

OPERATION MANUAL FOR W4-2 SCALES

NOMAD™ - W4-2 SCALES
OPERATING INSTRUCTIONS

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1. INTRODUCTION

The W4-2 scales controllers provide all the functionality required to implement a mobile or fixed weigh scales solution in the NOMAD system.

The standard controller accepts up to four load cells.

Power is supplied by internal rechargeable batteries and charger with a universal voltage range is built in.

2. OPERATION - W4-2

There are two modes of operation - operator and supervisor mode.

Operator mode is the default state of the scales and is the mode where actual weighing takes place - the only action that may be performed in operator mode.

Supervisor mode is protected by a keyswitch or nominated ID tags. It is in this mode that operators are clocked in and out and all other functions are performed.

All numerical entries should be followed by pressing the 'ENT' key. Pressing the 'CLR' key will clear the current entry with subsequent presses backtracking up the menu hierarchy if any.

2.1 OPERATOR MODE

In operator mode the controller waits for an operator number.

Place the load onto the weigh platform. Note that the weight is not displayed until the reading is accepted.

Enter the operator number. The controller will check to see if the operator is known to the controller - that is they have clocked in and have not clocked out. If the entered operator number is known to the controller then it will prompt for a row number.

Enter the row number from which the fruit was picked. A maximum of 5 digits are allowed.

After entering the row number the controller will monitor the weigh platform for stability.

If the platform is not stable the phrase "Acquiring Weight" will be displayed and the platform monitored for a preset period. If during that period the weight doesn't become stable an error message will be displayed "WEIGHT NOT STABLE" accompanied by a triple beep. Should this message occur press the cancel key and try the process again. If the error persists check that the scales are firmly positioned and that the load is correctly placed onto the weighing platform.

If a stable positive weight exists then the operators tare will be subtracted to give the net weight and the result displayed. This net weight together with the operator number, row and time will then be entered into memory for transmission to the NOMAD system. After 3 seconds the reading will be cleared from the display and the controller will be ready for another entry.

2.2 SUPERVISOR MODE

Supervisor mode is selected by inserting the control key and turning to the right or placing a supervisors ID tag against the reader.

There are 8 basic commands available in supervisor mode.

1. Clock on
2. Clock off
3. Coffee
4. Lunch
5. Free Weigh
6. Set Zero
7. Power Off
8. Calibration

If using ID tags there is a further command.

9. Return to operator mode.

With the exception of command 9 a textual prompt is displayed as each command number is keyed in. Pressing 'ENT' enacts that command. Further prompts will be displayed according to the command selected.

2.2.1 Clock In

Place the operators picking basket(s) on the scales. Enter '1'. The controller will prompt for the operators number. After entering the operators number the controller will monitor the platform for a stable weight. The stable weight will be entered as that operators tare value. The time and operator number will be transmitted to the NOMAD system as a clock on message.

If the operator is already known to the controller their previous tare value will be overwritten.

2.2.2 Clock Out

Enter '2'. The controller will prompt for the operators number. Enter the operators number to clock out that operator.

If all operators are to be clocked out enter a '0' instead of the operator number.

Once clocked out an operator may be clocked in again using function 1. The NOMAD system will always use the earliest clock in time and the latest clock out time.

2.2.3 Coffee

Enter '3'. The controller will prompt for the operators number. Enter the operators number to apply a fixed length coffee break for that operator or a '0' to apply it to all operators.

The break duration and job number are defined in NOMAD Central system setup. Two entries will actually be made by this command - a break entry timed at the current time and a "picking" entry timed at the current time plus the break duration.

2.2.4 Lunch

Enter '4'. The controller will prompt for the operators number. Enter the operators number to apply a fixed length lunch break for that operator or a '0' to apply it to all operators.

The break duration and job number are defined in NOMAD Central system setup. Two entries will actually be made by this command - a break entry timed at the current time and a "picking" entry timed at the current time plus the break duration.

2.2.5 Free Weigh

To aid verification of the scales and to allow general weighing to be performed a "Free Weigh" mode is available.

Enter '5'. The controller will display the weight on the platform with no adjustment for tare.

The phrase "WEIGHT NOT STABLE" will appear just above the indicated value whenever the weight varies by more than a preset amount.

To exit this mode press 'CLR'.

2.2.6 Set Zero

Enter the free weigh mode described above.

Enter '6'. The controller will zero the scales platform to the current reading and save the new zero value in memory.

2.2.7 Power Off

The controller can be put into a low power mode where everything but the core circuitry is turned off.

Enter '7'. The display will blank. If using a key it should now be turned back to the operator position. The controller will not power off completely, part of it will remain active to maintain the time. The data memory is also maintained.

To power the scales back on turn the key to the supervisor position or place a tag against the reader.

3. USE OF TRANSPONDER TAGS

The scale may be used with contactless transponders. The transponders themselves are credit card sized and derive their power from the radio signal that interrogates them. The transponders are normally fixed to a harvesting cart such that they pass the reader as the cart is loaded onto the weight platform. An external “strobe” input would normally be derived from a volt free contact pair in the controller of the grading machine.

The reader is housed in a separate enclosure and should be connected to PL2 via a screened cable.

The strobe input should be connected to PL4.

3.1 OPERATION WITH TRANSPONDERS

When a transponder is in range of the reader and the controller is in operator mode the transponder number will be displayed in large digits at the bottom of the screen.

When a strobe input is applied to the controller to instruct it to take a reading the last transponder number is used. The scale will wait until the weight is stable before accepting the reading, but should the stability time threshold be reached the reading will be accepted regardless.

3.1.1 TARE OF A TRANSPONDER CART

The tare for each cart or range of carts (identified by the transponder number) can be set from the Nomad PC.

4. CHARGING

Connect the controller to the main supply. After a second has elapsed the controller will beep and the message “CHG1” or “CHG2” will be displayed. These messages indicate that the terminal is charging.

The charging cycle and the meaning of the “CHG” messages is as follows.

- CHG1 The battery is very discharged and is being slow charged. When sufficient charge has been put into the battery it will switch to fast charge.
- CHG2 The battery is being fast charged. When the battery is fully charged it will switch to trickle charge.
- CHG3 The battery is fully charged and is now being trickle charged to maintain its charge.
- A fully discharged battery will take around 7 hours to recharge.

5. CALIBRATION / SETUP

All calibration and setup functions are reached from supervisor mode.

Pressing '8' then 'ENT' enters the calibration mode. A series of commands are then available that are related to calibration. All commands are constructed from an 8 digit number to avoid misuse.

- 93010001 - select cell #1 and display as raw value.
- 93010002 - select cell #2 and display as raw value.
- 93010011 - select cell #3 and display as raw value.
- 93010012 - select cell #4 and display as raw value.
- 93010003 - display all cells as calibrated value.
- 93010004 - mark start of calibration for selected cell.
- 90010005 - mark end of calibration for selected cell.
- 93010006 - save calibration values for all cells
- 93010007 - set and save zero offset.
- 93010009 - reload calibration values for all cells.
- 93020246 - clear data memory (does not affect calibration).
- 93030xxx - set node number.
- 93050xxx - set stability threshold.
- 93060xxx - program tag number into transponder.
- 93070xxx - set stability timeout.

Each load cell connected to the controller requires calibrating for span separately, this requires removal of any platform if using a scale with more than one load cell. The zero point is calibrated collectively.

5.1 EXAMPLE: CALIBRATING CELL #1

1. Ensure the scales are in supervisor mode.

2. Press '8' then 'ENT'.
3. Enter '93010001'. The raw value for cell #1 will be displayed in decimal and hexadecimal (the 2 leading digits of the hexadecimal value are status flags). Verify that the correct cell is selected by applying a load to the cell and observing the change in the display. Remove any load from the display and prepare to place calibration weight on the cell.
4. Enter '93010004'. This instructs the controller that the cell is without the calibration weight.
5. Place the calibration weight on the cell. It is important that the weight acts only on the cell.
6. Enter '93010005'. This instructs the controller that the weight is now on the cell. The controller will prompt for the value of the weight in units of 1/100 kg (i.e. 40kg = 4000).
7. Enter the weight value. The controller will calculate the calibration values and return to displaying calibrated weight. Note that at this point the new calibration values are not saved and the zero point has not been set.
8. Repeat steps 1 to 5 for all cells. If a cell is not connected then repeat the process except for step 3 and enter '0' for the weight value.
9. Remove all calibration weights and restore the weigh scale platform. Enter '93010007'. This will set the zero point. Verify that the calibration is correct by placing test weights in various locations.
10. Enter '93010006'. This will save the calibration values.

5.2 SETTING THE NODE NUMBER

In order for the scales to communicate with the rest of the NOMAD system a number must be assigned to the scales to identify it from other items in the system.

1. Ensure the scales are in supervisor mode.
2. Press '8' then 'ENT'.

3. Enter '9303yxxx', replacing the 'x's with the desired node number and the 'y' with the system number (usually 0).
4. The scales will restart. Note that the current node number is displayed during start-up.

5.3 CLEARING THE MEMORY

The memory should be cleared if the controllers batteries have been allowed to completely discharge for more than 2 weeks.

1. Ensure the scales are in supervisor mode.
2. Press '8' then 'ENT'.
3. Enter '93020246'.
4. The scales will restart.

5.4 STABILITY THRESHOLD AND TIMEOUT

When the controller take a reading of the load on the weigh platform it actually takes many readings and uses the average. The individual readings that make up the average are taken continuously. During this process it also monitors by how much these readings vary.

In most circumstances at the time when the reading is taken the load is stable and an average reading whose sub-readings are within limits is instantly available. If the sub-readings vary by more than a preset amount a message "Acquiring Weight" will be displayed. The controller will then continue to take sub-readings until either they are within the limit or a preset time has expired. Both the weight limit (threshold) and the time limit (timeout) can be set.

A recommended value for the threshold is 0.1% of the load cell capacity while that for the timeout is 5 seconds.

5.4.1 Threshold

1. Ensure the scales are in supervisor mode.
2. Press '8' then 'ENT'.
3. Enter '93050xxx' (replace the 'x's with the desired threshold in 10g increments).
4. The scales will restart.

5.4.2 Timeout

1. Ensure the scales are in supervisor mode.
2. Press '8' then 'ENT'.
3. Enter '93070xxx' (replace the 'x's with the desired timeout in 1 second increments).
4. The scales will restart.

6. CONNECTING THE SCALES

Each load cell should be terminated in a DB9 plug (pin contacts) as follows.

1. NOT CONNECTED
2. - SENSE
3. NOT CONNECTED
4. + SENSE
5. NOT CONNECTED
6. + EXCITATION
7. + EXCITATION MONITOR
8. - EXCITATION
9. - EXCITATION MONITOR

If using load cells with only four wires connect the excitation monitor lines to the excitation lines.

The load cells may be connected in any order but it will be necessary to note which cell is connected to which input for calibration purposes.

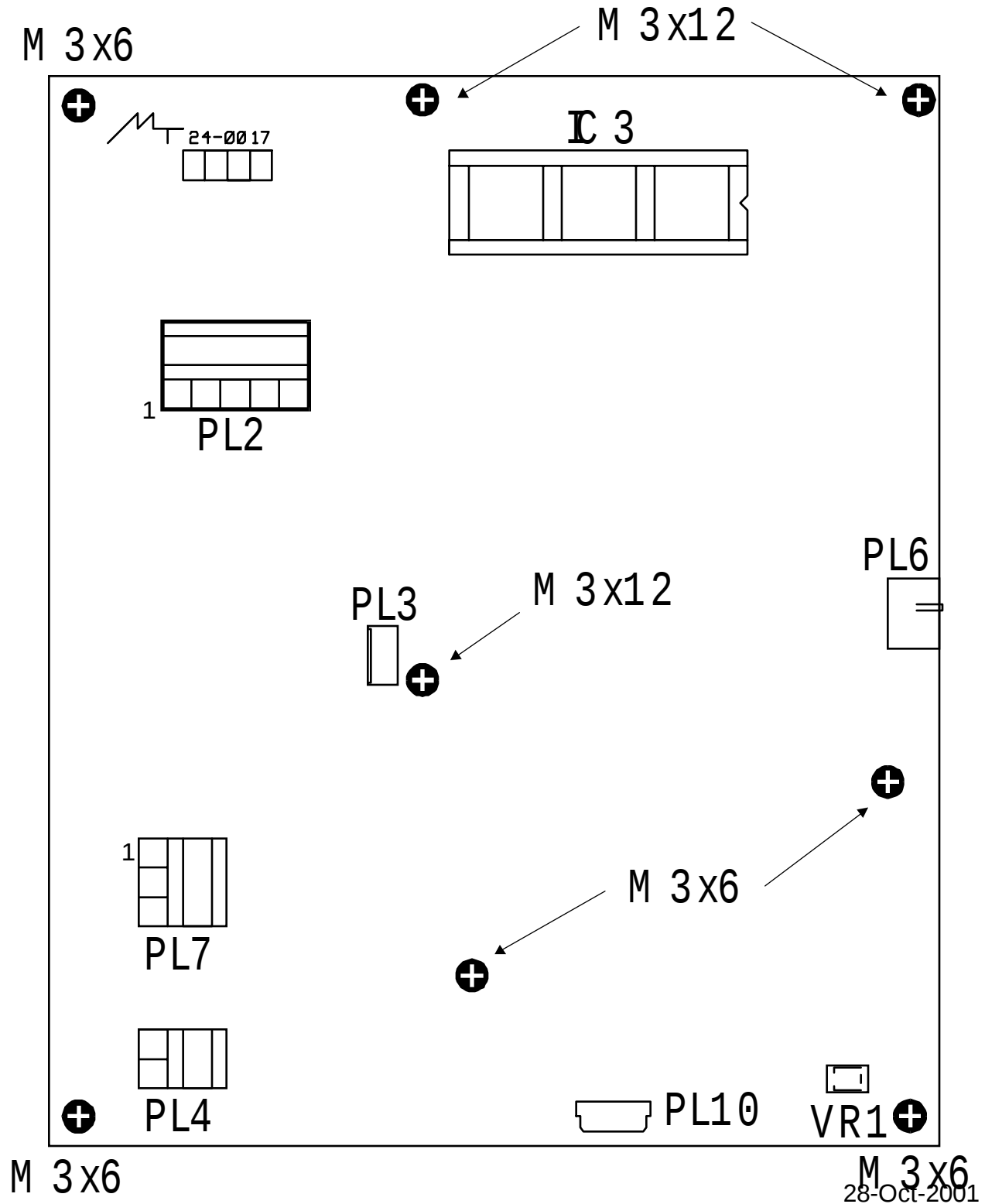
7. MAINTENANCE

7.1 BATTERIES

The scales are fitted with 7 x AA size 1.5Ah NiMH rechargeable batteries. With normal usage these should remain serviceable for 2 years.

7.2 REPLACING THE CIRCUIT BOARD

If it is necessary at any time to remove the circuit board pay careful attention to the location and type of screws employed. Use a #1 POSIDRIV screwdriver.



8. SPECIFICATIONS

Power	8.4V battery pack.
Average Consumption	100mA
Charging Input	15V DC @ 450mA max
Load Cells	
Impedance	300 - 1000 Ω
Excitation	5V
Sensitivity	0.6 μ V (0.003% FS)
Radio Link	
Frequency	916.5MHz $\pm$ 0.2MHz
Tag Reader	
Frequency	125kHz $\pm$ 0.1kHz

8.1 CERTIFICATION

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.

8.2 COMMUNICATION RANGE

The W4 controllers are designed to have a typical communication distance of 75m from a link unit in a typical glasshouse.

Communication range will be affected by local conditions and no guarantee can be made of the actual communication range encountered in an individual situation.

It should be noted that during periods of communication blackout the scales will continue to function normally with any entered data being transferred when communication is re-established.