

ERGO-EXPRESS®

Motorized Tug

Owner's Manual: Information and Operation



SERIAL NUMBER



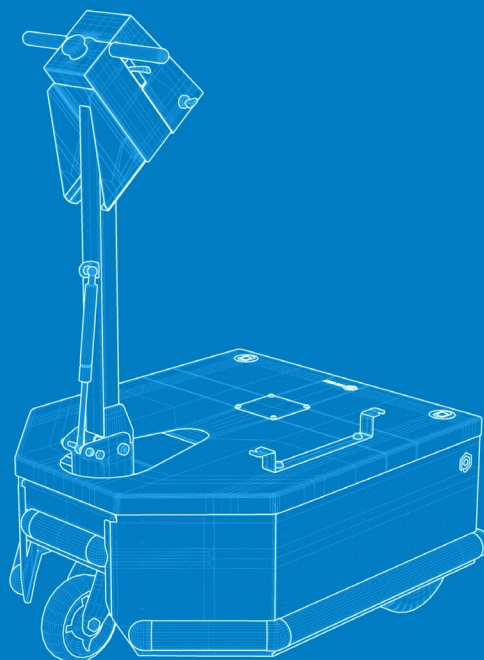
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Liability Statement

This product, the Motorized Tug, has been built to the highest standards of PHS West. Please do not attempt to operate or repair this equipment without adequate training. Any use, operation, or repair in contravention of this document is at your own risk. By acceptance of this system, you hereby assume all liability consequent to your use or misuse of this equipment. PHS West assumes no liability for incidental, special, or consequential damage of any kind. PHS West reserves the right to make equipment or product specification changes at any time. This manual, and all information contained within it, are subject to revision at a future date.

End of Life Statement

Your PHS West Motorized Tug has been designed to provide years of reliable and trouble free service, but at some point in time, it may be necessary to retire the system from service. To protect the environment, the following requirements should be considered and followed:

- This PHS West Motorized Tug is primarily constructed from steel and contains no hazardous materials (with the exception of the batteries). This equipment has an electrical control panel that must be removed from the system and disposed of according to country, regional and local requirements.
- The PHS West Motorized Tug is considered mobile industrial equipment as stated in Category 6 in Annex 1A of the European Waste of Electrical and Electronic Equipment (EU WEEE) Directive 2012/19/EU. As of 2014, this directive could change in the future and the directive should be reviewed for any future changes.
- Included in the PHS West Motorized Tug are components manufactured by others. Their retirement and disposal are covered in the individual equipment technical manuals listed in the PHS West manual if applicable.

Proprietary Notice

All drawings and information herein are the property of PHS West. All unauthorized use and reproduction is prohibited.

Trademark Acknowledgments

All product names and trademarks are the property of their respective owners.

Revision Log

Revision Level	Date	Affected Pages	Description of Change
-	8/28/2023	All	Consolidation of Motorized Tug Manuals



Introduction

The Ergo-Express® Motorized Tug is a powerful pulling device that can accommodate a variety of hitch attachments. For an understanding of efficient and safe operation of the tug it is important that you read this manual.

The motorized tug uses a microprocessor based controller to operate all functions including drive speed, direction of travel, a motor speed governor, a battery charge meter, and an automatic motor brake. Additionally, the microprocessor controls many functions that may not be readily apparent to the user, such as load compensation, acceleration control, emergency stop behavior and motor current limiting.

Index

- 1 Related Documents
- 1 Conditions Suitable to Operate
- 1 Safety
- 3 Operation
- 6 Battery Charging
- 7 Manually Moving
- 7 User Interface Programmability
- 8 Maintenance
- 9 Troubleshooting
- 10 Service
- 11 Warranty



Related Documents

These documents are included in the manual package that shipped with your equipment. All information contained in these documents pertains to devices not manufactured by PHS West. Each manufacturer assumes responsibility for the contents of the accompanying literature.

Equipment Type	Functional Data	Document Numbers and Manufacturer

Conditions Suitable to Operate

- Charger: 100-240VAC, 2A, 50/60Hz, 1~
- Lifter: 24VDC powered by (quantity two) 12VDC 17Ah lead acid batteries
- Maximum static load capacity of 350lbs (159kg) centered on the platform
 - Maximum dynamic load capacity of 250lbs (114kg) centered on the platform
- Size: 29.1" (73.9cm) W x 48" (121.9cm) L x 69.5" (176.5cm) H
- Operating Range: 4" (10.2cm) to 89" (226.1cm) H
- Indoor, dry environment
- Operating temperature range: 5°C - 40°C
- Typical operating humidity range from 50% to 70% non-condensing, may be operated at lower facility humidity levels
- Operating altitude up to 1,650m above mean sea level
- Transportation and storage temperature range -25°C-+55°C

Safety

Document Symbol Conventions

It is important that you read and understand this manual. The information contained within relates to protecting your safety and preventing problems. The symbols below are used to help you recognize this information.

Symbol	Description
	DANGER! Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury
	WARNING! Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
	CAUTION! Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury
	NOTICE: Indicates a potential situation which, if not avoided, can result in property damage or damage to the equipment
	Note: Indicates information, notes, or tips for improving your success using the equipment

⚠ CAUTION!

The following instructions are vital to preventing hazardous situations that could result in an injury.

- Before servicing, disconnect the power at the batteries and unplug the chargers.
- All batteries are sealed and maintenance free.
- Never operate the Motorized Tug if your visibility is obstructed.
- Always use safety straps while towing other equipment.
- Use caution when operating the tug on steep inclines.
- Never carry riders on the tug.
- Never leave the tug unattended while the parking brake is disengaged.
- Turn the power off when leaving the tug unattended.

Built-In Features

The UI is equipped with several internal features to enhance the operation of the system.

- **Throttle Engaged During Power Up:** To prevent abrupt startups, the tug will not operate if the throttle is depressed while the key-switch is turned off. This will create a fault code. The throttle must be in the neutral position when the control is turned on.
- **Sleep Mode:** The control system utilizes a power saving mode used to conserve battery life. If the system does not detect user input for several minutes, the controller will power itself off. To exit sleep mode, turn the key switch to the "off" position, and then to "on."
- **Electromechanical Brake:** the tug automatically engages a motor brake when the drive wheels are not being powered, even while the system is off. See **Manually Moving** for instructions on disengaging the brake.
- **Throttle Lock-Out During Charging:** If the system is charging, the throttle levers will be disabled. If the throttles are engaged while charging, the tug will not operate and a fault code will be displayed on the user interface.
- **Anti-Runaway:** If, for any reason, the brake lever is released and the tug rolls away, the controller will automatically limit the speed of the tug. This function operates even if the tug is powered "off."
- **Start Compensation:** The controller will sense when the tug is stopped on an inclined surface and will provide additional power when started to prevent roll back.

Daily Inspection

Perform the following on a daily basis:

- Visually check the caster wheels for damage.
- Check the battery charge indicator. Operating on a low charge can damage the batteries.
- If equipped with safety straps, check that they are functioning and secure.
- Ensure that the power cord is secured.
- Check the emergency stop switch for operation.
- Visually check the tug for any other external damage.
- Visually check the power cord and plug to monitor normal wear and tear. If the cord or plug is found to have damage, remove from service and replace immediately.

Operation

The user interface (UI) is the control system for the tug's power drive and safety features. It is located at the front of the tug at the top of the steering column.

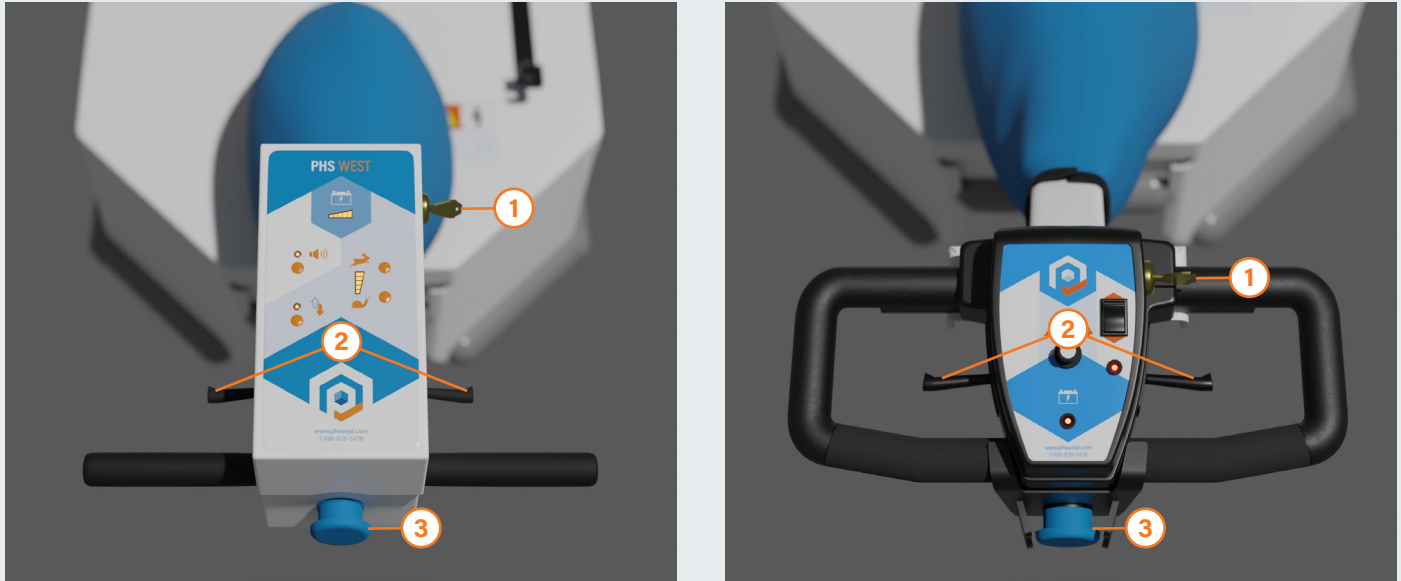


Figure 1: User Interface Components

1 Power Switch

The tug's power switch is located on the right side of the UI. To power the tug on, insert the key at a horizontal orientation and rotate it counterclockwise. With the key at a vertical orientation, the lights on the UI will activate. The tug will perform a boot up cycle lasting approximately ten seconds before the tug is ready to operate. To turn the tug off, rotate the key clockwise to its original position.

2 Throttle

Projecting from either side of the UI behind the handle grips, the tug's throttle engages the power drive system. To engage the throttle, hold the hand grip and use a finger to pull the throttle. The power drive will engage and the tug will begin moving. Releasing the throttle will disengage the power drive and the tug will come to a stop. The throttle is ambidextrous; the tug will travel in the direction indicated by the directional control regardless of which side of the throttle is engaged. The throttle also controls the speed of the tug. Depressing the throttle engages the power drive up to the maximum speed indicated on the speed control depending on the depth of depression. For example, depressing the throttle halfway will engage the power drive at half the maximum speed indicated on the speed control. Depressing the throttle fully will engage the power drive to the maximum speed indicated on the speed control.

3 Stop Switch

The stop switch is used to bring the tug to an immediate stop when needed and should not be used for routine stops. To engage the stop switch, press the large blue button. The tug will come to an immediate stop and the throttle will not function while the stop switch is depressed. Upon releasing the stop switch, the tug's throttle will function normally.



Figure 2: 4000S/4000SHD User Interface

4000S/4000SHD SPECIFIC

Battery Charge Level Indicator

If all bars are illuminated, the battery is fully charged. If a single bar is illuminated, the battery charge is very low. The display will start flashing when critically low. Operating when the batteries are low can damage the batteries. See **Battery Charging**.

Directional Control Button

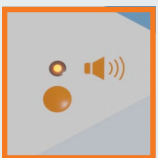
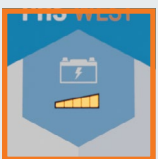
The tug's direction of travel is indicated by the directional control button. When the light is not illuminated, the tug will move towards the operator if they are standing at the UI. When the light is illuminated, the tug will move away from the operator.

Motion Alarm

The motion alarm sounds when the tug is in motion. The motion alarm is activated when the light is illuminated and deactivated when the light is not illuminated. The tug's default startup setting will have the motion alarm set to active.

Speed Control

The speed selector push buttons act as a speed governor. The speed setting determines the top speed of the tug when the throttle is fully engaged. To raise the speed, press the top button. To lower the speed, press the bottom button.



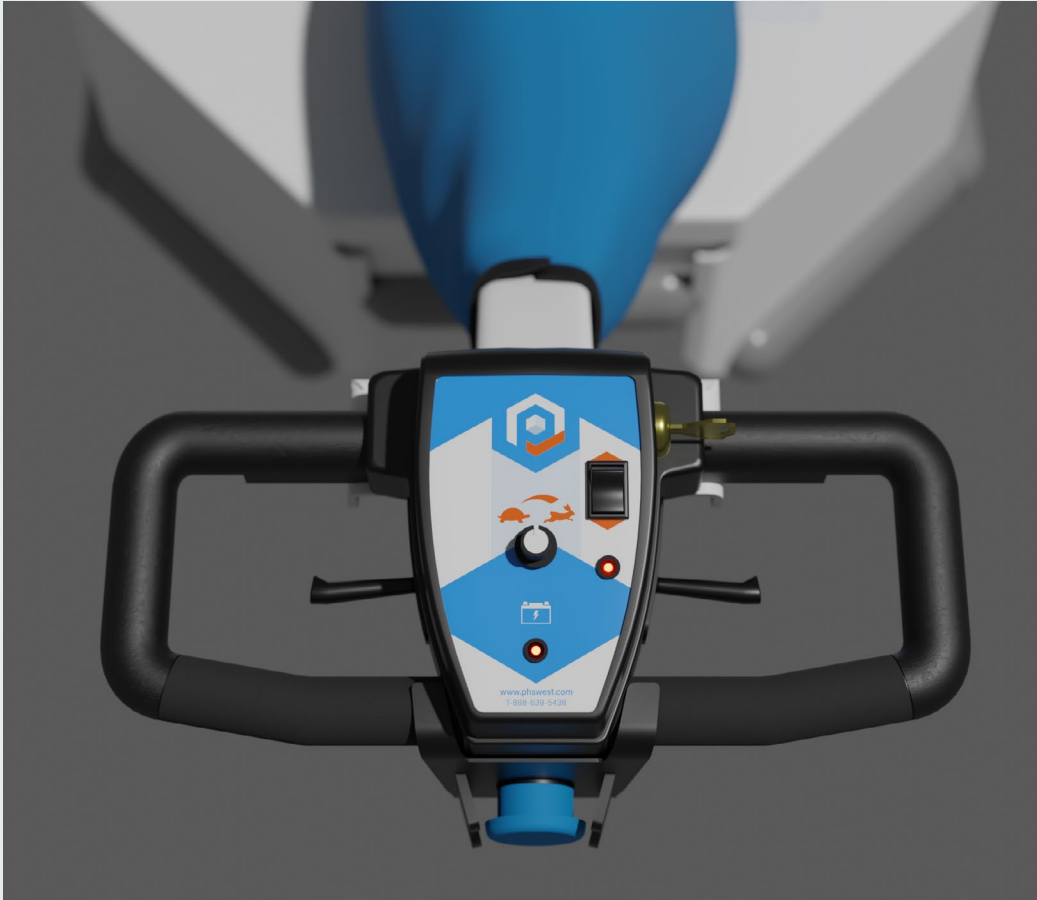


Figure 3: E4000S User Interface

E4000S/4000SLH SPECIFIC

Battery Indicator Light

When the tug is on, the battery indicator light will be illuminated. The light will start flashing when critically low. Operating when the batteries are low can damage the batteries. See **Battery Charging**.

Directional Control Switch

The tug's direction of travel is indicated by the arrows on the directional control switch. The light is illuminated when the tug is set to travel towards the user.

Speed Control

The speed control acts as a governor. The top speed is adjusted by turning the speed adjusting knob. Rotating the knob towards the rabbit increases the top speed. Rotating the knob towards the turtle decreases the top speed.



Battery Charging

⚠ CAUTION! Please read instructions completely before charging.

- Charge batteries fully in a dry, well ventilated, fire retardant location away from patient care areas with open sources of oxygen.
- Examine the power cord periodically for cracking and damage.
- Use only a charger designed for sealed lead acid batteries. The charger is not intended to supply power to an extra-low voltage electrical system or to change dry cell batteries.
- Driving functions are disabled while in charging mode. This safety feature eliminates the possibility of driving away while the cord is plugged in.
- Never change a frozen battery.

Proper charging practices will ensure the tug operates at peak performance throughout the day. It is recommended to charge the tug at the end of each shift and between workloads when possible. This will prevent unforeseen downtimes and maximize the cycle life of the batteries.

Charging the Batteries

1. Park near a grounded AC electrical outlet and turn the power off before charging.
2. Find the charging cord located beneath the UI.
3. Plug the end into the AC electrical outlet. Ensure the end of the cord is secure in the outlet.
4. Allow batteries to charge fully. Initial charge time is nine hours. Standard charge time from thereon is five to eight hours, uninterrupted.

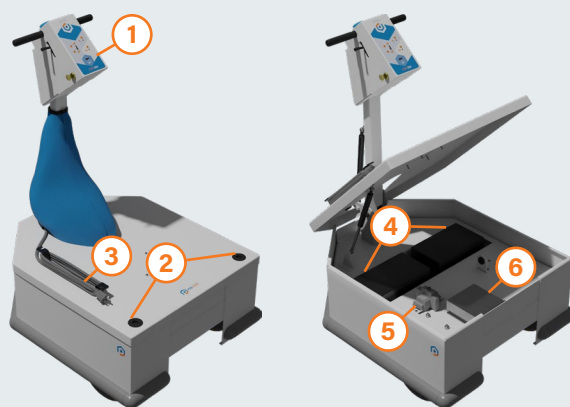


Figure 4: Electrical Components

- 1 User Interface (UI)
- 2 Hood Release
- 3 Charging Cable
- 4 Batteries
- 5 Circuit Breaker
- 6 Charger

4000S/4000SHD BATTERY CHARGE LEVEL DISPLAY

Use the battery charge level indicator to check the charging status of the tug. The batteries are fully charged when all bars are illuminated.

E4000S/4000SLH BATTERY INDICATOR LIGHT

The battery indicator light will flash for approximately 30 seconds to start the charging cycle. The light will remain fully illuminated while charging, and flash when charging is complete.

Manually Moving

If the tug must be moved manually, the motor brake must be physically disengaged. To disengage the brake, push the brake lever away from the brake. While the brake is physically disengaged, the tug will not operate and a 1-2 fault code will flash on the user interface. To engage the brake, pull the brake lever back into position.



Figure 5: Disengaging the Brake

User Interface Programmability

Certain parameters can be changed with the use of a handheld programmer. If you are unhappy with certain controller behavior, contact PHS West to discuss adjustments. Our technicians can send you a programmer and guide you through reprogramming the control. Examples of parameters able to be adjusted include: maximum speed, acceleration and deceleration rates, throttle release deceleration, brake onset delay, low battery shut down voltage, throttle gain, and load speed compensation (maintaining speed under increasing loads.)

WARNING!

Changing the programming on the microprocessor could damage your tug and invalidate the warranty. Always contact the PHS West Team if you wish to modify the program.

 **Note:** Separate documentation is available for programming the user interface module.

Maintenance

⚠ CAUTION!

Only minimum maintenance is required to maintain the service and dependability of the tug. Failure to follow these instructions may result in personal injury or property damage.

Daily

- Maintain battery charge. When not in use, turn off to prevent battery damage.
- Keep the charger plugged in when not in use.
- Visually check the caster wheels for damage.
- Ensure that the power cord is in good condition and secured.
- Check that the stop switch is operating properly.
- Visually check the tug for any other external damage.

Monthly

- Check and Tighten any exposed fasteners.
- Check front and rear casters for roughness during rotation. Replace if necessary.
- Check the charge cord and AC charging receptacle.

Three Months

- Check all bolts and connections for tightness and wear.

Six Months

- Check all electrical connections for clean contact.
- Check all tires for wear and replace if necessary.

Yearly

- Replace batteries.

General Cleaning

These manufacturer recommended practices for cleaning products are not intended to disinfect product. Periodic cleaning to remove the buildup of dirt and residue is highly recommended to extend the life of your powder coating finish.

Use a mild detergent with warm water on a soft cloth. Use of a CaviWipe™ type of cleaner is also acceptable. Do not use wire brushes, abrasives, or similar cleaning tools that will abrade the powder coated surface. Always test the solution in an inconspicuous area before using on a large scale.

⚠ WARNING!

Do not expose the tug to spray-on cleaning solutions or excessive moisture.

Troubleshooting

During the power on sequence, the control head will perform a self-diagnostic check. If errors are detected, a code is flashed in the battery charge display. There are three states provided by the battery charge display.

- **Steady On** indicates normal status.
- **Steady Off** indicates the power is off or there is no battery power.
- **Flashing** indicates an error. Reference the **Error Codes** table to interpret.

Error Codes

In regular operation with no faults present, the battery charge display will be illuminated steadily. If, during operation, the controller detects a fault, the display will flash a code to indicate the type of error. The display will flash the first number of the code, flash for approximately one second, and then flash the second part of the code. The controller will continually repeat the flash code until powered off. If the code indicates a service problem, contact PHS West for instructions to verify and correct the problem.

Code	Problem	Possible Causes/Corrective Steps
1-1	Brake Short	Inspect wire between brake and motor controller for damaged or loose connections. Replace wire if needed.
1-2	Brake Open	▪ Inspect wire between brake and motor controller for damaged or loose connections. ▪ Brake is open. See Manually Moving for instructions on re-engaging the brake lever. ▪ Brake is missing from unit. ▪ Brake is broken.
1-3	Quick Stop/ Drive Inhibit	An activated safety sensing device such as a seat switch, proximity sensor, or stop switch. 1. Clear the condition that is activating the safety device. 2. The safety device could be faulty and needs to be replaced.
1-4	Dead Band Start Error	Ensure the throttle is in the neutral position prior to turning on the tug. If the throttle is faulty and not returning to neutral position when released, contact PHS West.
2-1	Motor Short	▪ Inspect wire between brake and motor controller for damaged or loose connections. ▪ The drive motor is faulty and should be replaced.
2-2	Motor Open	▪ Inspect wire between brake and motor controller for damaged or loose connections. ▪ The drive motor is faulty and should be replaced. ▪ Re-engage the drive motor.
2-3	Power Relay Short	Contact PHS West for service of the motor controller.
2-4	PSL Motor Short	▪ Inspect wire between PSL motor and controller for damaged or loose connections. Replace wire if needed. ▪ Replace PSL motor.
3-1	Over Temperature	▪ Operate in accordance with OEM in regards to environment (heat/terrain.) ▪ Check brake for faulty operation. ▪ Reduce load on tug. If a slowdown in speed has occurred: stop, turn off the tug, and wait for it to cool down.
4-1	Over Voltage During Charge	The battery voltage is too high during charge cycle. The batteries should be inspected by a qualified technician. Check the battery charger and it's connections for problems.

Code	Problem	Possible Causes/Corrective Steps
4-2	Charge Mode Time Out	The charge cycle did not complete within 24 hours. The batteries should be inspected by a qualified technician. Check the battery charger and it's connections for problems.
4-3	Charger Over Temperature	The charger overheated during the charge cycle. The batteries should be inspected by a qualified technician. Check the batteries and charger for problems.
5-1 5-2	Internal Failure	An internal component of the motor controller. Contact PHS West.
5-3 5-4	Throttle Fail Band	Throttle control is off center or broken. Generally this is caused by a short to ground, 5V in throttle, or a broken throttle wire.
5-5- 5-10	Internal Failure	An internal component on the CS1108 has failed. Contact PHS West.
6-1	Internal Failure	The handheld programmer is not compatible with the motor controller. Contact PHS West.
6-2 6-3	Internal Failure	An internal component on the CS1108 has failed. Contact PHS West.

Service

Prior to servicing your equipment, please call our 24/7 technical and operational support hot-line at 1-888-639-5438.

Transaxle Assembly

Sealed for life. Do not open or service; these actions will void warranty.

Micro-Processing Controller (MPC)

Do not attempt to service the MPC or any related components; these actions will void warranty.

Circuit Breaker Replacement

An automatic resetting circuit breaker protects the wiring and batteries in event of a short circuit. If the tug stops, check for overloads or short circuits before continuing to operate. The circuit breaker is located under the cover and attached to the positive terminal on the batteries (see **Figure 4: Electrical Components**). If you suspect the circuit breaker is defective, call PHS West for technical support.

WARNING!

Do not operate the tug until the circuit breaker is repaired.

Warranty

PHS West warrants this product to be free of defects in material and workmanship during the warranty period. Our warranty obligation is to provide a replacement for a defective original part, if the part is covered by the warranty, after we receive a proper request.

- **Who may request service?** The purchaser is the warrantee. Only the warrantee can request service.
- **What is an "original part?"** The part used to make the product as shipped.
- **What is a "proper request?"** A request for warranty service is proper if PHS West receives both:
 - A photocopy of the customer invoice displaying shipping date.
 - A written request for warranty service that includes the warrantee's name and phone number.
- **Requests may be sent using:**
 - Email: info@phswest.com
 - Mail: PHS West, 6704 Bleck Drive, Rockford, MN 55373
 - Fax: +1 763-498-8128
- **What is covered under the warranty?** After PHS West receives a request for warranty service, an authorized representative will contact the warrantee to determine whether the claim is covered by the warranty. Before providing warranty service, PHS West may require the warrantee to send the entire product or the defective part(s) to PHS West.
- **How long is the warranty period?** The warranty period for original, dynamic components is one year. For batteries, the warranty period is 30 days. The warranty period begins the date the product is shipped to the warrantee from PHS West.
- **Warranty Evaluation:** All parts sent back (freight paid by warrantee) to PHS West for warranty replacement or repair will be evaluated. PHS West will determine if the part is a warranty issue or if it has been damaged due to misuse or negligence. A written report will be issued detailing the investigation of the part and whether or not the part is classified as warranty.
- **What is not covered by warranty?**
 - Labor
 - Freight
 - Occurrence of any of the following:
 - Product misuse
 - Negligent operation or repair
 - Corrosion or use in corrosive environments
 - Inadequate or improper maintenance
 - Damage sustained during shipping
 - Collisions or other incidental contact causing damage to the product
 - Unauthorized modifications: Do not modify the product in any way without first receiving written authorization from PHS West. Modifications may make the product unsafe or cause excessive or abnormal wear.
- **If a defective part is warranted, how will PHS West correct the issue?** PHS West will provide an appropriate replacement for any covered part. An authorized representative of PHS West will contact the warrantee to discuss the claim.
- **Warranty Procedure:** In the event that a part is damaged or broken, please contact PHS West via phone or email to establish dialogue to identify and diagnose the issue. Please have your tug's serial number available when you call or email.

Notes