TAG®-5000
WIRELESS PHASER
and ACCESSORIES
Operating & Instruction Manual

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DESCRIPTION

The TAG-5000 Wireless Phaser is a two unit system used to verify an in-phase condition between any two phases of a three phase power system. The TAG-5000 can be used anywhere a typical phasing voltmeter is used and many places where phasing voltmeters cannot be used due to distance or higher voltages. The standard TAG-5000 is supplied with a carrying case, the receiver and transmitter units and two probes (one hook and one “Y” probe) designed for overhead use. The probes are interchangeable between the two units, and can be selected based on preferred placement and company procedures. Each unit has a universal spline hot stick attachment built into the housing. Extension hot sticks should always be used. Both units are powered by 9V lithium or alkaline batteries. Optional underground probes are available for underground or pad mount applications or for any application where the TAG-5000 will be used in close proximity to grounded conductors or surfaces.

SAFETY

- Only trained, professional operating personnel should use the TAG-5000. 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 use on voltages less than the minimum voltage on the device label and do not exceed the TAG-5000 maximum voltage rating of 230kV line-to-line.

- Always assemble the TAG-5000 with the proper contact probe for your application.
• Always use a hot stick with length appropriate for the voltage being measured per your company and OSHA published requirements.

• Do not touch the TAG-5000 during measurements. The TAG-5000 housing should be considered to be at the same voltage as the conductor under test.

• Prior to using, inspect the instrument for cleanliness, any physical damage and check for proper working order by pressing and holding the All-Check™ buttons on each unit. Do not proceed if the units are not operating properly.

• Never allow another high voltage or grounded conductor to contact the instrument during use. Keep the TAG-5000 housing free and clear of all structures at all times.

• If the TAG-5000 does not indicate the presence of voltage it does not mean that the line is dead or grounded. The TAG-5000 may not indicate voltages below the minimum voltage on the device label. Always use proper grounding procedures.

• The TAG-5000 units are direct contact devices. The metal portion of the TAG-5000 probe must contact the metal conductor to be tested. Voltage and phasing indication on insulated conductors such as tree wire or spacer wire will be unreliable.

• The TAG-5000 is sensitive to geometry. Read and understand this entire manual before using the TAG-5000.

• The TAG-5000 is for three phase 50Hz and 60Hz systems. It does not work on other poly-phase systems.

**Do not use the TAG-5000 to phase or synchronize connections to generators**

**HOW TO USE IT**

**Testing**

Install the probes on both the transmitter and receiver. For overhead applications the hook probe is generally placed on the transmitter while the Y probe is placed on the receiver. Test the units by holding one in each hand and pressing and holding the All-Check button on each unit. The transmitter will begin a series of beeps and flashing lights lasting about 5 seconds. The receiver will emit a single short beep. When the transmitter stops beeping, it will start transmitting a radio signal to the receiver and the receiver will respond with a series of beeps and flashing lights indicating proper reception of the signal from the transmitter.
If the transmitter or receiver do not operate properly, replace the batteries in both units and repeat the test. Do not use the TAG-5000 until it successfully passes this test. Install the TAG-5000 transmitter and receiver on hot sticks with length appropriate for the voltage to be tested by way of the built-in universal spline, making certain it is securely attached. The transmitter and receiver can also be tested on an energized line within the voltage range on the device label by simply placing each unit on the same line. The transmitter should begin beeping as described above and when it stops the receiver should start a steady tone indicating an in-phase condition.

**Phasing**

Many companies have their own operating rules concerning phasing in conductors at a switch point. The following procedure is intended to be one example of proper use of the TAG-5000 but is not the only acceptable procedure.

1) Place the transmitter on each of the 6 conductors to verify the presence of voltage on each conductor. The transmitter will begin beeping when voltage is detected. On higher voltage systems the transmitter may begin beeping before the conductor is contacted, but always make sure that metal to metal contact is made between the transmitter probe and the live conductor.

2) Place the transmitter on the first conductor to be phased. When the transmitter stops beeping, one light remains on indicating the unit is transmitting.

3) Place the receiver on the proper conductor on the opposite side of the open point (e.g. switch) to determine if the two conductors are in-phase. When placed on an energized conductor the unit will beep once when voltage is detected and one LED light of the receiver will turn on to signal that the unit is operating in the receive mode.
On higher voltage systems the receiver may beep before the conductor is contacted, but always make sure that metal to metal contact is made between the receiver probe and the live conductor.

If the two conductors are in-phase the other three receiver lights will turn on and the unit will emit a steady tone. The TAG-5000 receiver is signaling that this phase of the system is in-phase with the transmitter.

If the conductors are out of phase, the receiver will supply a brief burst of all lights and a single short beep of the beeper but will not emit a steady tone.

4) Test all phases for an in-phase indication from the TAG-5000 to make certain that each phase is lined up correctly prior to closing in a switch. When an in-phase condition is shown for all three phases, the phasing operation is complete.

5) Test the TAG-5000 units using the procedures in the Testing section above to make certain that the units operated properly throughout the phasing procedure. If the testing procedure indicates that the units are not operating properly, DO NOT ASSUME that the phasing procedure just completed is correct. Remove the TAG-5000 units from service and re-phase the line using different phasing equipment.

WARNING: Use of the TAG-5000 units at a distance greater than allowed on page 10 may not provide proper operation due to loss of radio signal between the two units. Also, mobile communication devices may cause interference in transmission of the radio signal and can cause false signals. Care should be taken in operating other radio generating devices near the TAG-5000 units during operation.
SITUATIONS TO AVOID
Electrical field interference can affect the operation of the TAG-5000.
For best performance avoid the following:

1. **90° CORNER CONFIGURATIONS:** Position the TAG-5000 at least three feet (1 meter) away from any inside or outside corner. Any 90° inside corner configuration may cause field cancellation, causing the TAG-5000 not to operate correctly.

2. **SAME PHASE INTERFERENCE:** When two conductors of the same phase are in close proximity to one another, the field generated could shield the TAG-5000, causing it to not operate. Reposition the TAG-5000 to areas which will remove it from these situations.

BATTERY REPLACEMENT
The battery is tested each time the All-Check button is depressed and battery replacement should be the first step taken if the All-Check button does not provide the signal described in the Testing section. The battery in the transmitter and receiver should be replaced at the same time to ensure proper operation. Change out the batteries of the units by performing the following steps (see Figure 1 - TAG Components on the next page):

1) Remove the probe and the retaining nut from the top of the units.

2) Push out the electronic housing from within the polycarbonate casing by using the probe. Press firmly and slowly to remove the housing since the gaskets that protect the unit will provide resistance.

3) Carefully remove the metal shield from the electronic housing to get access to the battery. Make certain that the ground lead which is connected from the PC board to the inside of the metal shield is intact. If it is broken, or breaks, return the TAG-5000 to HD Electric for repair.

4) Remove the existing battery from its compartment by gently prying the battery from the bottom of the unit. Take care not to damage the circuit board that the battery is mounted on.

5) Replace the old battery with a fresh alkaline 9V DC battery, Duracell #MN1604 or equivalent. Again, take care in installing the new battery not to damage the circuit board. In addition, make certain that polarity is correct when the battery is installed by matching the plus of the battery to the plus sign indicated on the battery holder.

6) Replace the metal shield, place the housing back in the casing, and re-install the retaining nut and probe.

7) Press the All-Check button to confirm that the new battery is allowing the units to operate correctly.
ACCESSORIES

IEP-UD/C Underground Bushing Probe
The IEP-UD/C 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 phase-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-UD/C PROBE ON THE TAG-5000:
1. Inspect the IEP-UD/C probe for any mechanical defects and make certain it is clean and dry.

2. Remove the overhead probe and screw the IEP-UD/C onto each TAG-5000. Make certain it is snug by hand tightening, but DO NOT OVERTIGHTEN.

3. Test the fully assembled TAG-5000 on a known voltage source prior to using.
IEP-EA/C UNDERGROUND ELBOW PROBE
The IEP-EA/C Underground Elbow Probe is designed for insertion onto 15, 25 and 35kV loadbreak elbow probes. The probe must be inserted directly onto the elbow probe and remain free and clear of all surrounding surfaces. It is rated for use up to 21kV phase to ground.

TO ASSEMBLE THE IEP PROBE ON THE TAG-5000:

1. Inspect the IEP probe for any mechanical defects and make certain it is clean and dry.

2. Remove the overhead probe and screw the IEP onto each TAG-5000. Make certain it is snug by hand tightening, but DO NOT OVER TIGHTEN.

3. Test the fully assembled TAG-5000 on a known voltage source prior to use.

OTHER ACCESSORIES
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.
SPECIFICATIONS

MODEL NUMBER: TAG-5000

OPERATING VOLTAGE RANGE: 4 - 230kV line-to-line

OPERATING FREQUENCY & PHASING: Can be used on 50Hz and 60Hz systems
  In phase indication for phase angle shift \( \leq 10^\circ \)
  No in phase indication for phase angle \( \geq 30^\circ \)

TRANSMISSION: Radio frequency: 433.9MHz
  Transmission power: < 10mW
  Range: Over 33 feet through the air, over 1000 feet along overhead conductors and underground cables with polyethylene insulation; range is substantially reduced in underground conductors with rubber insulation.

OPERATING TEMPERATURE RANGE: -20°F to +120°F

WEIGHT: 1.2 lb. each unit with overhead probe

MAINTENANCE AND CARE

BATTERY - The batteries require checking prior to each use. Use the All-Check button to confirm proper operation. The All-Check button tests the battery voltage in addition to the electronic circuitry, so it is a good test of battery strength. If the All-Check button does not cause the lights to flash and the alarm to sound, replace the batteries with lithium or alkaline types only.

STORAGE - It is recommended for protection of the TAG-5000 that you always store it and its accessories in the carrying case provided.

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

WARNING: DO NOT USE SOLVENTS OF ANY KIND FOR CLEANING.

DAMAGE - If you suspect any mechanical or electrical damage, do not use the TAG-5000 and arrange for repair by returning to the factory.

CALIBRATION & TESTING - Regular calibration of the TAG-5000 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.
1. PRICES AND TAXES: Unless a fixed price is quoted, the price at which this order is accepted is subject to adjustment to HDE’s price at the time of order. Any current or future tax or government charge (or increase in same) affecting Seller’s costs or production, sale or delivery or which Seller is required to so collect or to pay in connection with the sale, delivery, processing, storage, use or consumption of Goods (but not any tax Seller net incurred on sale or delivery or which Seller is required to so collect or to pay in connection with the sale, delivery, processing, storage, use or consumption of Goods) shall be added to the prices quoted and charged to Buyer.

2. TERMS OF PAYMENT: Terms are stated on HDE’s invoice. Terms may change at any time at HDE’s discretion. Seller reserves the right to require payment in advance or by letter of credit, credit card or other acceptable means of payment before delivery of any Goods. In the event of non-payment, or any default in payment, or if any Goods are returned by Buyer, HDE’s reasonable costs and expenses shall be chargeable to Buyer. If any Goods are shipped in advance of settlement, any such Goods shall be securely marked as “property of HDE.” HDE reserves the right to refuse delivery of Goods to a Buyer who fails to meet any of its credit terms.

3. DELIVERY AND SHIPMENT: All Goods shall be shipped F.O.B. HDE’s shipping point. Risk of loss or damage during shipment and all other risks shall be borne by Buyer. Seller shall be liable for any hidden damage to Goods shipped under a consignment order or for any loss resulting from storage, handling, or transportation of Goods by Seller. All Goods, regardless of the form of shipment, shall be delivered to Buyer at Buyer’s risk and expense and under Buyer’s control. Buyer shall be responsible for all insurance on Goods during transportation. Seller shall immediately inform Buyer of any defect, deficiency or damage to any Goods of whatever kind discovered during Seller’s examination. Seller shall have no obligation to give Buyer notice of any such defect, deficiency or damage if Seller has given Buyer credit for such defect, deficiency or damage as of the time it shipped the Goods to Buyer for which such defect, deficiency or damage was found, if Seller and Buyer have made an agreement to return Goods, or if Seller and Buyer have signed a “notice of claim” or equivalent acknowledgement of such defect, deficiency or damage.

4. RETURN OF GOODS: Buyer shall return Goods to Seller at Seller’s expense 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 any and all deficiencies, defects, variations from specifications or complaints of nonconformance of the Goods, stating the nature and extent of any and all defects or nonconformities, and stating the reasons for the return of the Goods. Any return of Goods shall be at Buyer’s risk and expense. Buyer may not return goods without first advising Seller of the reasons therefore, obtaining from Seller a material authorization number and observing such instructions as Seller may give in authorizing such return. In the event a return is authorized by Seller, a restocking fee of twenty percent (20%) of the price charged for the Goods requiring repackaging or maintenance shall be assessed to Buyer in the final credit amount.

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 agrees to indemnify HDE for any and all damages in excess thereof. Buyer agrees that in no event shall Seller be liable for any claim for punitive damages. Seller and Buyer do not intend that any damages arising under this Agreement shall be multiplied or exacerbated by any product or process enhancement (including but not limited to the use of the Goods to which such enhancement is applied). Seller shall be liable only if, in an action brought by Seller, liability is found to exist for any such product or process enhancement.

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, strike, labor disputes, civil disturbances or riots, governmental restrictions, requisitions, allocations, laws, regulations, orders or actions; unavailability of or delay 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 not be affected by such suspensions or cancellations. Should HDE, or any of its contractors, be prevented or delayed by fire, strikes, strikes or any casualty or any other cause beyond its reasonable control from the performance of any obligation hereunder, including the failure of any Goods or failure to deliver or ship any Goods, then such cause or causes shall not be deemed a breach of this Agreement or a failure to perform. In the event of such event, Buyer shall be entitled to a reasonable extension of time to perform such obligation, but in no event shall such extension exceed ninety (90) days.

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, which shall not be modified without Buyer’s written consent.

8. ASSIGNMENT: Buyer shall not assign its rights or delegate its duties hereunder or any interest therein 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: At Buyer’s request, it 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 no event later than forty-five (45) days from the date of receipt of the Goods, written notice of any and all deficiencies, defects, variations from specifications or complaints of non-conformity of the Goods, stating the nature and extent of any and all deficiencies or defects, and stating the reasons for the return of the Goods. Buyer may not return goods without first advising Seller of the reasons therefore, obtaining from Seller a material authorization number and observing such instructions as Seller may give in authorizing such return. In the event a return is authorized by Seller, a restocking fee of twenty percent (20%) of the price charged for the Goods requiring repackaging or maintenance 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. SELLER’S EXCLUSIVE REMEDY 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 EXCEPT AS IMPLIED, WHETHER OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE. NO EXPRESS OR IMPLIED WARRANTIES OF ANY KIND WHATSOEVER, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER WARRANTY OR REMEDY, WHICH ARE NOT EXPRESSLY PROVIDED IN THIS AGREEMENT, SHALL APPLY TO ANY GOODS MANUFACTURED PRIOR TO THE DATE OF SUCH CHANGES.

13. 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 UNDER THESE TERMS IS ADMINISTERED THROUGH THE AMERICAN ARBITRATION ASSOCIATION (“AAA”). THIS AGREEMENT TO ARBITRATE INCLUDES ANY POLICY OR PRACTICE OF THE AMERICAN ARBITRATION ASSOCIATION OR ANY OF ITS AFFILIATES WHICH MAY IMPROVE THE ADMINISTRATION OF THE ARBITRATION. ANY CLAIMS, DISPUTES OR SETTLEMENTS CONTAINING A PERSONAL OR PROPERTY RELATIONSHIP TO OR WITHIN THE PERSONS, PROPERTY OR BUSINESS OF HDE THAT ARE RELATED TO THIS AGREEMENT OR THE GOODS SOLD HEREUNDER ARE SUBJECT TO THE EXCLUSIVE JURISDICTION AND CONSENT TO THE PERSONAL JURISDICTION OF THE STATE OR FEDERAL COURT LOCATED IN THE COUNTY WHERE HDE’S PRINCIPAL PLACE OF BUSINESS IS LOCATED. ANY CLAIMS, DISPUTES OR SETTLEMENTS CONTAINING A PERSONAL OR PROPERTY RELATIONSHIP TO OR WITHIN THE PERSONS, PROPERTY OR BUSINESS OF HDE THAT ARE RELATED TO THIS AGREEMENT OR THE GOODS SOLD HEREUNDER ARE SUBJECT TO THE EXCLUSIVE JURISDICTION AND CONSENT TO THE PERSONAL JURISDICTION OF THE STATE OR FEDERAL COURT LOCATED IN THE COUNTY WHERE HDE’S PRINCIPAL PLACE OF BUSINESS IS LOCATED.

14. DISPUTE RESOLUTION: In the event of any dispute INCLUDING, BUT NOT LIMITED TO, CONTRACT, BREACH OF CONTRACT, 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 CLAUSES between Buyer and Seller, either may choose to resolve the dispute by binding arbitration, as described below, instead of in court. THIS MEANS IT EITHER BUYER OR SELLER CHOOSE BINDING ARBITRATION. NEITHER PARTY WILL 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 if arbitration is not so 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 related 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.

15. TRADEMARKS: HDE is a registered trademark of HDE Electric Company. Other company and product names may be trademarks of their respective owners.

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