Engineering Corp.
Gordon

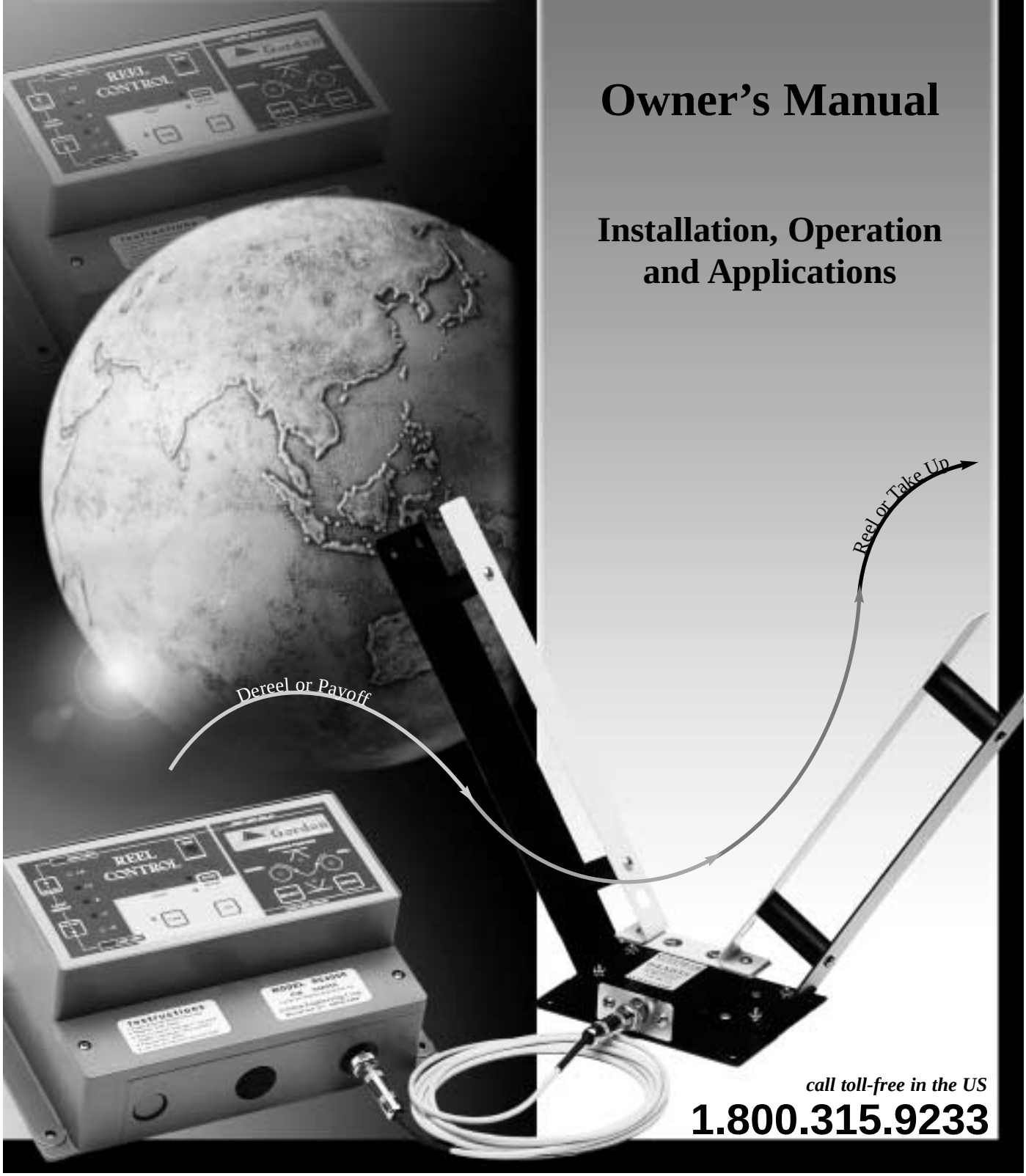
http://www.gordoneng.com

RC4000
Series Reel Control Systems

revision date 05/17/01

Owner's Manual

Installation, Operation and Applications



call toll-free in the US

1.800.315.9233

RC4000 Series Warranty

Five Year Warranty

This product will be repaired or replaced, for five years from the date of purchase, if it fails to perform to published specifications.

The product must be used in accordance with the specified manufacturer's ratings and must not be physically abused.

All questions related to this warranty should be directed to the Sales Dept. of Gordon Engineering Corp. See the contact information below for address, phone, fax and email.

Contact Information

Distributor Sales/Support

Your Distributor's Phone _____

Your Distributor's Fax _____

Your Distributor's email _____

Factory Sales/Support

Phone 1.203.775.4501

Fax 1.203.775.1162

email **sales@gordoneng.com**

Factory Mailing Address

Gordon Engineering Corp.
67 Del Mar Drive
Brookfield, CT 06804
USA

Product Information

RC4000 Series Reel Control

Part Number _____

Serial Number _____

Date of Purchase _____

Notes

Contents

RC4000 Series Overview

Shown with 04A049 Cable
and 04D067 Antenna

Operational Overview

The system is comprised of a control unit, connecting cable and an antenna assembly. The RC4000 is designed to interface with third-party motor controllers, while the RC4000M has a self-contained motor controller.

The control unit determines the load and status of the antenna assembly and establishes a tuned, RF sensing field around the antenna elements (yellow, inner pieces). This field is shaped, through the use of grounded shield elements (black, outer pieces), and is essentially contained within the "V".

Once the system is properly installed and configured for your application, the operator simply presses the TUNE button. The tuning process takes only a few seconds. Then, the operator positions the payoff or take-up loop within the "V", either manually or with the use of the JOG button, so that one of the green Loop Height indicators is lit. Once these conditions are met, he/she presses the AUTO/STANDBY button and the system is functional.

After your operation is running, you may find that you want to adjust the loop height, relative to the antenna. This is as easy as pressing the ADJUST Up or Down buttons located next to the bargraph indicators. This is done dynamically, with the motor running.

A pair of selectable relays for HIGH and LOW LIMIT are included in the control unit. These act in a similar manner to stand alone models of limit switches, with the exception that there is no contact with the material required by our limit relays. The result is non-contact protection against tight or slack loop conditions, when the relay contacts and the unit interlocks are properly wired to your control system.

Please direct any questions you have to our Sales Department.

toll-free in US **1.800.315.9233**

or

sales@gordoneng.com

Features	Benefits
■ **RF Sensing Technology** Non-contact, stress-free control of conductive materials.	■ **Control fine wire, delicate stamped parts and plated metals, without marring or damage.**
■ **Full Line of Modular Antennas** Match your material to our list - it tells you the proper antenna to choose for your application.	■ **Quick and easy setup and material changes minimize downtime and maximize profits.**
■ **Two-Button Tune and Run** Connect your antenna, press TUNE. Position your loop so that one green bargraph light is lit. Press the AUTO / SETUP keypad. You're running.	■ **The intuitive operator interface requires very little training, which saves you time and money.**
■ **Motor-On, Realtime Loop Height Adjustment** Allows on-the-fly adjustment of loop height.	■ **No need to stop the motor for adjustments to the loop height; therefore, no lost production.**
■ **Integrated High/Low Limit Relays** Ensure against tight or slack loop conditions.	■ **Prevents costly damage to machines, materials and dies. Eliminates the need for external limit switches.**
■ **Variety of Motor Drive Capabilities** RC4000 interfaces with various third-party motor drives. RC4000M has an integrated motor drive.	■ **RC4000 - access to sophisticated motor drive options, through use of third-party motor controllers. RC4000M - delivers economical, basic motor control, in a single enclosure.**

RC4000 Specifications

Input Voltage	*115/230 VAC; 50/60 Hz*
Power Consumption	*3 W*
Motor Drive	*provides an isolated, analog input drive to AC or DC motor controllers or hysteresis clutch controllers*
DC Output Range	*0 to +10 VDC maximum* *0 to +5 VDC minimum* *isolated*
Isolation	*1000 volts RMS*
Enclosure	*NEMA 12, industrial plastic* *10.2" L x 6.1"W x 4.0"D* *(259 mm x 154 mm x 102 mm)*
Mounting	*vertical or horizontal - to any bulkhead, chassis or panel*
Shipping Weight	*5.5 lbs. (2.5 Kg)*
Environment	*unaffected by dirt, grease, vibration, etc.* ***temperature:*** *0°F - 130°F* ***humidity:*** *0 - 95% R.H*

Keypad Controls

SELECT (in setup mode)
push to select reel or dereel mode, antenna position, and high and low limit relay activation.

ENTER (in setup mode)
push to lock in SELECT settings

TUNE (in setup mode)
push to tune system

JOG (in setup mode)
push and release to nudge motor
push and hold to run motor

AUTO/SETUP
push to toggle between setup and auto modes

ADJUST Up/Down (in auto mode)
allow motor-on, realtime loop height adjustment

Indicators

Bargraph: *displays loop height relative to antenna*

Limit lights: *lit when loop height exceeds control range*

Run light: *on when motor function is active -* AUTO *or JOG*

Tune light: *flashes when tuning is required*

on while unit is tuning

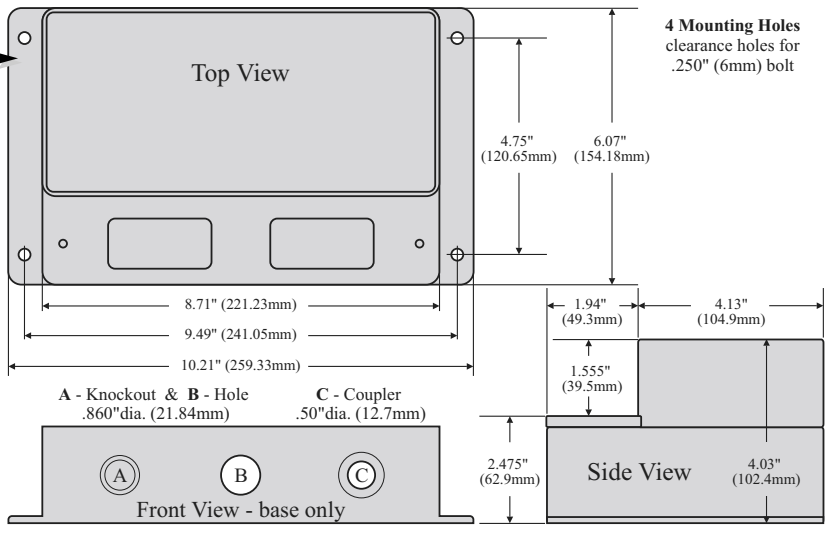
flashes with fault light on to indicate antenna fault

Fault light: *indicates a loss of antenna signal or internal fault*

Selection indicators: *for reel/dereel, antenna position, and high and low limit relay activation, the indicators flash to show they are available for selection. Use the* SELECT *key to step through the choices. Use the* ENTER *key to set each choice. Indicators stay lit to show how the unit is configured.*

RC4000 Dimensions

This is a dimensional drawing of the RC4000 enclosure.
All dimensions are in inches (with metric equivalents in parentheses).
For mounting instructions and specifics on shock mounts, please see the Installation section of the RC4000 User's Manual.



RC4000M Specifications

Input Voltage	*115/230 VAC; 50/60 Hz*
Power Consumption	*1200VA*
Motors	**directly drives** *DC shunt wound or permanent magnet motors up to 1/2 HP 90 volt armature or 1 HP 180 volt armature*
Interlocks	***auto:*** *allows on/off control of the reel motor by processing equipment - JOG active* ***shutoff:*** *allows on/off control of the reel motor by processing equipment - JOG inactive*
Enclosure	*NEMA 12, industrial plastic 10.2" L x 7.8"W x 4.0"D (259 mm x 199 mm x 102 mm)*
Mounting	*vertical or horizontal - to any bulkhead, chassis or panel*
Shipping Weight	*6.0 lbs. (2.7 Kg)*
Environment	*unaffected by dirt, grease, vibration, etc.* ***temperature:*** *0°F - 130°F* ***humidity:*** *0 - 95% R.H*

Keypad Controls

SELECT (in setup mode)
push to select reel or dereel mode, antenna position, and high and low limit relay activation.

ENTER (in setup mode)
push to lock in SELECT settings

TUNE (in setup mode)
push to tune system

JOG (in setup mode)
push and release to nudge motor
push and hold to run motor

AUTO/SETUP
push to toggle between setup and auto modes

ADJUST Up/Down (in auto mode)
allow motor-on, realtime loop height adjustment

Indicators

Bargraph: *displays loop height relative to antenna*

Limit lights: *lit when loop height exceeds control range*

Run light: *on when motor function is active -* AUTO *or JOG*

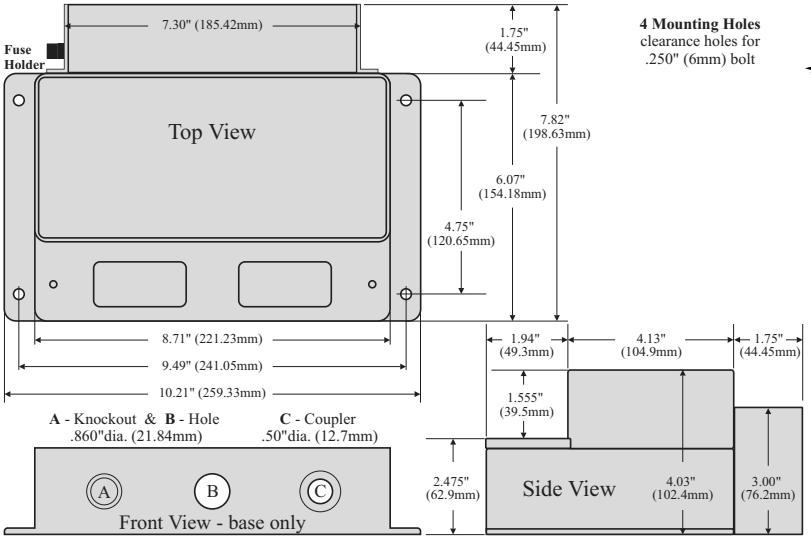
Tune light: *flashes when tuning is required*

on while unit is tuning

flashes with fault light on to indicate antenna fault

Fault light: *indicates a loss of antenna or internal fault*

Selection indicators: *for reel/dereel, antenna position, and high and low limit relay activation, the indicators flash to show they are available for selection. Use the* SELECT *key to step through the choices. Use the* ENTER *key to set each choice. Indicators stay lit to show how the unit is configured.*



RC4000M Dimensions

This is a dimensional drawing of the RC4000M enclosure.
All dimensions are in inches (with metric equivalents in parentheses).
For mounting instructions and specifics on shock mounts, please see the Installation section of the RC4000 User's Manual.

RC4000 Series Antenna Selection and Specifications

Antenna Selection

Providing the proper antenna for your application is a crucial part of making the RC4000 Reel Control system perform to its best abilities. Fortunately, this process has been made easy - due in large part to the introduction of our line of modular antennas.

These modular antennas come with an integrated coupler, and are designed to be quickly and easily swapped, by unplugging the locking cable connector. This allows for rapid replacement, if an antenna is physically damaged, and for quick and easy setups, in applications where a variety of material sizes are processed by the same equipment. Process down time is kept to a minimum, allowing you to maximize productivity.

Once you've determined the size of the material you wish to control, just look at the chart on the next page to select the proper antenna for your application. Under the heading, Use to Control, find the size range of the material you need to control. There are two sizes of "V" antennas for each material size, one 12" in length and one 18" in length.

For applications where the process speed is slow or where the motor and gear ratio are well matched to the process, a 12" antenna will provide all the control you need, with the added bonus of being very compact. Where the process runs at fast speeds or where dynamic mismatches exist in the application, you will want to choose an 18" antenna. This provides more control range and enhances the ability of the RC4000 to compensate for any mismatches in the application.

In applications where wide strips (6" or more in width) are to be reeled, it is possible to use a flat-plate antenna. These types of antennas should be positioned directly above or below the lowest point of the material loop, with the long dimension of the antenna perpendicular to the direction of travel.

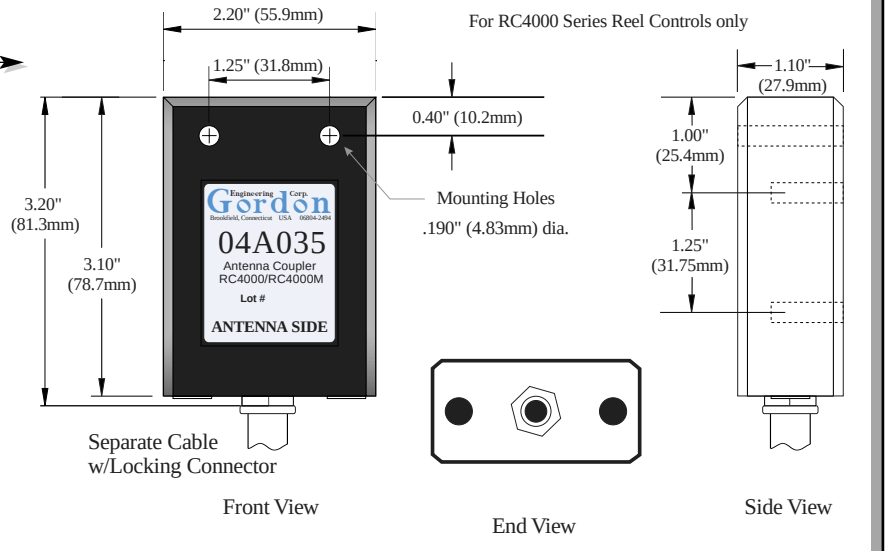
04A049 Cable

8' (2.44m) Standard length
other lengths quoted on request

sold separately

Coupler Dimensions

This is a dimensional drawing of the 04A035 Coupler.
All dimensions are in inches (with metric equivalents in parentheses).
These couplers come mounted to an antenna, but are available for sale separately. Cables are sold separately - 8' (2.44m) is standard, with other lengths available on request.

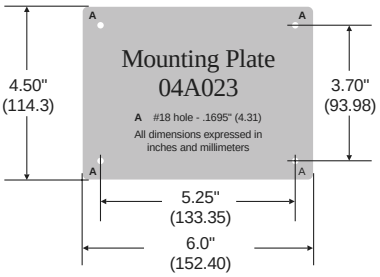


RC4000 Series Antenna Selection and Specifications

Type	Length of "V"	Flat	Width	Use to Control	Part Number
V	12" (30.5mm)	0" (0mm)	2" (5.1mm)	fine wire - .5" wire or strip	04A073
V	18" (45.7mm)	0" (0mm)	2" (5.1mm)	fine wire - .5" wire or strip	04A074
V	12" (30.5mm)	0" (0mm)	1" (2.54mm)	.125"- 1" wire or strip	04A091
V	18" (45.7mm)	0" (0mm)	1" (2.54mm)	.125"- 1" wire or strip	04A092
V	12" (30.5mm)	2" (5.1mm)	1" (2.54mm)	1"- 3" strip	04A067
V	18" (45.7mm)	2" (5.1mm)	1" (2.54mm)	1"- 3" strip	04A068
V	12" (30.5mm)	4" (10.2mm)	1" (2.54mm)	3"- 5" strip	04A069
V	18" (45.7mm)	4" (10.2mm)	1" (2.54mm)	3"- 5" strip	04A071
V	12" (30.5mm)	6" (15.2mm)	1" (2.54mm)	4"- 7" strip	04A070
V	18" (45.7mm)	6" (15.2mm)	1" (2.54mm)	4"- 7" strip	04A072
Flat	N/A	12" (30.5mm)	2" (5.1mm)	6" or wider strip	04A088

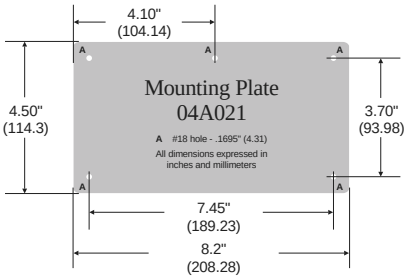
Mounting Plate dimensions for:

04A073 04A092
04A074 04A067
04A091 04A068



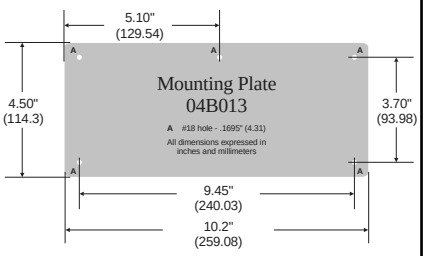
Mounting Plate dimensions for:

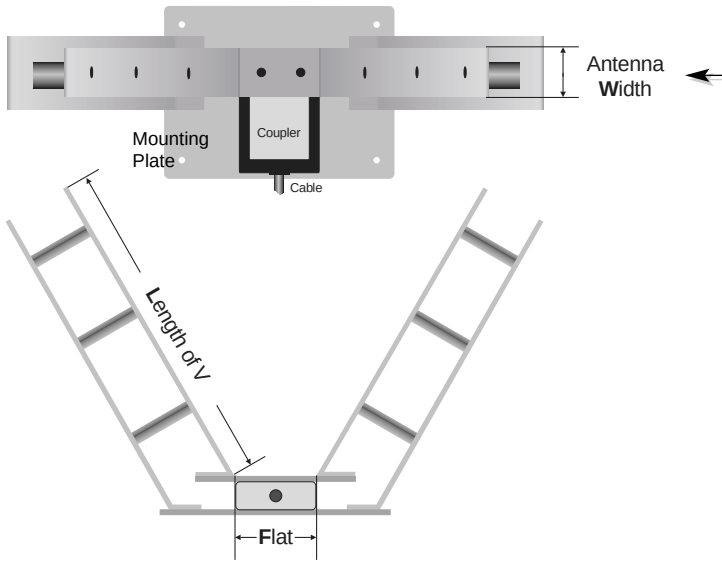
04A069
04A071



Mounting Plate dimensions for:

04A070
04A072
04A088





Antenna Dimensions

The dimensions for all RC4000 Series antennas are listed in the chart at the top of the page.
All dimensions are in inches (with metric equivalents in parentheses).
For mounting instructions and specifics on setup, please see the Installation section of the RC4000 User's Manual.

RC4000 Series Antenna Installation

The length of your coupler cable will determine how far from the control unit you can position the antenna assembly, but a minimum distance of three feet (3' or 1 meter) is strongly suggested. This helps to ensure that the operator's body is not close enough to the antenna to affect the tuning. The standard cable length is eight feet (8' or 2.4 meters), and optional lengths of fifteen feet (15' or 4.6 meters) and twenty-five feet (25' or 7.62 meters) are readily available.

Mount your antenna so the material runs through the middle of the "V" and the lowest point of the loop is either directly above or below the coupler, depending on whether you are looking up or down, respectively. **The antenna should be securely mounted, with either four (4) or six (6) #8 machine screws, flat and lock washers, as required**.

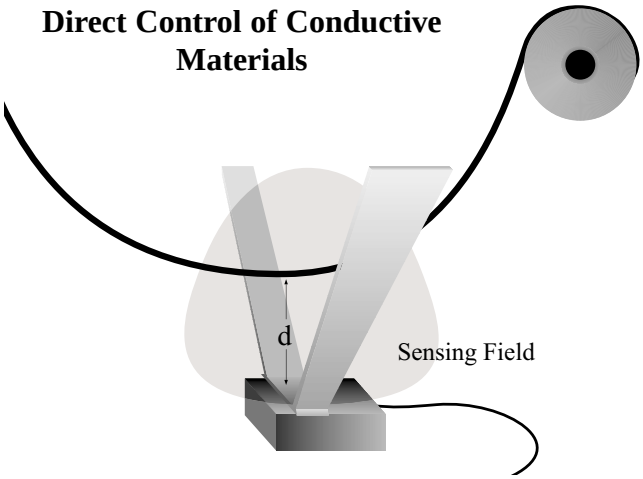
The illustrations below depict both direct and indirect methods of sensing the material loop.

Antenna Installation

Once you've selected the proper antenna for your application, you will need to decide whether you want to "look up" or "look down" at the material loop. The RC4000 Selection Mode allows you to configure the control for either scenario, whether you are in Reel or Dereel mode.

We strongly suggest that you employ the selectable High and Low Limit Relays, as an added level of safety. This will ensure against tight loop or excessive payoff conditions, if a control or process problem should occur (e.g. material breaks or runs out, or something moves or damages the antenna). These relays fulfill the same function as stand alone limit switches, when properly wired to your control system.

Direct Control of Conductive Materials

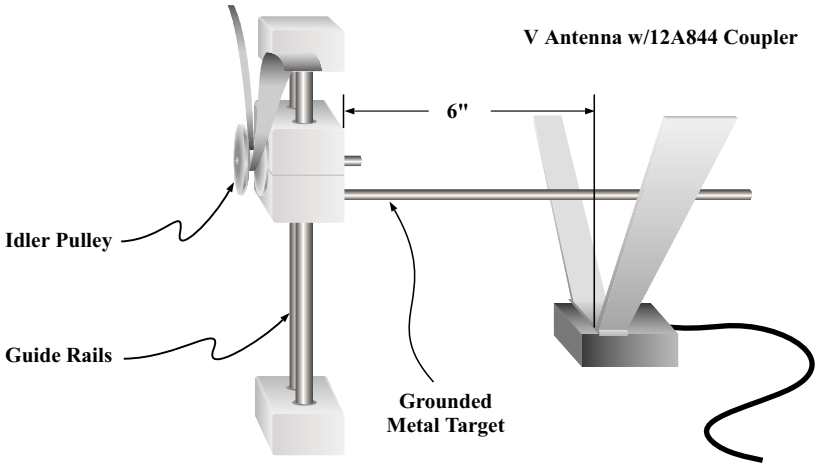


Indirect Control

This illustration depicts one way that a nonconductive material could be controlled using an RC4000 Series Reel Control.

An idler pulley, that rides on the material, is used to transfer the loop height information to a grounded metal target, which travels up and down within the "V" of the antenna.

Many variations of this approach are possible, and they can be as simple as a grounded metal weight or target suspended from the material loop within the "V" of the antenna.



Since the feed-rate in most applications requires much less than standard 1725 RPM DC motor speed, you must connect a speed reducer between the motor and the reel. You can use the following formula to calculate gear ratios.

$$R = \frac{S(3.14)d}{F}$$

Where:

R = step-down ratio between motor and reel
F = maximum machine feed-rate (units of measure/min)
d = reel hub diameter (units of measure)
S = motor speed (RPM)

In order to allow some margin for feed-rate increase, a motor speed (**S**) less than maximum should be used; for example, for a motor rated at 1725 RPM, calculate the ratio for 1500 RPM.

Sample Calculation:

$$\frac{(1500)(3.14)(6)}{1000} = \mathbf{28.2}$$

Where:

S = 1500 RPM
F = 1000 units of measure/min
d = 6 units of measure

Checklist

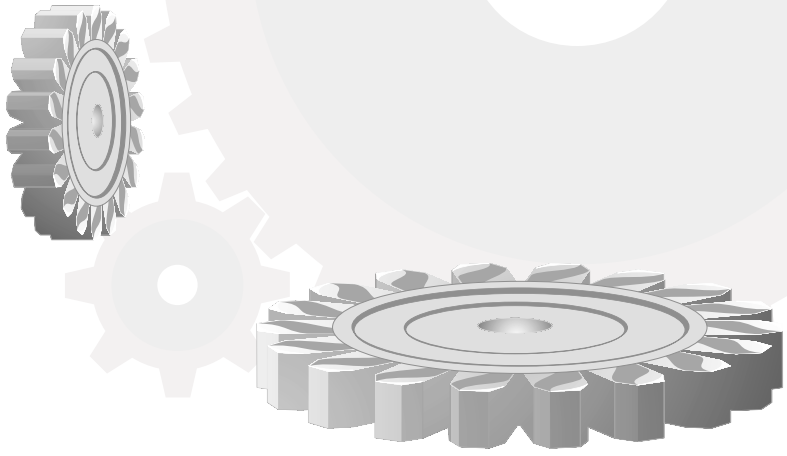
- Note the **Speed (S)** at which your motor is rated to operate here **(_____ RPM)** and in the top line of the formula below.
- Note your **Reel Hub Diameter (d)** here **(_____ units of measure)** and in the top line of the formula below.
- Note the **Feed Rate (F)** of your machine here **(_____ units of measure/min)** and in the bottom line of the formula below.

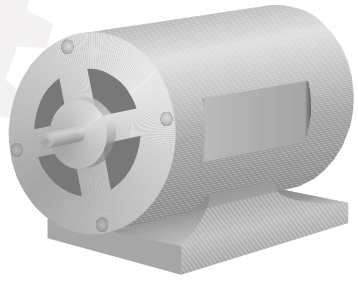
$$R = \frac{(\quad)(3.14)(\quad)}{(\quad)}$$

- Note the **Step Down Ratio (R)** of your machine below - round your answer to the nearest whole number.

R = ____ : 1

Checklist





Speed Reduction is Required for Most Applications

RC4000 Installation

Control Unit

If you have a standard 04A049 coupler cable, your control unit must be mounted within eight feet of your antenna; however, if a remote location for your control is required, you can order cables with special cable lengths of fifteen or twenty-five feet (04A049-15 and 04A049-25, respectively). For convenience during setup, the control unit should be as close to the machine and motor controls as possible, but a minimum distance of three feet from the antenna should be maintained. This should be a sufficient distance to prevent tuning errors that can be caused by the presence of the operator in the sensing field.

You shouldn't mount the control unit directly onto a machine that has an excessive amount of vibration, as this can cause mechanical failure of some components. If you have no alternative and the control must be mounted on a machine that vibrates, soft shock mounts must be used. Please ask for our 03A155 Shock Mount Kit (see page 9).

Antenna/Coupler Assembly

For most reeling applications, you can mount your antenna in a "looking-up" configuration, with the Reel mode selected. For specifics on mounting the antenna/coupler assembly, refer to page 6.

In dereel applications, if the material breaks it may be pulled from the sensing field by the machine processing the material. This will cause the dereel motor to pay off material onto the floor. If you wish to ensure against this, you should activate the High and Low Limit Relays.

Coupler Cable

The cable has locking connectors on both ends, to make replacement of the antenna or the control fast and easy. Plug one end into the antenna and other into the control, screw down the locking collars and you're ready to go.

If you elect to enclose your coupler cable in a conduit, it should not share a conduit with high voltage lines, as this could create a situation where interference from the high voltage lines affects the coupler voltage and degrades the performance of the system.

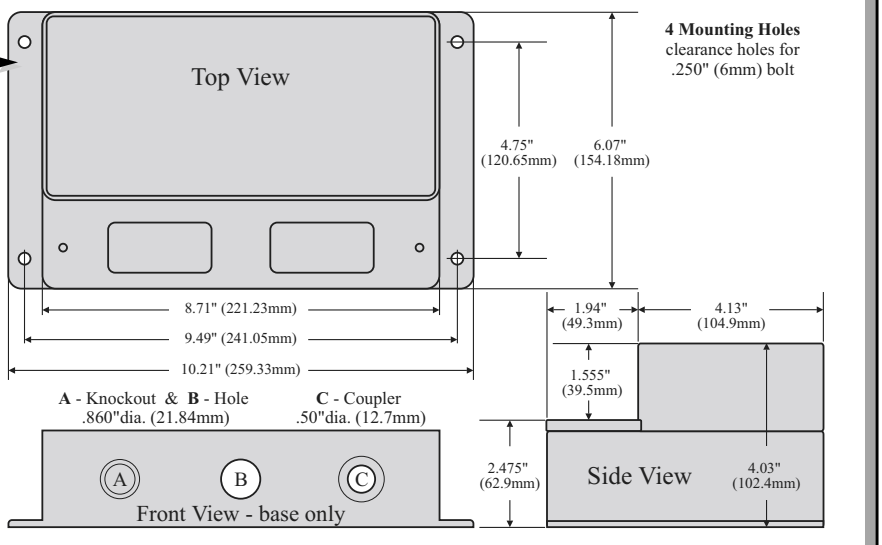
Gear Box Ratio

The gearbox ratio, for speed reduction between motor and reel, must be calculated according to the formula on Page 7. If your step-down ratio is too low for the application, the system will be overly sensitive and tend to exhibit jerkiness instead of a smooth control of the material.

RC4000 Dimensions

This is a dimensional drawing of the RC4000 enclosure.
All dimensions are in inches (with metric equivalents in parentheses).

Use ¼-20 bolts and flat washers to mount the control unit. If there is moderate to heavy vibration, use an 03A155 Shock Mount Kit.



Power Input Wiring

All power wires must be brought into the box through the .860" (21.8mm) hole on the left side, using a suitable ½" (13mm) electrical fitting. Wire size must conform to local electrical code requirements for 1 ampere (normally #14 AWG will meet these requirements).

Set the 115/230 volt selector switch to the proper position. Connect three-wire 115 or 230 VAC, single phase power to terminals 1, 2 and 3. Terminal 1 must be well grounded to a common electrical ground. The AC line power must be supplied from a disconnect box that is either fused or equipped with circuit breakers.

Output Wiring

The RC4000 requires a separate external motor control to drive the reel motor. The control voltage is taken from the Isolated DC Output Terminals. Select the +5 or +10 volt range, as required by your controller.

In general, all wire should be heavy enough to accept crimped, push-on style terminals and to withstand the rigors of your production environment. We recommend shielded twisted pair, with the shield grounded at the control unit end only. **These wires should not be run through conduit with high voltage lines.**

Auto Interlock

This feature allows external on-off control of the reel motor in AUTO mode only. To use this function, connect the AUTO and COM terminals to a relay contact that closes when reel motor stop is required. The Auto LED blinks to indicate the interlock is asserted, and since the unit is temporarily in SETUP mode, the JOG feature can be used. **When the AUTO interlock is released, the control returns to AUTO mode without operator intervention.**

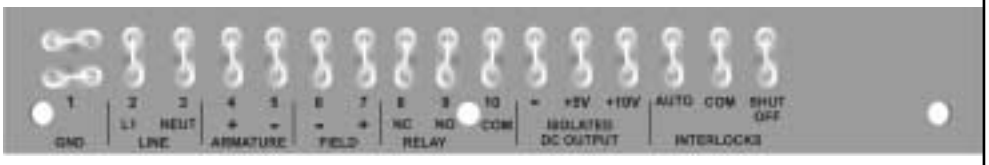
Shut-off Interlock

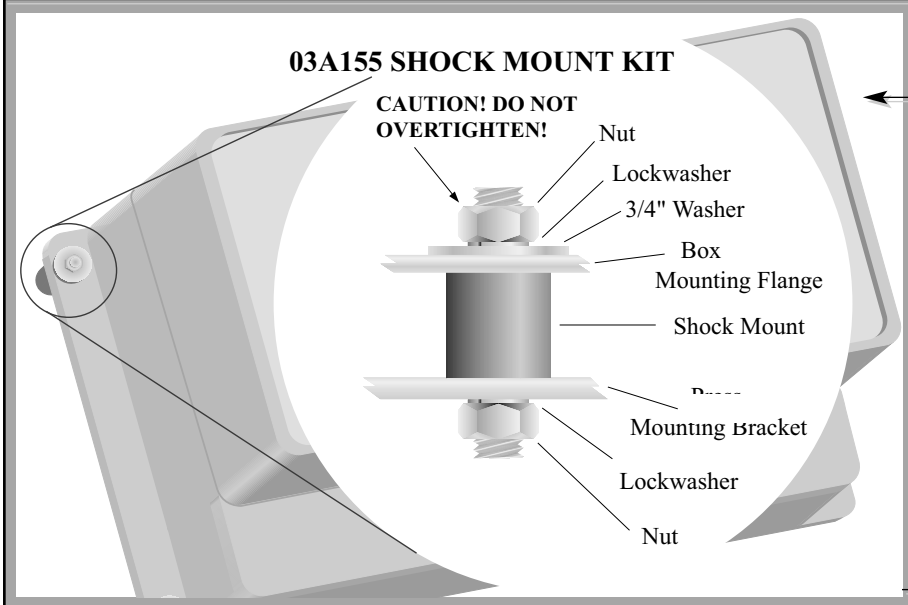
This feature allows external shut-off control of the reel motor in both Auto and Manual modes. To use this feature, connect the SHUT OFF and COM terminals to a relay contact that closes when reel motor stop is required. The AUTO and SETUP LEDs both blink as long as the contacts are closed. When the contacts open, the unit stays in SETUP mode until the AUTO key is pushed by the operator.

Relay Outputs

The **Operation** section describes the procedure for enabling the High and Low Limit Relays. Connections must be made to output terminals 8, 9, and 10, to utilize this feature. Connect to the COM and either the NO or the NC terminal, depending on the control function to be performed.

Wiring Terminals for RC4000 and RC4000M





03A155 - Shock Mount Kit

Our 03A155 shock mount kits contain **Lord Corporation's # SMB006-0100-7** shock mounts.

We recommend that you use these or their equivalents, whenever the control unit is mounted in a high vibration environment.

RC4000 Operation

Keypad Controls

SELECT (in setup mode)
push to select reel or dereel mode, antenna position, and high and low limit relay activation.

ENTER (in setup mode)
push to lock in SELECT settings

TUNE (in setup mode)
push to tune system

JOG (in setup mode)
push and release to nudge motor
push and hold to run motor
***Manual Speed Mode** - push and hold, simultaneously press Enter*
use Adjust Up/Down to adjust speed - any other key terminates this mode

AUTO/SETUP
push to toggle between setup and auto modes

ADJUST Up/Down (in auto mode)
allow motor-on, realtime loop height adjustment

Indicators

Bargraph: *displays loop height relative to antenna*

Limit lights: *lit when loop height exceeds control range*

Run light: *on when motor function is active* - AUTO *or JOG*

Auto light: *on when unit is in the Auto mode - reel motor is controlled by antenna information*

flashes to indicate auto interlock is engaged

flashes with standby light to indicate shutoff interlock is engaged

Setup light: *on when unit is in the Setup mode - reel motor is controlled by Jog function or Manual Speed mode*

flashes with standby light to indicate shutoff interlock is engaged

Indicators

Tune light: *flashes when tuning is required*

on while unit is tuning

flashes with fault light on to indicate antenna fault

Fault light: *indicates a loss of antenna signal or internal fault*

Selection indicators: *for reel/dereel, antenna position, and high and low limit relay activation, the indicators flash to show they are available for selection*

Use the SELECT *key to step through the choices*

Use the ENTER *key to set each choice*

Indicators stay lit to show how the unit is configured

Control Interface

This is an illustration of the RC4000 Series control interface.

Indicators and Keypad Functions are defined above.

SYSTEM CONFIGURATION

The Reel Control always powers up in SETUP mode, and this is expressed by the SETUP indicator being lit. The system configuration is expressed by the yellow indicators in the blue area of the panel. These can be set as follows:

Press the SELECT key. The indicators which represent the selected configuration will blink. Each subsequent entry of the SELECT key will toggle to the next configuration choice, and its corresponding indicators will blink. When the desired system configuration is displayed, press ENTER, and the new settings will be stored in memory.

Next the High Limit Relay indicators will blink. Press the SELECT key repeatedly until the desired configuration is indicated. Choose a dimly blinking indicator if you wish to disable the relay function, or a brightly blinking one to enable the relay function. Press ENTER to save settings. Repeat for the Low Limit Relay. These settings will remain in effect until this process is repeated.

TUNE

Each combination of antenna and material requires tuning of the system, for proper operation. First, ensure your antenna is positioned and installed according to the instructions on page 6; then, remove the material from the field and press TUNE. The TUNE indicator will remain on during the tuning process and will go off when the unit is successfully tuned.

If for any reason proper tuning cannot be achieved, the FAULT indicator will light, Auto operation will be locked out, and TUNE indicator will blink. Refer to the section on FAULTS. Any subsequent operation of the TUNE key turns off the FAULT indicator and initiates another tuning procedure.

Position the material in the sensing field, so that one of the green bargraph lights is lit (you may move the material through the sensing field either manually or with the JOG key).

JOG

The JOG function is enabled only when the unit is in SETUP mode. Pressing the JOG key causes the motor to run at an increasing speed, until the key is released and the motor stops.

For **Manual Speed Control**, press JOG until the desired speed is reached, then press ENTER. The ADJUST Up and Down keys allow the speed to be fine tuned. Pressing any other key than ADJUST Up or Down disables this function.

AUTO

Ensure that your line is operational and that all personnel are clear of any hazardous areas. Then, press the AUTO/SETUP key to put the system into Auto mode.

The AUTO and RUN indicators will light. The reel speed should automatically follow the feed rate of the material.

In the REEL mode with the antenna below or DEREEL mode with antenna above, ensure the motor stops when the material reaches the farthest distance away from the antenna. Use the ADJUST keys to bring the loop back towards the antenna until it always stops when the associated Limit indicator lights.

Note: The ADJUST keys only function when the motor is running and are limited to the green range of the bargraph.

In the DEREEL mode with antenna below or REEL mode with antenna above, operation is reversed and the motor should stop when the material is close to, but not touching, the antenna. Use the ADJUST keys to place the loop farther away from the antenna, until it always stops when the associated Limit indicator lights.

We strongly suggest that you employ the selectable High and Low Limit Relays, as an added level of safety. This will ensure against tight loop or excessive payoff conditions, if a control or process problem should occur (e.g. material breaks or runs out, or something moves or damages the antenna). These relays fulfill the same function as stand alone limit switches, provided they are properly wired to your control system.

FAULTS

Any detectable condition that will prevent proper operation will be indicated by the **FAULT Indicator** being lit. When this occurs, AUTO operation will be locked out. Fault conditions are as follows:

Fault + Flashing TUNE Indicator

Indicates inability to tune properly

Cable and/or antenna not connected
Short or open circuit in cable or antenna
Grounded metal or a person touching the antenna

Flashing FAULT Indicator

Indicates loss of System Synchronization

Unit must be powered down and restarted
If problem persists, try filtering power input lines
If problem still persists, call factory for assistance

Control Unit

If you have a standard 04A049 coupler cable, your control unit must be mounted within eight feet of your antenna; however, if a remote location for your control is required, you can order cables with special cable lengths of fifteen or twenty-five feet (04A049-15 and 04A049-25, respectively). For convenience during setup, the control unit should be as close to the machine and motor controls as possible, but a minimum distance of three feet from the antenna should be maintained. This should be a sufficient distance to prevent tuning errors that can be caused by the presence of the operator in the sensing field.

You shouldn't mount the control unit directly onto a machine that has an excessive amount of vibration, as this can cause mechanical failure of some components. If you have no alternative and the control must be mounted on a machine that vibrates, soft shock mounts must be used. Please ask for our 03A155 Shock Mount Kit (see page 13).

Antenna/Coupler Assembly

For most reeling applications, you can mount your antenna in a "looking-up" configuration, with the Reel mode selected. For specifics on mounting the antenna/coupler assembly, refer to page 6.

In dereel applications, if the material breaks it may be pulled from the sensing field by the machine processing the material. This will cause the dereel motor to pay off material onto the floor. If you wish to ensure against this, you should activate the High and Low Limit Relays.

Coupler Cable

The cable has locking connectors on both ends, to make replacement of the antenna or the control fast and easy. Plug one end into the antenna and other into the control, screw down the locking collars and you're ready to go.

If you elect to enclose your coupler cable in a conduit, it should not share a conduit with high voltage lines, as this could create a situation where interference from the high voltage lines affects the coupler voltage and degrades the performance of the system.

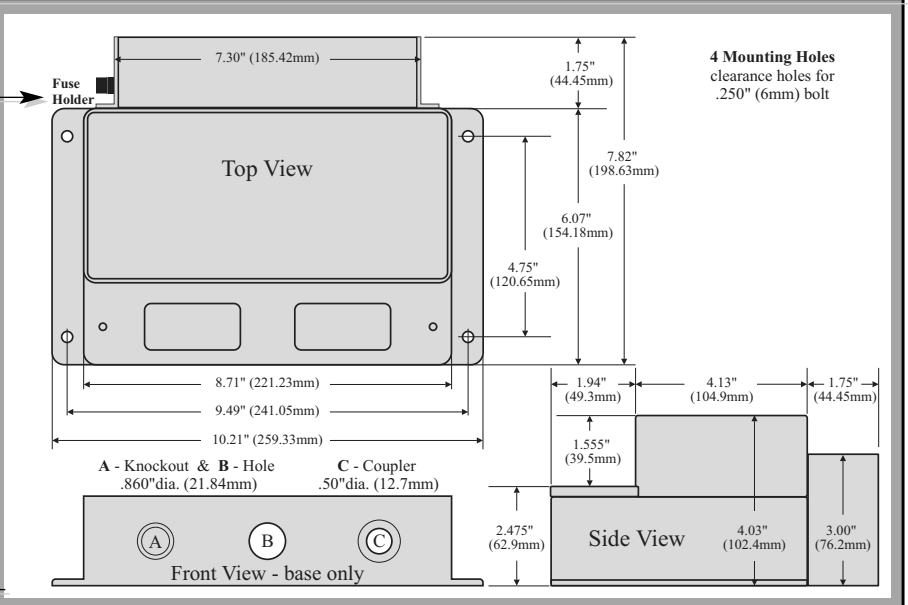
Gear Box Ratio

The gearbox ratio, for speed reduction between motor and reel, must be calculated according to the formula on Page 7. If your step-down ratio is too low for the application, the system will be overly sensitive and tend to exhibit jerkiness instead of a smooth control of the material.

RC4000M Dimensions

This is a dimensional drawing of the RC4000M enclosure.
All dimensions are in inches (with metric equivalents in parentheses).

Use ¼-20 bolts and flat washers to mount the control unit. If there is moderate to heavy vibration, use an 03A155 Shock Mount Kit.



Power Input Wiring

All power wires must be brought into the box through the .860" (21.8mm) hole on the left side, using a suitable ½" (13mm) electrical fitting. Wire size must conform to local electrical code requirements for 8 amperes (normally #14 AWG will meet these requirements).

Set the 115/230 volt selector switch to the proper position. Connect three-wire 115 or 230 VAC, single phase power to terminals 1, 2 and 3. Terminal 1 must be well grounded to a common electrical ground. The AC line power must be supplied from a disconnect box that is either fused or equipped with circuit breakers.

Output Wiring

If you use a **permanent magnet motor** in your application, connect the motor armature wires to terminals 4 and 5 - please note the polarity of the terminals and your armature wires - if you reverse the polarity, your motor will run in the opposite direction. Terminals 6 and 7 are not used with permanent magnet motors.

If you use a **shunt wound motor** for your application, connect the motor armature wires to terminals 4 and 5 - please note the polarity of the terminals and your armature wires - if you reverse the polarity, your motor will run in the opposite direction. Then, connect the motor field wires to terminals 6 and 7 - once again, be sure to observe the polarity of the terminals and your field wires.

Modification 04A060 must be installed on any RC4000M Reel Control that is intended for use with **Form Factor 1.0** motors (Bodine Electric has a line of these), as follows:

04A060-1	for1/50, 1/20 & 1/12 HP
04A060-2	for 1/8 HP
04A060-3	for 1/4 HP

In general, all wire should be heavy enough to accept crimped, push-on style terminals and to withstand the rigors of your production environment.

Auto Interlock

This feature allows external on-off control of the reel motor in AUTO mode only. **See page 9 for details**.

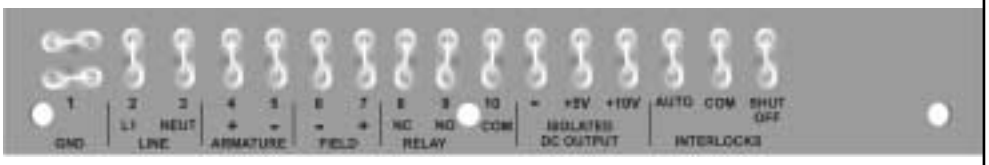
Shut-off Interlock

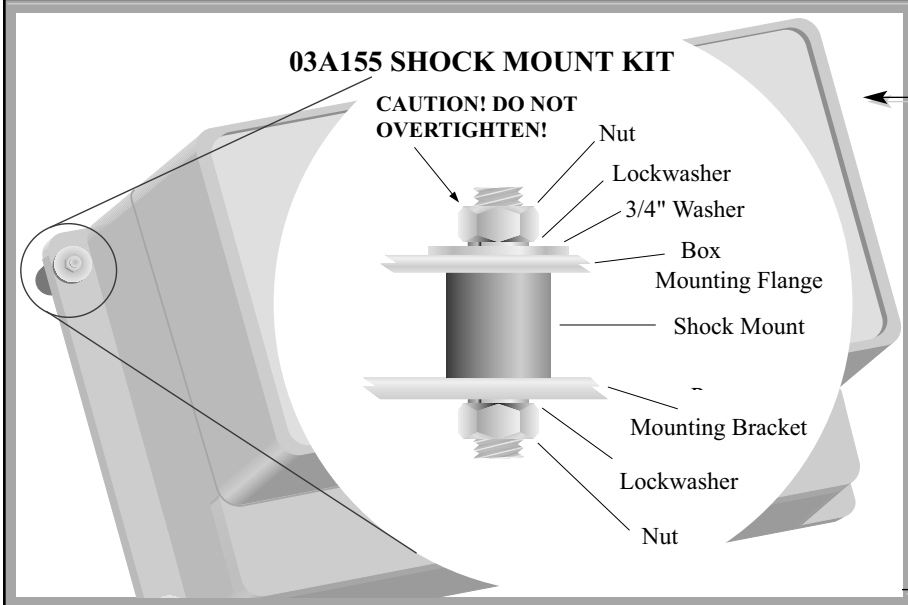
This feature allows external shut-off control of the reel motor in both Auto and Manual modes. **See page 9 for details**.

Relay Outputs

The **Operation** section describes the procedure for enabling the High and Low Limit Relays. **See page 9 for details**.

Wiring Terminals for RC4000 and RC4000M





03A155 - Shock Mount Kit

Our 03A155 shock mount kits contain **Lord Corporation's # SMB006-0100-7** shock mounts.

We recommend that you use these or their equivalents, whenever the control unit is mounted in a high vibration environment.

RC4000M Operation

Keypad Controls

SELECT (in setup mode)
push to select reel or dereel mode, antenna position, and high and low limit relay activation.

ENTER (in setup mode)
push to lock in SELECT settings

TUNE (in setup mode)
push to tune system

JOG (in setup mode)
push and release to nudge motor
push and hold to run motor
***Manual Speed Mode** - push and hold, simultaneously press Enter*
use Adjust Up/Down to adjust speed - any other key terminates this mode

AUTO/SETUP
push to toggle between setup and auto modes

ADJUST Up/Down (in auto mode)
allow motor-on, realtime loop height adjustment

Indicators

Bargraph: *displays loop height relative to antenna*

Limit lights: *lit when loop height exceeds control range*

Run light: *on when motor function is active* - AUTO *or JOG*

Auto light: *on when unit is in the Auto mode - reel motor is controlled by antenna information*

flashes to indicate auto interlock is engaged

flashes with standby light to indicate shutoff interlock is engaged

Setup light: *on when unit is in the Setup mode - reel motor is controlled by Jog function or Manual Speed mode*

flashes with standby light to indicate shutoff interlock is engaged

Indicators

Tune light: *flashes when tuning is required*

on while unit is tuning

flashes with fault light on to indicate antenna fault

Fault light: *indicates a loss of antenna signal or internal fault*

Selection indicators: *for reel/dereel, antenna position, and high and low limit relay activation, the indicators flash to show they are available for selection*

Use the SELECT *key to step through the choices*

Use the ENTER *key to set each choice*

Indicators stay lit to show how the unit is configured

Control Interface

This is an illustration of the RC4000 Series control interface.

Indicators and Keypad Functions are defined above.

SYSTEM CONFIGURATION

The Reel Control always powers up in SETUP mode, and this is expressed by the SETUP indicator being lit. The system configuration is expressed by the yellow indicators in the blue area of the panel. These can be set as follows:

Press the SELECT key. The indicators which represent the selected configuration will blink. Each subsequent entry of the SELECT key will toggle to the next configuration choice, and its corresponding indicators will blink. When the desired system configuration is displayed, press ENTER, and the new settings will be stored in memory.

Next the High Limit Relay indicators will blink. Press the SELECT key repeatedly until the desired configuration is indicated. Choose a dimly blinking indicator if you wish to disable the relay function, or a brightly blinking one to enable the relay function. Press ENTER to save settings. Repeat for the Low Limit Relay. These settings will remain in effect until this process is repeated.

TUNE

Each combination of antenna and material requires tuning of the system, for proper operation. First, ensure your antenna is positioned and installed according to the instructions on page 6; then, remove the material from the field and press TUNE. The TUNE indicator will remain on during the tuning process and will go off when the unit is successfully tuned.

If for any reason proper tuning cannot be achieved, the FAULT indicator will light, Auto operation will be locked out, and TUNE indicator will blink. Refer to the section on FAULTS. Any subsequent operation of the TUNE key turns off the FAULT indicator and initiates another tuning procedure.

Position the material in the sensing field, so that one of the green bargraph lights is lit (you may move the material through the sensing field either manually or with the JOG key).

JOG

The JOG function is enabled only when the unit is in SETUP mode. Pressing the JOG key causes the motor to run at an increasing speed, until the key is released and the motor stops.

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for Your Reeling and Guarding Solutions.

Call Gordon Engineering.

There's always a knowledgeable person at Gordon Engineering to answer your questions.

When you need to guard perimeters or complex machines, such as four-slides or automatic presses, call us. When you need a Brake Monitor for your mechanical power press, our engineers will gladly assist you in solving your application problem. We also make a full range of inductive ring sensors.

For price and delivery, call our sales department or the regional distributor listed below.

Don't forget our Five-Year Guarantee - it comes with every RC4000 Series Reel Control we sell, and we offer a 30-day Free Trial on all standard products.

Part # 04A107

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