Version 1.00

User's Guide

M2200

P02 2001 Application

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P02 2001 Application

In General

This is a technical description of the M2200-P02 2001 application.

The application's Lua source code is available from Marel hf free of charge but subject to conditions. For more information please contact service@marel.is.

The "Programming" chapter of the *M2200 P02 & M02 Packing Scale User's Guide* contains more information on Lua scripts and M2200 programming.

About P02 2001

P02 2001 is an MPS-compatible M2200 application for a simple hopper scale, designed to operate the hopper scale and its infeed system. Material is fed into the hopper until the weight in the hopper exceeds the specified target weight. When the weight target has been reached the hopper is stabilized, the weight recorded, and finally, the hopper is emptied.

The P02 2001 application supports the following components:

- an infeed conveyor
- an infeed buffer
- a hopper scale
- an optional request signal

The infeed buffer receives material from the infeed conveyor for a specific period of time while the hopper goes through the process of emptying itself. The infeed conveyor is stopped if the emptying process takes longer than the specified buffer time.

There are two options available for emptying the hopper: automatic emptying and non-automatic emptying (default).

If you select the automatic option the hopper is emptied as soon as a stable batch is ready.
If the automatic option is not selected, the system waits for a request signal before delivering the material.

Finally, the P02 2001 application lets you set a batch time-out so the hopper is emptied whenever the time it takes to fill the hopper exceeds the batch time-out.

Using P02 2001

Starting Up

To start using the P02 2001 application for the first time you must perform two tasks:

1. Set the application parameters (see table on page 3 with a description of all parameters)
2. Create a new product.

To set the application parameters

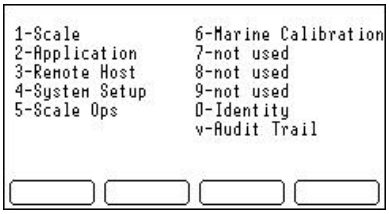

Figure 1 The Top Level Menu page.

1. Press and hold the PAGE key for ca. three seconds to display the Top Level Menu page.
2. Select **4–System Setup → Settings → System parameters A**.

Figure 2 Parameter list A.

3. Select a line in the parameter list, press the CHECK key to enter a value for the parameter, and then confirm by pressing again.
4. Press to return to the parameter list.

> **Note:** You must scroll down with the arrow keys to see all parameters in the list.

5. When you have finished setting all parameters, press once and select the Parameters option on the Settings menu to create a new product.

To create a new product

- For details on how to create products, see instructions in "Creating Products" on page 12 in the *M2200 P02 & M02 Packing Scale, User's Guide*.

The table below lists all available weighing parameters.

Parameter:	Description:
Batch weight (kg)	The target batch weight.
Batch time (s)	The maximum amount of time the system allows for the weight in the hopper to reach the batch weight. This parameter only applies if there is something in the hopper and, if the automatic option is not selected, there is a pending request.
Empty time (s)	The minimum amount of time the hopper is required to be stable after it has been emptied and before it is closed again. The purpose of this parameter is to make sure pieces are no longer falling from the hopper when it is closed.
Empty limit (kg)	The weight at which the hopper is stabilized before it is closed, after a batch is emptied.
Tare time (s)	The time in seconds the system waits after closing the hopper before the hopper is tared and the next weighing cycle is started. This parameter should be set to the time it takes the hopper to close after the hopper open signal is turned off.
Buffer time (s)	The time interval where the system can put material into the infeed buffer before the infeed system is turned off. If the system does not have an infeed buffer this time must be set to 0.
Auto option	If this option is selected, the system will not wait for a request signal before emptying the hopper.
Top-up option	If this option is selected, the system will make sure the actual weight of the batch is always at least the target batch weight.
Emergency time (s)	The time allowed before an emergency is signalled. No emergencies are signalled if this time is 0.
Generate weight messages	The system will generate a message to serial port #1 every time a weighing is performed.
Send weight messages to queue	If this option is selected, the weight message is sent to the persistent output queue.
Generate emergency messages	If this option is selected, the system will generate an emergency message to serial port #1 every time the emergency state changes. The same message is sent to the persistent output queue if there is an open external connection to the

queue.

Generate state messages

If this option is selected, the system will generate a state message to port #1 every time the program state changes.
The same message is sent to the persistent output queue if there is an open external connection to the queue.

To create a new weighing program

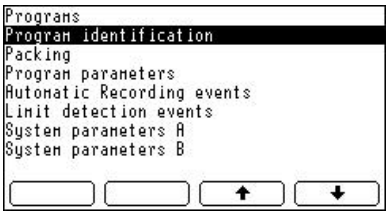

Figure 3 Creating a new program.

1. From the Top Level Menu page select **4–System Setup → Settings → Program identification**.
2. Use the ✓ key to enter a program name, number and ID. Press ✓ again to confirm.
3. When you are finished, press the menu key once and select **Programs → Save program**.
4. Make sure the correct program ID is displayed, and press ✓ to save the program.

To view weighing totals

There are two types of weighing totals available, for each product and for the system as a whole.

Product totals

To view product totals:

1. From the Scale page press the menu key once to go to the Application display (Data page) where you can see the total accumulated weight for the product.

System totals

To view system totals:

1. From the Scale page press and hold the menu key for ca. three minutes to access the Top Level Menu.
2. Select **4–System Setup → Results → System results A**.

The Scale page

The Scale page in P02 2001 shows the MPS terminal window (1), the fill progress bar (2), status indicators (3) and the weight display (4).

You can use the arrow keys to select the previous or the next product.

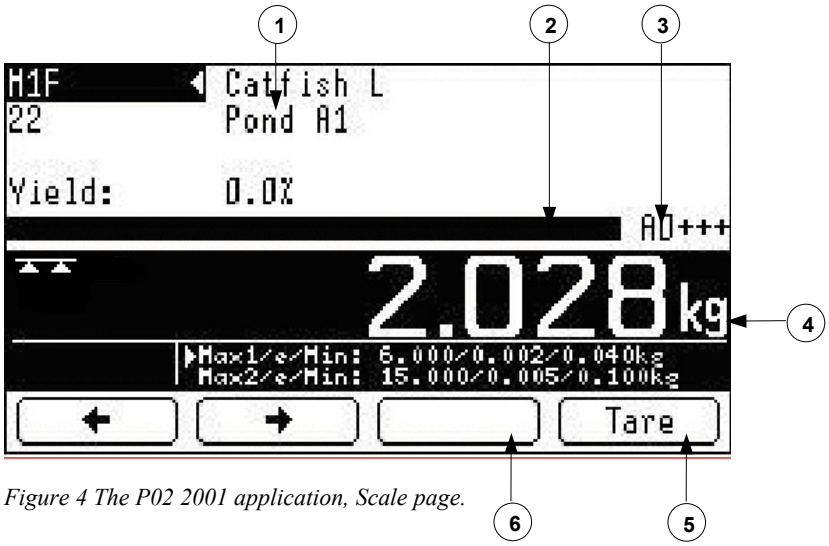

Figure 4 The P02 2001 application, Scale page.

Press the TARE (5) key to use the tare option.

When there are products in the hopper, a CLEAR (6) key is displayed on the Scale page. Pressing the CLEAR key stops infeeding to the hopper, records the weight currently in the hopper, and then empties the hopper. Typically, using the CLEAR key would be practical whenever you would like to interrupt the processing before the hopper had been filled, for example at the end of a working day.

Status indicators

The four status indicators (3) on the Scale page are (A0++):

- The first indicator shows a letter indicating the weighing cycle state (state label). For example, an "A" indicates that the run signal is off or the batch size is 0.
  Refer to page 9 for complete information on all state labels.
- The second indicator shows the current emergency number. A "0" indicates no emergency.
  Refer to page 11 for information on emergency numbers.
- The third indicator is "+" if there is an active connection on the persistent output queue, otherwise the indicator is set to "-".
- The fourth indicator is "+" if the CAN unit is online, otherwise the indicator is set to "-". The hopper scale will not work with an offline CAN unit.

The Application Page

From the Scale page press to display the Application display.

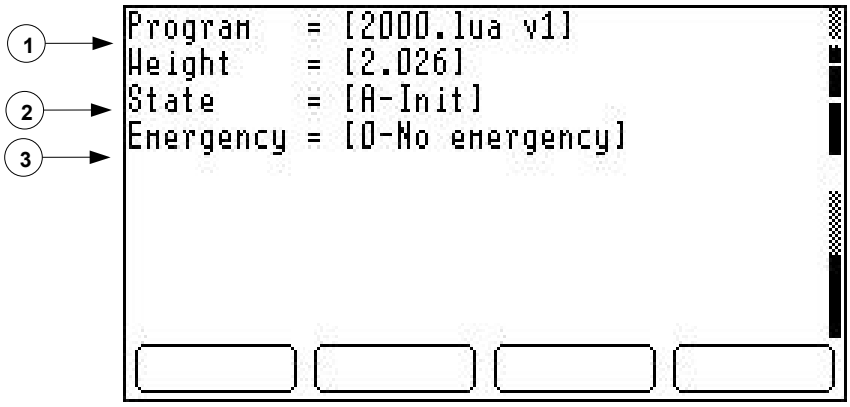

Figure 5 The Application display.

Data page

This page shows the application's name and version (1), the current state (2), and emergency number (3).

The Weight Totals Page

The P02 2001 application keeps track of the total amount of product weighed. To view the system totals select **4–System Setup → Results → System results A** from the Top Level Menu.

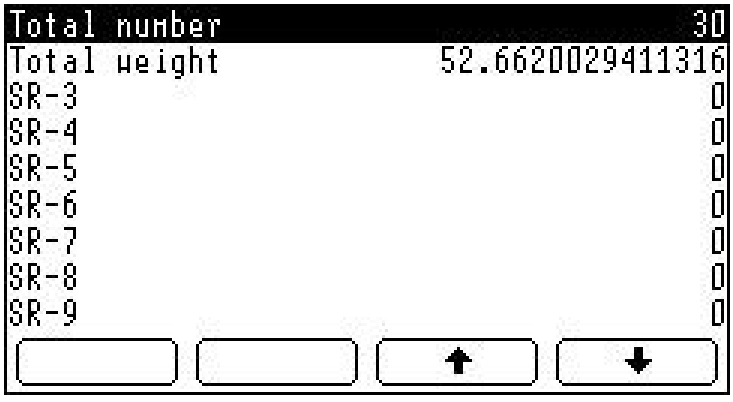

Figure 6 System results A, Total Weight page.

To clear the totals select **4–System Setup → Results → Clear system results** from the Top Level Menu.

Troubleshooting

Start the troubleshooting by checking the following:

- If the problem is with the **host connection**, check the third status indicator (on the Scale page) to see if the scale is connected to the host computer.

Basic problems

- If the problem is with the **hardware**, check by looking at the fourth status indicator whether the CAN unit is online.
- Verify that all **control lines** are working as intended.
- Check the **first** and **second status indicators** to try to figure out where in the weighing cycle the problem occurs and what the problem is.
- Subtle problems may occur when the **outputs** for hopper and buffer are switched or when the **air supply** from either valve is incorrectly configured. Turn the run signal off and manually apply voltage to each output in turn to verify that the hardware is being controlled correctly.

Common problems

The following is a list of common problems, possible causes and suggestions for solutions.

Refer to page 3 for information on setting the various application parameters.

Problem	Possible cause and solution
Infeed does not start (stuck in state A)	• Run signal is off. Verify that input 1 is high. • The batch weight is zero.
Hopper overfills	• The batch weight is incorrectly set. • The hopper is incorrectly adjusted or the load cell is damaged. Verify the adjustment and the load cell by placing a known weight in the hopper. • The system does not include an infeed buffer but the buffer time is set to a non-zero value.
Infeed buffer overfills	• The buffer time is set to a value that is too high.
Infeed conveyor stops too soon or at the same time as the infeed buffer	• The buffer time is incorrectly set.
The hopper does not empty itself at the end of the day	• Press the CLEAR button on the Scale page. • The batch time is incorrectly set.
The hopper does not close after emptying	• The empty limit is set to zero.
The hopper closes while product is still falling from it	• The empty time is set to zero or possibly to a value that is too low.
The hopper is tared incorrectly	• The tare time is set to zero or possibly to a value that is too low.
Material is fed into the hopper before it is fully closed	• The tare time is set to zero or possibly to a value that is too low.
The hopper does not empty itself	• In request systems verify that the request signal is received. • In automatic systems verify that the automatic option is selected in the program parameters.
The batches are lighter than the target batch weight	• This may be normal since the stable weight is not known when the infeed is stopped. Consider selecting the top-up option in the program parameters.
Emergencies are not indicated	• The emergency time is set to zero.
Emergencies are indicated too often	• The emergency time is set to a value that is too low.
State = C and emergency = 1	• The hopper cannot be tared. Empty the hopper and, if the problem persists, go to the **Top Level Menu → 4-System Setup → System → Configuration → Weighing Configuration → Options → Allow remote Zero and Tare** and set this option to Yes.
State = C and emergency = 2	• The hopper is unstable.
State = F and emergency = 2	• The hopper is unstable.
State = H and emergency = 3	• Product is stuck in the hopper.
State = I and emergency = 2	• The hopper is unstable.

The Weighing Cycle and State Labels

The hopper scale's position in the P02 2001 weighing cycle is easily determined by looking at the state labels on the Scale page.

The states are:

A – Init	The run signal is off or the batch size is 0
C – Tare	Tare empty hopper
E – Fill	Fill hopper
F – Unstable	Unstable batch ready
G – Batch	Stable batch ready
H – Emptying	Emptying hopper
I – Empty	Unstable empty hopper

States labelled B and D are transitional states that have no operational purpose.

Figure 7 shows a diagram of the P02 2001 weighing cycle:

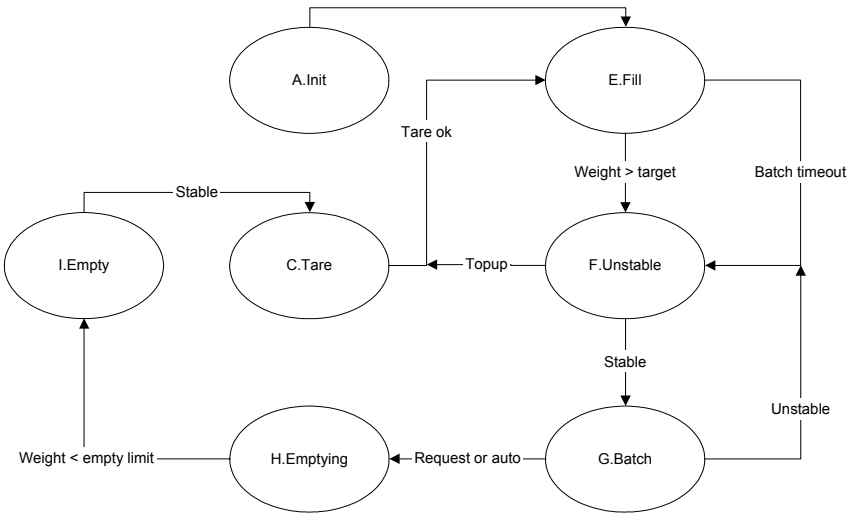

Figure 7 Weighing cycle with state labels.

The following is a description of each state and how transitions between states occur:

State 1	Conditions →→	State 2
	The run signal is off	A – Init
A – Init	The run signal is on and the batch weight is set to a non-zero value	C – Tare
C – Tare	The tare time has elapsed, and the hopper is successfully tared	E – Fill
E – Fill	There are products in the hopper, the batch time-out has expired, and the system is set to automatic or the request signal is on	F – Unstable
E – Fill	The batch weight has been reached	F – Unstable
F – Unstable	The hopper is stable	E – Fill, if the top-up option is enabled and the batch weight is lower than the target batch weight or G – Batch
G – Batch	The hopper is unstable The hopper is stable and the automatic option is enabled or the request signal is on	F – Unstable and the weight is recorded
H – Emptying	The weight has fallen below the empty limit and the hopper has been stable for a set period of time	I – Empty
I – Empty	The hopper is stable	C – Tare

The request signal, if used, can be given in any state except **A–Init**.
If, for example, a request signal is received in state **H–Emptying**, another batch will be delivered immediately.

Outputs

Outputs are set as follows:

- All signals are off when the state is **A–Init.**
- The infeed signal is on in all states except **A–Init**, provided that the time since the e last batch was completed is less than the buffer time.
- The infeed signal is on in state **E–Fill.**
- The hopper open signal is on in states **H–Emptying** and **I–Empty**.

- The buffer active signal is off in all states except **A–Init** and **E–Fill.**
- The batch ready signal is on in states **F–Unstable** and **G–Batch.**
- The request active signal is on when there is batch request pending.
- The emergency signal is on if there is an emergency. See below for more information on emergencies.

Emergencies

The following emergencies are defined:

- **Tare emergency** (1) occurs in state **C–Tare** if the hopper cannot be tared within the emergency period.
- **Unstable emergency** (2) occurs in states **C–Tare**, **F–Unstable** and **I–Empty** if the hopper does not stabilize within the emergency period.
- **Empty emergency** (3) occurs in state **H–Emptying** if the weight does not fall below the empty limit or if the hopper does not stabilize within the emergency period.

Controls

The P02 2001 application requires a CAN module with at least 8 inputs and 8 outputs, for example an MC88 module.

Inputs

Input	Description
1	**Run signal** This signal is always active. All controls are immediately disabled when the run signal is off and immediately enabled when it is on.
2	**Batch request** On non-automatic systems, this signal is used to start emptying the hopper. The signal is edge triggered and can be given at any time during the weighing cycle.

Table 1: Digital inputs

Outputs

Output	Description
1	**Infeed** This signal indicates that the system can accept material, either directly into the hopper or into the optional infeed buffer.
2	**Hopper open** This signal is used to release material from the infeed buffer.
3	**Buffer active** Controls an optional infeed buffer that can accept material while the hopper goes through the emptying process.
4	**Batch ready** Indicates that a batch is waiting in the hopper.
5	**Request pending** Indicates that the system has a pending batch request.
8	**Emergency** Indicates that there is a problem with the hopper. It might for example indicate that the hopper is stuck somewhere in the weighing cycle.

Table 2: Digital outputs

Host Interface

Standard Interface

The P02 2001 application supports the standard M2200 terminal program interface. See separate documentation for this interface.

Specific Interface

ID button message

A REC_IDBUTTON message is sent to the persistent output queue when an ID button is read. The message is only sent if there is an open socket connection on the output queue.

Field	ID Value	Value
REC_IDBUTTON	80	N/a
FLD_BUTTONID	55	Button number

Table 3 REC_IDBUTTON format.

Sample message:

<STX>(80<TAB>55<TAB>9f000002fe64d609<ETX>

Serial port 2 message

A REC_SCAN message is sent to the persistent output queue when serial data is input to comm port 2. The message is only sent if there is an open socket connection on the output queue.

Field	ID Value	Value
REC_SCAN	84	N/a
FLD_SCAN	60	Serial input
FLD_PORTID	62	Port ID

Table 4: REC_STATE format

Sample message:

<STX>(84<TAB>60<TAB>780879306045<TAB>62<TAB>2<ETX>

Weight message from device

A REC_INPUT message is sent to the persistent output queue every time a batch is completed.

Field	ID Value	Value
REC_WEIGHT	11	N/a
FLD_WEIGHT	1	Batch weight
FLD_UNIT	2	Unit for batch weight
FLD_OUTPUT	4	Output number, always 1
FLD_MATERIAL	6	Product ID

Table 5: REC_INPUT format

Sample message:

<STX>(11<TAB>1<TAB>2<TAB>2<TAB>kg<TAB>4<TAB>1<TAB>6<TAB>0<ETX>

Weight status message

A REC_STATUS message is sent to the persistent output queue when the scale has a new stable weight.

Field	ID Value	Value
REC_STATUS	14	N/a
FLD_WEIGHT	1	Current weight
FLD_UNIT	2	Weighing unit
FLD_STATUS	11	Weight status string
FLD_TARE	59	Current tare
FLD_TARETYPE	81	Tare type, “preset” or “button”

Table 6: REC_STATUS format

The message is only sent if there is an open socket connection on the output queue.

Additionally, the message is only sent automatically if the steady weight event is active. This event is normally activated by the application program but can be set manually by accessing the System page and selecting **Settings → General Events → When weight becomes steady**.

The message can also be requested by the application program by sending a REC_LUA message to the indicator, see below.

Sample message:

<STX>(14<TAB>1<TAB>-0.96<TAB>2<TAB>kg<TAB>11<TAB>szt<TAB>59
<TAB>0.96<TAB>81<TAB>button<ETX>

The weight status strings contains three letters:

- The first letter is either “s” for stable or “m” for unstable.
- The second letter is “z” if the scale is at zero or “n” if not.
- The third letter is “t” if there is an active tare or “n” if not.

State message from device

A REC_STATE message is sent to the persistent output queue every time the weighing cycle state changes. The message is only sent if there is an open socket connection on the output queue.

Field	ID Value	Value
REC_STATE	101	N/a
FLD_STATUS	11	State identifier, see “The Weighing Cycle and State Labels” on page 9.
FLD_ERRTEXT	33	State label

Table 7: REC_STATE format

The value of FLD_STATUS is numeric, with state A having the value of 0.

The message can be requested by the application program by sending a REC_LUA message to the indicator, see below.

Sample message:

<STX>(101<TAB>11<TAB>3<TAB>33<TAB>Start fill<ETX>

Emergency message from device

A REC_EMERGENCY message is sent to the persistent output queue every time the emergency status changes. The message is only sent if there is an open socket connection on the output queue.

Field	ID Value	Value
REC_EMERGENCY	102	N/a
FLD_STATUS	11	Emergency identifier, see section on emergencies on page 11.
FLD_ERRTEXT	33	Emergency label

Table 8: REC_EMERGENCY format

The message can be requested by the application program by sending a REC_LUA message to the indicator, see below.

Sample message:

<STX>(102<TAB>11<TAB>3<TAB>33<TAB>Can't empty<ETX>

REC_LUA messages to the indicator

REC_LUA messages are application specific control messages for the indicator. These messages do not define identifiers for individual fields.

Field	ID Value	Value
REC_LUA	87	N/a
#1	1	Lua command
#2	1	Send weight status message
	2	Send state message

Table 9: REC_LUA format

Sample message:

<STX>(87<TAB>1<TAB>1<ETX>