# **22C2** Spreader Control


# OPERATION INSTRUCTIONS

# VERSION 1.0

FARMSCAN

PART No: AM – 22C2V1

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# 1.0 Introduction

## 1.1 General Outline

The 22C2 will automatically adjust the belt speed to maintain the selected target rate.

Rates can be changed under GPS control when the 22C2 is connected via the serial port to a Farmscan canlink terminal or other computer-based product with GPS rate map and appropriate controlling software.

The 22C2 may be calibrated using either of two methods. The first method requires that the material be weighed as it falls from the gate whilst the second method requires the calculation of a factor based on the spreader manufacturer's charts supplied in the spreader manual. The factor may be fine-tuned after the first loads.

The 22C2 will also monitor spinner RPM via a sensor mounted on one of the spinners and low bin level via the bin level sensor mounted at the bottom of the bin.

The spinner can then be monitored to maintain the correct width of spread as products change. An alarm can be set to notify the operator when the spinner RPM drops below the set alarm point.

The bin low alarm is activated when the material in the bin uncovers the sensor. The sensor can thus be mounted to provide sufficient warning of a low bin level.

The built in trip meter allows for records of up to 10 trips. Each trip will record the area covered and weight of product spread. The "TOTAL" key allows a display of overall area, weight and distance covered.

# 2.0 Installation

## 2.1 Monitor Installation

When installing the monitor use the brackets, securing knobs and mounting hardware supplied to mount the monitor. Keep the following points in mind when finding the best location for the monitor.

- The monitor should be installed in the cab, clearly visible to the operator but not subject to intense heat or moisture.

- Keep the unit away from radios or other electronic equipment to minimize any risk of interference. As a precaution all connection cables should take an alternative route to other cables in the cab, especially antenna cables or clutch, solenoid and engine kill switch cables.

- Mount the unit firmly on the bracket using securing knobs supplied (AH-861). Don't use substitute bolts into the monitor.

- When installing the wiring loom ensure the green 12 way connector is inserted into the back of the monitor with the screws in the connector facing upwards.

**DO NOT force the connector. If it does not connect easily check that the connector is being inserted the correct way.**

- When running the tractor loom through the cab to the back of the monitor it may be easier if the green plug is removed so that the cable can be inserted through a smaller diameter hole in the cab wall etc.

**Take note of the wiring of the green plug before removal.**
**Refer to the back panel to make sure the cable colours correspond when rewiring the plug.**

- Use the cable ties supplied to secure the cable away from risk of damage.

## 2.2 Power Connection

Do not connect power until all other installation is complete.

Connect **power cable** from tractor loom **direct** to 12-volt DC vehicle battery terminals to ensure a clean uninterrupted source of power.

**DO NOT** connect power cable to alternative power source such as the starter solenoid as damage may result.

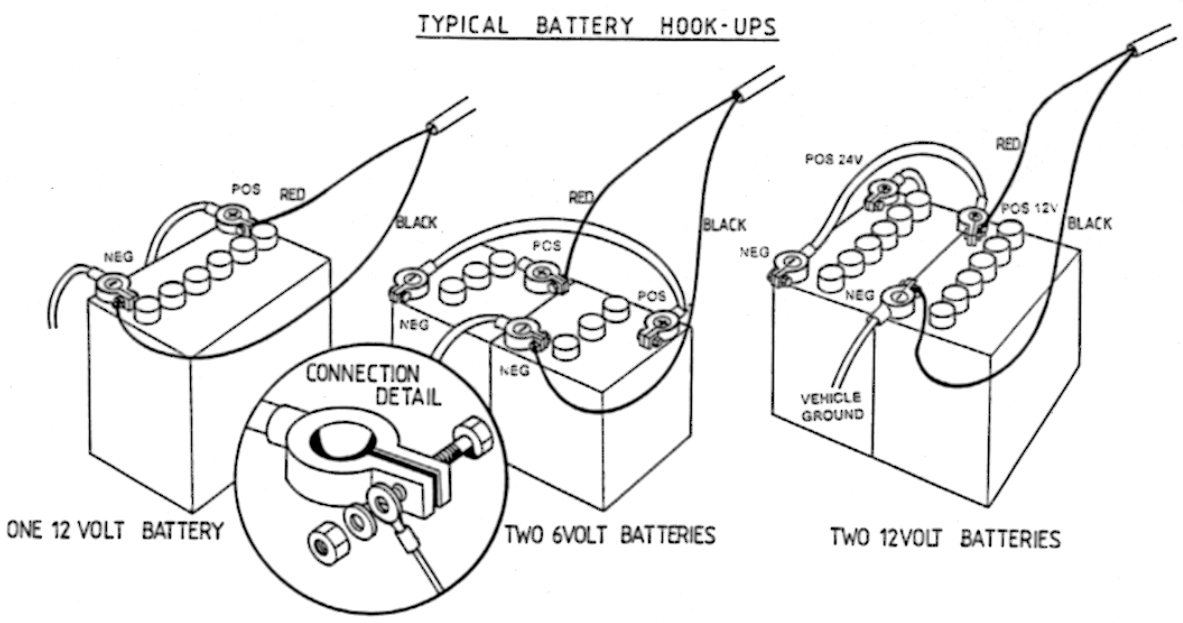
**DO NOT** connect other electrical equipment to the 22C2 monitor **power cable**.

Run the **power cable** away from radio antenna leads and mobile phones or wiring to solenoids or electric clutches.

Use cable ties supplied to secure power cable away from risk of damage.

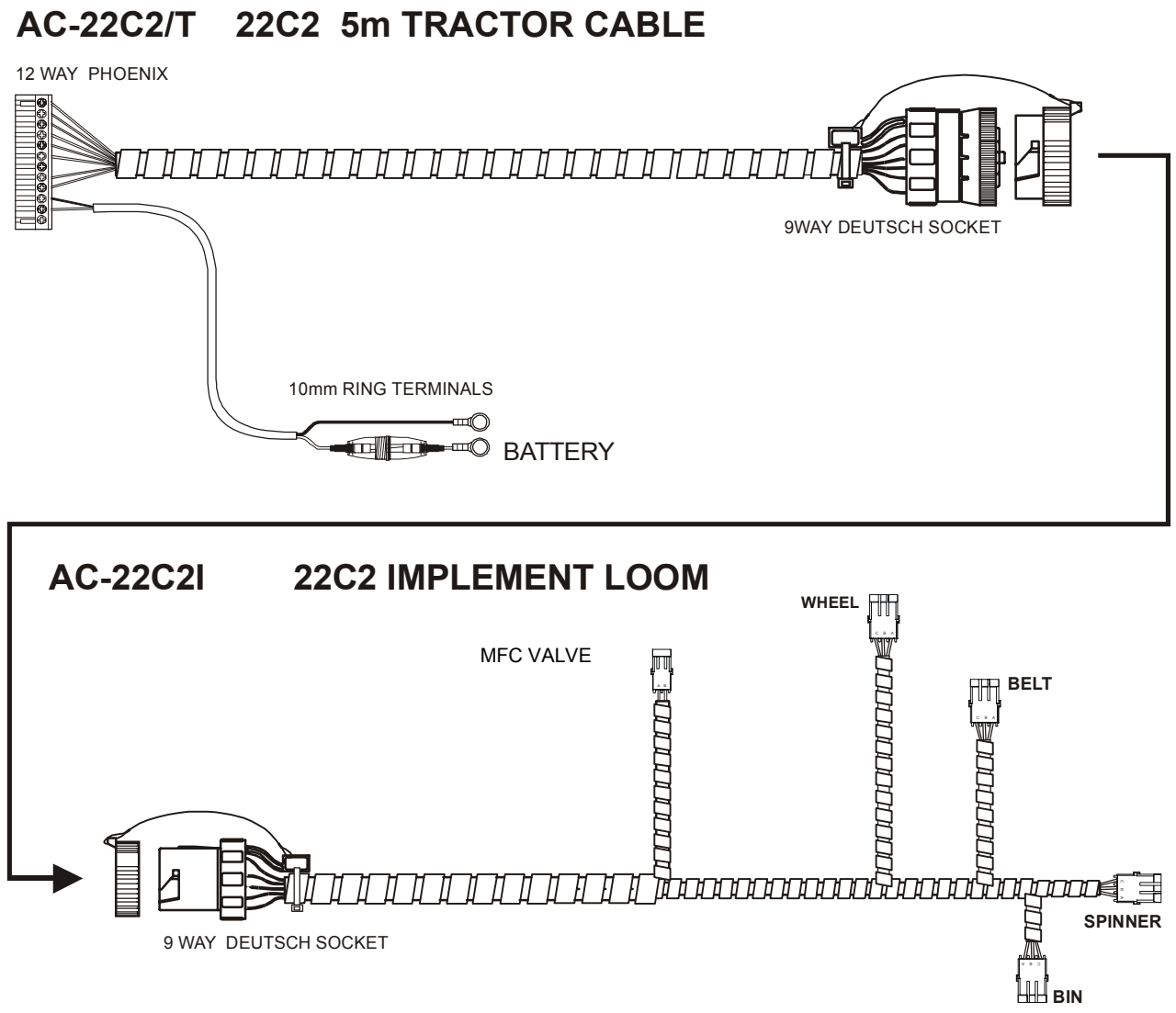
Connections to battery terminals must be clean and tight.

**WARNING -** Disconnect power cable when arc welding



## 2.3 Wiring Loom Installation

- Lay the loom out down the length of the machine and fasten with cable ties along the body of the spreader. The drawing below shows the best location for mounting the loom.
- Don't tighten the cable ties at this stage. This allows the loom to be adjusted so that the connectors align properly with the actuator and sensors.
- When the sensors have been installed and connected to the loom, align the loom so that there is the least amount of excess cable near the sensors. When correct, tighten the cable ties.




### Note

If a 2-way wheel, belt or spinner sensor are used then a 3 to 2 way adaptor must be used to connect the 2-way sensor to the 22C2 implement loom.

2-way sensors and the 3 to 2-way adaptor are optional and must be ordered separately.

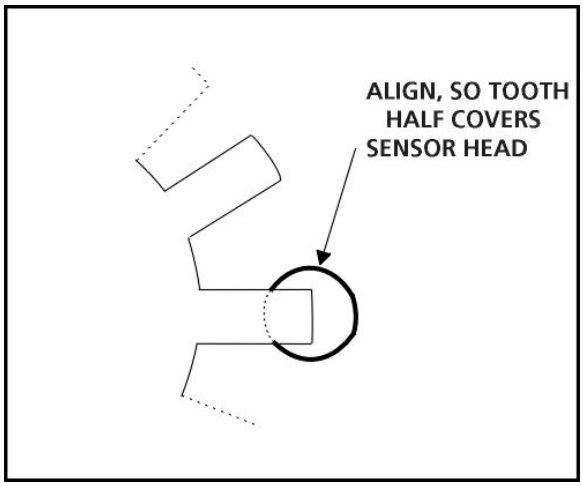
## 2.4 Wheel Sensor Installation

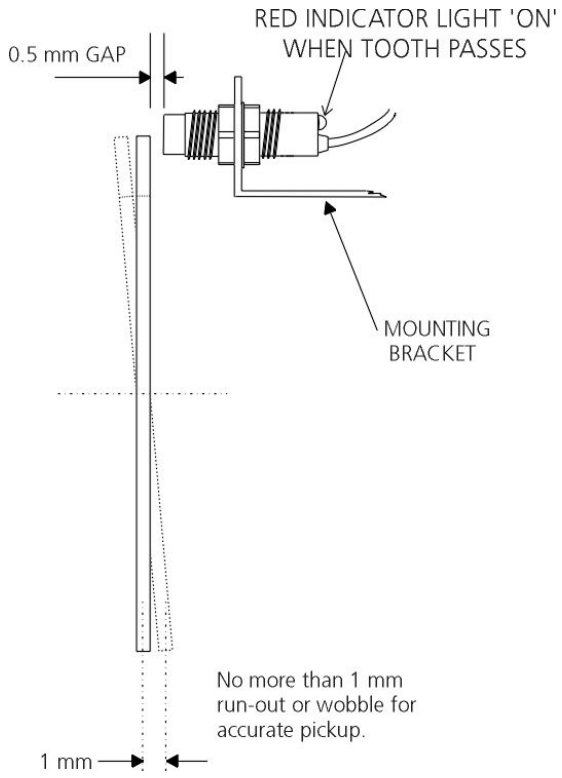
The wheel sensor is used by the controller to calculate the vehicle's ground speed so that the controller can keep the application rate the same at different speeds.

As supplied in the standard kit, the wheel sensor consists of a proximity switch. The proximity switch registers a signal when a piece of metal comes into close contact with the switch. The wheel sensor is installed on undriven ground wheel.

Mount the proximity switch close to a piece of metal that rotates in direct proportion with the wheel. Other wise a proximity target disc could be installed to trigger the proximity switch.

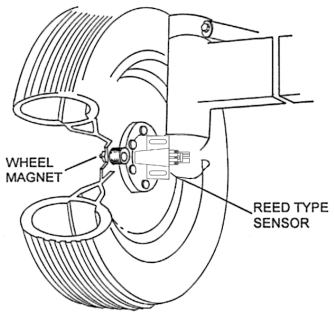
Mount the proximity switch using the bracket provided 0.5 mm (0.02") away from the tooth on the sprocket that comes closest to the proximity switch. Mount as shown in the diagrams below. The **maximum** gap is **2 mm** (**0.08"**).




## Alternatively

A reed switch and a magnet can be used as a wheel sensor instead of a proximity sensor. This sensor must be ordered separately. If using a reed switch and a wheel magnet mount the magnet and sensor as shown below. For best results the magnet and the reed switch must be 5 to 15mm apart.

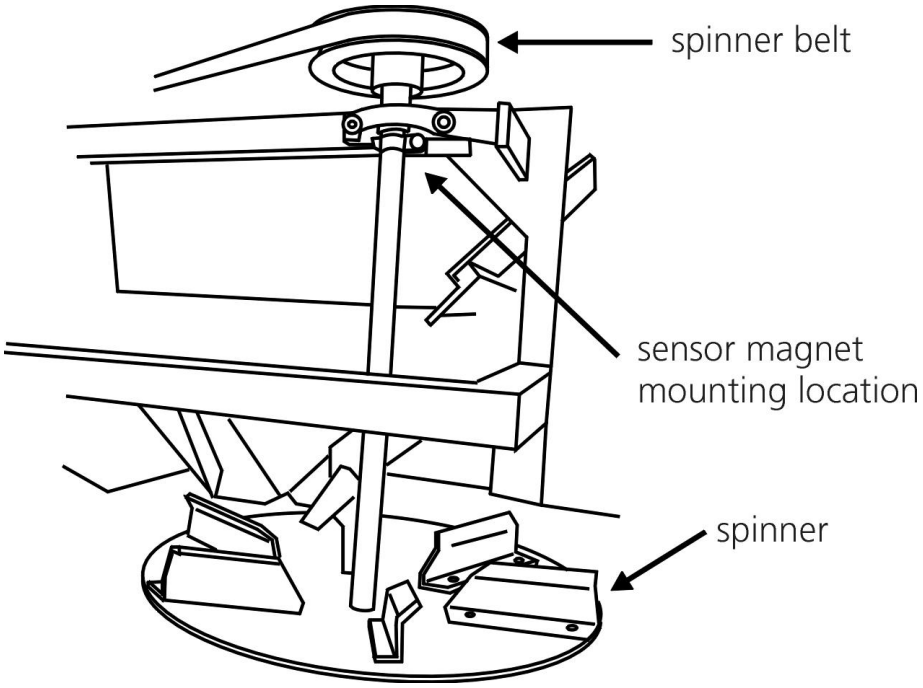


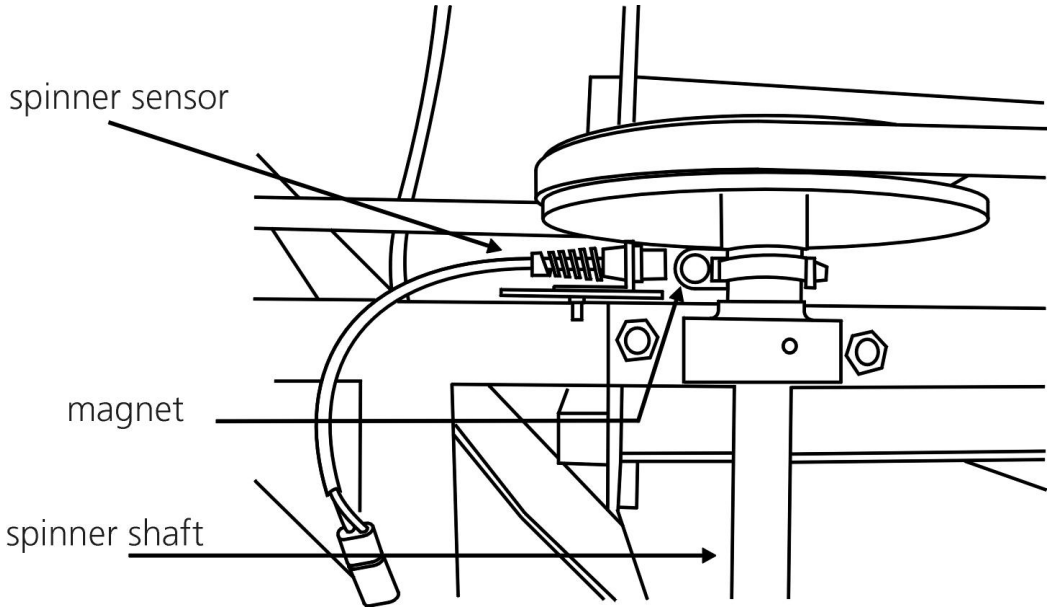
## 2.5 Spinner Sensor Installation

The spinner sensor supplied in the standard kit is a proximity sensor. The spinner sensor needs to be mounted on the spinner so that every time the spinner completes a rotation a piece of metal triggers the sensor. The sensor must be mounted 1 to 4 mm away from the piece of metal.

Mount the sensor using the bracket and the two slots in it. Alternatively, a target disc could be used to trigger the proximity switch. The target disc must be ordered separately, see the diagrams shown in section 2.4 to help install the target disc and proximity sensor.

A Reed switch and a shaft magnet can also be used as a spinner sensor. The Reed switch and clamp magnet are optional and must be ordered separately. See the diagrams below to mount the Reed switch and the shaft magnet.

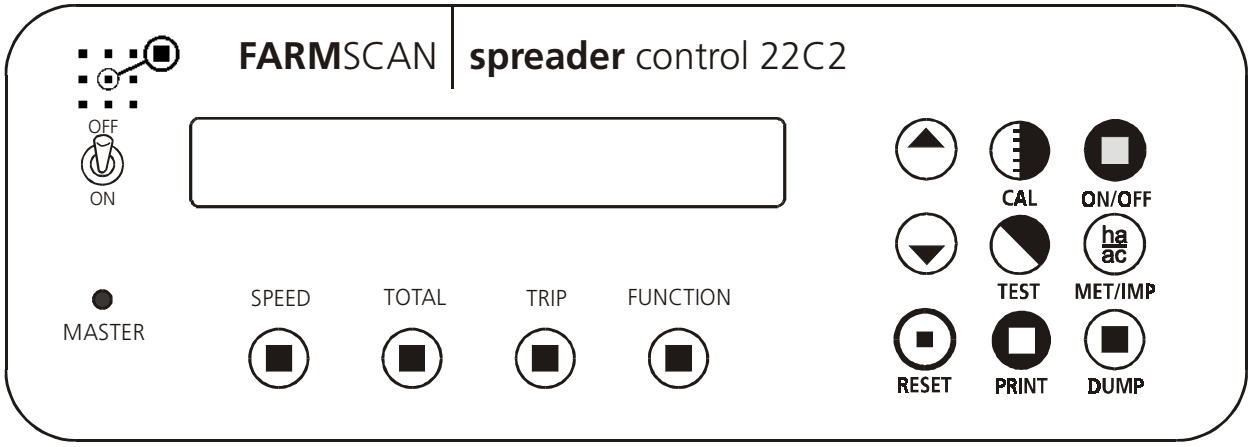


## 2.6 Belt Sensor Installation

The belt sensor consists of a proximity sensor. It is recommended that a target disc be installed on the belt to trigger the proximity sensor. The target disc must be installed on a part of the belt that turns in direct proportion with the belt. A good place to mount the disc is on the end of the belt shaft or on one of the wheels that drive the belt.

# 3.0 Operation




## 3.1 Power On/Off Key

To switch the monitor 'ON', press the  key



Whenever the monitor is switched 'ON' the display will run through a start up routine displaying version of software and the program the monitor is running.

e.g. M/HYD CONTROL

VERSION 1.02.0

The version number indicates which generation of functions and features are programmed into your unit.

If an upgraded program is installed, a new version number e.g. VERSION 2.10 will be displayed.

After momentarily displaying the current program and version number, the monitor will then display the speed and the target rate.

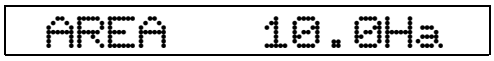
e.g. 0Kph ⊙ 50kg/Ha

If stationary the monitor will immediately go into 'hold' mode when first switched on, see section **3.12 Run/Hold Function** for an explanation of this alarm.

## 3.2 Imperial / Metric Key

Press the ha ac MET/IMP key to change any readout on display between metric and imperial.

e.g.





**NOTE:**

"IMP/MET" key is not active during calibration. All calibration factors must be entered in metric values.

## 3.3 Dump Key

Use the DUMP key to manually activate the belt to empty the bin whilst stationary. Belt speed can be increased or decreased from 0 (slowest) to 99 (fastest) using the ▲ or ▼ keys.

## 3.4 Cal Key

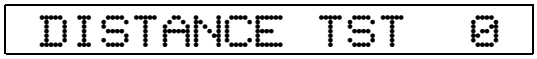
Pressing the ◑ key will step through a series of set up factors that need to be entered for the monitor to work correctly. The calibration section of this manual explains each of these set-up factors in greater detail.

## 3.5 Test Key

The "TEST" key provides a means of testing that the sensors and controlling electric motor are working correctly. The test function is also used in the calibration procedures.

Press the ◔ key and the "DISTANCE TEST" will appear.

e.g.



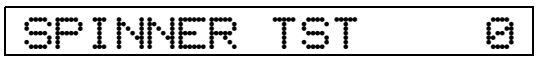

The distance test enables the operator to test the wheel sensor mounted on the wheel. Each time the magnet passes the sensor the monitor will beep and count the pulse.

To reset the pulse-count back to zero press the ■ RESET key.

## Test Key cont'd

Pressing the key again will display "SPINNER TST".

e.g.




The spinner test will beep and count up each time the magnet on the spinner shaft passes the coil sensor.

**NOTE:** The sensor will only activate when the magnet passes the sensor quickly. Turning the spinner by hand may not activate the test function.

To reset the spinner count press the RESET key

Pressing the key again will display "VALVE TST".

e.g.


The "VALVE TEST" figure indicates the number of pulses per second received from the belt sensor.

The pulses per second should increase or decrease as the controlling electric motor speeds up or slows the belt down using the or key.

The belt sensor is okay if the number changes continuously and smoothly from a low to a maximum belt speed.

Pressing the key again will display "BELT TST".

e.g.


The belt test will beep and count up each time a tooth of a cogwheel attached to the belt drive passes the proximity sensor (belt sensor). The "VALVE TST" and the "BELT TST" readings are related. The "VALVE TST" reading is the number of pulses from the "BELT TST" per second.

If the "BELT TST" count is steady and continuous then the belt sensor is okay.

## 3.6 Print Key

The 22C2 has a print facility that will print out trip area, weight and distance for each trip (1-10) or all trips. Use the optional 2040 Printer Kit connected to the adapter cable provided in the kit.

Press the PRINT key and the monitor will display the current trip to be printed.

e.g. PRINT TRIP 1 ?

To print another trip e.g. trip 2, press the trip key and use the ▲ or ▼ arrow keys to select the required trip then press "PRINT" again.

To print all the trip information, select Print then use the ▲ or ▼ arrow keys to change the display to "PRINT ALL TRIPS".

e.g. PRINT ALL TRIPS?

When the correct option is displayed press PRINT key again and the display will say "PRINTING" and the printer will begin to operate.

If there is no trip data the monitor will display "NO TRIP DATA" and printing will cease.

**NOTE:**

**Each trip data takes approx. 16 secs to finish printing. Printing 'ALL TRIPS' will take approx 3 mins.**

## 3.7 Reset Key

To reset total area & weight, distance, trip area & weight and timer, press the RESET key and follow the prompts on the screen. The RESET key can also be used to return the monitor to the base target rate quickly. See section **3.11 Rate Key** for further details.

## 3.8 Speed Key

Press the SPEED key to display the current working speed and the spinner rpm.

e.g. 15kph ⊙ 764RPM

An alarm can be set to notify the operator that the spinner RPM has dropped below a set point. The following display will appear accompanied by an audible beep to warn when the rpm has dropped below this point.

e.g. SPINNER SLOW

See section **4.5.4** **Spinner (RPM)** Alarm for the details on how to set the spinner alarm point.

## 3.9 Total Key

The "TOTAL" key is used to display total area covered, total weight applied and total distance travelled.

Area, weight and distance readings are only incremented when "UNIT OFF HOLD" & traveling with the jockey wheel engaged.

Press TOTAL key once to display total "AREA".

e.g. AREA 150.0Ha.

Press TOTAL key again to display total "WEIGHT".

e.g. WEIGHT 2.55t.

Press TOTAL key again to display total "DISTANCE".

e.g. DISTANCE 2.325km

**TO RESET TOTALS** press RESET key once to start reset process.

Total area, total weight and total distance are reset simultaneously; this can be done at the start of a spreading program to keep overall records.

e.g. RESET TOTAL ?

Press RESET again to complete reset process OR **to abort reset process**, press any other key.

After reset of "TOTALS" you will have the **option** to reset all trip memories at the same time

e.g. RESET ALL TRIPS?

Press RESET again to reset all trips OR **to abort reset of all trips,** press any other key.

## 3.10 Trip Key

The "TRIP" key allows the display of a sub total for area covered and weight applied. The trip function has 10 resetable memories to keep a tally of the areas and weights for 10 different plots or loads.

To display the current trip area press TRIP key once.

e.g. TRIP 1 12.5Ha

Press TRIP key again to display trip 1 weight

e.g. TRIP 1 0.85t

**TO RESET TRIP MEMORY** Press RESET key to start reset process

e.g. RESET TRIPS 1?

Press RESET key again to complete reset process OR **to abort reset process**, press any other key.

To change to another Trip memory, press the ▲ or ▼ arrow keys to change the current trip number on display.

e.g. TRIP 2 0.00t

**NOTE:**

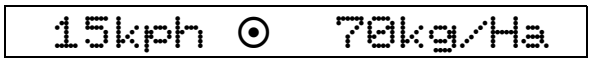
Previously engaged trips can be viewed or reactivated by using the 'up' and 'down' keys to display and hence activate any one of the 10 trip memories 1-10. Whichever trip number is displayed will be active when working.

## 3.11 Rate Key

The rate readout is the amount of material being spread per hectare or acre.

Press the RATE key to display the rate readout.

e.g.




The rate that is displayed is the target spreading rate. Based on **width** over which material is being spread and **speed**, the monitor will increase or decrease the belt speed via the controlling electric motor to attain the target rate. See section **4.4.1 Target Rate** for information on setting the target rate.

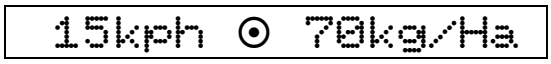
To increase or decrease the spreading rate while operating use the ▲ or ▼ keys. The amount of change in the rate from each press of the arrow keys can be set to any amount, e.g. 5, 10, 20% per step up or down from the standard target rate. This is referred to as the **STEP SET**.
See section **4.5.1 Step Set** for instructions on changing the step set.

When the rate has been changed an arrow will appear on the display. This arrow reminds the operator which way the rate has been adjusted from the target rate.

e.g.


To return back to the base target rate quickly, press the RESET key.

e.g.




If the monitor cannot achieve the desired rate, the monitor will display one of the following alarms.


e.g.

## 3.12 Run/Hold Function

The "RUN/HOLD" function is activated by the ground speed sensor switch on the front panel. Whenever the speed is zero (wheel is stationary), the monitor will go "ON HOLD" stopping the trip, total and distance functions from accumulating.

The "UNIT ON HOLD" message will re-appear every thirty seconds accompanied by an alarm to remind the operator the monitor is not accumulating.

e.g. UNIT ON HOLD

The monitor will go "OFF HOLD" and the trip and total functions will begin to accumulate as soon as speed is detected.

e.g. UNIT OFF HOLD

## 3.14 Bin Level Sensor (Optional)

The optional A-2220P bin/tank level sensor can be fitted to the bin to detect a low bin level and give a visual and audible warning to the operator.

e.g. BIN LOW

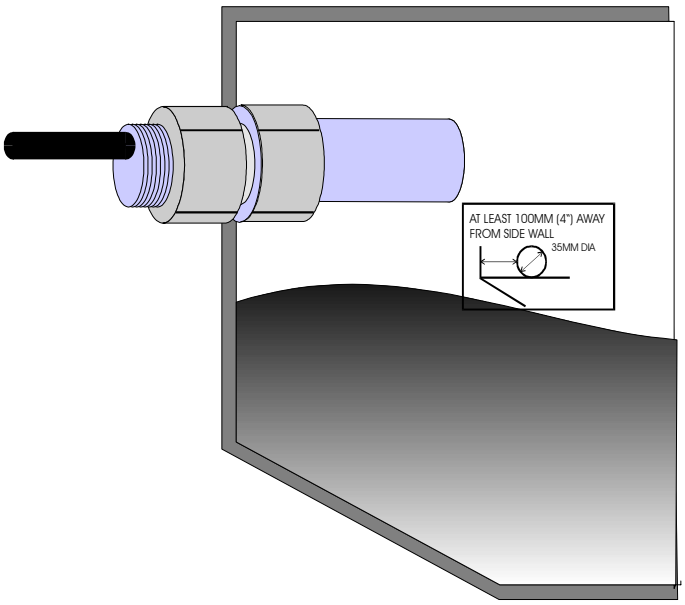
To cancel "BIN LOW" message on the screen:

- Press any other key.
- Re-fill bin
- Put "UNIT ON HOLD".
- Set "BIN SENSOR" calibration setting to '0FF'. See Section 4.5.5 Bin Sensor Alarm.

**NOTE:** "BIN LOW" message will re-appear if monitor goes "OFF HOLD" and bin is still empty.

**INSTALLATION**

Install the sensor through the bin wall by cutting a 35mm clearance hole at the bottom of the bin.
The sensor must be at least 100mm (4inches) away from any adjacent sidewall.
Some bins empty from one side first, so it pays to observe the unloading characteristics before making any holes.
When the sensor is plugged into the harness, the light at the rear (cable entry side) of the sensor glows brightly when the sensor is uncovered and dims when the sensor is covered.



# 4.0 Calibration

## 4.1 General Outline

The 22C2 contains 3 calibration menus:

1 Level 1 Calibration Menu.
Easily accessible.
Used to change settings that may vary frequently.

2 Level 2 Calibration Menu.
Accessible through a simple sequence of key presses.
Factors in this menu may not need to be altered frequently.

3 Level 3 Calibration Menu.
Accessible to the manufacturer only.

Variable factors need to be entered into the first two calibration menus before operation.

All calibration factors must be entered in **metric** units only. To adjust the factor displayed, use the

or arrow keys to change the displayed value.

Holding the or arrow keys will cause the numbers to change faster.

To save a calibration figure into memory, press the key after the required figure is set. The monitor will then proceed to the next calibration function in that menu.

To exit from the calibration routine, press any other operation key (e.g. "RATE") to return the monitor to normal operation.

## 4.2 Memory Backup

An inbuilt memory backup system will hold all calibrations and accumulated totals in memory whenever the power is switched off.

Memory will last for at least 3 months after disconnection from the 12 Volt DC power source.

## 4.3 Calibration Warning

A calibration checking system incorporated into the system will warn you if any calibration factors are lost from memory or change value without your knowledge.

If for any reason a calibration factor does change value, a continuous series of beeps **will** sound and the display will indicate which calibration factor has altered.

e.g. CHECK CALS!

In this case the operator must press the key to check and re-enter the correct factor. Save this factor by pressing "CAL" key again. Press any other key (e.g. "SPEED") to return to normal display.

## 4.4 Level 1 Calibration

Press the key at any time during operation to go into the level 1 calibration menu.

### 4.4.1 Target Rate

With target displayed, the or arrow keys can be used to set the base target spreading rate.

e.g. TARGET 100kg/Ha

Press the key to proceed to "WIDTH".

### 4.4.2 Width

The "WIDTH" is the effective width over which material is being spread. Use the or arrow keys to enter the width in metres.

e.g. WIDTH 10.00m

This is the end of level 1 calibration factors

## 4.5 Level 2 Calibration

Press and hold the key when in level 1 calibration menu, to proceed to setup level 2 calibration factors.

### 4.5.1 Step Set

The Step Set is the amount the target rate can be changed up or down when using the arrow keys to change the rate on the go. e.g. 5%, 10%, or 50% steps.

Use the arrow keys to set the steps as desired.

e.g. 


**NOTE:**

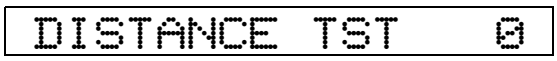
If operating under GPS rate map control, the step set may be used but your selection will be automatically overridden anytime the computer commands the rate to change.

Press the key again to proceed to the wheel factor.

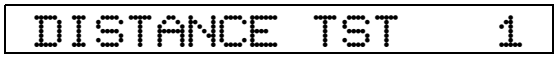
## 4.5.2 Wheel

The wheel factor is the distance covered per rotation of the wheel. Carry out the procedure below to establish this value.

Press the key until "DISTANCE TST" is displayed.

e.g. 


Crawl the spreader forward and stop when the "DISTANCE TST" beeps and counts up. (When the wheel magnet and sensor are aligned)

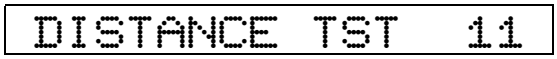
e.g. 


Peg the ground at the bottom centre of the spreader main ground wheel tyre.

Press the RESET key to reset the "DISTANCE TST" counter to 0.

Drive forward in a straight line until the monitor has counted to approximately 10, stopping exactly on a beep count.

(***If you go past a beep don't reverse; go forward to the next beep.)***

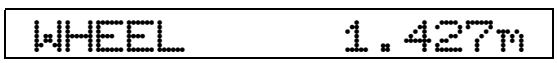
e.g. 


Measure the distance from the peg to the bottom centre of the same tyre.

Divide the distance travelled by the number displayed on the screen.

e.g. 15.7m ÷ 11 = 1.427 Wheel Factor

Press and hold the key to enter Level 2 calibration set-up. Press the key again to display "WHEEL" and use the or arrow keys to enter the wheel factor.

e.g. 


Press the key to set the slow hold speed.

## 4.5.3 Slow Hold Speed

Below a certain minimum speed, accurate control of the hydraulic motor controlling the belt speed, may not be achievable.
This is particularly true is the spreader is forced to travel too slow.
By setting a slow hold speed, the monitor will prevent the hydraulic motor from slowing down past this minimum speed.

If slow hold is set for 8 km/h, then below 8 km/h the belt speed is held constant.

e.g. 


**WARNING:** Operating below the slow hold speed will result in over application and activation of the 'RATE HIGH' alarm.

**TO DETERMINE SLOW HOLD SPEED**

1. Calibrate 22C2 as normal for the required rate.
2. Start spreading at normal speed then slow down until rate displayed on the monitor is erratic.
3. Take note of the ground speed readout and use this point for the slow hold speed.

Use the ▲ or ▼ arrow keys to enter the desired slow hold speed.

Press the ◐ key again to set the spinner RPM alarm point.

## 4.5.4 Spinner (RPM) Alarm

The spinner alarm is the slow rpm alarm point for the spinner. Whenever the spinner rpm drops below this value the monitor will beep and warn the operator that there is a problem with the spinner.

Use the ▲ or ▼ arrow keys to enter this value or set to zero for no alarm.

e.g. 


This is the end of level 2 calibration factors.

## 4.5.5 Bin Sensor Alarm

The **low bin alarm** may be switched 'ON' or 'OFF' when using the optional A-2220P Bin/Tank Level Sensor.

Set **bin sensor** to "ON" to enable audio and visual alarms.

Set **bin sensor** to "OFF" to disable audio and visual alarms.

Use the ▲ or ▼ arrow keys to enter the desired setting.

## 4.5.6 Pulse/kg Factor

In order for the 22C2 to work correctly over the full range of the gate setting, the pulses per kg (**P/kg**) factor needs to be set.

This factor can best be described as the number of belt sensor pulses required by the 22C2 to detect the flow of 1 kg of material.

This will only need to be performed **once** when the 22C2 is first installed, but must be repeated for each product before starting to spread in the field.

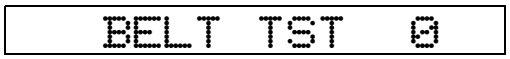
## Calibration Procedure

Follow the steps below to calculate the pulse/kg factor.

Press the key again to display "PULSE/KG".

Press the key to select the "BELT TST" test screen.

e.g.



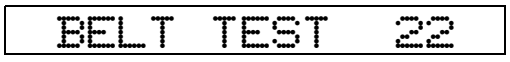

Load material onto the belt to be spread and find a way of catching material delivered off the belt. Make sure the belt is fully primed with material falling evenly off the entire width of the belt and the gate is open to a typical operation height.

**If this height changes during calibration the calibration procedure must be repeated. Once calibrated at this height keep this height during operation.**

Press the RESET key to zero the count of rotations.

Start operating the belt and prepare to catch material coming off the belt. Pulses from the belt sensor should be registered in the "BELT TEST" screen as a count up with a beep.

e.g.




Stop the belt record the count pulses and accurately weigh the material with digital scales.

**DO NOT RESET THE BELT TEST COUNTER**

To calculate the pulse/kg factor divide the number of pulses in the "BELT TEST" screen by the weight of material caught off the belt.

**Example:**

| | |
|---|---|
| belt sensor pulses: | 57 |
| weight or material caught: | 4.59 kg |
| pulse/kg factor: | = 57 ÷ 4.59 |
| | **= 12.41 pulses per kg.** |

## Calibration Procedure Continued…

Press "CAL" to return to the pulse/kg factor (if not step through "CAL" options again to display pulse/kg factor) to enter the calculated pulse/kg factor.

**This pulse/kg factor is accurate only for 50% more or 50% less than the required target rate.**

**A new pulse/kg factor must be obtained, even for the same product, if the new target rate is 50% above or 50% below the previous target rate.**

The above procedure will need to be carried out for each new product. Once the pulse/kg factor is established, it will be the same each time the same product is used unless material consistency differs greatly.

Record your pulse/kg factors for future reference.

| ***Product*** | ***Pulse/Kg*** |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

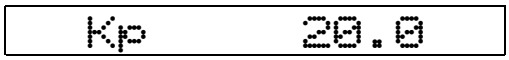
# 4.6 Level 3 Calibration

In this menu the settings which affect the way the motor is controlled can be altered. These settings are accessed by first pressing the "CAL" key to display "TARGET… " and then pressing and holding the "SPEED", "TEST" & "PRINT" keys simultaneously for 3 seconds.

To exit the menu press and hold the "CAL" key for 3 seconds.

## 4.6.1 Kp

"Kp" is displayed first, the default value is 20.0. Pressing the "RESET" key will bring the "Kp" value to its default.

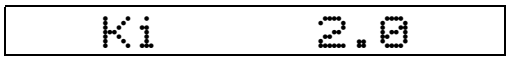



The "Kp" reading controls how fast the motor is driven to reach the target rate. If "Kp" is too large the motor can overshoot the target rate.

**Note:**
"Kp" shouldn't be set to zero as the 22C2 won't be able to control. The "Ki" and "Kd" settings can be set to zero but not the "Kp" setting.

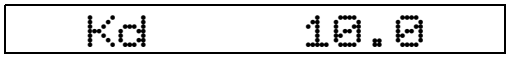
## 4.6.2 Ki

The "Ki" setting controls how close the motor will settle to the target rate. A large "Ki" will result in the motor settling very close to the target rate. However, if "Ki" is too large the motor will take a long time to settle to the target rate. Setting "Ki" to zero will mean the motor will settle at rate a little above the target rate.




## 4.6.3 Kd

The "Kd" setting controls the overshoot. A large derivative term will reduce the overshoot considerably. Setting "Kd" to zero will result in more oscillation and a longer time for the motor to settle at the target rate.




Refer to the table below as a guide to setting the values for the kp, ki and kd parameters.

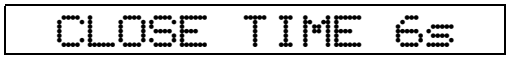
| | Rise Time | Overshoot | Settling Time | S-S Error |
|---|---|---|---|---|
| If Kp is Increased | Decreases | Increases | Small Change | Decreases |
| If Ki is Increased | Decreases | Increases | Increases | Eliminates |
| If Kd is Increased | Small Change | Decreases | Decreases | Small Change |

**Note:**
- **'rise time'** is the time taken to first reach the target rate.

- **'settling time'** is the time taken after some oscillation about the target rate to settle down to the target rate.
- **'s-s error'** (steady state error) is the error between the actual target rate and the rate the motor has settled down to. See the diagram below.

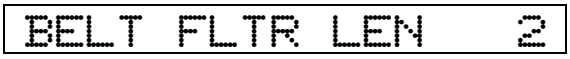
## 4.6.4 Close Time

The close time is the time taken to close the valve from the fully open position. Increasing the close time will decrease the motor's response time when changing application rates.




## 4.6.5 Belt Sensor Output Filtering

The degree of averaging of the belt sensor output signal can be set with this function. If the "BELT FLTR LEN…" is set to zero then no averaging is applied. If it is set to 2 then the output is averaged in pairs, if it is set to 6 then the output is averaged in groups of 6.




Entering a value smooths out the output signal allowing the 22C2 to control the motor more accurately.

## 4.6.6 Minimum PWM

This setting is the minimum speed that the motor can be driven at. The motor will not be driven at a speed below this setting. Setting this to zero will mean that the motor while being driven to a target rate can be stopped. The default rate is 350 and the maximum setting is 2000.


**Exiting the Menu**

Press and hold the "CAL" key for 3 seconds to exit this menu.

**Note:**

The 22C2 will issue an "OUT OF CONTROL" message if the belt speed is below 1.2Hz. This speed is too low for 22C2 control.

# 5.0 Parts List

| ITEM | PART No. | DESCRIPTION | QTY |
|---|---|---|---|
| 1 | A-22C2 | MONITOR | 1 |
| 2 | AH-406 | MOUNTING BRACKET | 1 |
| 3 | AH-861 | SECURING KNOBS | 2 |
| 4 | AH-408 | UNIVERSAL HARDWARE PACK | 1 |
| 5 | AC-22C2-T | 22C2 TRACTOR LOOM | 1 |
| 6 | AC-22C2-I | 22C2 IMPLEMENT LOOM | 1 |
| 7 | AA-2008P | PROX TYPE SENSOR | 3 |
| 8 | HG-706 | CABLE TIES | 20 |
| 9 | AH-398 | PROXIMITY SENSOR MOUNTING BRACKET | 3 |
| 10 | HW-M4SS | FLAT WASHER | 4 |
| 11 | AM-22C2 | 22C2 MANUAL | 1 |
| 12 | AC-079 | MOTOR TEST CABLE | 1 |
| 13 | AM-200 | 2 YEAR WARRANTY CARD | 1 |

## Optional Parts List

| Part No. | Description |
|---|---|
| AA-110P | REED SWITCH |
| AA-106 | HOSE CLAMP MAGNET |
| AA-133 | WHEEL MAGNET & NUT |
| AH-513 | TARGET DISC |

# 6.0 Troubleshooting Guide

| | PROBLEM | CAUSE | REMEDY |
|---|---|---|---|
| 1. | MONITOR DOES NOT TURN ON | Fuse Blown. | • Replace 20 Amp at rear of monitor. If there is no fuse then the monitor uses internal Poly-Fuses. These will cut out if the monitor is drawing too much current and will automatically restore power when the fault has been repaired. |
| | | Monitor not connected correctly. | • Connect **black** from loom directly to –ve side and **red** to +ve side of battery. Check there is 12V between pins 10 & 11 on the green plug at the back of the monitor. |
| | | Interference | • Make sure no other electrical device is connected to the monitor power cable. Do not share power with other devices such as foam markers, using 22C2 loom. |
| | | Poor battery connections. | • Ensure battery terminals are clean & tight. Check in-line fuse holder (if fitted) for blown fuse or corrosion. |
| 2. | MONITOR TURNS ON AND THEN TURNS OFF WHEN ACTUATOR MOVES. (Ensure Truck/Tractor engine is running) | Not enough power to the monitor. | • Run power cable directly to battery. Do not share power with other devices such as foam markers, using 22C2 loom |
| | | Poor battery connections | • Ensure battery terminals are clean & tight. Check in-line fuse holder (if fitted) for blown fuse or corrosion |
| 3. | LCD DISPLAY DROPS OUT OR GREY SQUARES APPEAR ON READOUT. | Not enough power to the monitor | • See TROUBLESHOOTING 2 above. |
| | | Monitor not connected directly to battery. | • Connect **black** from loom directly to –ve side and **red** to +ve side of battery. Do not share power with other devices such as foam markers, using 22C2 loom |
| | | Faulty battery. | • Replace battery. |
| | | Poor battery connections | • Ensure battery terminals are clean & tight. Check in-line fuse holder (if fitted) for blown fuse or corrosion. |
| 4. | MONITOR LOSING CALIBRATION VALUES. | Poor power connection or inadequate power source. | • Run power cable directly to battery. Do not share power with other devices such as foam markers, using 22C2 loom |
| | | Poor battery connections | • Ensure battery terminals are clean & tight. Check in-line fuse holder (if fitted) for blown fuse or corrosion |
| | | Interference | • Ensure 2-Way and other electrical equipment positioned 1m away from 22C2 monitor. |
| | | Wire ignition leads causing interference (Petrol trucks) | • Fit carbon leads to ignition system. |

| | PROBLEM | CAUSE | REMEDY |
|---|---|---|---|
| 5. | UNSTABLE OR NO SPINNER RPM. | Spinner magnet is missing or incorrect distance from sensor. | • Ensure gap between sensor and magnet is 10 – 15mm. Move sensor away from magnet until reading is stable. |
| | | Break in wiring loom. | • Press the "TEST" button until "SPINNER TST" is displayed. Disconnect spinner sensor from loom and short across loom pins. Monitor should beep and count each time the pins get shorted together if wiring OK.<br>• If monitor does not count pulses, check for breaks in the loom by shorting the green and black wires together in the 9-pin break away plug and at the back of the monitor.<br>• If no response directly at monitor, return monitor for repair. |
| | | Interference in loom.<br>(Usually accompanied by another action, such as machine moving or CB coming on). | • Ensure loom does not run close to other electrical cables. Ensure 2-Way and other electrical equipment positioned 1m away from 22C2 monitor |
| | | Faulty or incorrect sensor.<br>(Correct sensor has a **yellow** end cap) | • Unplug sensor and use a multimeter to check resistance of sensor pins is 50 – 70 Ohms.<br>• Replaced with Farmscan Part No. AA-112P if faulty. |
| 6. | UNSTABLE OR NO SPEED READOUT. (Can be checked by setting monitor to Distance and driving known distance) | Wheel magnet missing or incorrect distance from sensor. | • Ensure gap between sensor and magnet is 10 – 15mm. |
| | | **Distance calibration factor** incorrect or zero. | • See Section 4.9 DISTANCE in manual. |
| | | Break in wiring loom. | • Press the "TEST" button until "DISTANCE TST" is displayed. Disconnect wheel sensor from loom and short across pins of loom. Monitor will beep and count each time pins get shorted together if wiring and monitor OK.<br>• If monitor does not count pulses check for breaks in the loom by shorting the **white** and **black** wires together in the 9-pin break away plug and at the back of the monitor.<br>• If no response directly at the monitor, return monitor for repair. |
| | | Faulty or incorrect sensor.<br>(Correct sensor is **black**) | • Press the "TEST" button until "DISTANCE TST" is displayed and rotate the wheel. Monitor will beep and count each time wheel magnet passes sensor.<br>• If no response unplug the wheel sensor and short pins of loom plug.<br>• If monitor counts, replace sensor.<br>• To test the wheel sensor, measure the continuity (resistance) of the sensor with a multimeter. The multimeter should show a closed circuit (short) only when the magnet passes the sensor.<br>Replace with Farmscan Part No. AA-110P if faulty. |

| PROBLEM | | CAUSE | REMEDY |
|---|---|---|---|
| 7. | INCORRECT AREA. (Note: Does not record hectares when "Monitor On Hold".) | Inconsistent speed. | • Drive at consistent speed and check that readout is fairly stable. If speed readout unstable see TROUBLESHOOTING 6 above. |
| | | DISTANCE CALIBRATION FACTOR incorrect. | • See Section 4.9 DISTANCE in manual and ensure distance calibration factor measured correctly. |
| | | WIDTH CALIBRATION FACTOR incorrect. | • Is machine not overlapping or under lapping.<br>• Press "CAL" until "WIDTH" is displayed, using the ▲ ▼ keys enter realistic width. |
| | | Jockey wheel making insufficient contact. | • Check if jockey wheel is bouncing excessively. |
| 9. | TOO MUCH OR TOO LITTLE PRODUCT USED. | Incorrect DISTANCE CALIBRATION FACTOR. | • See TROUBLESHOOTING 6 above. |
| | | Incorrect AREA recorded. | • See TROUBLESHOOTING 7 above |
| | | Incorrect PULSE/KG CALIBRATION FACTOR | • See SECTION 4.5.5 PULSE/kg FACTOR in manual. |
| | | Gate operating at significantly different height to calibration height. | • Recalculate new PULSE/kg factor for new target. See SECTION 4.5.5 PULSE/kg FACTOR in manual. |
| 10. | MANUAL OPERATION | To bypass automatic rate application. | • Flick the switch on the 22C2 front panel and press the "DUMP" key. Change the rate using the ▲ ▼ keys. The front panel switch stops automatic control of the belt spreading rate. |

## 6.1 Summary of Alarms

| Alarm Type | Reference |
|---|---|
| BIN LOW | Section **3.14 Bin Level Sensor (Optional)** page 16 |
| RATE TOO HIGH | Section **3.11 Rate Key** page 15 |
| RATE TOO LOW | Section **3.11 Rate Key** page 15 |
| SPINNER SLOW | Section **3.8 Speed Key** page 12<br>Section **4.5.4 Spinner (RPM)** Alarm page 20 |
| UNIT ON HOLD | Section **3.12 Run/Hold Function** page 16 |
| UNIT OFF HOLD | Section **3.12 Run/Hold Function** page 16 |
| OUT OF CONTROL | Belt speed too low, cannot control below 1.2Hz |

# 7.0 Appendix

## 7.1 Motorised Flow Control Data

### MOTORIZED FLOW CONTROL

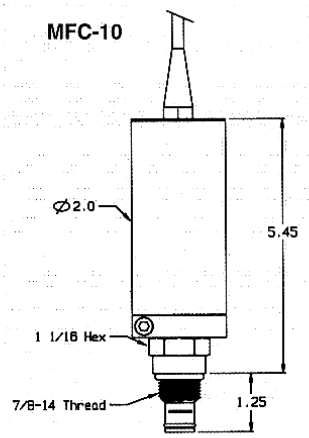
The Computronics Flow Control provides economical and simple electric remote control for flows up to 50 GPM. It uses a 12 volt DC motor to open or close a rotary spool valve. The flow rate is changed by providing a 12 volt signal to either increase or decrease valve opening. In its simplest form, the control element is a DPDT three position-momentary-contact toggle or rocker switch or two DP momentary-contact push buttons.

If a more sophisticated control is desired, the loop can be closed by using a control amplifier and relay circuit in conjunction with feedback from a flow or speed sensor.

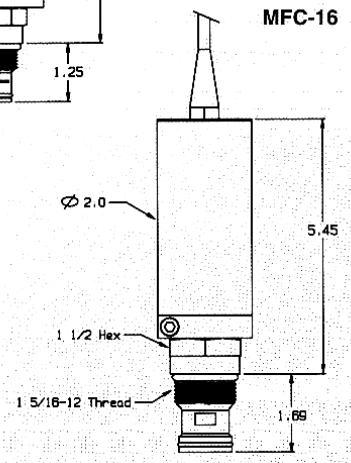
The valve requires no power to maintain its flow setting. A 12 volt DC signal is applied only while changing the flow rate and then shut off to hold flow rate at the desired setting. In the event of a power failure or system shut down, the valve will remain at its current flow setting until power is restored and a command signal is once again applied. Valve design allows for manual over-ride in case of electrical failure.

The valve is internally protected and will automatically shut down the internal drive when either the full open or full closed positions are reached.

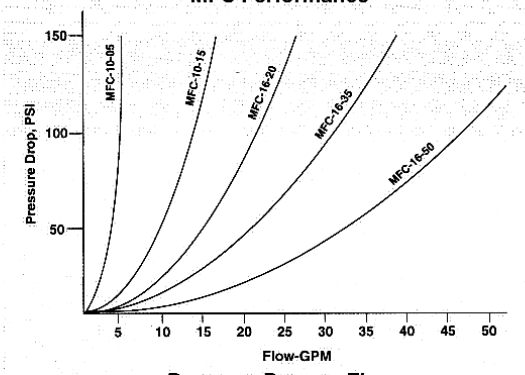
**MFC-10**




**MFC-16**




**MFC Performance**




**Pressure Drop vs Flow**
**Valve Fully Open**

#### FEATURES

- Internally protected
- Requires no power to maintain setting
- Safe
- Flexible
- Efficient
- Simple to use
- Economical

#### SPECIFICATIONS

**DESCRIPTION**

- MFC-10 and MFC-16 valves are cartridge design and fit generic 10-2 and 16-2 cavities respectively.

**OPERATING PRESSURE**

- 3000 psi (5000 psi with factory approval)

**FLOW RATING**

*(Based on 100 psi △P with valve fully open)*

- 0-5 GPM MFC-10-5-12V-**
- 0-15 GPM MFC-10-15-12V-**
- 0-20 GPM MFC-16-20-12V-**
- 0-35 GPM MFC-16-35-12V-**
- 0-50 GPM MFC-16-50-12V-**

**OPERATING SPEED**

*(Fully closed to fully open @ 12V DC)*

- 3.5 seconds (-03 option)
- 7 seconds (-07 option)
- 24 seconds (-24 option)
- 48 seconds (-48 option)

**VOLTAGE**

- 12V DC
- For 24V DC operation, add 100-ohm resistor in series with motor

**CURRENT DRAW**

- Less than 120 MA typical @ 12V DC

**CARTRIDGE WEIGHT**

- MFC-10: 1.3 lb.
- MFC-16: 1.6 lb.

**CONSTRUCTION**

- Nose, body and spool: steel
- Exposed parts plated
- Motor container assembly anodized aluminum

# MFC BODIES AND PACKAGES

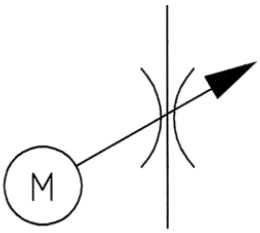
To facilitate and enhance applications of the Motorized Flow Control (MFC), Computronics offers several standard bodies and packages for use with the cartridge. These packages include additional functions such as:

- Pressure compensating elements for use in both restrictive and divider circuits
- Relief valves to provide either system or specific function protection
- Solenoid bypass functions for on/off control of specific functions

We make it easy to order. Call or fax us for your ordering package. It contains order forms and more information.

Source will also develop a custom package to fit your specific needs. For information on custom packages, please contact the factory or your local representative.

## CIRCUIT #1




**BODY NUMBER:**

- 10182 (MFC-10 size cartridge)
- 10183 (MFC-16 size cartridge)

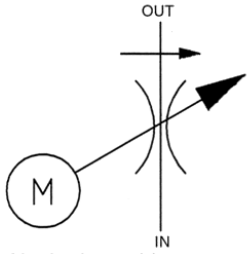
**FUNCTION:**

Two port body for MFC used as restrictor valve (not pressure compensated)

**APPLICATIONS:**

Typical applications are as remote control replacements for needle valves in any hydraulic circuit. The valve works well as the output control for a load sense pump, since it can handle flows up to 50 GPM without requiring a second, pilot-operated stage.

## CIRCUIT #2




**BODY NUMBER:**

- 25206-10 (MFC-10 size cartridge)
- 25206-16 (MFC-16 size cartridge)

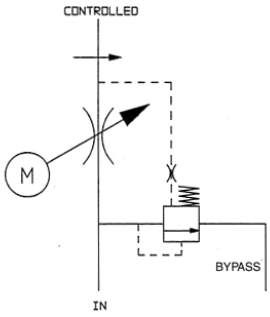
**FUNCTION:**

Two-port body for MFC with pressure compensating element.

**APPLICATIONS:**

Restrictive type flow control used with pressure compensated pumps and in circuits requiring constant flow under varying load conditions.

## CIRCUIT #3




**BODY NUMBER:**

- 25201-10 (MFC-10 size cartridge)
- 25201-16 (MFC-16 size cartridge)

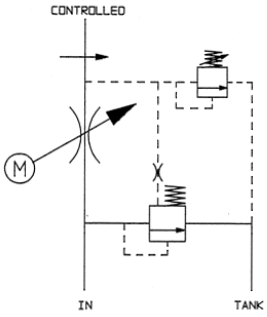
**FUNCTION:**

This package incorporates an MFC and a pressure compensating logic element in a body to provide a priority type adjustable flow divider with pressure compensated flow going to the controlled flow port and excess flow diverted to bypass.

**APPLICATIONS:**

Typically used with fixed displacement pumps to control the speed of a hydraulic motor or other function requiring less than full pump flow. These valves can be used in series with bypass and/or return flow from the first valve feeding the second to operate a second or third function. A typical application would be two valves in series to drive the conveyor and spinner on a spreader.

## CIRCUIT #4




**BODY NUMBER:**

- 25201-10-R (MFC-10 size cartridge)
- 25201-16-R (MFC-16 size cartridge)

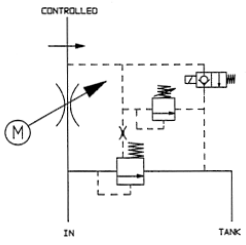
**FUNCTION:**

This package offers all the features of 25201-** and adds a pilot relief for the pressure compensating logic element. This feature provides relief protection for the system whenever the function fed by the controlled flow from the valve is in operation. When the MFC is fully closed, all pump flow is diverted to bypass at the pressure required to open the compensating logic element. Bypass flow must be diverted directly to tank when using this option.

**APPLICATIONS:**

Typically used to control a singe motor or other function in conjunction with a fixed displacement pump. In a single conveyor drive, for example, it eliminates the need for any other control components since the package provides on/off, speed control, and pressure control.

## CIRCUIT #5




**BODY NUMBER:**

- 25201-10-R**-S (MFC-10 size cartridge)
- 25201-16-R**-S (MFC-16 size cartridge)

**FUNCTION:**

This package incorporates all the features of the 25201-R package along with a solenoid dump valve. When opened, the dump valve vents the spring cavity of the pressure compensating logic element, bypassing all oil to tank. In this way, the function operated by the controlled flow from the valve can be turned on and off rapidly without changing the speed setting. As with the 25201-R, flow from the bypass must be diverted directly to tank.

**APPLICATIONS:**

This valve is used to control a single motor function which must be turned on and off frequently without resetting the speed setting.

***Call or fax us for your customized ordering package.***

**Telephone: (08) 9470-1177; Fax:(08) 9470-2844**

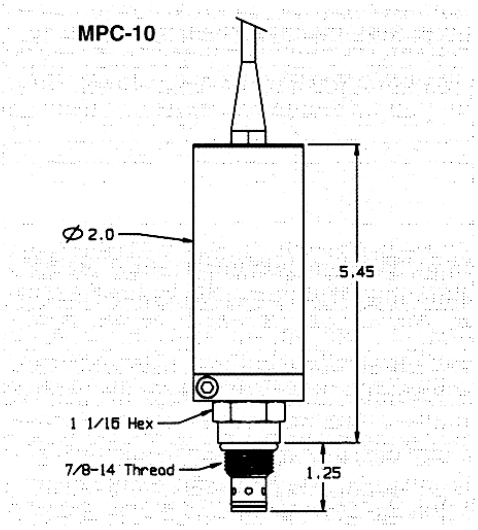
Computronics

## MOTORIZED PRESSURE CONTROL

The Motorized Pressure Control (MPC) uses the same DC drive system as the MFC to operate a direct acting pilot valve. This system offers a simple, low-cost method of achieving electric remote control of system pressure in all types of hydraulic systems.

Computronics offers two versions of the valve. Both fit a generic 10-2 cavity.

- The pilot operated version incorporates a pilot relief and second stage to control pressures from 150-3000 psi (1-200 Bars) at flows up to 15 GPM.
- The direct acting pilot version controls pressures from 500-5000 psi (35-350 Bars) at flows of less than 1.5 GPM. This valve is typicallly used as a remote pilot for large relief valves, or pressure limiters on pumps.




## SPECIFICATIONS

### DESCRIPTION:

- The MPC-10 motorized relief valves are cartridge valves and fit a generic 10-2 cavity

### OPERATING PRESSURE

- 0-1500 psi MPC-10-15-12V-**
- 400-3000 psi MPC-10-30-12V-**
- 500-5000 psi MPC-10-50-12V-**

### FLOW RATING

- 15 GPM MPC 10-15 & MPC-10-30
- 1.5 GPM MPC 10-50

### OPERATING SPEED

- 3.5 seconds (-03 option)
- 7 seconds (-07 option)
- 24 seconds (-24 option)
- 48 seconds (-48 option)

### VOLTAGE

- 12V DC
- For 24V DC operation, add 100-ohm resistor in series with motor

### CURRENT DRAW

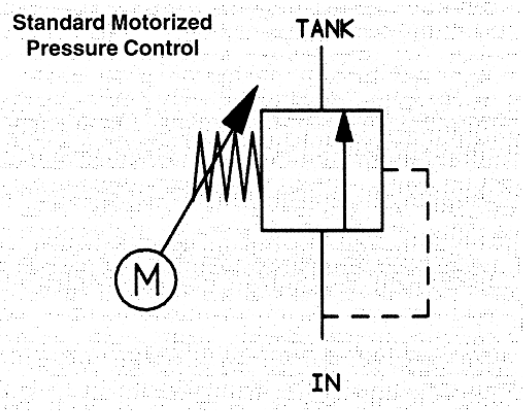
- Less than 120 MA typical @ 12V DC

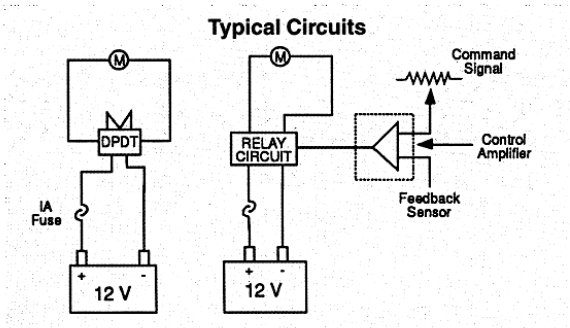
### CARTRIDGE WEIGHT

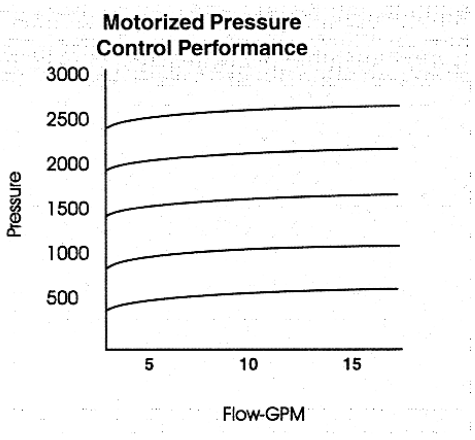
- 1.5 lb.

### CONSTRUCTION

- Nose and body are plated steel
- Motor cannister is anodized aluminum

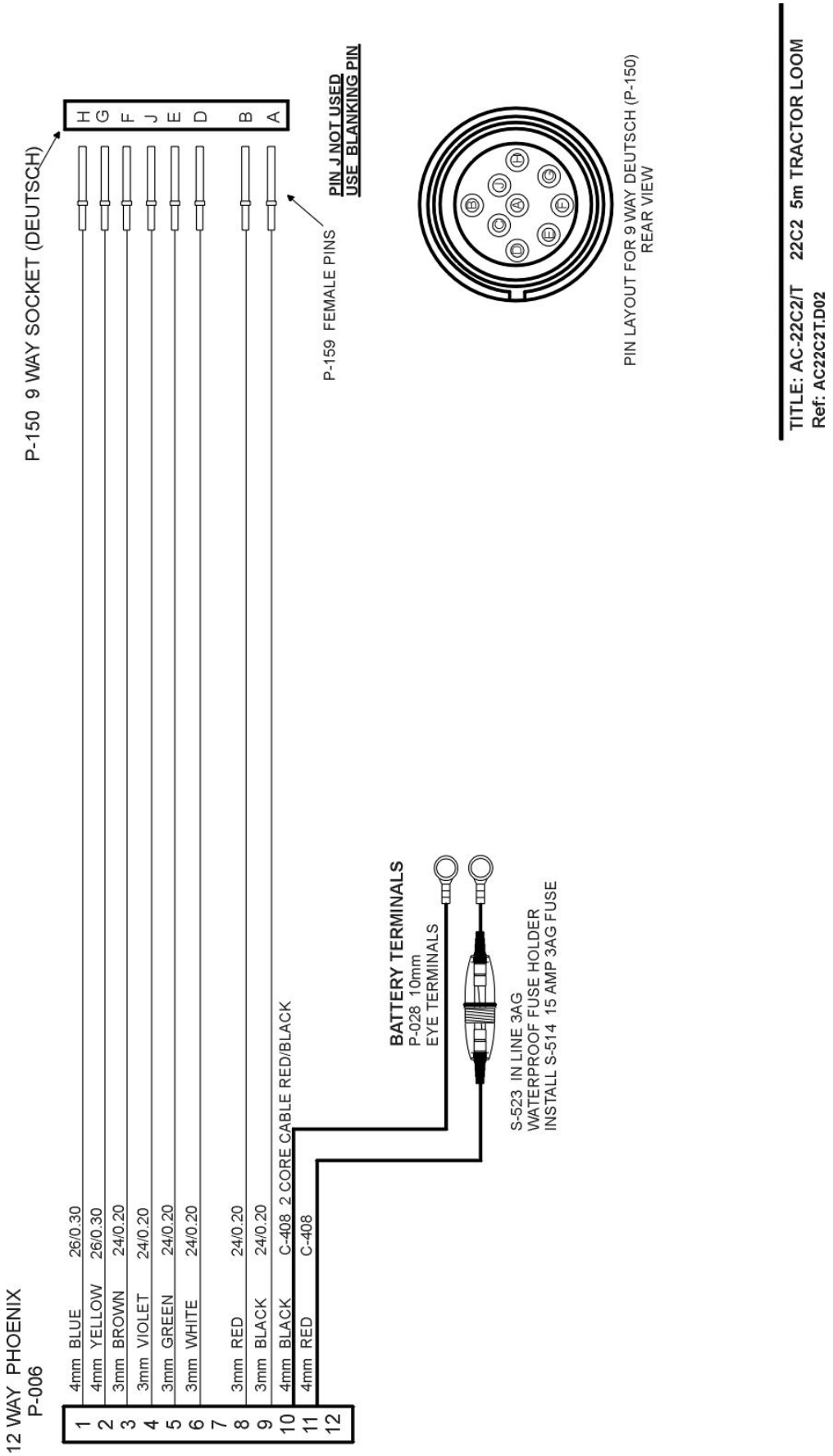


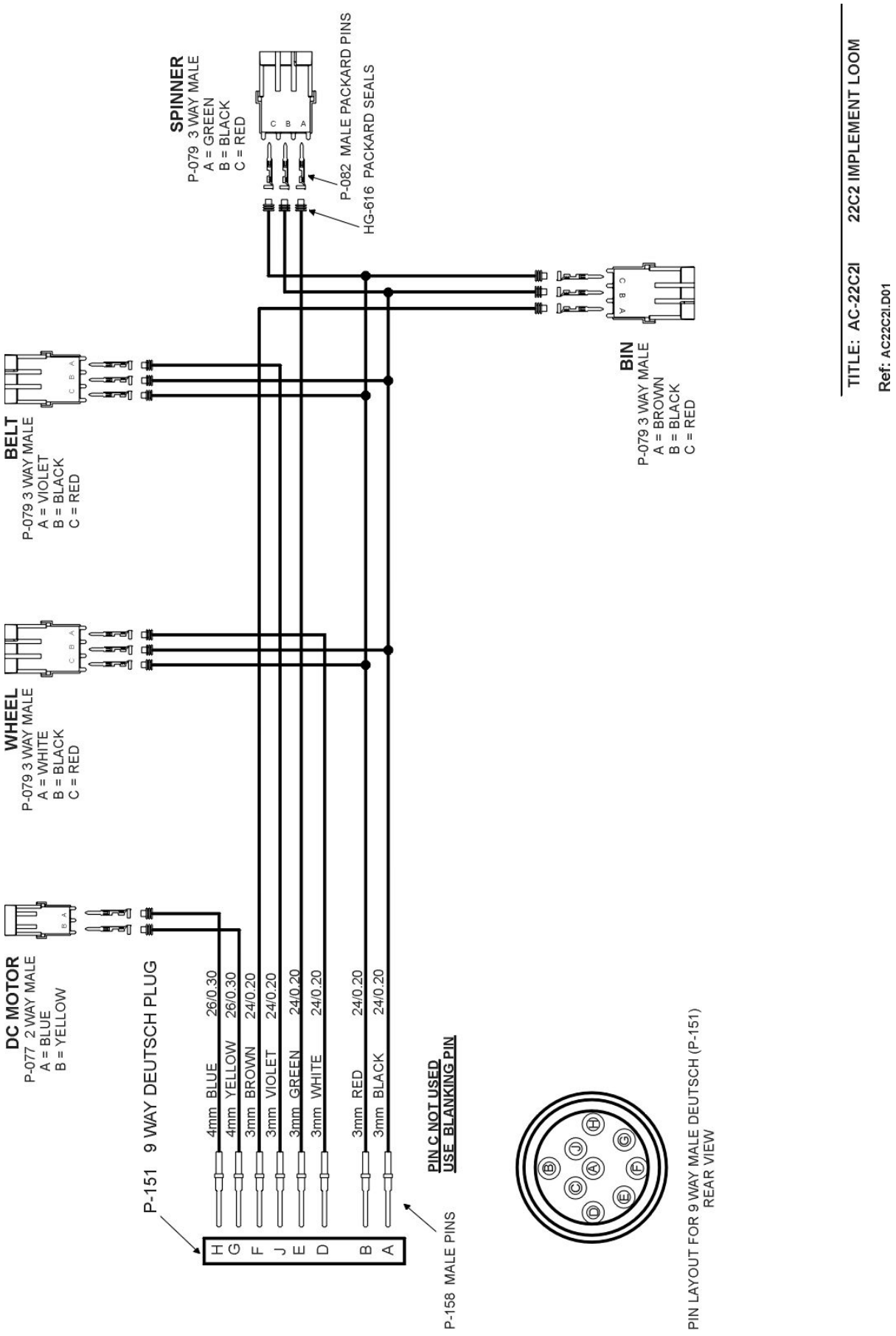




SFP997

# 7.2 Loom Diagrams




SPINNER
P-079 3 WAY MALE
A = GREEN
B = BLACK
C = RED
P-082 MALE PACKARD PINS
HG-616 PACKARD SEALS
BELT
P-079 3 WAY MALE
A = VIOLET
B = BLACK
C = RED
BIN
P-079 3 WAY MALE
A = BROWN
B = BLACK
C = RED
WHEEL
P-079 3 WAY MALE
A = WHITE
B = BLACK
C = RED
DC MOTOR
P-077 2 WAY MALE
A = BLUE
B = YELLOW
P-151 9 WAY DEUTSCH PLUG
4mm BLUE 26/0.30
4mm YELLOW 26/0.30
3mm BROWN 24/0.20
3mm VIOLET 24/0.20
3mm GREEN 24/0.20
3mm WHITE 24/0.20
3mm RED 24/0.20
3mm BLACK 24/0.20
H G F J E D B A
PIN C NOT USED
USE BLANKING PIN
P-158 MALE PINS
PIN LAYOUT FOR 9 WAY MALE DEUTSCH (P-151)
REAR VIEW
TITLE: AC-22C2I 22C2 IMPLEMENT LOOM
Ref: AC22C2I.D01