MICRO CONTROLLER BASED WEIGHING AND BAGGING CONTROLLER

MARATHON – M5603 VER.1.0

USER MANUAL

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Marathon - M5603 , User Manual

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Thank you....

...for selecting Core Technologies Bagging Machine Controller. Marathon M5603 is the outcome of a careful study of the requirements of Instrumentation Engineers, Research Scientists,. Its design emphasizes convenience in operation, very high reliability and ability to perform in the extreme conditions. At the same time, accuracy and repeatability have been given highest importance leading to a high degree of confidence.

The Bagging Machine Controller Marathon M5603 represents technological achievements by providing unmatched features and facilities at negligible power consumption. It is truly the most complete bagging solution available today.

About the manual....

In this manual, we have consciously avoided using Electronics engineer's language. Our emphasis has been on the application and use of the instrument rather than its description and design aspects. This user manual for Bagging Machine Controller Marathon M5603 is structured into chapters and sections. These are listed in the contents and should be of use in locating text of your interest.

It is our Endeavour to present User Instructions and other information about the Marathon M5603, as accurately and in as simple a language as possible. If there are any inaccuracies, errors or unintended lack of clarity, we shall be obliged if these are brought to our notice. Your suggestions and comments would be useful to us in improving the quality of our products as well as of our Manuals. Your co-operation in this regard will be highly appreciated and gratefully acknowledged.

Please call us at Tele-Fax Number: +91(22) 6799 1956 / 2513 7202 or at our e-mail: sales@coretech.co.in

About Core Technologies..

Founded in the year 1988, Core Technologies, is a high tech Electronics Company with many innovations and new products to its credit. Core Tech specializes in control and automation involving precision measurements. We endeavor to provide “Total Solutions” at reasonable cost and have unsurpassed commitment to after-sales customer support.

Based in Mumbai, Core Tech is a fast growing company with a sustained growth rate of over 25 % in the last 5 years, made possible by a dedicated team of young and qualified engineers and the trust of our customers which includes Defense R&D Organizations, Konkan Railway Corporation Limited among several private and public limited companies.

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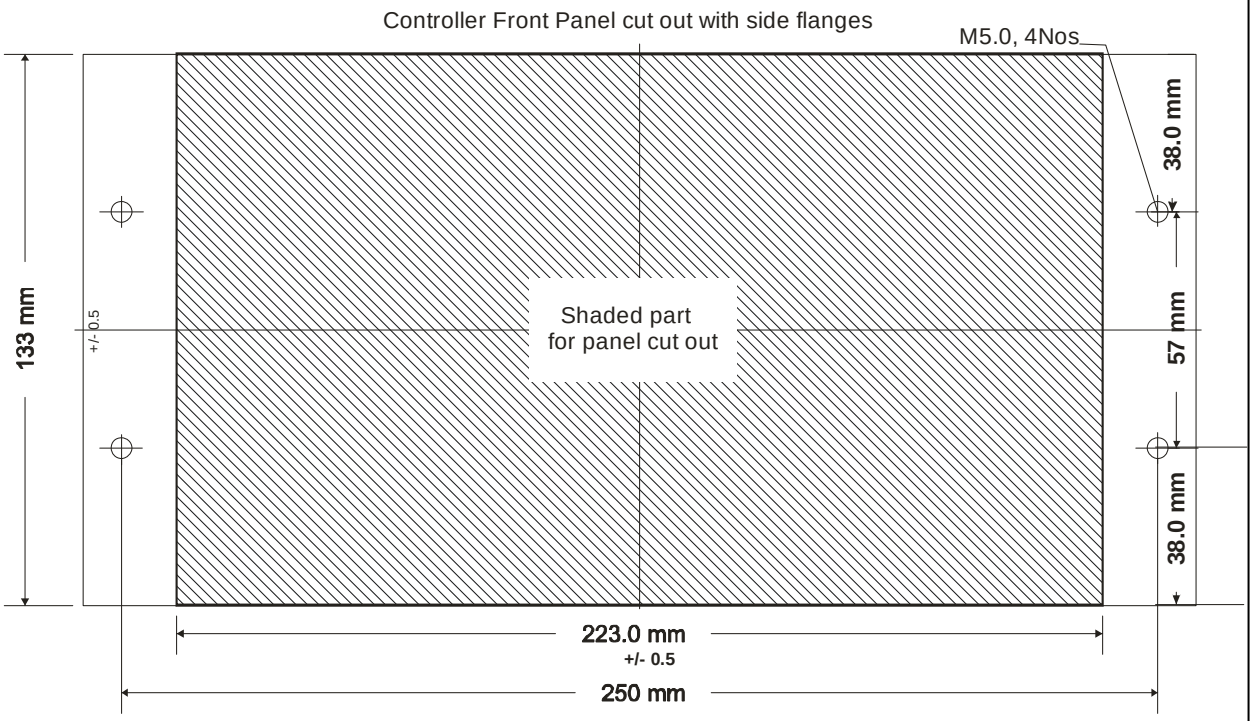
OPTIONAL
RS-232,
Printer Port
& RTC
I/O
Module
Signal
conditio
ning
Module
ADC
Module
MPC
Module
Hybrid
Power
Supply
SERIAL
PRINTER
MFM
UC - 09
INPUT
OUTPUT
UC-01
LOAD CELL
SGA
ADC
UC - 02
MPC
RESET
UC - 03
+24VDC
UC-06H
WARNING
Repairs by
unauthorized
persons may
be hazardous
POWER
SUPPLY
+24V
- 15V
+15V
+5V

Physical Specification:
Marathon - M5603 Dimension
For Table Top Mount: 213mm x 130mm x 320mm
For Panel Mount Cutout Dimension:



Front Cutout View

Side Cutout View

TECHNICAL SPECIFICATIONS

Absolute Limits

Ambient Temperature : 10 to 50 degree Celsius

Relative Humidity : 10% to 95%(noncondesing)

Power :160 to 265 VAC,50-60Hz

Load cell : Strain gauge ,250oms nominal .Up to 4 load cells with matched sensitivity may be used in parallel.

Sensitivity : 1.0mV/V to 3.0 mV/V

Capacity: Different Load cell capacities can be selected depending on the oan weight (dead weight) and weighing range.

Resolution: 1 part in 10,000 e.g. 0.1g in 1000g

Accuracy* : ±0.01% in the range of 10 to 125% of span *e.g. ±10 g in 100 Kg over full temperature.

Speed* : Feeling rates of 600 bags per hour can be achievable for 100kg.

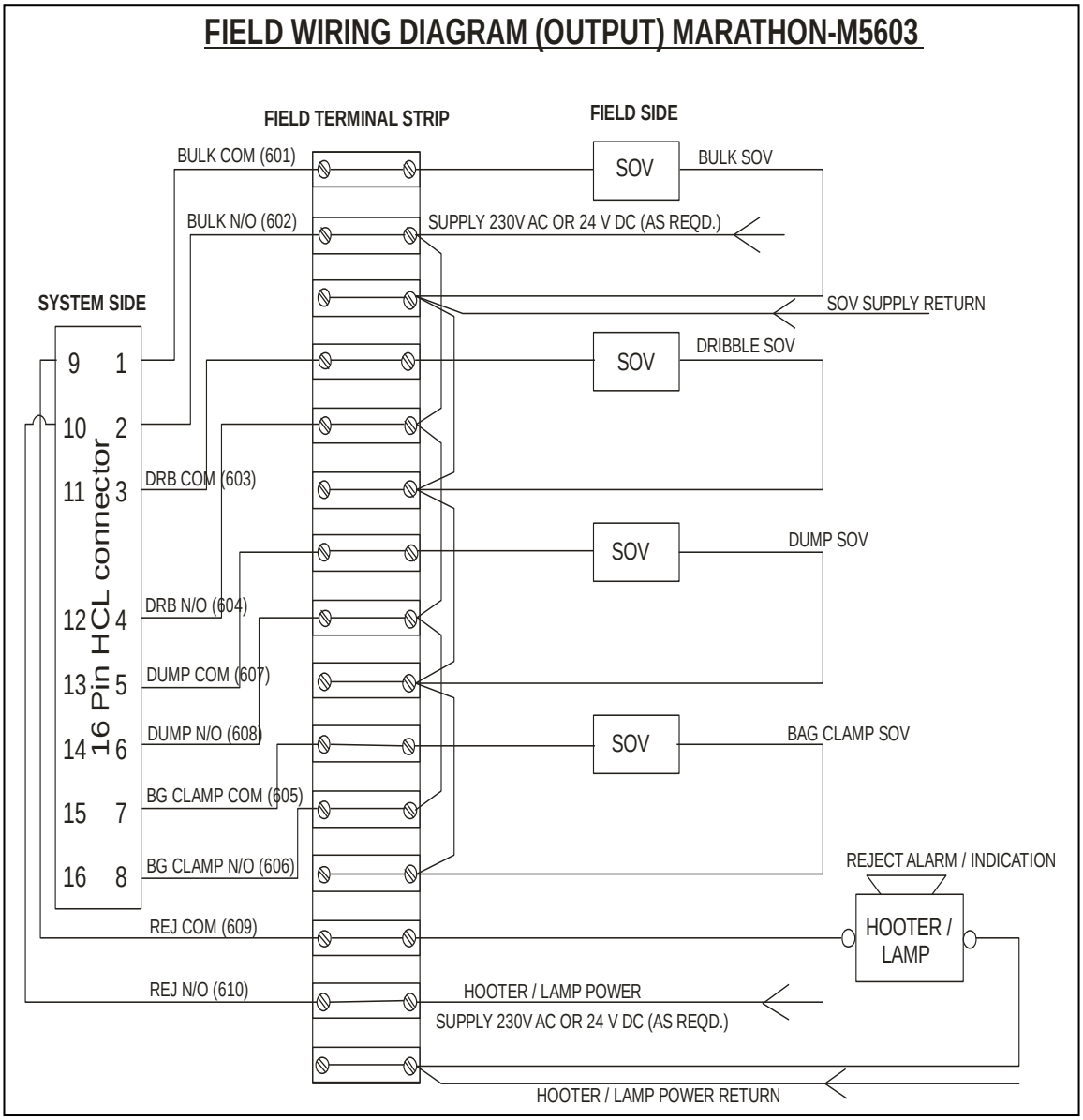
Recipe: Five preset recipes can be stored and recalled from non-volatile memory.

Logic Inputs: NPN OC type sensor inputs and Dry contacts of relay/ switches, total 8 inputs

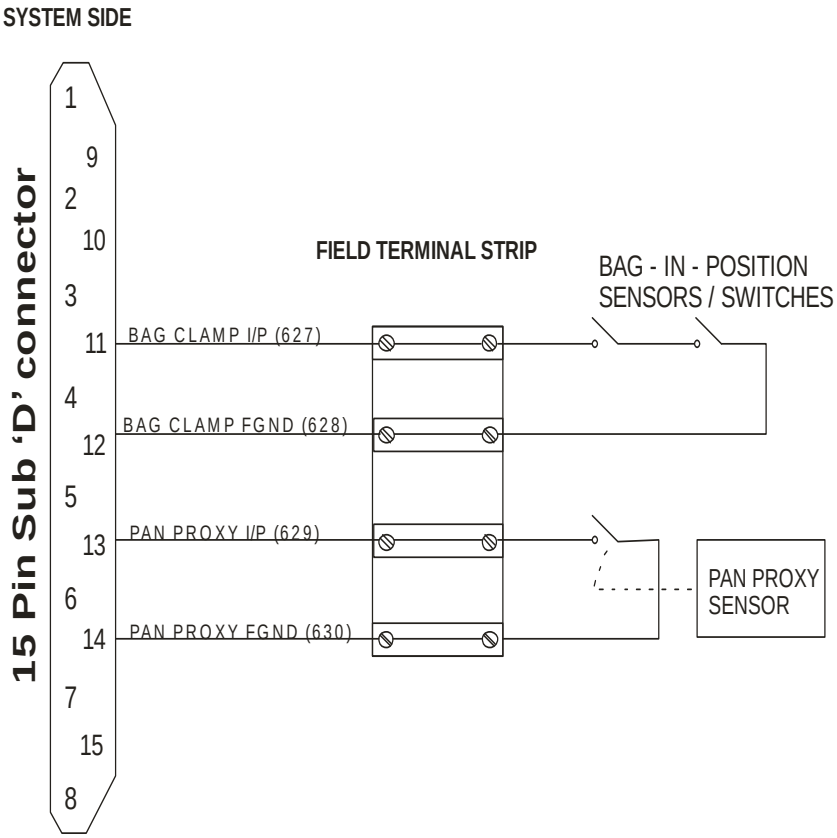
Logic outputs: 8 NO/NC relay changeover Dry contact with 24VDC or 230 V AC capacity.

Timers(16): Built in programmable timers can be programmed from 50ms to 10 secs. In step of 0.01 sec.

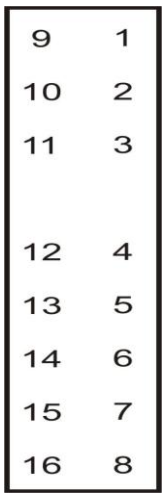
FIELD WIRING DIAGRAM



FIELD WIRING DIAGRAM (INPUT) for MARATHON -M5603



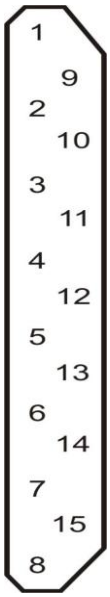
16 Pin HCL Digital Output Wiring Details for Marathon - M5603



16 pin HCL connector (Male) pin configuration

Pin No	Description	Ferules nos.	Wire colour
1	Bulk com	601	Black
2	Bulk NO	602	Brown
3	DRB Com	603	Red
4	DRB NO	604	Orange
5	Bag Clamp Com	605	Yellow
6	Bag Clamp NO	606	Green
7	Dump Com	607	Blue
8	Dump NO	608	Violet
9	Reject Com	609	Grey
10	Reject NO	610	White
11	NC	--	--
12	NC	--	--
13	NC	--	--
14	NC	--	--
15	NC	--	--
16	NC	--	--

Digital Input Wiring Details for Marathon -M5603



15 Pin Sub 'D' connector (Male) pin configuration

Pin No	Description	Ferules	Wire colour
1	NC	617	Black
2	NC	618	Brown
3	NC	619	Red
4	NC	620	Orange
5	NC	621	Yellow
6	NC	622	Green
7	NC	623	Blue
8	NC	624	Grey
9	NC	625	White
10	NC	626	Black
11	Bag Clamp I/P	627	Brown
12	GND	628	Red
13	Pan I/P	629	Orange
14	GND	630	Yellow
15	NC	631	--

Operator Interface:

Programming Readout Display:
Back lit 128 x 64 characters Alphanumeric Graphic, LCD display for showing programmed values and for messages generated by the controller to guide the operator in PROGRAM and RUN modes.

The Keyboard:
The keyboard is organized in to three main groups (Alpha-numeric keys, Function or Mode keys, Navigation keys)

The Alpha-Numeric data entry Keys:
These are 1 to 9 and 0, numeric and alphabetical keys patterned like the telephone keys (e.g. 1/ABC, 2/DEF etc.), Change from Numeric to alphabetical (and vice versa), data entry is done using [(TEXT) /(Sign)] key. The cursor movement is from left to right and is automatic after a numeric or alphabetical key is pressed. All data fields are five digits, except for timings. In the data entry, the leading zero is NOT suppressed. For example if you wished to enter 350, the operator is required to enter the leading zeros before 350, like 00350. The operator is not required to enter the decimal point, where required the decimal point is automatically inserted by the system. The five digit values normally have the upper limit of 59999. The system software, however, checks for validity of entry and returns “INVALID ENTRY” message if the entered value is not within the permitted range,

System function keys:
These are [UP], [DOWN], [LEFT], [RIGHT] arrow keys and [OK] key. The [UP] and [DOWN] arrow keys allow you to scroll through the different system parameter, the [LEFT] and [RIGHT] arrow keys are used for selection of front screen shown on the LCD display. The new value or choice entered by the operator on the LCD screen is saved in the memory by pressing the [OK] key. (*To quit programming without saving the entered value in to the memory, press [PREV] key).*

MENU (Function) key:
This key functions as described below:

[PROGRAM] This menu is divided in to following sub groups,

1. Select Recipe- The user can select one out of twenty program recipes. Each program recipe has 15 user entered parameters. These parameters can be viewed and changed manually using the functions PROGRAM PARAM or PROGRAM TIMINGS. Some of these parameters get altered, automatically in LEARN function also. When a particular recipe is selected, it uses the parameters stored in the battery backed memory corresponding to that particular recipe file only.

2 .Program Parameters– The following parameters can be entered through the front panel keyboard.

1. Target Weight
2. Coarse Cutoff Weight
3. Fine Cutoff Weight
4. Upper Tolerance
5. Lower Tolerance
6. Taring Frequency
7. Taring Limit
8. Display Tune Factor
9. No. of Bags
10. Auto Sample size
11. Correction Factor

Parameter	Minimum Value	Maximum Value
Target Weight	000.00 Kg	150% of the Span Weight.
Coarse Cut	000.00 Kg	Any value less than or equal to Target Weight
Fine Cut	000.00Kg	Any value greater than Coarse Cut value. or equal to Coarse Cut but less than the target weight
Upper Tolerance	000.00 Kg	+10% of the Span Weight.
Lower Tolerance	000.00 Kg	-10% of the Span Weight.
Taring Frequency	1	10000
Taring Limit	000.00 Kg	150% of the Span Weight.
Display Tune Factor	+/- 0.00 Kg	1% of the Span Weight

For normal operations, you must ensure that the entered value for Display Tune Factor is preferably less than 0.25% of the span and for Taring Limit is preferably less than 50% of the Span Weight.

Press **[OK]** to save the entries and come out of PROGRAM PARAMETERS mode and return to sign on message or press **[PREV]** to abandon editing and retain the old parameter values.

3 . PROGRAM TIMINGS (DELAYS) :

In general, all timing values are dependant on the machine. These are required to be entered manually as described below:

1- Coarse Feed initial Impact skip Time (D1).
2- Coarse to fine feed Change over Time (D2).
3- Calming Time (D3), required at the end of fine feed.
4- Dump Time (D4).
5- Inter Cycle Time (D5).
6- Jog Time (D6), discharges for a fixed time at fine feed rate.
7- Bag Clamp Time (D7)

3.1 Impact Time (D1) :

Opening of the Coarse and Fine gates, at the start of a filling cycle, causes free fall of the material, resulting in an impact on the load cell. This may cause a spike in the load cell signal, which may be large enough to cross the coarse cut point, causing the controller to altogether bypass the coarse feed operation. To prevent this from happening, the controller inhibits processing of the weight signal at the start of a new cycle for a time programmed as Impact Time. User is advised to program this time, taking into consideration the likely duration of the impact. Too large a value will prevent the genuine coarse cut operation, leading to gross misbehavior of the machine. When programmed correctly, Impact Time does not reduce the bagging speed.

3.2 Change Over Time (D2) :

This delay is activated at the end of Coarse feed cycle i.e. when coarse cut point is achieved. Abrupt closing of the Coarse gate causes a transient on the load cell signal which may interfere with fine cut operation. Therefore, during this delay, fine cut check is inhibited. User is advised to program this time, taking into

consideration the likely duration of this transient. A few trials may be necessary to arrive at the optimum value, at which you get the best repeatability in weighment. Too large a value will prevent the genuine fine cut operation leading to excess weighment. When programmed correctly, Change Over Time does not reduce the bagging speed. During the Change Over Time the 7-Segment LED display is blanked. At the end of the Change Over Time, the display starts showing actual weight, which keeps increasing at the fine feed rate till the end of the Calming Time (please see below). At this juncture, the final weighment value is displayed and frozen till the next Coarse cut point is achieved.

3.3 Calming Time (D3) :

This is an important parameter which affects both, the bagging speed and accuracy. This delay is activated at the end of Fine feed cycle. The closing of the Fine feed gate in the machine, causes a transient on the load cell signal. This transient may take long time to die down. Any declaration of the final weighment, before this transient has died down completely, may lead to erroneous weighment value to be displayed. User is advised to program and tune this delay, depending upon observations at the site, resonant frequency of the load cell, in flight weight after the fine feed cycle and other related parameters. This delay should not be excessively large, as it affects the bagging speed of the machine. Core Technologies' *unique* feature of Display Tune Factor provided in the Program Parameter and the RUN options, when optimized, helps to reduce the calming delay resulting in higher bagging speed. More details of the Display Tune Factor are provided in section 7.0. At the end of Calming Time the controller MARATHON M5603-01 displays the final weighment value, which remains on the 7-segment display up to the occurrence of the Coarse cut point of the ensuing RUN cycle.

3.4 Dump Time (D4) :

This delay is activated at the end of calming delay (D3). The pan is Opened for the time programmed for this Dump Time. This delay needs to be programmed after analysis of the Pan opening time, Pan closing time and the minimum time required to empty the pan in the bag. This delay should not be excessively large, as it affects the bagging speed of the machine. At the end of this delay, the Pan position (opened or closed) is verified by the controller by checking the PAN Proxy signal, before commencing the next action.

3.5 Inter Cycle Time (D5) :

This delay is activated at the end of dump time (D4). The status of the pan i.e. Opened or Closed is checked before commencing this delay. During this delay, the coarse and fine feed gates are closed. This delay should not be excessively large, as it affects the bagging speed of the machine.

4.Select Head:

Select Head function used when multiple controllers are placed at the same location head no. gives Identification of which controller is connected to which head.

5.Copy Recipe:

This feature is provided to copy any recipe to any other recip NOTE that recipe 1 to 5 are copy protected.

TEST:

1.Test I/P:

Before selecting this function, ensure that the main flow of the material to be weighed is stopped by a manual gate valve or similar device.

In this mode, the inputs of the controller MARATHON-M5603 are tested, individually. The status of inputs is monitored, in this function. Press **[TEST]** to invoke functions.

2.Test O/P:

The Outputs are activated and deactivated by a key sequence. Press **[→]** or **[←]** key to toggle the output status. The following message is displayed, when the coarse gate is opened.

Press **[→]** Coarse Gate Open

User can toggle the activated or de-activated condition by scrolling the [←] and [→] keys. The actual status is displayed on the on the LCD in front of each output parameter. The same can be observed on the front panel LEDs also. Pressing [PREV] cancels the TEST sequence and returns to the sign-on message, with the outputs in activated condition. This function allows you to test and fine tune if necessary, the operation of the Feed Gate. The actual status is on the LCD..

3.Untared Weight:

Untared weight shows the addition of tared weight & amount of weight which is to be tared.

4.VIEW Data:

The Data consists of information about Number of bags filled, gross weight, high reject, Low reject, total reject and total number of bags selected. This is generated automatically during a RUN cycle and remains stored in the memory forever. The stored data is locked when a RUN cycle stopped by HALT key or on completion of a batch. This data can be displayed on the LCD screen in TEST mode under the menu screen “VIEW STATISTICS”. When you start a new RUN cycle, it is necessary to clear the memory of this data before pressing the RUN key. Pressing both these keys simultaneously clears the memory of the stored data.

5. Clear Data:

This feature allows us to clear statistical data for selected recipe.

6 .Load Default:

This feature allows us to load the default parameters in the selected recipe.

[VIEW]
This key is used for checking the calibration and to view the weight value returned by the load cell and generally to see the stability of readings. If the readings are dancing then the operator should change the digital filter setting and ensure a stable display. If the display cannot be steadied within ± 1 count even with the selection of 3.0 Hz filter, then it is not advisable to proceed further as the accuracy and repeatability of bagging operations in RUN mode, will be inferior. When this happens, please check the machine for loose parts, excessive vibrations of the structure or ground vibration noise.

[RUN]
This key starts bagging operation using the recipe selected. Bagging will automatically stop once the numbers of bags for the batch are filled. Maximum number of bags in a batch is 59,999.

[HALT]
Pressing this key stops the bagging operation after completing the current feed cycle and the controller returns to HALT MODE.

[CAL]

CAL **Key** allows you to calibrate the controller by placing the standard weight for span calibration and no weight for “Zero” calibration. The Span and Zero adjustments are done with the help of [↑] & [↓] arrow keys provided on the front panel the upper limit of the counts is 255 for both coarse & fine adjustments & lower limit of the counts is zero.

[TARE]
This is the manual tare operation key. The controller, after tarring the residual value, reverts to VIEW mode to display weight equal to 0.00. Please ensure that

the weighing pan is empty by carrying out a manual DUMP operation before Manual Tare operation.

[PREV]
The escape key is pressed to quit entering program values without saving and to abort certain operations as described in the QRM.

[Auto Correction]

This is a very powerful feature which automatically adjusts the fine cut after every four bags. This adjustment is required to get the final weight (Displayed on seven segment display) closer to the target weight .Once we achieve the final weight which is closest to the target weight we can disable the Auto correction**.**

[Dump]
This is used to dump the material manually. This feature is used to make the PAN empty before start of new Run cycle

QUICK REFERENCE

Main menu

PRESS **MENU KEY** to get into main menu.

1 PROGRAM 2 TEST

PRESS
[1] To Enter in Program Setup
[2] To Enter in Test Menu

Main menu > 1 Program

1 SEL RECP	4 SEL HEAD
2 PRG PARM	5 COPY RECP
3 PRG TIMG	

PRESS
[1]To Select Recipe
[2]To Edit Program Parameters
[3]To Edit Program Timings
[4]To Select Head number
[5]To Copy Recipe

Main menu > 1 PROGRAM > 1 SEL RECP

RECIPE NUMBER 01

Use [↑] & [↓] KEY to scroll recipes FROM **1 TO 20**

Press **OK** for saving the desired recipe.

Main menu > 1 PROGRAM > 2 PRG PARM (screen 1 of 2)

TARGET WT	>	100.00kg
DRIBBL CUT		095.00kg
BULK CUT		060.00kg
UPPER TOL		0000.5kg
LOWER TOL		0000.5kg
TARE FREQ		00000
FOR NEXT		USE > <
NEW VALUE		1000.0

To Edit parameters use digit keys.

To scroll between parameters use [↑] & [↓] keys

To Save the parameters Press OK.

To Escape Program Parameters without Saving Press PREV key.

NOTE:

New Value indicates the current value to which cursor is pointing also user can enter or change the value in this field only.

Main menu > 1 PROGRAM > 2 PRG PARM > Press RIGHT key (screen 2)

DUMP TIME	>	02000ms
TARE LMT		0600.0 g
NO OF BAG		59999
D T F		0000.0Kg
ATO SPL SZ		01
CORR FACT		50 %
FOR NEXT		USE > <
NEW VALUE		0600.0

NOTE:

1.To change ATO SPL SZE (Auto sample size) & CORR FACT (Correction Factor) use 1,2 & 4 numeric keys.

2**.**Auto sample size indicates after how many bags auto correction is to be applied.For e.g. if ATO SPL SZE is 1 then for every bag autocorrection is applied.

3.Correction factor indicates by which factor correction is to be applied user can have 25%,50% & 75% correction factor.

Main menu > 1 PROGRAM > 3 PRG TIMG

PROGRAM TIMINGS		
CALMING	>	0200ms
CHANGE OVR		0300ms
IMPACT		0300ms
INTR CYCLE		0200ms
FOR NEXT		USE > <
NEW VALUE		0200

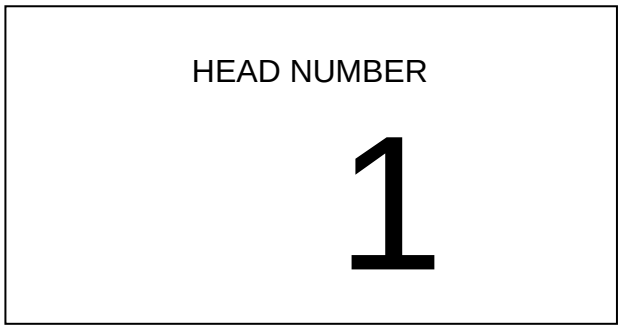
To edit parameters use digit keys.

To scroll between parameters use [↑] **&** [↓] keys

To Save the parameters Press **OK.**

To Escape Program Parameters without Saving Press **PREV** key.

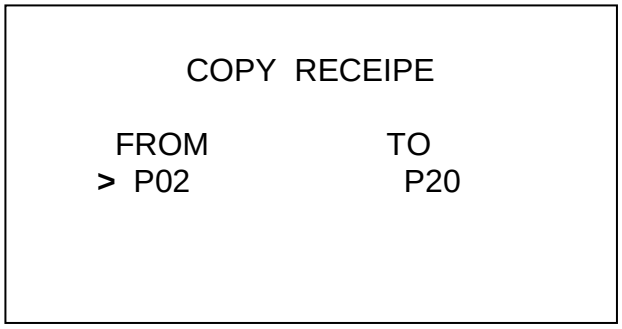
Main menu > 1 PROGRAM > 4 SEL HEAD



Use [↑] & [↓] KEY to scroll recipes FROM **1 TO 4**

Press **OK** for saving the desired HEAD.

Main menu > 1 PROGRAM > 5 COPY RECP



Use [↑] & [↓] key to increament decrement the recipe number

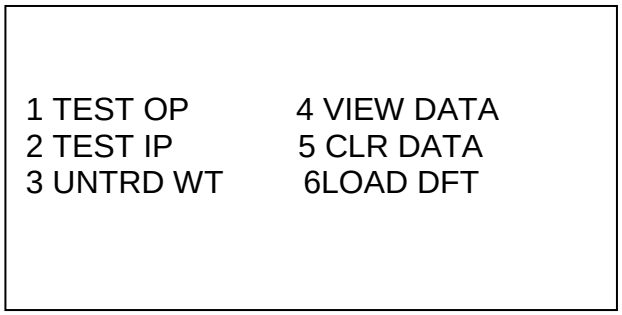
Use RIGHT & LEFT key to switch between TO and FROM options.

Press OK to copy recipe.

NOTE:

Recipe no.1 to 5 are copy protected user can not copy any recipe to these recipes.

Main menu > 2 TEST



PRESS

[1]To change the status of outputs
1 To view status of unputs
2 To view Untared Weight
3 To view statistical data
4 To clear the statistical data
5 To load the default parameters

Main menu > 2 TEST > 1 TEST OP

```
BULK    GATE      > CLOSE
DRIBBL GATE         CLOSE
BAG    CLAMP        CLOSE
DUMP   GATE         CLOSE
BAG      REJ        CLOSE
    USE >   <    KEYS
```

To test all outputs during Installation & commissioning.

To escape this menu Press PREV key

Use **RIGHT/LEFT** arrow keys to open/close the gates

Main menu > 2 TEST > 2 TEST IP

```
ACK                 DISABLED
DUMP                DISABLED
RUN                 DISABLED
HALT                DISABLED
PAUSE               DISABLED
BAG CLAMP           OPEN
PAN PROXY           OPEN
```

To escape this menu Press PREV key.

Main menu > 2 TEST > 3 UNTARED WT

```
UNTARED  WEIGHT

134.45 Kg
```

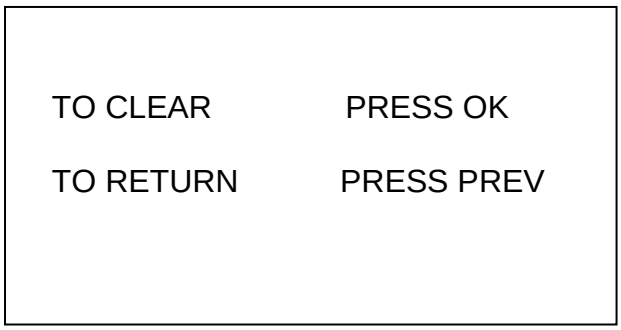
To escape this menu Press **PREV** key.

Main menu > 2 TEST > 4 VIEW DATA

```
GROSS WT        00004488Kg
OK  BAGS        15000
TOT.   REJ      00050
HIGH. REJ       00010
LOW.REJ         00060
TOT.BAGS        14940
```

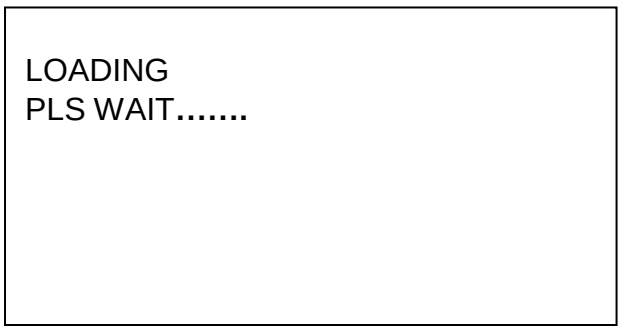
To escape this menu Press **PREV** key.
Statistical data will be stored according to recipe.

Main menu > 2 TEST > 5 CLR DATA



To clear the statistical data press **OK**.
To return from this menu press **PREV.**

Main menu > 2 TEST > 6 LOAD DFT

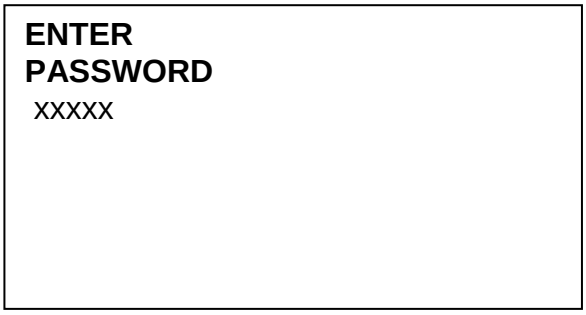


Using Load Default, default parameters can be loaded in one stroke.

NOTE:

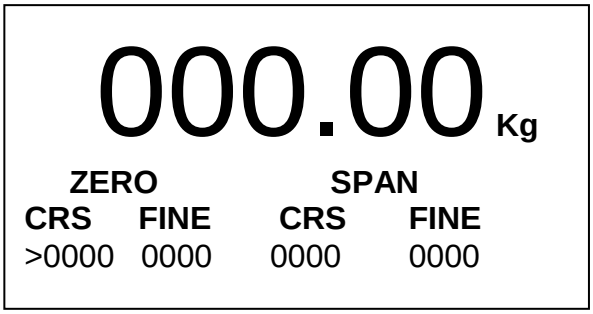
It is recommended that after selecting any recipe for first time Please use Load Default to fill all parameters.

CALIBRATION



To enter the calibration menu please enter the correct password using digit keys. After entering password press **OK** to enter in the calibration mode.

To return press **PREV.**



Press **OK** to save Calibration.

Calibration Procedure:

Calibration is divided in to two steps

1. Zero Calibration .
2. Span Calibration.

1.**Zero Calibration:**

Zero calibration is required for bucket weight cancellation. It is further divided in to two steps

1.Zero coarse

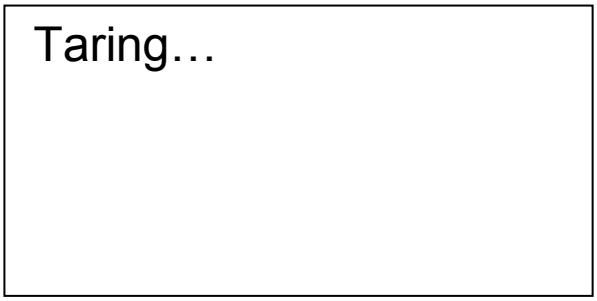
2.Zero Fine

In **Zero Coarse** calibration each steps cancel out 1.5kg & 255 such steps are provided. When bucket weight reaches less than 1.5kg use **Zero Fine** calibration in which each step cancel out 0.01kg.

2.**Span Calibration:**

Place standard weight **eg.25kg** on pan for span calibration Use **span coarse** & **span fine** (in the same way as Zero Calibration)to calibrate to **25kg**

Tare Operation:



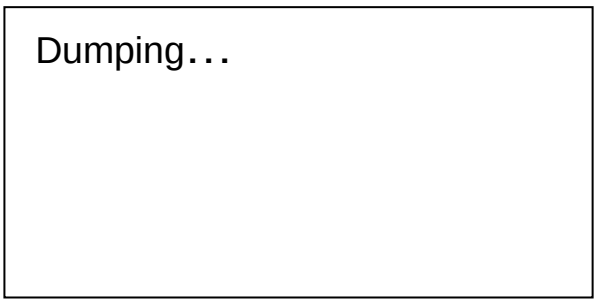
Press Tare key to tare unwanted weight.

NOTE:

Weight to be tared must be less than TARING LIMIT value programmed in program parameter menu.In case if tare weight exceeds the tare limit it gives warning message as “TARE LIMIT EXCEEDED”(as shown in screen below).

If weight to be tared is within the tare limit the we will get zero weight on display as shown below.

Dump Operation:

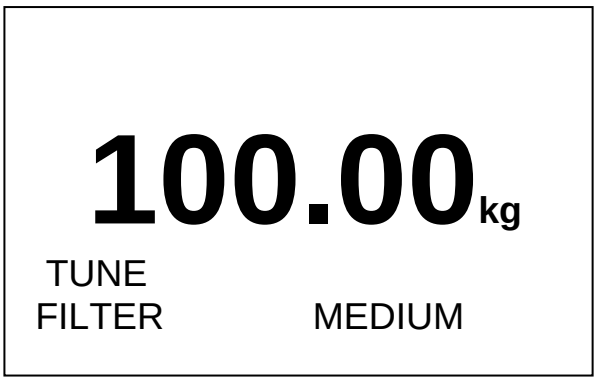


Press Dump key to dump Material bag.

NOTE:

Dump operation will be performed for programmed dump time delay.

View Operation:

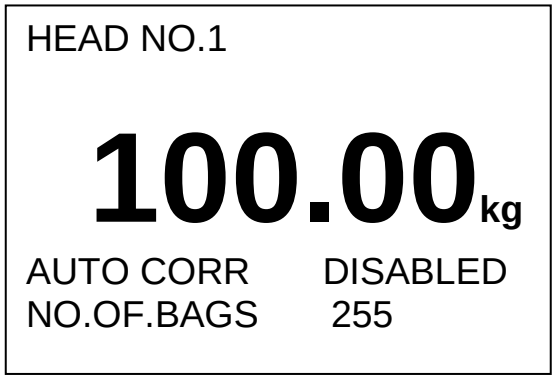


Using DOWN arrow select filter as,
1.SLOW
2.MEDIUM
3.FAST.
4.VERY FAST

NOTE:

Filter which gives stable reading should be selected

RUN Operation



After pressing RUN\/HALT when system enters in to RUN mode.In this mode only final weight after calming delay will be displayed on screen.When system is in RUN mode press HALT key to exit form the RUN mode after completion of current RUN cycle.

NOTE: Auto correction can be enabled or disabled using PAUSE key. When Auto Correction is enabled PAUSE LED will glow.

NOTE ON PAN PROXY:

Controller checks for **PAN STATUS** sensor continuously and proceeds with the filling operation only if the controller receives correct status signal. If the appropriate status signal (correct status) is not received then the controller waits till the correct status signal is received and then proceeds further. Role of **"DUMP TIME"** is, if **DUMP TIME** entry is less than the time taken by the mechanism to open the door fully, then after **DUMP TIME** is over, the controller checks **PAN PROXY** and gives **PAN STATUS?** And continuously keeps checking for **PAN STATUS** (open) and as soon as **PAN STATUS= OPEN** then it starts closing the door. In this case the speed is limited by the mechanism. If the **DUMP TIME** entry is greater than the mechanism to open fully, then the controller receives **PAN STATUS** before the expiry of **DUMP TIME** and the filling continues after **DUMP TIME** is over. In this case the speed is limited by the excess **DUMP TIME** programmed.

WARRANTY CERTIFICATE

Core Technologies certify their product Weighing and Bagging Controller MARATHON M5603 to be free from defects due to design, workmanship and raw material used in its manufacture. When used within the Electrical and Environmental specifications as applicable to the product, Core Technologies warrantees to repair and / or replace faulty components, free of cost, if any defect or malfunction of the product is on served within Twelve Months of the date of delivery provided that the faulty part is shipped to Core Technologies, Mumbai office, with return freight paid. This warranty does not apply to the damage or malfunction caused by improper use outside the environmental specifications, accident, and risks arising out of sabotage, floods, earthquake, fire and other natural phenomena termed as Act of God. Core Technologies, expressly do not bind themselves to any third party claim (s) consequential damages arising out of use of this equipment.

In the event of a suspected malfunction the customer is advised to refer to the relevant sections. If the problem persists then the user is advised to contact Customer service Division of Core Technologies No. (022) 2513 7202 / 6799 1956 for prompt response for further guidance.
Website: www.coretech.co.in

Sr. No. :

Date of Delivery : Sd.: