

ALPHA Plus[®] and A3 ALPHA[®] Switchboard Meters

Watt-hour/watt — Type A1D+, A1DQ+, A3D (all types)
 Watt-hour/TOU Watt — Types A1T+, A1TL+, A1TQ+, A1TLQ+, A3T (all types)
 Watt-hour/VAhour — Types A1K+, A1KL+, A1KQ+, A1KLQ+, A3K (all types)
 Watt-hour/VARhour — Types A1R+, A1RL+, A1RQ+, A1RLQ+, A3R (all types)

General

This leaflet contains general installation instructions for ALPHA Plus and A3 ALPHA meters in FT-21 cases. The electronic module used in the switchboard meter is the same as is used in the corresponding socket or A-base meter. This leaflet does not discuss the electronic assembly—refer to the technical manual for the specific meter: *ALPHA Plus Meter Technical Manual* (TM42-2182 or TM42-2185) or *A3 ALPHA Meter Technical Manual* (TM42-2190 or TM42-2195) for information about the electronic assembly.

The meter (Table 1) is mounted on a removable chassis, which is held in the case by two latches. All metering connections between the case and the chassis are made through the test switches.

CAUTION

To prevent electrical shock and bodily injury, automatic shorting switches are provided on all current circuits so that current transformers are not inadvertently opened when you test or remove the chassis.

The voltage and current inputs to the switchboard meter are located on the rear of the case. The standard switchboard meter has voltage limitations for phase A of 96 to 528 Vrms, while phase B and phase C have limitations of zero to 528 Vrms. The maximum current is 20 amperes. The ALPHA Plus switchboard meter is available in an alternate design with voltage limitations for phase A of 63 V to 240 Vrms.

Provisions have been made for optional relay outputs and optional communications. One optional relay output is a three-terminal molded insulation block installed in three knockouts at the top back of the case (Figure 5). This is the configuration used for a single KYZ output from the meter when supplied.

The other output configuration that is available, if relay outputs (other than KYZ) or relay/communications are required, uses a fourteen-position connector mounted on the chassis with a mating connector mounted in the back of the case. Leads from the case mounted connector go to two seven-pin terminal strips on the back of the case (Figure 6). Terminal strip positions are identified by the lead color going to the individual terminal rather than by function. The function of the individual terminal is dependent on the particular configuration of the ALPHA module or switchboard chassis. Some colors have multiple functions. See the following figures for specific function lead colors. Figure 6, Figure 7, Figure 8, Figure 9, Figure 10, Figure 13, Figure 16, Figure 18, Figure 19, and Figure 20.

Table 1. Metering applications

| Meter Type | Metered Quantities | Circuit Application |
|------------------------------|--|---|
| A1D+ A1DQ+ | Delivered, received, or "delivered plus received" Watthours (Wh) | 3-phase 3-wire (2 element equivalent) 3-phase 4-wire wye (2 1/2 element equivalent) 3-phase 4-wire wye (3 element equivalent) |
| A3D (all types) | Delivered, received, "delivered plus received," or "delivered minus received" Watthours (Wh) | 3-phase 3-wire (2 element equivalent) 3-phase 4-wire wye (2 1/2 element equivalent) 3-phase 4-wire wye (3 element equivalent) |
| A1T+, A1TQ+ A1TL+ A1TLQ+ | Delivered, received, or "delivered plus received" TOU Watthours (Wh) | 3-phase 3-wire (2 element equivalent) 3-phase 4-wire wye (2 1/2 element equivalent) 3-phase 4-wire wye (3 element equivalent) |
| A3T (all types) | Delivered, received, "delivered plus received," or "delivered minus received" TOU Watthours (Wh) | 3-phase 3-wire (2 element equivalent) 3-phase 4-wire wye (2 1/2 element equivalent) 3-phase 4-wire wye (3 element equivalent) |
| A1K+, A1KL+ A1KQ+, A1KLQ+ | Delivered, received, or "delivered plus received" both Watthours (Wh) & apparent energy (VAh) | 3-phase 3-wire (2 element equivalent) 3-phase 4-wire wye (2 1/2 element equivalent) 3-phase 4-wire wye (3 element equivalent) |
| A3K (all types) | Delivered, received, "delivered plus received," or "delivered minus received" Watthours (Wh) & apparent energy (VAh); Q1 + Q4, Q2 + Q3 for apparent energy (VARh) | 3-phase 3-wire (2 element equivalent) 3-phase 4-wire wye (2 1/2 element equivalent) 3-phase 4-wire wye (3 element equivalent) |
| A1R+, A1RL+ A1RQ+, A1RLQ+ | Delivered, received, or "delivered plus received" both Watthours (Wh) & reactive energy (VARh) | 3-phase 3-wire (2 element equivalent) 3-phase 4-wire wye (2 1/2 element equivalent) 3-phase 4-wire wye (3 element equivalent) |
| A3R (all types) | Delivered, received, "delivered plus received," or "delivered minus received" for Watthours (Wh), apparent energy (VAh—except "delivered minus received") & reactive energy (VARh); Q1, Q2, Q3, Q4 for both apparent energy (VAh) & reactive energy (VARh); Q1 +Q4, Q2 + Q3, Q1 – Q4, Q2 – Q3, or Q3 – Q2 for reactive energy (VARh) | 3-phase 3-wire (2 element equivalent) 3-phase 4-wire wye (2 1/2 element equivalent) 3-phase 4-wire wye (3 element equivalent) |

Installation

The meter case should be mounted and permanently wired before the meter chassis is placed in the case. Refer to Figure 1 for panel cut-out information.

▲ WARNING

Use authorized utility procedures to install and service metering equipment. Dangerous voltages are present. Equipment damage, personal injury and death can result if safety precautions are not followed.

Use circuit closing devices on current transformer secondaries. Dangerous currents and voltages are present. Equipment damage, personal injury and death can result if circuit closing devices are not used.

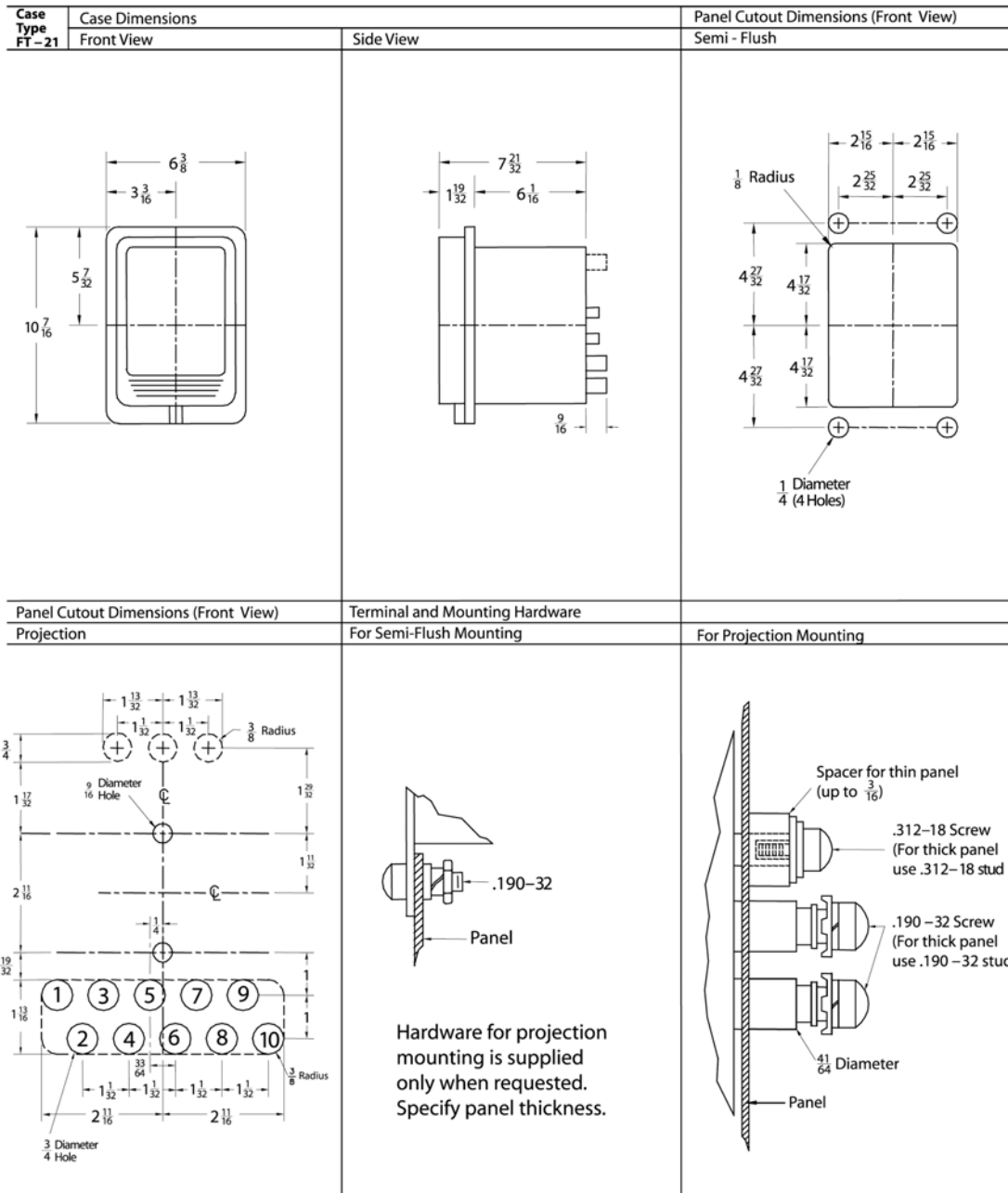
Hardware supplied with the meter permits semi-flush mounting on panels up to 3/16-inch thick.

NOTICE

Cases with the terminal strip output are not recommended for projection mounting due to the panel area required to be cut out for output connector and terminal blocks.

Opening the test switches will disconnect the meter chassis from the case (and close incoming current circuits). Test clip leads can then be attached to test lugs (above each jaw on the chassis) and to the switches as required. Test plugs are also available (from ABB Coral Springs) to facilitate testing:

- Style Number 1164046 - A 10-position plug for test using a separate supply source. Ten terminals bring out connections to a metering device between the case and the meter chassis only.
- Style Number 07B4618G04 - An individual current circuit test plug for inserting leads to an external metering device between the case and the meter chassis.



Approximate Unit Weight: 10 lbs (4.6 Kg)

Approximate Shipping Weight: 12 lbs (5.6 Kg)

Figure 1. FT-21 case and mounting

Interface Connections

It is the user's responsibility to apply the correct interface connectors, wired properly, to use the communications features supplied per the figures in Table 2 and Table 3.

Table 2 and Table 3 are included for reference only and are to be used to identify the removable chassis with respect to the options supplied, and associate it with the particular figures that indicate the functional color code for the external terminal strips. To determine the options supplied on the standard removable switchboard chassis, refer to the style coding in the upper left corner of the nameplate. The style coding begins with the letter **ZA** for the A3 ALPHA meter and **Q** for the ALPHA Plus meter in Field 1 and 2. Counting from left to right, the sixth character field indicates the output option, and the seventh character field for the ALPHA Plus meter and the seventh and eighth character fields for the A3 ALPHA meter indicate the communications option.

Table 2. ALPHA Plus Option applications

| Field 6 | Field 7 | Refer To |
|--------------|------------------------------|---|
| 1 (1 relay) | 0 (no comm option) | Figure 5 |
| 3 (2 relays) | 0 (no comm option) | Figure 6, Figure 7 |
| 6 (6 relays) | 0 (no comm option) | Figure 6, Figure 8 |
| 3 (2 relays) | A (external serial comm) | Figure 6, Figure 9, Figure 11, Figure 12 |
| 5 (5 relays) | A (external serial comm) | Figure 6, Figure 10, Figure 11, Figure 12 |
| 3 (2 relays) | B (20mA current loop) | Figure 6, Figure 18 |
| 5 (5 relays) | B (20mA current loop) | Figure 6, Figure 19 |
| 3 (2 relays) | D (internal modem) | Figure 6, Figure 20, Figure 21 |
| 3 (2 relays) | E (RS-232) | Figure 6, Figure 13, Figure 14, Figure 15 |
| 3 (2 relays) | F (RS-485) | Figure 6, Figure 16, Figure 17 |
| 3 (2 relays) | G (internal modem outage CB) | Figure 6, Figure 20, Figure 21 |

Table 3. A3 ALPHA Option applications

| Field 6 | Field 7 and 8 | Refer To |
|--------------|-------------------------------|---|
| 1 (1 relay) | 00 (no comm option) | Figure 5 |
| 3 (2 relays) | 00 (no comm option) | Figure 6, Figure 7 |
| 6 (6 relays) | 00 (no comm option) | Figure 6, Figure 8 |
| 3 (2 relays) | A0 (external serial comm) | Figure 6, Figure 9, Figure 11, Figure 12 |
| 5 (5 relays) | A0 (external serial comm) | Figure 6, Figure 10, Figure 11, Figure 12 |
| 3 (2 relays) | B0 (20mA current loop) | Figure 6, Figure 18 |
| 5 (5 relays) | B0 (20mA current loop) | Figure 6, Figure 19 |
| 3 (2 relays) | D0 (internal modem) | Figure 6, Figure 20, Figure 21 |
| 3 (2 relays) | E0 (RS232) | Figure 6, Figure 13, Figure 14, Figure 15 |
| 3 (2 relays) | F0 (RS485) | Figure 6, Figure 16, Figure 17 |
| 3 (2 relays) | G0 (internal modem outage CB) | Figure 6, Figure 20, Figure 21 |

The connection between the FT case terminal strips and the communication medium is accomplished with a cable (Style 4074B31G01). This 10-foot, 4-conductor cable has terminal spades on one end for connection to the FT terminal strips as shown in Figure 6, Figure 11, Figure 14, Figure 17, and Figure 21. The opposite end of the 4-conductor cable is terminated in a modular plug, which may be connected to a standard USOC RJ-11C modular jack or to another connector as required (see Figure 12 and Figure 15).

20 mA Current Loop option

For 20 mA current loop communications (**B** in Field 7 of Table 2 and Table 3) a user-supplied cable is used to connect to the terminal strip (see Figure 6, Figure 18, and Figure 19).

External Serial Communication option

Using the external serial communication option (**A** in Field 7 of Table 2 and Table 3) to connect to an external telephone modem requires the Elster Electricity external modem adapter (Style 1C11412G01, see Figure 12). This is a modular plug to DB-25 connector adapter with housing that contains a custom circuit that converts the optically isolated signals from the meter to RS-232 signals required by the modem. This adapter plugs into the DB-25 connector on the modem.

Some equipment may require a 9-pin connector. If so, use a female DB-25 to male DB-9 adapter. These are available at most computer and electronic hardware outlets.

RS-232 option

The RS-232 option (**E** in Field 7 of Table 2 and Table 3) also requires an adapter (Style 1C11637H01) for connecting to computers, modems, and other data communication devices. The modular plug of the cable coming from the FT case terminal strips fits in one end of the adapter, while the 25-pin connector on the other end attaches to the mating 25-pin connector of the data communication device.

RS-485 option

The RS-485 option (**F** in Field 7 of Table 2 and Table 3) provides signals via the 10-foot, 4-connector cable modular plug. The signals are defined in Figure 17.

Internal Modem option

The internal modem option (**D** or **G** in Field 7 of Table 2 and Table 3) connection to the public switched network is accomplished using the supplied communications cable (Style 4074B31G01, see Figure 7). Referring to Figure 20, connect the red lead of the spade terminated end of the communication cable to the FT case terminal strip position *Ring* (white/red), and connect the spade of the green lead to the terminal strip position *Tip* (white/green). The remaining black and yellow leads of the communications cable are not used and can be removed by cutting each lead near the outer insulating sheath. The conductive component of the unused black and yellow leads should not be allowed to come into contact with each other or any electrically conductive surface. The opposite end of the communication cable is terminated with a modular plug for connection to a telephone company provided USOC RJ-11C modular jack. Note that the difference between options **D** and **G** is that **G** is supplied with a battery for outage notification.

Operation

For information about operating the ALPHA Plus or A3 ALPHA switchboard meter, see the *ALPHA Plus Meter Technical Manual* (TM42-2182 or TM42-2185) or *A3 ALPHA Meter Technical Manual* (TM42-2190 or TM42-2195).

Maintenance

The switchboard meter is largely maintenance-free, with the exception of the battery used on some styles. A 3.6 volt lithium battery is used in conjunction with a super capacitor to maintain real time clock operations of the ALPHA Plus and A3 ALPHA meters during power interruptions. The projected carryover of the battery is a minimum of five years at 25 °C.

When the battery discharges below a set level, a low battery warning (F000001) appears as part of the display sequence. (For more information, see TM42-2182, TM42-2185, TM42-2190, or TM42-2195.)

▲ WARNING

Do not attempt to replace the battery while the unit is powered. Doing so could expose you to dangerous voltages, resulting in personal injury, death, or equipment damage. Remove the meter chassis from the case before disassembling the meter.

To replace the 3.6 volt lithium battery, first ensure that the meter chassis is removed from the case. With the front of the electronic assembly exposed, grasp the battery and pull it straight out of the battery well. Unplug the battery wire from the socket on the face of the electronic assembly.

▲ CAUTION

The switchboard meter must have been powered within an hour prior to installing the 3.6-volt lithium battery. If the 3.6-volt lithium battery is installed on a switchboard meter that has not been powered within the last hour, the switchboard meter may not operate correctly and the battery may be prematurely discharged.

Plug the new battery in the socket and place the new battery in the battery well. Replace the switchboard meter chassis in the case, close the metering switches, and install the cover. If you like, you can use Elster Electricity meter support software to reset the power outage log.

The optional internal modem with outage callback has a lithium battery present to provide energy for modem operation during a power outage. To replace this modem battery, first ensure that the meter chassis is removed from the case. Grasp the electronic housing assembly (the assembly with the display), rotate the assembly counterclockwise to detach it, and expose the CT housing with the modem battery. Remove the battery lead assembly connector from the internal modem assembly. The modem battery is located in the CT housing battery well and has adhesive on each side to hold it in place during shipment. Use a thin-bladed screwdriver tip to dislodge the adhesive. The battery can then be removed from the CT housing. Replace with a new battery assembly by sliding the new battery in the CT housing battery well. Plug the battery lead assembly connector into the internal modem assembly connector. Replace the electronic housing assembly, rotating clockwise to lock into place. Replace the meter chassis to the case, close the metering switches, and install the cover.

Wiring Diagrams

Meter Wiring. Wiring to the lower terminals on the rear of the FT-21 meter case is as shown in Figure 2, Figure 3, and Figure 4.

Output Relay Contact Wiring. ALPHA Plus and A3 ALPHA switchboard meters are available in the FT-21 case. The FT-21 cases may be supplied with either one relay connected to the three-screw type terminals as shown in Figure 5, or multiple relays connected to two terminal strips mounted on the back of the case as shown in Figure 6. If used, the three screw terminals are always KYZ contacts. If the terminal strip is used, only the color coding of the wires is shown, since the functions at each terminal depends on the specific relay options of the Switchboard Meter. See Figure 7, Figure 8, Figure 9, Figure 10, Figure 13, Figure 16, Figure 18, Figure 19, and Figure 20.

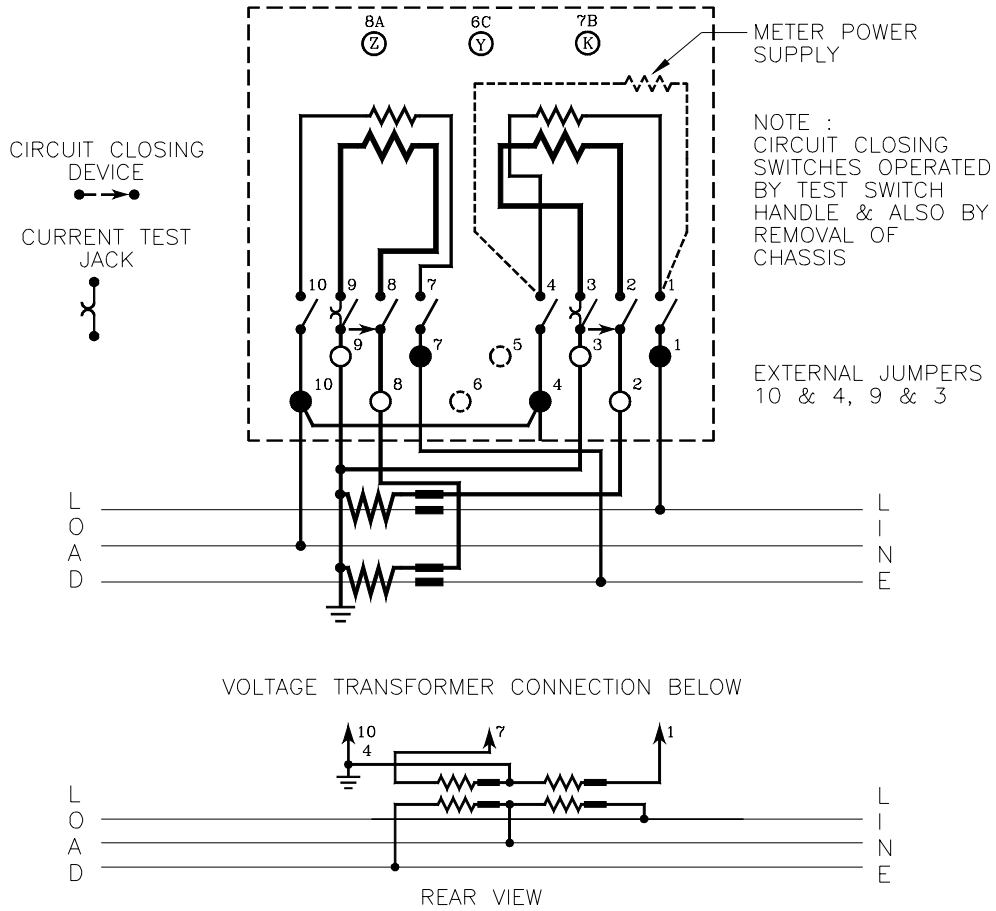


Figure 2. 3-phase, 3-wire (2-element equivalent)

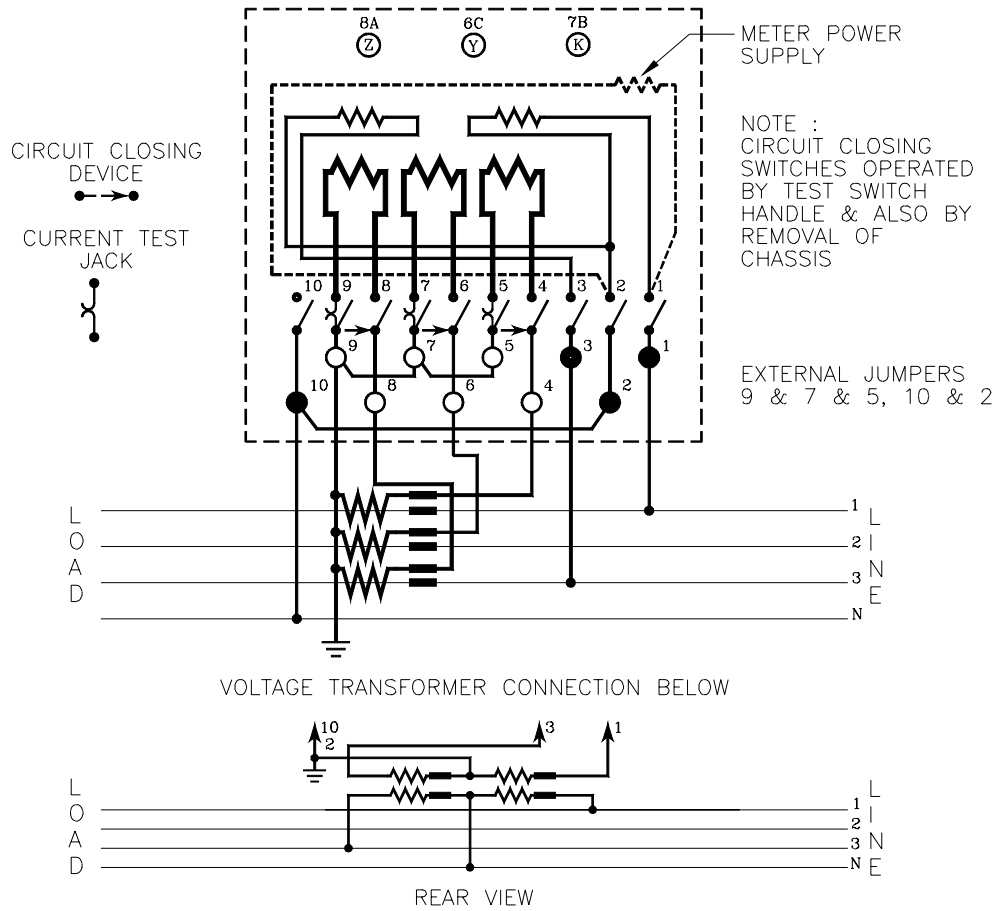


Figure 3. 3-phase, 4-wire Wye (2½ element equivalent)

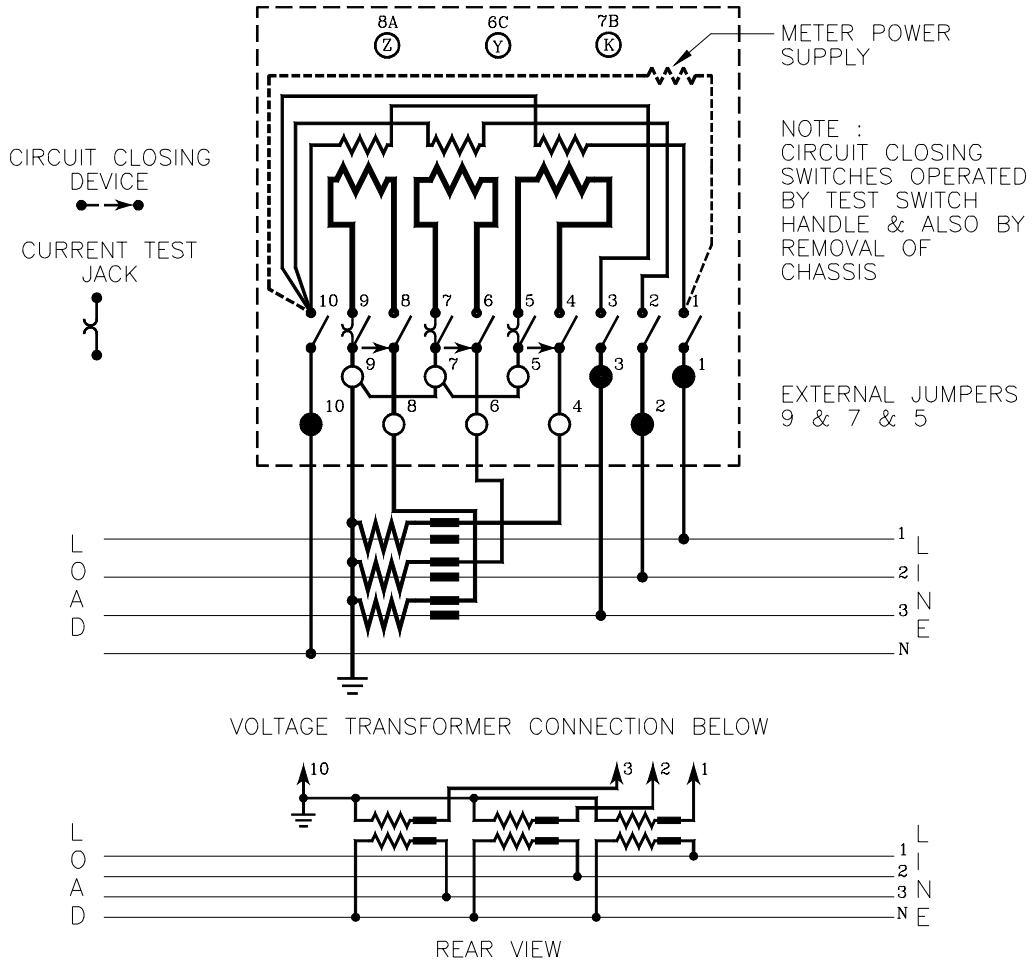
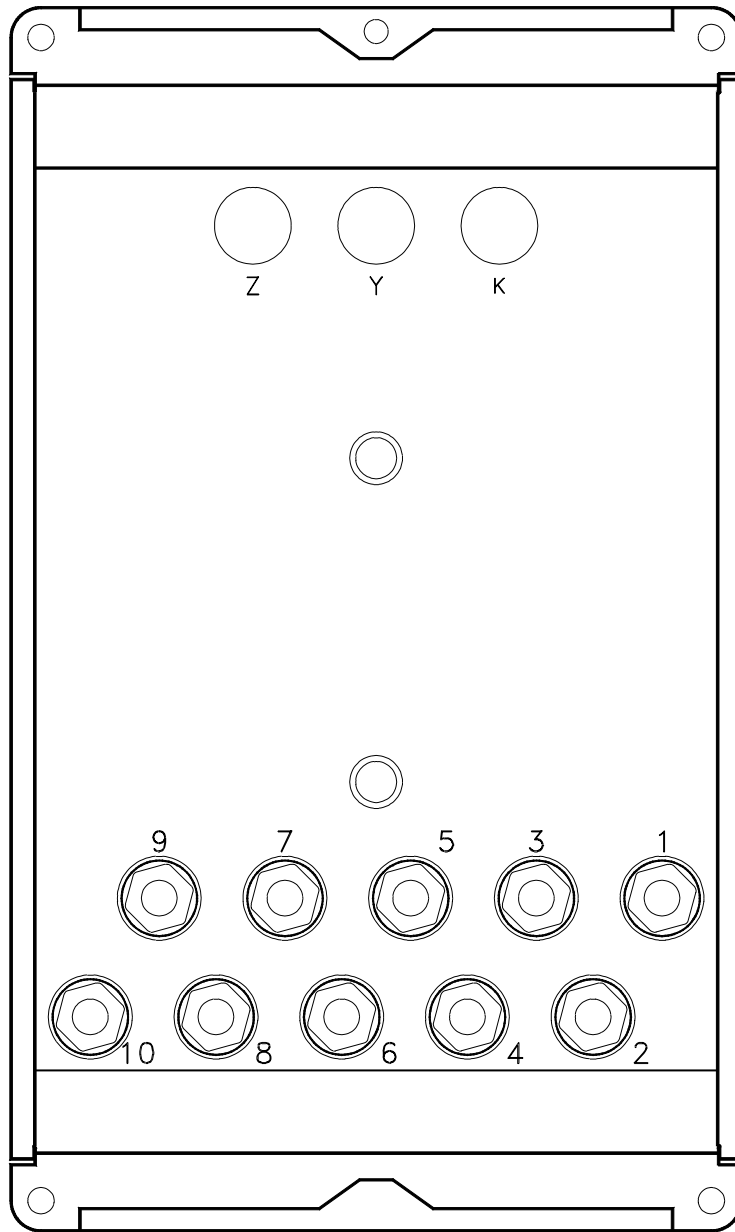


Figure 4. 3-phase, 4-wire Wye (3-element equivalent)



REAR VIEW

Figure 5. FT-21 case with single KYZ

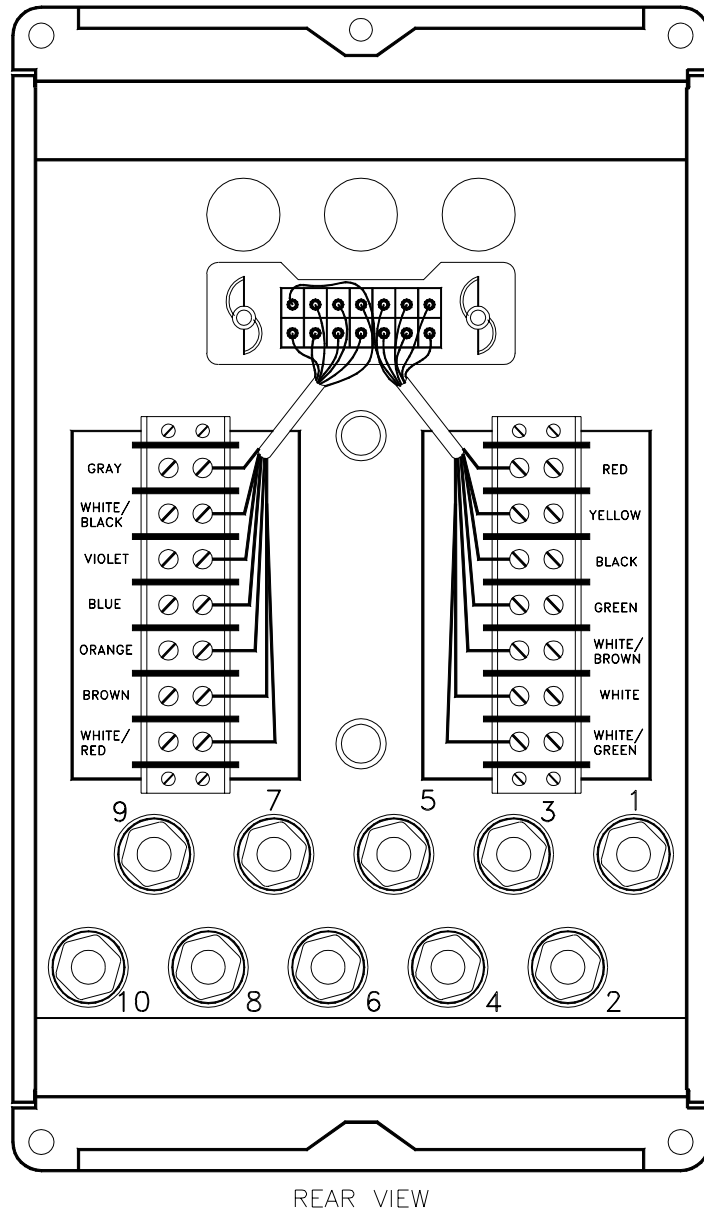


Figure 6. FT-21 case with terminal strip outputs

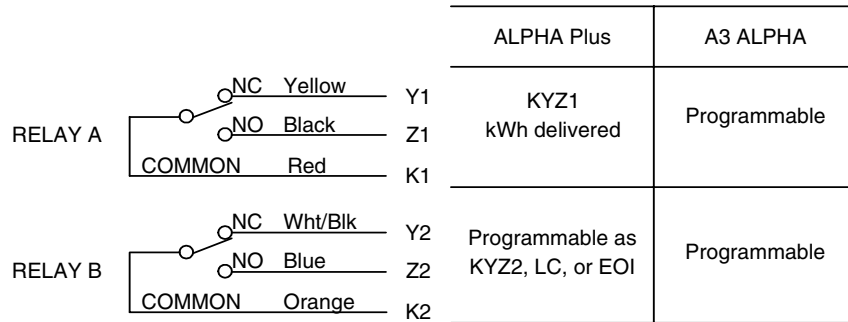


Figure 7. Color code for the active connections at the external terminal strips with 2 relays and no communication options

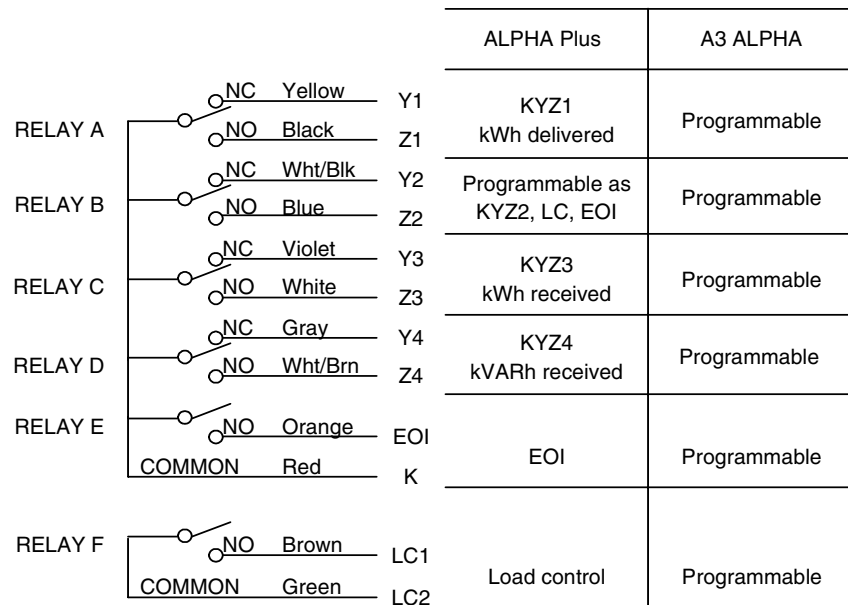


Figure 8. Color code for the active connections at the external terminal strips with 6 relays and no communication options

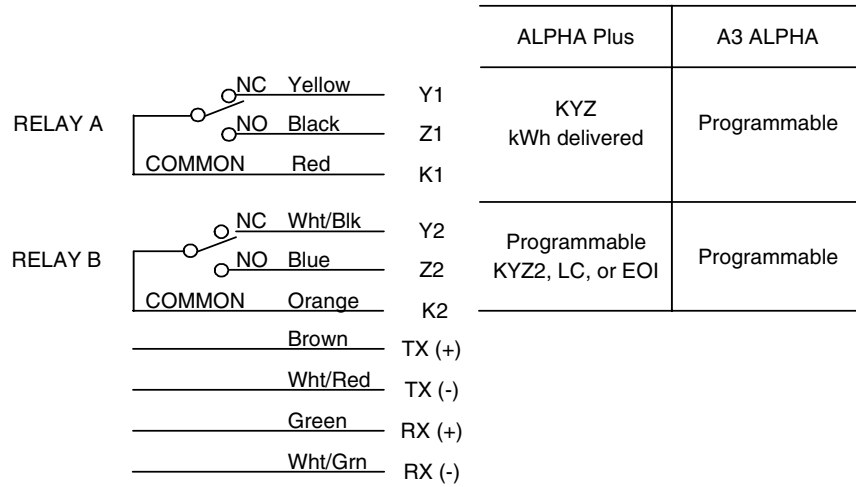


Figure 9. Color code for the active connections at the external terminal strips with 2 relays and the External Serial Communication option

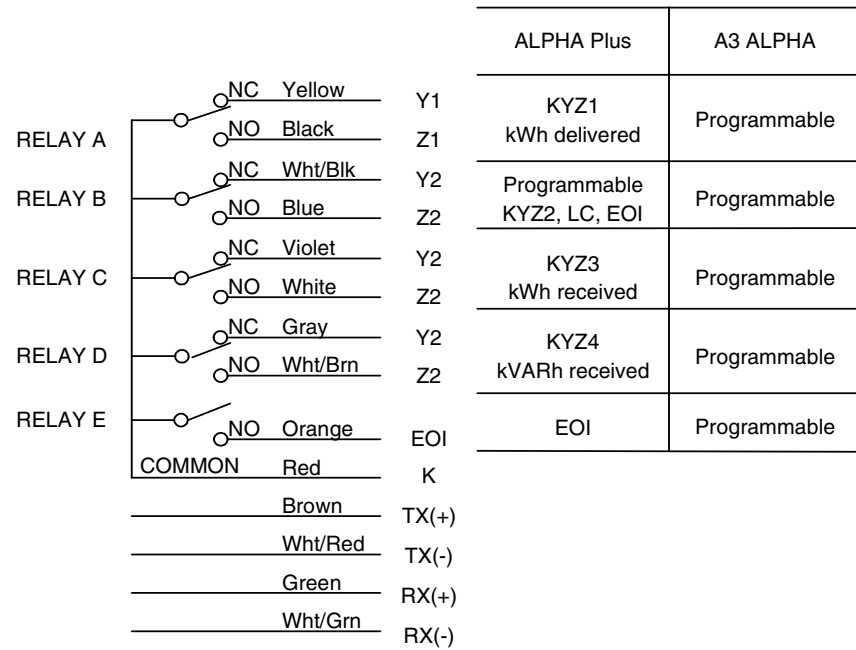


Figure 10. Color code for the active connections at the external terminal strips with 5 relays and the External Serial Communication option

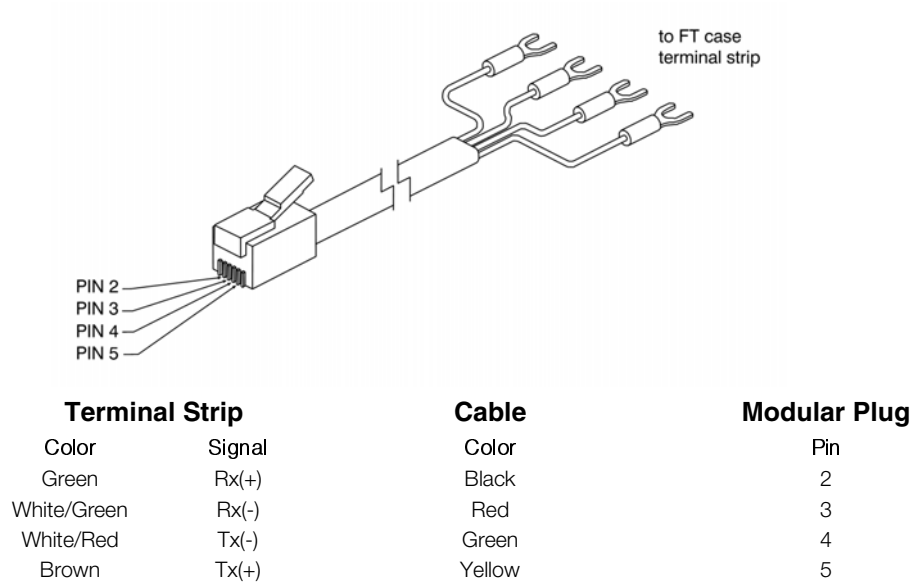


Figure 11. Modular plug termination to external modem adapter for the External Serial Communication option

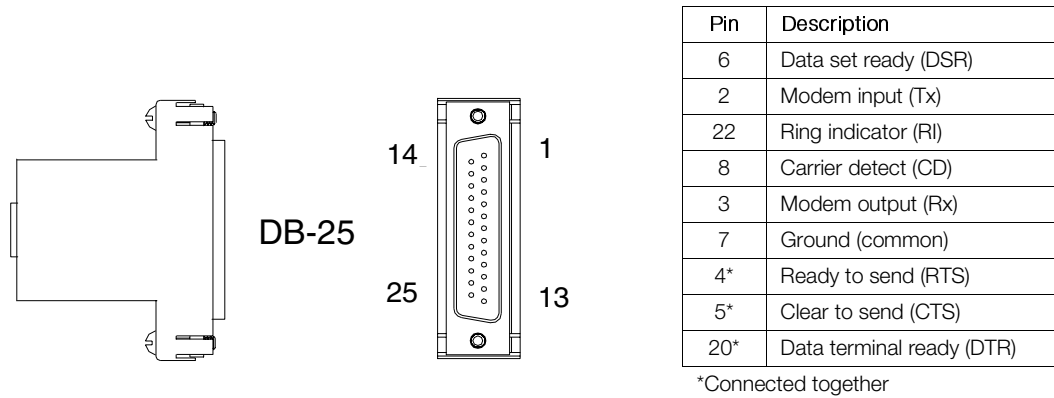


Figure 12. Pin configuration for external modem adapter for the External Serial Communication option (Style 1C11412G01)

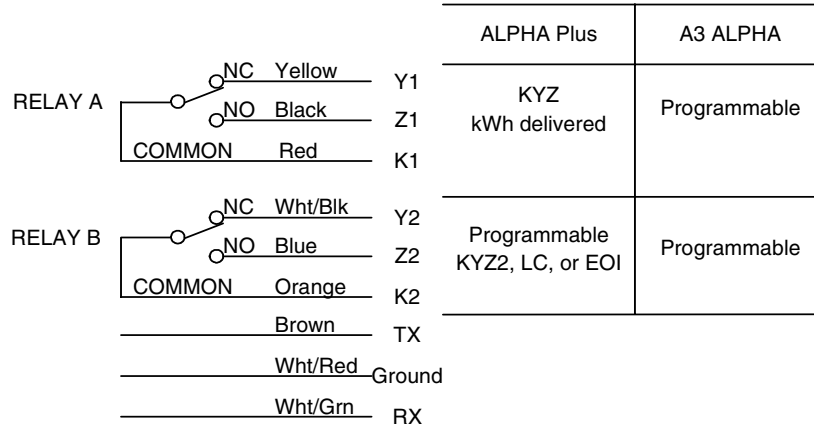
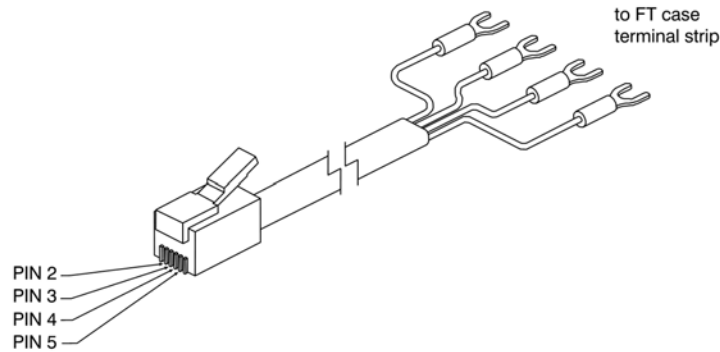


Figure 13. Color code for the active connections at the external terminal strips with 2 relays and the RS-232 option



| Terminal Strip | | Cable | Modular Plug |
|----------------|----------|--------|--------------|
| Color | Signal | Color | Pin |
| Green | Not used | Black | 2 |
| White/Green | Receive | Red | 3 |
| White/Red | Ground | Green | 4 |
| Brown | Transmit | Yellow | 5 |

Figure 14. Modular plug termination to FT case for RS-232 option

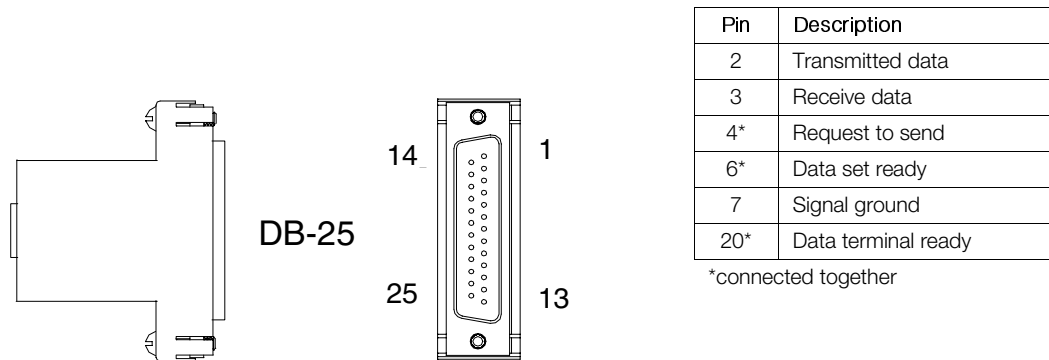


Figure 15. RS-232 Interface adapter (Style 1C11637H01)

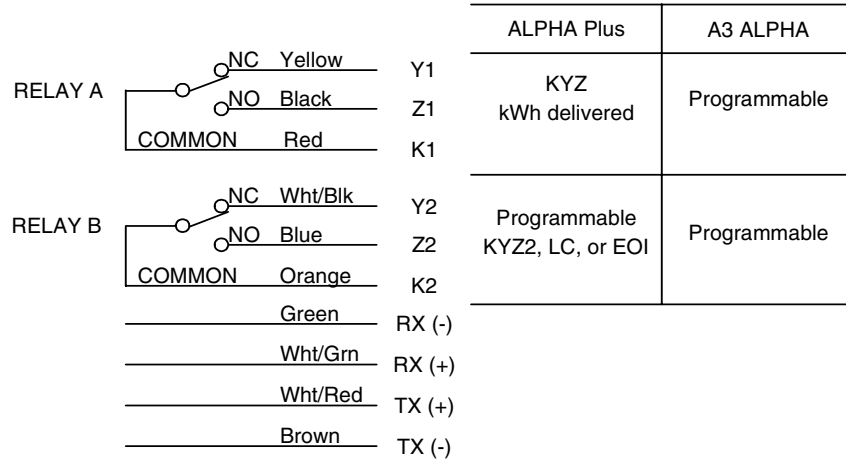
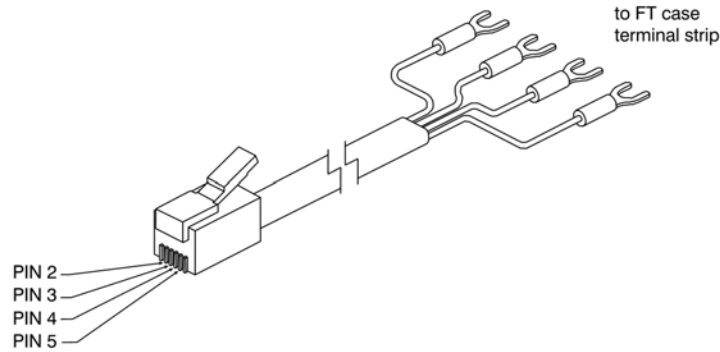


Figure 16. Color code for the active connections at the external terminal strips with 2 relays and the RS-485 option



| Terminal Strip | | Cable | Modular Plug |
|----------------|-------------|--------|--------------|
| Color | Signal | Color | Pin |
| Green | Receive(-) | Black | 2 |
| White/Green | Receive(+) | Red | 3 |
| White/Red | Transmit(+) | Green | 4 |
| Brown | Transmit(-) | Yellow | 5 |

Figure 17. Modular plug termination to FT case for RS-485 option

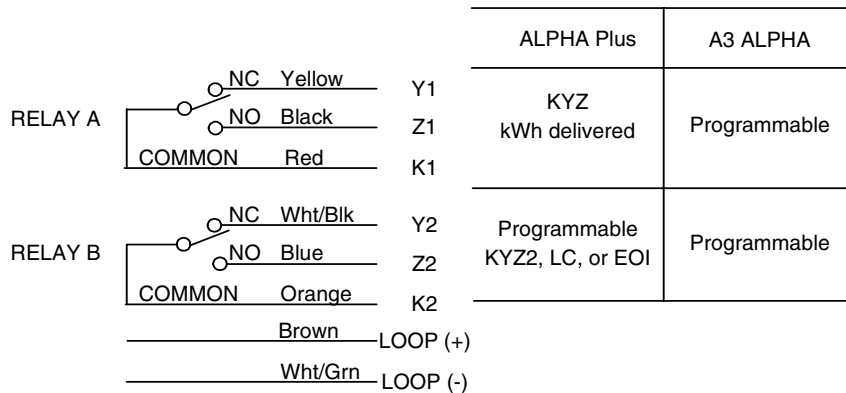


Figure 18. Color code for the active connections at the external terminal strips with 2 relays and the 20mA Current Loop option

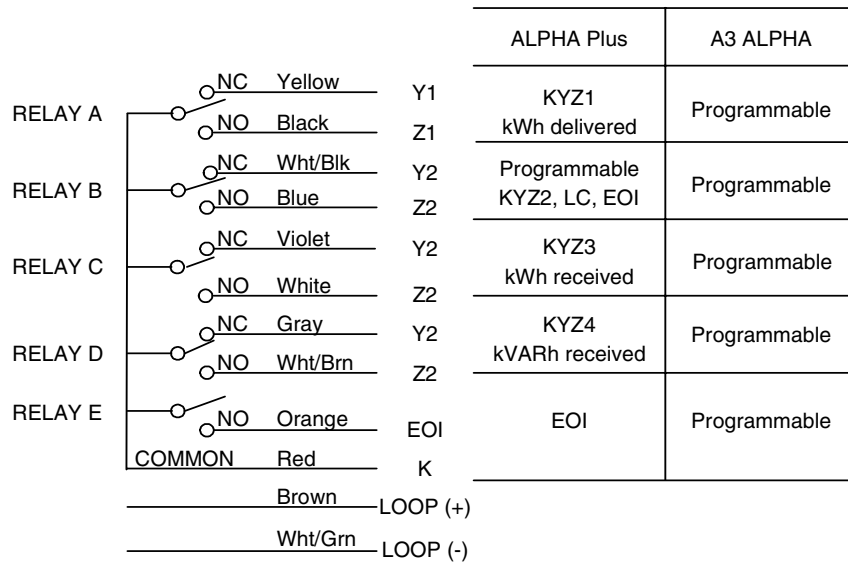


Figure 19. Color code for the active connections at the external terminal strips with 5 relays and the 20mA Current Loop option

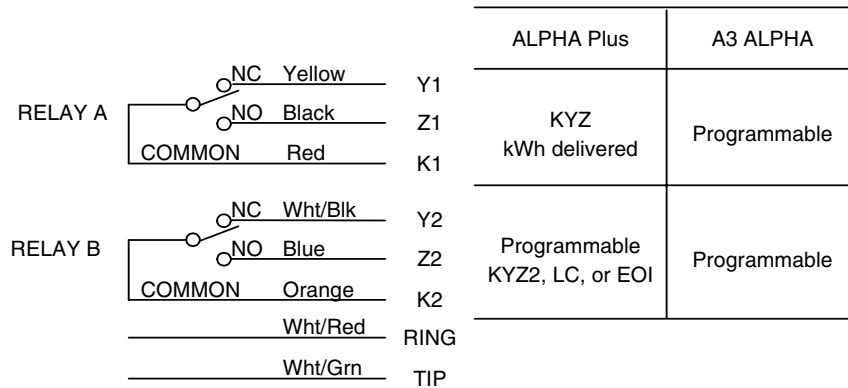
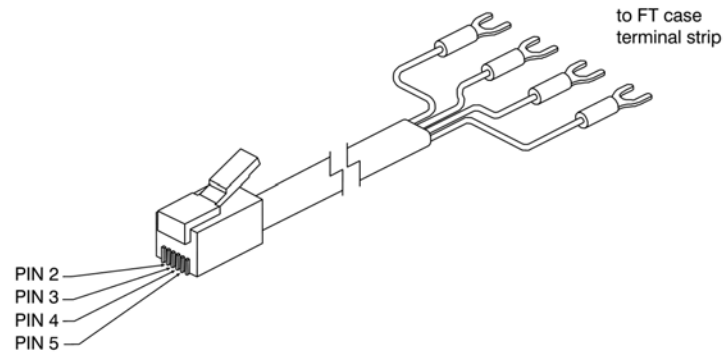


Figure 20. Color code for the active connections at the external terminal strips with 2 relays and the Internal Modem option



| Terminal Strip | | Cable | Modular Plug |
|----------------|----------|--------|--------------|
| Color | Signal | Color | Pin |
| | See text | Black | 2 |
| White/red | Ring | Red | 3 |
| White/green | Tip | Green | 4 |
| | See text | Yellow | 5 |

Figure 21. Modular plug termination to FT case for the Internal Modem option

Customer Information

This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of the equipment in a residential area may cause harmful interference, in which case, the user is required to correct the interference at his or her own expense.

The ALPHA Plus and A3 ALPHA switchboard meter modem complies with Part 68 of the FCC Rules. On the nameplate of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The connection to the telephone network is through an USOC RJ-11C modular jack.

The REN is used to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company.

If the ALPHA Plus or A3 ALPHA switchboard meter, when equipped with modem, causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with the ALPHA Plus or A3 ALPHA switchboard meter with modem, for repair or warranty information, please contact Elster Electricity, LLC, RMR Department, +1 919 212 4700. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Repair by the customer (end user) is limited to mechanical replacement of modules. Any changes or modifications not expressly approved by Elster Electricity could void the user's authority to operate the equipment.

The ALPHA Plus and A3 ALPHA switchboard meters cannot be used on public coin telephone service provided by the telephone company. Connection to party line service is subject to state tariffs. (Contact the state public utility commission, public service commission, or corporation commission for information).

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