



PROCESS MONITOR

For measuring

Area · Speed · Tacho's · Bins

User Guide



Software Version 2.0

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1 Introduction

Thank you for purchasing an Electrolee Process Monitor.

The Process Monitor can monitor various processes simultaneously, displaying the state of processes, and sounding an alarm when any monitored process isn't running well.

All applicable channels can be configured to a specific alarm sensitivity. For example, speed, area, axle rotation and the status of bins can be monitored, all with different alarm conditions. The unit can be used with various kinds of processes, including air seeders, many types of planters, combine harvesters, and many more. The Process Monitor can be combined with a Planter Monitor, or it can function as a standalone unit.

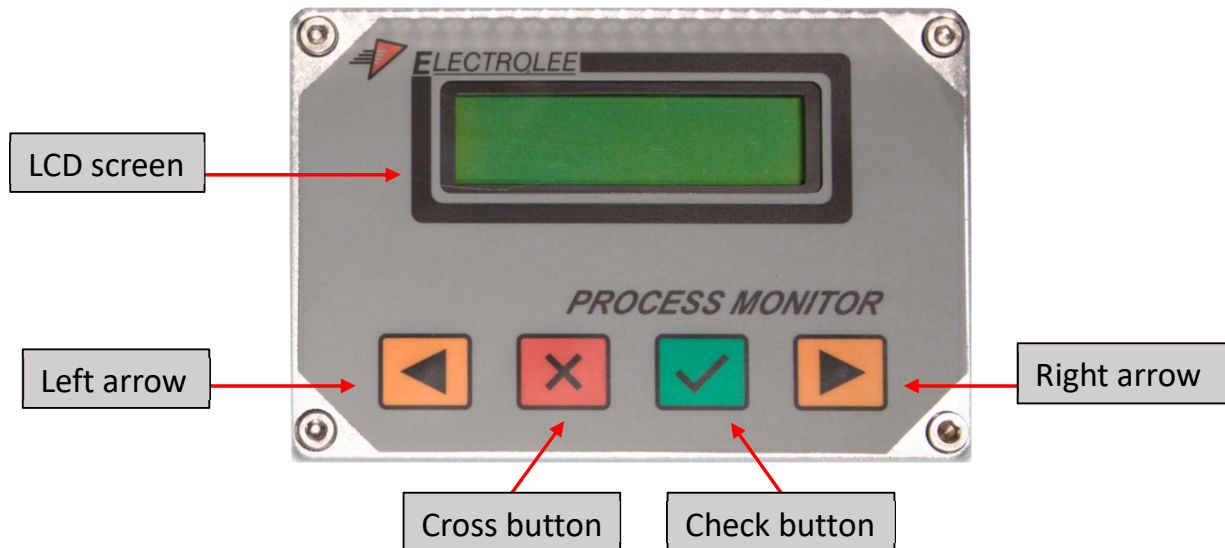
2 Items monitored

- Speed Monitoring with alarm thresholds for excessively fast or slow speeds, in meter per minute or kilometres per hour.
- Area monitoring in hectares, including 10 individual blocks.
- Up to four tacho channels, including individual alarm thresholds for maximum and minimum speed setting.
- Up to four bin sensing channels, including customisable bin-full / bin-empty reporting.

3 General features

- Individual channels or functions can be switched on or off.
- Calibration procedure is simple.
- "Picture" is taken of the working system to calculate alarm conditions from.
- The screen is lit with a backlight for low light conditions.
- The unit is robust and water resistant.
- Input power 10-15VDC.

4 Functions on the front panel



LCD screen:

Used to show numerical and graphical information. Left and right navigation is possible with the ◀ or ▶ buttons when ◀ ▶ is displayed on the screen.

Left arrow: (◀)

The left arrow button is used to navigate to the previous option, which includes moving to the previous channel or displaying an alternative option. It is also used to decrease counters and variables.

Cross button: (✘)

Use this button to answer *no* to a question, or to exit from a function. In a standalone Process Monitor unit, it also serves as the off switch. To switch off the unit, press and hold this button until the unit switches off.

Check button: (✓)

Use this button to answer *yes* to a question, or to enter a function. In a standalone Process Monitor, it is also used as the on switch. To switch on the unit, press the ✓ button. To go to setup mode, keep this button pressed until the unit displays **Setup Mode** on the screen. This is done from the off position.

Right arrow: (▶)

The right arrow button is used to navigate to the next option, which includes moving to the next channel, or displaying an alternative option. It is also used to increase counters and variables.

5 Installation

5.1 Installation of the Process Monitor main unit

Place the Process Monitor in a position that will be easy to see and operate.

5.2 Installation of the Harness and Sensors

5.2.1 Installation of the Harness

Position the harness on the planter frame where it is the least likely to get damaged from mechanical, or human movement on the planter. Where standard wiring is too short, extensions may be ordered from Electrolee.

5.2.2 Installation of the Wheel and Tacho sensors

Namur 2-wire type proximity sensors are used. Identify a position for each of the sensors where tacho functions are implemented. The sensors for the tacho functions must be placed strategically in order to sense a target (a target is a piece of metal like the head of a bolt). It may be mounted to make use of an existing target like the studs in a wheel hub. The number of studs is entered as part of the calibration process.

When tightening the nuts of the proximity sensor, be very cautious not to over-tighten. Use a weak type of nut-locking agent to prevent it from loosening due to vibration.

A good working distance is about 3mm, although the sensor has a longer range in most cases, depending on the model of sensor used. Mechanical damage, especially at the sensitive *nose* end, will render the sensor broken and unrepairable.

5.2.3 Installation of the lift sensor

If the wheel signal is taken from an axle that stops rotating when the implement is lifted, no lift sensor is necessary. In this case, it must be configured that no lift sensor is used during the software setup process (see page 10).

The proximity lift sensor must be placed strategically in order to sense when the implement is lifted, and when it is in the down position. The correct logic is entered within the setup mode.

5.2.4 Installation of the Bin Sensors

Position the capacitive proximity sensor in order to report on a bin empty, or bin full situation. This will depend on the function desired by the user. The sensor can be mounted inside the tank or bin. Here the substance to be sensed will cover it completely. Care must be taken not to put strain on the sensor's cable when emptying/filling the tank. It may also be mounted through a hole in the tank. In this way only the nose of the sensor will be exposed to the sensed substance.

6 Setup procedure of the Process Monitor

Before starting the calibration process, please ensure that the harness and sensors are plugged in and correctly installed. If no channels are selected at switch-on, the screen will indicate that no channels are selected, and the user needs to go to setup mode. To make the Process Monitor an accurate instrument, it is vital to calibrate it correctly. The unit will register these values and retain them in the memory until it is changed by the user.

6.1 Entering setup mode

6.1.1 Entering setup mode on a combination unit

While pressing the ✓ button on the Process monitor, switch on the Planter monitor with the *POWER ON* button.

6.1.2 How to enter setup mode on a standalone unit

Hold the ✓ button until the following message is shown on the screen:

```
Setup Mode..  
X=Out ✓=Continue
```

Pressing the ✕ button will exit setup mode and continue to normal operation. Pressing the ✓ button will continue to the setup menu, and the following message will appear on the screen:

```
Choose Function  
SEL/CHAN Tac100%
```

6.2 Setup of channels

SEL/CHAN will be flashing, indicating that this choice will be chosen if the ✓ button is pressed. The alternative option is Tac100%. The Tac100% option is discussed on page 10. Press ✓ while SEL/CHAN is flashing to go to the following screen.

```
Select Channel  
Edit<>Ch:Tacho1✓
```

6.2.1 Setup of tacho channels

The ✓ on the screen indicates that the sensor is detected by the unit. By bringing a metal object close to the proximity sensor, and moving it away again, the ✓ indicates that it is detecting the target. By pressing the ► button, the next channel is displayed. While at Tacho1, its settings may be changed by pressing the ✓ button.

```
Ch: Tacho1
Pulses/Rev:1
```

By pressing the ◀ or ► buttons, the number of pulses per revolution can be set to any number between 1 and 64.

Any unused channel must be switched off. By setting the Pulses/Rev to 0, that particular channel is switched off.

After a channel is switched off, the screen will momentarily display:

```
Ch: Tacho1
deactivated..
```

The number of pulses is derived from the number of targets that the sensor will detect during one revolution. After saving the pulses/rev setting by pressing the ✓ button, the alarm condition screen displays:

```
Ch: Tacho1 ALARM
Condition:% 50
```

Use the ◀ or ► buttons to set the desired Alarm percentage. Setting the Tacho 100% RPM value is discussed on page 10. The point at which the alarm will sound is set as a percentage of the Tacho's 100% RPM parameter. Press the ✓ button after the desired % is set. If the ✕ button is pressed, changes will not be saved. After Pressing the ✓ button, the following screen is displayed:

```
Choose Function
SEL/CHAN Tac100%
```

While the SEL/CHAN option is flashing, press ✓ to re-enter the channel setup screen. The other tacho channels can be set up in the same way as Tacho1.

6.2.2 Setup of bin channels

By using the ◀ or ► button, navigate to the following screen:


```
Select Channel
Edit<>Ch:Bin1✓
```

By using the ◀ or ▶ buttons, other bin channels may be changed as well. At the desired bin channel, press ✓ to enter the channel setup screen:

```
Ch: Bin1      <>
Bin Alarm: ON
```

```
Ch: Bin1      <>
Bin Alarm: OFF
```

Use the ◀ or ▶ button to toggle between ON or OFF. Press ✓ to confirm. Selecting ON will show the following screen:

```
Ch: Bin1      <>
Bin EMPTY Alarm
```

```
Ch: Bin1      <>
Bin FULL Alarm
```

Use the ◀ or ▶ buttons to toggle between a bin FULL alarm and a bin EMPTY alarm. Press ✓ to confirm.

6.2.3 Setup of speed and area channels

By using the ◀ or ▶ button, move to the following screen:

```
Select Channel
Edit<>Ch:Speed ✓
```

Press ✓ to enter the speed channel setup screen.

```
Speed Units
Km/h  Meter/Min
```

Use the ◀ or ▶ button to toggle between kilometres per hour (km/h) and meters per minute (m/min). While the desired option is flashing on the screen, press ✓ to confirm (1 km/h = 16.67 m/min).

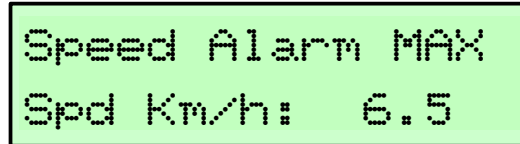
Next, the following screen will be displayed:

```
Speed Settings
MIN/MAX  CALIBR
```

While MIN/MAX is flashing, press ✓.

```
Speed Alarm MIN
Spd Km/h:  5.5
```

The Process Monitor can be set up to sound an alarm when the speed is outside a specific window. Using the ◀ and ▶ buttons, set the desired speed alarm minimum. Press ✓ to confirm. Now set the desired speed alarm maximum with the ◀ and ▶ buttons.

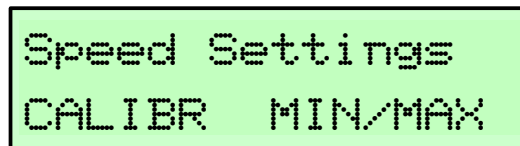


```
Speed Alarm MAX
Spd Km/h: 6.5
```

The speed channel can be switched off by setting speed alarm MIN equal to speed alarm MAX.

6.2.4 Calibrating of the wheel or drive axle's relation to distance

The 100m calibration must be done if any speed and/or area monitoring is required.



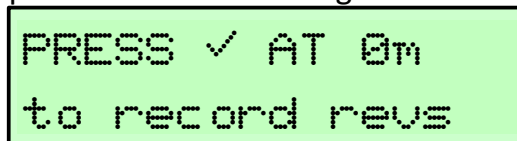
```
Speed Settings
CALIBR MIN/MAX
```

While the CALIBR option is flashing, press ✓ to enter the calibration of the axle or wheel revs/meter parameter.

The number of pulses/revolutions may be manually entered or measured over a 100m distance. The two methods should not be combined.

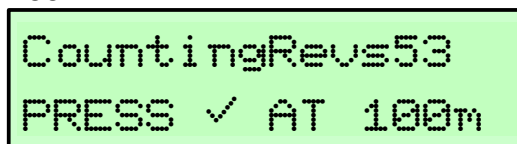
6.2.4.1 Manually entering the number of pulses per 100m

If the number of revolutions or pulses in 100m is already known, simply press ✓ at the following screen.



```
PRESS ✓ AT 0m
to record revs
```

Now, use the ◀ and ▶ buttons to specify the number of pulses per 100m.



```
CountingRevs53
PRESS ✓ AT 100m
```

Press ✓ button to save the count.

6.2.4.2 Measuring the number of pulses over a 100m distance

Identify a straight path through which the implement can be moved. It must be more than a distance of 100 metres. Mark a suitable starting point, measure exactly 100 metres and mark the end of the distance. Use a reliable source, for example a long tape-measure or a measuring wheel. Move the implement to the starting point.

```
PRESS ✓ AT 0m  
to record revs
```

Press ✓ to mark the starting point of the 100m calibration distance. Now move the implement across the 100m distance in order for the Process Monitor to count the number of pulses generated by the chosen axle or wheel. While the implement is moving across the 100m, the number of revolutions (or pulses) is displayed as it progresses. Stop exactly at the 100m point and press ✓ button to save the count.

```
CountingRevs53  
PRESS ✓ AT 100m
```

Press the ✕ button to exit the speed settings screen.

```
Select Channel  
Edit<>Ch:Speed
```

6.2.5 Setup of area

Move to the next channel with the ► button.

```
Select Channel  
Edit<>Ch:Area✓
```

The implement lift proximity sensor input is indicated by the ✓. If the implement lift is moved up and down, the ✓ will appear and disappear.

Press ✓ to enter the area setup screen.

```
Ch: Area <>  
Area Measure:ON
```

```
Ch: Area <>  
Area Measure:OFF
```

Use the ◀ or ▶ buttons to toggle between ON or OFF. If OFF is selected, no area calculations can be made. If ON is chosen, the implement width and presence of lift switch will need to be configured:

```
Area Settings:  
Impl.Width:500cm
```

```
New Impl.Width  
NOT saved
```

Enter the effective working width (cultivated width) of the implement in centimetres. Use the ◀ and ▶ buttons to change the width value.

Press ✓ to save the value. If the ✕ button is pressed, the user is reminded

that the parameter is **not** saved.

6.2.6 Setup of lift switch

```
Is Lift Used:<>
      ✓= YES
```

```
Is Lift Used: <>
      ✓= NO
```

Use the ◀ or ▶ button to toggle between ON or OFF. If YES is selected, the lift input will determine when to add area via the wheel input sensor, and when to negate travelling area. If NO is selected, the area is calculated continuously. If the axle that is used stops when the implement is lifted, NO may be chosen. Press ✓ to save the option.

The next screen measures the logic of your lift installation. Put the lift in the active position and confirm by pressing ✓.

```
Press✓ when LIFT
is in active pos.
```

6.2.7 Setup of alarm acknowledge

When an alarm condition arises, it can be acknowledged by pressing ✓. It is also automatically acknowledged after a set number of beeps.

Navigate to the last setting to set the number of alarm beeps to indicate an alarm.

```
Edit Acknowledge
Auto Beeps 3
```

Press ✓ to enter the screen to alter the number of beeps for auto acknowledge.

```
Beeps to auto
Acknowledge: 3
```

Use the ◀ and ▶ buttons to change the number of beeps before the alarm condition is automatically acknowledged. Up to 5 beeps is possible. Press ✓ to save the value.

6.2.8 Setting the 100% Tacho

Please ensure all tacho channels are set up and running at normal speed before executing the Tac100% function on the main setup screen.

```
Choose Function
Tac100% SEL/CHAN
```

Make sure all tacho processes are running at their normal working speed. You are about to *take a picture* of the running tacho channels to set the 100% mark for each individual channel. Make sure the desired tacho channels are switched on. All tacho alarm settings will be a percentage of the RPM readings that will be taken now.

Press ✓ to set current speeds as 100% on the tacho channels. The screen will indicate the following while the tacho channels are being read.

```
Reading TachoRPM
Please Wait...
```

```
Ch: Tacho1
Tac100% Taken !!
```

If a tacho channel is static while the 100% reading is being taken, it will be displayed on the screen momentarily.

```
Ch:Tacho1 STATIC
No Tac100% Taken
```

Use the ✕ button to exit setup mode and enter normal operating mode.

7 Normal Operating Mode

After the unit is switched on normally, the current firmware version is shown:

```
Electrolee
Process Monitor
```

```
Version X.XX
```

To prolong the display of the version number, press the ◀ and ▶ buttons simultaneously just after switch-on.

7.1 Speed Channel

While the measured speed is within the configured MIN and MAX values, the screen will display:

```
Ch: Speed
Speed: 5Km/h
```

During alarm condition: driving too slowly, the up arrow, \uparrow is displayed.

During alarm condition: driving too fast, the down arrow, \downarrow is displayed.

Ch: Speed <> \downarrow ALARM: 7Km/h \downarrow	Ch: Speed <> \uparrow ALARM: 3Km/h \uparrow
--	--

While at the speed screen, The \checkmark can be pressed to show the currently configured MIN and MAX values momentarily.

```
Ch: Speed <>  
MIN 5.0MAX 10.0
```

7.2 Area Channel

The area is only calculated and added to the active area block while the lift is in the down position (indicated by the letters DN). When the lift is in the UP position, area is not added to the total of the selected area block. If the *lift not used* option was selected in setup mode, counting is always on and no UP or DN will be displayed.

Ch: Area7 <>DN Area 12.45ha	Ch: Area7 <>UP Area 12.45ha
--------------------------------	--------------------------------

Press \checkmark to enter the area block selection screen. Use the \blacktriangleleft or \blacktriangleright button to navigate to another area block. It can now be selected as the active area block by pressing the \checkmark button. A total of 10 area blocks are available. They can be individually zeroed or be set as the active area block.

```
Area7: 12.45ha<>  
X Exit  $\checkmark$  Select
```

The following screen confirms the choice. The \times button will navigate to the previous screen. Another \checkmark button will navigate to the following screen.

```
Area7 Selected  
X Exit  $\checkmark$  to
```

To continue to the reset screen that will reset this Area Block to zero, press the \checkmark button. Press the \blacktriangleleft and \blacktriangleright buttons simultaneously to execute the zeroing of this area block.

```
Zero Area7 ?  
Press < with >
```

The screen will confirm that the area counter has been zeroed.

```
Ch: Area7 <>UP  
Area 0.00ha
```

7.3 Tacho Channels

```
Ch: Tacho3 <>  
RPM: 1000
```

Press the ◀ or ▶ button to navigate between channels. The currently monitored RPM is shown on the screen. As soon as an alarm condition is detected, the screen will display the word ALARM: and RPM. An audible alarm is also sounded.

```
Ch: Tacho3 <>  
ALARM: RPM
```

Press the ✓ button to see the configured MIN setting. This is the threshold at which the alarm will trigger for this channel.

```
Ch: Tacho3 <>  
Min RPM 900.0
```

7.4 Bin Channels

The four bins can be set individually to sound an alarm when empty or when full. In the example on the left, the status is reported as normal. On the right, the alarm condition is reported.

```
Ch: Bin1 <>  
Bin not empty
```

```
Ch:Bin1 <>  
ALARM: BIN EMPTY
```

```
Ch: Bin1 <>  
Bin not full
```

```
Ch:Bin1 <>  
ALARM: BIN FULL
```

8 Specifications

Speed	Units	kilometres/hour or metre/minute
	Minimum	1km/h or 16.67m/min
	Maximum	200km/h or 3333m/min
Area	Area Blocks	10
	Area increments	Every 100 meters
	Maximum Area per Block	65 536 hectares
	Lift switch input logic	User-configurable
Tacho	Tacho Channels	4
	Minimum RPM per channel	5
	Maximum RPM per channel	10 000
	Minimum pulses per revolution	1
	Maximum pulses per revolution	64
Bins	Bin Channels	4
	Bin status to be monitored	Bin Full or Bin Empty

9 Maintenance

Although the Process Monitor is dust proof and very water resistant, it is best to keep the unit in a cool and dry place while it is not in use.

Do not expose any part of the system to chemicals, including strong cleaning agents. All electrical plugs must be sprayed with electric contact cleaner annually.

9.1 Potential causes of inaccurate monitoring

Always follow the instructions in this manual. Recalibration is a good first step in rectifying inaccuracies. Other factors that may lessen accuracy is damage to wires, connectors, sensors, sensor targets and placement of proximity sensors.

9.2 Control Buttons and Screen

Use only a fingertip to press buttons.

Do not press down hard on the LCD screen as it can get damaged.

Warranty

ELECTROLEE CC warrants this Process monitor, purchased from ELECTROLEE CC or approved dealer, to be of a high quality and undertakes to replace or repair at its discretion, free of charge at ELECTROLEE CC's premises, any component (other than cables and/or electrical plugs) or the article itself, should it be found and brought to ELECTROLEE CC within three years from date of purchase, that any component or article itself is defective due to defects in workmanship or materials used in its manufacture.

This warranty does not cover:

1. Damage resulting from incorrect installation, or calibration, or use other than the designed use, or other than in accordance with the operating instructions issued by ELECTROLEE CC.
2. Any kind of consequential damage.
3. Abuse or neglect of the article.

The purchaser must deliver the article to ELECTROLEE CC, with proof of purchase, stating the date and serial number of the Process monitor, at the premises of ELECTROLEE CC, for inspection and the carrying out of any repairs, if necessary.

Liability

ELECTROLEE CC will not be liable for any losses incurred whatsoever, whether directly or indirectly, due to the use, misuse, or purchase of the ELECTROLEE Process monitor.

Also see our Standard terms and conditions for sale, available on request from ELECTROLEE CC.

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