EDDY CURRENT BRAKE
INSTALLATION AND USER GUIDE
For Model 224 Above Ground Automotive Dynamometers

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Eddy Current Brake Installation and User Guide For Model 224 Above Ground Automotive Dynamometers.

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Dynamometer Number: ______________________________________________________

Eddy Current Brake (Retarder) Number: ______________________________________
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⚠️ CAUTION

Equipment Power Requirements

The dynamometer has specific power requirements. Connecting the dynamometer to the incorrect voltage will void the dynamometer warranty. Installation may require a licensed electrician.

⚠️ WARNING

Potentially Lethal Voltages

Components attached to and within the dynamometer operate with potentially lethal voltages. To provide the greatest assurance of safety, the AC power cord(s) must be disconnected from the power source before servicing electrical components or wiring. Disconnect all power cords before servicing electrical components for the greatest assurance of safety.
Electrostatic Discharge Precautions

Electrostatic Discharge
Electrostatic Discharge (ESD), or static shock, can damage electronic components within the dynamometer. The damage may occur at the time of an ESD occurrence, or the shock may degrade the component, resulting in a premature component failure later. To avoid ESD damage, always practice good ESD control precautions when servicing the dynamometer. Dynojet designs its dynamometers to be very tolerant of static shocks by the users, but the electronics are vulnerable when the electronics are exposed. ESD occurs as a result of a difference of potential between two objects when the two objects touch. Damage occurs as a result of the energy released when the discharge (touch) occurs. The difference of potential can accumulate by as simple an action as a user moving across carpet or a seat. If that person’s energy is discharged directly to the electronics, the electronics can be damaged.

Precautions
To protect against ESD damage, you must eliminate the difference of potential before the electronics are handled. Touch the chassis of the dynamometer before touching any of the electronics. By touching the chassis, you discharge any static shocks to the chassis instead of to the electronics.

If you are holding a circuit board or dynamometer component in your hand when you approach the machine, touch the chassis of the dynamometer with your hand before installing the circuit board or component.

When handling a circuit board or component to someone, touch that person with your hand first, then hand them the component.

Always carry circuit boards in anti-static bags when the boards are exposed (removed from the dynamometer).

Battery Fire and Explosion Hazards

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer’s instructions.

Automotive Batteries
In operation, batteries generate and release flammable hydrogen gas. They must always be assumed to contain this gas which, if ignited by burning cigarette, naked flame or spark, may cause battery explosion with dispersion of casing fragments and corrosive liquid electrolyte. Carefully follow manufacturer's instructions for installation and service. Keep away all sources of gas ignition and do not allow metallic articles to simultaneously contact the negative and positive terminals of a battery.

Do not allow the positive and negative terminals to short-circuit. The dynamometer chassis is tied to the negative side of the battery. Do not short between the positive battery terminal or the starter connections to the chassis. In addition, make sure metal tools such as screw drivers, wrenches, and torque wrenches do not come in contact with the negative and positive terminals of the battery. Short circuiting the terminals of the battery can cause burn injuries, damage to the dynamometer, or trigger explosions.

Charging
Batteries being charged will generate and release flammable hydrogen gas. Charging space should be ventilated. Keep battery vent caps in position. Prohibit smoking and avoid creation of flames and sparks nearby.

Wear protective clothing, eye and face protection, when charging or handling batteries.
Other Potential Hazards

The AC power outlet shall be installed near the equipment and it shall be easily accessible to allow for disconnect before service.

The dynamometer should be located in a well ventilated area. There is a carbon monoxide hazard with all internal combustion engines. Engine exhaust contains poisonous carbon monoxide gas. Breathing it could cause death.

Any dyno room design must incorporate sufficient exhaust extraction.

Always wear proper ear and eye protection when operating the dynamometer.

Never operate the dynamometer with the covers removed.

Never stand behind the dynamometer when in operation.

Never operate the dynamometer when there is excessive vibration or noise. Resolve these problems before proceeding.

Never fuel the vehicle on the dynamometer unless appropriate safety measures are taken.

Verify brake operation before beginning any dynamometer testing.

Verify the vehicle is properly secured to the dynamometer.

Never operate the blowers without the guards installed.

Exercise care with any dynamometer testing; portions of the dynamometer and vehicle may become hot.

As with any equipment using electricity and having moving parts, there are potential hazards. To use this dynamometer safely, the operator should become familiar with the instructions for operation of the dynamometer and always exercise care when using it.

Do not repair or replace any part of the dynamometer or attempt any servicing unless specifically recommended in published user-repair instructions that you understand and have the skills to carry out.
EDDY CURRENT BRAKE INSTALLATION

This document provides instructions for installing the eddy current brake (retarder) to the Dynojet model 224 above ground automotive dynamometer (dyno). This document also provides instructions for installing and calibrating the load cell. To ensure safety and accuracy in the procedures, perform the procedures as they are described.

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This chapter is divided into the following categories:

• Introduction, page 2
• Eddy Current Brake Installation, page 4
• Torque Module Installation, page 24
• Load Cell Calibration, page 29
INTRODUCTION

Before installing your eddy current brake, please take a moment to read this guide for installation instructions and other important information.

This guide is designed to be a reference tool in your everyday work and includes the following chapters and information:

EDDY CURRENT BRAKE INSTALLATION
This chapter describes the procedures for installing the eddy current brake, torque module, and load cell. This chapter also includes the procedures for load cell calibration.

RED HEAD INSTALLATION
This appendix describes the procedures for installing the Red Head anchors.

POWER REQUIREMENTS
This appendix describes the power requirements and installation instructions for the eddy current brake.

INSTALLING THE ADAPTER AND BEARING—EARLY MODEL DYNOS
This appendix describes the procedures for installing the adapter and bearing needed for early model dynos.

TORQUE VALUES
This appendix describes the standard and metric torque values.
CONVENTIONS USED IN THIS MANUAL

The conventions used in this manual are designed to protect both the user and the equipment.

<table>
<thead>
<tr>
<th>example of convention</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="CAUTION" /></td>
<td>The Caution icon indicates a potential hazard to the dynamometer equipment. Follow all procedures exactly as they are described and use care when performing all procedures.</td>
</tr>
<tr>
<td><img src="image" alt="WARNING" /></td>
<td>The Warning icon indicates potential harm to the person performing a procedure and/or the dynamometer equipment.</td>
</tr>
<tr>
<td><img src="image" alt="RECORD #" /></td>
<td>The Record # icon reminds you to record your dynamometer and/or eddy current brake (retarder) number on the inside cover of this manual.</td>
</tr>
<tr>
<td><strong>Bold</strong></td>
<td>Highlights items you can select on in the software interface, including buttons and menus.</td>
</tr>
<tr>
<td><img src="image" alt="arrow" /></td>
<td>The arrow indicates a menu choice. For example, “select <strong>File</strong> <img src="image" alt="Open" />” means “select the <strong>File</strong> menu, then select the <strong>Open</strong> choice on the <strong>File</strong> menu.”</td>
</tr>
</tbody>
</table>

TECHNICAL SUPPORT

For assistance, please contact Dynojet Technical Support at 1-800-992-3525, or write to Dynojet at 2191 Mendenhall Drive, North Las Vegas, NV 89081.

Visit us on the World Wide Web at www.dynojet.com where Dynojet provides state of the art technical support, on-line shopping, 3D visualizations, and press releases about our latest product line.
EDDY CURRENT BRAKE INSTALLATION

You will need to provide equipment capable of lifting the eddy current brake off the crate and into position in your dyno room. You will also need a pair of straps. Dynojet recommends using single loop style straps.

**WARNING**

To prevent possible injury, turn off the dyno electronics and unplug the dyno.

**BEFORE INSTALLING THE EDDY CURRENT BRAKE—VERIFY OPTIMAL BRAKE COOLING**

Placing the eddy current brake on the left or right side of the dyno will determine the direction that it turns.

For optimal eddy current brake cooling, the brake should turn in the direction of the arrows on the rotors.

When running mostly rear wheel drive cars, orient the dyno and brake so the brake is turning in the direction of the arrows when a rear wheel drive car is on the dyno.

**Note:** The dyno will function correctly for front wheel drive cars, but cooling of the rotors will not be optimal.
UNPACKING THE EDDY CURRENT BRAKE

1. Remove the top and sides of the crate.
2. Remove any hardware and parts boxes from the crate and verify the box contents.
3. Remove the uprights and cross members from the crate.

Figure 1: Remove the Crate Top
4 Remove the four screws securing the small top cover to the brake. Set the screws and the cover aside.

5 Remove the eight screws securing the large top cover to the brake. Set the screws and the cover aside.

6 Remove the six screws securing the logo panel side cover to the brake. Set the screws and the cover aside.

Figure 2: Remove the Top and Side Covers
7 Remove the five screws and nuts securing the front and rear covers. Set the screws, nuts, and covers aside.

Be sure you record the dynamometer and/or eddy current brake number on the inside cover of this manual.

Figure 3: Remove the Front and Rear Covers
8 Remove the four lag bolts securing the brake to the crate.
9 Place the nylon loop strap around the shaft on either side of the brake.
   Dynojet recommends using single loop style straps.
10 Using a forklift, lift the eddy current brake from the crate and place the brake near the dyno.

Figure 4: Remove the Brake from the Crate
INSTALLING THE TEMPERATURE SENSOR

Use the following instructions to secure the temperature sensor to the eddy current brake in the location shown.

You will need the following parts:

- 76955001 Temperature Sensor Assembly

![Figure 5: Temperature Sensor Location](image)

1. Remove the nut from the sensor.
2. Slide the sensor through the cross brace.
3. Secure the sensor to the brace using the nut removed earlier.

**Note:** For clarity, the side panel has been removed.

![Figure 6: Install the Temperature Sensor](image)
REMOVING THE REAR DECK SUPPORT BRACE

If your rear deck is already installed, you will need to remove the rear deck support brace. The rear deck support will secure directly to the eddy current brake.

1. Remove the two bolts and washers securing the rear deck support to the brace and set aside. These will be used later to secure the rear deck support to the eddy current brake.

2. Remove the two bolts and washers securing the brace to the dyno and remove the brace. The brace will not be used.

Figure 7: Remove the Rear Deck Support Brace
INSTALLING THE BEARING, SPLINE SHAFT, AND DRIVELINE ASSEMBLY

The eddy current brake can be installed on either side of your dyno, the installation instructions are the same.

You will need the following parts:

- 32355056 Bearing
- 36801080 Bolt, 1/2-13 x 1.5", Flange-Hex (2)
- 62218130 Spline Shaft Assembly
- 62240130 Driveline Assembly

Install the bearing using two 1/2-13 x 1.5-inch flanged bolts. Leave the bolts loose. **Note:** If you are retrofitting an early model dyno which does not have the bearing mounting holes, refer to the instructions in Appendix C.

![Figure 8: Install the Bearing](image-url)
2 Insert the spline shaft through the bearing and into the spline hub of drum.  
Note: Make sure the short spline end faces out.
3 Push the spline shaft in until the shoulder is flush with the bearing.
4 Torque the bearing mounting bolts to 57 foot-pounds.
5 Torque the two set screws on the bearing to 25 foot-pounds.
6 Remove the four bolts securing the u-joint to the keyed driveline yoke. Set these bolts aside; they will be used to secure the eddy current brake to the driveline assembly.
7 Separate the keyed yoke from the driveline assembly. You may need to use a screwdriver or pry bar to separate the u-joint from the yoke.
8 Place the driveline assembly on the spline shaft.

Figure 9: Install the Spline Shaft and Driveline Assembly
INSTALLING THE EDDY CURRENT BRAKE

You will need the following parts:

- 36923100 Washer, 3/8", Hardened, Flat (8)
- DM150-019-012 Bolt, 3/8-16 x 1", Hex (8)

1. Place the keyed yoke onto the eddy current brake shaft.
2. Line up the eddy current brake yoke with the driveline assembly.
3. Slide the brake frame towards the dyno frame until they touch. Make sure the brake yoke is aligned with the driveline.

Figure 10: Install the Brake Assembly
4 Secure the side of the brake frame to the dyno using eight 3/8 x 1-inch bolts and eight 3/8-inch hardened flat washers. Not all of the bolts and washers are visible from this view.

5 Secure the yoke to the driveline assembly using the four bolts removed earlier. Torque the bolts to 70 foot-pounds.

6 Torque the brake yoke set screws to 25 foot-pounds.

Figure 11: Secure the Brake Frame to the Dyno
INSTALLING THE LOAD CELL

You will need the following part:
- 76950505 Load Cell Assembly

1. Verify the main dyno power is disconnected.
2. Remove the two bolts and nuts securing the existing bar on the eddy current brake and remove the bar. Set the bolts and nuts aside.
3. Verify the eyelets on the load cell are spaced the same as the bar removed earlier.
   Adjust the load cell spacing by loosening the lock nut and turning the eyelet.

4. Secure the load cell to the mounting bracket using the two bolts and nuts removed earlier.

---

**Figure 12: Verify the Load Cell Spacing**

**Figure 13: Install the Load Cell**
INSTALLING THE FRONT AND REAR BRAKE COVERS AND THETA CONTROLLER

You will need the following parts:

- 66411004  Theta Controller
- 36540647  Screw, 8-32 x 3/8", Ph-Sems, Phil (4)

Install the front and rear covers removed earlier to the frame using five 1/4-20 x 3/4-inch button-head flange screws and five nuts for each cover.

Figure 14: Install the Front and Rear Covers
2 Install the theta controller using four 8-32 x 3/8-inch screws.

Figure 15: Install the Theta Controller
3 Secure the rear deck support to the eddy current brake using the bolts removed earlier.

Figure 16: Secure the Rear Deck Support
ROUTING THE CABLES

Refer to Figure 17 on page 20 for cable routing location information.

1. Before routing the cables, remove the two cable pass through covers (just above the Theta Controller) and the cable pass through cover on the bottom of the side panel. Remove the two screws securing each cable pass through cover. Set the screws and covers aside.

2. Route the temperature sensor cable (A) from the eddy current brake through the panel opening closest to the dyno and over to the Breakout board. For more information on wiring the Breakout board refer to page 21.

3. Route the pickup card cable (B) from the pickup card through the panel opening closest to the dyno and over to the Breakout board. For more information on wiring the Breakout board refer to page 21.

4. Route the 25-pin cable (C) from the Breakout board through the panel opening closest to the dyno, along the inside of the panel using a cable routing channel (not used by the input power cable), out through the bottom panel opening, and to the dyno electronics.

5. Route the brake power cable (D) from the eddy current brake through the panel opening furthest from the dyno and over to the Theta Controller (underneath).

6. Route the input power cable (E) from the Theta Controller through the panel opening furthest from the dyno, along the inside of the panel using the cable routing channel (not used by the 25-pin cable), out through the bottom panel opening, and to your power source.

7. Route the control cable (F) from the Theta Controller to the Breakout board. For more information on wiring the Breakout board refer to page 21.

8. Slide the brake power cable and the input power cable into a double cable pass through. Secure the cable pass through to the panel using the two screws removed earlier.

9. Slide the temperature sensor, pickup card, and 25-pin cables into a single cable pass through. Secure the cable pass through to the panel using the two screws removed earlier.
10 Do not install the cable pass through cover on the bottom of the side panel until you have routed the load cell cable. Refer to “Installing the Load Cell” on page 15 for more information.

Figure 17: Routing the Cables
WIRING THE BREAKOUT BOARD

Refer to Figure 18 on page 22 for Breakout board location information.

1. Attach the temperature sensor cable (A) to the Breakout board. The temperature sensor cable has five wires which connect to the wiring block labeled TEMP. This cable was routed to the Breakout board on page 19.
   - Green wire connects to G1
   - Black wire connects to B1
   - Ground (shield) wire connects to S1
   - White wire connects to W1
   - Red wire connects to R1

2. Attach the control cable (F) to the Breakout board. The control cable has five wires which connect to the wiring block labeled LOAD CONTROL. This cable was routed to the Breakout board on page 19.
   - Black wire connects to V-
   - White wire connects to O+
   - Ground (shield) wire connects to SH
   - Red wire connects to V+
   - Green wire connects to O-

3. Attach the pickup card cable (B) to the Breakout board. The control cable has four wires which connect to the wiring block labeled DRUM 1. This cable was routed to the Breakout board on page 19.
   - Red wire connects to R1
   - White wire connects to W1
   - Black wire connects to B1
   - Ground (shield) wire connects to S1
4 Verify jumpers J1 and J2 are set for the eddy current brake as shown in Figure 18. The air brake will be activated when the dyno electronics power is turned off or when the red button on the pendant is lit. The eddy current brake is used for load control.

**Figure 18: Wire the Breakout Board**
**Securing the Brake to the Dyno Room Floor**

Dynojet recommends you secure your eddy current brake to the floor in your dyno room using concrete anchors.

You will need the following parts:

- 36708100 Nut, 1/2-13, Nylock, Hex (2)
- 36800001 Bolt, 1/2-13 x 1.25", Flange, Hex (2)
- 36923100 Washer, 3/8", Hardened, Flat, Steel (2)
- 37513200 Anchor, Redhead, 3/8" (2)
- 37518200 Redhead Anchor Installation Tool
- DM150-019-012 Bolt, 3/8-16 x 1", Hex (2)

1. Using the mounting feet as a template, mark and drill each hole needed to secure the two feet to the floor.
2. Install two Red Head anchors. Refer to Appendix A for installation instructions.
3. Secure one foot to the left and right panels using one 1/2-13 x 1.25-inch flange bolt and one 1/2-13-inch nylock nut (not visible) each.
4. Secure each mounting foot to the floor using one 3/8-16 x 1-inch hex bolt and one 3/8-inch flat washer.

![Figure 19: Secure the Brake to the Dyno Room Floor](image-url)
TORQUE MODULE INSTALLATION

This section describes how to install the Torque Module(s), connect the load cell cable, and install the side and top brake covers.

INSTALLING THE TORQUE MODULE

You will need the following part:

- 66104001 Torque Module

1. Verify the main dyno power is disconnected.
2. Turn off the main power switch on the CPU Module and unplug the power cord.
3. Remove the dust cover from the existing top module.

![Figure 20: Disconnect the Power and Remove the Dust Cover](image)

Figure 20: Disconnect the Power and Remove the Dust Cover
4 Loosen the top right screw on the back of the existing top module.
5 Plug the Torque Module (or modules) into the existing top module. Place the dust cover, removed in step 3, on the Torque Module.

Figure 21: Attach the Torque Module
6 Secure the grounding strap on the back of the Torque Module to the existing top module.
7 Secure the Torque Module to the dyno electronics with the plastic tie straps (one on each side).
   **Note:** Do not attach the load cell cable at this time.

*Figure 22: Secure the Grounding Strap*
**CONNECTING THE LOAD CELL CABLE**

1. Attach the 9-pin connector on the load cell cable to the front of the Torque Module and tighten down the screws.
   
   **Note:** When there are two Torque Modules, connect the load cell cable from the 4WD dyno to the top Torque Module.

2. Attach the power cord to the CPU Module and turn the power switch on.

3. The green LED light on the Torque Module(s) should now be on.

![Figure 23: Connect the Load Cell Cable](image)
INSTALLING THE TOP AND LOGO PANEL COVERS

**Note:** Before installing the top and logo panel covers, verify all cables have been routed. Refer to “Routing the Cables” on page 19 for more information.

1. Install the small top cover using four 1/4-20 x 5/8-inch torx flange screws removed earlier.
2. Install the large top cover using eight 1/4-20 x 5/8-inch torx flange screws removed earlier.
3. Install the logo panel side cover using six 1/4-20 x 5/8-inch torx flange screws removed earlier.

![Diagram of top and logo panel covers installation](image)
LOAD CELL CALIBRATION

This section provides instructions for calibrating the load cell. Follow the directions on the screen exactly. Failure to perform the directions accurately will result in improper torque values.

You will need the following parts:

- 35430899 Weight (4)
- 61319001 Calibration Arm Assembly

1. Verify you are in the MakeRun screen.
2. Verify you are connected to the dyno electronics.

Note: For more information on connecting to the dyno electronics, refer to the WinPEP 7 User Guide (on your WinPEP CD or at www.dynojet.com) or the WinPEP 7 Online Help.


Note: Before proceeding, be sure the eddy current brake is free and clear of any obstructions. There should not be anything resting on the eddy current brake or the dynamometer drum during this procedure.

4. Click Next to perform the Zero Calibration.

The Calibration window will appear. The hardware is now zeroing out the torque cell. If the unit does not calibrate, recheck the setup and retry.

![Figure 25: Zero Calibration Window](image)
Once the Zero Calibration is complete, the Calibration Mass window will appear.

5. Enter the Torque Module calibration value. Refer to Figure 27.

Note: You must perform this step the first time you calibrate the load cell.

Or

If you are only performing a Zero Calibration, click Finish.

![Calibration Mass Window](image)

Figure 26: Calibration Mass Window

Enter the calibration number stamped near the bolt pattern at the end of the calibration arm. If you do not have enough room to use the bolt pattern closest to the end of the calibration arm, use the number stamped near the bolt pattern in the center of the arm.

Note: Dynojet recommends you secure the calibration arm using the bolt pattern closest to the end of the arm unless space constraints in your dyno room do not allow you to.

![Calibration Arm Number](image)

Figure 27: Calibration Arm Number
6 Click **Next** to continue.

The Span Calibration window will appear.

![Figure 28: Span Calibration Window](image)

7 Install the calibration arm and weights.

**Note:** Calibration arm placement determines positive direction for torque. Place the weights towards the rear of the vehicle as shown in Figure 29 and Figure 30. Refer to step 8 and Figure 31 on page 33 for calibration arm installation instructions.

![Figure 29: Calibration Arm Placement—Front Wheel Drive](image)
place the weights towards the rear of the vehicle

Figure 30: Calibration Arm Placement—Rear Wheel Drive
8 Install the calibration arm and weights using the bolts at the end of the calibration arm.

Note: If you do not have enough room to use the bolt pattern closest to the end of the calibration arm, use the bolt pattern in the center of the arm. Refer to Figure 32 on page 34.

8a Secure the calibration arm to the eddy current brake by tightening the bolt using the handle.

8b Gently place the weights on the calibration arm.

Note: Verify the calibration arm is not contacting the cover.

⚠️ CAUTION ⚠️

The calibration weights are very heavy. The weights must be set on the arm gently or you will damage the load cell.
If you do not have enough room to use the bolt pattern closest to the end of the calibration arm, use the bolt pattern in the center of the arm as shown in Figure 32.

Figure 32: Install the Calibration Arm and Weights Using the Bolt Pattern in the Center
While installing the calibration weights, you should notice the Torque Gauge on the DynoTrac Window moving from 0 to about 500 foot-pounds.

**Note:** The Torque Gauge may or may not be in this range.

- If the torque cell has been previously calibrated incorrectly or has not been calibrated for a while, the gauge may show values out of this range until calibration is complete.
- If you use the bolt pattern in the center of the calibration arm, the gauge will show values around 250-260 foot-pounds.

**Note:** Let the torque gauge needle stabilize before clicking **Next**.

9. From the Span Calibration window (Figure 28), click **Next** to continue.
   At this point, the value on the gauge should match the value on the calibration arm.

10. Remove the calibration arm and weights and click **Finish**.
    For more information on loading a vehicle and basic dyno operation, refer to the Above Ground Model 224 Automotive Dynamometer Installation and User Guide (P/N 98210108).

![Figure 33: Calibration Is Complete Window](image-url)
RED HEAD ANCHOR INSTALLATION

This appendix contains instructions for installing the Red Head Multi-Set™II Anchors. The anchors will be used to secure the dyno to concrete. To ensure safety and accuracy in the procedures, perform the procedures as they are described. Be sure to read and understand the warnings included in this appendix.

WARNINGS

⚠️ WARNING
Always wear safety glasses and other necessary protective devices or apparel when installing or working with anchors.

⚠️ CAUTION
ITW Ramset/Red Head Multi-Set II Anchors are designed to operate properly only when installed with ITW Ramset/Red Head brand Setting Tools.

The use of a 24 to 40 ounce hammer is recommended for expanding Multi-Set II anchors.

The use of carbide drill bits manufactured with ANSI B94. 12-77 drill bit diameter requirements is recommended for installation of this anchor.

Not recommended for use in lightweight masonry material such as block or brick.

Use of core drills is not recommended to drill holes for use with this anchor.

Not recommended for use in new concrete which has not had sufficient time to cure.

Anchor spacing and edge distance requirements (anchor installation locations) are the responsibility of the engineer of record.

CONTACT INFORMATION FOR ITW RAMSET/RED HEAD

Contact ITW Ramset/Red Head at 1-630-350-0370, or 1300 North Michael Drive, Wood Dale, IL 60191.
INSTALLATION

Use the table below to determine the catalog number, drill bit size, minimum hole depth, and setting tool catalog number.

<table>
<thead>
<tr>
<th>catalog number</th>
<th>drill bit size</th>
<th>minimum hole depth</th>
<th>setting tool catalog number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Steel</td>
<td>1/2-inch</td>
<td>1 5/8-inch (41.2 mm)</td>
<td>RT-138</td>
</tr>
<tr>
<td>RM-38/RL-38 (9.5 mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use the following instructions to install the Red Head anchors.

1. Drill the hole in the concrete the same outside diameter as the anchor being used to any depth exceeding minimum embedment.

2. Insert the anchor.

Figure A-1: Red Head Anchor—Drill the Hole

Figure A-2: Red Head Anchor—Insert the Anchor
3. Using a hammer, drive the anchor flush with the surface of the concrete, or below the surface if the hole depth exceeds minimum embedment.

![Figure A-3: Red Head Anchor—Drive the Anchor Flush](image)

4. Using a hammer, expand the anchor with the setting tool. The anchor is properly expanded when the shoulder of the setting tool is flush with the top of the anchor.

Note: Use only Ramset/Red Head setting tools to insure proper installation.

![Figure A-4: Red Head Anchor—Expand the Anchor](image)
POWER REQUIREMENTS AND INSTALLATION

This appendix contains power requirements and installation instructions for the eddy current brake. To ensure safety and accuracy in the procedures, perform the procedures as they are described. Be sure to read and understand the warnings included in this appendix.

This Appendix is divided into the following categories:

• North America, Japan, and Locations Using 60 Hz Power, on page B-2
• Excluding North America and Japan, on page B-5
POWER REQUIREMENTS AND INSTALLATION—NORTH AMERICA, JAPAN, AND LOCATIONS USING 60 HZ POWER

The following power requirements and instructions are for North America, Japan, and locations using 60 Hz power. Refer to “Power Requirements and Installation—Excluding North America and Japan” on page B-5 for all other locations.

The eddy current brake requires a dedicated 240VAC single-phase power outlet rated for 30A for proper operation. Failure to follow these instructions could result in personal injury or damage to the brake. Connecting the brake to the incorrect voltage will void the warranty. Contact Dynojet with any questions.

Each eddy current brake requires a dedicated wall receptacle which must be wired for operation and is included with the brake or may be shipped in advanced in a separate package. The brake is equipped with a twenty-five foot power cord with a twist lock plug pre-wired on the end.

The dedicated wall receptacle is a twist lock four wire grounded 30A NEMA L14-30 type and must be wired in accordance with local building codes and requirements. If the facility does not have 120/240 volt single-phase power, and it does have 120/208 volt three-phase Y power, then it is acceptable to connect the four wire receptacle with two of the three-phase lines, the neutral and the ground. With this arrangement, there will only be 208 volts between line 1 and line 2 instead of 240 volts. This acceptable, but performance of the eddy current brake will be reduced. In no case shall all three-phase lines be connected to the receptacle! Installation may require a licensed electrician and must conform to UL and NEC safety standards.

Note: If you are installing your brake in North American or Japan and the brake is not equipped with twist lock four wire grounded plug, contact Dynojet before attempting to connect the brake.

Local and national electrical codes require a grounded receptacle box.

• This circuit should have a dedicated 30A double pole circuit breaker.
• The brake should be the only device connected to this circuit.

INSTALLING THE WALL RECEPTACLE

The wall receptacle is included with your brake and is shipped in a separate box or may be shipped in advance in a separate package.

The wall receptacle is a single-phase 240 volt 30A dedicated circuit with a neutral wire. The neutral wire is not used by the brake, but needs to be connected to terminal W.

The cable carrying the power to this receptacle should be ten gauge or larger. Check with local building codes for the correct size.

1. Connect one of the 240V legs to the X terminal (gold colored screw).
2. Connect the other 240V leg to the Y terminal (gold colored screw).
3. Connect the neutral conductor to the W or WH terminal (silver screw).
4. Connect the ground conductor to the G terminal (green colored screw).
Testing for Correct Voltages

You must test the receptacle for proper voltages before the eddy current brake is connected to the outlet.

**CAUTION**

If the voltage readings do not match the following table, DO NOT connect the brake. You must have a licensed electrician correct the power connection. Connecting the brake to the incorrect voltage can result in damage to the brake and will void the brake warranty. Contact Dynojet with any questions.

Using a voltmeter that is capable of measuring AC voltage, measure between the points listed below and verify that the correct voltages are present.

<table>
<thead>
<tr>
<th>probe 1</th>
<th>probe 2</th>
<th>desired voltage measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>216V to 260V*</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>108V to 130V</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>108V to 130V</td>
</tr>
<tr>
<td>3</td>
<td>box</td>
<td>&lt;5V</td>
</tr>
</tbody>
</table>

*If using two of the three-phase lines of a 120/208 V 3 phase Y system, then expect to see 187V to 225V.

![Figure B-1: Dedicated Power Receptacle](image)
HARD WIRING TO THE BUILDING

Use the following instructions to wire the brake directly to the building.

The brake must connect to a two pole disconnect switch to allow the removal of all power to the brake for servicing. This box may contain fusing, circuit breakers, or the circuit protection may be upstream in the building power system. The circuit must be protected to 30A with slow blow fuses or time delayed circuit breakers.

The power cord that attaches to the brake has three conductors internally and their colors are white, black, and green.

1. Remove the brake power plug and connect 240VAC single-phase between the black and the white wires through the disconnect switch.
2. Connect the green wire to the ground connection.
3. Refer to the previous table for testing and probe the new connections as follows:
   • white wire as location #2
   • black wire as location #4
   • green wire as location #3
POWER REQUIREMENTS AND INSTALLATION—EXCLUDING NORTH AMERICA AND JAPAN

The eddy current brake (excluding North America and Japan) requires a dedicated wall receptacle which must be wired for operation and is included with the brake or may be shipped in advanced in a separate package. The brake is equipped with a twenty-five foot power cord with a twist lock plug pre-wired on the end.

The brake requires a dedicated 240VAC single-phase power outlet rated for 30A for proper operation. **Failure to follow these instructions could result in personal injury or damage to the brake.** Connecting the brake to the incorrect voltage will void the brake warranty. Contact Dynojet with any questions.

The dedicated wall receptacle is a three-pin IEC grounded 30A type and must be wired in accordance with local building codes and requirements. Installation may require a licensed electrician to conform to applicable safety standards.

**CAUTION**

If you are installing your brake in a location other than North America or Japan and the brake is not equipped with a three pin IEC grounded plug, contact Dynojet before attempting to connect the brake.

Local and national electrical codes will require that the box containing the receptacle is grounded.

- This circuit should have a dedicated 30A double-pole circuit breaker.
- The brake should be the only device connected to this circuit.
INSTALLING THE WALL RECEPTACLE

The wall receptacle is a single 240 volt 30A dedicated circuit with a ground.

Note: The actual wall receptacle may be different from the image shown in Figure B-2; however, the installation instructions are the same.

The cable carrying the power to this receptacle should be 4.0 mm\(^2\) (ten gauge) or larger. Check with local building codes for the correct size.

1. Connect one of the 240V legs to the N terminal (no color).
2. Connect the other 240V leg to the L terminal (no color).
3. Connect the ground conductor to the green terminal.

Figure B-2: Wiring the Wall Receptacle
**Testing for Correct Voltages**

You must test the receptacle for proper voltages before the eddy current brake is connected to the outlet.

Using a voltmeter that is capable of measuring AC voltage, measure between the points listed below and verify that the correct voltages are present.

<table>
<thead>
<tr>
<th>probe 1</th>
<th>probe 2</th>
<th>desired voltage measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>220V to 250V</td>
</tr>
<tr>
<td>2</td>
<td>box</td>
<td>&lt;5V</td>
</tr>
</tbody>
</table>

![Figure B-3: Testing the Wall Receptacle](image)

**Hard Wiring to the Building**

Use the following instructions to wire the brake directly to the building.

The brake must connect to a two pole disconnect switch to allow the removal of all power to the brake for servicing. This box may contain fusing, circuit breakers, or the circuit protection may be upstream in the building power system. The circuit must be protected to 30A with slow blow fuses or time delayed circuit breakers.

The power cord that attaches to the brake has three conductors internally and their colors are white, black, and green.

1. Remove the brake power plug and connect 240VAC single-phase between the black and the white wires through the disconnect switch.
2. Connect the green wire to the ground connection.
3. Refer to the previous table for testing and probe the new connections as follows:
   - white wire as location #1
   - black wire as location #3
   - green wire as location #2
INSTALLING THE ADAPTER AND BEARING—EARLY MODEL DYNAMOMETERS

This appendix contains instructions for installing the adapter and bearing on early model dynamometers (dynos); this includes dynos with serial numbers between 2240088 and 2240120. To ensure safety and accuracy in the procedures, perform the procedures as they are described.
INSTALLING THE ADAPTER AND BEARING—EARLY MODEL DYNOS

Dynos missing the bearing mounting holes, shown in Figure 8 on page 1-11, will need to use the adapter (P/N 79110001) to install the bearing. This includes dynos with serial numbers between 2240088 and 2240120.

1. Orient the bearing to the adapter as shown in Figure C-1. The arrow on the adapter plate must point up.
2. Secure the bearing to the adapter plate using two 1/2-13 x 1.25-inch flange bolts and two 1/2-13-inch nuts. Leave the bolts loose.
   **Note:** The bolts are included with the eddy current brake while the nuts are included with the adapter kit.

   ![Figure C-1: Early Model Dynos—Install Bearing to Adapter](image)

3. Secure the adapter plate to the dyno using six 1/2-13 x 3/4-inch bolts.

   ![Figure C-2: Early Model Dynos—Install Adapter Plate](image)
4 Using the template included in this appendix, drill four additional holes into the dyno frame as shown.

Note: If you needed to use the adapter plate, you will need to drill brake mounting holes in the dyno frame.

4a Line the template up with the existing hole on the dyno.

4b Drill two 3/8-16-inch UNC holes on each side of the dyno.

Figure C-3: Early Model Dynos—Using the Template
Template Placement—Early Model Dynos

ADD 3/8-16 UNC HOLES

EXISTING HOLES

DYNO FRAME END

ADD 3/8-16 UNC HOLES

5 3/4''

5 3/4''

1 5/8''

Template—Early Model Dynos

EXISTING HOLE

5 3/4''

5 3/4''
This appendix contains tables for standard and metric torque values. Use these values when specified values are not given in other sections of this manual.
### STANDARD BOLT TORQUE VALUES

Always use the torque values specified in other sections of this manual. When specific values are not available, use the torque values listed below. Use the following guidelines when tightening torque:

- These values are based on use of clean, dry threads.
- The following tables include values for plain finish and plated fasteners.
- Reduce torque by 10% when engine oil is used as a lubricant.

#### CAUTION

The following tables are meant to be used as guidelines for Dynojet product torque values only. Always use caution when torquing fasteners.

<table>
<thead>
<tr>
<th>Grade 5</th>
<th>size</th>
<th>torque, plain</th>
<th></th>
<th>torque, plated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in-threads/in</td>
<td>in•lb</td>
<td>ft•lb</td>
<td>N•m</td>
</tr>
<tr>
<td>1/4-20</td>
<td>1/4-28</td>
<td>101</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>5/16-18</td>
<td>209</td>
<td>17</td>
<td>24</td>
<td>157</td>
</tr>
<tr>
<td>5/16-24</td>
<td>231</td>
<td>19</td>
<td>26</td>
<td>173</td>
</tr>
<tr>
<td>3/8-16</td>
<td>371</td>
<td>31</td>
<td>42</td>
<td>278</td>
</tr>
<tr>
<td>3/8-24</td>
<td>420</td>
<td>35</td>
<td>47</td>
<td>315</td>
</tr>
<tr>
<td>7/16-14</td>
<td>593</td>
<td>49</td>
<td>67</td>
<td>445</td>
</tr>
<tr>
<td>7/16-20</td>
<td>662</td>
<td>55</td>
<td>75</td>
<td>497</td>
</tr>
<tr>
<td>1/2-13</td>
<td>905</td>
<td>75</td>
<td>102</td>
<td>678</td>
</tr>
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<td>9/16-12</td>
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<td>109</td>
<td>147</td>
<td>979</td>
</tr>
<tr>
<td>9/16-18</td>
<td>1456</td>
<td>121</td>
<td>164</td>
<td>1092</td>
</tr>
<tr>
<td>5/8-11</td>
<td>1801</td>
<td>150</td>
<td>203</td>
<td>1351</td>
</tr>
<tr>
<td>5/8-18</td>
<td>2040</td>
<td>170</td>
<td>230</td>
<td>1530</td>
</tr>
<tr>
<td>3/4-10</td>
<td>3194</td>
<td>266</td>
<td>361</td>
<td>2395</td>
</tr>
<tr>
<td>3/4-16</td>
<td>3567</td>
<td>297</td>
<td>403</td>
<td>2675</td>
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<tr>
<td>7/8-9</td>
<td>5154</td>
<td>430</td>
<td>582</td>
<td>3866</td>
</tr>
<tr>
<td>7/8-14</td>
<td>5679</td>
<td>473</td>
<td>642</td>
<td>4259</td>
</tr>
<tr>
<td>1-8</td>
<td>7727</td>
<td>644</td>
<td>873</td>
<td>5795</td>
</tr>
<tr>
<td>1-12</td>
<td>8453</td>
<td>704</td>
<td>955</td>
<td>6340</td>
</tr>
</tbody>
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**GRADE 8**

<table>
<thead>
<tr>
<th>size</th>
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<th>torque, plated</th>
</tr>
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<tbody>
<tr>
<td>in-threads/in</td>
<td>in•lb</td>
<td>ft•lb</td>
</tr>
<tr>
<td>1/4-20</td>
<td>143</td>
<td>12</td>
</tr>
<tr>
<td>1/4-28</td>
<td>164</td>
<td>14</td>
</tr>
<tr>
<td>5/16-18</td>
<td>295</td>
<td>25</td>
</tr>
<tr>
<td>5/16-24</td>
<td>326</td>
<td>27</td>
</tr>
<tr>
<td>3/8-16</td>
<td>523</td>
<td>44</td>
</tr>
<tr>
<td>3/8-24</td>
<td>593</td>
<td>49</td>
</tr>
<tr>
<td>7/16-14</td>
<td>837</td>
<td>70</td>
</tr>
<tr>
<td>7/16-20</td>
<td>935</td>
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<tr>
<td>1/2-13</td>
<td>1277</td>
<td>106</td>
</tr>
<tr>
<td>1/2-20</td>
<td>1439</td>
<td>120</td>
</tr>
<tr>
<td>9/16-12</td>
<td>1843</td>
<td>154</td>
</tr>
<tr>
<td>9/16-18</td>
<td>2055</td>
<td>171</td>
</tr>
<tr>
<td>5/8-11</td>
<td>2543</td>
<td>212</td>
</tr>
<tr>
<td>5/8-18</td>
<td>2880</td>
<td>240</td>
</tr>
<tr>
<td>3/4-10</td>
<td>4509</td>
<td>376</td>
</tr>
<tr>
<td>3/4-16</td>
<td>5036</td>
<td>420</td>
</tr>
<tr>
<td>7/8-9</td>
<td>7277</td>
<td>606</td>
</tr>
<tr>
<td>7/8-14</td>
<td>8017</td>
<td>668</td>
</tr>
<tr>
<td>1-8</td>
<td>10908</td>
<td>909</td>
</tr>
<tr>
<td>1-12</td>
<td>11934</td>
<td>995</td>
</tr>
</tbody>
</table>
**METRIC BOLT TORQUE VALUES**

Always use the torque values specified in other sections of this manual. When specific values are not available, use the torque values listed below. Use the following guidelines when tightening torque:

- These values are based on use of clean, dry threads.
- The following tables include values for plain finish and plated fasteners.
- Reduce torque by 10% when engine oil is used as a lubricant.

⚠️ **CAUTION**

The following tables are meant to be used as guidelines for Dynojet product torque values only. Always use caution when torquing fasteners.

### Grade 8.8

<table>
<thead>
<tr>
<th>Size (mm x pitch)</th>
<th>Torque, plain (in•lb, ft•lb, N•m)</th>
<th>Torque, plated (in•lb, ft•lb, N•m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6 X 1</td>
<td>96 / 8 / 11</td>
<td>72 / 6 / 8</td>
</tr>
<tr>
<td>M8 X 1.25</td>
<td>233 / 19 / 26</td>
<td>175 / 15 / 20</td>
</tr>
<tr>
<td>M10 X 1.5</td>
<td>462 / 38 / 52</td>
<td>346 / 29 / 39</td>
</tr>
<tr>
<td>M12 X 1.75</td>
<td>805 / 67 / 91</td>
<td>604 / 50 / 68</td>
</tr>
<tr>
<td>M14 X 2</td>
<td>1287 / 107 / 145</td>
<td>966 / 80 / 109</td>
</tr>
<tr>
<td>M16 X 2</td>
<td>1997 / 166 / 226</td>
<td>1498 / 125 / 169</td>
</tr>
<tr>
<td>M20 X 2.5</td>
<td>3900 / 325 / 441</td>
<td>2925 / 244 / 330</td>
</tr>
<tr>
<td>M24 X 3</td>
<td>6739 / 562 / 761</td>
<td>5054 / 421 / 571</td>
</tr>
</tbody>
</table>

### Grade 10.9

<table>
<thead>
<tr>
<th>Size (mm x pitch)</th>
<th>Torque, plain (in•lb, ft•lb, N•m)</th>
<th>Torque, plated (in•lb, ft•lb, N•m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6 X 1</td>
<td>135 / 11 / 15</td>
<td>100 / 8 / 11</td>
</tr>
<tr>
<td>M8 X 1.25</td>
<td>323 / 27 / 36</td>
<td>242 / 20 / 27</td>
</tr>
<tr>
<td>M10 X 1.5</td>
<td>639 / 53 / 72</td>
<td>479 / 40 / 54</td>
</tr>
<tr>
<td>M12 X 1.75</td>
<td>1114 / 93 / 126</td>
<td>836 / 70 / 94</td>
</tr>
<tr>
<td>M14 X 2</td>
<td>1781 / 148 / 201</td>
<td>1336 / 111 / 151</td>
</tr>
<tr>
<td>M16 X 2</td>
<td>2762 / 230 / 312</td>
<td>2072 / 173 / 234</td>
</tr>
<tr>
<td>M20 X 2.5</td>
<td>5395 / 450 / 610</td>
<td>4046 / 337 / 457</td>
</tr>
<tr>
<td>M24 X 3</td>
<td>9322 / 777 / 1053</td>
<td>6992 / 583 / 790</td>
</tr>
</tbody>
</table>
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