BluKey Plus™

User Manual

Models:

- BluKey Plus™ S
- BluKey Plus™ SD

Contents

Introduction

The turnkey PayRange payment system includes a BluKey hardware device for the machine along with a mobile app and a transaction processing service for the consumer. Consumers maintain a prepaid balance on their smartphones and use it to make payments at a variety of machines that can include vending, amusement, parking, transit ticketing, and laundry equipment.

BluKey Plus (BK+) device provides mobile payment functionality and works with any commercial Vending machine in the USA and other countries that adopted the MDB standard.

Card connector on the BluKey Plus allows the use of MDB card reader on older machines that have VMC with only one CPD.

The BluKey Plus SD (BK+SD) model supports Real-Time Clock (RTC) timekeeping with an external backup battery and connection of expansion modules and DEX cable for vending machines with DEX port on the VMC.

Installing BluKey Plus takes under 1 minute and requires only plugging in the device into existing cables inside the machine.

PayRange BluKey Plus™ Mobile Payment System consists of:
- BluKey Plus™ (accepts payments from PayRange mobile app)

Vending Machine	Bill & Coin Acceptor and Card Readers	BluKey Plus™

References

[1] NAMA Multi-Drop Bus / Internal Communication Protocol MDB / ICP, Version 4.3, July 2019

[2] EVA DTS 6.1 (Data Transfer Standard)

Glossary

VMC   Vending Machine Controller, the central control unit that also controls the electromechanical system.

MDB   Multi-Drop Bus, NAMA Specification, the way a vending machine communicates to a payment system using the vending machine controller.

DEX   Digital Exchange, NAMA Standard, an interface and protocol for collecting audit and event data from vending machine VMC.

RTC   Real-Time Clock.

NAMA   National Automatic Merchandising Association is the American national trade association of the convenience services industry.

EVA   European Vending Association

UCS   Uniform Communications Standard

CPD2   CPD is Cashless Payment with Diagnostics, CPD2 is CPD unit #2, an alternate mode of operation in the MDB specification to allow two cashless devices.

Interfaces

1. 1-MDB connector
2. 2-CARD connector
3. Power/Status LED
4. Button
5. MDB connector
6. DEX connector (BK+SD only)

Installation

Before Installation

1. Create your PayRange Operator Account
   Create operator account at
   manage.payrange.com/#/register/asOperator

   a. *Follow prompts to create your account.*
   b. *Setup ACH for payment with your bank routing and account number.*

2. If you already have a PayRange account, make sure it is an Operator Account

   a. *Go to* manage.payrange.com *and Sign in.*
   b. *Once logged in, click Create an Operator Account (may need to click Account first).*
   c. *Select Operator Sign up (at the bottom of the page), follow prompts to create your account.*
   d. *Setup ACH for payment with your bank routing and account number.*

   Note: *Though it is possible to skip banking information, Weekly payments will commence only after banking is set up, and there are mobile sales.*

   e. *Issue free vend code for installation tests.*
   See video: vimeo.com/716923945

   OFFERS > Create Offer >

   Offer Type: Free Vend

   Description: Technician free vend offer

Max Vend Amount: <enter amount to cover a purchase>
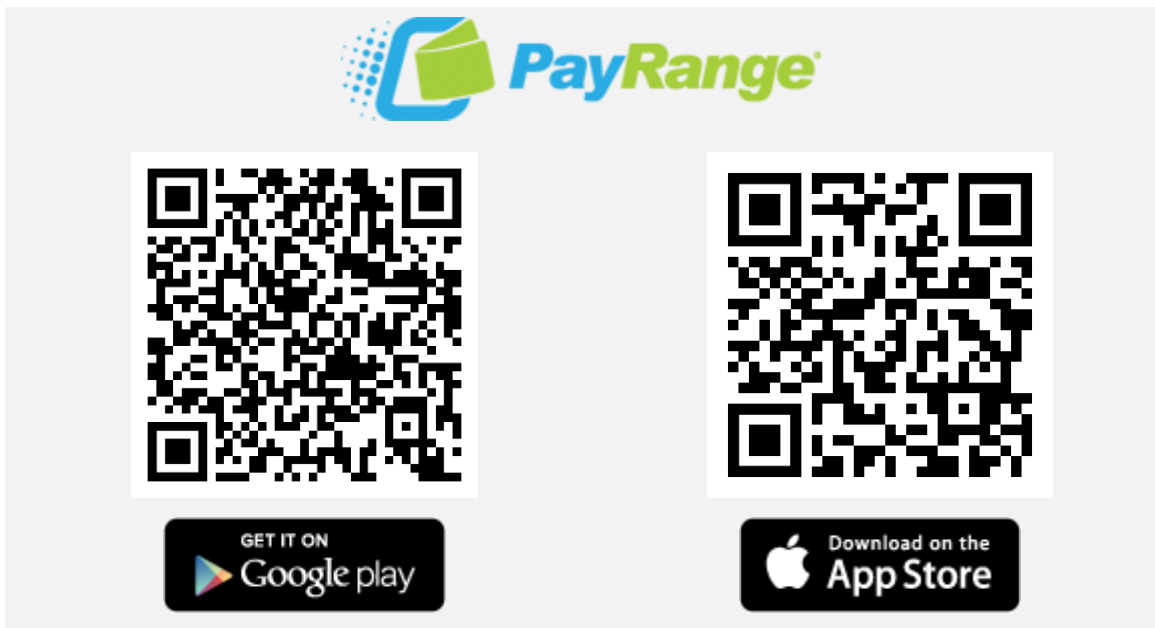
Enter any other necessary information.

Click "Create Offer" button.

Copy the offer codes and send them to installation technician(s) (via email or text).

3. Setup for Your Machine Installers
Prepare Installers:

a. *Download and install the PayRange app:*

b. *Load funds to the app with a credit/debit card or issue a Free Vend code.*
c. *Prepare additional point of sale material such as table tents, location flyers, and location posters. These can be downloaded free from payrange.com/resources.*

Note: *Because the PayRange device is inside the machine, the users will not know it is there unless you tell them. The more you do to promote PayRange, the quicker they will become loyal users of your machines.*

d. *Provide necessary tools and supplies:*
d.1. BluKey Plus device
d.2. Room key and necessary building access cards
d.3. Operator (Installer / Service) key for the machine
d.4. Smartphone, tablet or connected laptop with the PayRange app.
d.5. Installer login & password into Operator Account

Device Registration/Configuration
Device registration and setup can be done using the **PayRange App** on mobile devices (Android or iOS) – see vimeo.com/726126479

or the **Manage Dashboard** in a Web browser – see vimeo.com/781202007,
the steps are the same.

It is recommended to register the Device before installation. Though it can also be registered after the installation, just be sure to have access to the device **Serial Number** and **PIN** on the device label.

An operator account must be created before devices can be registered (see section "**Create your PayRange Operator Account**" above).

1. Open **PayRange** app on mobile device (Android or iOS)
   or open **Manage Dashboard** in a web browser
   https://manage.payrange.com/#/devices/register
2. **Login** using operator credentials to access the operator mode.
3. In **PayRange** app: open the menu (tap ☰ icon in upper left) and select **Register Device**
   In **Manage Dashboard**: click **DEVICES > Register** in the left panel.
   > **Note:**   When done filling information on the screen, click one of the buttons:

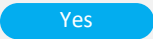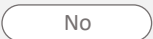 | NEXT | - click to advance |
   | BACK | - click to return and correct any information |

4. Enter **Device Information**:
   a. *Serial Number & PIN: or enter manually or tap* 📷 *icon to capture barcode for Serial Number and PIN.*
   b. *Machine ID: optional field for internal machine tracking (not visible to consumers).*
   c. *Position: optional field to enter number decal if one will be affixed to the machine.*
5. Enter **Machine Information**:
   a. *Category: select industry (Vending).*
   b. *Subcategory: select machine type (Snack, Drink, Combo, Cold Food, …).*
   c. *Service Location: optional.*
   d. *Machine Display Name: E.g. Snacks.*
6. Enter **Location Information**:
   a. *Location Name: location where device is installed (visible in consumer transaction history).*
   b. *Address: enter location address:*

   | Use Current Location | - fill address using phone location |
   | Use Last Entered | - fill location name & address based on last device registered |

7. **Device Preview**: image of the machine – take a picture of the machine, so customers can see how the machine looks in the app.
8. After all the information is entered, click:

   | REGISTER | - to complete device registration |

9. Device Registration Complete - Success dialog appears:
   > *Would you like to register another [machine] with same settings & pricing?*

   | Yes | - copies Machine and Location settings to next device, Position number increases by one |
   | No | - register a device for a machine with different settings |

Installation Steps – Machine with Card Reader and/or Bill Acceptor & Coin Mech

See video: vimeo.com/641632268

1. Power Off machine.
2. Unlock machine and open machine to access control panel.
3. Locate and follow the main MDB cable from the control panel to the card reader connection.
4. Connect BluKey (male port) to the main MDB cable (BluKey should always be first in line).
5. Connect the card reader harness to the opposite end of the BluKey Plus port (female port) labeled "2-Card".
6. Disconnect the "Y" harness (usually "Y" harness cable connects coin mechanism and bill validator) from the card reader harness and connect it to the opposite end of the BluKey labeled "1-MDB" (female port).
7. Turn On machine.
8. BluKey should display a LED light:
   a. *Solid Blue LED indicates machine is ready for mobile payments.*
   b. *Flashing Red LED:*
      b.1. Machine is disabling mobile payments because of door being open (Push door switch in and BluKey should turn Blue
      b.2. Machine is disabling payment system because of an error message from the control board (Clear any error messages from the machine)
   c. *Solid Red LED:*
      c.1. Access machine setup menu and turn ON the cashless option.
      c.2. Access control panel and ensure EPROM version meets PayRange requirements.
9. Attach instruction PayRange decal to the machine (Close to selection pad)

Installation Steps – Machine with Telemetry and Card Reader

See video: vimeo.com/641631666

2. Power Off machine
3. Unlock machine and open machine to access control panel.
4. Locate and follow the main MDB cable from the control panel to the card reader connection.
5. Connect BluKey (male port) to the main MDB cable (BluKey should always be first in line)
6. Connect the telemetry harness to the opposite end of the BluKey Plus port (female port) labeled "2-Card".
7. Disconnect the "Y" harness (usually "Y" harness cable connects coin mechanism and bill validator) from the card reader harness and connect it to the opposite end of the BluKey labeled "1-MDB" (female port).
8. Turn On machine.
9. BluKey should display a LED light:
   a. *Solid Blue LED indicates machine is ready for mobile payments.*

b. *Flashing Red LED:*

  b.1. Machine is disabling mobile payments because of door being open (Push door switch in and BluKey should turn Blue.

  b.2. Machine is disabling payment system because of an error message from the control board (Clear any error messages from the machine).

c. *Solid Red LED:*

  c.1. Access machine setup menu and turn ON the cashless option.

  c.2. Access control panel and ensure EPROM version meets PayRange requirements.

10. Attach instruction PayRange decal to the machine (Close to selection pad).

Specifications

BluKey Plus Models

Model	Part Number	DEX Connector	Notes
BluKey Plus S	10.02079		
BluKey Plus SD	10.02077	●	

All BluKey Plus models have MDB, 1-MDB and 2-CARD connectors for connecting to vending machine MDB bus and devices.

The BluKey Plus SD model has a 5-pin DEX connector for connection to VMC DEX port, backup battery for real-time clock, or for expansion modules.

Absolute Maximum Ratings

Symbol	Description	Min	Max	Unit	Notes
T_{STG}	Storage temperature	-40	85	°C	(1)
V_{CCDC_MAX}	VMDB Power supply, DC	-0.3	47	VDC	peak
$I_{DC\_OUT\_MAX}$	VMDB_OUT output combined current on 1-MDB and 2-CARD	-	2000	mA	peak
V_{DDO_MAX}	5V_OUT power supply output on DEX, DC	+4.75	+5.25	V	
I_{DDO_MAX}	5V_OUT power supply output on DEX, DC	-	100	mA	
V_{DI}	MDB_RX, VMC_RX Digital input voltage	-0.3	V_{DD} + 0.3	V	(2)
I_{DO}	MDB_TX, VMC_TX Digital output current	-	15	mA	

1. Determined according to JEDEC Standard JESD22-A103, High Temperature Storage Life.
2. V_{DD} is an internal 5V LDO regulator.

Operating Conditions

Symbol	Description	Min	Typ.	Max	Unit
T_O	Operating temperature range	-30	-	85	°C
V_{CCDC}	VMDB Power supply, DC	9	34	45	VDC
I_{CC}	Power supply current, max (@ typ.34VDC)	-	32	56	mA
U_{CC}	Power consumption	-	1	1.8	W (1)

Symbol	Description	Min	Typ.	Max	Unit
I_{DC_OUT}	VMDB_OUT output combined current on 1-MDB and 2-CARD	-	-	1000	mA
V_{DDO}	5V_OUT power supply output on DEX, DC	-	+5.0	-	V
I_{IL_MDB}	MDB_RX Input current for data low	0	-	1	mA
I_{IH_MDB}	MDB_RX Input current for data high	10	-	15	mA
I_{OL_MDB}	MDB_TX Output current for data low	0	-	30	µA
I_{OH_MDB}	MDB_TX Output current for data high	15	-	75	mA
I_{IL_VMC}	VMC_RX Input current for data low	0	-	1	mA
I_{IH_VMC}	VMC_RX Input current for data high	10	-	15	mA
I_{OL_VMC}	VMC_TX Output current for data low	0	-	50	µA
I_{OH_VMC}	VMC_TX Output current for data high	100	-	150	mA

1. Power consumption excludes load on VMDB_OUT/5V_OUT by other connected devices.
2. V_{DD} is an internal 5V LDO regulator.

ESD Handling Ratings

Symbol	Description	Min.	Max.	Unit	Notes
V_{HBM}	Electrostatic discharge voltage, human body model	-2000	+2000	V	1
V_{CDM}	Electrostatic discharge voltage, charged-device model	-500	+500	V	2
I_{LAT}	Latch-up current at ambient temperature of 105°C	-100	+100	mA	3

1. Determined according to JEDEC Standard JESD22-A114, Electrostatic Discharge (ESD) Sensitivity Testing Human Body Model (HBM).
2. Determined according to JEDEC Standard JESD22-C101, Field-Induced Charged-Device Model Test Method for Electrostatic-Discharge-Withstand Thresholds of Microelectronic Components.
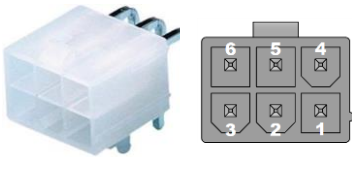3. Determined according to JEDEC Standard JESD78, IC Latch-Up Test.

RF Specifications

Symbol	Description	Min.	Max.	Unit	Notes
F_{RF}	RF Frequency range (Bluetooth 4.1)	2402	2483.5	MHz	
P_{RFO}	RF Output power		10	dBm	
S_{RFI}	RF Sensitivity (at 0.1% BER, 1Mbps GFSK BLE4.x)	-90		dBm	Estimated

Connector Pinouts

MDB Connector

BK+ MDB connector is a 6-pin Female Molex Mini-Fit Jr. and is compliant with NAMA MDB Specification for "Peripheral Slave". It provides power to BluKey Plus and MDB data low-voltage signals.
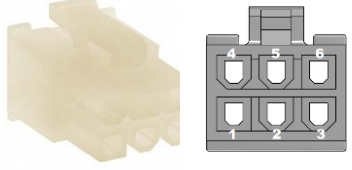
MDB Connector	BluKey Plus	Cable / Mating part
6-pin Mini-Fit Jr		

Pin	Name	Notes
1	VMDB	DC power supply input +
2	GND	DC power supply input - common
3	(NC)	Unused
4	MDB_TX	Data output, opto-isolated
5	MDB_RX	Data input, opto-isolated
6	MDB_COM	Data common, opto-isolated

Notes:

- Direction of input and output is from the BK+'s perspective.

- GND is for machine-provided power.

- MDB signaling is fully isolated from the machine by optocouplers in BK+.

1-MDB Connector

BK+ 1-MDB connector is a 6-pin Male Molex Mini-Fit Jr. and is compliant with NAMA MDB Specification for "VMC Master". It provides a power and downstream / pass-through data connection to other MDB payment devices.

CARD Connector	BluKey Plus	Cable / Mating part
6-pin Mini-Fit Jr		

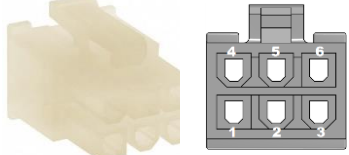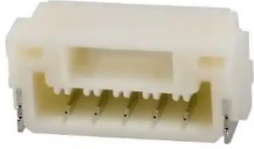| Pin	Name	Notes
1	VMDB_OUT	DC power supply output +
2	GND	DC power supply output - common
3	(NC)	Unused
4	MDB_RX	MDB Data input
5	MDB_TX	MDB Data output
6	MDB_COM	MDB Data common

Notes:

- Direction of input and output is from the BK+'s perspective.

- GND is for machine-provided power.

- BK+ passes Power supply from MDB connector VMDB/GND pins to the output.

- MDB_COM is common for MDB_RX, MDB_TX, all passed from MDB connector MDB_RX/MDB_TX/MDB_COM pins.

2-CARD Connector

BK+ 2-CARD connector is a 6-pin Male Molex Mini-Fit Jr. and is compliant with NAMA MDB Specification for "VMC Master". It provides power and a VMC connection (from BK+ internal mini-VMC) to card readers on machines that do not have CPD2 support.

CARD Connector	BluKey Plus	Cable / Mating part
	6-pin Mini-Fit Jr	

Pin	Name	Notes
1	VMDB_OUT	DC power supply output +
2	GND	DC power supply output - common
3	(NC)	Unused
4	VMC_RX	VMC Data input
5	VMC_TX	VMC Data output
6	GND	VMC Data common
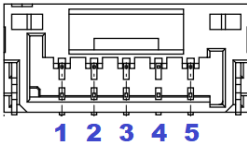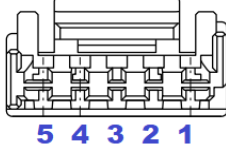
Notes:

- Direction of input and output is from the BK+'s perspective.

- GND is common for VMDB, VMC_RX, VMC_TX.

- BK+ passes Power supply from MDB connector VMDB/GND pins to the output.

DEX Connector

DEX connector supports an external backup battery for Real-Time Clock (RTC) timekeeping function, connection of expansion modules and DEX cable for vending machines with DEX port on the VMC.

It is present only on BK+SD model.

DEX Connector	BluKey Plus SD	Cable / Mating part
	1 2 3 4 5	**5 4 3 2 1**
	5-pin JST SM05B-GHS-TB	JST GHR-05V-S

Pin	Name	Notes
1	VBAT_IN	RTC backup battery input
2	5V_OUT	+5V auxiliary power output (for expansion modules)
3	DEX_TXD	Serial data output, RS-232 (5V compatible). For DEX use, connect to ring on the DEX connector
4	DEX_RXD	Serial data input, RS-232 (5V compatible). For DEX use, connect to tip on the DEX connector
5	GND	Common for all power and signals

Notes:

- Direction of input and output is from the BK+'s perspective.

- Recommended CR1632. BK+SD supports only lithium-based 3V watch coin cell batteries, e.g., CR2016, CR2032.

- BK+SD provides up to 100mA of current on auxiliary power output 5V_OUT.

Recommended Mating Parts

MDB Connector: Molex Housing 39-01-2061 / Crimp pins 39-00-0067
                  AMP Housing 794550-6 or 794542-6 / Crimp pins 794578-1 or 794576-1

CARD Connector: Molex Housing 39-01-2060 / Crimp pins 39-00-0065
                  AMP Housing 106527-6 / Crimp pins 106528-2 or 106529-2

DEX Connector: JST Housing GHR-05V-S / Crimp pins SSHL-002T-P0.2

Mechanical

The following figure shows BluKey Plus dimensions.
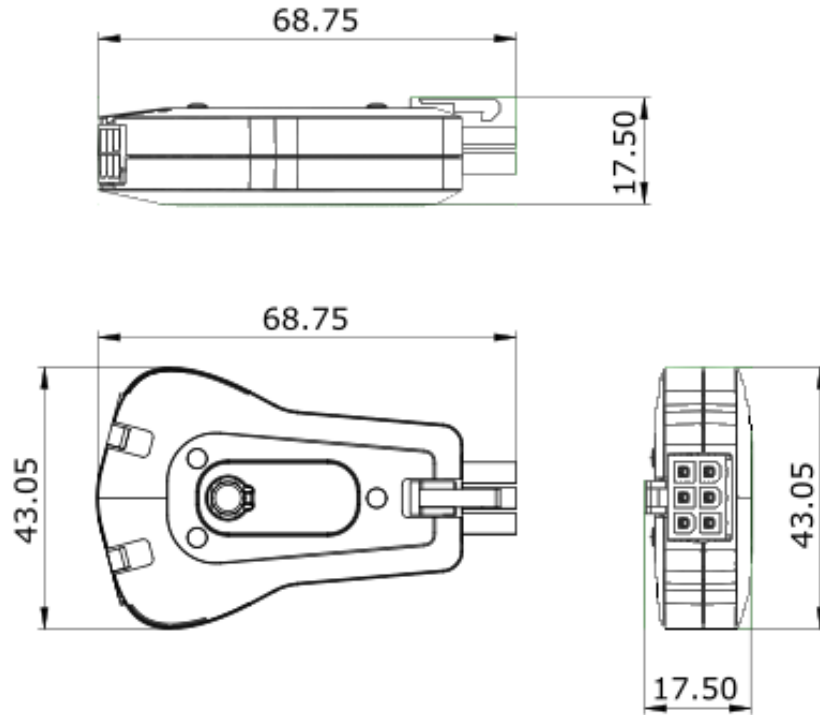
Troubleshooting / Light Codes

LED Pattern		Status	Fix
	Solid Blue	Powered On and Ready	(Normal operation)
	No Light	Machine not powered	Power on the machine.
		No power on harness	Check Machine's harness connectors.
	Faint Light	Device malfunction	Replace the Device.
	Solid Red	Not Registered on MDB	Switch MDB mode. Contact PayRange for support.
	Solid Purple	Device needs to reboot	Power cycle the machine.
	Slow Blue Flash	Connected with App	(Normal operation)
	Slow Red Flash	Disabled by Machine	Refer to Machine manual to enable payments / return to enabled state.
	Slow Purple Flash	Transaction in progress	(Normal operation)
	Fast Red Flash	Device malfunction	Replace the Device.
	Fast Purple Flash	Transferring data	(Normal operation)
	Fast Red/Blue Flash	Capturing debug data	(Normal operation)
	Solid Purple with Red Flash	1-Button Mode	(Normal operation)
	1 Blue/3 Red Flash	No Mobile Transaction within 24 hours	Power-cycle Machine to reset the warning. Check if Machine has any problems running.

LED Pattern		Status	Fix
●●●●● (5 Blue/5 Red)	5 Blue/5 Red Flash	Device malfunction	Replace the Device.
●●●●● (Fast Blue)	Fast Blue Flash	Upgrading	Keep power on until done.
	1. Mobile payment does not work		1. Check if Device is in Ready state / LED is solid blue. 2. Check if Device flashes "Transaction in progress" LED pattern during mobile payment. If not, check Internet / data connection on mobile device.
	2. Machine does not accept coins or bills		1. Disconnect the Device and re-connect coin & bill acceptor, check if machine accepts coins & bills. If not, replace the coin / bill acceptor and its harness. 2. Plug coin / bill acceptors into 1-MDB connector (2-CARD connector does not support coin / bill acceptors). 3. Plug in fully all the connectors.
	3. Machine does not accept credit cards		1. Disconnect the Device and re-connect credit card acceptor, check if machine accepts credit card. If not, replace the credit card acceptor and its harness. 2. If machine VMC supports CPD2, switch BluKey Plus to CPD2 mode and plug the credit card acceptor into 1-MDB connector. 3. If machine VMC does not support CPD2, plug the credit card acceptor into 2-CARD connector (1-MDB connector does not support credit card acceptor on machines that have VMC without CPD2). 4. Plug in fully all the connectors.

Regulatory Approval

United States

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference; and
(2) This device must accept any interference received, including interference that may cause undesired operation

PayRange has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

To satisfy RF exposure requirements, this device and its antenna must operate with a separation distance of at least 20 cm from all persons.

Canada

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference received, including interference that may cause undesired operation of the device.

PayRange has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

To satisfy RF exposure requirements, this device and its antenna must operate with a separation distance of at least 20 cm from all persons.

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

PayRange n'a approuvé aucun changement ou modification de cet appareil par l'utilisateur. Toute modification ou changement pourrait annuler l'autorisation de l'utilisateur d'exploiter l'équipement.

Pour satisfaire aux exigences d'exposition aux RF, cet appareil et son antenne doivent fonctionner avec une distance de séparation d'au moins 20 cm de toutes les personnes.

Device Labelling

FCC ID: 2AF78-02075
IC: 21341-02075

Appendix A: Switching BluKey Mode

To switch BluKey modes:

1. Power off the machine.
2. Press and hold BluKey button, power ON machine while holding the button.
3. Release the button after 3 seconds after machine powers On.
4. Press the button briefly to change modes:
   a. *Single Red Flash is CPD1 (Default setting).*
   b. *Two Red Flashes is CPD2.*
5. Power Off machine and power machine back ON to accept settings.
6. Check that BluKey LED turns solid blue.

Appendix B: Light Codes decal

BluKey™ Light Codes

● Blue Light   ● Red Light   ● Purple Light

Solid Blue - Powered On and Ready

Solid Red - Not Registered on MDB

Solid Purple - Needs to Reboot

● ● ● **Slow Blue Flash** - Communicating with App

● ● ● **Slow Red Flash** - Disabled by Machine

● ● ● **Slow Purple Flash** - Transaction in Progress

●●●●● **Fast Red Flash** - Unit Needs to be Replaced

●●●●● **Fast Purple Flash** - Transferring Data

●●●●● **Fast Red/Blue Flash** - Capturing Debug Data

Solid Purple with Red Flash - 1 Button Mode

●●●● **1 Blue/3 Red Flash** - No Mobile Transaction within 24 hours

●●●●● **5 Blue/5 Red Flash** - Crash Sequence: Unit Needs to be Replaced

Faint LED - Unit Needs to be Replaced

Tips:
• Machine must be powered down to install or remove BluKey.
• Do a test vend with mobile app after install.
• Crane machines may require "MDB Card" to be enabled in machine configuration.

For Support: https://support.payrange.com

or Call: (855)-856-6398

23.00478-01

Appendix C: Firmware Upgrade

PayRange may release firmware updates with new functionality and improvements.

BK+ upgrades firmware automatically, in the background.

Contact PayRange support for additional information on firmware upgrades.

Contacting PayRange Support

For assistance with installing and operating your BluKey Plus devices, please contact our support group:

1. For Technical Support:

2. For Sales and Marketing Support:

Phone: +1 (855) 856-6398 (menu option 1)

Phone: +1 (855) 856-6398 (menu option 2)

Email: support@payrange.com

Email: sales@payrange.com

Document History

Part Number 23.02359

Issue	Date	Reason
00	16 Oct 2023	Initial Release – DRAFT 1
01	19 Jan 2024	Updated "Device Registration/Configuration" section, Added QR codes for links and mobile apps
02	05 Aug 2024	Revised Canadian RF exposure separation distance requirement into it's own section

(Trademarks)