# INSTALLATION INSTRUCTIONS

Original Issue Date: **7/09**

Model: **KBC, KBP, KBS, KCC, KCP, KCS, KCT, KEP, KGP, KGS, KSP, KSS Automatic Transfer Switches**

Market: **ATS**

Subject: **Digital Power Meter Kits GM67267-KA1 through KA58; GM67268-KA1 through KA20; GM67269-KA1 through KA24; GM92145-KA1 through -KA20**

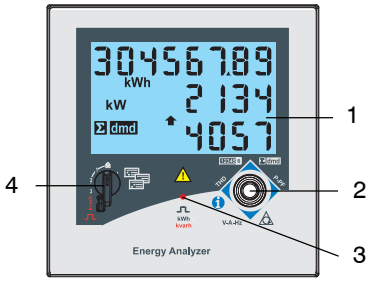
## Introduction

The digital power meter displays voltage, current, frequency, and power for both sources connected to the automatic transfer switch. The meter also provides programmable visual alarms for high and low voltage and high current conditions. Programming menus are password- protected. The meter is shown in Figure 1.

The meter kit includes a 3-position source selector switch. Use the switch to select the source to be monitored by the meter, Normal or Emergency.

Current transformers (CTs) are included with the kits. Follow the instructions in Section 1 to install the CTs on the load leads and connect the CT leads to the power meter. Instructions for connecting optional outputs and communication wiring are also included. Follow the safety precautions during installation and connection.

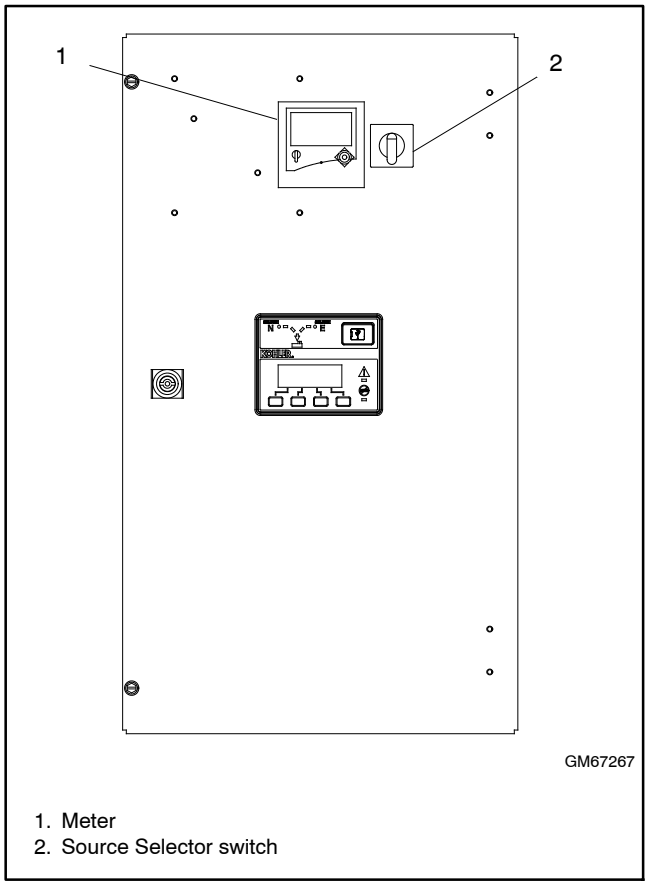
Section 2 contains instructions for meter operation, setting alarms, and other meter programming procedures. Keep this document with the transfer switch.




1. LCD display
2. Joystick
3. LED (red) blinks at a rate proportional to the energy measured
4. Selector switch

**Figure 1** Power Meter Front Panel

Digital power meters are available factory-installed on transfer switches equipped with MPAC® 1000, MPAC® 1500, Decision-Maker® MPAC 1200, or Decision-Maker® MPAC 1500 transfer switch controllers. See Figure 2 for a typical meter kit location. Information in this publication represents data available at the time of print.




1. Meter
2. Source Selector switch

**Figure 2** Installed Meter and Selector Switch, Typical

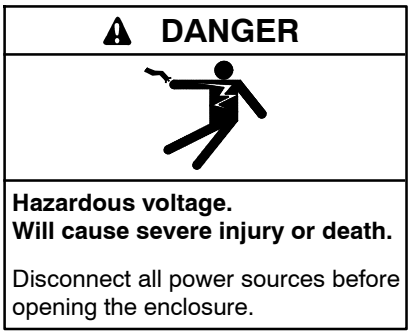
## Features and Specifications

- System variables: VLL, VLN, Admd, VA, VAdmd, VAdmd max, W, Wdmd, Wdmd max, var, PF, Hz, phase sequence.
- Single phase variables: VLL, VLN, A, VA, W, var, PF
- Energy measurements: total and partial kWh and kvarh or based on 4 different tariffs; single phase measurements
- Hour counter (6 + 2 digits)
- Harmonic analysis (FFT) up to 15th harmonic (current/voltage)
- Two digital outputs for pulses and/or alarms, relay type
- RS-485 serial output (Modbus–RTU), iFIX SCADA compatibility
- Power consumption:
  - AC: 6VA
  - DC: 3.5 W

## Software Functions

- Password: numeric code of up to 4 digits. Two protection levels of the programming data are available:
  - Password = 0, no protection
  - Password = 1 to 9999, all data are protected
- Transformer Ratio:
  - VT (PT): 1.0 to 999.9/1000 to 6000
  - CT: 1.0 to 999.9/1000 to 9999/10.00k to 60.00k The maximum power being measured cannot exceed 210 MW (calculated as maximum input voltage and current). The maximum VT by CT ratio is 48600. If the currents and/or voltages being measured exceed the maximum limits, the display shows the error message EEEE. For EN50470-3 compliant applications the maximum power being measured is 25 MW.
- Display: Up to 3 variables per page. See Figure 13, Display Pages. 8 different sets of variables are available, according to the selected application .
- Alarm Highlight: In case of alarm and if the relevant function is enabled, the display backlight flashes blue and white.
- Reset: Using the front joystick:
  - Demand: dmd and max dmd
  - Total energies: kWh, kvarh
  - Partial energies and tariffs: kWh, kvarh

## Safety Precautions




**Servicing the transfer switch. Hazardous voltage can cause severe injury or death.** Deenergize all power sources before servicing. Turn off the main circuit breakers of all transfer switch power sources and disable all generator sets as follows: (1) Move all generator set master controller switches to the OFF position. (2) Disconnect power to all battery chargers. (3) Disconnect all battery cables, negative (–) leads first. Reconnect negative (–) leads last when reconnecting the battery cables after servicing. Follow these precautions to prevent the starting of generator sets by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer. Before servicing any components inside the enclosure: (1) Remove all jewelry. (2) Stand on a dry, approved electrically insulated mat. (3) Test circuits with a voltmeter to verify that they are deenergized.

(Decision-Maker® 3+ and 550 Controllers)

**Servicing the transfer switch. Hazardous voltage can cause severe injury or death.** Deenergize all power sources before servicing. Turn off the main circuit breakers of all transfer switch power sources and disable all generator sets as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect power to all battery chargers. (3) Disconnect all battery cables, negative (–) leads first. Reconnect negative (–) leads last when reconnecting the battery cables after servicing. Follow these precautions to prevent the starting of generator sets by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer. Before servicing any components inside the enclosure: (1) Remove all jewelry. (2) Stand on a dry, approved electrically insulated mat. (3) Test circuits with a voltmeter to verify that they are deenergized.

(RDC, DC, RDC2, DC2, Decision-Maker® 3000, 3500 and 6000 Controllers)

# 1 Installation and Connection

Read and follow the safety precautions in the previous section during the installation and connection procedure.

The digital meters are factory-installed and connected. The digital meter kits include current transformers (CTs) that must be installed and connected during the transfer switch installation. Single-phase kits use two CTs. Three-phase kits use three CTs. Figure 23 on page 20 lists the CTs provided with each kit.

Install the CTs on the load leads inside the ATS enclosure and connect the CT leads to the power meter as described in the following procedure. Refer to the wiring diagrams on pages 16 through 19 during the installation and connection procedure.

Optional outputs and communication wiring can also be connected to the digital meter. Connection diagrams are shown in Figure 5 and Figure 6 on the following pages. Also see the wiring diagrams on pages 16 through 19.

**Installation Procedure**

1. Disable the generator set(s) to prevent accidental starting.
   a. Place the generator set master switch in the OFF position or press the OFF/RESET button on the generator set controller.
   b. Disconnect the power to the battery charger, if equipped.
   c. Disconnect the generator set engine starting battery(ies), negative (–) lead first.
2. Disconnect power to the transfer switch.
3. Open the ATS enclosure.
4. Install the current transformers (CTs) on the load leads with the dot or mark pointing toward the power source. See Figure 3 or Figure 4 or the wiring diagram for your unit.
5. Connect the black and white CT leads to the power meter (PM) as shown in Figure 3 or Figure 4 or the wiring diagram for your unit.
6. Optional: Connect RS-485 serial communication connections as shown in Figure 5. Connect additional network devices in parallel. Use a terminating jumper across A– and T on the last device in the network as shown in Figure 5. Also see Figure 7 for RS-485 connection specifications.
7. Optional: Connect outputs as shown in Figure 6. See Figure 7 for output specifications and Figure 8 for available outputs.
8. Reconnect power to the transfer switch.
9. Re-enable the generator set(s).
   a. Check that the generator set master switch is in the OFF position.
   b. Reconnect the generator set engine starting battery, negative (–) lead last.
   c. Reconnect power to the battery charger, if equipped.

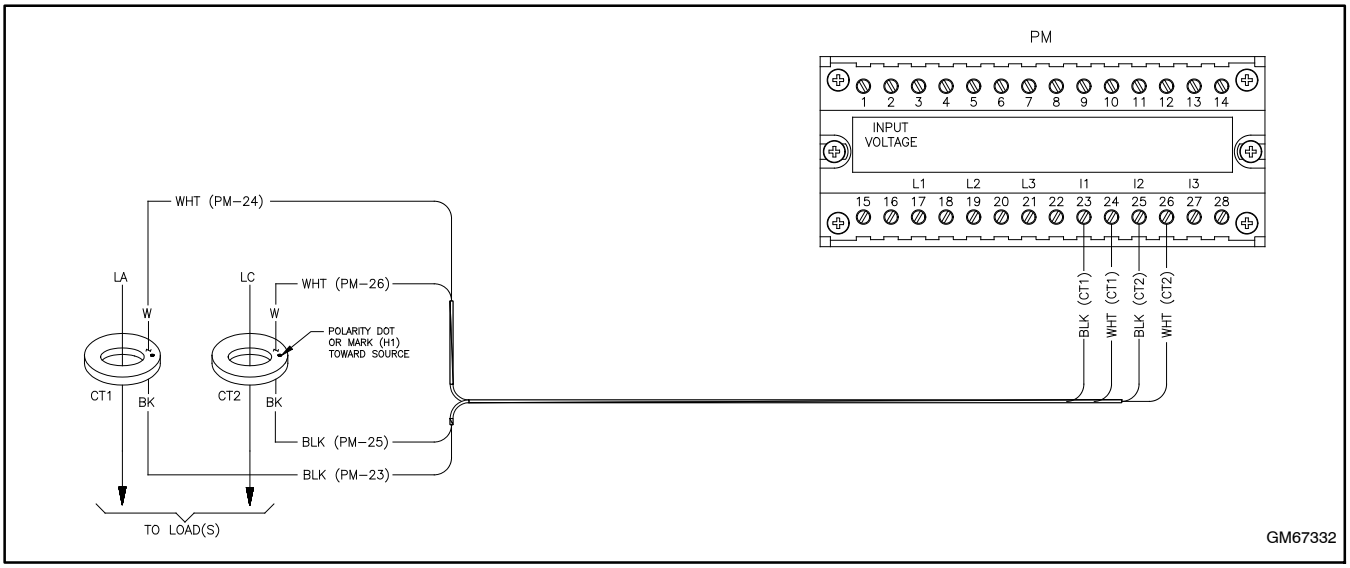



**Figure 3** Current Transformer Installation and Connection, Single-Phase

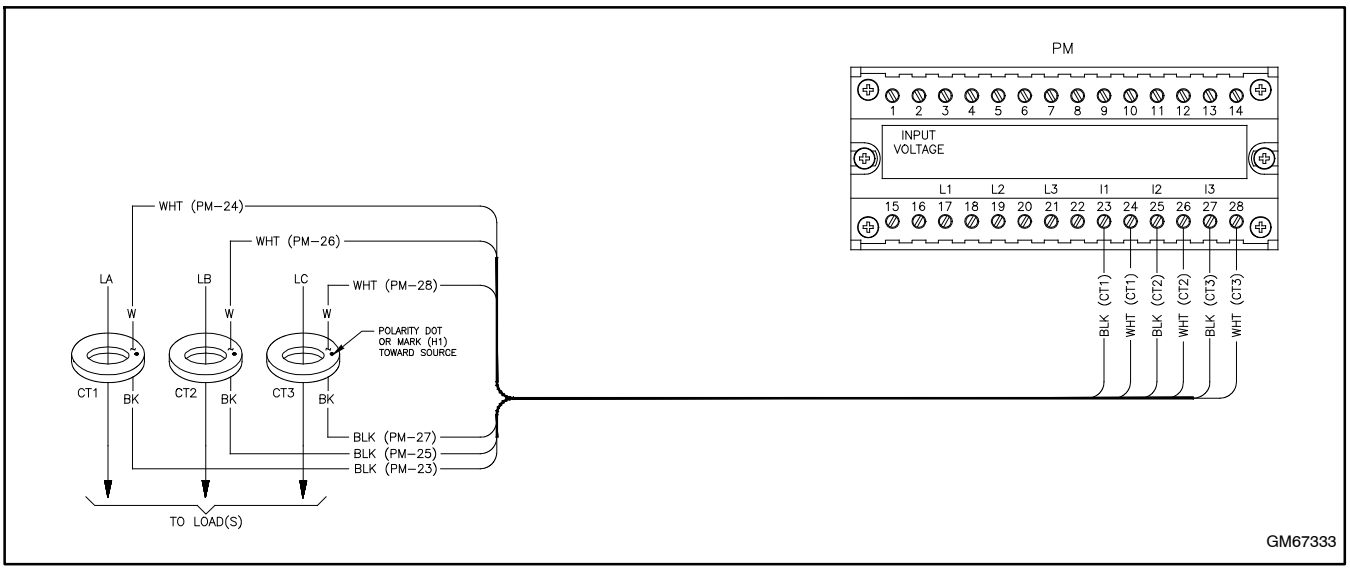



**Figure 4** Current Transformer Installation and Connection, Three-Phase

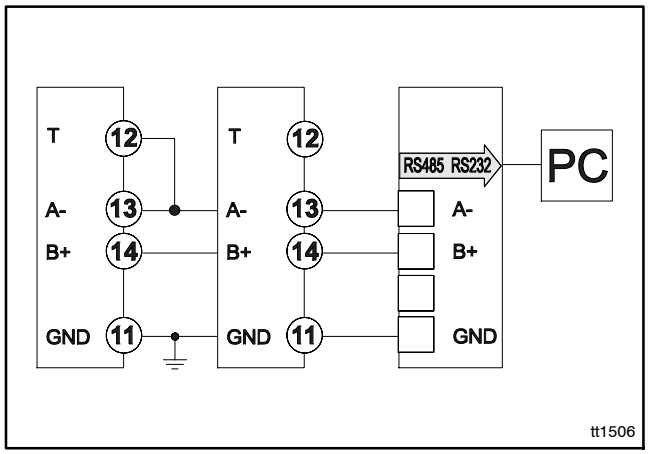



**Figure 5** Optional RS-485 Port Serial Connection

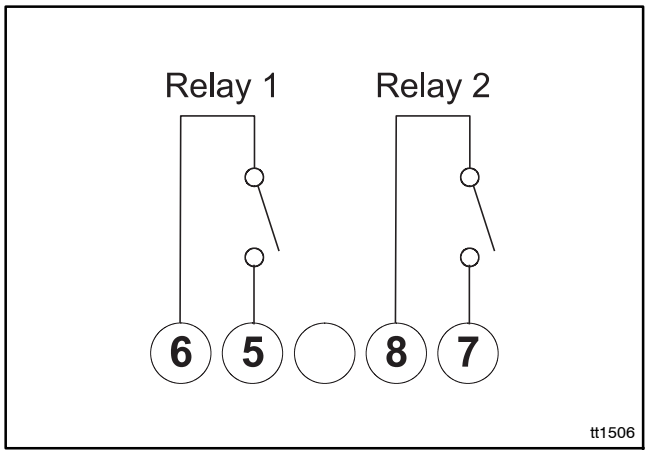



**Figure 6** Optional Relay Output Connections

## Output Specifications

| Output Type | Specification | Description |
|---|---|---|
| Digital–Pulse * | Number of outputs | Up to 3, independent. Programmable from 0.001 to 10.00 kWh/kvarh per pulse. |
| | Type | Outputs connectable to the energy meters (Wh/varh) |
| | Pulse duration | $\geq$100 ms < 120 ms (ON); $\geq$120 ms (OFF), according to EN62052-31 |
| Digital–Alarm * | Number of outputs | Up to 3, independent. |
| | Alarm modes | Up alarm, down alarm (see Figure 8) |
| | Setpoint adjustment | From 0 to 100% of the display scale |
| | Hysteresis | From 0 to full scale |
| | On-time delay | 0 to 255 s |
| | Output status | Selectable: normally de-energized or normally energized. |
| | Minimum response time | $\leq$ 700 ms, filters excluded. Setpoint on time delay: 0 s |
| Digital | Remote control | The digital output status can be managed by means of serial communication RS-485, if programmed as remote. |
| Relay output | Physical outputs | maximum 2 |
| | Purpose | For pulse output, alarm output, or remote control. |
| | Type | Relay, SPST type<br>AC 1–5 A @ 250 VAC<br>DC 12–5 A @ 24VDC<br>AC 15–1.5 A @ 250 VAC<br>DC 13–1.5 A @ 24 VDC |
| RS-485 | Type | Multidrop, bidirectional (static and dynamic variables) |
| | Connections | 2-wire. Maximum distance 1000 m (3281 ft.) (without amplifier). Termination directly on the instrument. |
| | Addresses | 247, selectable by means of the front joystick. |
| | Protocol | MODBUS/JBUS (RTU) |
| | Data (bidirectional) | Dynamic (read only): System and phase variables. See Figure 8. |
| | | Static (read and write): All configuration parameters. |
| | Data format | 1 start bit, 8 data bits, no parity, 1 stop bit. |
| | Baud rate | 4800 or 9600 bits/s |
| | Driver input capability | 1/5 unit load. Maximum 160 transceivers on the same bus, which can be expanded with signal amplifiers. |
| | Insulation | By means of optocouplers, 4000 VRMS output to measuring inputs, 4000 VRMS output to power supply input. |
| * The three digital outputs can also work as a triple pulse output, triple alarm output, or any other combination. | | |

**Figure 7** Output Specifications

**Available Outputs**

- RS485 communication port
- Alarm outputs (max. variable, energies, and hour counter excluded)
- Pulse outputs (energies only)

| Number | Variable | 1-Phase | 2-Phase | 3-Phase | Notes |
|---|---|---|---|---|---|
| 1 | V L-N sys | 0 | X | X | sys = system |
| 2 | V L1 | X | X | X | |
| 3 | V L2 | 0 | X | X | |
| 4 | V L3 | 0 | 0 | X | |
| 5 | V L-L sys | 0 | X | X | sys = system |
| 6 | V L1-2 | 0 | X | X | |
| 7 | V L2-3 | 0 | 0 | X | |
| 8 | V L3-1 | 0 | 0 | X | |
| 9 | A dmd max | 0 | X | X | Highest dmd current among the phases * |
| 10 | A L1 | X | X | X | |
| 11 | A L2 | 0 | X | X | |
| 12 | A L3 | 0 | 0 | X | |
| 13 | VA sys | X | X | X | sys = system |
| 14 | VA sys dmd | X | X | X | sys = system * |
| 15 | VA L1 | X | X | X | |
| 16 | VA L2 | 0 | X | X | |
| 17 | VA L3 | 0 | 0 | X | |
| 18 | var sys | X | X | X | sys = system |
| 19 | var L1 | X | X | X | |
| 20 | var L2 | 0 | X | X | |
| 21 | var L3 | 0 | 0 | X | |
| 22 | W sys | X | X | X | sys = system |
| 23 | W sys dmd | X | X | X | sys = system * |
| 24 | W L1 | X | X | X | |
| 25 | W L2 | 0 | X | X | |
| 26 | W L3 | 0 | 0 | X | |
| 27 | PF sys | X | X | X | |
| 28 | PF L1 | X | X | X | |
| 29 | PF L2 | 0 | X | X | |
| 30 | PF L3 | 0 | 0 | X | |
| 31 | Hz | X | X | X | |
| 32 | Phase seq. | 0 | 0 | X | |
| 33 | Hours | X | X | X | |
| 34 | kWh (+) | X | X | X | Total or by user |
| 35 | kvarh (+) | X | X | X | Total or by user |
| 36 | kWh (+) | X | X | X | Partial or by tariff |
| 37 | kvarh (+) | X | X | X | Partial or by tariff |
| 38 | kWh (-) | X | X | X | Total |
| 39 | kvarh (-) | X | X | X | Total |
| 40 | *m3 Gas* | X | X | X | Total |
| 41 | *m3 Cold H2O* | X | X | X | Total |
| 42 | *m3 Hot H2O* | X | X | X | Total |
| 43 | *kWh H2O* | X | X | X | Total |
| 44 | A L1 THD | X | X | X | |
| 45 | A L2 THD | 0 | X | X | |
| 46 | A L3 THD | 0 | 0 | X | |
| 47 | V L1 THD | X | X | X | |
| 48 | V L2 THD | 0 | X | X | |
| 49 | V L3 THD | 0 | 0 | X | |
| 50 | V L1-2 THD | X | X | X | |
| 51 | V L2-3 THD | 0 | X | X | |
| 52 | V L3-1 THD | 0 | 0 | X | |
| X = available; 0 = not available (zero indication on the display) | | | | | |
| * = maximum value with data storage | | | | | |

**Figure 8** Available Output Variables

# 2 Operation

### Source Selector Switch

Use the source selector switch to choose the source to be monitored by the meter, Normal or Emergency. See Figure 9.

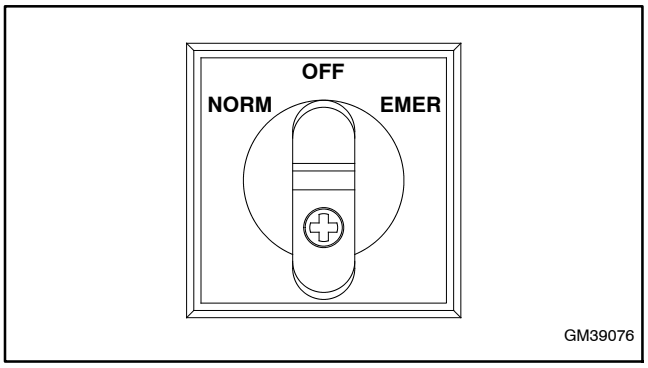



**Figure 9** Three-Position Source Selector Switch

## Meter Controls

### Joystick Operation

The numbers below refer to the numbered joystick motions in Figure 11.

In measurement mode:

1. Push the joystick for at least 3 seconds to enter programming mode.

2–5. Scroll the measurement and info pages according to Figure 13 and Figure 14.

In programming mode:

1. Push to enter the modified value or access the menus.

2–3. Increase/decrease the values to be modified.

4–5. Scroll the menus.

### Knob Operation

The locked position ( ) prevents access to the programming mode. Positions 1, 2, and 3 allow direct access to the predefined measuring pages. See the Advanced Programming section for instructions to assign selected pages to knob positions 1, 2, and 3. The measuring pages change according to the selected application (APPLiCAt) parameter. See Figure 12 and Figure 13 for application types and available measuring pages.

Knob positions are summarized in Figure 10.

| Knob Position | Description |
|---|---|
| (Lock) | Programming lock |
| 1 | Page 1 * |
| 2 | Page 2 * |
| 3 | Page 3 * |
| **P** | The front LED blinks at a rate proportional to the reactive energy (kVARH) being measured. |

* Selected pages from Figure 13.

**Figure 10** Knob Positions

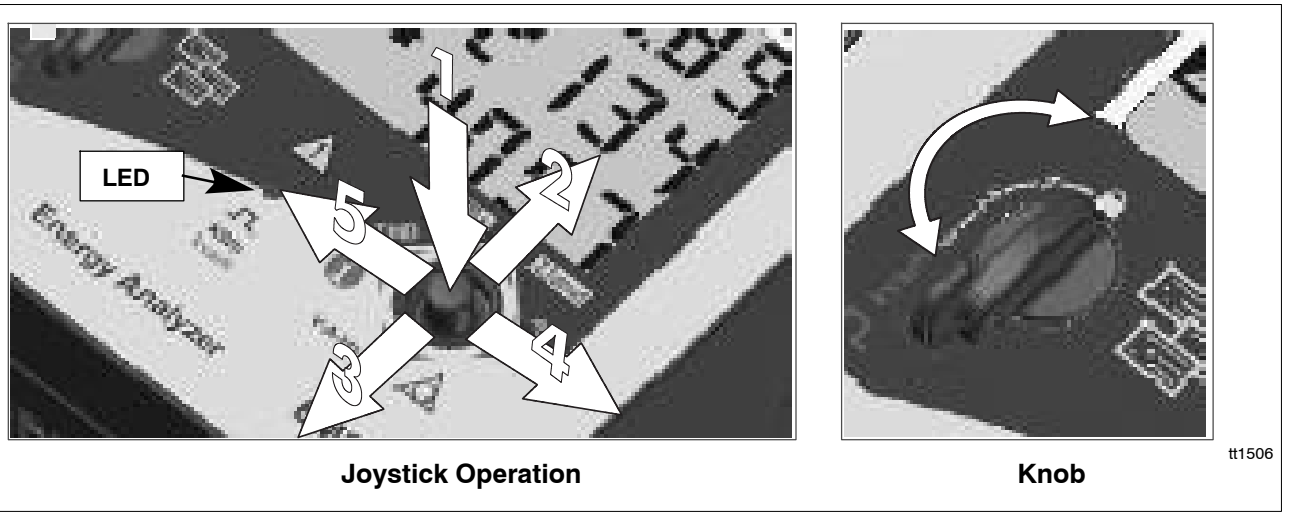



**Figure 11** Meter Controls

### LED Operation

When the knob is in position 1, 2, or lock, the red LED flashes at a rate proportional to the active imported energy consumption.

When the knob is in position 3, the red LED flashes at a rate proportional to the reactive inductive energy consumption (kvarh).

Negative (exported) energy and power are not indicated by the LED.

### Display Layout

The display is divided into three lines. The engineering units apply to the variables shown in the relevant lines. The negative symbols (∑, dmd) refer to all variables displayed in the second and third lines of the display. Some symbols are used to improve the display legibility.

In the case of overflow, EEEE is displayed, the DMD calculation, hour counter, and energy meter functions are inhibited, and alarm outputs are activated. EEEE in a single-phase application automatically implies the overflow condition of the relevant system variable, and the PF indication is forced to 0.000.

### Measurement Pages and Information pages

Move the joystick to positions 2, 3, 4, or 5 to display and scroll the measurement pages. See Figure 13. Different measurement pages are available depending on the application selection listed in Figure 12.

- Direction 2 (up): measurement pages relevant to the meters, the dmd, and system values.
- Direction 3 (down): current, voltage, single phase, frequency, and phase sequence measurement pages.
- Direction 4 (right): power and phase displacement measurement pages.
- Direction 5 (left): THD current and voltage indications, and all info pages listed in Figure 14.

| Type | Application | Notes |
|---|---|---|
| A | Basic domestic | Main energy metering |
| B | Shopping centers | Main energy metering |
| C | Advanced domestic | Main energy metering (total and based on tariff), gas and water metering |
| D | Multi domestic (camping, marinas) | Main energy metering (3 by single phase) |
| E | Solar energy | Energy meter with some basic power analyzer functions |
| F | Industrial | Main energy metering |
| G | Advanced industrial | Energy metering and power analysis |
| **H** | **Advanced industrial for power generation (default, recommended setting)** | **Complete energy metering and power analysis** |

**Figure 12** Application Types

| | | | | | Application | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JS | Page | Line 1 | Line 2 | Line 3 | A | B | C | D | E | F | G | H |
| ▲ | 1 | Total kWh (+) | W sys dmd | W sys dmd max | X | X | X | | X | X | X | X |
| ▲ | 2 | kWh (+) | A dmd max | PArt (partial kWh) | | | | | | X | X | X |
| ▲ | 3 | Total kvarh (+) | VA sys dmd | VA sys dmd max | | X | X | | | X | X | X |
| ▲ | 4 | kvarh (+) | VA sys | PArt (partial kvarh) | | | | | | X | X | X |
| ▲ | 5 * | Totalizer 1 † | W sys | text ‡ | | | X | | | X | X | X |
| ▲ | 6 * | Totalizer 2 † | W sys | text ‡ | | | X | | | X | X | X |
| ▲ | 7 * | Totalizer 3 † | W sys | text ‡ | | | X | | | X | X | X |
| ▲ | 8 * | kWh (+) | t1 (text) § | W sys dmd | | | X | | | X | X | X |
| ▲ | 9 * | kWh (+) | t2 (text) § | W sys dmd | | | X | | | X | X | X |
| ▲ | 10* | kWh (+) | t3 (text) § | W sys dmd | | | X | | | X | X | X |
| ▲ | 11* | kWh (+) | t4 (text) § | W sys dmd | | | X | | | X | X | X |
| ▲ | 12* | kWh (+) | t1 (text) § | W sys dmd | | | X | | | X | X | X |
| ▲ | 13* | kWh (+) | t2 (text) § | W sys dmd | | | X | | | X | X | X |
| ▲ | 14* | kWh (+) | t3 (text) § | W sys dmd | | | X | | | X | X | X |
| ▲ | 15* | kWh (+) | t4 (text) § | W sys dmd | | | X | | | X | X | X |
| ▲ | 16* | kWh (+) X | W X | User X | | | | X | | | | |
| ▲ | 17* | kWh (+) Y | W Y | User Y | | | | X | | | | |
| ▲ | 18* | kWh (+) Z | W Z | User Z | | | | X | | | | |
| ▲ | 19 | Total kvarh (-) | VA sys dmd | VA sys dmd max | | | | | | X | | X |
| ▲ | 20 | Total kWh (-) | W sys dmd | W sys dmd max | | | | | X | X | | X |
| ▲ | 21 | Hours | W sys | PF sys | | | | | X | X | X | X |
| ▲ | 22 | Hours | var sys | PF sys | | | | | X | X | X | X |
| ▶ | 23 | W L1 | W L2 | W L3 | | | | | X | | X | X |
| ▶ | 24 | VA L1 | VA L2 | VA L3 | | | | | | | X | X |
| ▶ | 25 | var L1 | var L2 | var L3 | | | | | | | X | X |
| ▶ | 26 | PF L1 | PF L2 | PF L3 | | | | | | | X | X |
| ▼ | 27 | V L1 | V L2 | V L3 | | X | | X | X | | X | X |
| ▼ | 28 | V L1-2 | V L2-3 | V L3-1 | | | | | | | X | X |
| ▼ | 29 | A L1 | A L2 | A L3 | | | | | X | | X | X |
| ▼ | 30 | Phase seq. | V LN sys | Hz | X | X | X | | X | X | X | X |
| ▼ | 31 | Phase seq. | V LL sys | Hz | | | | | | X | X | X |
| ▼ | 32 | ASY | V LL sys | % | | | | | | X | X | X |
| ▼ | 33 | ASY | V LN sys | % | | | | | | X | X | X |
| ◀ | 34 | THD A1 | THD A2 | THD A3 | | | | | | | X | X |
| ◀ | 35 | THD V1 | THS V2 | THD V3 | | | | | | | X | X |
| ◀ | 36 | THD V12 | THD V23 | THD V 31 | | | | | | | X | X |
| ◀ | 37 | Lot number | Year | DMD time | X | X | X | X | X | X | X | X |
| ◀ | 38 | CT ratio | Value of CT | System | X | X | X | X | X | X | X | X |
| ◀ | 39 | VT/PT ratio | Value of VT | Connection | X | X | X | X | X | X | X | X |
| ◀ | 40 a | Alarm 1 status | Setpoint value | Variable type | | | X | | X | | X | X |
| ◀ | 41 a | Alarm 2 status | Setpoint value | Variable type | | | X | | X | | X | X |
| ◀ | 42 a | Alarm 3 status | Setpoint value | Variable type | | | X | | X | | X | X |
| ◀ | 40 b | Pulse 1 status | Output pulse | | X | X | X | X | X | X | X | X |
| ◀ | 41 b | Pulse 2 status | Output pulse | | X | X | X | X | X | X | X | X |
| ◀ | 42 b | Pulse 3 status | Output pulse | | X | X | X | X | X | X | X | X |
| ◀ | 43 | Serial port | Address | RS485 status | X | X | X | X | X | X | X | X |

* The page is available according to the selected measurement.

† m3 gas, m3 water. kWh remote heating

‡ Hot or cold water

§ The active tariff is displayed with an A before the t1, t2, t3, or t4 symbol.

**Figure 13** Display Pages

| Type | Line 1 | Line 2 | Line 3 |
|---|---|---|---|
| Meter information page 1 | Lot (production day) | year of production | dmd time |
| Meter information page 2 | CT ratio | Value of CT ratio | System (1, 2, or 3 phase) |
| Meter information page 3 | PT ratio | Value of PT ratio | Connection (2, 3, or 4 wire) |
| In case of alarm output page 4a | Alarm output 1, 2, or 3 status (ON/OFF) | Setpoint value | Variable type |
| In case of pulse output page 4b | Pulse output 1, 2, or 3 variable link (kWh/kvarh) | Output pulse weight (kWh/kvarh per pulse) | |
| In case of communication port page 5 | Serial port | Address | RS485 status (RX-TX) |

**Figure 14** Additional Display Information

## Basic Programming and Reset

Numbered steps **00** through **04** below refer to numbered sections in Figure 15.

**Reset Wdmd max and VAdmd** (A, B, C, and E only)

**00 rESET UP:** To reset the Wdmd max and VAdmd max in applications A, B, C, and E only (see Figure 12):

1. Move the knob to the lock position.
2. Press the joystick (direction 1 in Figure 11). The display will show rESET UP no.
3. Move the joystick up or down (directions 2 and 3 in Figure 11) to change the display to YES.
4. Press the joystick to confirm the YES setting, resetting Wdmd max and VAdmd max.

**Basic Programming and Reset**

**Note:** All measurement and controls functions are disabled in programming mode.

See Figure 15. Programming mode is not allowed when the knob is in the locked position. To enter the programming mode:

1. Verify that the knob is not in the locked position.
2. Press and hold the joystick (direction 1 in Figure 11) for at least 3 seconds.

**01 PASS?** At the PASS? display, two entries are possible:

- Enter the correct password (default = 0) to access the main menu. OR
- Enter 1357 to access the reset menu.
  - rESET UP = peak dmd values reset
  - rESET.dnd = dmd values reset
  - PAr EnEr = partial energy meter reset.

**02 CnG PASS:** allows changing the password.

**03 CoLour:** Select the color and display backlight setting.

- CoL.0 = backlight off
- Col.01 = white backlight
- CoL.02 = blue backlight
- CoL.03 = backlight off except flashing white/blue in the case of an alarm
- CoL.04 = white backlight and flashing white/blue in the case of an alarm
- CoL.05 = blue backlight and flashing white/blue in the case of an alarm

**04 APPLiCAt:** allows selection of the application. See Figure 12.

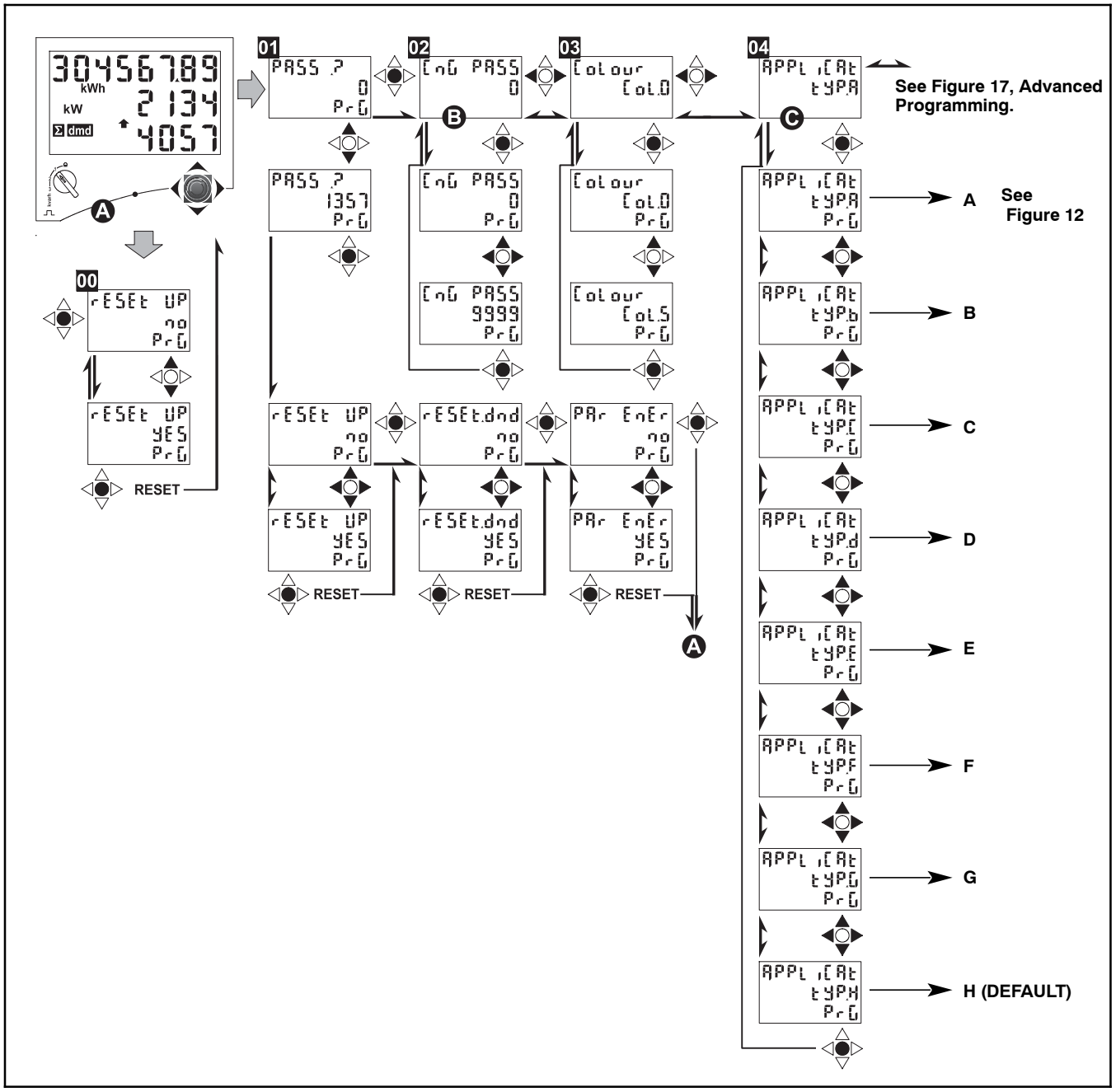



**Figure 15** Basic Programming

## Advanced Programming

Numbered steps **05** through **17** below refer to numbered sections in Figure 17 and Figure 18.

**05 USEr:** (application D only) links an ID code (from 1 to 9999) to the user of the displayed consumption (three single-phase independent users by instrument).

**06 SELECtor:** allows selection of the variable combination (page) to be displayed for knob positions 1, 2, and 3.

- SELEC.1, .2, .3, .LoC: selects knob position 1, 2, 3 or lock.
- PA.1 through .36: selects one page from pages 1 through 36 to assign to the selected knob position. If the page assigned to the knob position is not available for the selected application, the meter will display the first page available according to the list in Figure 13.

**07 SYS:** allows selection of the electrical system:

- 3P.n: 3-phase unbalanced system with or without neutral.
- 3P.I: 3-phase balanced system with or without neutral.
- 2P: 2-phase system.
- 1P: Single-phase system.

**08 Ut rAtio:** VT ratio, 0.1 to 6000.
The default setting is 1.0.

**09 CT rAtio:** CT ratio, 0.1 to 60.00k.
Example: If the connected CT primary is 3000 A and the secondary is 5 A, the CT ratio is 600 (3000/5).
See Figure 16 for CT ratio settings.

| Contactor Rating, Amps | CT Part Number | CT Description | CT Ratio Setting |
|---|---|---|---|
| 30–150 * | 246885 | 100:5 | 20 |
| 30–150 | 246886 | 150:5 | 30 |
| 200–400 | 248874 | 400:5 | 80 |
| 600 * | 297148 | 600:5 | 120 |
| 600–1000 | 291546 | 1000:5 | 200 |
| 1000-1200 * | 297756 | 1200:5 | 240 |
| 1200–1500 | 291547 | 1500:5 | 300 |
| 1600–2000 | 291548 | 2000:5 | 400 |
| 2500–3000 | 297675 | 3000:5 | 600 |
| 4000 | 297676 | 4000:5 | 800 |
| * See Figure 23 for kits that use these CTs. The digital meter kit number is shown on the ATS nameplate. | | | |

**Figure 16** Current Transformer (CT) Ratios

**10 P int.ti:** The integration time, from 1 to 30 minutes, used to calculate the demanded power (Wdmd and VAdmd).

**11 diG in 1/ diG in 2/ diG in 3:** (I3 option only)

**12 FiLtEr.S:** For applications F, G, and H only. Allows selections of the operating range of the digital filter as % of the full scale value (1 to 100).

**13 FiLtEr.Co:** Allows selection of the filter coefficient from 1 to 32. The higher the coefficient, the higher the stability and updating time of the measurement.

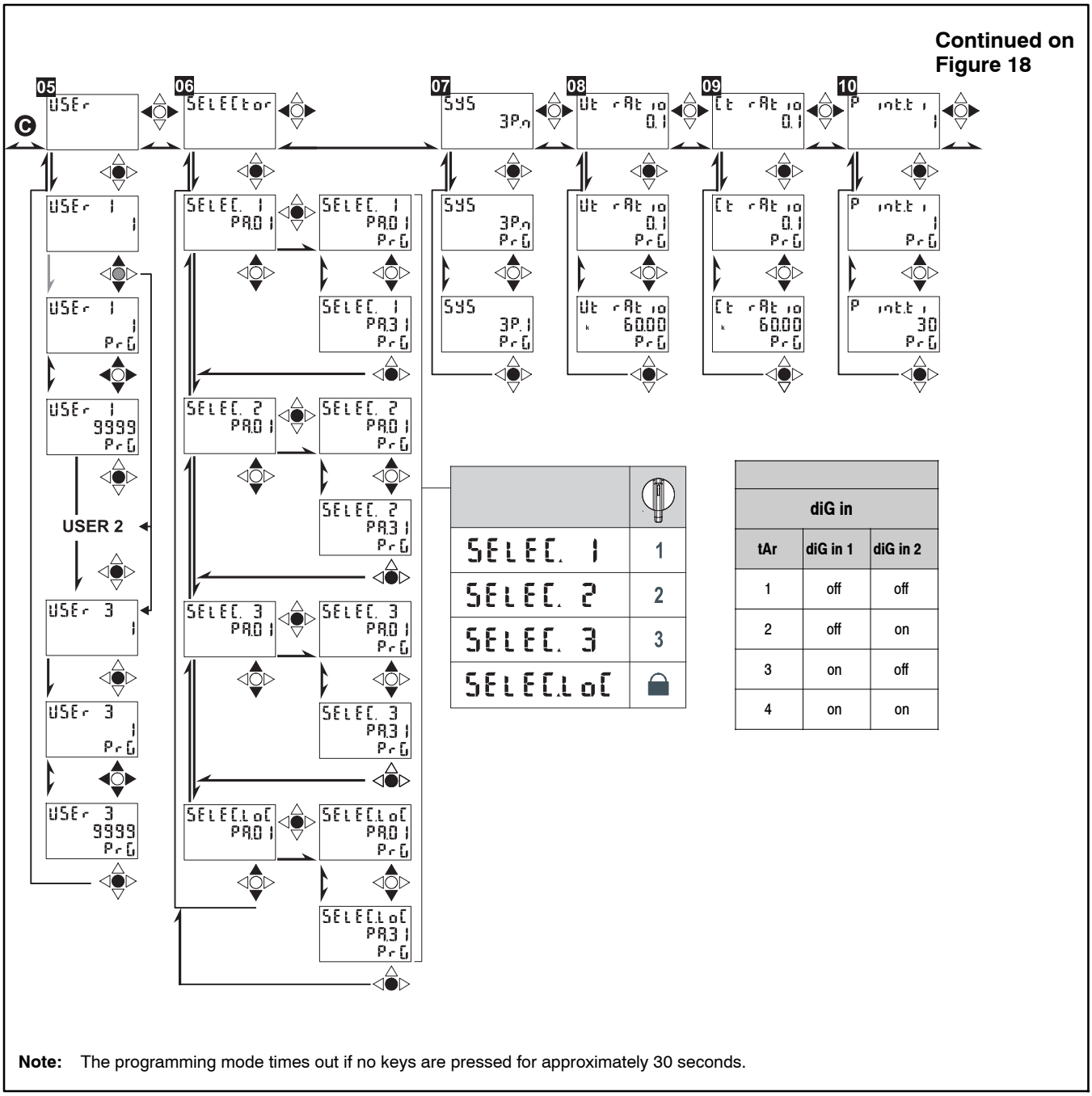
**14 AddrESS:** Allows selection of the serial address of the meter from 1 to 247. bAudrAtE: allows selection of the baud rate, 9600 or 4800 baud.

**15 diG out.1/diG out.2** Allows selections of the digital output functions.

- PuLS: pulse output selection. Set the pulse weight, kWh/kvarh per pulse from 0.001 to 10.00.
- tESt: Select YES to activate on the pulse output. In the further menu program the simulated power value (kW or kvar) corresponds to a pulse frequency proportional to it and based on the PULSEou.1/2/3. The test is active until you exit from this menu.
- AL: Alarm output (active only for applications C, E, G, H) selection of the variable to be controlled (Ph.AL: phase sequence alarm), and deactivation setpoints “on AL “ and “off AL”, the delay on activation “t dEL” and the output status in normal condition. nE is normally energized or nd if normally de-energized are also set.
- rEM: Allows remote control of the digital output.

**16 EnE t.rES:** Resets all the total counters.

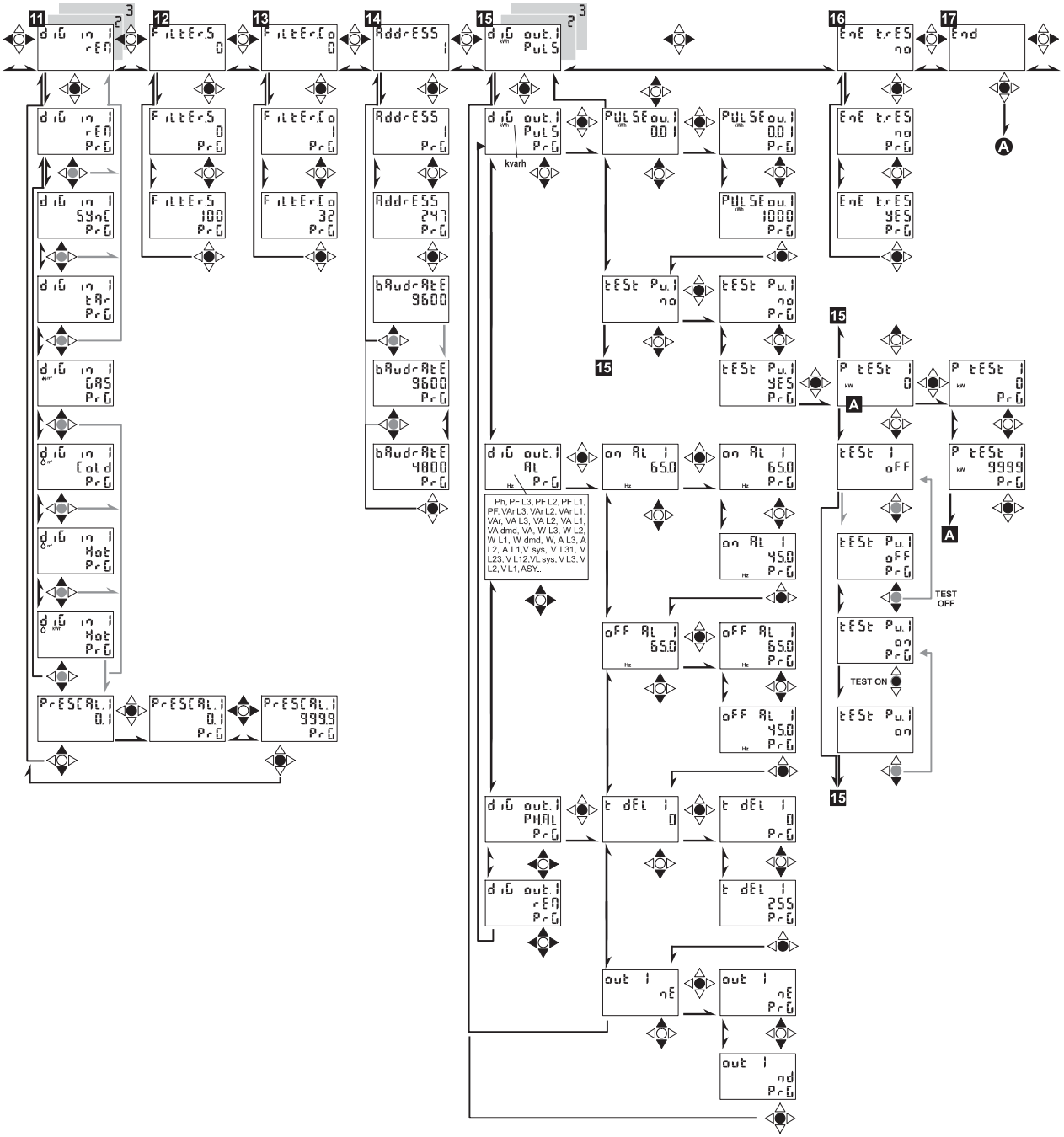
**17 End:** Exit the program mode by pressing the joystick in direction 1. Joystick directions 4 and 5 allow browsing the main menu again.




**Note:** The programming mode times out if no keys are pressed for approximately 30 seconds.

**Figure 17** Advanced Programming, Page 1

**Continued from Figure 17**




**Note:** The programming mode times out if no keys are pressed for approximately 30 seconds.

**Figure 18** Advanced Programming, Page 2

# Formulas Used

### Phase Variables

Instantaneous effective voltage:

$$= \sqrt{- \cdot \sum}$$

Instantaneous active power:

$$= - \cdot \sum \quad \cdot$$

Instantaneous power factor:

$$= \frac{}{}$$

Instantaneous effective current:

$$= \sqrt{- \cdot \sum}$$

Instantaneous apparent power:

$$= \quad \cdot$$

Instantaneous reactive power:

$$= \sqrt{\quad -}$$

where n = sample number

### System Variables

Equivalent 3–phase voltage:

$$_{\Sigma} = \frac{+ \quad +}{}$$

3-phase reactive power:

$$_{\Sigma} = \quad + \quad +$$

3-phase active power:

$$_{\Sigma} = \quad + \quad +$$

3-phase apparent power:

$$_{\Sigma} = \sqrt{\ _{\Sigma} + \quad _{\Sigma}}$$

3-phase power factor (TPF):

$$\phi_{\Sigma} = \frac{_{\Sigma}}{_{\Sigma}}$$

### Energy Metering

$$= \int \quad \cong \Delta \ \underset{=}{\Sigma} \quad ( )$$

$$= \int \quad \cong \Delta \ \underset{=}{\Sigma} \quad ( )$$

where:

P = active power

Q = reactive power

$t_1$, $t_2$ = starting and ending time points of consumption recording

nj = time unit

$\Delta t$ = time interval between two successive power consumptions

$n_1$, $n_2$ = starting and ending discrete time points of consumption recording

# 3 Wiring Diagrams

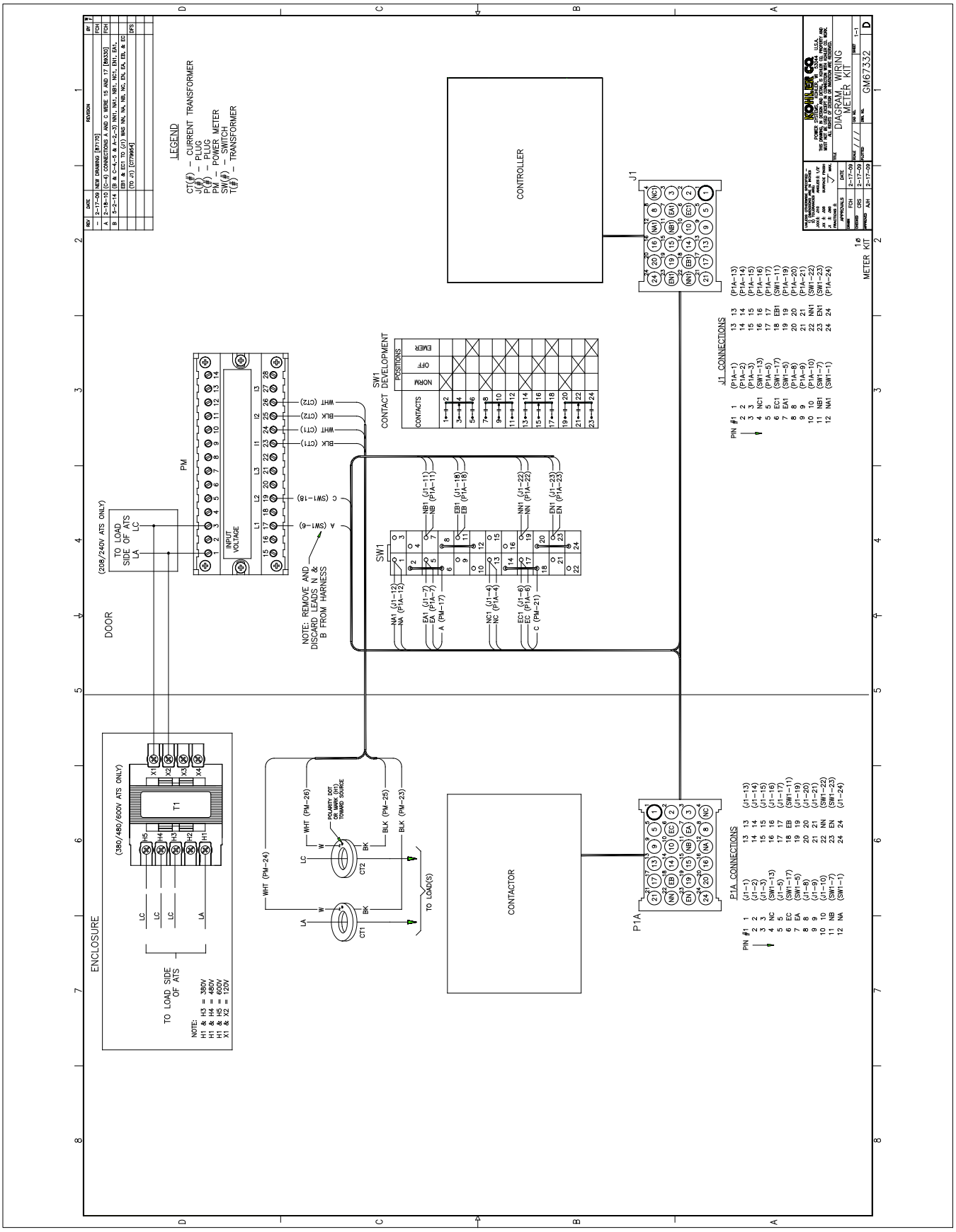



**Figure 19** Wiring Diagram, Single-Phase, GM67332 (See Figure 21 for Model KGS/KGP)

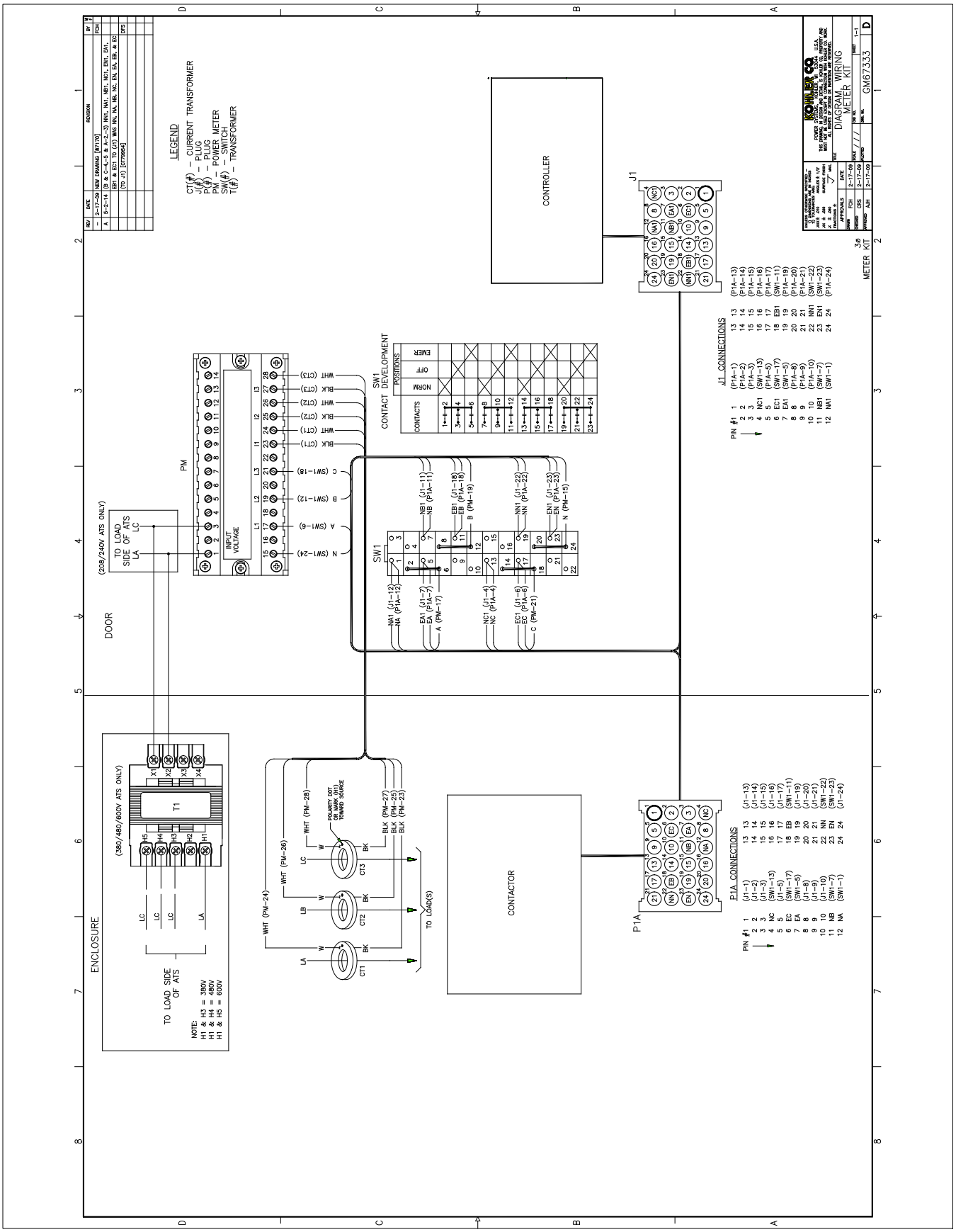



**Figure 20** Wiring Diagram, Three-Phase, GM67333 (See Figure 22 for Model KGS/KGP)

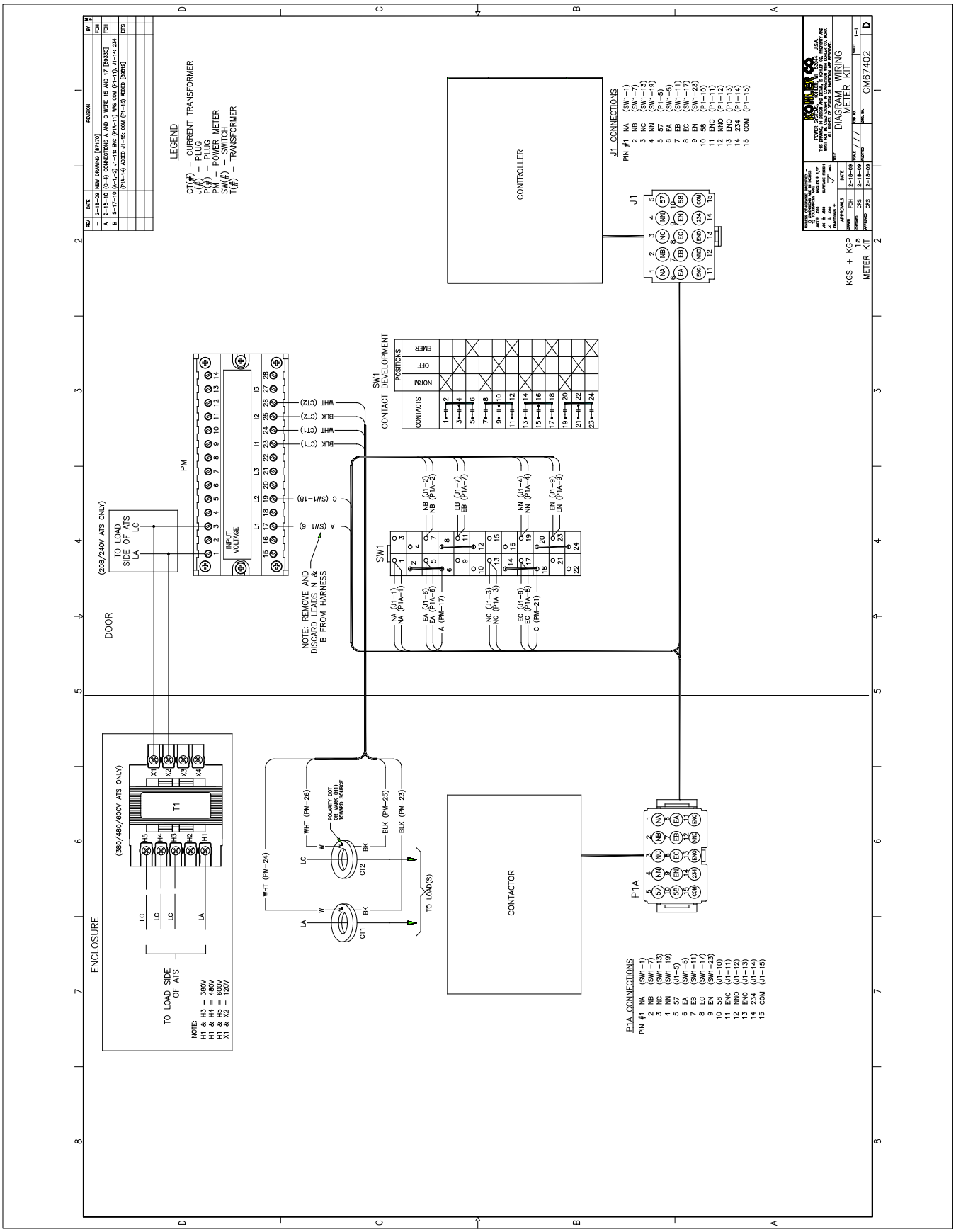



**Figure 21** Wiring Diagram, Single-Phase Models KGS/KGP, GM67402

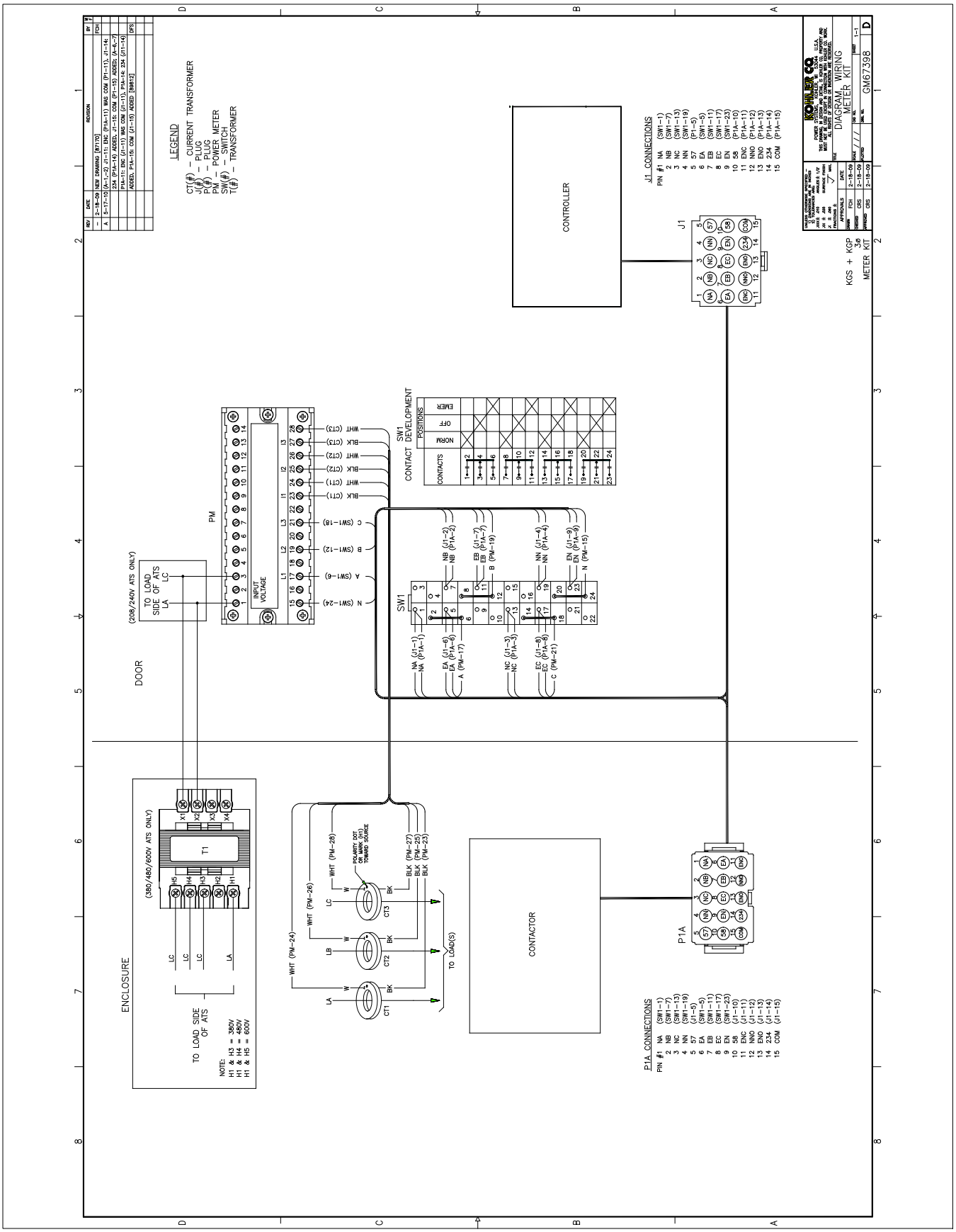



**Figure 22** Wiring Diagram, Three-Phase Models KGS/KGP, GM67398

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# Current Transformer (CT) Parts List

The digital meter is factory-installed on the transfer switch. The installer must install the current transformers (CTs) on the load leads as shown in the wiring diagram. The following parts list shows only the CT part numbers.

The digital meter kit number is shown on the ATS nameplate.

| Meter Kit Numbers | CT Part Number | CT Description | CT Qty. |
|---|---|---|---|
| GM67267-KA1, KA3, KA9, KA11, KA13, KA15, KA41, KA43<br>GM67268-KA1, KA3<br>GM67269-KA1<br>GM92145-KA1 | 246886 | 150:5 | 2 |
| GM67267-KA2, KA4, KA10, KA12, KA14, KA16, KA42, KA44<br>GM67268-KA2, KA4<br>GM67269-KA2, KA4<br>GM92145-KA2, KA4 | 246886 | 150:5 | 3 |
| GM67269-KA3<br>GM92145-KA3 | 246885 | 100:5 | 2 |
| GM67267-KA5, KA7, KA17, KA19, KA45, KA47, KA49, KA51<br>GM67268-KA5, KA7<br>GM67269-KA5, KA7<br>GM92145-KA5, KA7 | 248874 | 400:5 | 2 |
| GM67267-KA6, KA8, KA18, KA20, KA46, KA48, KA50, KA52<br>GM67268-KA6, KA8<br>GM67269-KA6, KA8<br>GM92145-KA6, KA8 | 248874 | 400:5 | 3 |
| GM67267-KA21, KA23, KA29, KA31, KA53, KA55<br>GM67268-KA9, KA11<br>GM67269-KA9, KA11<br>GM92145-KA9, KA11 | 291546 | 1000:5 | 2 |
| GM67267-KA22, KA24, KA30, KA32, KA54, KA56<br>GM67268-KA10, KA12<br>GM67269-KA10, KA12<br>GM92145-KA10, KA12 | 291546 | 1000:5 | 3 |
| GM67267-KA25, KA27 | 297148 | 600:5 | 2 |
| GM67267-KA26, KA28 | 297148 | 600:5 | 3 |
| GM67269-KA13, KA15 | 291547 | 1500:5 | 2 |
| GM67267-KA33, KA34<br>GM67268-KA13, KA14<br>GM67269-KA14, KA16<br>GM92145-KA13, KA14 | 291547 | 1500:5 | 3 |
| GM67269-KA17, KA19 | 291548 | 2000:5 | 2 |
| GM67267-KA35, KA36<br>GM67268-KA15, KA16<br>GM67269-KA18, KA20<br>GM92145-KA15, KA16 | 291548 | 2000:5 | 3 |
| GM67269-KA21, KA23 | 297675 | 3000:5 | 2 |
| GM67267-KA37, KA38<br>GM67268-KA17, KA18<br>GM67269-KA22, KA24<br>GM92145-KA17, KA18 | 297675 | 3000:5 | 3 |
| GM67267-KA39, KA40<br>GM67268-KA19, KA20<br>GM92145-KA19, KA20 | 297676 | 4000:5 | 3 |
| GM67267-KA57, KA58 | 297756 | 1200:5 | 3 |

**Figure 23** Current Transformers

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.