

FIREFLY[®]

FUSE TOOL & VOLTAGE DETECTOR
and TESTER

Operating Instruction Manual



Making the Invisible Visible[®]

HDE HD ELECTRIC
HDElectricCompany.com

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and TESTER

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IMPORTANT SAFETY INFORMATION

READ AND UNDERSTAND ALL ELEMENTS OF THIS MANUAL PRIOR TO USE.

WARNING: Use of the FireFly Fuse Tool Voltage Detector in certain corner locations may result in incorrect indications. Those conditions should be avoided or re-tested in a nearby location. Voltage cancellation effects inside right angles (conductors approximately 90° apart) may cause false indications if the Detector is used within 3 feet (1 meter) of the conductors joining. Other operating limitations may exist. These are found in the Instructions for Use section of this manual (page 6).

DANGER: Never insert the FireFly Detector into metal enclosures, switchgear, through access holes or use in any situations other than overhead conductors. Incorrect use of the FireFly Detector can lead to severe injury or death.

SAFETY

Rigorous hot stick work practices should be used at all times. All industry, OSHA and company work practices and safety procedures shall apply when working on or near high voltage systems. When used properly, the FireFly Detector reliably provides an alarm warning of energized conductors.

- Only trained, professional operating personnel should use this equipment. The voltages these instruments operate at are to be considered live and dangerous and are lethal. Severe injury or death can occur if improperly used.
- Make certain all other safety considerations have been identified, implemented and are in place prior to using this equipment. Maintain proper work clearances at all times.
- Make certain the FireFly Detector is properly rated for use on the system voltages you will test.
- Prior to using, make certain to inspect the instrument for any physical damage, cleanliness and check for proper working order using the test button. Remove from service and do not use if you suspect a problem with any of the above.
- Test the instrument before and after each use by testing on a known voltage source such as the PT-FTVD Proof Tester® Detector Tester for FireFly Voltage Detectors.
- Never allow another high voltage conductor, or grounded point, to come in contact with the tool during use. Keep housing of FireFly Detector free and clear of all structures at all times.
- Hot sticks must be used at all times per industry, OSHA and company work practices.
- Never touch the detector or control panel during contact with high voltage. The FireFly Detector should be considered to be at the same voltage as the conductor under test.

DESCRIPTION

The FireFly Detector combines a lighted fuse tool with voltage detection adding an extra margin of safety for those working on distribution lines. Operating frequency is 60Hz (optional 50Hz available).

The FireFly Detector includes is a single range voltage detector. One range of operating voltages is set within the unit. A typical range is 4kV-12kV. If the unit contacts a conductor energized from 4kV (line-to-line) to 12kV (line-to-line), red LEDs flash and an audible alarm is activated.

Other FireFly Detector voltage ranges are available up to and including 35kV. Do not use the detector at voltages higher or lower than it is rated. Consult the product label for the specific range or levels for the unit supplied.

When operating within the unit's voltage range (see product label), the FireFly Detector will provide both an audible and visual alarm upon making contact with an energized conductor. The FireFly Detector units will not give an alarm due to induced voltage on de-energized conductors, unless the induced voltage level exceeds the threshold voltage of the detector.

The FireFly Detector should be tested both prior to and after line testing to make certain the unit is working properly. The FireFly Voltage Detector has a built-in self-test feature to make certain the unit is working properly. Push the TEST button, which will test the battery, the electronic circuitry and the audible and visual alarm (see page 5 for more information). To test the FireFly Detector on a known voltage source before and after each use, the PT-FTVD Proof Tester FireFly Voltage Detector Tester can be used (see page 10 for more information).

If the FireFly Detector does not pass the self-test, the voltage detector batteries should be replaced and the unit re-tested. If the unit still does not pass the test, the unit should be sent in for repair. **NEVER USE THE FIREFLY DETECTOR IF THE SELF-TEST IS NOT SUCCESSFULLY PASSED!** See Self-Test Operation Section (page 5).

Four (4) 3V lithium batteries power the FireFly Voltage Detector and white lights. Even though the voltage detector is always "ON" and sensing voltage, the voltage sensor batteries should last for approximately one year under normal use. We do recommend however, replacing the batteries every six months. If the instrument is to be stored for a year or more, remove the battery during storage.

A universal spline adapter is built into the aluminum housing of the FireFly Detector units. Extension hot sticks are required for use at all times. Hot sticks are available from HD Electric and must be used when placing the FireFly Detector in contact with any conductor.

VOLTAGE DETECTOR SELF-TEST OPERATION

The self-test feature provides a full test of the battery, the voltage detection circuitry and the audible and visual alarm.

NOTE: The self-test should be used both prior to and after testing the conductor to confirm proper operation.

- 1) Push and hold the self-test button on the front panel to operate the self-test. The red (alarm) LED lights will flash and the buzzer will beep. The unit is ready for operation (Figure 1).
- 2) If pressing the test button does not cause the events listed in Step 1, the unit should not be placed in operation. The battery may need replacement, see Battery Replacement section (page 8). If changing the battery does not produce the results shown in Step 1, remove the unit from service and send in for repair.
- 3) After completing the voltage detection on the conductor (see next section), always confirm proper function of the FireFly Detector by completing Step 1 again. If the self-test does not function as above, DO NOT assume that the test results are correct. Re-test the conductor, preferably with a different FireFly Detector.
- 4) Verify the operation of the white lights by pressing the Lights ON/OFF button. Verify both the top and side white lights turn on. Replace the two Lights batteries if the lights do not come on (page 8).



Figure 1

NOTE: Never use the self-test if the FireFly Detector is in contact with any voltage source.

FIREFLY™

4/12kV

FTVD-15

Indicates presence of voltage with flashing red lights and beeper. Press and hold the TEST button to verify flashing lights and beeper are active. If not, replace the batteries. Two batteries are required for voltage detection and two for the white lights. All are lithium 2/3A or 123A batteries. Pressing the LIGHTS button toggles lights on and off. This is a direct contact device and must be used with an insulating hot stick. Do not use this

device as your only indication of high voltage. Use extreme caution as high voltage is nearby.

WARNING: Detects AC voltage only. Does not detect DC voltage such as charged capacitors or cable. Do not touch during measurement and keep free of other conductors and grounds. Read and understand all instructions. For use by trained professionals only. Misuse or abuse of this product can lead to severe injury or death.

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INSTRUCTIONS FOR USE

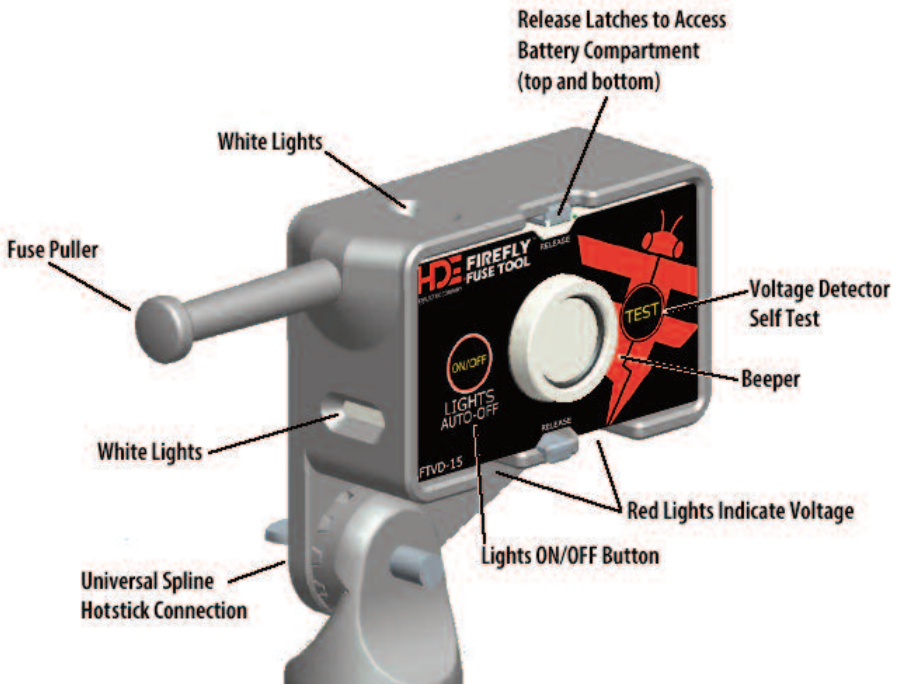
Situations To Avoid

Within certain situations and because of various system configurations, electrical field interference capable of affecting the operation of the FireFly Voltage Detector may occur. Within these areas it is imperative that you be aware of and identify all such conditions which may exist. Some examples of these situations are discussed here.

- 1) **90° CORNER CONFIGURATIONS:** Using the FireFly Detector on the inside of 90° corners may cause reduced voltage sensitivity or a failure to indicate voltage.
- 2) **SAME PHASE INTERFERENCE:** When two conductors of the same phase are in close proximity to one another, the field generated could shield the FireFly Detector, causing it not to operate.
- 3) **OPPOSITE PHASE INTERFERENCE:** This condition may occur when testing a grounded and de-energized conductor which is in close proximity to a live, ungrounded conductor. In this situation the FireFly Detector may indicate live voltage when the conductor being contacted is at ground potential.

NOTE: Only use the FireFly Detector within the voltage range specified on the product label. Do not use the FireFly Detector above or below the product label rating.

DANGER: Never allow the body of the FireFly Detector to bridge across, or come in contact with, another conductor or grounded point.



OPERATION

NOTE: Direct, metal-to-metal contact with the conductor must be made for the FireFly Voltage Detector to operate correctly.

- 1) Place the FireFly Detector at the end of a hot stick adequate for protection for the voltage range being tested. Company, OSHA and industry safety procedures **MUST BE FOLLOWED AT ALL TIMES**. Connect the detector to the hot stick by way of the built-in universal spline, making certain it is securely attached.
- 2) If the FireFly Detector will be used at night or in the dark, test the Lights before use. The lights will shut off automatically 10 minutes after the most recent voltage detection or self-test, or they can be turned off manually.
- 3) Place the FireFly Detector in direct contact with the conductor being tested for voltage or inside the loop of the fuse cutout or switch. The FireFly Detector should be positioned as close to a 90° orientation (perpendicular) to the fuse or switch as possible. If the conductor is energized, the detector will give both an audible (beeping tone) and visual (red blinking lights) indication. If the conductor is not energized no signal is given.

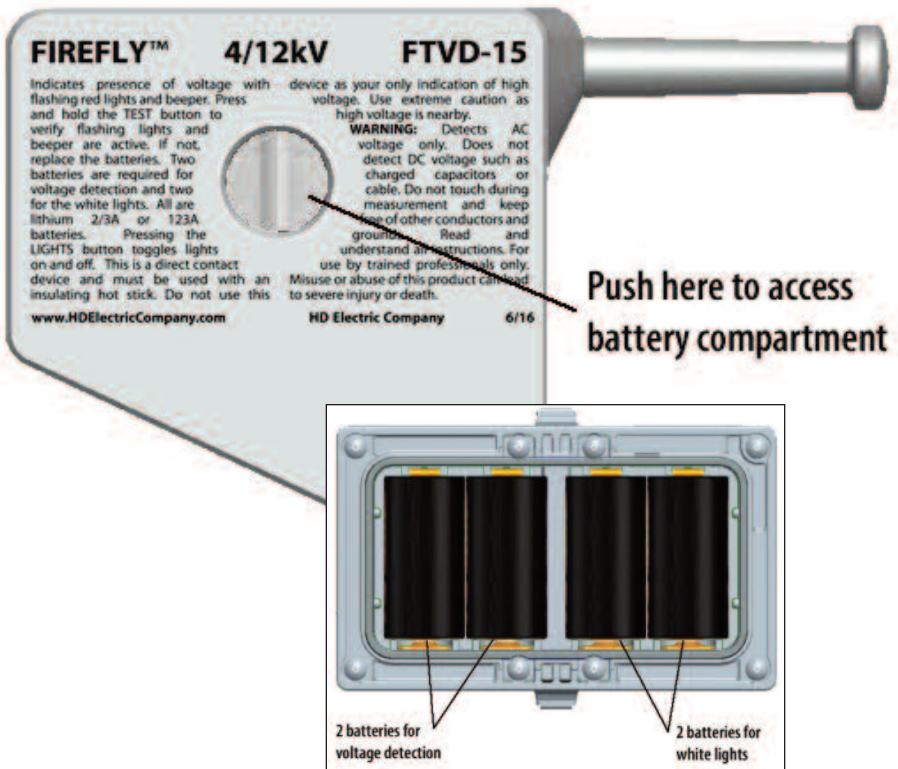
When operating within the unit's voltage range (see product label), the FireFly Detector will provide both an audible and visual alarm upon making contact with an energized conductor. The FireFly Detector unit will not give an alarm due to induced voltage on de-energized conductors, unless the induced voltage level exceeds the threshold voltage of the detector.

- 4) Test the FireFly Detector for proper voltage detection after each use by pushing the TEST button. See the Self-Test Operation section (page 5). The PT-FTVD Proof Tester FireFly Voltage Detector Tester can also be used to test the FireFly on a known voltage source before and after use (page 10).

BATTERY REPLACEMENT

Replace the four batteries as needed with IEC type CR17345 including Duracell® 123, Panasonic® CR123A and Energizer® 123. Note: Panasonic® type CR17335 or BR-2/3A are not acceptable replacements. Two of the four batteries power the voltage detector and the other two power the white lights. Always replace the two batteries for each function in pairs, but it is not necessary to replace all four batteries at the same time.

- 1) Remove the molded plastic inner housing from the aluminum outer housing by pressing and holding the two latches on the front of the unit and pushing through the hole in the back of the unit.
- 2) Pull the battery cover off of the back of the molded housing.
- 3) Replace batteries as needed for the voltage detector and/or the white lights. Verify correct battery polarity.
- 4) Replace the battery compartment cover and push the molded housing back into the aluminum holder right side up. Ensure both latches snap into place.



MAINTENANCE AND CARE

STORAGE - It is recommended for protection of the FireFly Detector that you always store it and its accessories in the carrying bag provided. If a prolonged period of storage is anticipated (six or more months), remove the batteries. Remember to replace the batteries prior to using the FireFly Detector again.

CLEANLINESS - The aluminum outer housing is very rugged, but it should be kept clean and free of dirt, grease and any other foreign materials. The inner plastic housing should also be kept clean and dry. If either housing surface integrity has been compromised in any way, return the FireFly Detector to the factory for repair or replacement. Do not use.

DAMAGE - If you suspect any mechanical or electrical damage, do not use the FireFly Detector and arrange for repair by returning to the factory.

BATTERY REPLACEMENT - See Battery Replacement section (page 8) for additional information.

CALIBRATION & TESTING - It is recommended that every twelve months the FireFly Detector is sent in for testing, cleaning and inspection. If any damage is found please contact us at 800-435-0786 to arrange for service.

Minimal maintenance is required for the FireFly Detector. The carrying bag that is supplied with the unit is recommended for storage of the FireFly Detector when it is not in use.

TECHNICAL SPECIFICATIONS

ENVIRONMENTAL CONDITIONS

Conditions - Indoor and outdoor use

Altitude - Up to 6,566 ft. (2000M)

Operating Temperature -40°F to +120°F (-40°C to +49°C)

Humidity - 95% to 49°C (non-condensing)

Measurement Category IV

Overvoltage Category IV

Enclosure Material - Aluminum, polycarbonate

DIMENSIONS:

Length - 6 in. (15cm), Width 1.2 in. (3cm), Height 6 in. (15cm)

Weight - 1 lb. (454g)

Battery Life - Voltage detection - up to 40 hours continuous alert

White lights - up to 8 hours continuous

Battery - 3V lithium, ANSI-5018LC, IEC-CR17345

Voltage Detection Range - Voltage ranges available from

4kV to 35kV system voltage, 50/60Hz.

OPTIONAL ACCESSORIES

PT-FTVD TESTER FOR FIREFLY DETECTORS

The PT-FTVD Proof Tester® FireFly Detector Tester is for use on all FireFly Detector models. This tester generates high voltage AC for testing the FireFly Voltage Detector.

To use, apply the metal plate on the bottom of the FireFly Tester to the right side of the Firefly Detector housing as shown. Press and hold the TEST button on the Proof Tester. A properly operating FireFly Detector will signal the presence of voltage with both the beeper and red lights. If the FireFly Voltage Detector does not operate, replace the Voltage Detector batteries, per the instructions (page 8). If the Proof Tester LED does not light, replace the Proof Tester battery with a 9V lithium or alkaline type battery.

CAUTION: This device generates high voltage AC for testing the voltage detection function in FireFly Detectors. There is no danger of electric shock when this Tester is used as directed. Discontinue use and return to HD Electric for service if the housing is cracked or broken, or if the battery cover is lost.

WARNING: Do not use this Tester except as directed. Do not use to test equipment other than specified FireFly Voltage Detectors. Do not apply to energized circuits or equipment. Do not operate this Tester without the battery cover and do not open the housing. Refer all servicing to the factory. Failure to follow these instructions may lead to electric shock, severe injury or death.

HOT STICKS

A range of hot sticks are available in lengths starting at 4'. Contact HD Electric for more details.



FireFly™ Detector Proof Tester® for HD Electric FireFly Fuse Tools

This tester tests the voltage detector in FireFly fuse tools. To use, apply the right flat side of the FireFly fuse tool to the metal end plate on the Tester. Press and hold the test button on the Tester. A properly operating FireFly will indicate the presence of voltage with its flashing red lights and beeper. If the FireFly does not indicate, replace the batteries. See instructions. If the Tester LED does not light, replace the Tester battery with a 9V alkaline or lithium type.

CAUTION: This device generates 200VAC for testing the voltage detector in FireFly fuse tools. There is no danger of electric shock when this tester is used as directed. Discontinue use and return to HD Electric Company for service if the housing is cracked or broken or if the battery cover is lost.

WARNING: Do not use this tester except as directed. Do not use to test equipment other than FireFly fuse tools. Do not apply to energized circuits or equipment. Do not operate this Tester without the battery cover and do not open the housing. Refer all servicing to the factory. Failure to follow these instructions may lead to electric shock, severe injury or death.

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TERMS AND CONDITIONS OF SALE

HD Electric Company is herein referred to either as "HDE" or "Seller" and the customer or person or entity purchasing goods or services (hereinafter collectively referred to as "Goods") is referred to as the "Buyer". These Terms and Conditions, any price list or schedule, quotation, acknowledgment or invoice from HDE relevant to the sale of the Goods and all documents incorporated by specific reference therein, constitute the complete and exclusive statement of the terms of the agreement governing the sale of Goods by HDE to Buyer. Buyer's acceptance of the Goods will manifest Buyer's assent to these terms and conditions with variation or addition. Any different or additional terms in Buyer's purchase order or other Buyer documents are hereby objected to. HDE reserves the right in its sole discretion to refuse orders.

1. PRICES AND TAXES: Unless a fixed price is quoted, the price at which the order is accepted is subject to adjustment to HDE's price in effect at the time of order. Any current or future tax or governmental charge (or increase in same) affecting Seller's costs or production, sale or delivery at which Seller is otherwise required to pay or collect in connection with the sale, purchase, delivery, storage, processing, use or consumption of Goods (but excluding any tax on Seller's net income or profit) shall be for Buyer's account and shall be added to the price.

2. TERMS OF PAYMENT: Terms are stated on HDE's invoice in U.S. currency. HDE shall have the right, among other remedies, either to terminate this agreement or to suspend further performance under this and/or other agreements with the Buyer in the event Buyer fails to make any payment when due, which other agreements Buyer and Seller hereby amend accordingly, or HDE otherwise deems itself insecure. Buyer shall be liable for all expenses, including attorney's fees, relating to the collection of just due amounts. Should Buyer's financial position become unsatisfactory to HDE, cash payments or security satisfactory to HDE may be required by HDE for future deliveries and for the goods thereafter delivered. If such cash payment or security is not provided, in addition to HDE's other rights and remedies, HDE may discontinue deliveries. HDE may apply a finance charge for payments made by credit card.

3. SHIPMENT AND DELIVERY: Unless otherwise expressly provided, shipments are made F.O.B. HDE's shipping point. Risk of loss or damage and responsibility shall pass from HDE to Buyer upon delivery to and receipt by common carrier. Any claims for shortages or damages suffered in transit are the responsibility of Buyer and shall be submitted by the Buyer directly to the carrier. Shortages or damages must be acknowledged and signed for at the time of delivery. While HDE will use all reasonable commercial efforts to maintain the delivery dates(s) acknowledged or quoted by HDE, all shipping dates are approximate and not guaranteed. HDE reserves the right to make partial shipments. HDE, at its option, shall not be bound to tender delivery of Goods to the Buyer until the shipment of Goods is processed and approved by the Buyer. If the shipment of Goods is postponed or delayed by any reason, Buyer agrees to reimburse HDE for any and all handling and storage costs and other additional expenses resulting therefrom. All claims for shipping errors, lost shipments or any other discrepancies must be made within ninety (90) days or they will be disallowed and deemed waived.

4. HDE LIMITED WARRANTY: HDE covers its products with a manufacturer's warranty against defects in material or workmanship for a period of ten years in the case of Capacitor Controls and in all other circumstances for a period of one year, unless otherwise stated by HDE in writing. To take advantage of this warranty, the complete product must be delivered prepaid to HDE or any HDE Authorized Service Center. This warranty shall not apply to any Goods including but not limited to products which: (a) Have been repaired or altered outside HDE's factory (or Authorized Service Center) or in any manner so as, in HDE's judgment, to affect its serviceability or proper operation; (b) have been subjected by persons other than HDE (or Authorized Service Center) to improper handling, operation, maintenance, repair or alteration; and, (c) have been subjected to normal wear and tear and misuse, neglect, improper use, or accident. HDE's limited warranty shall be void if the Goods are altered, repaired or replaced by anyone other than HDE or its authorized service center. HDE's obligation to repair or replacement of any allegedly defective Goods or issuance of credit. HDE requires the return of any allegedly defective Goods, transportation prepaid, before honoring any claim. All returned Goods are subject to inspection, and if examination does not disclose any defect covered by this warranty, replacement of such Goods or issuance of credit for same will not be approved. THE FOREGOING CONSTITUTES HDE'S SOLE WARRANTY RESPONSIBILITY AND BUYER'S EXCLUSIVE REMEDY WHETHER SOUNDING IN TORT, CONTRACT, STRICT LIABILITY OR OTHERWISE, EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS AGREEMENT. THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE. No employee, agent, dealer, or other person is authorized to give any warranty on behalf of HDE. This warranty extends only to persons or organizations who purchase the Goods from HDE for resale.

5. LIMITATION OF REMEDY AND LIABILITY; THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY HEREUNDER SHALL BE LIMITED TO REPAIR, CORRECTION, REPLACEMENT OR CREDIT UNDER SECTION 4. HDE SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE, AND IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL HDE'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE PAID BY BUYER FOR THE SPECIFIC GOODS GIVING RISE TO THE CLAIM OR CAUSE OF ACTION, AND BUYER SHALL INDEMNIFY HDE FOR ANY DAMAGES IN EXCESS THEREOF. BUYER AGREES THAT IN NO EVENT SHALL HDE'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS INCLUDE SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES OF ANY CHARACTER IN CONNECTION WITH THE SALE, RESALE OR USE OF THE GOODS, WHICH ARE WAIVED BY BUYER AND AS TO WHICH BUYER SHALL INDEMNIFY HDE. The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, business interruption, loss of use of revenue, cost of capital or loss of or damage to property, equipment, or data, or loss of reputation. Further, Buyer shall indemnify and hold HDE harmless from any liability to Buyer, Buyer's employees, workers, contractors or any other persons arising out of Buyer's, and any other persons', use of the Goods. All instructions and warnings supplied by HDE will be passed on to those persons who use the Goods. HDE's Goods are to be used in only their recommended applications and all warning labels adhered to the Goods by HDE shall be left intact. It is impossible to eliminate all risks associated with the use of the Goods. Risks of serious injury or death, including risks associated with electrocution, arc flash and formal burn, are inherent in work in and around energized electrical systems. Such risks arise from the wide variety of electrical systems and equipment to which Goods may be applied, the manner of use or application, weather and environmental conditions or other unknown factors, all of which are beyond the control of HDE. HDE does not agree to be an insurer of these risks, and shall have no liability for any claims arising from such risks. WHEN YOU BUY OR USE THESE PRODUCTS, YOU AGREE TO ACCEPT THESE RISKS.

6. EXCUSE OF PERFORMANCE (FORCE MAJEURE): HDE shall not be liable for delays in performance or for non-performance due to acts of God; acts of Buyer; war; fire; flood; weather; sabotage; strikes, labor disputes, civil disturbances or riots; governmental restrictions, restrictions, allocations, laws, regulations, orders or actions; unavailability of or delays in transportation; or default of suppliers; or unforeseen circumstances or events beyond HDE's reasonable control. Deliveries or other performance may be suspended for an appropriate period or cancelled by HDE upon notice to Buyer in the event of any of the foregoing, but the balance of this agreement shall otherwise remain unaffected. If HDE determines that its ability to supply the total demand for the Goods, or to obtain material used directly or indirectly in the manufacture of the Goods, is hindered, limited or made impracticable due to causes set forth herein, HDE may allocate its available supply of the Goods or such material (without obligation to acquire other supplies of any such Goods or materials) among itself and its purchasers on such basis as HDE determines to be equitable without liability for any failure of performance which may result therefrom.

7. CHANGES: HDE reserves the right to change designs and specifications for standard Goods without prior notice to Buyer, but not with respect to custom Goods being made for Buyer. HDE shall have no obligation to install or make such change in any Goods manufactured prior to the date of such change.

8. ASSIGNMENT: Buyer shall not assign its rights or delegate its duties hereunder or any interest herein without the prior written consent of HDE, and any such assignment, without such consent, shall be void.

9. INSTALLATION: Buyer shall be responsible for receiving, inspecting, testing, storing, installing, starting up and maintaining all Goods.

10. INSPECTION/TESTING: Buyer, at its expense, agrees that it will promptly inspect the Goods upon receipt thereof, and in no event later than thirty (30) days from the date of receipt of the Goods. Buyer shall deliver to HDE within fifteen (15) days of inspection, but in no event later than forty-five (45) days from the date of receipt of the Goods, written notice of, and all deficiencies, defects, variations from specifications or complaints of any kind with respect to the quantity, quality, condition, shipment, performance, price or appearance of the Goods so received by Buyer, and the extent of such written notice as received by HDE. Buyer shall be deemed conclusively to have inspected and accepted all such Goods unconditionally and to have waived any and all rights and claims, including without limitation any right to reject the Goods or to claim damages in respect thereof. Buyer may not return goods without first advising HDE of the reasons therefor, obtaining from HDE a material authorization number and observing such instructions as HDE may give in authorizing such return. In the event a return is authorized by HDE, a restocking for any Goods requiring repackaging or maintenance a twenty percent (20%) restocking fee shall be assessed to Buyer in the final credit amount.

11. SERVICES: If this agreement requires HDE to perform or provide any services, HDE (including without limitation its successors, assigns, agents or any person or entity acting at HDE's direction) shall not be responsible for any damages, claims, liabilities or expenses of any nature arising out of such services.

12. U.S. EXPORT CONTROL LAWS: All Goods sold to Buyer by HDE hereunder are subject to U.S. Export Control Laws. Buyer hereby agrees not to re-sell or divert any goods contrary to such laws.

13. COMPLIANCE: Seller/Contractor shall comply with all applicable federal, state or local laws, rules, regulations, or orders. Seller/Contractor shall comply with Executive Order 11246, as amended by Executive Order 11375, and the applicable provisions of the Office of Federal Contract Compliance Programs (OFCCP), 41 CFR Part 60, which are incorporated herein by this reference. Buyer shall comply with all applicable federal, state, or local laws, rules, regulations or orders including but not limited to the Foreign Corrupt Practices Act of 1977, as amended. HDE reserves the right to delay or refuse delivery if requests for reasonable assurances of Buyer's compliance are not tendered as requested.

14. MISCELLANEOUS: These terms and conditions supersede all other communications, negotiations and prior oral or written statements regarding the subject matter hereof. No change, modification, rescission, discharge, abandonment, or waiver of these terms and conditions shall be binding upon HDE unless made in writing and signed on its behalf by its duly authorized representative. No conditions, usage or trade, course of dealing or performance, understanding or agreement purporting to modify, vary, explain, or supplement these terms and conditions shall be binding unless hereafter made in writing and signed by Seller. No modification shall be effected by HDE's receipt or acceptance of Buyer's purchase orders, shipping instruction forms, or other documentation containing terms of sale in variance with or in addition to those set forth herein, all of which are objected to by HDE. Any such modifications or additional terms are specifically rejected by HDE. No waiver by HDE with respect to any breach or default of any right or remedy and no course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default of any other right or remedy, unless such waiver be expressed in writing and signed by HDE. All typographical or clerical errors made by HDE in any quotation, acknowledgment or publication are subject to correction. Validity and performance relating to the interpretation and effect of this agreement shall be governed by the laws of the state of Illinois without regard to its conflict of law principles.

15. DISPUTE RESOLUTION: In the event of any dispute INCLUDING, BUT NOT LIMITED TO, BREACH OF CONTRACT, BREACH OF WARRANTY, CLAIMS BASED IN TORT, NEGLIGENCE, PRODUCT LIABILITY, FRAUD, MARKETING, STATE OR FEDERAL REGULATIONS, ANY CLAIMS REGARDING THE ENFORCEABILITY OF THIS LIMITED WARRANTY, AND THE WAIVER OF CLASS ACTION TRIALS between Buyer and Seller, either may choose to resolve the dispute by binding arbitration, as described below, instead of in court. THIS MEANS IF EITHER BUYER OR SELLER CHOOSE BINDING ARBITRATION, NEITHER PARTY SHALL HAVE THE RIGHT TO LITIGATE SUCH CLAIM IN COURT OR HAVE A JURY TRIAL. DISCOVERY AND APPEAL RIGHTS ARE LIMITED IN BINDING ARBITRATION. Buyer and Seller agree that the proper venue of Arbitration is not to be chosen by Buyer or Seller of all actions arising in connection herewith shall be only in the state of Illinois and the parties agree to submit to such jurisdiction. No action, regardless of form, arising out of transactions relating to the agreement, may be brought by either party more than two (2) years after the cause of action has accrued. The U.N. Convention on Contracts for the International Sales of Goods shall not apply to this agreement.

16. CLASS ACTION WAIVER: BINDING ARBITRATION MUST BE ON AN INDIVIDUAL BASIS. THIS MEANS NEITHER BUYER NOR SELLER MAY JOIN OR CONSOLIDATE CLAIMS IN ARBITRATION BY OR AGAINST OTHERS, OR LITIGATE IN COURT OR ARBITRATE ANY CLAIMS AS A REPRESENTATIVE OR MEMBER OF A CLASS OR IN A PRIVATE ATTORNEY GENERAL CAPACITY. ADMINISTRATION OF ARBITRATION: The binding arbitration shall be administered by the American Arbitration Association ("AAA") in accordance with its Commercial Arbitration Rules and/or Supplementary Procedures for Consumer-Related Disputes (including proceedings to mitigate costs of AAA). This binding arbitration is governed by the Federal Arbitration Act ("FAA") (9 USC §1, et. seq.) and will govern the interpretation and enforcement. The binding arbitration shall be held at a location determined by AAA, or at such other location as mutually agreed. In addition to the terms stated above, the following will apply to the binding arbitration: (1) the arbitrator, and not any federal, state, or local court or agency, will have exclusive authority to resolve any dispute relating to the interpretation, applicability, enforceability or formation of this Agreement including any claim that all or any part of this Agreement is void or voidable; (2) the arbitrator shall apply Illinois law consistent with the FAA.

HD Electric Company is committed to ongoing review and improvement of its product lines, and thus reserves the right to modify product design and specifications without notice.

HD Electric Company® products are available through HDE® sales representatives worldwide.

HD Electric products receive final assembly and shipment from HDE's production facility at

Suite 400 - 4320 Executive Drive, Southaven, MS 38672.

HD Electric Company is ISO 9001:2015 certified

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