

DIGITAL VOLTAGE INDICATORS

and ACCESSORIES

Operating & Instruction Manual



HDE HD ELECTRIC
HDElectricCompany.com

DIGITAL VOLTAGE INDICATORS

and ACCESSORIES

Operating & Instruction Manual

- DESCRIPTION 4
- IMPORTANT SAFETY INFORMATION 5
- HOW TO USE IT 6
- ACCURACY 6-7
- INDICATING VOLTAGE ON ELBOW TEST POINTS 8
- ACCESSORIES 8-9
- TECHNICAL SPECIFICATIONS 9
- CARE AND MAINTENANCE 10
- TERMS AND CONDITIONS OF SALE 12

DIGITAL VOLTAGE INDICATORS



DESCRIPTION

The Digital Voltage Indicators, DVI-100 and DVI-500, are direct contact digital voltage indicators for overhead and underground power distribution systems up to 500kV line-to-ground (870kV line-to-line). The display is auto-ranging and indicates from 0.1kV (100 volts) to 9.9kV and from 10kV to 99kV for the DVI-100 and to 500kV for the DVI-500. An audible alarm beeps whenever the indicated voltage is 0.1kV or higher.

There are two versions available of each model. The DVI-100 and DVI-500 indicate voltage by directly contacting conductors on overhead and underground systems. The DVI-100T and DVI-500T with Test Point mode also indicate voltage on elbow test points.

An optional underground probe is available for underground or pad mount applications, or for any application up to 21kV line-to-ground where the DVI will be used in close proximity to grounded conductors or surfaces.

OPERATIONAL IMPAIRMENT

If the DVI is used in a manner not described in this instruction manual, the protection and effective operation of this equipment may be impaired.

IMPORTANT SAFETY INFORMATION

- Only trained, professional operating personnel should use the DVI. The voltages this instrument operates at are dangerous and lethal. Severe injury or death can occur if improperly used.
- Risk of electrocution is inherent in or around high voltage.
- Always use proper high voltage procedures, including personal protective equipment, when working near or around high voltage equipment or conductors.
- Do not exceed the DVI maximum voltage rating.
- Assemble the DVI with the proper contact probe for your application.
- The DVI must be used with a hot stick of the appropriate length for the voltage being measured per your company and OSHA published requirements.
- Do not touch the DVI during measurements. The DVI housing should be considered to be at the same voltage as the conductor under test.
- Prior to using, inspect the instrument for any physical damage, cleanliness and check for proper working order by pressing and holding the ON button. Do not proceed if the display does not indicate all 8's or if the beeper does not sound.
- Never allow another high voltage or grounded conductor to contact the instrument during use. Keep the DVI housing free and clear of all structures at all times. Bridging the DVI probe or housing from line-to-ground or line-to-line may cause a fault and arc.
- The DVI does not indicate voltages below 100 volts. Always use proper grounding procedures. A zero voltage reading on the DVI does not mean the line is dead or grounded.
- Grounded equipment or lines can appear to be live when in close proximity to energized conductors if not fully or properly grounded.
- Always test the DVI on a known voltage source before and after each use, or use the PT-DVI Proof Tester® Voltage Indicator Tester.
- **The DVI is a voltage indicator, not a voltmeter.** Do not attempt to make accurate voltage measurements for phasing or other applications with the DVI.
- The DVI is a direct contact device. The metal portion of the DVI probe must contact the metal conductor to be tested. Voltage indication on insulated conductors such as tree wire or spacer wire will be much lower than actual and may not indicate any voltage at all.
- DVI voltage readings are sensitive to geometry. Read and understand the Accuracy section of this manual before using the DVI.
- The DVI indicates AC voltage only. It does not detect DC voltage such as charged capacitors or cable.

These important labels are affixed to the products. Read and understand before proceeding.

DVI-100

Digital Voltage Indicator Model DVI-100
Indicates presence of AC Line to Ground voltage with direct contact to energized conductor from 0.1kV (100V) to 80kV. Beeper indicates presence of voltage. Press and hold ON button before each use to test battery. Verify proper operation on a known voltage source. Replace battery with 9V alkaline or Brum type only. Always use with hot stick with length appropriate for voltage.

CAUTION: Install proper probe before use.
Use overhead probe for overhead testing. Use underground probe for all other applications or when testing in proximity to energized conductor or surface up to 21-kV.

WARNING: Indicates 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.

US Patent 6,998,832
www.IDElectroCompany.com e.h.
HD Electric Company, Waikegan, IL, U.S.A. 1109

DVI-100T

Digital Voltage Indicator with Elbow Test Point Indicator Model DVI-100T
Indicates presence of AC Line to Ground voltage with direct contact to energized conductor from 0.1kV (100V) to 80kV. Beeper indicates presence of voltage. Press and hold ON button before each use to test battery. Press ON again for above test point voltage indication and note flashing LED. Press ON again for direct contact voltage indication. Verify proper operation on a known voltage source. Replace battery with 9V alkaline or Brum type only. Always use with hot sticks with length appropriate for voltage.

CAUTION: Install proper probe before use.
Use overhead probe for overhead testing only up to 99kV. Use underground probe for all other applications including above test points or when testing in proximity to energized conductor or surface up to 21-kV.

WARNING: Indicates 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.

US Patent 6,998,832
www.IDElectroCompany.com e.h.
HD Electric Company, Waikegan, IL, U.S.A. 1109

DVI-500

Digital Voltage Indicator Model DVI-500
Indicates presence of AC Line to Ground voltage with direct contact to energized conductor from 0.1kV (100V) to 80kV. Beeper indicates presence of voltage. Press and hold ON button before each use to test battery. Verify proper operation on a known voltage source. Replace battery with 9V alkaline or Brum type only. Always use with hot stick with length appropriate for voltage.

CAUTION: Install proper probe before use.
Use smaller overhead probe for overhead testing. Use larger overhead probe for overhead testing above 100kV. Do NOT use this larger probe on distribution voltage systems below 100kV.

WARNING: Indicates 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.

US Patent 6,998,832
www.IDElectroCompany.com e.h.
HD Electric Company, Waikegan, IL, U.S.A. 1108

DVI-500T

Digital Voltage Indicator with Elbow Test Point Indicator Model DVI-500T
Indicates presence of AC Line to Ground voltage with direct contact to energized conductor from 0.1kV (100V) to 80kV. Beeper indicates presence of voltage. Press and hold ON button before each use to test battery. Press ON again for above test point voltage indication and note flashing LED. Press ON again for direct contact voltage indication. Verify proper operation on a known voltage source. Replace battery with 9V alkaline or Brum type only. Always use with hot sticks with length appropriate for voltage.

CAUTION: Install proper probe before use.
Use smaller overhead probe for overhead testing only up to 99kV. Use larger overhead probe for all other applications including above test points or when testing in proximity to energized conductor or surface up to 21-kV.

WARNING: Indicates 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.

US Patent 6,998,832
www.IDElectroCompany.com e.h.
HD Electric Company, Waikegan, IL, U.S.A. 1108

HOW TO USE IT

Test the DVI battery and display by pressing and holding the ON button. Verify that the display reads all 8's and the beeper sounds. If needed, replace the 9V battery with an alkaline or lithium type. The DVI will shut off automatically four minutes after the display returns to zero or it can be shut off manually by pressing and holding the ON button until the display shuts off.

Install the appropriate probe securely to the DVI. Use the overhead hook probes, the smaller hook can be used up to 99kV and the larger hook 100kV and above, for overhead applications with clearance sufficient to keep the DVI housing away from any other live or grounded conductor. Use the optional insulated underground probe for underground or pad mount applications including loadbreak bushings, metal clad switchgear or any other applications where grounded or other live conductors may be in close proximity to the conductor being tested. Some overhead applications such as fuse cutouts, switches, isconnects, terminations or measurements made near a pole or crossarm may call for use of the underground probe due to the close proximity of grounds. **Never allow the DVI to bridge between two energized conductors or from an energized conductor to ground.**

Always install the DVI on a hot stick with length appropriate for the voltage to be measured by way of the built-in universal spline, making certain it is securely attached.

Test the DVI on a known voltage source before and after each use, such as the PT-DVI Proof Tester Voltage Indicator Tester.

Apply the DVI probe to the conductor to be tested making sure to make metal to metal contact.

All readings are in kV. Voltages below 0.1kV (100V) may indicate zero. A zero voltage reading does not mean the line is dead or grounded. Voltage in excess of 99kV line-to-ground for the DVI-100 and in excess of 500kV for the DVI-500 will cause the display to flash and may damage the unit.

ACCURACY

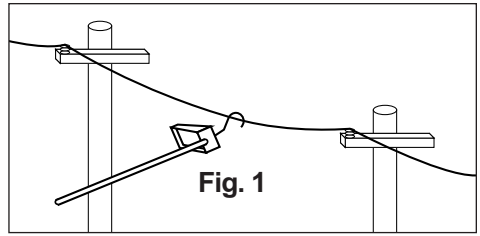
The DVI indicates voltage based on the electric field strength surrounding a conductor. Electric field strength can be greatly influenced by the geometry of a conductor and the presence of other nearby conductors. For best accuracy, keep the DVI at least three feet (one meter) away from inside or outside corners or points and position the face of the DVI away from other live conductors and towards ground. The following guidelines may be helpful:

- The DVI may read up to 25% higher than actual voltage when placed on outside corners or points.
- The DVI may read up to 25% lower than actual voltage when placed on inside corners.
- The DVI may read up to 25% higher than actual voltage if measurements are taken with a ground in close proximity.
- The DVI may read up to 25% higher or lower if other phases are nearby, such as from an overbuild.
- When checking for voltages on conductors believed to be grounded, make the measurement and keep the DVI as far away as possible from energized conductors and position the face of the DVI towards ground. When checking pole guy wires, make the measurement as close to ground as possible.

For best overall accuracy, the following guidelines may be helpful:

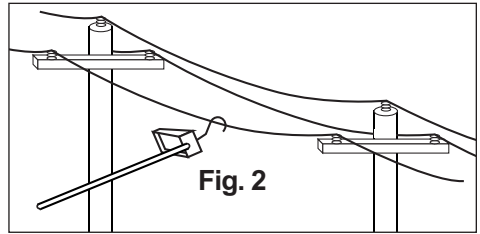
Best overall accuracy is with a single energized conductor (Fig. 1), midspan with no nearby grounds.

Expected accuracy is +/- 3%.



In a typical overhead three phase system with horizontal spacing, the best accuracy is on the two outside conductors (Fig. 2).

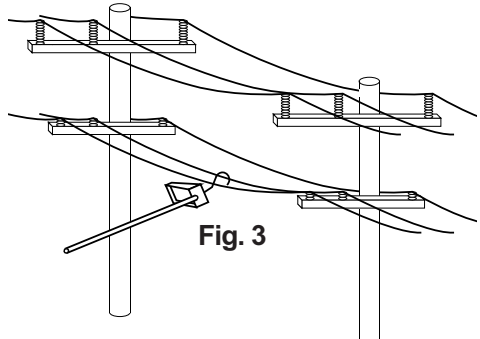
Expected measurement accuracy on the two outside conductors is +/- 5%



On the center conductor, expected accuracy is +/- 10%.

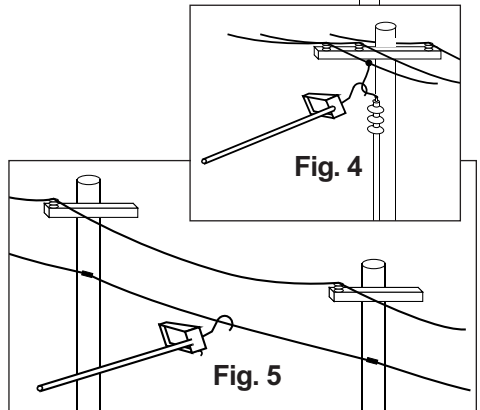
In more complex situations with transmission or other higher voltage overbuild, accessory hardware such as fuses or disconnects or for measurements made on points such as terminations or endpoints, best accuracy is with the DVI as far away as possible from other live conductors or grounds, away from points or corners and facing the ground (Fig. 3 & 4).

Expected overall accuracy is +/- 25%.



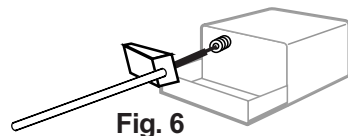
For measurements made on grounded conductors, keep the DVI as far away as possible from energized conductors and face the DVI towards ground (Fig. 5).

Readings on grounded conductors with nearby energized conductors may indicate 0.1 to 0.2kV or more.



For best accuracy with readings on pad mount equipment, livefront (shown) or deadfront, keep the DVI housing clear of adjacent grounds (Fig. 6). DVI with IEP-DVI-5 probe shown.

Expected overall accuracy is +/- 10%.



INDICATING VOLTAGE ON ELBOW TEST POINTS

DVI-100T AND DVI-500T ONLY

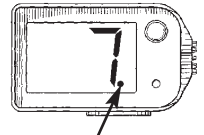
The DVI-100T and DVI-500T can be set to indicate voltages on elbow test points.

For checking elbows and all other pad mount or underground equipment, first install the IEP-DVI-5 underground probe.

For checking elbow test point voltages, turn the DVI on by pressing the **ON** button. Press the **ON** button again for test point mode, indicated by the flashing decimal point.

All elbow test point voltage indications are in kV, calibrated for line voltage. For example, an elbow energized at 7.2kV will indicate 7 as shown here. Expected accuracy is +/- 10%. Variations among elbows from different manufacturers or vintages can be as much as +/- 25%.

To cancel test point mode, press the **ON** button again. Test point mode will be automatically cancelled if the indicated voltages exceeds 99kV.



Flashing Decimal Point

ACCESSORIES

IEP-DVI-5 UNDERGROUND BUSHING PROBE

The IEP-DVI-5 Underground Bushing Probe is designed for direct insertion into exposed 15, 25 or 35kV loadbreak bushings (after connecting elbows have been removed and properly stored). The probe must be inserted directly into the bushing and remain free and clear of all surrounding surfaces. It is rated for use up to 21kV line-to-ground. This probe should also be used in metal clad switchgear or any other applications where grounded or other live conductors may be in close proximity to the conductor being tested. To assemble the IEP-DVI-5 probe on the DVI:


1. Inspect the IEP-DVI-5 probe for any mechanical defects and make certain it is clean and dry.
2. Screw the IEP-DVI-5 into the DVI. Make certain it is snug by hand tightening, but **DO NOT OVERTIGHTEN**.
3. Test the fully assembled DVI on a known voltage source, such as the PT-DVI Proof Tester Voltage Indicator Tester, prior to using.



PT-DVI PROOF TESTER FOR DVI VOLTAGE INDICATORS

The PT-DVI Proof Tester Voltage Indicator Tester is for use on the DVI with any available probes. This tester generates high voltage AC for testing the DVI. To use, turn on the DVI, hold the Tester in one hand and the DVI in the other. Apply the DVI probe to the metal end plate on the Tester. Press and hold the TEST button on the Tester. A properly operating DVI-500 will indicate a voltage of 0.2-0.5kV depending on how the DVI and Tester are held and a DVI-100 will indicate 1.5-4.5kV. For best results, hold both units with a tight grip and wrap your fingers around each unit. If the DVI does not indicate voltage, do not use it and return it to HD Electric for service.

CAUTION: This Tester generates high voltage AC for testing DVI AC voltage indicators.

 There is no danger of electric shock when this tester is used as directed. Discontinue use and return to HDE for service if the housing is cracked or broken, or if the battery cover is lost.

CAUTION: High Voltage

WARNING: Do not use this tester except as directed. Do not use to test equipment other than specified DVI Voltage Indicators. 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.

OTHER ACCESSORIES

The DVI-100 comes standard with (1) HP-DVI-2 small overhead hook probe and a CS-DVI carrying case. The DVI-500 comes standard with (1) HP-DVI-2 small overhead hook probe, (1) HP-DVI-6 large overhead hook probe and a CS-DVI-5 carrying case. Both cases can accommodate the IEP-DVI-5 underground bushing probe, the PT-DVI Proof Tester Voltage Indicator Tester and a spare 9V battery.

ADAPTER FOR SHOTGUN STICK (HSA-2500)

HOT STICKS

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

ENVIRONMENTAL CONDITIONS

CONDITIONS: Indoor and outdoor use

ALTITUDE: Up to 6,566 ft. (2000M)

OPERATING TEMPERATURE: -20°F to +140°F (-29°C to +60°C)

HUMIDITY: 95% to +60°C (non-condensing)

POLLUTION DEGREE: PD4

MEASUREMENT CATEGORY IV

OVERVOLTAGE CATEGORY IV

TECHNICAL SPECIFICATIONS

MODEL NUMBER: DVI-100, DVI-100T,
DVI-500 and DVI-500T

OPERATING VOLTAGE DVI-100: 0 - 99kV (0.1kV - 9.9kV and 10kV - 99kV)

RANGES: DVI-500: 0 - 500kV (0.1kV - 9.9kV and 10kV - 500kV)

OPERATING FREQUENCY: 60Hz (50Hz available)

DIMENSIONS: Display housing: 4.25"H x 7"W x 4.5"D (11 cm x 18 cm x 11 cm)

Overhead probes: HP-DVI-2: 8" long (20 cm) for conductors to 1" diameter

HP-DVI-6: 12" long (30 cm) for conductors to 6" diameter

WEIGHT: 1.37 lb. (0.62 kg) with overhead probe

LED HEIGHT: DVI-100: 2.25" (6 cm)

DVI-500: 1.45" (3.7 cm)

ACCURACY: Laboratory calibrated to +/- 3%

Typical overhead line in compact overhead three phase +/- 10%

Other applications up to +/- 25%

BATTERY: 9V alkaline 1604A, IEC 6LR61 or 9V lithium, ANSI-1604LC.

BATTERY LIFE: About 100 readings with 9V alkaline

ENCLOSURE MATERIAL: Supertough nylon UL94-HB

PRINTED CIRCUIT BOARDS: FR-4 UL94V-0



BATTERY REPLACEMENT INSTRUCTIONS

To replace the battery, open and remove the compartment on the bottom of the DVI housing. Remove and dispose of the old battery, replacing it with a fresh, new 9-volt lithium or alkaline battery. Note battery polarity on the battery compartment. This compartment cannot be reinserted if the battery polarity is reversed.

CARE AND MAINTENANCE

STORAGE - It is recommended for protection of the DVI that it and its accessories are stored in the carrying case provided.

CLEANLINESS - The molded housing is very rugged, but it should be kept clean and free of dirt, grease and any other foreign materials. If the housing surface integrity has been compromised in any way, remove from service and return to factory for repair or replacement.

CLEANING INSTRUCTIONS - To clean the DVI wipe with a damp cloth with water. Do not use harsh chemicals or solvents.

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

CALIBRATION & TESTING - Regular calibration of the DVI is not required. There is no accessible calibration adjustment.

REPAIRS

If any damage is found please contact us at 800-435-0786 to arrange for service.

MANUFACTURING LOCATION

HD Electric • Southaven, MS, 38672 USA

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. Once Buyer's final payment or responsibility to HDE, cash payments or secure 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 any Goods or to provide shipping instructions. If the shipment of Goods is postponed or delayed by HDE for 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 installation, or modification. The HDE Limited Warranty shall be limited to HDE's obligation to repair or replace, at HDE's option, 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 OR 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 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 injury or death, including risks associated with electrocution, arc flash and thermal 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 have no applicability, 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; 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 any Buyer 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 at 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, and 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 throughout 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

Printed in U.S.A. © HD Electric Company 2020 • Bulletin No. DVI IM-200a

US Patent 6,998,832 US Patent D510,882