Entelliguard® TU Conversion kits

For GE Low Voltage Power Circuit breaker types:
AK, AKT, AKS, AKU, AKJ, AKR, AKRU, AKRT, AKJT, AKW

For I-T-E Low Voltage Power Circuit breaker types:
K, KA, KB, KC, KD, KE

For Allis Chalmers Low Voltage Power Circuit breaker types:
LA Gold, LA Blue

For Westinghouse Low Voltage Power Circuit breaker types:
DB, DS

Supplementary Instructions Only

This publication must be read in conjunction with the installation instructions for MicroVersaTrip® Plus and PM Conversion kits for GE Low Voltage Power Circuit Breaker of respective type.

Introduction

GE conversion kits are designed to upgrade existing GE Low Voltage Power Circuit Breakers, rather then replacing the entire breaker. The conversion kits contain enhanced solid state Entelliguard® TU, representing the latest technological advancements in GE trip systems.

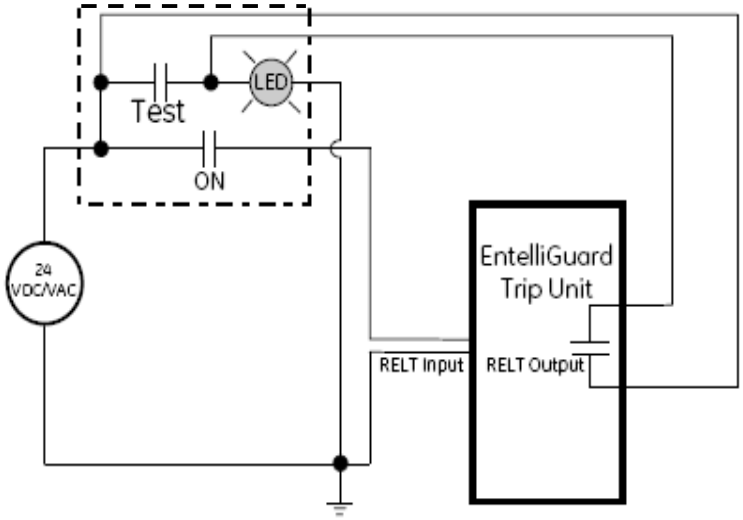
This supplementary publication covers specific instructions for the installation of Entelliguard® TU with advanced optional features like RELT (Reduced energy let through mode), Ground Fault Alarm etc. in GE Low Voltage Power Circuit Breakers. This supplementary publication does not detail all aspects of the conversion kit installation process.

The EntelliGuard TU trip unit provides an optional second, user-adjustable, RELT Instantaneous trip. This trip provides an alternate Instantaneous setting that allows a user to temporarily set a circuit breaker to a more sensitive pickup to provide better protection, only when better protection is needed and some selectivity may be sacrificed.

RELT Instantaneous pickup can be enabled via application of 24Vdc or Vac at the RELT input terminals or serial communications via the Modbus communication port. The RELT input command may be wired to a manual switch, automatic sensor or, via external logic, to one or more signal sources. When the EntelliGuard TU trip unit has the RELT Instantaneous pickup enabled, the trip unit provides a feedback signal via an optically isolated dry contact and serial communication. This provides positive feedback that the trip unit has received and reacted to the RELT Enable command. RELT harness consists of four wires for this input and output signal

The EntelliGuard TU trip unit's RELT capability provides the ultimate in user flexibility for wiring and controlling an alternate Instantaneous setting for temporary use to reduce personnel hazard.

The RELT switch may be connected to a manually operated two-position switch, a remote sensor, or both simultaneously. The EntelliGuard TU trip unit provides a feedback capability directly from the trip so the user is able to verify that the signal was received by the trip unit and the settings have changed. Optionally, an indicating light may also be connected to the source of control power so the user knows if control power is available to change the setting. The trip unit does not require its own control power to accept a RELT input and change the Instantaneous trip pickup according to the user settings. However, if control power is available to the trip unit, the feedback signal will function immediately, rather than when the trip unit becomes self-powered through its load current (Fig. 1).



- This configuration provides positive indication that the trip unit has received and processed the RELT "On" signal. It Also provides a control power check. Caution: It is recommended that RELT output be wired to an appropriate annunciation when remote activation control of RELT is used.

Figure 1

Section 2 in this instruction manual explains the process of upgrading the LV power Circuit Breaker from MVT (Microversatrip Plus and PM) to Entelliguard® TU with RELT. Sections 3 to 7 have the process of routing the "RELT wire harness" in different types of GE circuit breaker as supplemental to base instruction manual.

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SECTION 1 Prior To Installation

1. Before starting any work, turn off and lock out all power sources leading to the breaker, both primary and secondary. Remove the breaker to a clean, well-lighted work area.

WARNING: **Low-voltage power circuit breakers use high-speed, stored-energy spring operating mechanisms. The breakers and their enclosures contain interlocks and safety features intended to provide safe, proper operating sequences. For maximum personnel protection during installation, operation, and maintenance of these breakers, the following procedures must be followed. Failure to follow these procedures may result in personal injury or property damage.**

2. Only qualified persons, as defined in the National Electrical Code, who are familiar with the installation and maintenance of low-voltage power circuit breakers and switchgear assemblies, should perform any work on these breakers.

3. Completely read and understand all instructions before attempting any breaker installation, operation, maintenance, or modification.

4. Turn off and lock out the power source feeding the breaker before attempting any installation, maintenance, or modification. Follow all lock-out and tag-out rules of the National Electrical Code and all other applicable codes.

5. Do not work on a closed breaker or a breaker with the closing springs charged. Trip the breaker OPEN and be sure the stored-energy springs are discharged, thus eliminating the possibility that the breaker may trip open or the closing springs discharge and cause injury.

6. Trip the breaker OPEN, then remove the breaker to a well-lighted work area before beginning work.

7. Do not perform any maintenance that includes breaker charging, closing, tripping, or any other function that could cause significant movement of a draw-out breaker while it is on the draw-out extension rails.

8. Do not leave the breaker in an intermediate position in the switchgear compartment. Always leave it in the CONNECTED, TEST, or DISCONNECTED position. Failure to do so could lead to improper positioning of the breaker and flashback.

SECTION 2 Installation instructions for "RELT wire harness kit" (Catalogue Number – GTURHA)

For GE type AK, AKT, AKS, AKU, AKJ, AKR, AKRU, AKRT, AKJT, AKW
Low Voltage Power Circuit Breakers.

Installing the RELT wire harness

1. Remove the existing MVT trip unit from breaker by pressing the lever on side of trip unit mounting plate and gently pull the trip unit toward yourself as facing the breaker,.

Figure 2

2. Loosen the three screws with screwdriver as shown in figure 3.
   Save the screws, washer and nut for mounting back the plate later.

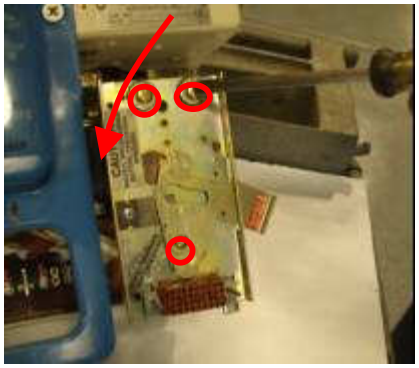


Figure 3

3. Rotate the mounting plate from frame, being careful not to pull on existing wires.

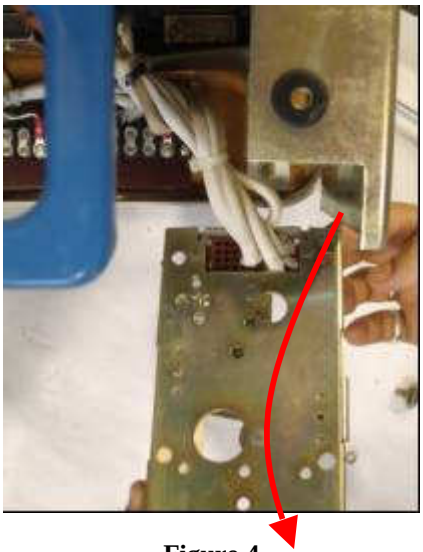


Figure 4

4. Take the "RELT wire harness" (4 wire harness) provided with kit and insert the pins at the end of wire to respective terminal on 36-pin connector.

Figure 5

Individual wires in harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer figure 7 and table 1.

Table 1

Wire Colour	Slot in 36 pin connector	Function
Red	4	Input +
Yellow	2	Input -
Black	30	Output +
White	27	Output -

Figure 6

5. The control power supply voltage to trip unit shall be given through wires 1 and 2 of communication harness already installed in breaker or supplied.

Figure 7

In case when communication wire harness is not installed on the breaker, use the power supply harness (2 wire harness) supplied with the kit.

Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 2.

Table 2

Wire	Slot in 36 connect	Functio
Black	35	24 V DC +
White	36	24 V DC -

Figure 8

6. Tie these extra four wires (or 6 wires) with other wires at back of 36-pin connector properly. Inspect the 36-pin connector from front side of plate for extra four connectors installed.

Figure 9

7 Take the earlier removed sets of screws, washers and nuts.

Install the mounting plate again on frame by tightening the screws at three locations.

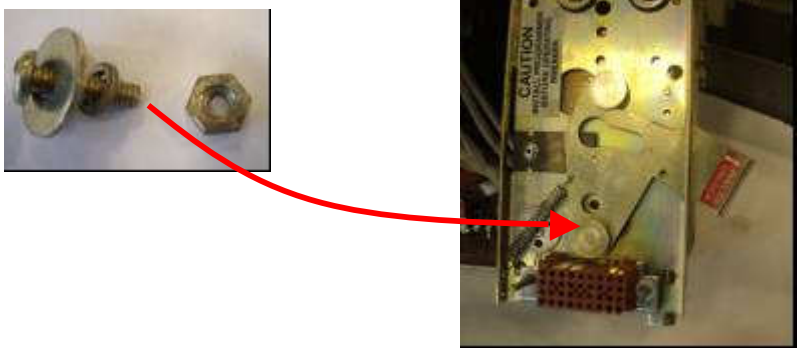


Figure 10

9. Route the RELT & power supply wire harnesses as instructed in following section 2 to section 6 depends on breaker type.

SECTION 3 Supplement to GEH-5965

For GE type AK-50, AKU-50, AKS-50, AKT-50, AK-75, AK-100 Low Voltage Power Circuit Breakers.

Following text is in addition to Section 3 of GEH5965

Routing the RELT wire harness

1. Route the RELT wire harness (set of 4 wires) from left of trip unit mounting plate as shown in figure 11.

Figure 11

2. Secure the wires with wire tie as shown in figure 12 and apply caution label supplied with kit on both breaker frame & compartment door.

3. Mount the new Entelliguard® TU on front frame.

Figure 12

4. The other wire harness supplied loose with kit shall be connected to the RELT wire harness to signal the input or output.

Figure 13

5. The wires in harness are color coded for input and output. Yellow and red wires are for input to trip unit.
   Black and white wires are for output from trip unit.

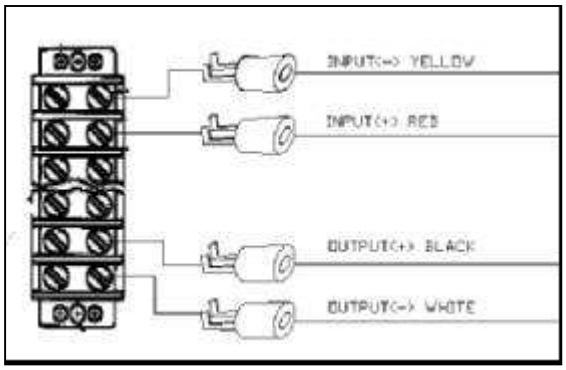


Figure 14

Table 3

Wire Colour	Slot in 36 pin connector	Function
Red	4	Input +
Yellow	2	Input -
Black	30	Output +
White	27	Output -

6. If required to use the power supply harness for control power supply, rout the 2-wire harness in same way above RELT wire harness.

   Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 4.

Table 4

Wire Colour	Slot in 36 pin connector	Function
Black	35	24 V DC Supply -
White	36	25 V DC Supply +

7. Refer Entelliguard® TU Installation manual DEH-4567 for detailed description of input and output signal requirements.

SECTION 4 Supplement to GEH-5966

For GE type AKR-30, AKR-50, AKJ-50, AKRU-30, AKRU-50, SKR-30H, AKR-50H, AKRT-50, AKRT-50H, AKJT-50, AKJT-50H Low Voltage Power Circuit Breakers.

Following text is in addition to Section 3 of GEH5966

Routing the RELT wire harness

1. Route the RELT wire harness (set of 4 wires) from left of trip unit mounting plate, going around the breaker from backside and ending at right side of frame. Same way as the "Communication wire harness is routed", as shown in figure 15 and 16.

Figure 15

2. Secure the wires with wire tie and apply caution label supplied with kit on both breaker frame & compartment door.

Figure 16

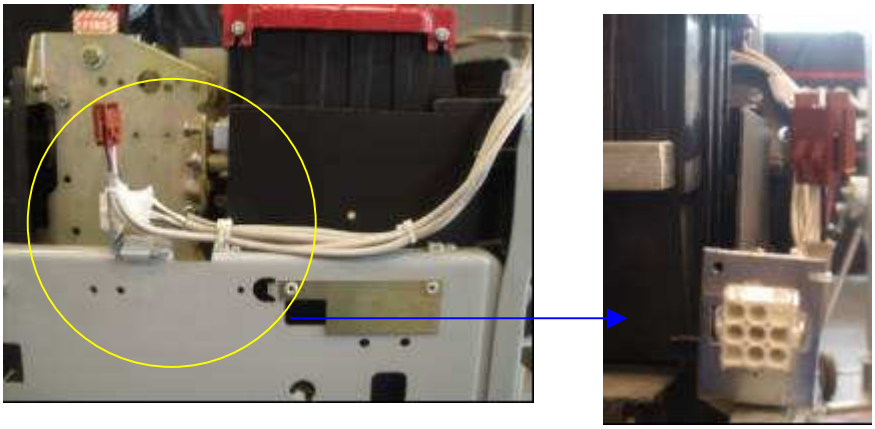


Figure 17

3. Mount the new Entelliguard® TU on front frame.

4. The other wire harness supplied loose with kit shall be connected to the RELT wire harness to signal the input or output.

Figure 18

5. The wires in harness are color coded for input and output. Yellow and red wires are for input to trip unit.
   Black and white wires are for output from trip unit.

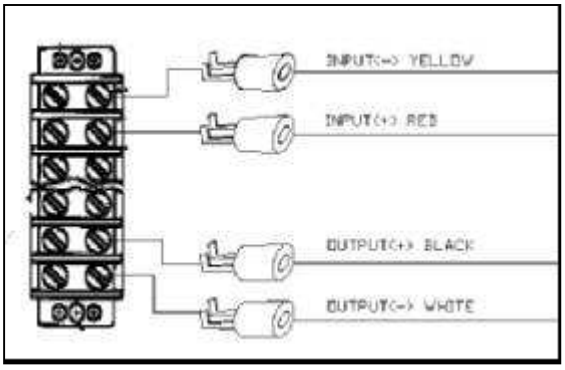


Figure 19

Table 5

Wire Colour	Slot in 36 pin connector	Function
Red	4	Input +
Yellow	2	Input -
Black	30	Output +
White	27	Output -

6. If required to use the power supply harness for control power supply, rout the 2-wire harness in same way above RELT wire harness.

Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 6.

Table 6

Wire Colour	Slot in 36 pin connector	Function
Black	35	24 V DC Supply -
White	36	25 V DC Supply +

7. Refer Entelliguard® TU Installation manual DEH-4567 for detailed description of input and output signal requirements.

SECTION 5 Supplement to GEH-5967

For GE type AK-15, AK-25, AKU-25, AKR-30S, AKRU-30S Low Voltage Power Circuit Breakers.

Following text is in addition to Section 3 of GEH5967

Routing the RELT wire harness

1. Route the RELT wire harness (set of 4 wires) from right of trip unit mounting plate as shown in figure 20.

Figure 20

2. Secure the wires with wire tie and apply caution label supplied with kit on both breaker frame & compartment door.

Figure 21

3. Mount the new Entelliguard® TU on front frame.

4. The other wire harness supplied loose with kit shall be connected to the RELT wire harness to signal the input or output.

Figure 22

5. The wires in harness are color coded for input and output. Yellow and red wires are for input to trip unit.
   Black and white wires are for output from trip unit.

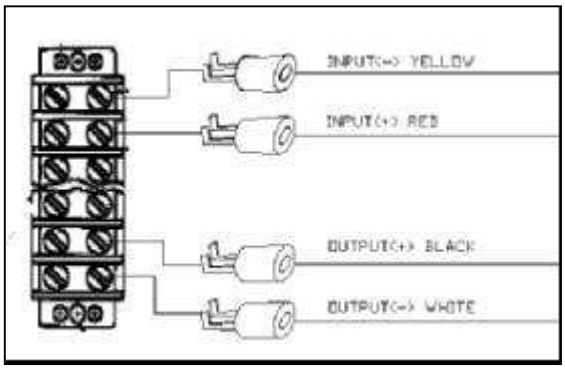


Figure 23

Table 7

Wire Colour	Slot in 36 pin connector	Function
Red	4	Input +
Yellow	2	Input -
Black	30	Output +
White	27	Output -

6. If required to use the power supply harness for control power supply, rout the 2-wire harness in same way above RELT wire harness.

   Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 8.

Table 8

Wire Colour	Slot in 36 pin connector	Function
Black	35	24 V DC Supply -
White	36	25 V DC Supply +

7. Refer Entelliguard® TU Installation manual DEH-4567 for detailed description of input and output signal requirements.

SECTION 6 Supplement to GEH-5964

For GE type AKR-75, AKR-100 Low Voltage Power Circuit Breakers.

Following text is in addition to Section 3 of GEH5964

Routing the RELT wire harness

1. Route the RELT wire harness (set of 4 wires) from left of trip unit mounting plate as shown in figure 24.

Figure 24

2. Secure the wires with wire tie as shown in figure 25 and apply caution label supplied with kit on both breaker frame & compartment door.

3. Mount the new Entelliguard® TU on front frame.

Figure 25

4. The other wire harness supplied loose with kit shall be connected to the RELT wire harness to signal the input or output.

Figure 26

5. The wires in harness are color coded for input and output. Yellow and red wires are for input to trip unit.
   Black and white wires are for output from trip unit.

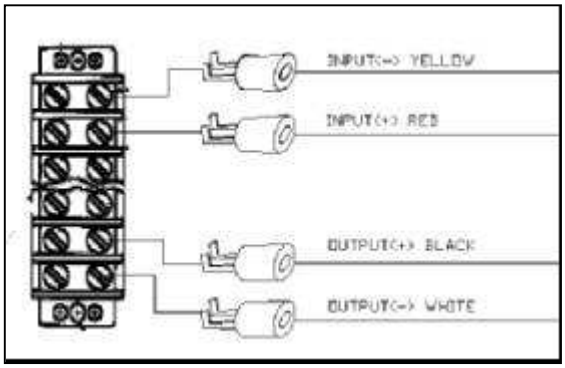


Figure 27

Table 9

Wire Colour	Slot in 36 pin connector	Function
Red	4	Input +
Yellow	2	Input -
Black	30	Output +
White	27	Output -

6. If required to use the power supply harness for control power supply, rout the 2-wire harness in same way above RELT wire harness.

   Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 10.

Table 10

Wire Colour	Slot in 36 pin connector	Function
Black	35	24 V DC Supply -
White	36	25 V DC Supply +

7. Refer Entelliguard® TU Installation manual DEH-4567 for detailed description of input and output signal requirements.

SECTION 7 Supplement to GEH-6466

For GE type AK-1-15, AK-1-25 Low Voltage Power Circuit Breakers.

Following text is in addition to Section 4 of GEH5964 after installing the communication harness

Routing the RELT wire harness

1. Route the RELT wire harness (set of 4 wires) along the top surface of cubicle towards right as shown in figure 28.

2. Secure the wires with wire tie and apply caution label supplied with kit on both breaker frame & compartment door.

3. Mount the new Entelliguard® TU on front frame.

4. The other wire harness supplied loose with kit shall be connected to the RELT wire harness to signal the input or output.

5. The wires in harness are color coded for input and output. Yellow and red wires are for input to trip unit.
   Black and white wires are for output from trip unit.

6. If required to use the power supply harness for control power supply, rout the 2-wire harness in same way above RELT wire harness.

   Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 12.

Figure 28

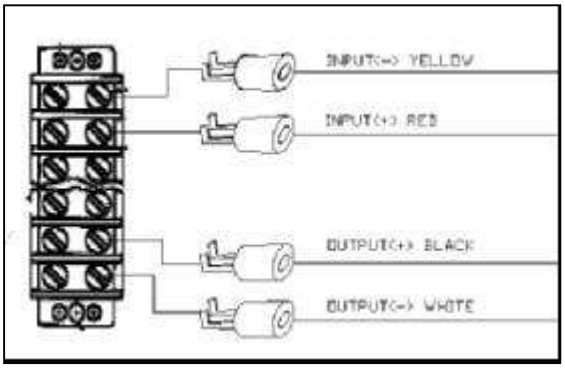


Figure 29

Table 11

Wire Colour	Slot in 36 pin connector	Function
Black	35	24 V DC Supply -
White	36	25 V DC Supply +

7. Refer Entelliguard® TU Installation manual DEH-4567 for detailed description of input and output signal requirements.

SECTION 8 Supplement to DEH-40008 & DEH-40009

For Allis Chalmers LA-600, LA-800, LA-1600, Blue & Gold version Low Voltage Power Circuit Breakers.

Following text is in addition to Section 4 of DEH-40008 & DEH-40009

Routing the RELT wire harness

1. Route the RELT wire harness (set of 4 wires) from right of trip unit mounting plate as shown in figure 30. Secure the extra length of wire harness by coiling inside steel rail as shown in figure.

Figure 30

2. Secure the wires harness with wire tie to the frame in a location where it is accessible in switchgear. Figure 31 shows a suggested location. The actual location is dependent on the configuration of equipment and may be determined by field engineer.

   Generally this RELT wire harness is routed along with communication wire harness & tied at the same location as communication wire harness.

Figure 31

   Apply caution label supplied with kit on both breaker frame & compartment door.

3. Mount the new Entelliguard® TU on front frame.

4. The other wire harness supplied loose with kit shall be connected to the RELT wire harness to signal the input or output.

Figure 32

5 The wires in harness are color coded for input and output. Yellow and red wires are for input to trip unit.
Black and white wires are for output from trip unit.

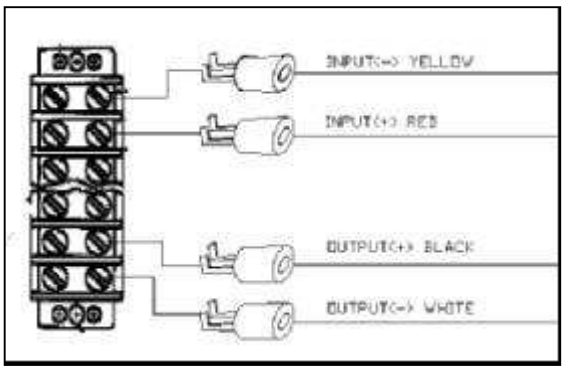


Figure 33

Table 12

Wire Colour	Slot in 36 pin connector	Function
Red	4	Input +
Yellow	2	Input -
Black	30	Output +
White	27	Output -

6. If required to use the power supply harness for control power supply, rout the 2-wire harness in same way above RELT wire harness.

   Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 14.

Table 13

Wire Colour	Slot in 36 pin connector	Function
Black	35	24 V DC Supply -
White	36	25 V DC Supply +

7. Refer Entelliguard® TU Installation manual DEH-4567 for detailed description of input and output signal requirements.

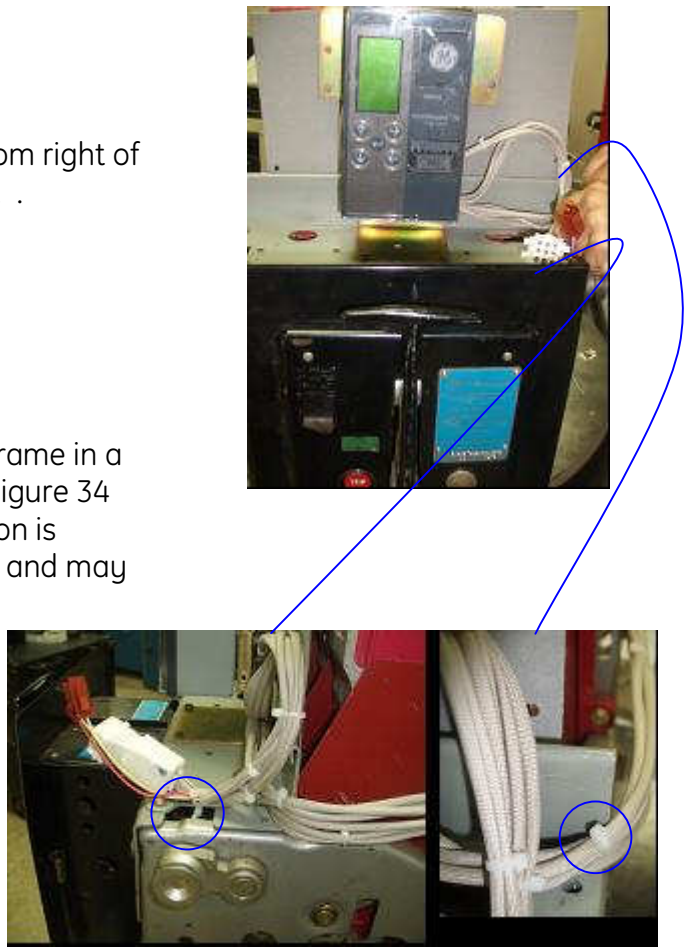
SECTION 9 Supplement to GEH-6293, GEH-6294, GEH-6295, GEH-6433, DEH-40019 & DEH-133

For I-T-E K-225, K-600, K-800, K-1600, K-2000, K-3000, K-4000, KA, KB (Metal), KB (Steel) , KC, KD & KE Low Voltage Power Circuit Breakers.

Following text is in addition to Section 4 of GEH-6293, GEH-6294, GEH-6295, GEH-6433, DEH-133 and addition to Section 3 of DEH-40019

Routing the RELT wire harness

1. Route the RELT wire harness (set of 4 wires) from right of trip unit mounting plate as shown in figure 34. .



2. Secure the wires harness with wire tie to the frame in a location where it is accessible in switchgear. Figure 34 shows a suggested location. The actual location is dependent on the configuration of equipment and may be determined by field engineer.

   Generally this RELT wire harness is routed along with communication wire harness & tied at the same location as communication wire harness.

Figure 34

3. Apply caution label supplied with kit on both breaker frame & compartment door.

4. Mount the new Entelliguard® TU on front frame.

Figure 35

5. The other wire harness supplied loose with kit shall be connected to the RELT wire harness to signal the input or output.

Figure 36

6 The wires in harness are color coded for input and output. Yellow and red wires are for input to trip unit.
Black and white wires are for output from trip unit.

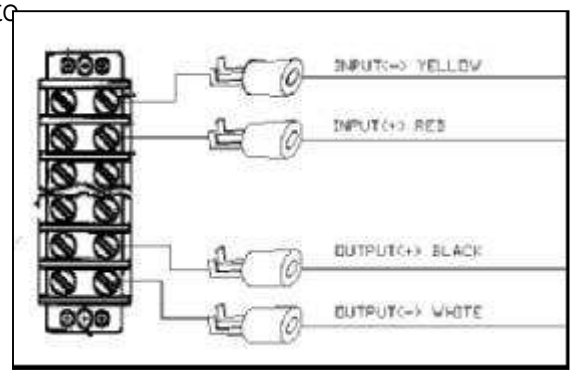


Figure 37

Table 14

Wire Colour	Slot in 36 pin connector	Function
Red	4	Input +
Yellow	2	Input -
Black	30	Output +
White	27	Output -

8. If required to use the power supply harness for control power supply, rout the 2-wire harness in same way above RELT wire harness.

   Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 16.

Table 15

Wire Colour	Slot in 36 pin connector	Function
Black	35	24 V DC Supply -
White	36	25 V DC Supply +

9. Refer Entelliguard® TU Installation manual DEH-4567 for detailed description of input and output signal requirements.

SECTION 10 Supplement to GEH-6318, GEH-6319, GEH-6320 & DEH-023

For Westinghouse DB-15, DB-25, DBL-25, DB-50, DB-75, DBL-75, DB-100, DBL-100, DS-206, DSL-206, DS-416, DSL-416, DS-420 & DS-632 , Low Voltage Power Circuit Breakers.

Following text is in addition to Section 4 of GEH-6318, GEH-6319, GEH-6320 and DEH-023

Routing the RELT wire harness

1. Route the RELT wire harness (set of 4 wires) from right of trip unit mounting plate as shown in figure 38. .

Figure 38

2. Secure the wires harness with wire tie to the frame in a location where it is accessible in switchgear. Figure 39 shows a suggested location. The actual location is dependent on the configuration of equipment and may be determined by field engineer.

   Generally this RELT wire harness is routed along with communication wire harness & tied at the same location as communication wire harness.

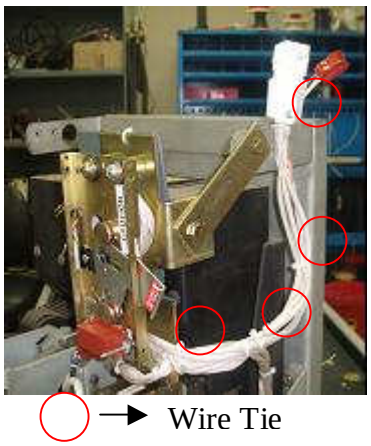


Figure 39

3. Apply caution label supplied with kit on both breaker frame & compartment door.

4. Mount the new Entelliguard® TU on front frame.

Figure 40

5. The other wire harness supplied loose with kit shall be connected to the RELT wire harness to signal the input or output.

Figure 41

7 The wires in harness are color coded for input and output. Yellow and red wires are for input to trip unit.
Black and white wires are for output from trip unit.

Table 16

Wire Colour	Slot in 36 pin connector	Function
Red	4	Input +
Yellow	2	Input -
Black	30	Output +
White	27	Output -

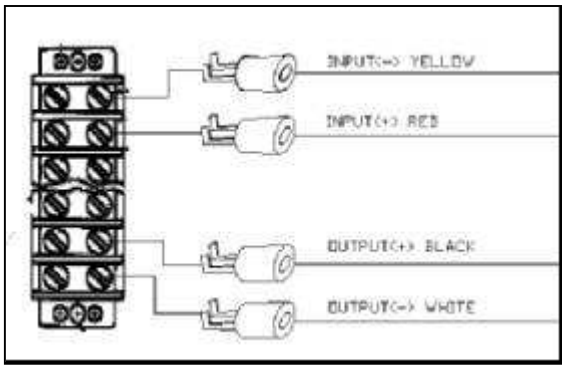


Figure 42

10. If required to use the power supply harness for control power supply, rout the 2-wire harness in same way above RELT wire harness.

    Individual wires in power supply harness are color coded and numbered. The pins should be inserted at correct places on backside of 36-pin connector. Refer table 18.

Table 18

Wire Colour	Slot in 36 pin connector	Function
Black	35	24 V DC Supply -
White	36	25 V DC Supply +

11. Refer Entelliguard® TU Installation manual DEH-4567 for detailed description of input and output signal requirements.