Firmware V1.0

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1. Overview

a. Description

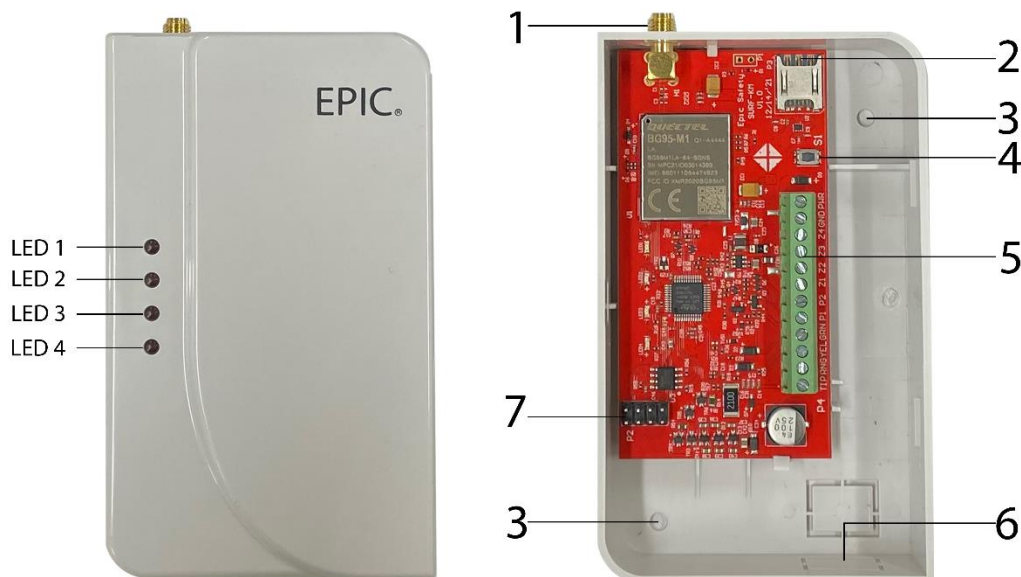
Surf-K and Surf-KM are primary alarm communicators that use cellular (LTE) technology. They use dial capture to monitor any alarm system that uses Contact ID (CID) and SIA formats. They can also connect to the keybus on supported DSC and Honeywell panels to monitor these systems and provide users the ability to access their systems remotely from anywhere via Aryo Cloud platform on the web and on iOS and Android smartphones.

Surf-K/KM uses 3 zones to monitor legacy systems for legacy burglary, fire, and panic alarms. Surf-K/KM uses zone 1 and PGM 1 for keyswitch arming and disarming. Refer to **Section 5** (PGM Output Functions) for information on the PGM automation functionality.

b. In the Box

- surf-k or surf-km
- Antenna (75cm)
- Quick Start Guide

c. Parts Identification



- | | |
|----------------------|----------------------|
| 1) Antenna connector | 5) Terminal block |
| 2) SIM card | 6) Wire entrance |
| 3) Mounting holes | 7) RF expansion port |
| 4) Button | |

2. Introduction

a. Device & Cloud Features

Surf-K and Surf-KM:

- Cover a wide area using low-power cellular technology using **LTE, NB-IoT** by Surf-K and **LTE, CAT-M1** by Surf-KM.
- Take over any alarm system whether locked or not.
- Monitor any system with little to no programming.
- Provide keybus, dial capture, and legacy monitoring options for alarm panels.
- Connect to Aryo cloud for remote control and monitoring.
- Support DSC PowerSeries & Honeywell keybus, SIA & CID formats for all other panels.
- Allow for concurrent use of landline digital account and LTE account.
- Enable full supervision and automatic device & panel status detection.
- Provide full event reporting to Aryo cloud and Central Monitoring Station (CMS).
- Send panel and device troubles for remote diagnostics.
- Support flexible use of 2 PGMs for automation.
- Enable up to 2-partition keyswitch arming when using dial capture.
- Use one master code (for the main user) and up to 40 user codes to arm and disarm the alarm panel when keybus is not used.

Aryo cloud platform:

- Provides comprehensive reports and analytics.
- Displays zones, partitions, events, and status on up to 8 partitions or account numbers.
- Enables effortless cancellation of false alarms and dispatch of resources.
- Provides access to full-function mobile keypad when keybus is used.
- Supports permission-based roles and functions for utmost security.
- Enables end-to-end device & user data encryption for enhanced protection.
- Sends Push, Email, & SMS notifications.
- Allows for managing multiple alarm systems within the same app.

b. Monitoring Options

- **Keybus** enables Surf-K/KM to communicate with the panel and keypads directly for faster status reporting. It also allows for use of additional commands such as zone status, bypass/unbypass, and no entry delay arm. Keybus monitoring is available for supported DSC PowerSeries and Honeywell Vista series panels. Connect YEL and GRN terminals to keybus terminals of these panels to fully interact with the alarm panel. The events and status signals are sent to Aryo cloud and the CMS.
- In case the alarm panel does not support keybus, Surf-K/KM is able to arm and disarm the system through **keyswitch** arming.
- **Dial capture** allows Surf-K/KM to detect and capture CID and SIA events and monitor any alarm system that uses these two formats. Dial capture monitoring is available to connect the TIP and RNG terminals to any panel that can communicate in CID and SIA formats. The signals are captured and sent to Aryo cloud and the CMS.
- **Keybus and dial capture** can be used together for fully control and monitoring the alarm panel, through connecting the corresponding terminals.
- **Legacy monitoring** is also available, in case the panel does not support CID/SIA formats. Surf-K/KM can use 3 input zones to monitor legacy alarm panel outputs by providing **burglary, fire, and panic** alarms. These signals are then sent to Aryo cloud and the CMS.

3. Pre-Installation Recommendations

- Conduct a placement test to find a suitable location with the best LTE signal.
- Wiring can only be done when both Surf-K/KM and the alarm panel are powered down.
- DO NOT route any wire over the alarm panel or Surf-K/KM circuit boards.
- Install and program your alarm panel before connecting it to Surf-K/KM.
- Use only one device per alarm panel.
- Install and operate Surf-K/KM within its specified temperature range to prevent any possible damage.
- DO NOT install the unit close to a heating source, direct sunlight, or in a damp location.
- DO NOT connect Surf-K/KM to a phone line. This will damage the device.
- Always connect Surf-K/KM to an approved power source and battery backup.

a. Antenna

- Surf-K/KM uses a full-band LTE magnetic antenna. The antenna can be connected to Surf-K/KM antenna connector as shown in **Section 1.c**.
- Antenna should be placed high in an open area within the building and far from any interference by heating ducts, metal pipes, or electrical wiring and concrete walls.
- DO NOT install the antenna in a metal enclosure.

b. Cable Length

Using Station Z or CAT 5 type wires. Surf-K/KM can be installed up to 1000 feet away from the alarm panel. Please note that the below table serves as guideline only, and the maximum wire length could be different depending on the interference level generated by the environment, alarm panel, and other accessories in the system.

Cable Type & Size	Number of wires	Communication Format	Keybus & Power	Keybus & Tip/Ring	Tip/Ring & Power	Keybus & Tip/Ring & Power
Station Z 4 x 22AWG DO NOT CONNECT SPARE WIRES	One wire	Keybus	1000ft	-	-	-
		CID	-	200ft	1000ft	-
		SIA	-	100ft	1000ft	-
	Two wires	Keybus	1000ft	-	-	-
		CID	-	1000ft	1000ft	-
		SIA	-	1000ft	1000ft	-
	Three wires	Keybus	-	-	-	-
		CID	-	-	-	1000ft
		SIA	-	-	-	1000ft
CAT 5 8 x 24AWG DO NOT CONNECT SPARE WIRES Power +: Orange pair Power -: Blue pair Keybus GRN: Green Keybus YEL: White/Green TIP: Brown RING: White/Brown	One wire	Keybus	1000ft	-	-	-
		CID	-	1000ft	1000ft	200ft
		SIA	-	1000ft*	1000ft	200ft
	Two wires	Keybus	1000ft	-	-	-
		CID	-	1000ft	1000ft	1000ft
		SIA	-	1000ft	1000ft	1000ft
	Three wires	Keybus	-	-	-	-
		CID	-	-	-	1000ft
		SIA	-	-	-	1000ft

*For this specific configuration, power cable must not exceed 500ft.

4. Performance Guide

a. Signal Level

The signal level is reported using RSSI (Received Signal Strength Indicator) method which can be converted to dBm (decibel-milliwatts). The RSSI and corresponding signal strength can be seen in the table below:

RSSI	Signal Level (dBm)	Service Level
99	NA	No service
0 – 2	-113 ~-109	

3 – 13	-108 ~-87	Poor – Device will trigger signal strength trouble event.
14 -20	-85~-73	Acceptable
21- 24	-71~-65	Good
26- 31	-61~-51	Excellent

This data is for reference only and may not be applicable for all situations.

b.Temperature

For correct operation, the device must be in the operating temperature range. The different temperature levels and their corresponding interpretations are listed below. The device's temperature is displayed and reported on Aryo cloud.

Surf-K/KM Temp. (°C)	Interpretation
< -5 °C	Low – Device will trigger low temperature trouble event.
-5 °C to 50 °C	Normal
> 51 °C	High – Device will trigger high temperature trouble event.

c. Voltage

For proper operation, both alarm panel and Surf-K/KM should be powered by an approved power source within the recommended range. Different voltage levels and corresponding interpretations for the alarm panel are listed below.

Panel Voltage (VDC)	Interpretation
< 9	Low voltage - Device will trigger voltage trouble event.
10.1 – 13	Acceptable
13.1 – 14.5	Good
> 14.5	High voltage - Device will trigger voltage trouble event.

d.Button Functions

Surf-K/KM button functions described in the table below:

Button Press Time (sec)	Function Name	Function Use	Duration time	LED Indicators
1 sec	Self-Test	To send device information such as signal level, voltage, and temperature to Aryo cloud.	Immediate	Blinks once

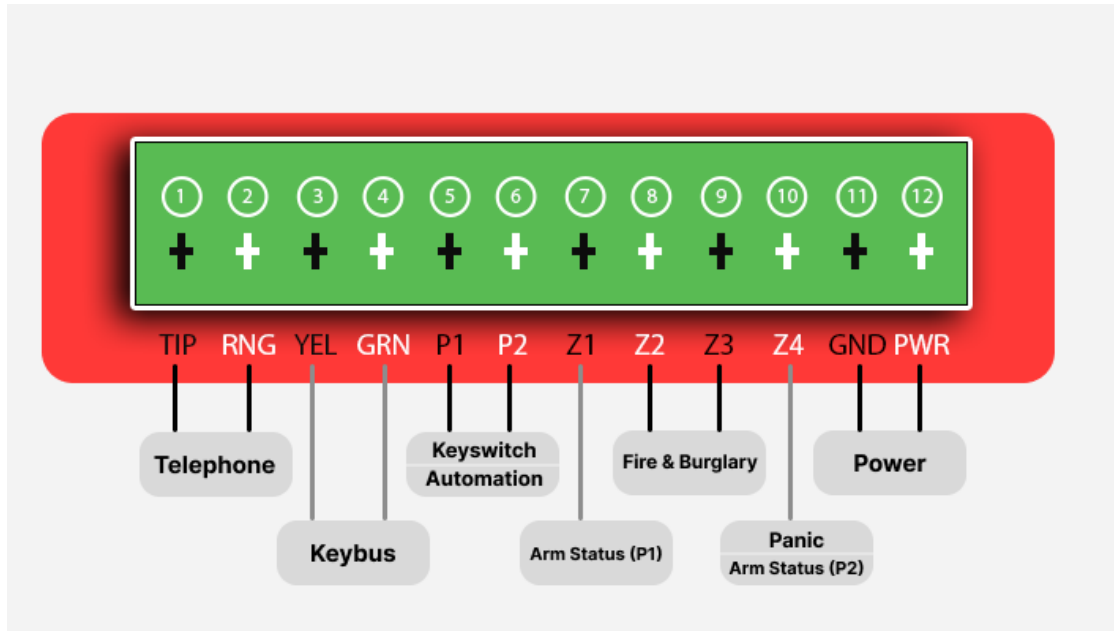
5 sec	Signal Level Mode	To select the best mounting location based on the signal level of Surf-K/KM. LED Indications LED 1 Blink 0 ~ 9 LED 1 On 10 ~ 12 LED 2 Blink 13 ~ 16 LED 2 On 17 ~ 19 LED 3 Blink 20 ~ 22 LED 3 On 23 ~ 25 LED 4 Blink 26 ~ 28 LED 4 On 29 ~ 31	30 sec	Slow blinking
10 sec	Reboot Device	If required following the troubleshooting guide in Section 6.b.	Immediately	Fast blinking
15 sec	Reset SSL	When a device is reused for a new client or moved to a new location.	Immediately	Alternate blinking

e.LED Indications

Condition	Status	LED	Color	On	Off	Fast blink	1 blink	2 blinks	On-1 blink
Power	DC power on	1	Red	X					
	DC power off	1	Red		X				
	Device not registered	1	Red				X		
	Device troubles	1	Red			X			
Cellular Network	Cannot find the cellular network	2	Green			X			
	Poor signal	2	Green				X		

	Acceptable signal	2	Green					X	
	Good signal	2	Green						X
	Excellent signal	2	Green	X					
Server Network	Connecting to server	3	Green				X		
	Disconnected from server	3	Green		X				
	Communicating with server	3	Green			X			
	Connection with server is normal, but not communicating	3	Green	X					
	Dial Capture	4	Green				X		
Panel Communication	Keybus	4	Green			X			
	Dial Capture and Keybus	4	Green	X					
	Legacy	4	Green		X				
	Firmware update in progress	All	Red/Green	Alternating LEDs. LEDs 1&2 are on/off while LEDs 3&4 are off/on.					

f. Terminal Connections



i. Surf-K/KM Terminals Description

Surf-K/KM terminals and their connections to alarm panel are described in the table below:

Surf-K/KM Terminal	Alarm panel Terminal	Description
Tip (TIP)	TIP	Surf-K/KM TIP/RNG terminals connect to the Tip/Ring interface of any alarm panel that uses CID or SIA format to capture all generated signals and send them to Aryo cloud and the CMS.
Ring (RNG)	RING	
Keybus Yellow (YEL)	YEL	Surf-K/KM supports DSC PowerSeries and Honeywell keybus interface. Yellow (YEL) and Green (GRN) terminals can be connected to Surf-K/KM YEL and GRN to allow interaction with DSC PowerSeries panels to monitor events and provide status of the alarm panel.
Keybus Green (GRN)	GRN	
PGM 1 (P1)	Keyswitch zone(s) or used for automation	Surf-K/KM has two PGM outputs for keyswitch arming, for remote arming/disarming, and automation functionality for variety of purposes, as outlined in Section 5 .
PGM 2 (P2)		
Zone 1 (Z1) (Dry contact only)	Available PGM Always use a relay when connecting panel PGM that supplies voltage/current to the Surf-K/KM zone. Otherwise, it will damage the device.	Surf-K/KM zone 1 can be connected to alarm panel PGM to receive arm/disarm status of partition 1.
Zone 2 (Z2) (Dry contact only)	Siren output Always use a relay on Siren/bell output for monitoring burglary and/or fire.	Surf-K/KM zone 2 is used as the common burglary input to monitor the burglary alarm signal received from the alarm panel output. For DSC panels, this zone can be used for both fire and burglary detection when connected to the siren output.
Zone 3 (Z3) (Dry contact only)	Available PGM Always use a relay when connecting panel PGM that supplies voltage/current to the Surf-K/KM zone. Otherwise, it will damage the device.	Surf-K/KM zone 3 is used as the common fire input to monitor the fire alarm signal received from the alarm panel output.

Zone 4 (Z4) (Dry contact only)	Available PGM Always use a relay when connecting panel PGM that supplies voltage/current to the Surf-K/KM zone. Otherwise, it will damage the device.	Surf-K/KM zone 4 is used as the common panic input to monitor the panic alarm signal received from the alarm panel output. Alternatively, the panic alarm can be programmed as audible to send burglary signal. It can also provide arm/disarm status of partition 2 of the panel when not monitoring legacy panels.
Ground (GND)	Ground	Surf-K/KM could be powered by an alarm panel auxiliary 9-14 VDC. External auxiliary power source with backup battery can be used if they use a common ground. These devices can still operate with a power range of 6 to 20 VDC. Surf-K/KM monitors panel voltage and generates power trouble when voltage drops below 9 VDC.
Power (PWR)	9-14 VDC	

ii. Other Hardware Connections

- RF expansion port is for future addition of more wireless capabilities to Surf-K/KM.
- Antenna connector is for connecting the LTE antenna.

5. PGM Output Functions (Automation)

a.Features

Surf-K/KM provides 2 programmable outputs (PGMs) to be used for various use cases. These PGMs can be used to control gates, garage doors, sirens, and strobe lights, among various other uses depending on Surf-K/KM communication type. See the table in section 5.4 for the details.

b.Keyswitch - Dial Capture/ Legacy

When using Surf-K/KM for dial capture or legacy monitoring and remote arm/disarm, PGM 1 must be connected to a keyswitch zone on the alarm panel. For remote arm/disarm on 2 partitions systems (dial capture only), PGM 2 must be connected to another keyswitch zone on the alarm panel. Any available PGM can be used for automation functionality.

c. Keybus

When using keybus for monitoring, both PGM 1 and 2 can be used for automation functionality, as remote arm/disarm is handled by the keybus connections.

d.PGM Output Function Table

1. Using Keybus								
Output	Momentary/ Maintained	Time Duration	Keyswitch 1	Garage Door	Open Door Strike	Open Gates	Siren	Strobe
PGM 1	Momentary	2 sec		0				
	Maintained	5 sec -300 sec			0			
	Maintained	5 sec -300 sec				0		
	Maintained	5 sec -300 sec					0	
	Maintained	5 sec -300 sec						0
Output	Momentary/ Maintained	Time Duration	Keyswitch 2	Garage Door	Open Door Strike	Open Gates	Siren	Strobe
PGM 2	Momentary	2 sec		0				
	Maintained	5 sec -300 sec			0			
	Maintained	5 sec -300 sec				0		
	Maintained	5 sec -300 sec					0	
	Maintained	5 sec -300 sec						0
2. Using Dial Capture (Tip/Ring)								
Output	Momentary/ Maintained	Time Duration	Keyswitch 1	Garage Door	Open Door Strike	Open Gates	Siren	Strobe
PGM 1	Momentary	1 sec	0					
	Momentary	2 sec		0				
Output	Momentary/ Maintained	Time Duration	Keyswitch 2	Garage Door	Open Door Strike	Open Gates	Siren	Strobe
PGM 2	Momentary	1 sec	0					
	Momentary	2 sec		0				
	Maintained	5 sec -300 sec			0			
	Maintained	5 sec -300 sec				0		
	Maintained	5 sec -300 sec					0	
	Maintained	5 sec -300 sec						0
3. Using Legacy								
Output	Momentary/ Maintained	Time Duration	Keyswitch 1	Garage Door	Open Door Strike	Open Gates	Siren	Strobe

PGM 1	Momentary	1 sec	0					
	Momentary	2 sec		0				
Output	Momentary/ Maintained	Time Duration	Keyswitch 2	Garage Door	Open Door Strike	Open Gates	Siren	Strobe
PGM 2	Momentary	2 sec		0				
	Maintained	5 sec -300 sec			0			
	Maintained	5 sec -300 sec				0		
	Maintained	5 sec -300 sec					0	
	Maintained	5 sec -300 sec						0

6. Trouble Conditions & Troubleshooting

a. Trouble Conditions

Surf-K/KM monitors some important parameters such as alarm panel power, temperature, Keybus or DTMF communication for proper functionality and report the occurred troubles to Aryo cloud and CMS.

i. Primary Power Failure

If alarm panel power rises above 14.5V or falls below 9V, Surf-K/KM will send a trouble event to Aryo cloud server and CMS.

ii. Network Signal

If radio signal is poor, Surf-K/KM will send a trouble event to Aryo cloud server and CMS.

iii. No Cellular Service

If Surf-K/KM cannot connect to the cellular tower (RSSI is sent as 0 or 99), Surf-K/KM will send a trouble event to Aryo cloud server and CMS.

iv. DTMF Communication Failure

When keybus and DTMF wiring are detected, and a keybus event has occurred, but no DTMF event follows, Surf-K/KM will send a trouble event to Aryo cloud server and CMS.

v. SIM Card Error

If there is an issue with Sim card detection by Surf-K/KM, it will send a trouble event to Aryo cloud server and CMS.

vi. Keybus Communication Failure

When connected to a DSC and Honeywell alarm panel keybus terminals, Surf-K/KM continuously supervises the keybus communication path for normal operation. If Surf-K/KM stops receiving data from the keybus line, Surf-K/KM will send a trouble event to Aryo cloud server and CMS.

vii. Aryo Communication Failure

If there is any error or failure in device communication with the cloud, Surf-K/KM will send a trouble event to Aryo cloud server and CMS.

viii. High/Low Temperature

If the temperature rises above 50 degrees Celsius or falls below -5 degrees Celsius, Surf-K/KM will send a trouble event to Aryo cloud and the CMS.

CID codes for supervisory and troubles

Power	970
Network Signal	971
No Cellular Service	972
DTMF Communication Failure	973
SIM Card Error	974
Keybus Communication Failure	975
Aryo Communication Failure	976
High Temperature	977
Low Temperature	978

b. Troubleshooting

Trouble Category	Trouble	Indication	Solution
Primary Power Failure	Panel Voltage below 9V or above 14.5V.	First LED blinks quickly.	Check the output voltage of DC/Auxiliary terminals of the alarm panel.
Network Signal	Poor signal.	1. First LED blinks quickly. 2. Second LED blinks slowly, one at a time.	1. Make sure the antenna is connected properly. 2. Move the antenna or Surf-K/KM to a place where the LTE signal is well received.
Cellular Network	No connection to the cellular tower (RSSI 0 or 99).	1. First LED blinks quickly. 2. Second LED blinks quickly.	Check if the signal level is acceptable. If it is, check the followings: 1. Check that the SIM card is properly installed in the device.

			2. Check that the device is properly registered with the cloud server.
DTMF Communication Failure	When keybus and DTMF wiring are detected, and a keybus event has occurred, but no DTMF event follows.	First LED blinks quickly.	1. Check if the Tip & Ring line is connected to the alarm panel and the device is well connected. 2. Check the settings of the alarm panel (CID or SIA). 3. Check all call directions are enabled.
SIM Card Error	No SIM card Detected.	1. First LED blinks quickly. 2. Second LED blinks quickly.	1. Check that the SIM card is properly installed in Surf-K/KM. 2. Check that the device is properly registered with the cloud server. 3. Reboot the device.
Keybus Communication Failure	No data received from the keybus panel terminals after a certain period.	First LED blinks quickly.	Check if the keybus line (Yellow, Green) is connected properly to the alarm panel and to the Surf-K/KM.
Aryo Communication Failure	No connection to Aryo cloud.	1. First LED blinks quickly. 2. Second LED blinks quickly. 3. Third LED is off.	If it does not operate normally even after waiting for a while, check the following. 1. Check that the SIM card is properly installed. 2. Check that the device is properly registered in the cloud server. 3. Check if the antenna is properly connected.
High/Low Temperature	Ambient temperature being out of the operating range of Surf-K/KM.	1. First LED blinks quickly.	Check the ambient temperature, identify the cause of the temperature abnormality, and eliminate the cause.

7. Specifications

Hardware	surf-k, surf-km
Dimensions	120 mm*70 mm*26.7 mm
Weight	81g, 82 g
Operating temperature	32°F to 120°F (0°C to 48.9°C)
Humidity	86%
Input voltage	9-14 VDC
Operating voltage	6-20 VDC
Mounting	2 screw holes
Average current draw at 13.5V (Surf-K)	25 mA
Max current draw at 13.5V (Surf-K)	55 mA
Average current draw at 13.5V (Surf-KM)	35 mA
Max current draw at 13.5V (Surf-KM)	80 mA
Keybus (DSC & Honeywell)	Y
Tip/Ring	Y
Input zone	4
PGMs	2
Status LEDs	4
RF expansion port	1
Antenna cable length	75 cm
Antenna frequency	LTE Full band
Communication	LTE
Certification	FCC, IC, AT&T, PTCRB

8. Warranty

a. Product Warranty

Subject to the limitations set forth herein and in Epic's warranty policy document, Epic warrants that the products sold by it to its authorized Dealers shall be free, under normal use and service, from defects in material and workmanship for a period of twelve (12) months from the date of purchase. Epic does not warrant products that do not have a serial number. This warranty shall also be void if there is a failure to maintain the products and the systems

in which they operate in proper working conditions. During the warranty period, Epic shall, at its option, repair or replace any defective product upon return of the product, by the Dealer, to Epic, at no charge for labor and materials. This warranty is for the authorized Dealer who originally purchased the product and is not transferrable, not assignable to any party.

Further details are available in Epic's warranty policy document.

b. Warranty Disclaimer

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Epic's Limited Warranty is offered to its authorized Dealers, only on the new Products according to Epic's warranty policy that is published and updated from time to time. It includes replacement or repair of defective products returned in accordance with the Return Policy. Freight costs to the repair center are not covered. If repair attempts fail, replacement is the sole remedy. Epic holds no responsibility for the products manufactured by third parties. Epic also makes no assertion that its products are immune to compromise and/or circumvention.

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Epic shall not be liable for any loss and/or damage to the user's premises and the contents thereof, any injury or death to any person, any failure of the system to function, any error in performance, any inaccuracies or issues in transmission, reception, or handling by the recipient of any alarm signal to react properly, for any reason whatsoever, and such circumstances shall not create any liability for Epic, whether in breach of contract, tort, or otherwise.

Epic's usage of services is not intended to establish obligations under the Health Insurance Portability and Accountability Act of 1996 (HIPAA), and no assurances are provided that the services fulfill HIPAA requirements. If the end User is (or becomes) a Covered Entity or Business Associate under HIPAA, Epic's services cannot be employed for any involvement with Protected Health Information (as defined by HIPAA) without obtaining prior written consent from Epic.

Epic is not an insurer and assumes no responsibility for any damage, loss, or injury resulting from alarm system failures or signal monitoring, and the user must obtain their required insurance coverage. System failures may occur beyond Epic's control, and responses from authorities can be slow or ineffective. The system serves as a deterrent, not a comprehensive protection or substitute for insurance. Payment to Epic covers subscription services, not insurance. Epic's charges are unrelated to User's premises value. In case of loss, the User's reimbursement sources are their resources or insurers.

The total aggregate liability of Epic, its affiliates, and their respective officers, directors, employees, and agents, for damages of any nature, regardless of the form of action, shall not exceed the total amount paid by the authorized parties to Epic in the twelve (12) months preceding the event giving rise to the claim.

d. Repair Under Warranty

All the warranty claims must be accompanied by a Return Merchandise Authorization (RMA) number which must be obtained before merchandise can be returned for any warranty replacement or repair. To request an RMA number, the customer can contact Epic's Technical Support Center via telephone. The Technical Support Center will provide troubleshooting assistance and if they find the product to be defective, will issue an RMA number. The RMA number must be displayed on the outside packaging of the returned item. Transportation charge, if any, incurred in connection with the return of a defective item to Epic shall be borne by the customer. Any collect shipments returned to Epic will be refused. Epic shall fix the goods without extra costs under the warranty period.

Epic shall pay any transportation charge incurred with the redelivery of a repaired or replacement item or ship the warranty item with customer's next order. If, however, Epic reasonably determines that the item can function, the customer shall pay all the transportation charges. If Epic determines, at its sole discretion, that the allegedly defective

item is not covered by the terms of the warranty provided hereunder or that a warranty claim is made after the warranty period, the cost of repair by Epic, including all shipping fees, shall be paid by the customer.

Claim for damaged products or shortages when shipment arrived must be made by the customer immediately. If any goods are damaged on shipment arrival, it must be noted on the carrier's waybill prior to signing. Failure to note the shortages or damages on the carrier's waybill will result in the claim being denied. Epic will provide free replacement or credit note for the damaged products or product shortage claims.

THE FOREGOING IS CUSTOMER'S AND DISTRIBUTOR'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A WARRANTY CLAIM.