





# **Wirelessly Controlled Bag-Counter System**

# Amazin Automation Solutions JANUARY - 2020

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#### 1 Abbreviation/Acronyms

- JB - Junction Box
- TB - Terminal Block
- LED - Light Emitting Diode
- AP - Access Point
- CCQ - Client Connection Quality •
- PtP - Point to Point Access
- PtMP Point to Multi Point •
- CPE – Customer Premises Equipment (device that is installed outdoors typically a wireless access) • point, wireless bridge, or wireless router)

#### 2 **Objective of the Document**

The objective of this document is to give assistance to people about Bag-Counter Specification, operation & configuration.

#### 3 Audience

- 1. End User
- 2. Testing Team
- 3. Plant Management

#### Introduction 4

This is a micro-controller-based system that receives input signal from load cell (Sher Beam), which is installed below conveyor belt. Whenever the cement bag passes over the load cell assembly, a pulse is generated according to the weight and time of the bag. (time in the sense, how long the bag was on the sensor) When the target is given through the application. The controller starts counting the bags until the target is reached. The control unit has a relay to stop the conveyor belt after completion of the target. The discharge belt is connected to that relay. And it stops as soon as the target is met.

When the load-cell sense the cement bag, it sends a pulse to the control unit. The control unit processes the



pulse according to the defined algorithm and shows it on the LED display as a count. And along with this, there is communication from the application as well. And the count keeps updating on the application's dashboard.

# 5 Technical Specification and Features

- MCU: Cortex M3 based 32bit advanced micro controller.
- > This controller can also count adjacent bags, overlapping bags, horizontal and vertical bags.
- > It has 16X2 character LCD display to know the current status for better understanding to the operator.
- It has Single row high brightness LED display, to display the current count (4 Digits)/target count (4 Digits) with long view distance (20 meters) and the character size is 6inches.
- ON Board Ethernet Module (RJ45 port) with 10 to 100Mbps speed for MIS reports and operating from Amazin PPMS Application.
- > IT Supports TCP Server, TCP Client, UDP Client, UDP Server and HTTPD Client working modes.
- > On board one RS232 channel to send the data to LED Display.
- On board two RS485 channels.
- Supports 4X3 Keypad for entering target quantity (Not Included).
- LED indicators to know the controller working status.
- > It can read belt running feedback signal to know belt running/stop status.
- It has 2 Nos. of On board potential free outputs to stop the conveyor belt when count reaches the Target value and it can be used as ALARAM.
- Isolated industrial SMPS for both load cell and controller power.
- No need of Separate power supply for load cell.

# 5.1 Electrical Specification

- Input power: AC 90V-240V/3amp.
- Device power consumption: 2watts.
- One load cell input to read the load cell status.
- > Two potential free relay outputs with N0/NC contact to stop the belt.
- One Belt Running signal feedback input: AC 110V or 230V

# 5.2 Environmental Condition

- Temperature: 0 to +65 C.
- Humidity: 0 to 96% Rh non-condensing.

# 5.3 Mechanical Specification

# **Controller Junction Box**

- Body: 1.2mm MS
- Dimension: 400mm \* 400mm \* 200mm
- Surface Finish: Powder coated.
- Net weight: 15 Kgs
- Standard Wall Mounting.

### LED DISPLAY:



- Body: 1.2mm MS
- Dimension: 3 ½ Feet\* ½ feet
- Surface Finish: Black Powder coated.
- Net weight: 12 Kgs
- Standard Wall Mounting.

# 6 Associated Hardware Components

# 6.1 Control Unit

The controller is the main part of Bag-Counter (web base application). It is an embedded device in which the bag counter application operates the entire functions with the help of programmed controller.

The bag counter Controller has a metallic cabinet, inside which all its necessary components are packed. Those are relay Card, PoE switch, MCB & SMPS etc.

### For controller connection detailed diagram (Internal), please refer to:

Reference Document\<u>Reference Docs\Bag-Counter\_Internal\_Wiring\_Diagram.pdf</u>

Default IP : 192.168.0.7 Default ID : admin Password : admin

### Follow these steps to configure the Bag-Counter controller:

- If the IP address is known, then open it on the web browser and set the parameters as described below- (Figure 4, 5, 6, 7).
- User Name & Password is <u>admin.</u>
- Or download the USR-TCP232-M4K3 Setup Software for find the IP Download Link - https://www.usriot.com/support/downloads/usr-tcp232-m4k3-setup-software.html
- ▶ USR-TCP232-M4K3 Setup Software V2.3.3.97.exe (or available latest version).
- First Search the device (Figure 1) and set the parameters as described.



# Opened in USR-TCP232-M4K3 Setup Software

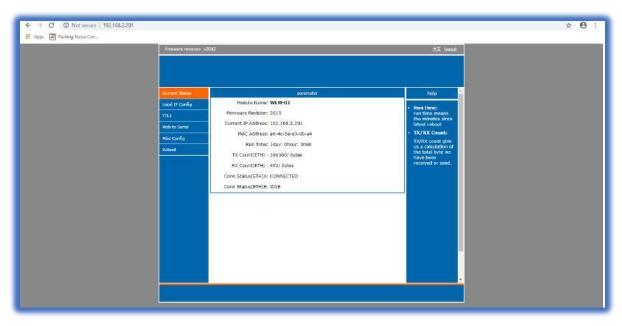
earch List [Click a device to read	parameters in the Sea	rch List]	Port1 Port2 Port3	3 Port4	
Device IP Device Name	мас	Version			
192.168.1.75 Weighbridge 192.168.1.235 Digitizer		3009 3009 ear ARP table mpatible with Factory Reset	Baudrate: Paritiv/Data/Stop: FlowControl: Work Mode: RemoteIP: RemoteIP: Remote Port Local Port: TCP Server style	115200         •           NONE         8         1           None         •           TCP Client         •           192.168.0.131         5555           5555         Transparenttransmi	<ul> <li>(?)</li> </ul>
	Static IP • (?)		ModbusTCP PackTime: PackLen:	10         ms (0~255)           200         byte (0~1460)	(?) (?) (?)
ModuleStaticIP. SubnetMask Gateway	(7)		Synchronize ba	oud D 1234567890123456788	(?) (?)
Full Show +	Base S			Save COM1	

Figure 1. Search Devices (Default Parameters)



irch List[Click a device to read p	arameters in the Sea	rch List]	RS232		
evice IP Device Name	MAC	Version			
32.168.1.75 Weighbridge 32.168.1.235 Digitizer		3009 3009 ear ARP table mpatible with	Baudrate: Parity/Data/Stop: FlowCentrol: Work Mode: RemoteIP: Remote Port:	19200         •           NONE         8         •         1         •           None         •         •         •         •         •           TCP Client         •         •         •         •         •         •           192.168.1.150         •         •         •         •         •         •         •	(?) (?) (?) (?) (?)
Dpen Device		Factory Reset	Local Port: TCP Server style: ModbusTCP:	2301 Transparent transmi 👻	(?) (?) (?)
	atic IP • (?) 2.168.1.75 (?)		PackTime: PackLen: V Synchronize ba	0 ms (0~255) 0 byte (0~1460)	(?)
	5.255.255.0 (?) 2.168.1.1 (?) Base S	ave	Synchronize as     Synchronize as     Enable USR Cl     Device     ammunication Coordination		(?) (?) ]

Figure 2. Selected Parameters



**Figure 3. Current Status** 

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#### Figure 4. Local IP Configuration



Figure 5. All Parameters



Ferninare exvision: v301		th:X: honeval	
Current Status	parameter	bela 🗠	
Local Status Fig	Module Name: WLM-01	• module name	
TTLE	Websocket Port : 6432	max length is 15 char	
Meb 10 Serial	Webserver Port: 00 MAC Address: a6-4o-5e-e3-db-o4	Woh port     default 80	
His Carly	User Name: admit.	+ ID and ID type	
Retort	Pass Word: admin	we could use it for D2D	
	Buffer Data Bafore Connected: 🗐	Mac oddress     user could modify	
	Reset Timeoult: 0 (60~65535) a	usor could modify this MOC address • Halfler data	
	Save Cancel	Indian deta     default not     checked, buffer	
		dets tenare top connection	
		established • reset timeout	
		recort timeout     default 0, 0-50     muon no timoout,	
		>60 mian when there is no data	
		received during this time, the	
		device will restart	

#### Figure 6. Misc Config

### 6.1.1 Control Unit Programming Procedure

- Required Platform Windows (win 7 and higher version)
- > Download FLASH-MAGIC (open source\*) programming software
- > Connect RS232 Programming kit to controller through jumper wire as follows
  - \_ **RX to RX**
  - TX to TX \_
  - GND to GND
- Power the controller 5VDC @2A  $\geq$

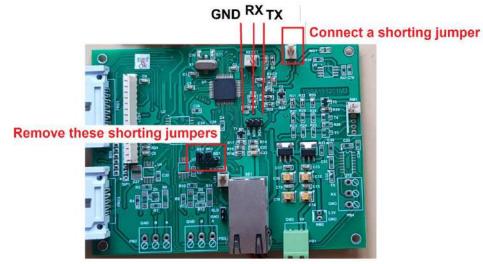


Figure 27. Bag Counter Controller



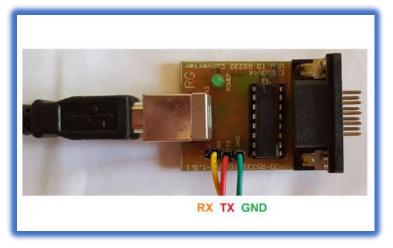


Figure 8. Programming Kit

> Open Flash magic software and select parameters according to the following screenshot

Solution (LPC2148)	3   18   <b>8</b>   4   ×	Start Page
Device	Erase	~
Device: LPC2148 (LPC200) Change Serial Port: COM4 V	Erase: Entire device	FlashMagic
Baudrate: 9600 v		Getting Started Open a project Visit the Flash Magic website Visit the Embedded Systems Academy website
Firmware File: Cillsers/user/Desktop/Balaj_Hex/wa Last modfied: 28-02-2020 11:09:36 Options	gen1_280220.hex Browse <u>Misw file Information</u> Start	Embedded Systems Blog Press Release: Free Micro CANopen Libraries for NXP Microcontrollers Training and event paper presentation videos
✓ Verify after Programming ☐ Patch Befor ☐ Fill Unused Rash ☐ Go after Pro	e Programming Settings	online See you at the upcoming shows and conferences: #EW2020 and #iCC2020 CAN (FD) / CANopen (FD) security specification updates CANopen Maric 10 Released

Figure 9. Flash Magic Software Screenshot

- **Browse Hex file as per WLM number (WLM-1.Hex)**
- Click on Start



After the controller is programmed, the name of the hex dumped in it will be displayed on its LCD. (e.g. Wagon Loader - 1)

#### 6.2 Load-Cell (Shear Beam)

Sher Beam load cell are used wherever compressive forces act.

The core of the shear bar load cell is the spring body. This consists of a piece of metal, which deforms under the action of force and return to its original state when the force is withdrawn. This defined deformation is registered by a strain gauge attached to metal and converted into an electrical signal. It has to be calibrated time to time.



Figure 10. Load Cell

#### 6.2.1 Load-Cell /Bag Timing Calibration



Figure 11. Load-Cell /Bag Timing Calibration

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# 6.3 LED Display

It is a serial communication based 12 characters LED display, which is communicates directly with the bag counter controller and displays counts and target.



Figure 12. LED Display

6.4 Handheld Device (Kiosk/Tablet)

Security Application Password: 0000





Figure 13. Tablet/KIOSK

# 7 Wireless Connectivity Architecture

For wireless connection detailed diagram, please refer to:

Reference Document\<u>Reference Docs\Wireless\_Connectivity\_Diagram.pdf</u>

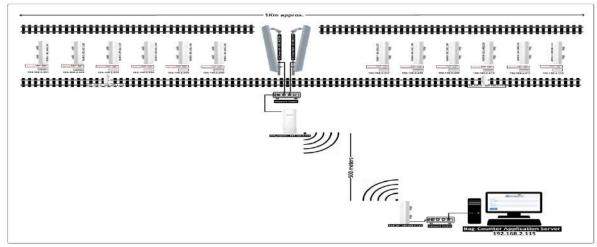


Figure14. Connectivity Architecture

Figure 3

# 7.1 Base-Station (AP)

Tenda B6 5GHz 11n 300Mbps Basestation is designed for PtP and PtMP solutions for wireless connectivity B6 adopt of IP65 weatherproof and 6000V Lightning protection design, it can withstand the harsh environmental conditions such as sunshine, rainfall or extremely low/high temperature environment.



ntra LAN Sertop Correct Model: AP Kak Setup MAC Address SBD9:D5:A6/07:88  AAC Address SBD9:D5:A6/07:88  IP Address Type State:IP Address • IP Address 1P Address • IP Address 122:163:2:254 KCP Client Subnet Mack 256:256:266.0 AN Setting: Default Gateway 8:0.0 Primary DAS Server 10.0.0
Noduce         IP Address.Type         Static IP Address. *           NSdrup         IP Address.         192.108.2.254           KCP Server         192.008.2.256.00           KCP Client         Submit Mask.           XAN Settings         Default Cateway           Values         Primary DNS Server
N Setup     IP Address     192.108.2.254       KCP Server     Subnet Mask     265.255.266.0       AN Settings     Default Cateway     0.0.0       values     Primary DNS Server     0.0.0
KCP Sarvar     12,152,152,153       KCP Client     Subnet Mask       XIN Settings     Default Cateway       Volume     Primary DAts Server       No.0.0
HCP Client     Subnet Mask     255255.266.0       AM Settings     Default Cateway     0.0.0       values     Primary DMS Server     0.0.0
reliase Printary DNS Server 0.0.0
Primary DNS Server 0.0.0.0
A STATE OF A
sanced Secondary DNS Server 0.0.0.0
th Device Name B6V1.0
Suive

Figure 15. Tenda O6 & B6 Web UI

Default Credentials:

IP: 192.168.2.1Default ID: adminPassword: adminWiFi Password: amazin@123

# For detailed configuration, please refer to:

Reference Document\<u>B6\_User\_Guide.pdf</u>



Channel Bandwi	dth 20MHz		Transmit/Receive	Speed	72Mbps/72Mbps	
TX Po	wer 8dBm		Ţ	D-MAX	Disabled	
Wireless Cl	lent G					
Statistics						
Throughput	Wireless Client	Interfac	e ARP Ta	able	Routing Table	
IP Address	MAC Address	Signal/Noise	Transmit/Receive	CCQ	Connection Duration	
192.168.2.106	04:95:E6:A1:EB:01	-35/-109d8m	72/72Mbps	100%	3 d15 h32 m37 s	
192,168,2,103	04:95:E6:A1:E9:95	-65/-109d8m	26/72Mbps	73%	2 d12 h46 m38 s	
192.168.2.104	04:95:E6:A1:EC:6D	-61/-109dBm	52/65Mbps	93%	23 h34 m30 s	
192,168.2,105	04:95:E6:A1:E9:C5	-44/-109dBm	72/65Mbps	100%	9 h33 m53 s	
192,168.2,102	04:95:E6:A1:EB:5D	-59/-109d8m	65/72Mbps	95%	3 h8 m32 s	
192,168,2,101	04:95:E6:A1:E8:F9	-64/-109d8m	26/26Mbps	76%	28 m	



# 7.2 Wireless CPE (AP/Station)

It features with an external power amplifier and a built-in 16dbi directional antenna to provide an efficient way to pick up and maintains a stable signal for a wireless network connection range up to 10 kilometers.

Default Credentials:

IP: 192.168.2.1Default ID: adminPassword: adminWiFi Password: amazin@123

### For detailed configuration, please refer to:

Reference Document\<u>O6\_User\_Guide.pdf</u>

# 8 Application Overview

The interface of the Bag-counter application is as follows:



# 8.1 User Login

Bag-Counter application is a web based application. To open the application user has to open the browser and enter the below mentioned URL,

### 192.168.2.115:8080/BagCo2

Default User ID : admin Password : 1234

#### Figure 17. Login

### 8.2 Home

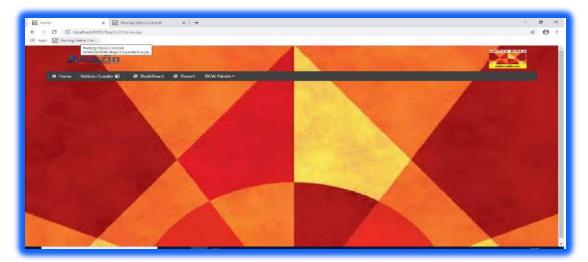


Figure 18. Home



# 8.3 Vehicle/Loader

## User need to open the Vehicle/Loader tab

Following fields will be filled by the user as per loading requirement:

- Destination (Rack)
- Vehicle/Wagon Number\*
- Number of bags\*
- Type of Bags\* (HDPE, LPP, LPP5-S, Others)
- Product Code\* (43, 53, PPC, Ultra Super, Others)
- Packer Number\* (Packer-1/2/3/4/5)
- Wagon Loader Number\* (WLM-1/2/3/4/5/6/7/8/9/10/11/12)
- Remarks
- Tare Weight

## The entire star (\*) marked fields are required to be filled by the user.

Amazi	n		and a	1990	Ditra Billa
# Home Vehicle/Loader 🖗	🖉 DashBoard 🖉 Report - BCW Admin 👻				
	Bag Assign	and the second			
	Update Vehicle Number				1995 - 1 C
	Destination (Rack)	Vehicle/Wagon Number	No. Of Baga	Type Of Bags	
States and the second second	Destination (Rack)	Vehicle-Wagon Number	roumber of bags	Select Bags Type 🔹	the second s
	Product Code	Packer Number	Wagon Loader	Remarks / Reason if any	
	Select Bags Type 🔹	Select Packer 🔹	Select Packer 🔻	Select Remarks •	
	Tare Weight  Submit RESET Note - 1.Please enter	correct vehicle Number	Select Poster WLM-1 WLM-2 WLM-3 WLM-3 WLM-4 WLM-4 WLM-5 WLM-5 WLM-5 WLM-6 WLM-10	f any bags is damaged / Busted	
1			WLM-12 WLM-12		



# 8.4 Target Entry Procedure

### By using web application:

- Login the AMAZIN Application as ADMIN or OPERATOR with provided password and open BAG assign option.
- User has to fill required detail in compulsory fields (\*) and click the SUBMIT button.
- The target entered will appear on the dashboard.

### By hand held device (Kiosk/Tablet):

The same web UI will also be accessible through the kiosk/Tablet, Just as the user fills the details through the PC, and the same has to done through the tablet.



#### 8.5 Dashboard

Dashboard are provided to view the data on real time basis

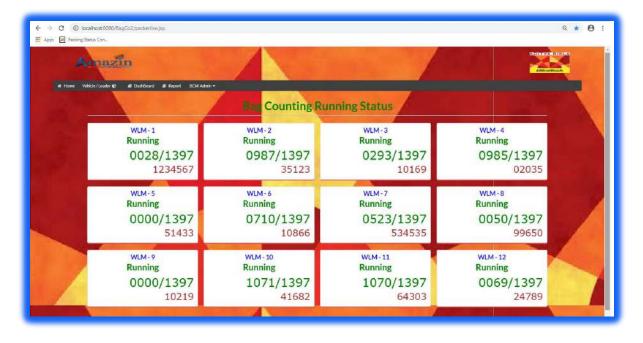


Figure 20. Dashboard

### Following data is displayed on the Dashboard

- Loader Number  $\geq$
- $\succ$ **Running Status**
- $\succ$ Bag Target and Current Count
- Vehicle or Wagon Number

Serial No.

#### 8.6 Report

0

For accessing **Reports**, user need to open UI > Reports > Daily Dispatch Report/ Shift Report

#### $\geq$ Fields

- : Serial Number
- Destination : Where it will be sent 0
- Wagon No. : Number of the Wagon Ο
- No. of Bags : Loading Target 0
- **Types of Bags** : Material type of the cement bag cover 0
- **Product Code** : Type/Quality of the Cement 0
- : Packed by which packer machine Packer 0
- Loader : Loaded by which Loader 0
- **Actual Bags** : Actual loaded bags 0

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- o Remarks
- : Remark if any
- Tare Weight
  - **ht** : Tare (Empty) weight of that wagon
- Start Date/Time : When the bag counter machine was targeted
- End Date/Time
- : When the bag counter machine was stopped



Figure 21. Report Generation

## 8.6.1 Daily Dispatch Report / Shift Wise Report

- c		Camostos, Anyas Refue Cox	igCn2/biogDispatchReport11	19									0, p	88
the Fil	Address 2	ACCOL.									-		TRANSFER OF	-
		max											Didition allowed	
			98 C				1					1	ANDOLOGIA	
	ternia:	White/Loader	C	Report BCW	Amiter						-			
			nth Report					1	-		1			
		Tree Care	A company and	To Det				N						
		Franti	da -	Tut	utu		Search	h Regent	Experitorization					
											0	-		
	NEC.		· Magazina and Provide a	No. Cr Baja 4	New OF BRIDE	Canada Codes	Packar	Loader	Actual Hoge =	Name		C. Baltimo Long	Children and	
1		Drat	25124	1397	HDRE	PFC.	Pecker-2	VILAN-R	1015	Other	-	24-32-2923-00-59.21	2629-42-26 00 89-65	
2		Or .	25124	1397	HDPE	PPC-	Packer-2	W1.450	1997	Ofer	-	24-02-2070-01-02-11	24-02-2020 02:20:02	
3		Che .	42917	1397	HDPE	PPC .	Peder 2	YEM?	1364	Other	-	24-12-2923-11-02.05	2823-62-24 02:39-52	
4		Chic	21702	1397	HDRE	FIPC	Padier-2	WEAR-6	1405	Other		24-82-2029 01:04:04	24-02-2020 02-03-15	
		Clin	\$881-I	1397	HOPE	PPC	Packer-2	775368	4093	Other	-	25-62-2028-01-00-21	3828-42-24 B2-67-IN	
1.0		Deat	97564	3397	1.97	FPC .	Patker 1	70.941	1598	Office	1	24-82-2929.01.05.25	24-02-2026 03 10:37	
7		Ou	72104	5397	LPP	FP0	Paster-1	91.019	1358	Ofer	-	24-02-2925-01-00-27	24-02-2020 02 19 22	
		Deki	Ner 63041	1.397	LPP	PPC	Padker 1	71114-2	1398	Other		24-82-2928 01:05:40	24-02-2020 03/02/26	
		Chr	27643	5397	(p)	PPC:	Parker-1	WIWH.	1399	Ottur	-	24-82-2028 (11-11-65	24.02-2020 02.39 01	
		DVM	54424	1397	LPP	PPC.	Facket-3	WENT	1338	Office.	-	24-82-2020 01 14:44	24-02-2020 02 25:34	
	ALC: NO	1124										And and a state of the local division of the local division of the local division of the local division of the	I the	

Figure 23. Generated Report

[End of the document]