M2200

P02 2002 Application

Contents

P02 2002 Application

In General

This is a technical description of the M2200-P02 2002 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 2002

P02 2002 is a stand-alone 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 2002 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 2002 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 2002

Starting Up

To start using the P02 2002 application for the first time you must perform two tasks:

1 Set the weighing parameters (see table on page 3 with a description of all parameters)

2 Create a new weighing program (refer to page 4).
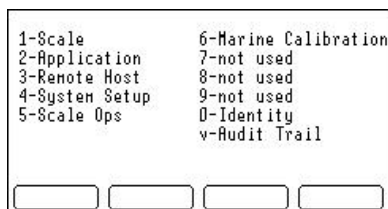
To set the application parameters

```
1-Scale         6-Marine Calibration
2-Application   7-not used
3-Remote Host   8-not used
4-System Setup  9-not used
5-Scale Ops     0-Identity
                v-Audit Trail
```

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**.

```
Batch weight (kg)        0.1
Batch time (s)            30
Empty time (s)             1
Empty limit (kg)         0.1
Tare time (s)              1
Buffer time (s)           60
Auto option                1
Top-up option              0
Emergency time (s)        20
```

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.

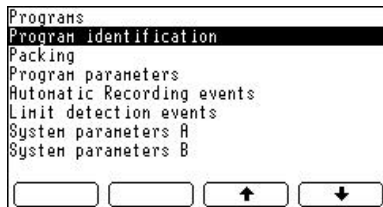|	
Generate state messages	If this option is selected, the system will generate a state message to port #1 every time the program state changes. The same message is sent to the persistent output queue if there is an open external connection to the queue.

To create a new weighing program

```
Programs
Program identification
Packing
Program parameters
Automatic Recording events
Limit detection events
System parameters A
System parameters B

[      ][      ][  ↑  ][  ↓  ]
```

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 📄 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 📄 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 📄 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 2002 shows the currently selected product (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.
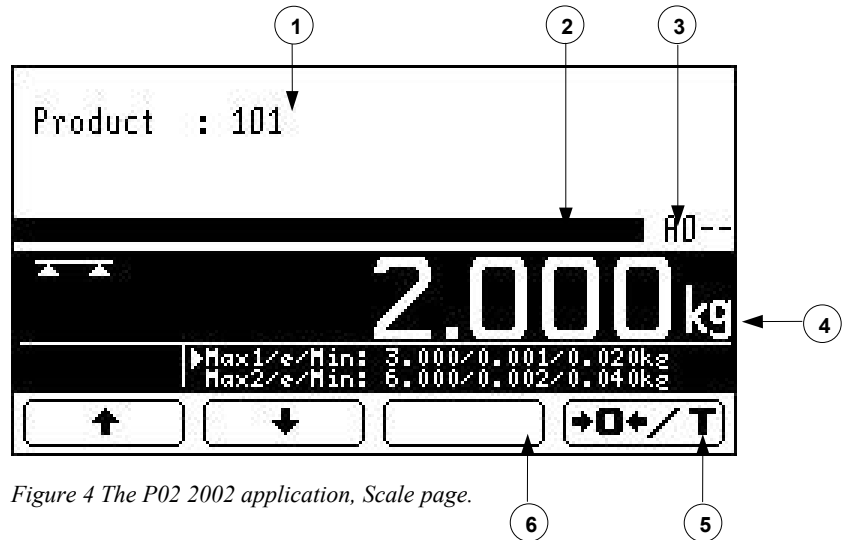

Figure 4 The P02 2002 application, Scale page.

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.

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

Status indicators

- 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 "The Weighing Cycle and State Labels" on page 10 for complete information on all state labels.

- The second indicator shows the current emergency number. A "0" indicates no emergency.
  Refer to page 12 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, which gives access to two pages, the Data page and the Debug page.

Use the DEBUG and DATA keys to switch between pages.

```
Product : Size A fillets
Number  : 0
Height  : 0.0kg




    ↓       Clear    Report    Debug
```

Figure 5 The Application display, Data page.

Data page

On the Data page you can see the product identification (1), the total number of weighings performed for the product (2), and the total accumulated weight for the product (3).

- Use the arrow key to select another product to view its details.

- Press the CLEAR key (4) to clear data for the displayed product.

- Press the REPORT key (5) to generate a weight report to the scale's serial port 1.

- Press the DEBUG key (6) to switch to the Debug page.

```
Program  = [2002.lua v1]
Height   = [0]
State    = [A-Init]
Emergency = [0-No emergency]




                              Data ↑
```

Figure 6 The Application display, the Debug page.

The Debug page shows the currently active application's name and version number (1), the current weight on the platform (2),and the current state (3) and emergency number (4).

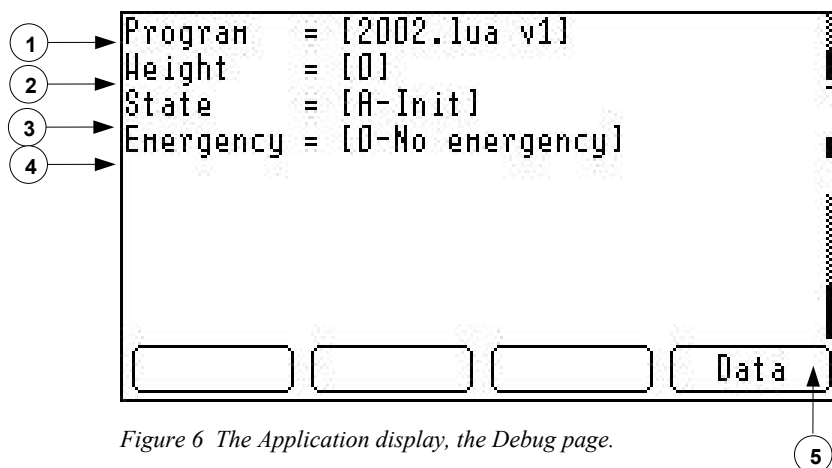- Press the DATA key (5) to switch to the Data page.

The Weight Totals Page

The P02 2002 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 7 System results A, Total Weight page.

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

Note: The totals stored in the System Results page are not necessarily the same totals as in a report generated from the Data page. This is because system totals and product totals are cleared independently.

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.

- 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.

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

Common problems Refer to page 2 for information on setting the various program 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.

Problem	Possible cause and solution
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 2002 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.

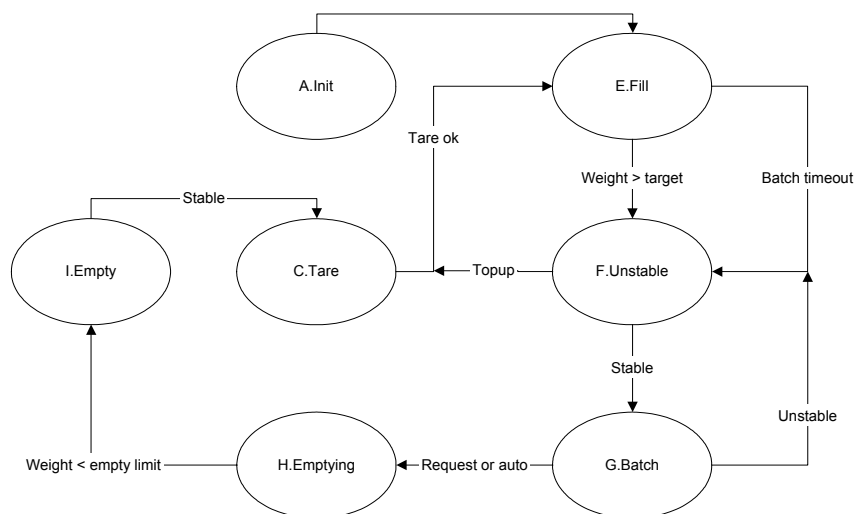Figure 8 shows a diagram of the P02 2002 weighing cycle:

Figure 8 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 are set as follows:

- All signals are off when the state is **A–Init.**

Outputs
- The infeed signal is on in all states except **A–Init**, provided that the time since the 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.

The following emergencies are defined:

Emergencies
- **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 2002 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 Messages

Weight message from device

Depending on the weight message options specified (see "To set the application parameters" on page 2) a message is sent to serial port 1 and the persistent output queue every time a batch is completed.

The message format is:

W<TAB><Product name><TAB><Product ID><TAB><Batch weight><unit>

Example:

W   Size_C   10   2.194kg

State message from device

Depending on the state message option specified and the connection status (see "To set the application parameters" on page 2) a message is sent to serial port1 and the persistent output queue every time the weighing cycle state changes.

The message format is:

S<TAB><State label>

Example:

S   4   Fill

Emergency message from device

Depending on the emergency message option specified and the connection status (see "To set the application parameters" on page 2) a message is sent to serial port 1 and the persistent output queue every time the emergency state changes.

The message format:

E<TAB><Emergency label>

Example:

E   2   Unstable