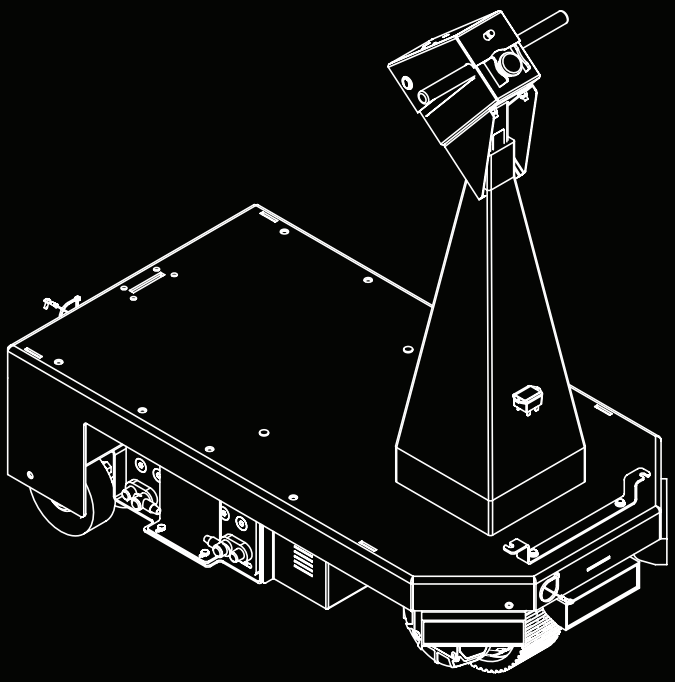
ERGO-EXPRESS®

Model 4000SXHD

Owner's Manual: Information and Operation

SERIAL NUMBER



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62046-401_Rev_C

Liability Statement

This product, the Model 4000SXHD 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 4 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

Trademark Acknowledgments

Revision Log

Revision Level	Date	Affected Pages	Description of Change
A	7/20/2021	All	Updated Equipment
B	10/25/2024	9	Ground Strap Inspection
C	9/15/2025	All	Updated Branded

Introduction

The Ergo-Express® Model 4000SXHD is a powerful device that can accommodate a variety of attachments. For an understanding of efficient and safe operation of the equipment, it is important that you read this manual.

The Ergo-Express® Model 4000SXHD uses a microprocessor based controller to operate all functions, including drive speed, drive direction, 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 a user, such as load compensation, acceleration control, emergency stop behavior, and motor current limiting.

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3 Operation
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6 Battery Charging
8 Maintenance
9 Troubleshooting
9 Labeling
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12 Addendum A

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
Battery Charger	24 VDC 120 Watt Intelligent Active PFC Battery Charger	Doc # CS1205 Control Solutions LLC™

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

General Safety Instructions

Read all safety warnings and instructions. Failure to follow the warnings and instructions may result in serious injury or property damage. The following precauations are recommended for all personnel who perform system operation or maintenance:

- Personnel responsible for system operation and/or maintenance should attend all available safety and operational training courses.
- Do not disconnect safety interlocks on covers, doors, or any other hazard barrier.
- Know the location and operation of all stop devices.
- Know the location of fire extinguisters and how to use them. Use only ABC type extinguishers on electrical fires.
- Observe all safety and warning signs when working with the system.
- Make sure that the floors in the work area are dry and non-slip. Keep the work area clean to help.

Hazardous Energy Safety

Sources of hazardous energy can be in many forms such as electrical power, hydraulic power, pneumatic power, and stored energy such as springs, capacitors, and even falling weight. Before servicing any equipment, it is important to disable, or at least account for, all forms of hazardous energy.

- Know the location of equipment branch circuit interrupters or circuit breakers and how to turn them on and off in case of emergency.
- Avoid contact with electrical components while the system is powered. Contact with electrical components may result in electric shock.
- Immediately disconnect electrical power if there are signs of overheating such as a burnt odor, smoke, or excessive heat. Failure to disconnect power immediately may result in fire or equipment damage.
- See Addendum A for Regulatory Cautions.

⚠ 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. (AGM batteries)
- 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 rider(s) 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 Safety Features

The Motorized Tug user interface (**UI**) is equipped with several internal features to enhance the operation of the system.

- **Throttle Engaged During Power Up:** To prevent abrupt startups, the equipment will not operate if the throttle is engaged while the power switch is turned on. The throttle must be in the neutral position when the power switch is turned on.
- **Sleep Mode:** The equipment utilizes a power saving mode designed to conserve battery life. If the system does not detect user input for 15 minutes, the equipment will power itself off. To exit sleep mode, turn the power switch to the off position, and then back to the on position.
- **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 (Interlock):** 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 UI.
- **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.

- **Manually Moving:** To disengage the brake, rotate the brake release lever clockwise. To engage the brake, rotate the brake release lever counter-clockwise. The UI will display a 1-2 error code when the brake is disengaged, disabling operation.
- **Daily Inspection:** Always inspect your tug before using it. If any of the components are found to be damaged, nonfunctional, or missing, remove the tug from service and replace immediately. Refer to the **Maintenance** section.

Operation

1. Turn the key counter-clockwise to the on position. Check the battery level indicator to verify the batteries have an adequate charge. Check the reverse indicator to determine the direction the equipment will travel when the throttle is engaged.
2. Slowly engage the throttle lever (either side, but not both) until the equipment begins to move. Position yourself in front and to the side of the equipment, using one hand to operate the throttle and to steer. The two throttle levers on the UI are used to control the speed of the drive motor. When either is engaged, the equipment will move in the direction determined by the reverse indicator lamp. Both levers perform the same, functioning as proportional speed controls. Engaging the throttle fully gives full speed. Engaging half-way results in half speed, and so on.
3. When the stop switch is activated, the equipment will immediately stop. The equipment will not operate if the stop switch is held closed.
4. The horn button is for use when approaching blind corners, high traffic intersections, etc..
5. The operator of the equipment must always maintain spatial awareness when operating the equipment. Anytime the equipment is in motion, the operator should be facing the direction of travel, announcing their presence, and managing their speed appropriate to their environment.
6. When the equipment is towing a rack, the operator must be mindful of the impacts this will have on the equipment's performance. Wider turns must be taken and additional distance will be needed to come to a complete stop.

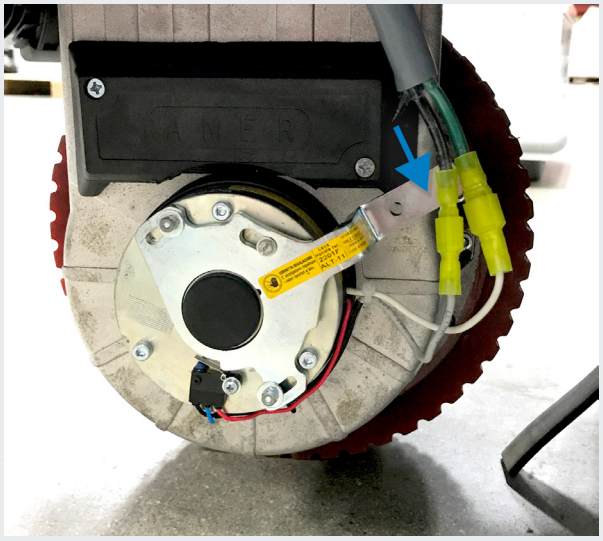


Figure 1: Brake Lever

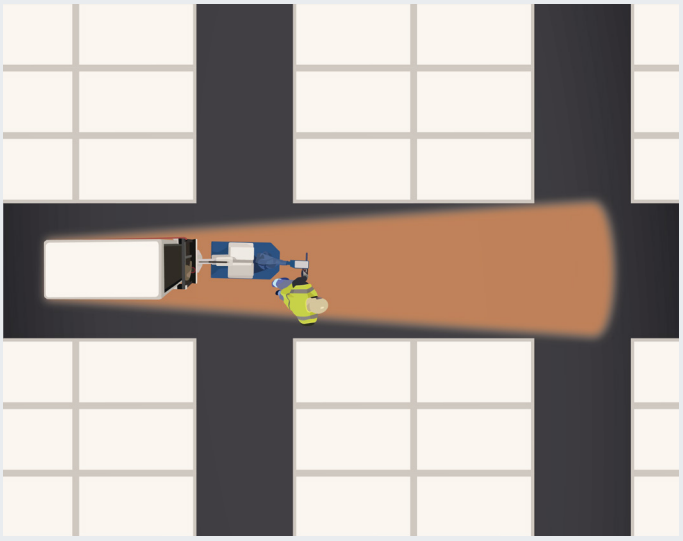


Figure 2: Spatial Awareness

User Interface

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.

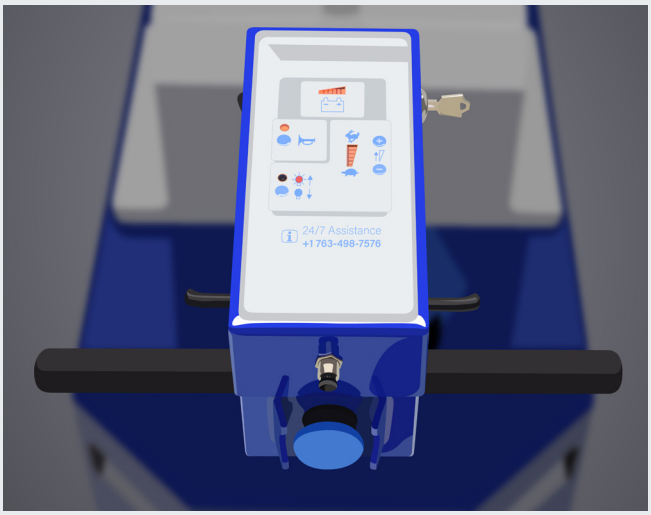
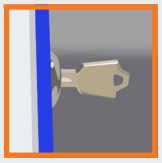
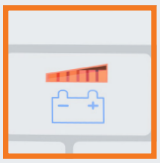


Figure 3: User Interface



Key Switch

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



Battery Charge Level Indicator

The battery charge level is displayed at the top of the UI. The battery charge level can be checked either when the equipment is plugged into a charging station or when the equipment is powered on. The charge level is displayed on the red LED indicator. If all bars are illuminated, the battery is fully charged. If a single bar is illuminated, the battery is significantly drained and needs to be charged immediately.

Reverse Button

The equipment's direction of travel is controlled by this button on the UI overlay. Press the button to toggle between forward and reverse modes. When the LED is not illuminated, the equipment is operating in forward mode. In forward mode, the equipment will move towards the operator if they are standing at the UI. When the LED is illuminated, the equipment is operating in reverse mode. In reverse mode, the equipment will move away from the operator if they were standing at the UI.

Running Lights Switch

The equipment's running lights are operated from a toggle switch located on the left side of the UI. To turn the lights on, press the toggle switch so the top is depressed. A small blue light on the toggle switch will illuminate as will the equipment's running lights. To turn the lights off, press the toggle switch so the bottom is depressed. The small blue light on the toggle switch and the equipment's running lights will no longer be illuminated.

Figure 4: Running Lights

Motion Alarm Button

The equipment's motion alarm is controlled by pressing this button on the UI overlay. The on and off status of the motion alarm is indicated by a red LED and can be activated or deactivated by pressing the motion alarm button. The equipment's motion alarm is activated when the red LED above the motion alarm button is illuminated. The equipment's default startup setting has the motion alarm set to active.

Stop Switch

The equipment's stop switch is the large blue button located on the front of the UI. The stop switch is used to bring the equipment 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 equipment will come to an immediate stop and the throttle will not function while the stop switch remains depressed. Upon releasing the stop switch, the equipment's throttle will function normally.

Horn

The equipment's horn is a small black button located on the front of the UI above the stop switch. The horn is not the same as the motion alarm and is used to project a clear signal when approaching blind corners, high traffic zones, etc. To engage the horn, press the small black button. The horn will sound for as long as the button is depressed.

Throttle

The equipment's throttle levers engage the power drive system. It is critical to understand all UI functions prior to engaging the throttle. The throttle extends from either side of the UI just behind the hand grips. To engage the throttle, hold the hand grip and use a finger to pull the throttle. The power drive will engage and the equipment will begin moving. Releasing the throttle will disengage the power drive and the equipment will come to a stop. The throttle is ambidextrous; the equipment will travel in the direction indicated by the reverse button regardless of whether the left or right throttle lever is pulled or pushed. The throttle also controls the speed of the equipment. Engaging the throttle activates the power drive up to the maximum speed indicated on the speed control depending on the depth of depression. For example, engaging the throttle halfway will activate the power drive at half the maximum speed indicated on the speed control. Engaging the throttle fully will activate the power drive to the maximum speed indicated on the speed control.

Speed Control

The equipment's speed control determines the maximum speed the equipment will travel when the throttle is engaged. The maximum speed can be adjusted using the two speed buttons located on the UI overlay. A red LED indicator to the left of the buttons displays the speed setting. To raise the maximum speed, press the button with the plus symbol. To lower the maximum speed, press the button with the minus symbol.

Battery Charging

⚠ CAUTION! Please read instructions completely before charging.

24V Charging Precautions

- Charge batteries fully in a dry, well ventilated, fire retardant location. Do not charge near patient care areas with open sources of oxygen.
- Inspect batteries for bulging, swelling, and cracking before charging.
- Ensure that batteries are replaced every 12 months.
- The installed charger is not intended to supply power to an extra-low voltage electrical system or to charge dry cell batteries.
- Never charge a frozen battery.

To Charge

1. Park the equipment near grounded AC electrical outlet and turn the power off before charging.
2. Find the charging cord located beneath the hand controls.
3. Plug into the AC electrical outlet. Ensure the end of the cord is secure in the outlet.

- The battery level indicator on the user interface indicates the level of charge on the equipment's batteries. When all the indicator bars are illuminated, the battery is fully charged. When only one bar is illuminated, the battery charge is very low. The display will start flashing when the charge is critically low. Operating the equipment when the batteries are low may damage the batteries.
- Allow batteries to charge fully. Initial charge is approximately nine (9) hours.
- Standard charge time after the initial charge is approximately five-to-eight (5-8) hours, uninterrupted.
- It is recommended that the equipment should remain plugged in when not in use. The charger is a self-regulating smart charger that will automatically regulate the amount of charge required to maintain the battery charge level.

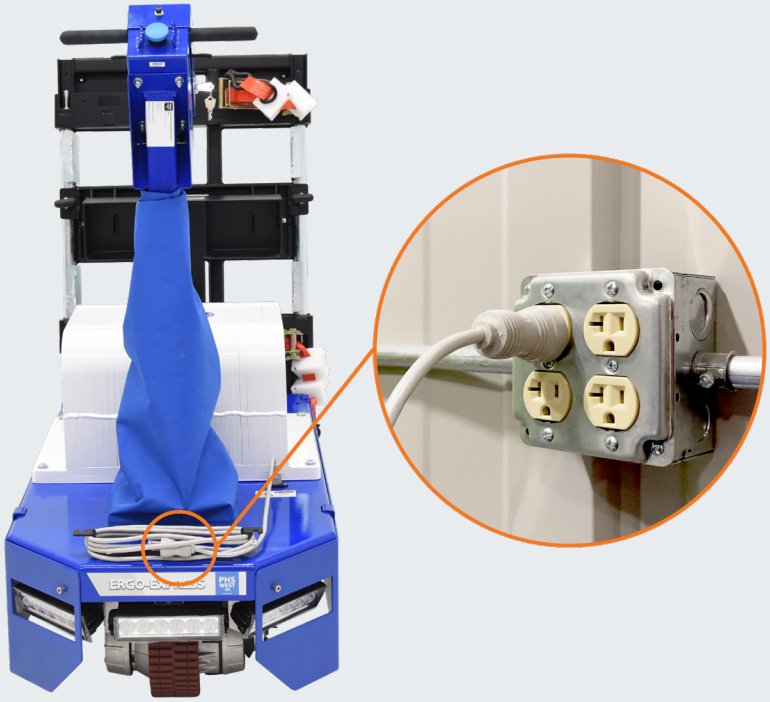


Figure 5: Charging Cord

Figure 6: Battery Level Indicator

- Driving functions are disabled while in the charging mode. This safety feature eliminates the possibility of driving away while the cord is plugged in.
- Chargers draw approximately two (2) amps AC.
- Battery life is greatly improved when proper charging procedures are followed.

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

- Always inspect your tug before using it. If any of the following are found to be damaged, nonfunctional, or missing, remove the tug from service and replace immediately.
- Visually check the caster wheels for damage.
- Check the battery charge level indicator. Operating the equipment with a low charge can damage the battery and void your warranty.
- Keep the charger plugged in when not in use.
- Ensure that the power cord is in good condition and secured.
- Check that the stop switch is operating properly.
- If equipped with safety straps, check that the straps are functioning and secure.
- Check the grounding strap located under the tug. Ensure the chain is present and touches the ground.
- Visually check the tug for any other external damage.

Monthly

- Check and tighten any exposed fasteners.
- Inspect casters for roughness during rotation. Replace if necessary.
- Inspect 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.

Troubleshooting

The equipment's UI will perform a self-diagnostic check during the boot sequence. If faults are detected, the battery charge display flashes a code and can be interpreted using Table 1. There are three conditions indicated by the battery charge display:

- **Steady On:** Indicates normal status and will glow steady during most operations.
- **Steady Off:** Indicates power is off. There is no battery power.
- **Flashing (Fault Codes):** When a fault is detected the display will flash a code to indicate the type of fault. The display will flash the first number of the code, pause for approximately one second, and then flash the second part of the code. Count the number of flashes in each set to determine

Fault Codes	Problem	Possible Causes	Corrective Steps
1-1	Brake Short	Loose/broken connection between brake and motor controller or shorted with bad brake	Inspect wire between brake and controller for damaged or loose connections. Replace wire if needed.
1-2	Brake Open	▪ Brake shorted to case ▪ Missing/Open brake ▪ Loose/Broken connection to brake ▪ DC motor controller	Inspect wire between brake and controller for loose or damaged connections. Replace wire if needed. If it is not a connection issue, contact your representative.
1-3	Quick Stop/Drive Inhibit	A safety sensing device such as a seat switch, proximity sensor or emergency stop button has been activated.	Clear the condition that is activating the safety device. The safety device could be faulty and needs to be replaced.
1-4	Dead Band Start Error	▪ The throttle was engaged during power up. ▪ The throttle is automatically returning to neutral when released.	▪ Make sure the throttle is in the neutral position prior to powering on. ▪ The throttle is faulty. Contact your local service center to have it re-centered.
2-1	Motor Short	▪ Loose/broken connection to brake or motor controller ▪ Broken motor	▪ Inspect the wire between brake and controller for damage or loose connections. Replace wire if needed. ▪ The drive motor is faulty and should be replaced.
2-2	Motor Open	▪ Loose/broken connection to brake or motor controller. ▪ Broken motor ▪ The drive motor was disengaged.	▪ Inspect the wire between brake and controller for damage or loose connections. Replace wire if needed. ▪ The drive motor is faulty and should be replaced. ▪ Re-engage the drive motor.

Fault Codes	Problem	Possible Causes	Corrective Steps
2-3	Power Relay Short	The power relay on the controller has developed a short.	Contact your OEM or representative for service of the motor controller.
2-4	PSL Motor Short	▪ Loose/broken connection to the PSL motor. ▪ Bad PSL motor	▪ Inspect wire between PSL motor and controller for damage or loose connections. Replace wire if needed. ▪ Replace PSL motor.
3-1	Over Temperature	▪ Operating in an extreme environment (heat/terrain). ▪ Brake is engaged while driving. ▪ Excessive load ▪ A slowdown in speed may accompany this error code.	▪ Operate the vehicle in accordance with OEM specifications. ▪ Check brake for faulty operation. ▪ Reduce load ▪ If slowdown has occurred: stop, turn off the unit and wait for it to cool down. The unit will return to full operating range.
4-1	Over Voltage Condition During Charge	The battery voltage is too high during charge cycles.	The batteries should be inspected for problems by a certified technician. Check the battery charger and it's connections.
4-2	Charge Mode Time Out	The charge cycle did not complete within 24 hours.	The batteries should be inspected for problems by a certified technician. Check the battery charger and it's connections.
4-3	Charger Over Temperature Condition	The charger overheated during the charge cycle (valid for CS1204 charger only).	The batteries should be inspected for problems by a certified technician. Check the battery charger and it's connections.
5-1, 5-2	Internal Failure	An internal component of the motor controller has failed.	Contact your OEM or representative for service of the motor controller.
5-3, 5-4	Throttle Fail Band	Throttle control is off center or open.	▪ Broken throttle ▪ Loose/broken connection to throttle. 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 of the motor controller has failed.	Contact your OEM or representative for service of the motor controller.
6-1	Internal Failure	The software revision of the programmer is the wrong version for the software in the controller.	The hand-held programmer is not compatible with the motor controller. Contact the OEM or Control Solutions for advice.
6-2, 6-3	Internal Failure	An internal component of the motor controller has failed.	Contact your OEM or representative for service of the motor controller.

Declaration of Conformity

Manufacturer's Name: PHS West
Manufacturer's Address: 6704 Bleck Drive
Rockford, MN 55373 USA

PHS West declares under sole responsibility for issuing this declaration of conformity in relation to the following product(s):

Product Description: Heavy Duty Server Rack Tug
Model Number: 36500 HD

The above product(s) is hereby declared to conform to the essential requirements set out in community harmonization legislation mentioned below:

Machinery Directive: 2006/42/EC
EMC Directive: 2014/30/EU
RoHS Directive: 2011/65/EU

The following standards have either been referred to or have been compiled with in part or in full as relevant:

EN ISO 12100:2010	Machinery Safety	Safety of Machinery - General Principles for Design - Risk Assessment & Reduction, includes EN 14121:2007
IEC 60335-1:2010/AMD2:2016	Safety	Household and similar Electrical Appliances - General Safety
EN 60204-1:2010	Machinery Safety	Electrical Equipment of Industrial Machines - General Requirements
EN/ISO 14120:2015	Machinery Safety	Equipment Guarding - General Requirements
EN/ISO 4871:2009-11	Machinery Safety	Noise Levels - Declaration & Verification
EN 614-2:2000+A1:2008	Machinery Safety	Ergonomic Design Principals
EN 1037:1995+A1:2008	Machinery Safety	Prevention of Unexpected Start-Up
EN 55014-1:2006+A1:2	EMC	Electromagnetic Compatibility - For Household Appliances
EN 55014-2:2015	EMC	Electromagnetic Compatibility - For Household Appliances
CENELEC 61000-3-2E	EMC	Electromagnetic Compatibility - Limits for Harmonic Emissions
CENELEC 61000-3-3E	EMC	Electromagnetic Compatibility - Limitation for Voltage Changes
EN 12895:2015	EMC	Industrial Trucks Electromagnetic Compatibility
EN 62233:2008+C1	EMC	Measurement Methods for EMC Fields of Household Appliances

Full Name, Position of Responsible Person and Place of Signing
Michael Lindsay, President, Rockford, MN 55373 USA

Signature: Date:

A technical file has been compiled and is available to European national authorities upon written request.

Addendum A

Regulatory Reference - 60335-1 © IEC:2010+A1:2013 (Clause 7.12 and 7.12 of Annex B)

⚠ CAUTION! Possible Harm to persons and equipment

This equipment is not intended for use by:

- Persons with reduced physical, sensory, or mental capabilities, including children, or that lack experience and knowledge of said equipment, unless they have been trained and supervised in the instruction of use of this equipment by a person responsible for their safety.
- Children (if applicable) should be supervised to ensure they do not play with the equipment.

⚠ CAUTION! Follow all instructions regarding battery handling

- Batteries are intended to be replaced by the user. See sections for **Replacing the Batteries.**
- Disable the equipment before performing any maintenance.
- Disconnect the equipment from the charging system before servicing the batteries.
- This equipment utilizes three sealed 12VDC rechargeable AGM batteries.
- Remove batteries as per the **Replacing the Batteries** instructions in this manual.
- Replace batteries as per the **Replacing the Batteries** instructions in this manual.
- For installation, be sure to understand the correct battery polarity.
- The batteries must be removed from the equipment before scrapping the device.
- Follow country and local environmental laws and regulations for proper and safe disposal of used batteries.
- Do not use non-rechargeable batteries.

⚠ CAUTION! In the event of a leaking battery, follow the instructions below

- Immediately stop use of the equipment.
- Follow the **Replacing the Batteries** instructions to remove the leaking battery. Wear gloves and eye protection during removal.
- Properly dispose of the leaking battery according to local environmental laws and regulations.
- Replace the battery with an identical 12VDC rechargeable AGM battery.

⚠ WARNING! Crushing Risk! Heavy Weight!

Notes

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