Owner's Manual

GenMax Load Balancing Controllers rated for subpanels and whole services, single phase, 120 Vac, w/automatic generators & automatic transfer switches

DANGER

DANGER is used in this manual to warn of risk of electrical shock from high voltages capable of causing shock, burns or death.

WARNING

WARNING is used in this manual to warn of possible personal injury.

CAUTION

CAUTION is used in this manual to warn of possible equipment damage.

Installation should be performed by a licensed electrician and in accordance with the National Electrical Code (NEC) and all local electrical code requirements. Read and understand all instructions before installing, servicing, or operating. **Failure to do so could result in serious personal injuries or property damage.**

ADVANCED CONTROL SYSTEMS LLC Manalapan New Jersey 07726 USA
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3-2-841-22 A

Advanced Control Systems LLC GenMax controllers are intended for use only in optional standby systems in accordance with the National Electrical Code, NEC/NFPA 70, Article 702. This controller is for use with automatic start generators and automatic transfer switches. For other applications contact Advanced Control Systems LLC for suitable products.

Rating Label

Each controller has rating labels to define the loads and withstand ratings. Refer to the labels on the controller for specific values.

Nameplate

The nameplate includes data for each specific Advanced Control Systems LLC GenMax controller. Use the controller only within the limits shown on this nameplate. A typical Catalog Number is also shown below with its elements explained:

ADVANCED CONTROL SYSTEMS LLC

GenMax Load Shedding Controller

GMIII-2-8-D-1-LB
Electrical Ratings
Generator: 120VAC/2.6A/60Hz
Utility: 120VAC/2.6A/60Hz

Reference
Schematics: Electrical Schematics
User Manual: Owner's Manual GenMax

Catalog number

GM III 2 8 D 1 LB

- GM — product designation
- III — series I, II, II,etc.
- 2 — poles: 2 = 2 lines, 3 = 3 lines
- 8 — outputs: 8=9 outputs
- D — voltage code: A=208, B=220, C=230, D=240, E=380, F=400, G=415, H=440, J=460, K=480, L=550, M=575, N=600
- 1 — enclosure: 1 = Type 1
- LB — sensing: FS = frequency, LB = load balance current

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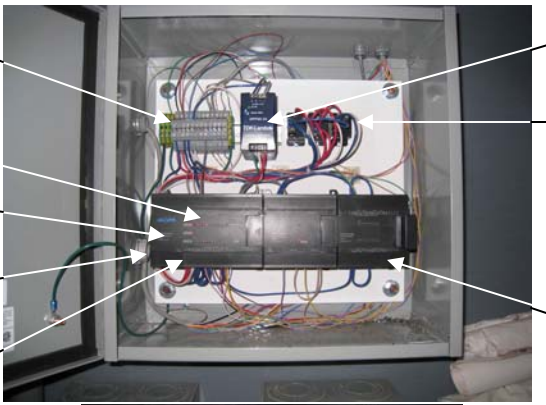
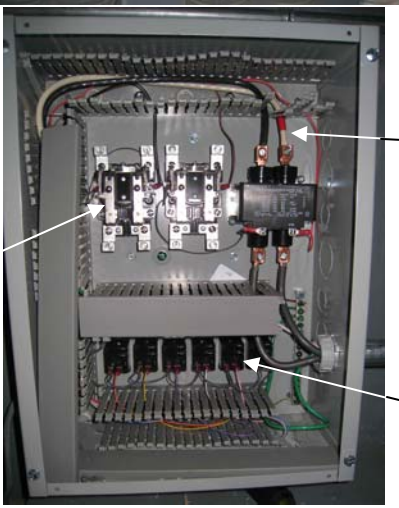
GenMax System Controller (typical)





SPECIFICATIONS

ENCLOSED CONTROLLER CABINET

Enclosure Size:

Type 1 ..... 12" H x 12" W x 4" D
(305 mm H x 305 mm W x 102 mm D)

CONTROLLER

Voltage .....120 VAC
Phase 1-Phase
Frequency.....50/60 Hz
Rating..... 2.6A
Fuse .....6A Time Delay

GenMax Power Supply:
Voltage .....85~264 VAC
Frequency.....50/60 Hz
Current 1.0A (AC110V)
Output Power Supply Voltage/Current.....
..... DC24V/0.2A
Power indicator..... ..... PWR LED On when power is normal

Base Unit Outputs:
Number output points 4
Insulation method..... relay insulation
Rated load voltage/current DC24V/2A, AC220V/2A
Mechanical life..... More than 20,000,000
Electrical Life..... . .....100,000 or more @ rated voltage/current
Operating indicator .....LED on at ON state of output

CONTROLLER (cont.)

Input Points:
Number of input points 6
Rated input voltage ..... DC 24V
Rated input current .....4 mA
Operating voltage range ..... DC20.4~28.8V
Operating indicator.... .....LED on at ON state of input

Time Delays (each Phase):
Load Shed Current (85% of rated).....
..... Adjustable
Load Drop Current (95% of rated).....
..... Adjustable
Load Restore Timing..... Adjustable

24VDC Power:
Input Voltage..... 100~240VAC
Frequency..... 47~63Hz
Voltage Adjust..... 21.6-26.4
Rated Input ... 1.5A/115VAC(0.75A/230VAC)
Current Output.....2.0A
Power 48W
Over current Protection..... 105-150% rated output power
LED Indicator.....Green LED = ON

Base/Expansion Outputs:
Number output points..... 5
Power supply voltage..... 12-24V AC/DC
Power consumption ..... 50mA@24VDC
Insulation method ..... relay insulation
Rated load voltage/current..... DC24V/2A, AC125V/0.5A

INTRODUCTION

INTRODUCTION

Advanced Control Systems LLC controllers are intended for use only in optional standby systems in accordance with the National Electrical Code, NEC/NFPA 70, Article 702.

This GenMax II controller is intended for standby power applications in residential, commercial or industrial use only.

WARNING

The GenMax II controller is not for emergency or life-support systems.

This product is not intended for emergency or life-support systems.

If you have more stringent application requirements contact Advanced Control Systems LLC for other products suitable for critical applications.

The backup generator controller helps provide safe operation of an alternate source (generator) that is connected to a preferred source (utility) through an approved Underwriter's Laboratories automatic transfer switch. The controller provides continuous load shedding and restoration of circuits and monitoring of the generator power source. The controller prevents generator overload and complete generator shutdowns.

INSTALLATION

Installation of the Advanced Control Systems LLC GenMax controller cabinet must be performed by a licensed electrician. It must be installed according to the National Electric Code and all local and electrical code requirements. Refer to the electrical schematics.

CAUTION

MALFUNCTION or SHORTENED LIFE

Protect the unit from construction grit and metal chips to prevent malfunction or shortened life.

Open the enclosure cover and inspect the unit for shipping damage. If damage is evident do not install the unit. Type 1 enclosures are for indoor use only (refer to local codes for Type 1 use). Mount the controller vertically to a rigid supporting structure. Level all mounting points with a flat washer behind the holes to avoid distortion of the enclosure.

TYPICAL INSTALLATION

A typical installation is shown on the next page for a main circuit panel. It is best to mount the relay panel that houses the power relays as close as possible to the main power distribution panel. The GenMax controller can be mounted at a remote location.

INSTALLATION (cont.)

ELECTRICAL CONNECTIONS

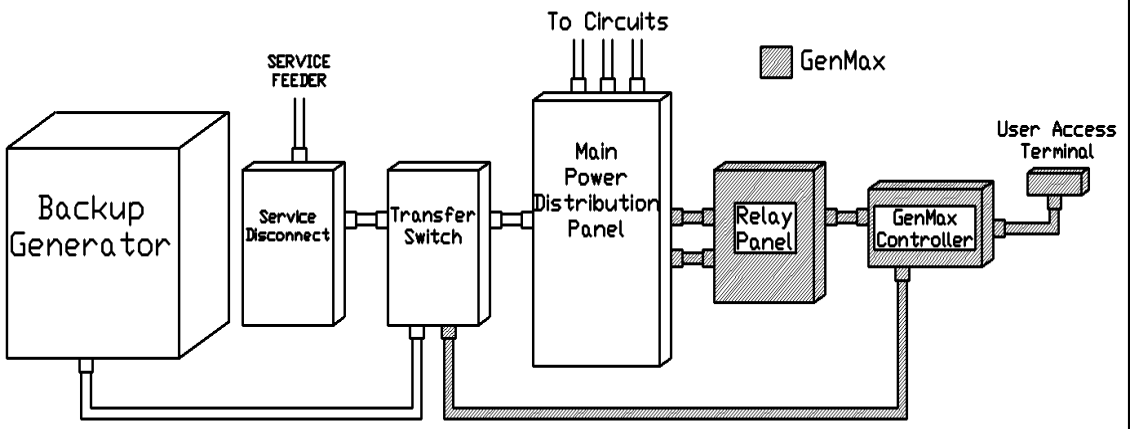
Installation and wiring must be performed by a licensed electrician in accordance with the National Electrical Code (NEC) and all local electrical code requirements.

The controller must be protected by the fuses provided when feeding the normal and generator (alternate source) power terminals. The ratings of the fuses are based on the requirements of the National Electrical Code for its nameplate ampere and short circuits withstand ratings. See the wiring schematic provided with the unit.

Enclosure conduit entry must be made for the electrical connections as follows:

For the Generator & Utility/Normal Power Connections
Drill or knockout one hole for 1/2" conduit on the top of the enclosure. The center of the hole must be 3/4" from the rear and 3/4" from the LEFT side of the enclosure.

For the Generator & Transfer Switch Signals and the Relay Cabinet Connections
Drill or knockout two holes for 1/2" conduit on the top of the enclosure. The center of the holes must be 3/4" from the rear and 3/4" & 2-1/4" from the RIGHT side of the enclosure.

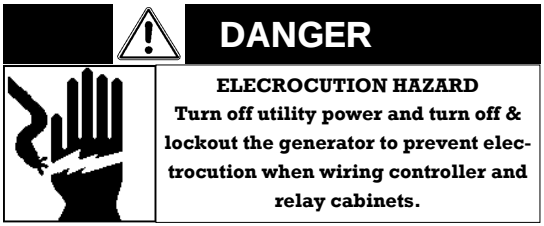


Typical Installation on Main Circuit Panel.

INSTALLATION (cont.)

FIELD INSTALLED CONDUCTOR WIRING

All field installed conductors running from the generator or transfer switch to the GenMax controller must be insulated for the maximum voltage of either circuit. Field installed conductors used for low voltage signals as well as power connections must be rated for maximum voltage of either circuit. For example, 300V rated wiring must be used to run Generator & Transfer Switch signals (i.e. economical Honeywell Type 1111, Belden Type 5308UE, romex Type NM cable, THHN or comparable) and 300V rated communications wiring must be used (i.e. 300V 4-pair CAT5E cable, economical Honeywell Type 5078, Belden Type 1583R, or comparable).



GENERATOR & UTILITY POWER CONNECTIONS

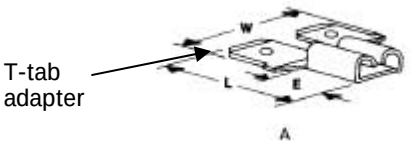
Installation and wiring must be performed by a licensed electrician in accordance with the National Electrical Code (NEC) and all local electrical code requirements.

Make all connections in the generator and transfer switch with the power turned off and locked out. Turn off the main service entrance breaker or disconnect switch. Make sure the generator battery is disconnected and verify that the ignition switch is in the OFF position. Lock or lockout the generator or generator enclosure door.

TERMINALS/TABS

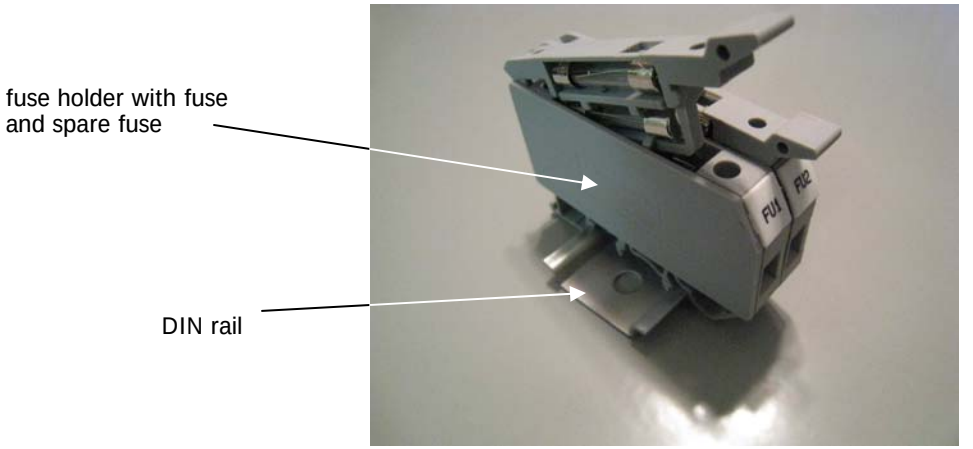
Locate a suitable location to tap the generator and utility power connections. For example, some generators have utility power terminals in the generator along with the generator power. Other manufactures have quick connect terminals for the generator and utility power located in the transfer switch. Whether these are terminals or tabs coming off of the main terminal lugs, use the appropriate size terminations. Fork or ring terminals can be used or T-tab adapters, to connect a new feed for one phase of the generator and one phase of the utility power supplies.

Run a minimum 18AWG 300V wire from the generator and utility power sources to the fuse blocks and terminate the wires. Make sure to replace any terminations that were removed during the installation of the power feeds. Refer to electrical schematics provided with the unit for proper connections.



GENERATOR & UTILITY POWER CONNECTIONS (CONT.)
FUSE BLOCKS

Mount the fuse blocks in a suitable enclosure or inside the enclosure of the transfer switch or generator cabinet. Mount the DIN rail inside the enclosure. Drill two (2) 11/64" diameter holes and use self-tapping 1/2" x 10-32 screws or drill two (2) 5/32" diameter holes and use 1/2" x 10 -24 tri-lobe screws. Separate the holes to prevent the DIN rail from twisting. Mount the two (2) fuse blocks and one (1) end plate on the DIN rail by snapping them into place. Seat one end of the fuse block on the DIN rail before pressing the other end down until it snaps in place. The end plate is mounted to cover the open side of the last fuse block. See diagram below for reference. Insert the two (2) fuses into the fuse blocks and the two (2) spares into the plastic holders above each fuse block.



CAUTION

CONTROLLER DAMAGE. Observe polarity when connecting the power wires to the controller. Refer to electrical schematics.

GENERATOR & UTILITY POWER CONNECTIONS (CONT.)
CONTROLLER POWER FEEDS

Run a minimum 18AWG 300V rated wire from the fuse blocks to the controller (i.e. economical Honeywell Type 1119, Belden Type 5304UE, 14-3 romex Type NM cable, THHN or comparable). Run four (4) wires total between the fuse blocks and the controller. Run two (2) wires from the fuse blocks, one (1) wire from the neutral and one (1) wire from ground. Enter the control cabinet through the LEFT side opening and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit.

INSTALLATION (cont.)

DANGER

ELECROCUTION HAZARD
Turn off utility power and turn off & lockout the generator to prevent electrocution when wiring controller and relay cabinets.

GENERATOR & TRANSFER SWITCH SIGNALS

Installation and wiring must be performed by a licensed electrician in accordance with the National Electrical Code (NEC) and all local electrical code requirements.

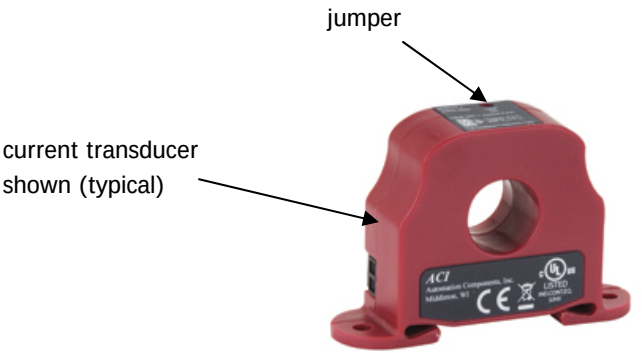
GENERATOR & TRANSFER SWITCH SIGNALS (CONT.)
CURRENT SENSE SIGNALS

Current Transducers

Mount the current transducers in a suitable enclosure or inside the enclosure of the transfer switch or generator cabinet. Find a convenient location to route the generator power wiring through the current transducers. Route the wiring through the center of the current transducer. The direction through the current transducer does not matter. Re-install the generator power wires if they were removed during installation of the current transducers. Note the phase of the current transducers for later connection to the controller, i.e. Phase A & B. Run 300V wiring from the current transducers to the controller (i.e. economical Honeywell Type 1111, Belden Type 5308UE, romex Type NM cable, THHN or comparable). Run three (3) wires between the current transducers and the and the controller. Run one (1) wire as a common and the other two (2) for each current transducer signal. Enter the control cabinet through one of the RIGHT side openings and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit. Connect the other side of the wires to the current transducers according to the electrical schematics that come with the unit.

Current Transducer Jumper Settings

Insert the field selectable jumper corresponding to the rated amps of the generator. For example, for a 0-100/200/250A current transducer, no jumper 0-100A, Mid position 0-200A, and High position for 0-250A. The corresponding current transducer configuration constants should be verified or set via the User Access Terminal or configuration software, refer to the UAT Operating & Setup Guide or GenMax Configuration Software respectively.



GENERATOR & TRANSFER SWITCH SIGNALS (CONT.)

AUXILIARY SIGNALS

The system requires signals from the transfer switch and generator to indicate a transfer to emergency power, utility/normal power and that the generator is running. The signal from the transfer switch to indicate transfer to emergency power is a safety circuit in case the utility/normal power drop signal is not transmitted due to overvoltage, slight voltage drop or low frequency. In this case, the transfer signal will initiate the load shed. Additionally, a fault signal from the generator and/or transfer switch is optional.

Transfer Signal

Run a set of 300V rated wires from an auxiliary set of transfer switch transfer contacts (normally open) to the controller (i.e. economical Honeywell Type 1111, Belden Type 5308UE, romex Type NM cable, THHN or comparable). These contacts should close on transfer to emergency power. Before wiring the transfer switch transfer contacts refer to the manufacturer's installation manual for requirements. Enter the control cabinet through one of the RIGHT side openings and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit.

Utility/Normal Power Signal

Run a set of 300V rated wires from an auxiliary set of utility/normal power contacts (normally open) to the controller (i.e. economical Honeywell Type 1111, Belden Type 5308UE, romex Type NM cable, THHN or comparable). These contacts should close when utility/normal power is present. Before wiring the utility/normal power contacts refer to the manufacturer's installation manual for requirements. Enter the control

Utility/Normal Power Signal (cont.)

cabinet through one of the RIGHT side openings and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit.

Generator Run Signal

Run a set of 300V rated wires from the generator run contacts (normally open) to the controller (i.e. economical Honeywell Type 1111, Belden Type 5308UE, romex Type NM cable, THHN or comparable). These contacts should close to indicate the generator is running. Before wiring the generator run contacts refer to the manufacturer's installation manual for requirements. Enter the control cabinet through one of the RIGHT side openings and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit.

Generator Fault Signal (Optional)

Run a set of 300V rated wires from the generator fault contacts (normally open) to the controller (i.e. economical Honeywell Type 1111, Belden Type 5308UE, romex Type NM cable, THHN or comparable). These contacts should close on a generator fault. As an option, normally open transfer switch fault contacts could be used. (Note: if both are used they should be wired in series). Before wiring the fault contacts refer to the manufacturer's installation manual for requirements. Enter the control cabinet through one of the RIGHT side openings and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit.

To access data logging requires the connection of the User Access Terminal (UAT). For each occurrence the date-time among other data is recorded, i.e. transfer start-end plus other data, generator run start-end, and fault activation-clearing.

RELAY CABINET CONNECTIONS

Installation and wiring must be performed by a licensed electrician in accordance with the National Electrical Code (NEC) and all local electrical code requirements.

DANGER

ELECROCUTION HAZARD
Turn off utility power and turn off & lockout the generator to prevent electrocution when wiring controller and relay cabinets.

RELAY CABINET CONNECTIONS (CONT.)

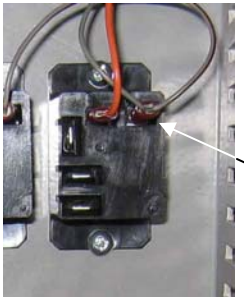
LOCAL RELAY CABINET CONNECTIONS (Low Voltage)

Determine all the circuits that will be controlled by the system. Enough circuits need to be controlled in order to prevent generator overload when all the controlled circuits are OFF. Based on the number of controlled circuits the corresponding number of relays should be supplied in the relay cabinet. Ensure that all circuit ampere ratings do not exceed the maximum specifications for the corresponding power relays.

GenMax Controller to Power Relay Wiring

Route 300V rated wiring between the controller and local relay cabinet (i.e. economical Honeywell Type 1111, Belden Type 5308UE, romex Type NM cable, THHN or comparable). Enter the control cabinet through one of the RIGHT side openings and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit. Connect the other end of the wiring to the power relay coils in the Local Relay Cabinet according to the electrical schematics that come with the unit. These are the low voltage connections to ***ENERGIZE*** (pick-up) each of the power relay coils. One wire will be used as a common, the remaining wires are for each coil.

Terminations on the relay coils can be accomplished with quick connect crimp terminals for the single-pole 20A relays (use 0.187" tab type, i.e. Tyco AMP PIDG #640917 22-18AWG or comparable). For larger power relay coils screw terminals are provided for convenient fork or spade crimp terminal connection. All wiring and terminations must be in accordance with the National Electrical Code (NEC) and all local electrical code requirements. The ratings of the wiring and terminations must be based on the requirements of the National Electrical Code for its voltage and current ratings. See the wiring schematic provided with the unit.



terminate the low voltage wiring on relay coils here (single-pole 20A relays shown with 0.187" tab quick connect terminals)

RELAY CABINET CONNECTIONS (CONT.)

Installation and wiring must be performed by a licensed electrician in accordance with the National Electrical Code (NEC) and all local electrical code requirements.

DANGER

ELECROCUTION HAZARD
Turn off utility power and turn off & lockout the generator to prevent electrocution when wiring controller and relay cabinets.

RELAY CABINET CONNECTIONS (CONT.)

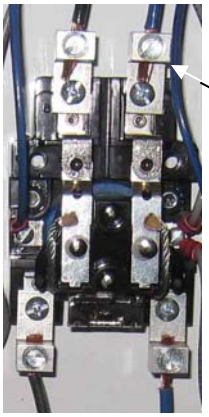
LOCAL RELAY CABINET CONNECTIONS (High Voltage)

Circuit Panel to Local Relay Cabinet

Route sufficient capacity high voltage wires from the circuit panel breakers to the remote relay cabinet to interrupt the circuits with the power relays.

Terminations on the high voltage relay contacts can be accomplished with quick connect crimp terminals for the single-pole 20A relays (use 0.250" tab type, i.e. Tyco AMP PIDG #640907 12-10AWG or comparable). For the larger two-pole power relays/ contactors lugs are provided for direct wire connection. Wiring for the single-pole 20A relays should be between the COM (common) and NC (normally closed) terminals. Wiring for the larger two-pole power relays/contactors should also be between COM and NC terminals if both NO (normally open) and NC terminals are present. Some of the larger two-pole power relays/ contactors are of the NC type so these are the only terminals to wire to. Refer to the specifications on the power relays to determine maximum allowed amperage that can interrupted for a given load. All single-pole power relays are rated for 20A. Two-pole power relays/contactors are available from 20A to over 100A.

All wiring and terminations must be in accordance with the National Electrical Code (NEC) and all local electrical code requirements. The ratings of the wiring and terminations must be based on the requirements of the National Electrical Code for its voltage and current ratings. See the wiring schematic provided with the unit.

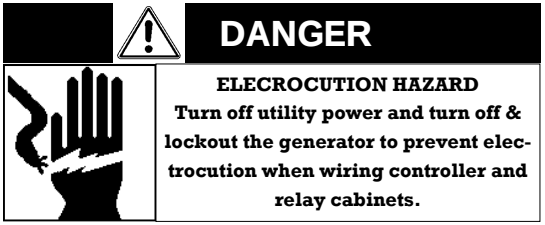


terminate high voltage wiring on lugs provided (two-pole 50A power relay/contactor shown with lugs)

terminate high voltage wiring on relay contacts (single-pole 20A relays shown with 0.250" tab quick connect terminals)

RELAY CABINET CONNECTIONS (CONT.)

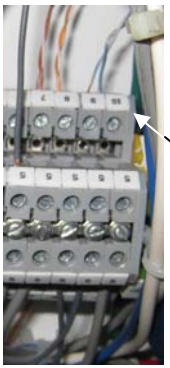
Installation and wiring must be performed by a licensed electrician in accordance with the National Electrical Code (NEC) and all local electrical code requirements.



RELAY CABINET CONNECTIONS (CONT.)

REMOTE RELAY CABINET CONNECTIONS (Low Voltage)

Determine all the circuits that will be controlled by the system. Enough circuits need to be controlled in order to prevent generator overload when all the controlled circuits are OFF. Based on the number of controlled circuits the corresponding number of relays should be supplied in the relay cabinet. Ensure that all circuit ampere ratings do not exceed the maximum specifications for the corresponding power relays.



terminate low voltage CAT5E wiring on the terminal blocks (terminal 4-orange/white-orange twisted pair, terminal 5-brown/white-brown twisted pair, terminal 6-blue wire of twisted pair, terminal 7-white-blue wire of twisted pair, ground terminal-green/white-green twisted pair)

GenMax Controller to Remote Relay Wiring

Route a 300V 4-pair CAT5E cable between the controller and remote relay cabinet (i.e. economical Honeywell Type 5078, Belden Type 1583R, or comparable). Enter the control cabinet through one of the RIGHT side openings and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit. Connect the other end of the wires to the terminals in the Remote Relay Cabinet according to the electrical schematics that come with the unit. Terminals are designated for each of the four (4) pairs of the CAT5E cable. The remote relay cabinet wiring to the power relay coils will come pre-wired. Once the low voltage wiring is completed only the high voltage wiring of the load control power relays remains to be completed.

All wiring and terminations must be in accordance with the National Electrical Code (NEC) and all local electrical code requirements. The ratings of the wiring and terminations must be based on the requirements of the National Electrical Code for its voltage and current ratings. See the wiring schematic provided with the unit.

RELAY CABINET CONNECTIONS (CONT.)

REMOTE RELAY CABINET CONNECTIONS (High Voltage)

Circuit Panel to Remote Relay Cabinet

High voltage Remote Relay cabinet connections are the same as the high voltage Local Relay cabinet connections, refer to high voltage Local Relay cabinet connections in this manual.

INSTALLATION (cont.)

USER ACCESS TERMINAL

User Access Terminal (UAT) Mounting

Remove the UAT enclosure cover and inspect the unit for shipping damage. If damage is evident do not install the unit. Type 1 enclosures are for indoor use only (refer to local codes for Type 1 use). Mount the UAT vertically to a rigid supporting structure. Level all mounting points with a flat washer behind the holes to avoid distortion of the enclosure.

UAT Connections

Run a 300V 4-pair CAT5E cable between the UAT and the controller (i.e. economical Honeywell Type 5078, Belden Type 1583R, or comparable). Enter the control cabinet through one of the RIGHT side openings and terminate the wires in the proper locations in the controller according to the electrical schematics that come with the unit. Connect the other end of the wires to the terminals on the UAT according to the electrical schematics that come with the unit.

4.1" LCD User Access Terminal

FUNCTIONAL TEST

After installing the GenMax controller cabinet perform the following functional test.

1 - VOLTAGE CHECKS

The GenMax controller cabinet is rated for 120Vac at 60 Hz (as stated on the nameplate). Verify that both your utility and alternate sources (generator) are also 120Vac nominal, 60 Hz. See the electrical schematics.

WARNING

PERSONAL INJURY HAZARD

Install front covers of transfer switch and load centers before operation. An electrical system fault could cause a flash and cause injury.

2 - ELECTRICAL OPERATION

This procedure checks the electrical operation of the controller. If the actual operation does not follow this procedure, consult the *Troubleshooting* section. This procedure assumes the controller is configured for the correct sensing using a current transducer and a transfer switch transfer signal plus utility/normal power contact drop to initiate a transfer. If the controller is configured differently, the test procedure may vary. Contact technical support for further information.

Note: to verify configuration access the constant adjustment screen through the UAT and check constant #50 is set to 0 for load balancing controller and constant #52 is set to 1 for normal power signal is used.

FUNCTIONAL TEST (cont.)

Before operating the generator and transfer switch refer to the manufacturer's owner's manuals for requirements. Generator and Transfer Switch operation vary by manufacturer.

1. Transfer Simulation (Generator and Transfer Switch will not operate during simulation)

   Install the Generator, Transfer Switch, GenMax controller, Local and Remote relay panel covers and any other covers that were removed during installation and tighten the screws.

   Access the "Transfer Test" screen using the User Access Terminal (UAT). RUN the Transfer test. Refer to the UAT operating & setup instructions for entering passwords and accessing screens. As soon as the simulation starts observe the power relays. All the power relays should ***ENERGIZE*** (pick-up) and drop power to the circuits through the normally closed relay contacts.

   After a time delay (default:24s, adjustable) from when the simulation started the circuits will begin to turn on in priority order. Verify the power relays ***DE-ENERGIZING*** (dropping) and providing power to the circuits through the normally closed relay contacts. If the power relays do not ***ENERGIZE*** (pick-up) or ***DE-ENERGIZE*** (drop) then a malfunction has occurred with the controller (consult the *Troubleshooting* section).

3. Apply Generator Power Under Load Test

   Refer to the manufacturer's owner's manuals for requirements. For generator test under load, some generator and transfer switch manufacturers require the generator and utility main circuit breakers to be OFF/OPENED and the transfer switch to be manually switched to the emergency position before starting the generator.

   Once the generator starts and runs, the main generator circuit breaker is turned ON/CLOSED and power is provided to the loads. This operation will suffice for this test. For generators and transfer switches with a ***Test*** feature, skip to the section for ***Test*** feature to begin the test.

   The light on the transfer switch indicates that the generator is running and that its output voltage and frequency are acceptable. Under typical conditions, the light should come on after anywhere from 3 to 10 seconds. If the generator is running and fails to produce the proper voltage and frequency after 60 seconds then a malfunction has occurred (consult the *Troubleshooting* section of the generator manufacturer's owner's manual).

Test feature

For generators and transfer switches with a ***Test*** feature, i.e. Kohler, Generac, verify that the generator battery is connected and that the generator's starting controls are set for automatic.

Turn ON the utility and generator circuit breaker. Verify that the UTILITY power source light is on.

FUNCTIONAL TEST (cont.)

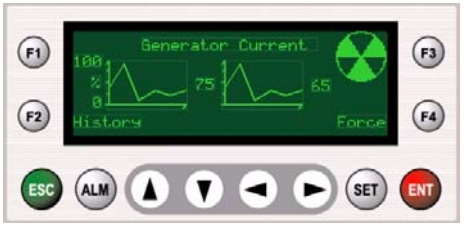
3. (cont.)
   Start the generator and transfer to emergency power using the transfer switch ***Test*** feature. Press and hold the ***Test*** button until the generator power source light comes on and stays on. Continue to hold the button. Holding the ***Test*** button for more than 6 seconds will start the generator and complete the transfer (Kohler only).

   For some transfer switches anywhere from 5 to 15 seconds after the ***GENERATOR*** (alternate source) acceptable light comes on, the transfer switch automatically transfers the load from the utility to the generator. Indicators come on to show that the ***TRANSFER SWITCH*** is connected to the generator (alternate source) power.

4. Controller Circuit Restoring
   After a time delay (default:24s, adjustable) from when the simulation started the circuits will begin to turn on in priority order. Verify the power relays ***DE-ENERGIZING*** (dropping) and providing power to the circuits through the normally closed relay contacts. If the power relays do not ***DE-ENERGIZE*** (drop) in priority order then a malfunction has occurred with the controller (consult the *Troubleshooting* section).

5. Current Sensing

   Monitor the current in each phase by accessing the main overview screen. Verify the current in each phase using a clip-on amperage probe. If the current in each phase does not match what is displayed on the screen then a malfunction has occurred with the controller (consult the *Troubleshooting* section). Note: the main display indicates current as a percentage (%) of generator rated amps.



6. Load Shed & Restore

   When the generator loading causes the current in a phase to rise above the middle frequency set point (default:85% of rated current, adjustable) for a time period the controller will begin to shed circuits at the rate of one (1) every time period (adjustable) until the condition is satisfied. When the generator current in a phase rises above the max set point (default:95% of rated current, adjustable) for a time period then the controller will shed all of the circuits immediately. The controller will restore circuits at the rate of one (1) every time period (adjustable).

   Force circuits ON and OFF using the Force screens. Verify that each circuit is correctly identified in the controller and that each circuit is in the correct phase by monitoring the current when the circuit is forced ON and OFF, i.e. use a heat gun or hair dryer plugged into a controlled receptacle to view a change in current in the correct phase.

FUNCTIONAL TEST (cont.)

6. (cont.)

   Place test loads on a circuit or circuits to force the generator current above 85% and observe the controller shedding circuits. If the power relays do not ***ENERGIZE*** (pick-up) to shed loads then a malfunction has occurred with the controller (consult the *Troubleshooting* section). Remove the test loads and observe the controller restores circuits.

   To complete the test set the main breaker of the generator to the OFF/ OPEN position and let the generator properly cool down and then shut it OFF. With the utility power supply to the transfer switch disconnected, using whatever means provided (such as a utility main line circuit breaker) return the transfer switch to the utility position. Turn ON the utility power to the transfer switch. For generators and transfer switches with a ***Test*** feature, skip to the section for ***Test*** feature to complete the test.

6. (cont.)

   Test feature

   For some generators and transfer switches, the transfer switch stays connected to the generator for a time period (varies from 5~20 minutes) or until you press and hold the ***Test*** button again to stop the test (Kohler only). The load is then automatically transferred back to the utility. To bypass the time delay, press and hold the ***Test*** button for more than 6 seconds (Kohler only).

This completes the *Functional Test*. Proceed to the next section.

OPERATION & TROUBLESHOOTING

INDICATOR LIGHTS

On the front of the controller are LED's that indicate the status of the controller.

O PWR LED

- When on, this light indicates that the status of the power supply to the system is normal.

O RUN LED

- When on, this light indicates operating status of the main unit is in run mode

O ERR LED

- When off, this light indicates the operating status of the CPU is normal. When flickering, this light indicates an error.

O I/O LED

- When on, these lights indicate the operating status of the I/O (inputs/outputs.

OPERATION & TROUBLESHOOTING

This troubleshooting guide describes some of the simple causes of problems with the installation of the controller. **Troubleshooting beyond the scope of this guide should not be attempted by the installer.** A licensed electrician must perform all internal troubleshooting. Advanced Control Systems can be contacted at 973-738-2878 or www.acscompany.net.

DANGER

ELECROCUTION—FLASH HAZARD
Do not work on the controller and relay cabinet until both the utility and generator are off. Turn OFF both circuit breakers.

Problem 1

After the generator starts and a transfer occurs or a Transfer Simulation Test is run all the power relays do not ***ENERGIZE*** (pick-up) disconnecting all the controlled circuits.

- Verify that the **PWR** and **RUN** indicator lights are ON and the **ERR** light is OFF on the controller.

  If the PWR or RUN indicator lights are not ON

  With an accurate AC voltmeter and frequency meter, check the no-load, voltage and frequency from the generator and utility supply:

  Measure across the controller power terminals to Neutral .

  a. Frequency 60-62 Hertz

  b. Normal Power terminal to neutral 120 VAC

  c. Generator Power terminal to neutral 120 VAC

- Verify that one phase of the generator feed is wired to the fuse block number FU1 and the fuse block is wired back to the controller and terminated on the correct terminals.

Problem 1 (cont.)

- Verify that the neutral and ground wires are wired back to the controller and terminated on the correct terminals.
- Verify that the fuse in the fuse block FU1 is not blown.
- Verify that the controller is setup for load balancing by accessing the constant adjustment screen through UAT and checking constant #50 is set to 0 for load balancing.
- Verify the power relays coils are wired correctly. Refer to electrical schematics that came with the unit. Verify the power relays are being powered by testing the voltage at the relay coils, i.e. typically 24VDC.
- If the current shown is incorrect, check the phases are correct and if necessary reverse the low voltage current transducer signal wires feeding back to the controller. Also, verify the circuit or circuits being checked are in the correct phase or phases.
- Verify or set the corresponding constants for generator rated current (#61), current transducer amperage (#65), & current (#66) via the UAT. Verify they jumper setting on the current transducer matches the settings.