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Installation Guide for In Ground Model 224 Automotive Dynamometers.

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Dynojet Research, Inc., 2191 Mendenhall Drive, North Las Vegas, Nevada 89081, USA.

Printed in USA.

Part Number: 98200046 Version 4 (05/2019)

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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.
**WARNINGS**

**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.
**WARNINGS**

**CAUTION**

**Grounding Requirements**

Always ground the vehicle to the dynamometer. Never operate the dynamometer without properly grounding the vehicle to the dynamometer.

**WARNING**

**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 dynamometer 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.

Verify the vehicle is properly grounded 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.
Thank you for purchasing Dynojet’s In Ground Model 224 Automotive Dynamometer (dyno). Dynojet’s software and dynamometers will give you the power to get the maximum performance out of vehicles you evaluate. Whether you are new to the benefits of a chassis dynamometer or an experienced performance leader, the repeatability and diagnostic tools of Power Core software and a Dynojet dynamometer will give you the professional results you require.

This document provides instructions for installing the dyno. This document will walk you through operating requirements, installation, and basic dyno operation. To ensure safety and accuracy in the procedures, perform the procedures as they are described.

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Version 4
Last Updated: 05-30-2019

This chapter is divided into the following categories:

- Introduction, page 1-2
- Dyno Specifications and Requirements, page 1-5
- Model 224 In Ground Dynamometer, page 1-11
- DynoWare RT Electronics, page 1-12
- Pit Specifications, page 1-15
INTRODUCTION

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

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

SPECIFICATIONS AND OPERATING REQUIREMENTS

This chapter describes the requirements and specifications for the dyno.

DYNO INSTALLATION

This chapter describes the procedures for installing the dyno.

EDDY CURRENT BRAKE INSTALLATION

This chapter describes the procedures for installing the eddy current brake and load cell. This chapter also includes the procedures for load cell calibration.

BASIC DYNO OPERATION

This chapter describes basic dyno operating procedures and maintenance.

RED HEAD INSTALLATION

This appendix describes the procedures for installing the Red Head anchors.

POWER REQUIREMENTS AND INSTALLATION

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

TORQUE VALUES

This appendix describes 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>✏️ <strong>CAUTION</strong></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>🚨 <strong>WARNING</strong></td>
<td>The Warning icon indicates potential harm to the person performing a procedure and the dynamometer equipment.</td>
</tr>
<tr>
<td>🔍 <strong>RECORD #</strong></td>
<td>The Record # icon reminds you to record your dynamometer and eddy current brake (retarder) serial number on the inside cover of this manual.</td>
</tr>
</tbody>
</table>

*Bold* Highlights items you can select in the software interface, including buttons and menus.

> The arrow indicates a menu choice. For example, “select **File >Open**” means “select the **File** menu, then select the **Open** choice on the File menu.”

*Blue* Highlights items you can click on directing you to a location with additional information (electronic version).

**TECHNICAL SUPPORT**

For assistance, please contact Dynojet Technical Support at 1-800-992-4993, or write to Dynojet at 2191 Mendenhall Drive, North Las Vegas, NV 89081.

Visit us on the World Wide Web at [www.dynojet.com](http://www.dynojet.com) where Dynojet provides state of the art technical support, on-line shopping, and press releases about our latest product lines. Try our remote support assistance or watch one of our informative videos.

Access the electronic version of this guide along with additional accessory guides, software guides, and the latest technical bulletins at [www.dynojet.com/downloads](http://www.dynojet.com/downloads).
YOUR DYNO ROOM

This section is not meant to imply that a dyno room is essential to repeatable results on a Dynojet dynamometer. However, a dyno room with an engine cooling intake fan, exhaust extraction, and noise reduction capabilities can add a new dimension to your shop.

A proper dyno room design will help to ensure repeatable, accurate runs. A good dyno room should do the following:

- minimize noise
- provide a controlled environment for testing
- provide a view window (safety glass) for customers
- be designed with safety in mind

Intake Air Fan—After building your dyno room, you will need to supply an intake air fan. The intake air fan supplies air to cool the vehicle’s engine while supplying fresh oxygen for you and your vehicle to breathe. It is a common misconception that you cannot tune a vehicle without a large fan simulating exact road conditions; however, a good cooling fan is the only requirement for consistent diagnostics and tuning. The dyno room requires a minimum of seven (7) air changes per minute (CFM). Use the formula \( \text{Room Volume} \times \text{Air Changes Per Minute} = \text{CFM} \) to calculate the CFM needed for your dyno room. For example, if your room is 10 x 10 x 10 (room volume is L×W×H), then \( 1000 \times 7 = 7000 \text{ CFM} \). The CFM value is room size dependent.

Equalizer Box—If the air flow rate coming into the dyno room is greater than the air flow rate leaving the dyno room, the room will become pressurized. A pressurized dyno room will make measured power misleading. To compensate, you need an equalizer box. The equalizer box is a baffled (to reduce noise) vent to the outside of your dyno room. The size of the equalizer box is dependent on the size of your dyno room and the size of your fans.

Exhaust Extraction—An exhaust fan is needed to remove exhaust gasses, especially carbon monoxide, from the dyno room. Carbon monoxide is potentially lethal to people if not removed from the room and will affect engine power when mixed with fresh air.

**WARNING**

Engine exhaust contains poisonous carbon monoxide gas. Breathing it could cause death. Operate machine in well ventilated area.

Fire Suppression—Always have adequate fire suppression or fire extinguishers in your dyno room.

Industrial Noise Control, Inc. Industrial Noise Control, Inc. offers a zinc-coated steel room custom built to your specifications. This room meets all dyno room requirements. The dyno room must be clean and dry with a comfortable room air temperature above 32 degrees Fahrenheit (0 degrees Celsius), and have some system of exhaust extraction.
DYNAOMETER SPECIFICATIONS AND REQUIREMENTS

The following specifications and requirements will help you set up your dyno area and verify you have the requirements necessary to operate your dyno safely. For more information about dyno room setup and layout, refer to the Pre-Installation Guide P/N 98200083.

CHASSIS SPECIFICATIONS

<table>
<thead>
<tr>
<th>description</th>
<th>specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td></td>
</tr>
<tr>
<td>of frame</td>
<td>74.00 cm (29.00 in.)</td>
</tr>
<tr>
<td>including feet</td>
<td>90.00 cm (35.25 in.)</td>
</tr>
<tr>
<td>including brake</td>
<td>97.00 cm (38.00 in.)</td>
</tr>
<tr>
<td>pit covers</td>
<td>145.00 cm (57.00 in.)</td>
</tr>
<tr>
<td>Height</td>
<td></td>
</tr>
<tr>
<td>to top of frame</td>
<td>58.50 cm (23.00 in.)</td>
</tr>
<tr>
<td>Width</td>
<td></td>
</tr>
<tr>
<td>of frame</td>
<td>218.50 cm (86.00 in.)</td>
</tr>
<tr>
<td>of frame with eddy current brake</td>
<td>321.00 cm (126.50 in.)</td>
</tr>
<tr>
<td>of pit covers, frame</td>
<td>279.50 cm (110.00 in.)</td>
</tr>
<tr>
<td>of pit covers, frame and eddy current brake</td>
<td>381.00 cm (150.00 in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>224 dyno/crated dyno 1,588 kg (3,500 pounds)/ 1,905 kg (4,200 pounds)</td>
</tr>
<tr>
<td>Drum</td>
<td></td>
</tr>
<tr>
<td>diameter</td>
<td>61.00 cm (24.00 in.)</td>
</tr>
<tr>
<td>width</td>
<td>206.00 cm (81.00 in.)</td>
</tr>
<tr>
<td>Frame</td>
<td>structural steel channel and angle</td>
</tr>
<tr>
<td>Maximum Speed</td>
<td>322 KPH (200 MPH)</td>
</tr>
<tr>
<td>Maximum Axle Weight</td>
<td>1,361 kg (3,000 pounds)</td>
</tr>
<tr>
<td>Remote Switches</td>
<td>remote software control</td>
</tr>
</tbody>
</table>
Figure 1-1: Model 224xLC In Ground Dyno Dimensions
381.00 cm (150.00 in.)
frame and eddy current brake
pit covers

279.50 cm (110.00 in.)
frame pit covers

145.00 cm (57.00 in.)

Figure 1-2: Model 224xLC In Ground Dyno with Pit Covers Dimensions
CHAPTER 1

Dynamometer Specifications and Requirements

COMPRESSED AIR

You will need to provide an air hose nipple (1/4-inch NPT) to connect your clean, dry shop air supply (100-140 psi) to the dyno.

The following requirements are needed for the air brake:
• air dryer
• shut off valve
• gauge on the regulator
• 1/4-inch NPT pipe thread connector (to attach air to the dyno)

The following requirements are needed for the optional Air Fuel Ratio (AFR) module:
• Clean and dry air, 100 psi regulated (690 kpa), 5 CFM (.014 m3/min) or better flow
• 1/4-inch NPT pipe thread compressed air connector
• optional air regulator

COMPUTER SPECIFICATIONS

You will need to provide a computer system to run the Power Core software. Refer to www.dynojet.com for the latest computer requirements.

<table>
<thead>
<tr>
<th>description</th>
<th>minimum specifications</th>
<th>recommended specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Windows 7 or later</td>
<td>Windows 7 or later</td>
</tr>
<tr>
<td>Processor</td>
<td>Dual Core Processor, 2GHz or faster</td>
<td>Intel Core i5 2.8GHz or faster</td>
</tr>
<tr>
<td>Memory</td>
<td>4GB System Ram</td>
<td>8GB System Ram or more</td>
</tr>
<tr>
<td>Hard Drive</td>
<td>100GB or larger (54MB required for program)</td>
<td>500GB or larger (54MB required for program)</td>
</tr>
<tr>
<td>Monitor/Graphics Card</td>
<td>1280x1024 (SXGA) resolution or higher</td>
<td>1600x900 resolution or higher</td>
</tr>
<tr>
<td>Network Adapter</td>
<td>1 free 10/100 Mbps RJ45 Ethernet Port</td>
<td>1 free 100Mbps RJ45 Port or Wireless</td>
</tr>
<tr>
<td>External Media</td>
<td>CD-Rom Drive</td>
<td>CD-Rom Drive</td>
</tr>
<tr>
<td>Printer</td>
<td>Printer, if prints are needed</td>
<td>Color printer, if prints are needed</td>
</tr>
</tbody>
</table>
ELECTRICAL REQUIREMENTS

<table>
<thead>
<tr>
<th>description</th>
<th>specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Requirements: 4WD electronics</td>
<td>100-240 VAC, 50/60 Hz</td>
</tr>
<tr>
<td>Power Requirements: dyno electronics</td>
<td>100-240 VAC, 50/60 Hz</td>
</tr>
<tr>
<td>Power Requirements: AFR</td>
<td>100-240 VAC, 50/60 Hz</td>
</tr>
<tr>
<td>Power Requirements: computer</td>
<td>Per computer manufacturer specifications</td>
</tr>
<tr>
<td>Power Requirements: optional eddy current brake</td>
<td>240v 30amp single phase circuit for each eddy current brake</td>
</tr>
</tbody>
</table>

The eddy current braking power source require user supplied grounded electrical outlets with over current and short-circuit protection. These must be accessible to the operator to be used as a disconnect.

ENVIRONMENTAL REQUIREMENTS

<table>
<thead>
<tr>
<th>description</th>
<th>specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>10°C/50°C (50°F/122°F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>0 to 95% non-condensing</td>
</tr>
</tbody>
</table>

FIRE SUPPRESSION

Always have adequate fire suppression or fire extinguishers in your dyno room.

FORKLIFT REQUIREMENTS

You will need to provide equipment capable of lifting a minimum of 2,722 kg. (6,000 lb.) to lift the dyno off the crate and into position in your dyno room. You will also need a pair of straps capable of supporting the uncrated dyno. Dynojet recommends using single loop style straps. Use an approved strap lifting attachment for the forklift to prevent strap slippage. Using lift straps with bare forks is not OSHA compliant.

GROUNDING REQUIREMENTS

You will need to ground the vehicle to the dyno before every run using the vehicle grounding kit P/N 76100015. Never operate the dyno without first grounding the vehicle to the dyno. Refer to “Grounding the Vehicle” on page 4-8.

⚠️ CAUTION ⚠️

Never operate the dyno without properly grounding the vehicle to the dyno.
PHONE AND INTERNET ACCESS

Dynojet recommends you have a phone close to the dyno to call for assistance in an emergency. You may also wish to contact Dynojet to troubleshoot your dyno.

Internet access on your computer is desirable for contacting Dynojet and downloading new information and updates.

TIE-DOWN STRAPS

Dynojet recommends using tie-down straps for securing the car on the dyno. The dyno comes with an automotive tie-down package.

TOOL REQUIREMENTS

You will need to provide a drill and drill bit capable of drilling holes in concrete. Refer to Appendix A for more information on installing Red Head Anchors.

- drill bit size: ½-inch
- minimum hole depth: 1 ⅝-inch (41.2 mm)
MODEL 224XLC IN GROUND AUTOMOTIVE DYNAMOMETER

Figure 1-3: Model 224xLC In Ground Dyno with 224 Pit Cover Set
DYNOWARE RT ELECTRONICS

The DynoWare RT electronics consists of a main module and a speed pickup. Optional modules include the Air Fuel Ratio (AFR) module and the Eddy Current Brake (ECB) driver. Use this section to identify the modules and connections. More detailed information for configuring the DynoWare RT electronics can be found in the Power Core Help.

![Figure 1-4: DynoWare RT Electronics]

- main module
- speed pickup
- eddy current brake driver
- air fuel ratio module
**Main Module Connections**

A description of the main module symbols and connections follows.

<table>
<thead>
<tr>
<th>use this port</th>
<th>toAVISLista</th>
<th>use this port</th>
<th>toAVISLista</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPM Inputs</td>
<td>Connect inductive and optical RPM inputs.</td>
<td>Auxiliary Temperature</td>
<td>Connect to an auxiliary input for an infrared temperature sensor.</td>
</tr>
<tr>
<td>Communication I/O</td>
<td>Connect to auxiliary Dynojet products such as the Power Commander, Wideband 2, etc.</td>
<td>Auxiliary Switch</td>
<td>Connect to the brake air pressure switch on 248 and older 224 dynos.</td>
</tr>
<tr>
<td>Communication I/O</td>
<td>Connect to auxiliary dyno electronics such as the pendant, atmospheric module, etc.</td>
<td>Emergency Stop</td>
<td>Connects the dyno electronics to the emergency stop input on the 200i/250i dynos.</td>
</tr>
<tr>
<td>Communication I/O</td>
<td>Connect to internal dyno electronics and controllers such as the ECB controller and AFR module.</td>
<td>Network Connection</td>
<td>Connects the dyno electronics to your computer or computer network.</td>
</tr>
<tr>
<td>Drum</td>
<td>Connect to the drum 1 and drum 2 speed inputs and digital brake outputs.</td>
<td>Refer to Instructions</td>
<td>Do not press this button unless instructed to do so by a Dynojet Technician. This button may need to be pressed to update the device.</td>
</tr>
</tbody>
</table>
NETWORK CONNECTIONS

The Dynojet DynoWare RT dyno electronics connects to your computer directly or over a Local Area Network. If you have an existing network, connect the DynoWare RT main module to a router or a network switch on your network. If you do not have an existing network, you can create a network for the DynoWare RT by connecting the main module to a router.

There are some advantages to connecting the DynoWare RT to a network, particularly a wireless network. With DynoWare RT on a network, a single dedicated computer for the dyno is no longer required. Any computer on the network can connect and operate the dyno. A wireless connection allows you to control the dyno from inside the vehicle without a cable running to the DynoWare RT main module.

**Note:** The DynoWare RT allows only one computer at a time to connect.

When the DynoWare RT main module is on a network connected to the internet, automatic updates for both the DynoWare RT and software are possible.

<table>
<thead>
<tr>
<th>connection method</th>
<th>auto updates</th>
<th>multi-computer connection</th>
<th>wireless connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless Network Internet</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Wireless Network Router</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Direct Connection Point to Point</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1-5: DynoWare RT Network Connections
PIT SPECIFICATIONS

Before installing your dynamometer, prepare your pit according to the specifications provided by your salesperson.

Refer to the pit dimensions (P/N 98219103) for more detailed specifications.

224 PIT REQUIREMENTS AND SPECIFICATIONS

<table>
<thead>
<tr>
<th>description</th>
<th>specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>length</td>
<td>134.62 cm (53.00 in.)</td>
</tr>
<tr>
<td>depth</td>
<td>58.42 cm (23.00 in.)</td>
</tr>
<tr>
<td>width</td>
<td>269.24 cm (106.00 in.)</td>
</tr>
<tr>
<td>width with eddy current brake</td>
<td>370.84 cm (146.00 in.)</td>
</tr>
</tbody>
</table>

Figure 1-6: Verify Pit Dimensions
This chapter will walk you through unpacking and installing the dynamometer. To ensure safety and accuracy in the procedures, perform the procedures as they are described.

This chapter is divided into the following categories:

• Unpacking and Inspecting the Dyno, page 2-2
• Dyno Installation, page 2-5
• Eddy Current Brake Installation, page 2-8
• Cable Routing, page 2-9
• Pit Cover Installation, page 2-14
• Ground Hook Installation, page 2-16
UNPACKING AND INSPECTING THE DYNO

When you receive your dyno, examine the exterior of the shipping container for any visible damage. If damage is detected at this stage, contact the shipper or Dynojet before proceeding.

Use the following steps to unload your dyno. You will need to provide equipment capable of lifting a minimum of 2,722 kg. (6,000 lb.) to move the crated dyno into position in your dyno room.

1. Move the crated dyno to a clear area near your dyno room.
2. Using a pry bar and a hammer, remove the top and sides of the crate.
3. Inspect the exterior of the dyno for any indications of damage. Report any damage immediately.
4. Remove the boxes and loose parts from the crate, verify their condition and contents, and set them aside.

<table>
<thead>
<tr>
<th>part</th>
<th>description</th>
<th>part</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>224 foot (4)</td>
<td>P/N 21917100</td>
<td>pendant assembly</td>
<td>P/N 76100007</td>
</tr>
<tr>
<td>chock (4)</td>
<td>P/N 2A092</td>
<td>vehicle grounding kit</td>
<td>P/N 76100015</td>
</tr>
<tr>
<td>axle strap, 21” (4)</td>
<td>P/N 30AS21</td>
<td>CAN termination plug</td>
<td>P/N 76423045</td>
</tr>
<tr>
<td>power cord, 125V, 10A</td>
<td>P/N 318110301</td>
<td>primary inductive pickup (2)</td>
<td>P/N 76950201</td>
</tr>
<tr>
<td>bolt, 3/8-16 x 1.5”, flange, hex (4)</td>
<td>P/N 36582471</td>
<td>secondary inductive pickup (2)</td>
<td>P/N 76950203</td>
</tr>
</tbody>
</table>
### Unpacking and Inspecting the Dyno

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>washer, 3/8”, flat (4)</td>
<td>P/N 36923100</td>
<td>cable, CAN dyno user, 15’</td>
<td>P/N 76950798</td>
</tr>
<tr>
<td>anchor, Red Head, 3/8” (4)</td>
<td>P/N 37513200</td>
<td>*included with the optional</td>
<td></td>
</tr>
<tr>
<td>installation tool, Red Head</td>
<td>P/N 37518200</td>
<td>anchor, Red Head, 3/8” (4)</td>
<td></td>
</tr>
<tr>
<td>car tie-down, 2” x 10’ (4)</td>
<td>P/N 500-C10</td>
<td>screw, mach 8-32 x 1/2” (4)</td>
<td>P/N DE100-109S</td>
</tr>
<tr>
<td>car tie-down, hi-perf, 2” x 10’ (2)</td>
<td>P/N 500-C10W/S</td>
<td>washer, #8 ext star (4)</td>
<td>P/N 91114A009</td>
</tr>
<tr>
<td>DynoWare RT main module</td>
<td>P/N 66100016</td>
<td>banner, dynojet (2)</td>
<td>P/N D706</td>
</tr>
<tr>
<td>remote atmos assembly</td>
<td>P/N 66400011</td>
<td>bolt, 3/8-16 x 1”, hex (4)</td>
<td>P/N DM150-019-012</td>
</tr>
</tbody>
</table>

*Note: P/N stands for Part Number.*
## 2. Unpacking and Inspecting the Dyno

### In Ground Model 224 Automotive Dynamometer Installation Guide

<table>
<thead>
<tr>
<th>part Description</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The following parts are included in the 224 Pit Cover Set P/N 81923001:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side pit cover (2)</td>
<td>P/N 21216502P</td>
<td></td>
</tr>
<tr>
<td>End pit cover (2)</td>
<td>P/N 61245100P</td>
<td></td>
</tr>
<tr>
<td>Bolt, 3/8-16 x 1.25”, button-head flange, allen (16)</td>
<td>P/N 36582034</td>
<td></td>
</tr>
<tr>
<td>Ground hook kit</td>
<td>P/N 79100006</td>
<td>See list of parts below</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>part Description</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The following parts are included in the Ground Hook Kit P/N 79100006:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground hook/D-ring (10)</td>
<td>P/N 10111</td>
<td></td>
</tr>
<tr>
<td>Washer, 5/16”, flat (20)</td>
<td>P/N DM150-002-007</td>
<td></td>
</tr>
<tr>
<td>Washer, 3/8”, splitlock, steel (20)</td>
<td>P/N 36932100</td>
<td></td>
</tr>
<tr>
<td>Bolt, 3/8-16 x 1”, hex (20)</td>
<td>P/N DM150-019-012</td>
<td></td>
</tr>
<tr>
<td>Anchor, Red Head, 3/8” (20)</td>
<td>P/N 37513200</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>part Description</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The following parts are included in the Grounding Kit P/N 76100015:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grounding bracket</td>
<td>P/N 21600084</td>
<td></td>
</tr>
<tr>
<td>Cable, vehicle ground</td>
<td>P/N 76950788</td>
<td></td>
</tr>
<tr>
<td>Screw, 1/4-20 x 1/2”</td>
<td>P/N 36560834</td>
<td></td>
</tr>
</tbody>
</table>
DYNO INSTALLATION

This section will walk you through removing the dyno from the crate and installing the dyno in the pit.

REMOVING THE DYNO FROM THE CRATE

You will need to provide equipment capable of lifting a minimum of 2,722 kg. (6,000 lb.) to move the crated dyno into position in your dyno room. You will also need a pair of straps capable of supporting the same weight. Dynojet recommends using two 2-inch x 6-foot single loop style straps.

Be sure you record the dynamometer number on the inside cover of this manual.

1. Remove the crate braces that support the top portion of the crate.
2. Remove the four lag bolts and washers securing the dyno to the crate base using a 9/16-inch socket, open or box end wrench.
3. Remove the four flange bolts securing the crate feet to the dyno. Set aside the feet and bolts.
4. Route the loop strap through the opening in the dyno frame and through itself. Pull the strap tight. Do this on each side of the dyno frame.
5. Push the forklift forks together.
6. Place each loop strap over both forks.
   Note: The straps must be the same length and meet in the middle. Verify each loop strap is over both forks to prevent the forks from being pulled apart.
7. Using the forklift, carefully lift the dyno off the crate and move it into position in your dyno room.
8 Place the drum module in the pit as shown.  
**Note:** If you have an eddy current brake (retarder), refer to the pit dimensions (P/N 98219103) for more detailed specifications.

![Diagram of Dyno in Pit](image)

Figure 2-2: Position the Dyno in Pit
ANCHORING THE DYNO

Dynojet recommends you secure your dyno to the pit floor in your dyno room using concrete anchors. Use the following instructions to secure the dyno to the floor.

Note: Make sure you install and align the eddy current brake with the dyno before anchoring the dyno. Refer to Chapter 3 for eddy current brake installation instructions.

You will need the following parts:

- 36923100 Washer, 3/8”, Hardened, Flat, Steel (4)
- 37513200 Anchor, Red Head, 3/8” (4)
- 37518200 Red Head Anchor Installation Tool
- DM150-019-012 Bolt, 3/8-16 x 1”, Hex (4)

1 Using the mounting feet as a template, mark and drill each hole needed to secure the four dyno feet to the floor.
2 Install four Red Head anchors. Refer to Appendix A for installation instructions.
3 Secure each mounting foot to the dyno using the bolts and flat washers removed earlier.
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.
5 If necessary, use shims to level the dyno before tightening the anchor bolts.

Figure 2-3: Secure the Dyno to the Pit Floor
EDDY CURRENT BRAKE INSTALLATION

Refer to Chapter 3 for eddy current brake installation instructions and install your eddy current brake at this time.

Figure 2-4: Eddy Current Brake
## Cable Routing

Use the following instructions to identify and route the cables. You will need to route the cables before installing the pit covers.

### Identifying the Cables

<table>
<thead>
<tr>
<th>Cable</th>
<th>Brief Routing Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - 318110301 power cable</td>
<td>Connects the DynoWare RT to a power outlet</td>
</tr>
</tbody>
</table>
| B - 318110301 power cable | Connects the air fuel module to a power outlet  
  *the air fuel ratio module is an optional accessory* |
| C - 42900000 network cable | Connects the DynoWare RT to your local network |
| D - 66400011 remote atmos cable assembly | Connects to the DynoWare RT |
| E - 66952003 controller cable | Connects the eddy current brake to the eddy current brake driver |
| F - 76100007 CAN pendant cable assembly | Connects to the DynoWare RT |
| G - 76950201 primary RPM pick up cable  
  - 76950203 secondary pick up cable | Connects to the DynoWare RT |
<p>| H - 76950311 power cable | Connects the eddy current brake driver to a power outlet |</p>
<table>
<thead>
<tr>
<th>Cable</th>
<th>Brief Routing Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T - 76950547</td>
<td>speed pick up/brake cable connects the brake solenoid and speed pick up to the DynoWare RT</td>
</tr>
<tr>
<td>J - 76950569</td>
<td>IR temp sensor cable connects to the temp sensor cable to the eddy current brake driver</td>
</tr>
<tr>
<td>K - 76950574</td>
<td>load cell cable connects the load cell to the eddy current brake driver</td>
</tr>
<tr>
<td>L - 76950791</td>
<td>CAN control cable, 15' connects the eddy current brake driver to the DynoWare RT using the CAN adapter cable or CAN network cable chain</td>
</tr>
<tr>
<td>M - 76950798</td>
<td>CAN dyno user cable, 15' connects the air fuel module to the DynoWare RT using the CAN adapter cable  *the air fuel ratio module is an optional accessory</td>
</tr>
<tr>
<td>N - 76950807</td>
<td>CAN control cable, adapter, 2' connects the DynoWare RT to the CAN control and CAN dyno user cables</td>
</tr>
<tr>
<td>O - 76423045</td>
<td>CAN termination plug connects to the last CAN cable in the CAN network cable chain</td>
</tr>
<tr>
<td>P - air hose</td>
<td>connects the air can on the dyno to your clean dry shop air (customer supplied)</td>
</tr>
</tbody>
</table>
ROUTING THE CABLES

Use the following instructions along with Figure 2-6 on page 2-12 for routing the cables. You will need to route the cables before installing the pit covers.

1. Route the speed pickup/brake cable (I) from the speed pickup card and brake solenoid leads on the dyno, through one of the pit conduits, to DRUM 1 on the back of the DynoWare RT module.
2. Connect the IR temperature sensor cable (J) to the eddy current brake driver.
3. Connect the load cell cable (K) to the eddy current brake driver.
4. Route the power cable (H) from the eddy current brake driver, through one of the pit conduits, and plug the power cable into your power source. Refer to Appendix B for power requirements.
5. Connect the controller cable (E) from the eddy current brake to the eddy current brake driver.
6. Attach the CAN adapter cable (N) to the back of the DynoWare RT main module.
7. Attach the CAN dyno user cable (M) to the CAN adapter cable (N) and route to the AFR assembly. Attach the CAN dyno user cable (M) to the AFR assembly.
   **Note:** The AFR assembly is an optional accessory.
8. Attach the CAN control cable (L) to the “T” on the CAN dyno user cable (M) and route the cable through one of the pit conduits to the eddy current brake driver. Attach the CAN control cable (L) to the eddy current brake driver.
9. Insert the CAN termination plug (O) in the CAN control cable (I).
   **Note:** If you do not have an eddy current brake or AFR assembly, insert the CAN termination plug (O) at the end of your CAN network cable chain.

![Figure 2-5: CAN Network Cable Configuration](image-url)
10 Route the air hose from your clean dry air supply through one of the pit conduits.
11 Connect the air hose (P) from your clean dry air supply to the T fitting on the dyno brake solenoid.
   **Note:** The air brake comes installed with a hose barb for a 3/8-inch inside diameter air hose. If your hose does not have an inside diameter of 3/8-inch you will need an air hose nipple (1/4-inch NPT) to connect your clean, dry shop air supply to the dyno. Once the pressure is connected, the air brake is ready to use.
12 Connect the CAN pendant cable (F) to the DynoWare RT module.
13 Connect the remote atmos cable (D) to the DynoWare RT module.
14 Connect the primary/secondary pickup cable (G) to the DynoWare RT module.
15 Connect the network cable (C) to your DynoWare RT module and connect to your network. Refer to “Network Connections” on page 1-14 for more information.
16 Connect the power cable (A) to the DynoWare RT module. Plug the power cable into your power source.

Figure 2-6: Routing the Cables
ALIGNING THE OPTICAL PICKUP CARD TAB

The optical pickup card is an electronic circuit board that accurately senses each drum revolution. The pickup card is recessed into the side of your dyno. The optical pickup card comes installed, the cable routed, and ready to use, but should be checked for alignment before the drum is turned.

1. Turn on the DynoWare RT main module.
2. Release the brake by pressing the red button on the pendant.
3. While looking through the optical pickup window, slowly turn the drum until a tab approaches the pickup. The tab should pass through the pickup without contact and should be centered in the pickup.
4. If the tab is not centered adjust by loosening the mounting screws.
5. Set the brake by pressing the red button on the pendant.

⚠️ CAUTION

The optical pickup is very delicate. Be careful not to damage the optical pickup.

Figure 2-7: Pickup Card and Cable
PIT COVER INSTALLATION

Before installing the pit covers, be sure you have routed any cables and connected your shop air. Refer to “Cable Routing” on page 2-9 for more information. If you ordered the CE drum guards, install them before securing the pit covers. Refer to the CE Package Installation Manual (P/N 98295112).

Note: If you did not order the pit cover set, you will not have pit covers.

You will need the following parts:

- 21216502P Side Pit Cover (2)
- 36582034 Bolt, 3/8-16 x 1.25”, Button-head Flange, Allen (21)
- 61245100P End Pit Cover (2)
- DM150-009-005 Nut, 1/4” (8)

1 Loosely install the left end pit cover to the dyno and end deck assembly using five 3/8-16 x 1.25” button-head flange bolts.
2 Loosely install the right end pit cover to the dyno using two 3/8-16 x 1.25” button-head flange bolts.

Figure 2-8: Install the Left and Right End Pit Covers
3Loosely install the side pit covers to the dyno and the end pit covers using seven 3/8-16 x 1.25" button-head flange bolts each.
4Tighten all pit cover screws.

Figure 2-9: Install the Side Pit Covers
GROUND HOOK INSTALLATION

Using Figure 2-10 as a guide, place the ground hooks in a location that works best for your dyno application.

You will need the following parts:

- 10111  Ground Hook/D-Ring (10)
- 36932100  Washer, 3/8”, Splitlock, Steel (20)
- 37513200  Anchor, Red Head, 3/8” (20)
- DM150-002-007  Washer, 5/16”, Flat (20)
- DM150-019-012  Bolt, 3/8-16 x 1”, Hex (20)

1. Using the ground hook as a template, mark and drill each hole needed to secure the ground hooks to the floor.

2. Install the Red Head anchors. Refer to Appendix A for installation instructions.

3. Secure each ground hook to the floor using two 3/8-16 x 1-inch hex bolts, two 5/16-inch flat washers, and two 3/8-inch lock washers.

Figure 2-10: Ground Hook Placement
The eddy current brake, when added to Dynojet’s market leading inertia dynamometer, results in a complete vehicle performance test.

This chapter provides instructions for installing the eddy current brake (retarder) to the model 224 automotive dynamometer. This chapter also provides instructions for installing the load cell along with load cell calibration procedures. To ensure safety and accuracy in the procedures, perform the procedures as they are described.

This chapter is divided into the following categories:
- Eddy Current Brake Installation, page 3-2
- Load Cell Calibration, page 3-18
EDDY CURRENT BRAKE INSTALLATION

This section will walk you through removing the eddy current brake from the crate, installing the eddy current brake to the dyno, and installing the eddy current brake driver.

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.

Refer to Appendix B for information on the power requirements for the eddy current brake.

**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.
Before installing the eddy current brake—verify the mounting holes

Dynos with the serial number 2240308 and lower will need to have mounting holes drilled into the dyno frame before installing the eddy current brake.

Using a 5/8-inch or 1/2-inch drill, mark and drill the four holes as shown in Figure 3-1.
CHAPTER 3

Eddy Current Brake Installation

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.

<table>
<thead>
<tr>
<th>part description</th>
<th>part description</th>
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<td>washer, 3/8&quot;, flat (10)</td>
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<td>anchor, Red Head, 3/8&quot; (2)</td>
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<td>P/N 37513200</td>
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<td>installation tool, Red Head anchor</td>
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<tr>
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<td>P/N 37518200</td>
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<td>P/N 61118131P</td>
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<td>P/N 61319001</td>
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<td>bolt, 1/2-13 x 1-1/4&quot;,</td>
<td>P/N 36800001</td>
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<td>flange hex (2)</td>
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<tr>
<td>bolt, 1/2-13 x 1.5&quot;,</td>
<td>P/N 36801080</td>
</tr>
<tr>
<td>flange hex (2)</td>
<td></td>
</tr>
</tbody>
</table>
3. Remove the uprights and cross members from the crate.

4. Remove the two screws securing each pit cover support. Set the screws and supports aside.

**RECORD #**

Be sure you record the eddy current brake number on the inside cover of this manual.
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:

- 76950569 Temperature Sensor Assembly

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.
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:

- 22100022 Splined Shaft Assembly
- 32355056 Bearing
- 36801080 Bolt, 1/2-13 x 1.5", Flange-Hex (2)
- 62240130 Driveline Assembly

1. 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 “Before Installing the Eddy Current Brake—Verify The Mounting Holes” on page 3-3
2 Insert the spline shaft through the bearing and into the spline hub of the drum. **Note:** Make sure the short spline end faces out.

3 Push the spline shaft in until it bottoms out then back the shaft out 1/4-inch. **Note:** Make sure to back the shaft out 1/4-inch to prevent friction.

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 3-7: 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. Remove the four lag bolts securing the brake to the crate.
2. Place the keyed yoke onto the eddy current brake shaft.

![Diagram of Eddy Current Brake Installation](image-url)

Figure 3-8: Remove the Bolts Securing the Brake to the Crate and Install the Yoke
3 Place one nylon loop strap around the brake shaft with the yoke. Keep the strap close to the bearing.

4 Place one nylon loop strap around the other side of the brake shaft. Keep the strap close to the bearing.

   Dynojet recommends using single loop style straps.

5 Place the nylon loop straps around the forklift forks.

6 Slide the forklift forks together until the straps angle inward. This will prevent the straps from slipping off the brake shaft.

7 Using the forklift, lift the eddy current brake from the crate and place the brake in the pit next to the dyno.

Figure 3-9: Remove the Brake from the Crate
8 Line up the eddy current brake yoke with the driveline assembly.
9 Slide the brake frame towards the dyno frame until they touch. Make sure the brake yoke is aligned with the driveline assembly and the driveline is straight.
10 Secure the yoke to the driveline assembly using the four bolts removed earlier. Torque the bolts to 70 foot-pounds.
11 Secure 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.
12 Torque the brake yoke set screws to 25 foot-pounds.
INSTALLING THE LOAD CELL

You will need the following part:

- **76950574** 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.

![Figure 3-11: Verify the Load Cell Spacing](image)

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

![Figure 3-12: Install the Load Cell](image)
INSTALLING THE PIT COVER SUPPORTS AND EDDY CURRENT BRAKE DRIVER

You will need the following parts:

- **1904004** Screw, 4-40 x 1/4", Ph-Phil (4)
- **21200068** Bracket, Eddy Current Brake Driver (2)
- **21626210** Cable Routing Channel
- **36540647** Screw, 8-32 x 3/8", Ph-Sems, Phil (4)
- **36561045** Screw, 1/4-20 x 5/8", Pan-Head, Torx (2)
- **66400019** Eddy Current Brake Driver
- **134490301** Nut, 8-32, with Lock Washer (4)
- **A10Z2-304A** Bumper, 3/8 x 1/2" (4)

1. Loosely secure the pit cover supports to the frame using the two 1/4-20 x 3/4-inch button-head flange screws for each support removed earlier.

   **Note:** Do not tighten the screws.

2. Verify the pit cover supports are flush with the top of the pit floor before you tighten the screws.

   2a. Place a straight edge across the pit cover supports.

   2b. With the pit cover supports tight against the straight edge, tighten the screws.

   **Note:** You can use c-clamps to attach the upright to the straight edges to make this quicker. Tighten the c-clamps until the pit cover supports are flush with the pit floor.

2c. Remove the straight edge.

   **Note:** For clarity, the pit is not shown.

---

Figure 3-13: Install the Pit Cover Supports
3 Secure the mounting brackets to the eddy current brake driver using two 4-40 x 1/4-inch screws each.
4 Secure the four bumpers to the mounting brackets using four 8-32 x 3/8-inch screws.

![Install mounting brackets and bumpers](image)

**Figure 3-14: Install the Mounting Brackets and Bumpers**

5 Install the eddy current brake driver using four 8-32 nuts.
6 Install the cable routing channel using two 1/4-20 x 5/8-inch screws.

![Install eddy current brake driver and cable routing channel](image)

**Figure 3-15: Install the Eddy Current Brake Driver and Cable Routing Channel**
SECURING THE BRAKE TO THE DYNOMETER 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:

- 21917100 Mounting Foot (2)
- 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, Red Head, 3/8” (2)
- 37518200 Red Head 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 3-16: Secure the Brake to the Dyno Room Floor
INSTALLING THE PIT COVERS

Before installing the pit covers, be sure you have routed any cables and connected your shop air. Refer to “Cable Routing” on page 2-9 for more information.

You will need the following parts:

- 21217504 Hood Scoop
- 21217505 Hood Scoop, 20"
- 36561045 Screw, 1/4-20 x 5/8", Pan-Head, Torx (8)
- 36580434 Bolt, 3/8-16 x 1/2", Button-Head Flange (4)
- 61118131P Eddy Current Brake Pit Cover
- DM150-009-005 Nut, 1/4" (8)

1 If not already installed, secure each hood scoop to the eddy current brake pit cover using four 1/4-20 x 5/8-inch pan-head torx screws and four 1/4-inch nuts each.

2 Loosely install the eddy current brake pit cover to the pit supports using four 3/8-16 x 1/2-inch button-head flange screws.

Figure 3-17: Install the Eddy Current Brake Pit Cover
LOAD CELL CALIBRATION

Before proceeding, make sure all cables have been routed and the covers have been installed.

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. Double-click the Power Core program icon.
2. Click Dyno Control from the Application Launcher.
3. Verify you are connected to the DynoWare RT.
   
   **Note:** For more information on connecting to the dyno electronics, refer to the Power Core Quick Start Guide or the Power Core Online Help.
4. Click the **Configuration tab**.
5. Click Load Cell Calibration.
   
   **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.
6. Click **Next** to zero the load cell.

![Figure 3-18: Zero Calibration Window](image-url)

Refer to the documentation for detailed instructions and procedures.
Once the load cell is zeroed, the Calibration Mass window will appear.

7. Enter the calibration arm value in the Mass box. Refer to Figure 3-20. **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**.

![Figure 3-19: Calibration Mass Window](image)

Enter the calibration number stamped near the bolt pattern at the end of the calibration arm in the Mass box. 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.

![Figure 3-20: Calibration Arm Number](image)
8 Place the weights towards the rear of the vehicle.

**Note:** Calibration arm placement determines positive direction for torque. Place the weights towards the rear of the vehicle.

Refer to Figure 3-23 on page 3-21 for calibration arm installation instructions.
9 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 3-24 on page 3-22.

9a Secure the calibration arm to the eddy current brake by tightening the bolt using the handle.

9b Gently place the weights on the calibration arm.

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

⚠️ **CAUTION**

The calibration weights must be set on the arm gently to avoid damaging the load cell.

![Diagram](image)

Figure 3-23: Install the Calibration Arm and Weights Using the Bolt Pattern Closest to the End
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 3-24.

10 With the calibration arm and weights secured, click Next in the Load Cell Calibration dialog to continue.

Figure 3-24: Install the Calibration Arm and Weights Using the Bolt Pattern in the Center.
11 Once sending the torque cell calibration is complete, click **Next** to continue.

Figure 3-25: Calibration Is Complete Window

12 Remove the calibration arm and weights and click **Finish**.

Figure 3-26: Calibration Is Complete Window
The Dynojet Dynamometer gives you the state of the art technology, durability, and accuracy that you need. Dynojet’s advanced engineering delivers the precise horsepower measurements a technician needs to make quick and accurate evaluations of engine performance and drivetrain problems.

This chapter includes instructions for basic dyno operation. For more detailed instructions, refer to the Power Core Help.

This chapter is divided into the following categories:

- Loading the Vehicle, page 4-2
- Connecting the RPM Pickup, page 4-5
- Grounding the Vehicle, page 4-8
- Pre-Run Inspection, page 4-9
- Making a Test Run, page 4-11
- Preventative Maintenance, page 4-12
LOADING THE VEHICLE

Use the following steps to load a vehicle on the dyno.

You will need the following parts:

<table>
<thead>
<tr>
<th>part</th>
<th>description</th>
<th>part</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>short axle strap, 10M #, 21” (4)</td>
<td>car tie-down, 2” x 10” (4)</td>
<td>short axle strap, 10M #, 21” (4)</td>
<td>car tie-down, 2” x 10” (4)</td>
</tr>
<tr>
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<td>P/N 500-C10</td>
<td>P/N 30AS21</td>
<td>P/N 500-C10</td>
</tr>
<tr>
<td>long axle strap, 10M #, 6” (4)</td>
<td>car tie-down, high performance, 2” x 10” (2)</td>
<td>long axle strap, 10M #, 6” (4)</td>
<td>car tie-down, high performance, 2” x 10” (2)</td>
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<td>P/N 500-C10W</td>
<td>P/N 30AS72</td>
<td>P/N 500-C10W</td>
</tr>
</tbody>
</table>

1  Verify your computer is running. Set the dyno brake on by pressing the red button on the hand-held pendant.

**CAUTION**

*Verify the dyno brake is on before driving a vehicle onto the dyno.*

2  Drive the vehicle onto the dyno and align the vehicle straight with the dyno.

3  Stop the vehicle when the drive axle is centered on the drum.

![center drive axle on dyno drum](Figure 4-1: Center the Drive Axle on the Drum)
4 When the vehicle is positioned properly on the dyno, shut the engine off.
   • If the vehicle has an automatic transmission, place it in park.
   • If the vehicle has a manual transmission, place it in gear.
5 Set the vehicle’s emergency brake.
6 Secure the non-drive wheels using the provided tire chocks. Do not use tire chocks for four wheel drive vehicles on four wheel drive dynos.
7 Attach the tie-down straps.
   Rear Wheel Drive
   • Attach two tie-down straps from secure anchor points to the rear of the vehicle. Attach additional tie-down straps from the rear of the vehicle as shown in Figure 4-2.
   • Attach two tie-down straps from secure anchor points to the front of the vehicle.
   Front Wheel Drive
   • Attach two tie-down straps from secure anchor points to the rear of the vehicle.
   • Attach two tie-down straps from secure anchor points to the front of the vehicle. Attach additional tie-down straps across the front of the vehicle to form a crisscross.

WARNING

With front wheel drive vehicles, always use longitudinal and cross straps at the front of the vehicle.

Figure 4-2: Attach Tie-down Straps
8  Tighten the tie-down straps evenly making sure the drive wheels remain centered on the drum.

⚠️ CAUTION ⚠️
The tie-down straps should always be connected to the vehicle’s solid axle or the suspension control arms. Factory tie-down hooks connected to the vehicle’s frame may be used on the end opposite the drive wheels (for example: the front end of a rear driven vehicle).

9  Release the brake on the vehicle and the dyno.
10 Start the vehicle and put the transmission into first gear or drive.
11 Press the accelerator pedal so the drums begin turning slowly. While the drums are slowly turning, verify the stability of the vehicle.
12 Press the brake button to bring the dyno and vehicle to a stop.
13 Check all the straps and ensure the vehicle is tracking straight on the dyno.
CONNECTING THE RPM PICKUP

Your Dynojet dynamometer includes two primary wire inductive pickups and two secondary wire inductive pickups. These small “clothespin like” inductive pickups are used to sense RPM. An RPM pickup is required if you want to view torque graphs. Generally, you will use one secondary wire inductive pickup on a spark plug wire. The primary wire inductive pickup senses RPM pulses from the coil. Although this pickup location generally works better, it is harder to find the correct location to connect the RPM pickup.

The optional Optical Sensor is useful on diesel powered vehicles, MSD ignitions, and other high RFI ignition systems. For more detailed information on the Optical Sensor, refer to the Optical RPM Sensor Installation Guide (P/N 98200044).

⚠️ CAUTION ⚠️

Inductive pickups are very fragile. The ferrite core can easily be damaged and is not covered under warranty. Dropping, snapping, vibration, and heat can all damage the ferrite core.

The DynoWare RT contains the electronics that sense the RPM pulses.

You will need the following parts:

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<td>(2)</td>
</tr>
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RPM PICKUP DESCRIPTIONS

<table>
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<th>RPM pickup</th>
<th>description</th>
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</thead>
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<td>Secondaries (Non-wasted spark system)</td>
<td>Use one secondary pickup. Set the degrees between plug fires to 720° in Power Core.</td>
</tr>
<tr>
<td>Secondaries (Wasted spark ignition system)</td>
<td>Use one secondary pickup. Set the degrees between plug fires to 360° in Power Core.</td>
</tr>
<tr>
<td>Primary pickup</td>
<td>Attach the primary wire pickup to the primary side of the coil. Set the degrees between plug fires by taking 720/number of cylinders. For example, the number of degrees between plug fires on a V-8 engine with a single coil is 720/8=90 degrees.</td>
</tr>
<tr>
<td>Optional Optical RPM Sensor</td>
<td>Attach the sensor wire to the RPM port on the DynoWare RT module. The other end of the wire attaches to the Optical Sensor. Set the degrees between plug fires to 360° in Power Core. Refer to the Optical RPM Sensor Installation Guide (P/N 98200044).</td>
</tr>
</tbody>
</table>
Connecting the Secondary Inductive Pickup

The secondary inductive pickup cannot be in contact with, or its connecting wire be crossing other engine electrical wires or stray electrical interference may result.

1. Clip the secondary inductive pickup around one spark plug wire.
2. Route the inductive pickup cable to the RPM port on the DynoWare RT module making sure the cable is clear of devices that produce electronic noise (spark plug wires, coil wire, coil etc.).

**Note:** Inductive pickup placement is important. Position the inductive pickup so that it is not making contact with any other spark plug wires. Separate the spark plug wire from the spark plug wire bundle for proper operation.

**Note:** You must ground the vehicle to the dyno for the electronics to function properly. Refer to “Grounding the Vehicle” on page 4-8.

Figure 4-3: Secondary Inductive Pickup

Figure 4-4: Separate Spark Plug Wire
CONNECTING THE PRIMARY INDUCTIVE PICKUP

The primary inductive pickup cannot be in contact with, or its connecting wire be crossing other engine electrical wires or stray electrical interference may result.

1. Clip the primary inductive pickup around the negative side of the coil.
2. Route the primary wire cable to the RPM port on the DynoWare RT module making sure the cable is clear of devices that produce electronic noise (spark plug wires, coil wire, coil, etc.).

**Note:** You must ground the vehicle to the dyno for the electronics to function properly. Refer to “Grounding the Vehicle” on page 4-8.

![Figure 4-5: Primary Inductive Pickup](image-url)
GROUNDING THE VEHICLE

You will need to ground the vehicle to the dyno before every run. Use the following steps to install the grounding bracket and ground the vehicle to the dyno.

⚠️ CAUTION
Never operate the dyno without first grounding the vehicle to the dyno.

You will need the following parts:
- 21600084 Grounding Bracket
- 36560834 Screw, 1/4-20 x 1/2"
- 76950788 Vehicle Grounding Cable

1. Choose any location on your dyno with a black 1/4-20 x 5/8-inch torx screw that threads directly into the sheet metal and remove this screw.
2. Secure the grounding bracket to this location using one 1/4-20 x 1/2-inch screw.
3. Attach the vehicle ground cable to an exhaust bolt or engine bolt on the vehicle.
4. Attach the vehicle ground cable to the grounding bracket.
PRE-RUN INSPECTION

Perform a vehicle inspection before making a run.

- Check the radiator coolant and oil levels.
- Check the fuel source.
- Rotate the drum(s) and check for rocks caught in the tire tread that could fly out.
- Check the tire pressure and tire speed rating. Improperly inflated tires or exceeding the maximum speed rating can result in premature wear or severe tire damage. Make sure the tire has no major deficiencies (cracks in sidewalls, tread life, etc.).
- Visually inspect the vehicle. Make sure it is in safe running order.
- Make sure ear protection and safety glasses are used when the dyno is being operated.
- Check the tie-down straps to make sure that they are tight and secured.
- Check the drive tires to be sure that they are aligned correctly on the dyno drums.
- Keep all rotating components clear at all times.
- Only the operator should be near the dyno or the vehicle during the test.
- Never allow any person(s) to stand behind the dyno or vehicle when it is being operated.
- Perform any other safety inspections appropriate to running your vehicle on the dyno.

WARNING

Never allow any person(s) to stand behind the dyno or vehicle when it is being operated. Only the operator should be near the dyno or the vehicle during the test.

BEFORE STARTING THE ENGINE

Connect an exhaust hose or hoses (if dual exhaust) on the vehicle, make sure the hose fits over the tail pipe, is not plugged or kinked and the hose is vented correctly out of the dyno room.

WARNING

Engine exhaust contains poisonous carbon monoxide gas. Breathing it could cause death. Operate machine in well ventilated area.
ENGINE WARM UP

Warm the vehicle’s engine and drivetrain before beginning testing. Consistent engine temperatures will assure your runs are repeatable.

AFTER ENGINE WARM UP

Always leave the vehicle in park (automatic transmission) or in first gear (manual transmission), with the engine off, and make sure the emergency brake and the dyno brake are on when you get out of the vehicle.

- Fix any fuel, oil, or coolant leaks that may have shown up after engine warm up and check the carburetor for leaks.
- Any loud or unusual engine noises or excessive exhaust smoke should be resolved before continuing.
MAKING A TEST RUN

Dyno runs provide safe, reliable road testing right in the shop. The dyno allows you to measure, record, and diagnose performance problems quickly. The dyno combined with the Power Core software produces consistent, easily interpretable power graphs. Use the following instructions to ensure repeatable and accurate measurements.

1. Verify the vehicle is secured properly.
2. Verify the vehicle is grounded to the dynamometer properly. Refer to “Grounding the Vehicle” on page 4-8.

**CAUTION**

Never operate the dyno without first grounding the vehicle to the dyno.

3. Double-click the Power Core program icon to start the software.
4. Click Dyno Control from the Application Launcher.
5. Test the tachometer operation.
   5a. Rev the engine. The gauges on the computer screen should be moving. If the tachometer is moving but not registering the correct RPM values, the number of degrees of revolution of the crank shaft (the plug fires number) is incorrect.
   5b. Select Run File Information to enter vehicle information.
6. Place the vehicle in a low gear and release the dyno brake using the hand held pendant.
7. Slowly accelerate the vehicle to 20 m.p.h.
8. Press the red brake button to apply 100% braking and slow down the vehicle.

**CAUTION**

Using the vehicle’s own brakes to slow or stop the drum at speeds over 30 m.p.h. can severely overheat the brake parts. Dynojet dynamometers with the air brake or eddy current brake accessory can be used to slow the vehicle and drum to a full stop at any speed. The vehicle’s brakes should be used in an emergency stop situation only.

9. Shut the engine off and put the vehicle in gear (manual transmission) or park (automatic transmission).
10. Set the vehicle’s parking brake and leave the dyno brake on.
11. Select MakeRun Configuration Run Information, and enter the correct value for the plug firing order.
12. Perform a final inspection.
   - Verify the drive tire’s alignment on the dyno drums.
   - Make any adjustments to the tie-down straps as needed.
   - Perform any other safety checks that you deem appropriate to your particular situation.

You are now ready to make a high speed run on the dyno. Refer to your Power Core Help for more detailed instructions.
PREVENTATIVE MAINTENANCE

This section covers maintenance items for all model 224 dynos with the Spring Applied Air Release (SAAR) brake. For more detailed maintenance instructions, refer to the Maintenance Guide for Automotive Dynamometers (P/N 98119101).

THINGS TO CHECK

- Check all air fittings for leaks monthly. Correct any leaks found.
- Once per month verify the brake pressure gauge reads 100psi (690kPa). Adjust the regulator if the pressure is out of specification. Refer to page 4-13 for more information.
- Check the brake shoe clearance. Refer to page 4-14 for more information.
- Dyno Bearing Grease:
  Under steady use, over 25 runs per day, each bearing should receive .65oz (19 ml) of a recommended grease every two months.
  Under occasional use, less than 25 runs per day, each bearing should receive .65oz (19 ml) of a recommended grease every six months.

Recommended Grease:

<table>
<thead>
<tr>
<th>grease specification</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>thickener</td>
<td>Lithium 12 Hydroxy Stearate</td>
</tr>
<tr>
<td>oil</td>
<td>Petroleum</td>
</tr>
<tr>
<td>thickness</td>
<td>NLGI 2</td>
</tr>
<tr>
<td>operating temperature (Fahrenheit)</td>
<td>-20°F to 200°F, intermittent to 250°F</td>
</tr>
<tr>
<td>operating temperature (Celsius)</td>
<td>-29°C to 93°C, intermittent to 121°C</td>
</tr>
<tr>
<td>EP additive</td>
<td>yes</td>
</tr>
<tr>
<td>examples</td>
<td>Mobil Mobilith AW-2</td>
</tr>
</tbody>
</table>
**Verifying the SAAR Brake Pressure**

1. Verify the SAAR brake pressure gauge reads 100psi (690kPa).
2. Using the knob, adjust the regulator until the correct pressure is achieved.

![Diagram of brake pressure regulator and pressure gauge.]

Figure 4-6: Check the SAAR Brake Pressure and Adjust the Regulator
MAINTAINING THE SAAR BRAKE SHOE CLEARANCE

1. Verify the area is clear and the dyno can be operated safely.
2. Turn on the DynoWare RT.
3. Using the pendant, turn the brake to the OFF position. This will release the SAAR brake by moving the brake shoe away from the drum.

**WARNING**

Keep hands and fingers clear when operating the dyno.

4. Measure the gap between the brake shoe and the drum surface. This gap should be between .125 inch - .375 inch (3mm - 10mm).
   
   Note: For clarity, the dyno frame is shown transparently to reveal the drum.

Note: The mounting bracket shown is used with the SAAR upgrade. Factory installed SAAR brakes use a slightly different bracket.

![Figure 4-7: Measure the Gap Between the Brake Shoe and Drum](image-url)
5 If the brake shoe clearance is out of specification, loosen the upper nut on the bottom of the air can rod.

6 Adjust the lower nut until the brake shoes are .25 inch (6mm) away from the dyno drum.

7 Tighten the upper nut on the air can rod down onto the brake actuating tube.

8 Torque the lower nut to 110 foot-pounds.

If you cannot adjust the brakes to specification, you will need new brake shoes. Contact Dynojet for more information.

Figure 4-8: Adjust the Brake Shoe Clearance
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.

![Figure A-1: Red Head Anchor—Drill the Hole](image)

2. Insert the anchor.

![Figure A-2: Red Head Anchor—Insert the Anchor](image)
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)
APPENDIX B

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.

Note: The following instructions are intended as a guide to aide in the electrical installation of your dynamometer. All local regulations shall supersede any instructions herein and should always be considered.

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
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 “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 advance 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 is 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.

![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
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 mm² (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

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
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.

### Grade 5

<table>
<thead>
<tr>
<th>size</th>
<th>torque, plain</th>
<th>torque, plated</th>
</tr>
</thead>
<tbody>
<tr>
<td>in-threads/in</td>
<td>in•lb ft•lb N•m</td>
<td>in•lb ft•lb N•m</td>
</tr>
<tr>
<td>1/4-20</td>
<td>101 8 11 76 6 9</td>
<td></td>
</tr>
<tr>
<td>1/4-28</td>
<td>116 10 13 87 7 10</td>
<td></td>
</tr>
<tr>
<td>5/16-18</td>
<td>209 17 24 157 13 18</td>
<td></td>
</tr>
<tr>
<td>5/16-24</td>
<td>231 19 26 173 14 20</td>
<td></td>
</tr>
<tr>
<td>3/8-16</td>
<td>371 31 42 278 23 31</td>
<td></td>
</tr>
<tr>
<td>3/8-24</td>
<td>420 35 47 315 26 36</td>
<td></td>
</tr>
<tr>
<td>7/16-14</td>
<td>593 49 67 445 37 50</td>
<td></td>
</tr>
<tr>
<td>7/16-20</td>
<td>662 55 75 497 41 56</td>
<td></td>
</tr>
<tr>
<td>1/2-13</td>
<td>905 75 102 678 57 77</td>
<td></td>
</tr>
<tr>
<td>1/2-20</td>
<td>1019 85 115 765 64 86</td>
<td></td>
</tr>
<tr>
<td>9/16-12</td>
<td>1305 109 147 979 82 111</td>
<td></td>
</tr>
<tr>
<td>9/16-18</td>
<td>1456 121 164 1092 91 123</td>
<td></td>
</tr>
<tr>
<td>5/8-11</td>
<td>1801 150 203 1351 113 153</td>
<td></td>
</tr>
<tr>
<td>5/8-18</td>
<td>2040 170 230 1530 128 173</td>
<td></td>
</tr>
<tr>
<td>3/4-10</td>
<td>3194 266 361 2395 200 271</td>
<td></td>
</tr>
<tr>
<td>3/4-16</td>
<td>3567 297 403 2675 223 302</td>
<td></td>
</tr>
<tr>
<td>7/8-9</td>
<td>5154 430 582 3866 322 437</td>
<td></td>
</tr>
<tr>
<td>7/8-14</td>
<td>5679 473 642 4259 355 481</td>
<td></td>
</tr>
<tr>
<td>1-8</td>
<td>7727 644 873 5795 483 655</td>
<td></td>
</tr>
<tr>
<td>1-12</td>
<td>8453 704 955 6340 528 716</td>
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</table>
### Grade 8

<table>
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<th>Size</th>
<th>Torque, Plain</th>
<th>Torque, Plated</th>
</tr>
</thead>
<tbody>
<tr>
<td></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>
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<td>5/16-18</td>
<td>295</td>
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<tr>
<td>5/16-24</td>
<td>326</td>
<td>27</td>
</tr>
<tr>
<td>3/8-16</td>
<td>523</td>
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<tr>
<td>3/8-24</td>
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<td>7/16-14</td>
<td>837</td>
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<tr>
<td>7/16-20</td>
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</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>
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<td>171</td>
</tr>
<tr>
<td>5/8-11</td>
<td>2543</td>
<td>212</td>
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<td>5/8-18</td>
<td>2880</td>
<td>240</td>
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<td>4509</td>
<td>376</td>
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<td>3/4-16</td>
<td>5036</td>
<td>420</td>
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<td>7/8-9</td>
<td>7277</td>
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<td>668</td>
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<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</th>
<th>torque, plain</th>
<th>torque, plated</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm x pitch</td>
<td>in•lb</td>
<td>ft•lb</td>
</tr>
<tr>
<td>M6 X 1</td>
<td>96</td>
<td>8</td>
</tr>
<tr>
<td>M8 X 1.25</td>
<td>233</td>
<td>19</td>
</tr>
<tr>
<td>M10 X 1.5</td>
<td>462</td>
<td>38</td>
</tr>
<tr>
<td>M12 X 1.75</td>
<td>805</td>
<td>67</td>
</tr>
<tr>
<td>M14 X 2</td>
<td>1287</td>
<td>107</td>
</tr>
<tr>
<td>M16 X 2</td>
<td>1997</td>
<td>166</td>
</tr>
<tr>
<td>M20 X 2.5</td>
<td>3900</td>
<td>325</td>
</tr>
<tr>
<td>M24 X 3</td>
<td>6739</td>
<td>562</td>
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</tbody>
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GRADE 10.9

<table>
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<tr>
<th>size</th>
<th>torque, plain</th>
<th>torque, plated</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm x pitch</td>
<td>in•lb</td>
<td>ft•lb</td>
</tr>
<tr>
<td>M6 X 1</td>
<td>133</td>
<td>11</td>
</tr>
<tr>
<td>M8 X 1.25</td>
<td>323</td>
<td>27</td>
</tr>
<tr>
<td>M10 X 1.5</td>
<td>639</td>
<td>53</td>
</tr>
<tr>
<td>M12 X 1.75</td>
<td>1114</td>
<td>93</td>
</tr>
<tr>
<td>M14 X 2</td>
<td>1781</td>
<td>148</td>
</tr>
<tr>
<td>M16 X 2</td>
<td>2762</td>
<td>230</td>
</tr>
<tr>
<td>M20 X 2.5</td>
<td>5395</td>
<td>450</td>
</tr>
<tr>
<td>M24 X 3</td>
<td>9322</td>
<td>777</td>
</tr>
</tbody>
</table>
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