MAKESAFE® TOOLS
PREVENTING INJURIES SINCE 2016

Power Tool Brake

User Manual

Note: The image above represents one particular configuration of this product though this manual can be used for all product configurations.

⚠ Warning ⚠

You have just purchased a safety device and this manual contains critical safety instructions on the proper setup, operation, maintenance, and service of this safety device. Keep this document readily available, refer to it often, and use it to instruct other operators.
Failure to read, understand and follow the instructions in this manual may result in property damage and/or serious personal injury - including amputation, electrocution, or death. The owner of this device is solely responsible for its safe use.
The manufacturer will not be held liable for injury or property damage from negligence, failure to adhere to this documentation, improper training, device modifications or misuse.

⚠ Warning ⚠

This safety device is intended to be installed as a retrofit to a very specific class of power tool. Read and understand the intended use and limitations of this device before installing it.
The manufacturer has made reasonable attempts to test and describe this device's compatibility with different power tools but cannot certify or guarantee its compatibility with any one power tool. It is the responsibility of the owner of this device to follow the guidance provided below to determine compatibility.

⚠ Warning ⚠

All induction motors, such as those running power tools, have inherent limitations on their maximum number of starts per hour and their minimum rest time between starts, as described in NEMA MG 10, Table 8. Motor braking contributes additional heat to the motor and can significantly impact these values. Reduce allowable startups per hour by a factor of 0.5 and increase rest time between starts by a factor of 1.5, until such time that a more precise factor can be determined by the operator for a specific tool and set of conditions.

⚠ Warning ⚠

When this device is in braking mode, it delivers high voltage direct current to your tool. If you operate the tool switch during braking, you will destroy or significantly reduce the life of your tool switch while also increasing the risk of electrical fire. Never operate your tool switch during braking and always cover the tool switch as described in the instructions below.

⚠ Warning ⚠

RISK OF ELECTRIC SHOCK

DISCONNECT ALL SOURCES OF POWER PRIOR TO SERVICING THIS DEVICE.

Important!

Retain this manual and include it with the original user manual for the machine on which this device is installed.

Table of Contents

Introduction

Application

The MAKESafe Power Tool Brake is a safety device that provides accidental restart protection, motor braking, and emergency stop functions to stationary power tools and machinery.

Compatibility

This safety device is not compatible with all power tools. Please complete the included compatibility checklist below before installing this device.

Glossary

- **Power Tool** - the tool or machinery that you intend to use this brake with.
- **Brake (noun)** - The MAKESafe Power Tool Brake.
- **Brake (verb)** - The act of decelerating a power tool.
- **Control Panel** - The provided remote enclosure with start, stop, and e-stop buttons.
- **Business End** - The part of the power tool that performs an operation on a work piece (i.e. saw blade, grinding wheel, etc.).

Specifications

	PTB-V120-P1	PTB-V240-P1	PTB-V240-P3
Rated Input Voltage	120 VAC 1 PH, 60Hz (50 Hz options available)	240 VAC 1 PH, 60Hz (50 Hz options available)	240 VAC 3 PH, 60Hz (50 Hz options available)
Rated Horsepower (UL508)	1.5 HP	3.0 HP	5.0 HP
Rated Current (UL508)	20 A	17 A	15 A
Approvals	UL508: Industrial Control Devices CSA #14-13: Industrial Control Equipment LISTING NUMBER: E114885		
Control Voltage	5 VDC		
Control Current	< 100mA		
Dimensions (main enclosure)	7.25” L x 5.0” W x 2.22" H (185 mm x 127 mm x 57 mm)		
Dimensions (standard control panel)	4.1” x 2.2” x 0.9” in. (105 mm x 57 mm x 23 mm)		
Weight	3 lbs (1.4 kg)		3.3 lbs (1.5 kg)
Rated Output Voltage (motoring)	120VAC	240VAC	240VAC
Rated Output Voltages (braking)	0 - 90 VDC	0 - 180 VDC	0 - 240 VDC
Plug & Receptacle Type	NEMA 5-15 (custom and international options available)	NEMA 6-15 (custom and international options available)	NEMA L15-20 (custom and international options available)

Notes:

1. *This device is only compatible with direct-powered induction motor tools. To verify compatibility, see included compatibility guide*
2. *Suitable for connection in the field to a branch circuit rated not more than 20 amperes and capable of delivering not more than 5,000 rms symmetrical amperes.*

Device Diagrams

Main Enclosure

7.25” L x 5.0” W x 2.22" H

(185 mm x 127 mm x 57 mm)

Standard 3-Button Control Panel

4.1” x 2.2” x 0.9” in.

(105 mm x 57 mm x 23 mm)

**All dimensions are for enclosure and do not include dimensions of buttons, plugs, and cable glands.*

Compatibility Checklist

Getting Ready

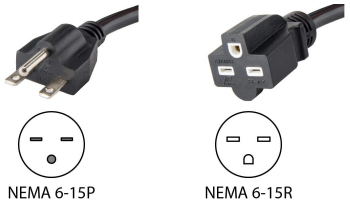
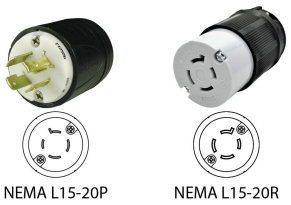
This safety device is meant to be installed and used in conjunction with a power tool. Prior to completing the compatibility checklist, collect the following items:

- The MAKESafe Power Tool Brake.
- The power tool you intend to use with this brake with.
- The instruction manual and specifications sheet for your power tool.

As the owner of this safety device and your pre-existing power tool, it is your responsibility to complete this compatibility checklist before installing this safety device. If you cannot complete the checklist, do not install the device.

Checklist	For More Information
❑ Confirm that the voltage, number of phases, and frequency of your **power tool** match the voltage, number of phases, and frequency indicated on your **brake.**	This is typically marked on the motor itself and on the top of the brake.
❑ Confirm the motor horsepower on the **power tool** is rated at or below the horsepower rating of your **brake**.	This is typically marked on the motor itself.
❑ Confirm the **power tool** has the same plug and receptacle type as your **brake**.	See section below titled *Identifying Receptacles.* If you plan to hardwire the device, you can ignore this section.
❑ Confirm the **power tool** uses an AC induction motor for its motive force.	See section below titled *Identifying Motor Type*
❑ Confirm the **business end** of the **power tool** is not mounted on a reverse threaded spindle or confirm that you will operate the brake within the limits described in the section *Understanding Reverse-Threaded Spindles.*	See section titled *Understanding Reverse-Threaded Spindles.*
❑ Confirm the **power tool** contains only a simple on/off switch (for plug-and-play installation) or contact MAKESafe Tools for guidance on how to install the **brake** on your particular machine.	See section titled *Recognizing Existing Controls*
❑ Confirm the **power tool** does not contain an integral circuit breaker.	Review your tool manual and inspect your tool to ensure there are no integral circuit breakers.

Identifying Receptacles

Plug & Receptacle Types		
Single-Phase 120V		The most common type of plug and receptacle that you will find in most american homes and businesses.
Single-Phase 240V		A common plug and receptacle type for single-phase 240VAC applications.
Three-Phase 240V		A common locking plug and receptacle type for three-phase 240VAC applications.
Other	Many alternate configurations exist. If you need assistance determining machine voltage or plug type, please contact MAKESafe Tools.	

Identifying Motor Type

Power tool motors come in a wide variety of shapes, sizes, and types. The intent of this section is to help you identify if your tool uses an AC Induction Motor.

You have an Induction Motor if …

- You see one or more external capacitors on your motor. These often appear as cylindrical or rectangular lumps on the exterior of your motor (see photos).
- You have a heavy stationary (not “portable” or “jobsite”) power tool. Tools like stationary band saws, table saws, jointers, and disc sanders typically use AC Induction Motors.

You <u>do not</u> have an Induction Motor if…

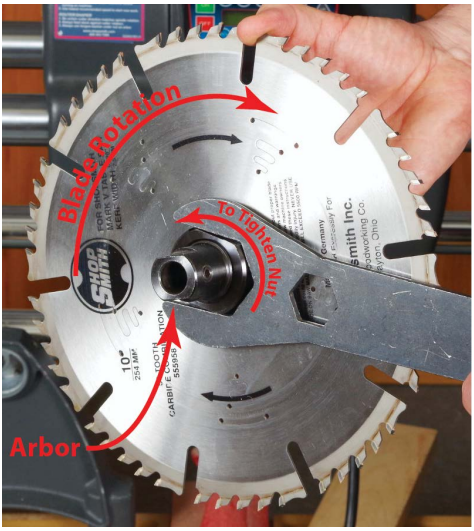
- Your tool is hand held. Tools like a corded drill or angle grinder do not use an AC Induction Motor.
- Your motor uses brushes. Brushes are a common maintenance item on other motor types. If your **power tool** manual describes brushes, you see brush caps on your motor (image below),or you see sparking from your motor, your **power tool** does not have an AC induction motor.

(handheld power tools example)

Reverse-Threaded Spindles

Reverse threaded spindles are common on some types of power tools. “Reverse threaded” just means that the torque of the motor in normal operation puts force on the arbor nut to tighten the “business end” onto the spindle. This is an inherent safety measure in all power tools and helps to make sure that cutting blades and sanding/grinding surfaces don’t loosen during normal operation.

When a motor brake is used to slow a machine’s operation, the momentum of the “business end” puts a loosening force onto the arbor nut. If this force is sufficiently large, it can loosen or unscrew the arbor nut. For this reason, you never want to apply excessive braking torque to a reverse threaded spindle. To prevent excessive braking torque on reverse-threaded arbor tools, adhere to the following operational limitations.



Limitations of Operation

If you have a machine with a reverse threaded spindle, ensure that you follow the rules and limitations below. Failure to follow the limitations below may increase risk of injury.

1. Check tightness of arbor nut prior to installation and as a regular maintenance item.	Regularly check the tightness of your arbor nut and compare to the listed torque specifications in your tool manual. To prevent loosening, use double-nuts or other positive locking methods.
2. Calibrate braking torque to bring the tool to stop in no less than two seconds.	When braking a tool with a reverse-threaded spindle, never calibrate the brake to stop the tool in less than two seconds. Refer to the calibration section of this manual for a discussion of how to calibrate your device.
3. Never use The MAKESafe Power Tool Brake to brake high inertia reverse-threaded loads, such as: ○ a lathe with a reverse-threaded spindle. ○ A saw with a dado or other non-standard blade installed.	The larger the business end, the more loosening force will be applied during braking. For example, a lathe with a reverse-threaded spindle should never be used with a motor brake. The chuck has sufficient mass to unscrew itself from the spindle during braking and is a severe safety risk.
4. Always make sure that all power tool wheel guards, blade guards, shields, and other manufacturer-provided and OSHA required guards are properly installed and adjusted.	Power tools should never be operated without manufacturer-provided and OSHA required guards.

Recognizing Existing Controls

The MAKESafe Power Tool Brake is designed for plug-and-play use on tools with a simple on/off switch and no pre-existing electronic controls. If your power tool has any other controls, electronic indicators, digital displays, electronic dials or variable controls, magnetic switches, or variable frequency drives - additional wiring and consideration may be required. Contact MAKESafe Tools for assistance and we'll help you to determine the best way to proceed with the installation.

Tip: Some existing controls can be safely bypassed (as the function also exists in the Power Tool Brake) but this should be confirmed by an expert on a case-by-case basis. Please call MAKESafe Tools for assistance.

Warning: Below are some examples of existing controls that would prevent a plug-and-play installation. If your machine has any of the following controls, please contact MAKESafe Tools before proceeding with your installation:

Note: this is a list of examples but does not represent every possible control. If in doubt, contact MAKESafe Tools.

Magnetic Switch

Note: Many of the switches shown above could be a magnetic switch or a simple on/off switch as they look similar. The following section provides a simple procedure to determine if your machine has a magnetic switch installed.

Starter

Variable Frequency Drive (VFD), Inverter, or Electronic Speed Control


How to Check for a Magnetic Switch.

If your power tool utilizes spring-loaded or momentary push buttons for start and/or stop operations (as opposed to a toggle switch or other mechanical switch), follow the procedures below to confirm that your power tool switch is not a magnetic switch.

Note: This evaluation is for power tools with relatively simply on/off controls and not for evaluating larger control systems. Before proceeding, confirm that the working area is free of hazards and that it is safe to operate the power tool.

Step 1: Turn the power tool ON.

Step 2: While the power tool is ON and running, remove power by unplugging the power tool or by switching-off power at an electrical disconnect switch or circuit breaker.

Step 3: Count to 5 then restore power by plugging-in the power tool or by switching-on power at the disconnect switch or breaker.

Evaluate:

- If the power tool automatically turns ON when power is restored, then your power tool does not have protection from unintentional restarts. You do not have a magnetic switch.
- If the power tool remains off when power is restored and requires manual turn-on to restart, then your power tool does have protection from unintentional restarts. It is likely that you have a magnetic switch or other type of control installed. Contact MAKESafe Tools before proceeding with your installation.

Installation

You can find a video companion for these installation and calibration instructions on our website at www.makesafetools.com.

1. Unbox your new **brake** and inspect the device and shipping containers for any damage that may have been incurred during shipping.
2. Find the *braking torque* adjustment and use a small flathead screwdriver to confirm that it is turned counter-clockwise as far as it will go. This will set the braking torque to the minimum for your first test. This only requires gentle turning force - excessive force on the adjuster can damage the device.
3. Find the *braking time* adjustment and use a small flathead screwdriver to confirm that it is turned counter-clockwise as far as it will go. This will set the braking period to the minimum for your first test. This only requires gentle turning force - excessive force on the adjuster can damage the device.
4. Plug your control panel into your **brake** by inserting the silver connector on the control panel cable into the mating connector on the **brake**. The connector will only fit in one orientation so rotate it gently until it snaps into place. Once mated, manually screw the control panel connector clockwise to lock it in place. Hand-tighten the connector until snug (do not use tools to tighten).
5. Plug your **power tool** into the **power tool receptacle** on the **brake**. It is important to plug your tool into the brake before plugging the brake into the wall.
6. Once your **power tool** is plugged into the **brake**, plug the **brake** into a power outlet.
7. Mount the **control panel** to your **power tool** in a convenient to access location.
8. Turn the on/off switch on your **power tool** to the 'on' position. Note that the **power tool** switch must now remain in the 'on' position at all times. To prevent tampering or otherwise being turned 'off', cover the power tool switch. If this device is being used in a workplace, refer to the **Occupational Safety Standards** section for further information.
9. Now that you have completed the installation, proceed to the **Calibration** section to calibrate your device.

Occupational Safety Standards

ANSI B11.19-2010, Performance Criteria for Safeguarding, states the following:

Code Excerpt (Requirement)	**Code Excerpt (Explanation)**	**Relevance & Applicability***
"The user shall ensure that guards are installed, maintained, and operated so as to protect against: unauthorized adjustment or circumvention;" (ANSI B11.19-2010 7.2.6)	*"Guards installed in such a manner that tools are necessary for their adjustment or removal may satisfy this requirement."* *"Examples of some types of fasteners that should not be used are: slotted or Phillips head screws; wing nuts; Magnets; latches and hasps; hooks and eyes."* (ANSI B11.19-2010 E7.2.6)	After the installation of your **brake**, MAKESafe Tools recommends the following in order to comply: **1)** Cover the original tool switch on your **power tool** to prevent tampering and to maintain its 'on' position. **2)** Use a plug lockout enclosure or other fastening means to prevent the unauthorized unplugging of the **power tool** from the **brake**.

**It is the end user's responsibility to read and interpret all occupational safety requirements along with their local authority having jurisdiction. Interpretations provided here are the opinion of MAKESafe Tools.*

Calibration

While the MAKESafe Power Tool brake is capable of stopping your tool instantly, this sudden action should be avoided. The purpose of this calibration section is to find an optimal braking setting for your **power tool**.

You have two means of adjustment on this safety device, described below:

Braking Torque	**Braking Period**
Controls how strong of a braking force is applied to your motor during braking.	Controls how long the braking torque is applied.

Notes on Calibration:

- The first calibration step will apply a very small braking torque for a very short time and may not be noticeable. This is normal. Proceed with calibration, making only incremental changes for each braking attempt.
- We recommend finding a braking torque and braking time combination that brings your **power tool** to a complete stop in between one and three seconds. A good rule of thumb is to aim for a braking time equivalent to or greater than the time it takes your tool to come up to speed during normal operation.
- You will hear an audible buzzing sound during and after braking. This is normal. Calibrate the device such that there is a buzzing sound for approximately 0.5 seconds after the tool has come to a complete stop.

Making Adjustments:
Adjustments are made by inserting a small flathead screwdriver into the holes on the side of the brake enclosure and gently turning counter-clockwise (to turn down) or clockwise (to turn up) the respective setting. You will feel the adjustment hit a stop at the maximum and minimum values. This only requires gentle turning force - excessive force on the adjuster can damage the device.

Calibration Steps:

1. Find the braking torque and braking time adjustment and use a small screwdriver to confirm that it is turned counter-clockwise as far as it will go. This will set the braking torque and braking time to the minimum for your first test. This only requires gentle turning force - excessive force on the adjuster can damage the device.
2. Turn on your **power tool** by using the green start button on the control panel. It should start normally.
3. Once your **power tool** has come up to speed, press the red stop button on the **control panel**. This will immediately disconnect power from the tool and apply a braking torque for a set period of time.
4. If this braking action does not bring your **power tool** to a complete stop, increase your braking period or braking torque, making small incremental adjustments. Never turn an adjustment more than 1/8 of a turn at any one time.
5. Repeat until you achieve the desired result.

Normal Operation

The MAKESafe Power Tool Brake is designed to make normal operation of the device simple and straightforward. To operate your power tool with the MAKESafe Power Tool Brake installed, follow the procedure below:

1. Turn on your power tool by using the green start button on the **control panel**.
2. Use your power tool.
3. Press the red stop button on the **control panel** to stop and brake your tool.
4. If the emergency stop is activated, release the stop button by rotating it clockwise.

Inspections & Maintenance

MAKESafe Tools recommends the following inspections:

1. At the beginning of each shift, cycle the tool through the complete on/off cycle and visually verify that the tool is coming to a complete stop in the expected time.
2. Re-calibrate the device every time a blade or cutting tool is replaced, tooling is changed, or a machine is serviced.

Troubleshooting

Problem	**Solution**
My tool will not start. Every time I try to turn my tool on, the brake makes a clicking noise, and the tool fails to start.	You may have engaged low voltage protection. This can happen due to low service voltage or under-rated conductors. Do not use this device with an extension cord.
My power tool operates normally, but when I try to brake the tool, there is no braking action.	Your braking torque may be set too low. Ensure that you have followed the instructions for installation and calibration.
My tool will not start.	You may have blown the device's internal fuse. Unplug the device from the wall and remove the cover using a phillips screwdriver. Remove the fuse and test for continuity. If the fuse is blown, first identify the source of the fault. Contact MAKESafe Tools, Inc. for fuse replacement specifications. **This device does not use a standard fuse**. Be sure to replace the cover before plugging in the device.
I don't know what's happening and I need help.	Please contact MAKESafe Tools at: service@makesafetools.com or (415) 937-1808.

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Service

If you have any questions or your device needs service, please contact us.

service@makesafetools.com

(415) 937-1808

www.makesafetools.com