

# FUNCTIONAL DEVICES INC.

## POWER-LINE CARRIER

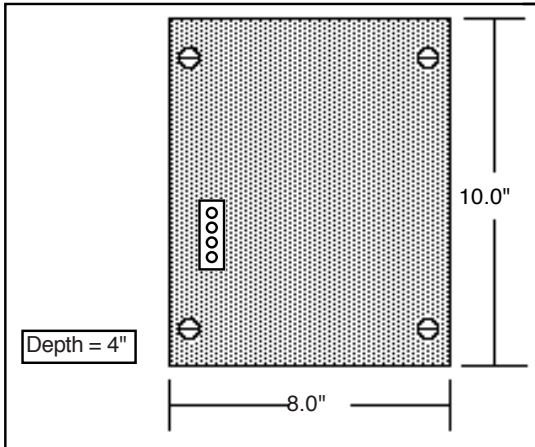


LISTED



### SIGNAL COUPLERS

- CTME --- COMMAND TRANSMITTER
- CTR ----- COMMAND TRANSMITTER / RECEIVER
- TB4 -----TRANSFORMER BYPASS
- C600 ---- CAPACITOR NETWORK



#### MODEL

**CTME** 1-WAY  
COMMAND TRANSMITTER

**CTR** 2-WAY  
COMMAND TRANSMITTER/RECEIVER

#### DESCRIPTION

The CTME amplifies the power line carrier (PLC) signal being generated by a Command Synthesizer and then injects that signal on all phases of the ac wiring.

The CTR amplifies the PLC signal being generated by a Command Synthesizer and then injects that signal on all phases of the ac wiring. CTR also detects the PLC answer coming from 2-way Responders and passes the data via wires to the Command Synthesizer for processing and eventual conveyance of the DI and AI information to the head-end controller.

The CTME or CTR PLC output can be connected to any ac voltage source up to 600 Vac, single or 3 phase, including any voltage case shown on Drawing 2 of Technical Reference Manual A234. CTME and CTR are hard wire connected to the Command Synthesizer via a 2-wire shielded pair or other dedicated wires.

#### FEATURES

- Transmits into any impedance ac line
- Excellent diagnostics
- Easy-connection screw terminal strips
- Signal injection / reception into all phases
- Signal injection / reception into 120 - 600 Vac, or dedicated line
- Injects / receives PLC signal on energized lines with respect to equipment ground

#### SPECIFICATIONS

- Housed in 10" X 8" X 4" metal enclosure
- 120 Vac, 20 watts power input, 5 watts minimum power output into 10-ohm load
- Contains LEDs ( externally visible through a slot in front cover ), which show the presence of outgoing PLC signal to ac wiring; presence of PLC signal from Command Synthesizer; availability of ac power and, in CTR only, presence of return PLC signal from ac wiring
- PLC signal injection / reception into a maximum of three phases and a maximum of 600 Vac
- Communicates with a Command Synthesizer over a twisted pair with shield with a distance limitation of 1500 feet for 22- gauge, 2500 feet for 20-gauge and 4000 feet for 18-gauge wire
- Operating temperature range -30° F to 150° F, storage temperature range -40° F to 185° F, humidity range 5 to 95% (noncondensing)
- UL listed under Standard 916 Energy Management Equipment. CSA Certified.

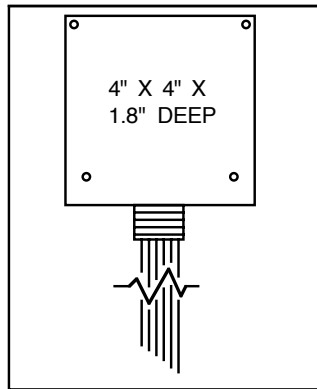
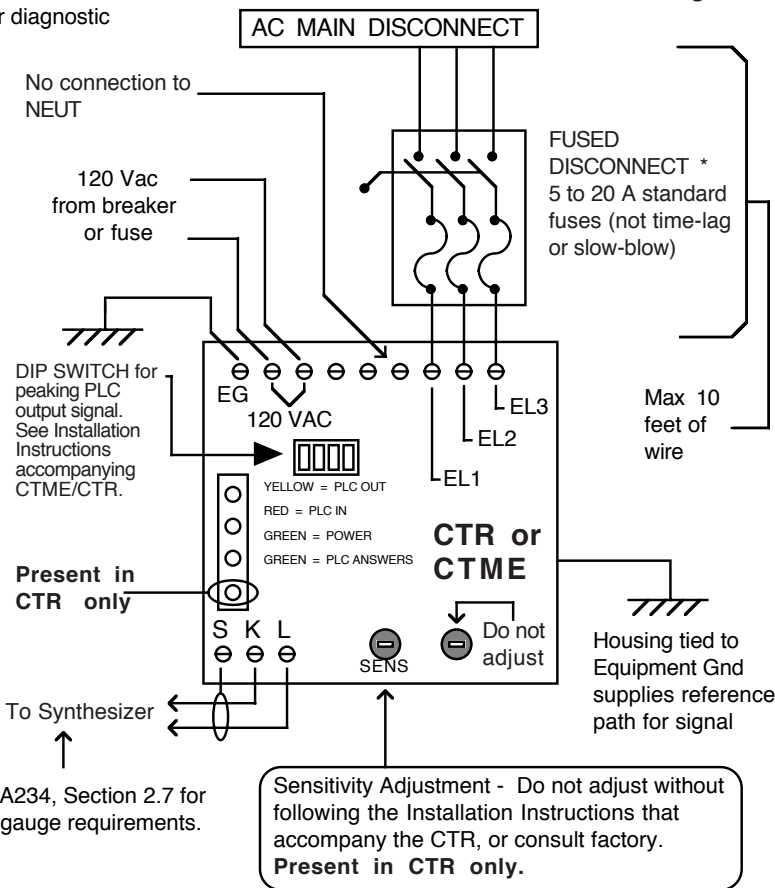
See drawings 2, 3, 4 and 5 of Manual A234 for connections to ac wiring and to Command Synthesizer. See section 4 for diagnostic information on LEDs.

**+++ IMPORTANT +++**

Power-factor-correction capacitors may not be used from energized lines to neutral or to equipment ground. When one leg is grounded (cases C & E of Manual A234, Drawing 2) then power-factor-correction capacitors must not be used at all.  
**WARNING:** Make no connection to grounded phase in Case C and Case E of Drawing 2.

In Drawing 2 of Manual A234 EL1, EL2, EL3, EG and HOUSING indicate where the connections are made to the CTME or CTR.

\* In case L of Drawing 2 the fused disconnect is not required. If 24-volt Responders are on the dedicated line then the installer must provide 24 Vac across these two lines and the wire gauge must be sufficient to supply the ac power to the 24-volt Responders (at least 12 Gauge). If there are no 24-volt Responders, the line needs no voltage. At the location of each Responder the LOW wire of the dedicated line should be connected to Equipment Ground. **The dedicated line to the Responder should be configured as a branching tree as opposed to one long run.**

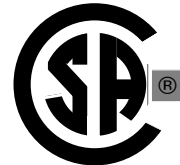


**MODEL TB4 TRANSFORMER BYPASS**

**DESCRIPTION**



LISTED



TB4 shunts PLC signals around 1- or 3-phase voltage step-down transformers, enabling the signal to reach 1-way and 2-way Responders serviced by the transformer. It also allows PLC answers to return to the Command Transmitter / Receiver via the same path. TB4s can only be used if conditions specified in Section 2.7 of Manual A234 are rigidly satisfied.

Observe local Electrical Codes in connecting TB4.

**SPECIFICATIONS**

- 6 red wires exit from NPT nipple, 3 for connection to primary of transformer and 3 for connection to secondary
- Max 600 Vac on any wire
- Operating temperature range -30° to 150° F, storage temperature range -40° to 185° F, humidity range 5 to 95% (noncondensing)
- One piece housing 4" X 4" X 1.8" of 94-5V flame retardant plastic, mountable via screw mounts or 1/2" NPT nipple
- UL listed under Standard 916 Energy Management Equipment. CSA Certified.

**MODEL C600 CAPACITOR NETWORK**

**DESCRIPTION**

Use with RA and RT Responders to allow their use with 347 and 600 Vac—see page 7 of Manual A234.

