DIPL.-ING.
**H. Horstmann GmbH.**
**Faulted Circuit Indicators**

**LaPrairie, a Division of WESCO Distribution**
1206 Ringwell Drive, Units# 5-6
Newmarket, Ontario L3Y 8V9
Tel: 905-830-9975

# STANDARD NAVIGATOR LM HV <161kV

## Faulted Circuit Indicator for Overhead Lines - *Catalogue # 41-2008-10X*

**Description**

The **Navigator LM HV (Load Memory)** is the latest generation of faulted circuit indicators, utilizing many years of experience, from the Horstmann Company.


Designed for overhead distribution circuits, the Navigator fault indicator quickly and accurately aids trouble crews in determining the status of the system and the location of faults. Installed on bare or covered conductor the unique design allows for easy installation and/or removal with a **hot stick or Grip All Tool**. These FCI's are held in place by an extremely strong spring loaded mechanism combined with serrated mounting surfaces, the Navigator can be mounted at any angle from vertical to horizontal.

The **Navigator** housing is sealed to operate in **adverse outdoor conditions**. The housing materials are corrosion and UV protected polyamide, polycarbonate and stainless steel. There are no moving mechanical parts to wear or fatigue, therefore trip current calibration remains constant throughout the life of the indicator. Attached to the housing is a conductive wire cage to provide additional protection to the internal electronic circuits of the **Navigator**.

The ***STANDARD Navigator HV*** is a version of the Standard Navigator Overhead Faulted Circuit Indicator that is designed and engineered for **Standard Grid – Distribution & Transmission applications while the "SMART" Navigator LM HV is used for Data Acquisition Equipment** such as **SCADA or on Desktop Software.**

The ***STANDARD Navigator HV Cat#* 41-2008-10X** installs on overhead circuit's **≤ 161kV**. For overhead circuits >46kv refer to the separate brochure.

***STANDARD Navigators*** transmit event based fault information to LED lights (the visual flash for field detection).

The **STANDARD NAVIGATOR** can be integrated into any overhead electric grid system from 120 volts to 46 kV. NOTE: There is an available **HV design** that can be placed on Lines up to 161kV.

The **STANDARD NAVIGATOR** detects fault events and provides a digital LED Strobe demonstrating that the fault has passed the given point.

The load leveling (LM) and load memory feature enables the unit to automatically set fault trip current rating in relation to peak load current. Once the unit detects fault current above its trip current rating the FCI sends signal to the Red Strobe LED and the RED LED begins to flash. Cold Load pickup will not falsely trigger the flash.

The ***Navigator*** detects fault current an indication of the Red and Amber strobe lights. The feature of load leveling with load memory (**LM**) enables the unit to automatically set the fault trip threshold in relation to peak load current. Once the unit identifies fault current above its trip rating threshold, the ***STANDARD Navigator*** sends a signal to the LED Strobe Lights to begin reporting of the condition. Local fault indication is provided by a bright red flashing LED. Low battery indication is provided by a bright yellow flashing LED when approximately 50 hours remain in the flash life of the indicator. This allows for scheduled replacement with a Battery Kit. Several combinations of reset methods are available including current, time and manual.

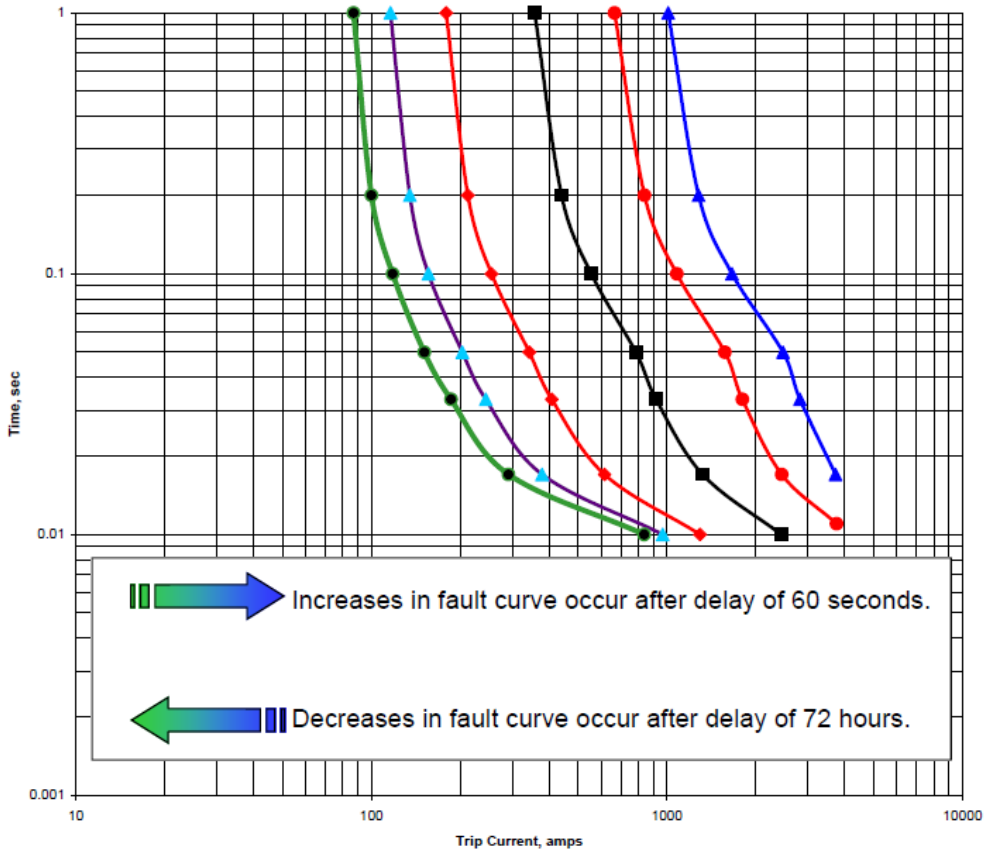
**Fault Indication Function**
(Refer to time-current curves next page)

The Navigator has a single characteristic trip curve. The shape of the characteristic trip curve is referred to as Protection Mated. Protection Mated (PM) means the curve's shape is designed to coordinate with today's electronic protection devices and to avoid improper indication on circuit inrush. The Navigator constantly monitors the load current on the conductor and electronically adjusts the trip curve position accordingly. We refer to this action of self-adjusting as load tracking. The initial or out of the box position of the trip curve is displayed on the next page. Its location is described by the time - current coordinates of 100 amps @ 200 MS and the green color. This is the position of the trip curve for conductor amperages zero to thirty amps. The table located at the bottom of the figure shows data for other positions the curve would assume when currents larger than thirty amps are detected by the Navigator.

**As an example**; if 100 amps where detected then the curve would move horizontally to the right and assume the position at coordinates 440 amps @ 200 ms. (Black Squares). The relationship between conductor current and the trip position @ 200ms is non-linear. Load tracking begins at 30 amps, reaching its maximum adjusted value at 200 amps of load current. For load currents in excess of 200 amps the trip curve remains fixed at the 200 amp load current position of 1280 amps @ 200 ms. (Dark Blue Triangles). Keeping the curve fixed for load currents of 200 amps or more maintains coordination with upstream protection devices such as fuse links and breakers.

Load Memory (**LM**) describes how quickly the characteristic trip curve is adjusted. The highest continuous current sensed for at least 60 seconds will establish a trip curve position in memory and will be held there for 72 hours. If the load-current reaches or exceeds the stored value, a new trip curve position is registered and the memory retention time of 72 hours starts again. If load current does not meet or exceed this recorded level for 72 hours, the Navigator will then re-establish a new lower trip curve position.

It should be noted that while the characteristic curve and load levelling position of the curve has been designed for today's protection devices, utility operating practices may dictate that load levelling will not coordinate in 100% of all operational circumstances. For those cases a (non-adjusting) PM curve of fixed magnitude can be provided.




**EXPLAINATION OF PERMANENT & TEMPORARY FAULT DETECTION (Standard Only!)**

1. THE STANDARD NAVIGATOR IN RESPONSE TO THE FAULT, RECORDS THE EVENT BY FLASHING RED FOR PERMANENT FAULT FOR 4 HOURS OR UNTIL CIRCUIT IS RESTORED. FOR TEMPROARY FAULT, THE RED WILL EXTINGUISH AND THE AMBER LIGHT WILL FLASH FOR 4 HOURS OR UNTIL RESET WITH A MAGNET.

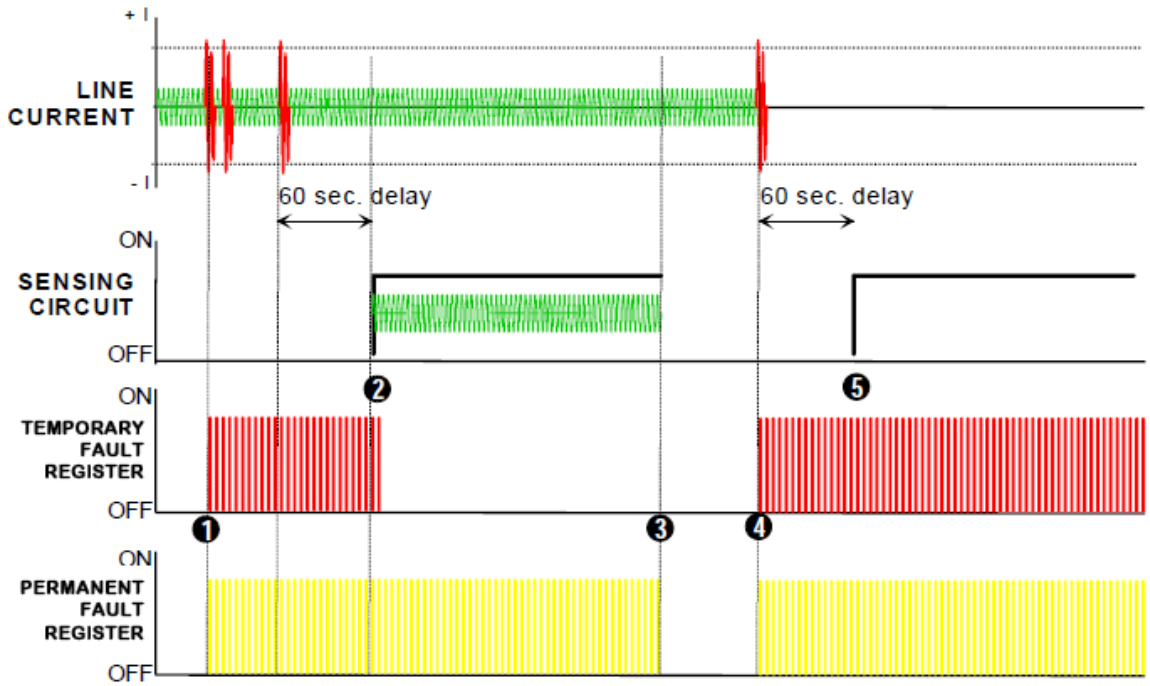
2. 60 SECONDS AFTER FIRST RECORDED FAULT, A CIRCUIT SENSES FOR >3A, 60 Hz. RESPONDING TO CURRENT THE SENSING CIRCUIT RESETS THE RED WILL EXTINGUISH AND THE AMBER LIGHT FLASHES SIGNIFYING A TEMPORARY FAULT.

3. THE PERMANENT REGISTER REMAINS ON FOR 4 HOURS, UNLESS A RESET HAS OCCURREED WITH AMPERAGE OR MANUAL RESET OCCURS.

4. AFTER 4 HOURS HAVE ELAPSED, THE PERMANENT “RED” LIGHT IS RESET IF NO ADDITIONAL CURRENT WAS DETECTED.

5. THE STANDARD NAVIGATOR IN RESPONSE TO THE FAULT, RECORDS THE EVENT IN BOTH TEMPORARY & PERMANENT IDENTFYERS WITH THE “RED” AND “AMBER” LIGHTS.

6. 60 SECONDS AFTER FAULT, CIRCUIT SENSES FOR >3A, 60 Hz. AS NO CURRENT IS DETECTED, THE TEMPORARY REGISTER REMAINS ON FOR 4 HOURS, OR UNTIL CURRENT IS SENSED. THE PERMANENT REGISTER REMAINS ON FOR 4 HOURS. BOTH MAY BE MANUALLY RESET.



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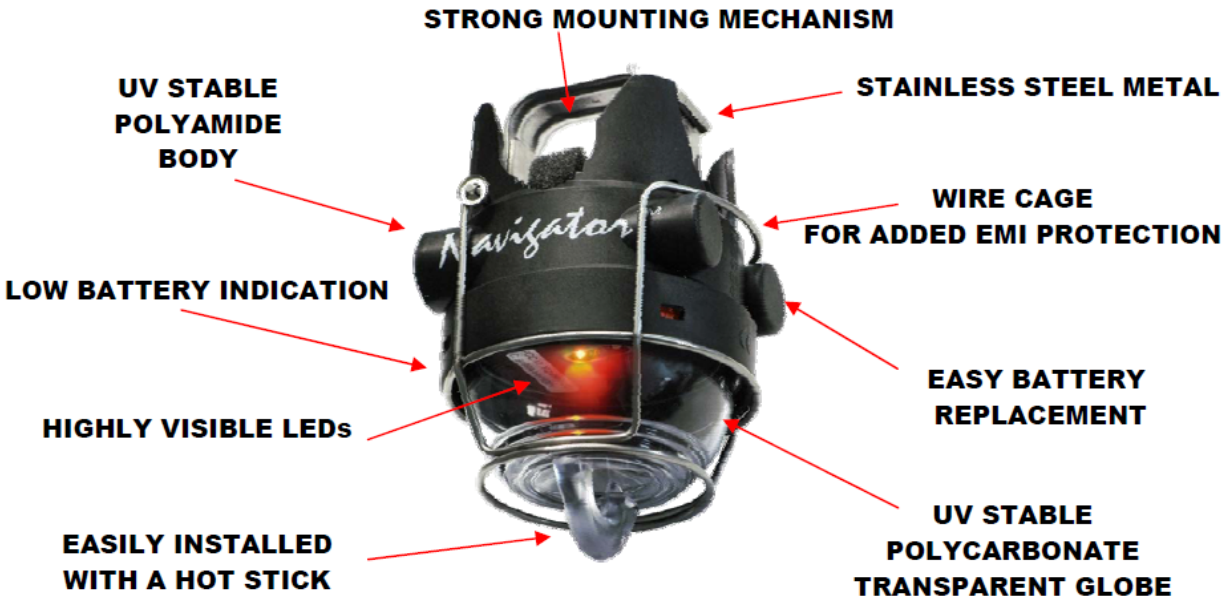

| TECHNICAL DATA | |
|---|---|
| **ELECTRICAL DATA** | MEETS OR EXCEEDS ANSI/IEEE Std. 495 - 1986. |
| Trip Rating @ 200ms | 100 amps (min.) - 1280 amps (max.) |
| Accuracy: | ± 10% @ 20°C. ± 20% over full trip characteristic @ -40°C to +85°C |
| Temperature Range: | -40°C to +85°C |
| Min. load current to start load tracking: | 30 amps |
| Tracking delay: | Approximately 60 sec. |
| Tracking memory: | 72 hours |
| Trip Indication: | 4 Super bright red LED > 2000 mcd and 2 Super bright yellow LED. |
| Total Flashing Time: | > 500 hours. |
| Flash Frequency: | 30 per minute |
| Power: | 4 only 1.2 Ah Lithium Oxide Cells,<br>Each 3V, replaceable, 15 to 20 year life expectancy. |
| Battery check: | Yellow LED, flashing frequency of 6 per minute. |
| Reset: | Automatic after 4 hours or manually by magnet anytime. |
| RED LEDs - Current reset: | Approx. 3 A (60 Hertz) after 60 sec. delay. |
| YELLOW LEDs - Time reset: | 4 hours (± 5% ) |
| Operating Voltage: | 161 kV (line - line) Maximum. |
| Current Withstand: | 25,000 A. sym. RMS / 170 ms. |
| EMI Withstand: | IEC 1000-4-2 (ESD, degree 4), IEC 1000-4-3(HF, degree3) |
| Adjacent Cable Immunity: | 254 mm (10 inches) @ 10 kA |
| Test/Reset | By permanent magnet. Catalogue Number 49-6001-002. |
| **MECHANICAL DATA:** | |
| Cable Diameter Range: | 13 mm - 35 mm. |
| Mounting: | Shot gun operable. |
| Casing: | UV stable polyamide & polycarbonate. |
| Metallic Parts: | Stainless Steel. |
| Current Transformer: | Closed core. |
| Degrees of Protection: | IP 66 |
| Weight: | 426 g. (15 oz.) |
| **Visibility:** | 30.5 m (100 ft.) day / 152.4 m (500 ft.) night. |
| **Catalog Number:** | 41-2008-10X (replace X with 1=4H reset, 2=8H, 3=12H, 6=24H) |

# ACCESSORIES

**Test & Reset Magnet Cat. #49-6001-002**

The test & reset magnet is a permanent magnet retained by a specially designed housing allowing it to fit universal and shot gun type hot sticks. This allows testing of faulted circuit indicators on live circuits following proper hot stick procedures. The purpose is to introduce a magnetic field that will influence individually the 'trip' and 'reset' switches of electronic faulted circuit indicators.

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# OH Standard LM HV to 161kV - Catalogue Ordering Instructions

**41-2008-10X** (replace X with **1**=4H reset, **2**=8H, **3**=12H, **6**=24H)

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# CAUTION!

Clamping mechanism is powered by EXTREMELY STRONG SPRINGS. Once set in the open position, the clamping mechanism is easily triggered. To avoid injury, keep hands and fingers away from clamping area as much as possible.

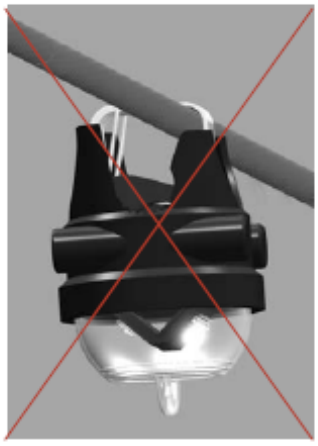
**1** Open clamp with your hand until engaged in plastic groove.

**2** Engage hook stick on bail of indicator.

**3** Position indicator on conductor through opening.

**4** Thrust indicator up on to conductor until fully clamped..

**5** In CORRECT clamped position.



**6** INCORRECTLY Installed.

**7** Remove hot stick.