POWERHANDLING INC.   POWERPALLET

USER MANUAL

⚠️ DO NOT INSTALL, OPERATE OR SERVICE THIS PRODUCT UNLESS YOU HAVE READ AND FULLY UNDERSTAND THE ENTIRE CONTENTS OF THIS MANUAL. FAILURE TO DO SO MAY RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.

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Description

Introduction

This document describes the PowerPallet, a unique bolt-on device that instantly converts a manual pallet jack into a powerful, fast, yet ultra-compact motorized pallet jack. The safety features, assembly instructions, user operation, maintenance, software upgrade and troubleshooting features pertaining to the device are listed in this manual.

General Description

The PowerPallet provides power-assist by retrofitting on to any major name-brand manual pallet jack. It operates on a Ni-MH battery which runs a brushless DC electric motor. The PowerPallet is compact enough to retain the maneuverability of the manual pallet jack that it is being bolted on to.

Weight (including Battery Pack): 17kg (38lbs)

Max. Load Capacity (on flat concrete): 2,267kg (5,000lbs)

Max. Speed (unloaded, on flat concrete): 100m/min (3.7mph)

Safety Features

Braking by Handle Position

In the default drive mode (Warehouse Mode), the PowerPallet applies full braking when the handle is in the upright position or in the horizontal position. This feature reduces the possibility of the operator getting pinned by the steering handle and/or getting stuck between the steering handle and a wall.

Proximity Detection

In the other drive mode (Truck Mode) with slower speed setting, the PowerPallet drives the motor only when a human presence is detected within close proximity to the Throttle. The Throttle has capacitive sensing built into it that senses if there is a human presence in the vicinity of the Throttle. If no proximity is detected, full braking is applied to the motor to prevent any forward/backward motion.

Belly Button

Pressing or bumping against the Belly Button stops all executing functions, applies full braking and brings the truck to a stop. This feature reduces the possibility of the operator getting pinned by the steering handle.

Installation & Adjustments

List of Parts

1. Machine
2. Battery Charger
3. Battery Pack
4. Pallet Mount kit (Pallet-Jack specific)

Tools Required

1. Snap-Ring Pliers
2. Philips #1 screwdriver
3. Flat-head screwdriver
4. M3 and M5 Allen Wrenches

Curb-Wheel Height

To adjust the curb-wheel height, remove the bottom plate using the M3 wrench to unscrew the fasteners (See *figure 1*). Once the plate is removed, the curb-wheel can be set in 2 positions:

1. *Lower to the ground*: The flat side of the axle is positioned facing the ground and away from the machine.
2. *Higher from the ground*: The flat side of the axle is positioned facing the machine and away from the ground.

Once the desired height is set, place the bottom plate back and secure it with the M5 flat-head screws.
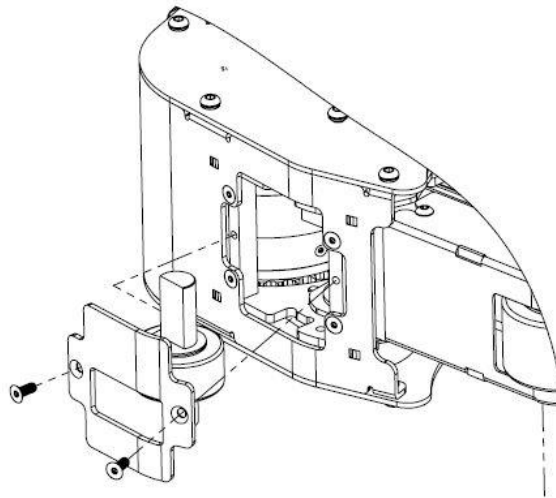

Figure 1: Curb-wheel adjustment

Assembly

1. Set the rear end of the pallet jack such that the wheels are off the ground. Place some weights (>20kg) on the front forks, to prevent it from tipping over during installation.
2. Remove end caps of both wheels using a flat-head screwdriver.
3. Remove the snap rings using the snap-ring pliers, and slide the wheels out.
4. Place one mounting plate on one side of the PowerPallet and secure it with the screws provided.
5. Gently lift and slide this assembly on to the corresponding shaft of the pallet-jack (The assembly can be held in place by mounting on one of the pallet-jack's wheels behind it).
6. Slide the other mounting plate on to the opposite side and secure it to the PowerPallet with the remaining screws. Place the cylindrical spacer rod between the 2 mounting plates and secure it with the M5 flat-head screws on both ends.
7. Readjust the screws on both sides (if necessary) to securely mount the PowerPallet symmetrically about the wheel mounting shaft.
8. Slide the pallet-jack's wheels back on to the shafts, secure them with the snap-rings using the snap-ring pliers, and reattach the wheel end caps.
9. Install the Throttle on the handle of the pallet-jack using the throttle mounting plate with the aid of the Philips screwdriver. Make sure the backs of the mounting plate and the throttle are laid completely flat against the handle of the pallet-jack.
10. Wrap the cable sleeve around the stem of the handle and the coiled cable, and close the zipper.
11. Place tool to adjust the screw-jack in the slot provided on the cable sleeve.

Screw-Jack Adjustment

The machine comes with an adjustable screw-jack that allows the operator to set the height of the drive wheel with respect to the wheels of the pallet-jack. The operator can change this height by using the tool provided, to achieve sufficient traction and optimal stability for any load.

Operation

General

The general features, precautions, and operating and control instructions to use the PowerPallet are described in this section.

Precautions

Improper operation of the equipment may result in operator injury, or load, and/or property damage. The following precautions must be adhered to at all times:

- Any person operating the machine must be trained and authorized to do so.
- All warnings and instructions must be carefully read and understood before operating the device.
- Inspect the unit before use. Do not operate if anything seems out of place.
- Do not operate the machine without the pallet-jack wheels mounted and secured properly on the wheel shaft.
- Foot protection must be worn while operating the device.
- Observe applicable traffic regulations. Yield right of way to pedestrians. Slow down and sound horn at cross aisles and wherever a clear sight of travel is absent or compromised.
- Start, stop, travel, steer and brake smoothly. Slow down for turns and on uneven or slippery conditions that could cause the truck to slide or overturn.
- Leave sufficient room for braking depending on load being carried and speed of travel.
- Do not overload the pallet truck beyond its rated load capacity.
- Do not carry loads that the operator cannot handle manually. The PowerPallet is only meant to provide a power-assist, and does not increase the load carrying capacity.
- Make sure load is centered and located as far back as possible against the chassis.
- Do not carry people or try to ride on the machine.
- Do not operate the machine under the influence of alcohol or drugs.
- Regular inspection of the device must be performed by a qualified person.
- Please follow all safety procedures required by the workplace, city, state and country where the machine will be used.

Terms and Definitions

Base unit

The base unit consists of the chassis which encloses the motor and the controller board. It also has 2 horns for warning and feedback.

Throttle

The Throttle acts as the main means for user interface. It recognizes user input and communicates it to the motor controller located on the device, and also returns useful machine feedback. The parts of the Throttle and their basic functionality are shown and described on the next page.

Figure 2: Parts of the Throttle

1) *Horn Button:*

   Beeps the Horn on the Machine when depressed.

2) *2-way Slider:*

   Runs Motor in the direction of rotation. Returns to center (neutral) when released.

3) *Belly Button:*

   Wakes up device from sleep-mode. Activates Belly-Stop mode when depressed while the device is awake.

4) *LED 1:*

   Tri-color (Red, Orange and Green) LED primarily indicates mode of operation. It is also used to relay other important feedback to the user.

5) *LED 2:*

   Tri-color (Red, Orange, Green) LED primarily indicates battery level. It is also used to relay other important feedback to the user.

6) *Mode Button:*

   Used to control or change mode of operation, and to release from Belly-Stop mode.

Forward motion

If the truck is moving away from the operator when the operator is standing directly behind the handle of the pallet jack and away from the forks, it is said to be moving forward.

Reverse or backward travel

If the truck is moving towards the operator when the operator is standing directly behind the handle of the pallet jack and away from the forks, it is said to be moving in reverse or traveling backward.

Battery Installation and Removal

The PowerPallet runs on a rechargeable 46V Ni-MH battery (provided by PowerHandling), which needs to be properly placed for the machine to function normally. See correct procedure below:

Figure 3: Installing the Battery

Step 1: Align and insert centrally located steel tabs on the front of the battery into the slots on the battery base-plate.

Step 2: Make sure the tabs on the back plate securely capture the battery from the back.

To remove the battery, pull the tab located on the back plate, rotate the battery about its front tab, and slide it out from the slot shown in Step 1 of the installation process.

Device Operation

Startup

When the battery is properly placed on the machine, the PowerPallet is ready and starts up in sleep mode with both LEDs turned off. To wake up the machine for normal operation, the Belly Button with the power symbol should be depressed. On pressing the Belly Button, the horn beeps once indicating the device is awake, the left LED will indicate the default drive mode i.e. Warehouse Mode, and the right LED will indicate the battery level.

Driving

1. Follow startup procedure mentioned above.
2. Lower the steering handle to a comfortable position above horizontal to activate speed control[1]. (See *fig. 3* below)
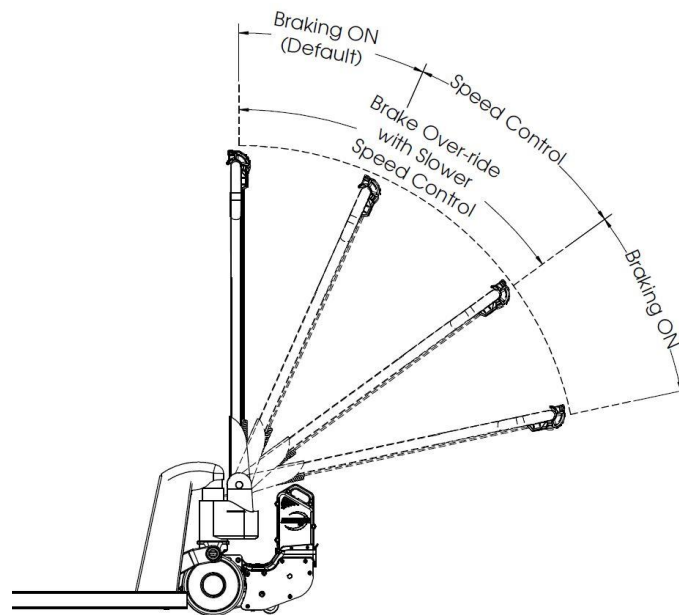
Figure 4: Handle Control Positions in Drive Mode

3. Slowly rotate the slider on the throttle in the direction you wish the wheel to drive. The farther the slider's relative position is from its neutral position, the faster the device will move.

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[1] In Truck Mode, braking in the upright handle position can be over-ridden when user proximity is detected. All other operating conditions apply as described. See Main Operating Modes & Driving Modes for details.

Braking

To slow down or stop, release the slider allowing it to return to neutral position. The level of braking applied depends on the control setting selected (see Control Settings).

When in Warehouse Mode, raising or lowering the steering handle to an upright or horizontal position (as shown in *fig. 3*) engages full braking and brings the machine to a stop.

In Truck Mode, full braking is applied whenever user proximity is not detected by the Throttle.

Pressing the Belly Button also brings the machine to a stop by applying full braking (See Belly Button). To resume driving, the Mode Button needs to be pushed while the slider is in the neutral position.

Device Feedback

The PowerPallet provides feedback to the operator by means of the 2 LEDs on the Throttle and horn signals.

Operating Mode Indication

Table 1: Main Operating Modes

MODE	LED INDICATION		HORN	BRAKING	DESCRIPTION
	Left	Right			
Sleep Mode	OFF	OFF	No Horn	Full	- Default startup mode. - Machine enters Sleep Mode if it is idle for 100 seconds. - Press Belly Button to wake up the machine from Sleep Mode.
Drive Mode	See Drive Modes	See Battery Levels	See Horn Settings	Brake to Stop	- Allows operator to drive the machine. - Machine brakes to stop when Slider on the Throttle is released to neutral. - Level of braking, when the Slider on the Throttle is released depends on Motor settings chosen. - See Driving Modes for more details.
Manual Mode	RED			None	- Press Horn and Mode buttons simultaneously to enter Manual Mode. - Drive disabled. - Allows operator to manually operate the pallet-jack.
Belly-Stop Mode	Flashing RED		Horn beeps simultaneously with LED Flash	Full	- Applies full braking and brings machine to complete stop when Belly Button is pressed. - Press Mode Button to exit Belly-Stop mode (Slider on the Throttle must be in neutral).

Battery Level Indication

Table 2: Battery Levels

BATTERY LEVEL	RIGHT LED INDICATION	DESCRIPTION
Good	GREEN	>70% remaining
OK	ORANGE	40%-70% remaining
Low	RED	10%-40% remaining
Extremely Low (Drive Disabled)	Flashing RED	<10% remaining Replace or Recharge immediately.

Warning Indications

Table 3: LED & Horn Warnings

WARNING	LED INDICATION		HORN	DESCRIPTION	RECOMMENDED ACTION
	Left	Right			
Attempting to over-ride Safety Feature	Rapid Flash GREEN	See Battery Levels	-	Slider (Throttle) input detected with steering handle upright or horizontal	Lower steering handle to operable position to activate Speed Control. (See Driving)
	Rapid Flash ORANGE		-	Slider (Throttle) input detected with no user proximity detection	Place both hands closer to the Slider on the Throttle before attempting to drive the machine.
Motor Overheated	See Operating Modes	Rapid Flash ORANGE	Horn beeps simultaneously with Right LED flash if machine is driven	Machine performance severely limited to preserve Motor	Move truck to a safe area, and allow motor to cool-down.
Slider not in neutral, when Mode Button is pressed in Belly-Stop Mode	Both LEDs RED		-	Machine would continue to act like it's in Belly-Stop mode	To resume driving the motor, allow slider to return to neutral position.
Communication Failure	-		Horn Beeps Continuously	Communication lost between the Controller and Throttle	Remove battery, wait for 15 seconds, and reconnect battery.
No Valid Software	Both LEDs blink RED and ORANGE alternatively		-	Machine will not function without valid software	Update the device with the latest software. (See Software Upgrade section).
Motor moving without input or Downhill rolling	-		Beeps continuously	Event where Motor RPM is detected with no input from the Slider on the Throttle	<Add legal advice>

Control Settings

The operator has the flexibility to choose from a variety of operational modes and settings designed for various work environments. These are accessed by specific input combinations on the Throttle. There are 2 drive modes, 3 settings for the horn, and 6 different speed and acceleration settings, providing 36 possible combinations.

The rest of this section describes the settings and how the operator can access them.

Drive Modes

The PowerPallet has 2 drive modes. See the Driving section for driving instructions. The table below shows how to switch between the 2 drive modes and their brief description.

Table 4: Drive Modes

DRIVE MODE	CHANGE MODE	LEFT LED INDICATION	DESCRIPTION
Warehouse Mode (Default Driving Mode)	→ Press Mode button to switch between Warehouse Mode and Truck Mode	GREEN	- Full braking applied when handle is upright or horizontal. - Braking is ON if there is no Slider Input from the Throttle. - Slider on the Throttle needs to be in neutral position before lowering the handle, and attempting to drive.
Truck Mode (Slower)		ORANGE	- Full Braking applied when no user proximity is detected. - Allows operator to drive with handle in upright position at a slower speed (1/4th of the speed in Warehouse Mode). *Note: Machine needs to be stopped with Slider on the Throttle in neutral position before attempting to drive*

Motor Settings

The Motor Settings can be changed to achieve the best performance in various environments. Each setting picks the optimal level for max. speed, acceleration and braking for the corresponding environment. See table below on how to access the motor settings.

Table 5: Motor Settings

SETTING	RECOMMENDED ENVIRONMENT	THROTTLE INPUT	LED INDICATION		DESCRIPTION
			Left	**Right**	
1.	Supermarket (Concrete)	→To enter settings mode, press and hold Mode Button for 2-3 seconds until LEDs flash ORANGE, and then rotate Slider on Throttle forward to Max. →To exit settings mode, press and hold Mode Button for 2-3 seconds until Left LED stops flashing ORANGE.*	Flashing ORANGE while in settings mode	Solid RED	In settings mode, press Mode Button to cycle through the settings.
2.	Supermarket (Vinyl) *Default*			Flashing RED	
3.	Back-of-truck (Light)			Solid ORANGE	
4.	Back-of-truck (Heavy)			Flashing ORANGE	
5.	Warehouse (Medium)			Solid GREEN	
6.	Warehouse (Fast)			Flashing GREEN	

Note: On exiting the settings mode, the LEDs resume indication of the Main operating Modes

Horn Settings

The Horn settings and how to access them are described in the table below:

Table 6: Horn Settings

SETTING	HORN FUNCTION	HORN OUTPUT	THROTTLE INPUT	SETTING CONFIRMATION	RIGHT LED INDICATION	DESCRIPTION
1.	Beeps only when Horn Button is pressed	Soft	→ To enter settings mode, press and hold Mode Button for 2-3 seconds until LEDs flash ORANGE, and then press Horn Button. → To exit settings mode, press and hold Mode Button for 2-3 seconds until Right LED stops flashing GREEN.	Left LED flashes GREEN *<setting#>* of times with simultaneous Horn beeps	Rapid flash GREEN while in settings mode	In settings mode, press Mode Button to cycle through the settings.
2.		Loud				
3.*	Beeps when motor drives forward	Soft				
4.*		Loud				
5.*	Beeps when motor drives either forward or backward	Soft				
6.*		Loud				

Note: For Horn settings 3 through 6, horn functions as described, in addition to beeping when the Horn Button is depressed.

Last Saved Settings

The machine stores the control settings (Motor settings and Horn settings) each time they have been changed. This enables the operator to resume operation of the machine with the last saved settings on startup, even if the machine has been powered down for a while or if the battery was removed.

Note: After a power down and restart, the machine wakes up from Sleep-Mode in the Warehouse mode (even if the machine was shut down in the Truck Mode or Manual Mode) with the last saved Motor and Horn settings.

Maintenance & Service

The PowerPallet has been designed and built to be virtually maintenance free. The following instructions are recommended for achieving the best performance and increasing the life of the machine and battery. (Refer to our website *www.powerhandling.com* for step-by-step videos.)

Machine Maintenance

1. Measure the diameter of the Drive wheel with urethane. Make sure the outer diameter of the urethane is greater than 55mm.
2. Check urethane thickness on the curb wheel.
3. Lube the drive chain at least once a year for smooth operation.
4. Check wire terminal connectors, so that they are securely connected.

Warning*: Perform any kind of maintenance with the battery removed from the machine.*

Battery Maintenance

1. Recharge the battery whenever possible to maximize battery life.
2. Do not leave the battery on the shelf for long periods of time. (A fully charged battery will lose about 20% of its charge if left unattended for about a week.)
3. Do not place/leave battery on an unplugged charger unit.
4. Do not leave battery on the PowerPallet unit for too long or when stored away.
5. Take care to not place/store the battery where the terminals could be shorted.

Service

<To be added>

Software Upgrade

The software on the device can be upgraded or reinstalled using a USB 2.0 flash drive formatted to a FAT32 file system. The upgrade file can be found on the company website. The upgrade process is listed below:

1. Download the update file names **"PHPPPRR.BIN"** from www.powerhandling.com.
2. Copy the downloaded file on to a 1/2/4 GB USB 2.0 flash drive formatted to a FAT32 file system.
3. Remove battery from the PowerPallet (if battery is present).
4. Dismount the right wheel of the pallet-jack from the wheel axle after removing the snap-ring holding it in place.
5. Remove the dust cap on the USB programming port located behind the side-plate of the PowerPallet chassis.
6. Insert the USB flash drive containing the update file into the USB programming port.
7. While holding down the Mode button, insert the battery on the unit.
8. The LEDs on the Throttle will light up ORANGE to indicate the file verification process. (Release the Mode button once the LEDs light up ORANGE.)
9. If the upgrade is successful, the LEDs will rapidly blink GREEN 4 times.
10. Detach the USB flash drive, and re-insert the dust cap into the USB programming port.
11. Re-mount the right wheel on the wheel axle, and secure it with the snap-ring.
12. Device is ready to operate with the updated software.

Note: If the file verification process fails, device will load the already existing program and run.

Troubleshooting

If the PowerPallet does not perform as expected, try following the instructions in the table below to troubleshoot the problem.

Problem	Diagnosis	Possible Solution
For any problem, first check Warning Indications & Battery Levels	Does problem match any of the warnings?	Follow corresponding recommended action
Motor turns but does not drive the pallet-jack	Is the drive-wheel off the ground?	Adjust the screw-jack to lower the drive-wheel
	Is the drive-wheel slipping on the ground while the pallet-jack wheels are in contact with the ground?	
Throttle not responsive in Truck Mode	Is the throttle wet?	Operate in Warehouse Mode until Throttle is dry
Problem not listed	Make a note of the problem, environment and the situation leading up to its occurrence.	Reset machine by removing the battery, waiting 15 seconds and re-installing the battery
	Problem persists after reset	Reinstall/Upgrade software

Note: If the problem is not fixed by any of the above methods, please contact customer support.

Revision History

Date	Revision	Changes
22nd October 2014	002	Manual Mode added; Troubleshooting and Machine maintenance sections updated; Software Update Revised; Additional Horn Settings added; Color AMBER replaced by ORANGE
2nd October 2014	001	Initial Release

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