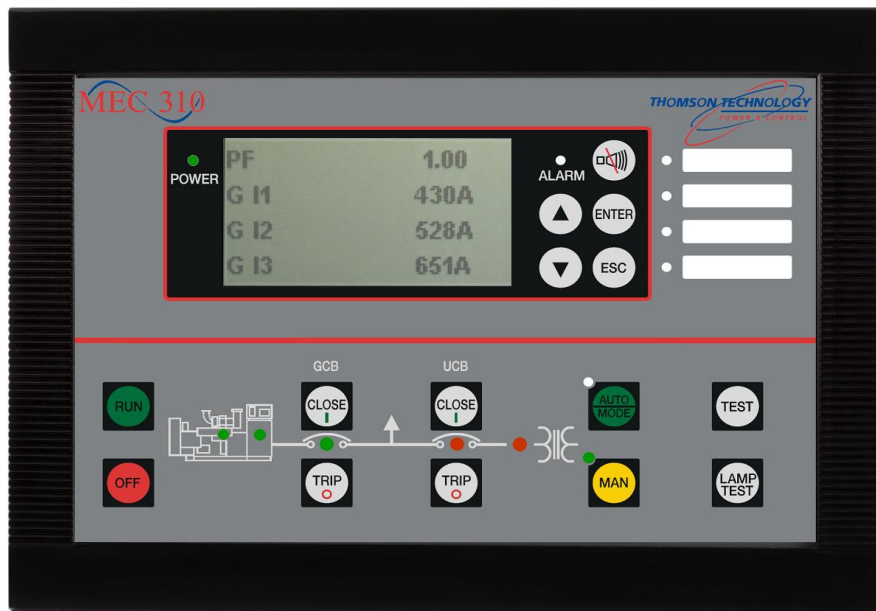


MEC 310

GENSET CONTROLLER

OPERATOR'S MANUAL

Option A – Automatic Mains Failure
 & Island Mode



PM090 Rev 2 10/02/09

This description of options covers the following products:

MEC 310

SW version 1.2X.X

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1. About this document

General purpose

This document is the Operator's Manual for THOMSON TECHNOLOGY's generator controller MEC 310. The document includes information about push-buttons, LEDs, display readings, icon list and basic operational theory.

The general purpose is to give the operator important information to be used in the daily operation of the unit.



Please make sure to read this manual before working with the MEC 310 controller and the gen-set to be controlled. Failure to do this could result in damage to the equipment or human injury.

Intended users

This Operator's Manual is mainly intended for the daily user. On the basis of this document the operator will be able to carry out simple day-to-day procedures.

Contents/overall structure

The document is divided into chapters, and in order to make the structure simple and easy to use, each chapter will begin from the top of a new page.

2. Warnings and legal information

Legal information and responsibility

THOMSON TECHNOLOGY takes no responsibility for installation or operation of the engine/generator set. If there is any uncertainty regarding how to install or operate the engine controlled by the MEC 310, the company responsible for the installation or the operation of the engine/generator set should be contacted.

**The controllers are not to be opened by unauthorized personnel.
If opened / warranty seals broken, the warranty will be void.**

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the MEC 310 controller implies work with dangerous currents and voltages. Therefore, authorized personnel, who understand the risks involved in working with live electrical equipment, should only undertake the installation.



Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

Factory settings

The unit is delivered with certain factory settings. Given the fact that these settings are based on generic values, they are not necessarily the correct settings for matching the individual engine. Therefore precautions must be taken to ensure the suitability of the settings before running the engine. In some cases protection settings may be disabled in an effort to allow the commissioning agent ease of initial startup. As such all alarm/shutdown protection settings must be reviewed to ensure the engine generator set is adequately protected against catastrophic failure.

Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Notes



The notes provide general information, which will be helpful for the reader to bear in mind.

Warnings



The warnings indicate a potentially dangerous situation, which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

3. Push-buttons, LEDs and Display

Dimensions

Front dimensions H x W	160 x 220 mm (6.30" x 8.66")
Unit depth	54 mm (2.13")

Push-Button Functions - Island Controller

The push-buttons on the unit have the following functions:

RUN:
Permits local engine Start/Run. Operation Mode must be in MAN to enable this Push-button.

▲:
Normal Display: Scrolls the display up once.
Program Menu: Increases set point value.

ALARM (Horn icon):
Silences Local Horn and resets horn relay output.
Hold for 2 seconds to display alarm list.

▼:
Normal display: Scrolls the display down once.
Program Menu: Decreases set point value.

ENTER:
Enters value or acknowledges alarm.

ESC:
Escape/Exit from Parameter Menu, Alarm Lists or Event Logs to the Normal Display.

TEST:
Activates the programmed timed test (i.e. timed based off load test).

LAMP TEST:
Activates all LEDs for 3 seconds.

OFF:
Stops the engine immediately.
If the unit is running in AUTO, the operation mode will change to MAN and the engine will immediately stop.

AUTO:
Automatic Operation Mode selector.
Requires a Remote Start Input to Initiate Start/Run Sequence.

MAN:
Manual Operation Mode selector.
Requires RUN Push-button be depressed to initiate Start/Run Sequence

RUN: Permits local engine start and run. Mode Selection must be in MAN to enable this push-button.

OFF: Stops the engine instantaneously. If the unit is in AUTO mode, the mode will change to MAN and the engine will immediately stop.



Note: For Shutdown fault clearing the OFF button **must** 1st be depressed before pressing the ENTER button. If the condition is still present the shutdown is acknowledged and will self-clear when the field device or programming logic permits a return to the none-fail state.

AUTO: AUTO running mode selector.

MAN: Manual Operation Mode selector. Requires RUN Push-button be depressed to initiate Start/Run Sequence

TEST: Initiates the test sequence selected for the push-button. Test type only programmable using TPS300 utility software.

LAMP TEST: Lamp test. One push will illuminate all LEDs for 3 seconds.

ESC: Escape\Exit from Parameter Menu, Alarm Lists, Event Logs or Fault Banner to the Normal Display. Hides pop-up messages.



Resets horn relay. Extra function: Press and hold button 2 sec. to see alarm list.

▲: Normal display: Scrolls the display up once. Programming: Increases set point value.

▼: Normal display: Scrolls the display down once. Programming: Decreases set point value.

ENTER: Enters value/acknowledges alarm.

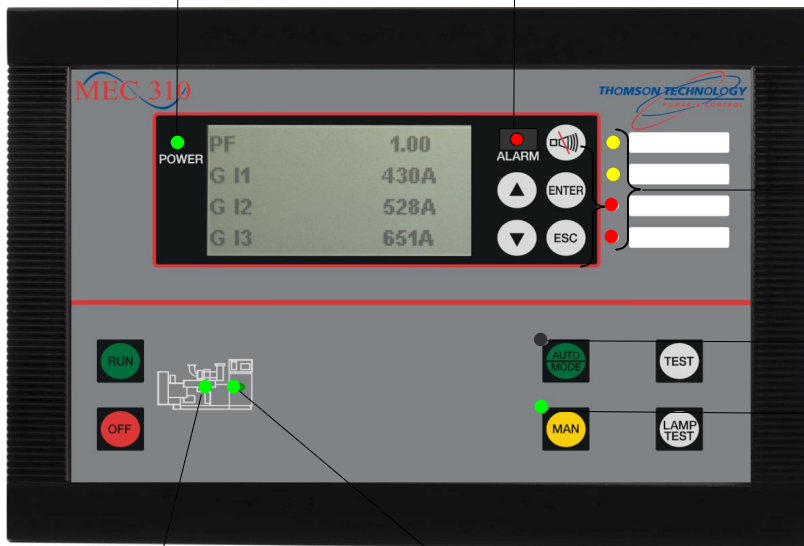
LED Functions

The LEDs provide the following status:

Power LED:
Power OK

Alarm LED:
Flashing: Active, non-acknowledged alarm(s) present.
Steady: Active, acknowledged alarm(s) present.

Red = Shutdown / Amber = Alarm



Additional alarm indication LEDs:
LED on when the configured alarm or condition is present

(For more information, see relay configuration in the "Installation and Operators Manual").

LED ON – Auto Mode selected

LED ON – Manual Mode selected

Running feedback present
(selectable in program)

- Oil Pressure
- Magnetic Pickup
- DC Charging Alternator
- AC Voltage
- AC Frequency

Generator Voltage and Frequency OK

- Illuminates after Voltage & Frequency are within limit for programmed delay (channel 6221)

Power: Power OK indicator.

Alarm LED: Flashing: Active, non-acknowledged alarm(s) present.
Steady: Active, acknowledged alarm(s) present.
Amber: Alarm only condition
Red: Shutdown condition present, alarm condition may be present but shutdowns have higher precedent.

Additional alarm Indication LEDs: Flashing: Active, non-acknowledged alarm(s) where output A or B is configured to LED 1, 2, 3 or 4.
Steady: Active, acknowledged alarm(s) where output A or B is configured to LED 1, 2, 3 or 4.

Running Feedback: Provides crank disconnect or backup means and visual indication of engine running. More than type one can be used at the same time.

Generator Volts/Hz Ok: Illuminates once generator voltage & frequency have been within acceptable limits for a programmed period of time.

AMF Controller (Auto Mains Failure) Optional Feature

The AMF controller has the following push-buttons in addition to the those on the Island Controller:

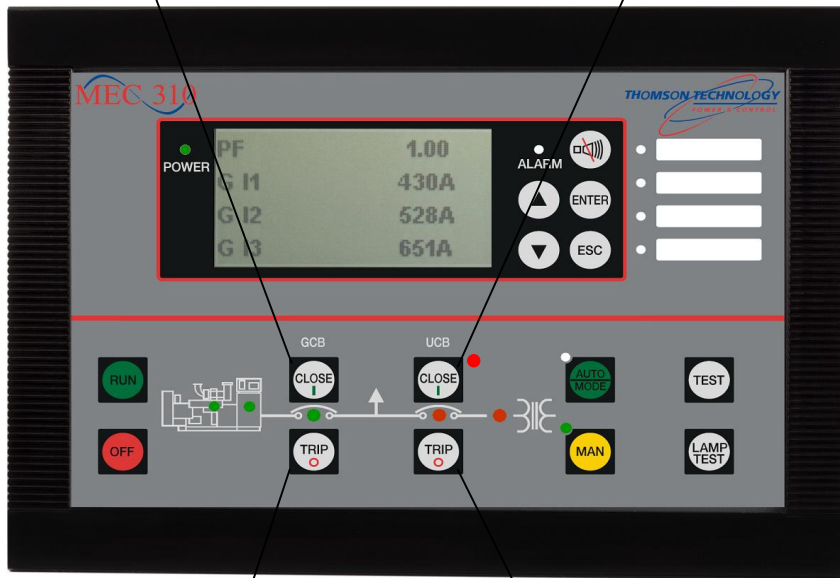
i The AMF breaker control push-buttons are only active in the Manual Operation Mode.

GCB Close Push-button

- Active only when the generator voltage & Hz are within programmed limits, associated delays expired and USB close removed.

UCB Close Push-button

- Always active when the manual mode is selected, not dependant on voltage and Hz within programmed limits



GCB = Generator Circuit Breaker

UCB = Utility Circuit Breaker

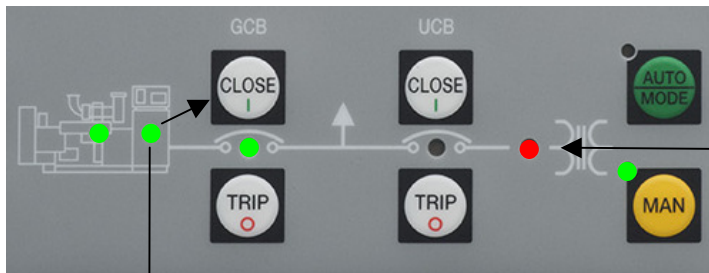
GCB Trip Push-button

- Always active when in Manual Operation Mode.

UCB Trip Push-button

- Always active when the manual mode is selected, not dependant voltage & Hz within programmed limits

AMF Status LEDs



GCB CLOSE, only permitted once Gen Volts & Hz Ok LED illuminates (delay programmable - channel 6221)

Utility Supply Status LED

Flashing Red LED = Utility out of limits delay, inhibit engine start.

Solid Red LED = Utility out of limits delay complete, engine start sequence and transfer blocks removed.

Flashing Green LED = Utility healthy and in Transfer Return Delay.

Solid Green LED = Utility healthy and transfer to generator initiated or complete

i The GCB and UCB breaker status LEDs are only illuminated when the breaker close output contact is closed. When either of the trip push-button is depressed its associated the LED is immediately extinguished.

AMF Push-button/LED Terms & Functions

GCB = Generator Circuit Breaker

UCB = Utility Circuit Breaker

GCB Trip: Generator or automatic transfer switch breaker trip/open push-button. This push-button is always active when the Manual Operation Mode is selected.

GCB Close: Generator or automatic transfer switch breaker close push-button. This push-button is only active if the generator is running, its voltage and frequency are within acceptable limits for the set delay time as defined in programming and the USB Close has been removed (press UCB Trip to remove GCB close inhibit condition).

UCB Trip: Utility or automatic transfer switch breaker trip/open push-button. This push-button is always active when the Manual Operation Mode is selected.

UCB Close: Utility or automatic transfer switch breaker close push-button. This push-button is always active when the Manual Operation Mode is selected. GCB close must be removed to permit operation.



Changing the operating mode from Manual to Auto will not cause operational errors. Making this change will only revert automatic breaker and generator control to the MEC 310. Mode changes can be made at anytime, however if changing from Automatic to Manual all operational sequences must be carried out manually. Automatic generator starting and transferring of essential loads will not occur.

AMF LED Functions

GCB LED: Green LED illuminates when generator circuit breaker is closed.

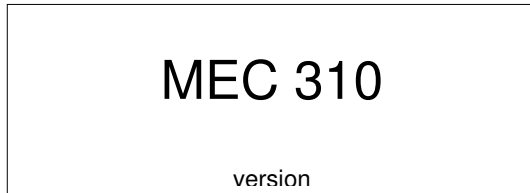
UCB LED: Green LED illuminates when utility circuit breaker is closed.

Utility Supply Status LED: Provides at a glance health status of the utility supply, these are:

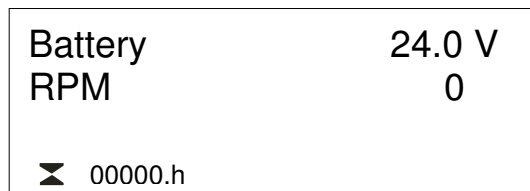
Flashing Red LED	= Utility out of limits delay, inhibit engine start.
Solid Red LED	= Utility out of limits delay complete, engine start sequence and transfer blocks removed.
Flashing Green LED	= Utility healthy and in Transfer Return Delay.
Solid Green LED	= Utility healthy and transfer to generator initiated or complete

Display functions

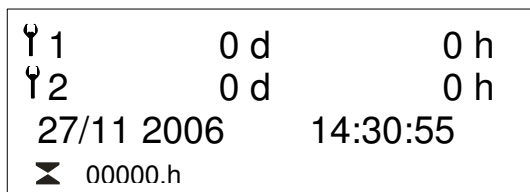
The display indicates both readings and alarms. Illustrated below are examples with icons and English language.



Type and software version.

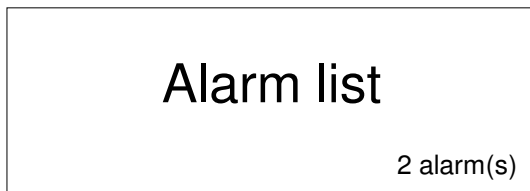


Battery voltage, RPM and running hours counter.

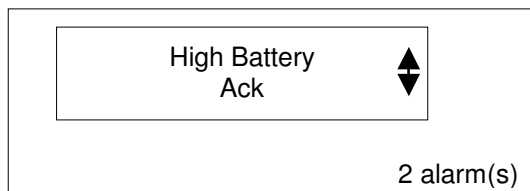


Service timer 1 and 2.

Date and time.



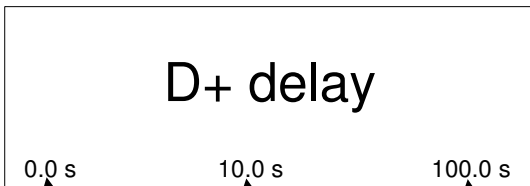
Press to enter the list of active alarms.



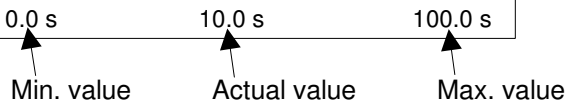
Active alarm list. The alarm list pops up automatically, when an alarm appears. When the arrow is present, more alarms are active. Press to scroll through the list. Exit the list by pressing ESC.



Press to enter the parameter setting.



Parameter example: D+ delay setting. Use or to scroll through the settings list. If change of settings is necessary, press and enter the password. Then use or to change values. Use ESC to leave settings.



The available parameters depend on the set options. Some parameters can only be changed using the TPS 300 software. The parameter list will automatically be abandoned, if no button is pressed during a 30 sec. period.

Disclaimer

Disclaimer



The Product is delivered with certain factory setting. The factory settings are based on typical values and not to be considered acceptable for the equipment it is intended to operate and protect. Thus precautions must be taken to confirm all settings meet the requirements of the equipment being put into service.

Thomson Technology takes no responsibility for the installation or operation of the engine-generator set controls. If there is any doubt about how to install or operate the engine-generator set controlled by this unit, the company responsible for the installation or the operation of the equipment must be contacted.

To better understand the programming and methods of programming please refer to the MEC310 Installation and Operation manual.

4. Basic Operation

Basic Operational Theory



The operation instructions provided are based on the assumption the controller has been previously reviewed, programs modified and the controls and engine generator set commissioned as acceptable for its intended use. It is also assumed the engine generator set is ready to operate and all necessary house keeping has been completed such as, checking oil and coolant levels, all mechanical and electrical fundamentals proven to be in good working order.

Initial Power up and Fault Clearing

On initial power up of the controller it is probable that various alarms or shutdowns may be presented. These will need to be cleared prior to placing the equipment into service or operation.

Fault alarms can **only** be cleared if the alarm message appears on the display, the field device causing the fault has returned to the non-fail state or the associated alarm is programmed to be ignored during initial start up (bypassed on start) and the ENTER push-button depressed. If the field device remains in its fault state during the reset process and its fault condition is not programmed to be ignored during initial start up pressing the ENTER push-button will only result in acknowledging the alarm.



Shutdown states require the OFF push-button be depressed prior to the ENTER push-button to allow fault clearing. This ensures the engine generator set cannot unintentionally restart after the fault is cleared if an automatic start is being requested.



Previously acknowledged alarms or shutdowns will clear automatically when its associate field device returns to its non-fail state.

Shutdown conditions differ from Alarm conditions in that only one shutdown can exist at a time, 1st shutdown in locks out subsequent shutdowns. If multiple shutdowns were permitted it would be impossible to determine which state was the actual cause making troubleshooting a nearly impossible task.

The controller provides a quick reference as to the alarm state level. The alarm LED on the controller can change between an amber or red state. If both alarms and a shutdown are present the LED will be red indicating the highest level of alarm, this being a shutdown condition. When there are only alarms present, the alarm LED will be amber. Multiple alarms are permitted and will be displayed on the alarm list with an up/down arrow advising to scroll through the list to view all. Only the displayed alarm can be cleared, unviewed alarms cannot be cleared unless displayed or previously acknowledged.

A flashing alarm LED is an indication of a new alarm/shutdown, which is unacknowledged. Pressing the ENTER push-button will acknowledge and/or clear the alarm if the associated field device or program permits. If not permitted the alarm LED will change to a solid state, if multiple new alarms are present the LED will continue to flash until all new alarms are acknowledged or cleared.



The Horn Silence push-button only silences the local controller horn and reset the horn relay output, it will not acknowledge or clear alarm states. The MEC310 internal alarm horn must be enabled using M-Logic if desired.



The Horn Silence push-button provides a secondary function, by holding this push-button for greater than 2 seconds the alarm list is displayed.

Manual Operation Mode

Pressing either the **MAN** or **OFF** push-buttons will select Manual Operation Mode.

In the Manual Operation Mode the remote start input is ignored, starting and stopping of the engine generator can only be achieved with the RUN and OFF push-buttons on the left side of the controller.



Once a manual RUN is initiated the engine generator set will continue to operate until manually requested to stop by pressing the OFF push-button (immediately stops without cooldown) or by pressing the AUTO push-button (the cooldown sequence will be initiated prior to the engine stopping), the fuel supply blocked/exhausted or a shutdown action resulting from a protection setting.

With the Manual Operation mode selected, pressing the **RUN** push-button initiates the start sequence.

The **start sequence** is as follows:

1. Preheat delay is posted if programmed (also pre-start delay for preheat, prelube, etc...)
2. Initiate starter motor engagement and cranking of engine.
3. Disengages the starter motor automatically once the speed of the engine rises above the run setpoint. Additional crank and rest cycles are added if the engine fails to start in its first attempt. Fail to Start shutdown protection is activated should the engine not start after the programmed number of attempts has been exceeded.
4. All protection and alarm functions, which were bypassed when not running, are enabled after the engine starts (generally within 10 – 20 seconds of the starter motor being disengaged).
5. Engine generator set continues to operate until requested to stop.

The **stop sequence** is as follows:

1. Press the **OFF** push-button. The engine generator set stops immediately without a cooldown sequence.
2. Press the **AUTO** push-button. The engine generator continues to operate and will include a cooldown sequence before stopping the engine generator set. The stop/cooldown sequence is not initiated until the remote start input is removed.

Automatic Operation Mode

Pressing the **AUTO** push-button selects Automatic Operation Mode.

The start sequence is as follows:

1. When a remote start contact is closed to a binary input configured for remote start the Preheat delay is posted (if programmed).

2. Initiates starter motor engagement and cranking of engine
3. Disengages the starter motor automatically once the speed of the engine rises above the run setpoint. Additional crank and rest cycles are added if the engine fails to start in its first attempt. Fail to Start shutdown protection is activated should the engine not start after the programmed number of attempts has been exceeded.
4. All protection and alarm functions, which were bypassed when not running, are enabled after the engine starts (generally within 10 – 20 seconds of the starter motor being disengaged).
5. The engine generator set will continue to operate until requested to stop.

The **stop sequence** is as follows:

1. When the remote start contact opens the engine generator set will continue to operate for its programmed cooldown period and then stop.



The available parameters depend on the set options. Some parameters can only be changed using the PC utility software (USW) for MEC 310. The parameter list will automatically be abandoned, if no button is pressed during a 30 sec. period.



For detailed information about changing parameters and setup, please see the Installation Instructions in Reference Handbook on CD.

AMF - Manual Operation (Optional Feature)

Pressing either the **MAN** or **OFF** push-buttons selects Manual Operation Mode and enables the AMF breaker control push-buttons.

The **start sequence** for the generator is covered under manual operation mode as previously described.

The following describes the AMF operation utilizing the push-buttons provided:

1. With the engine generator set operational and producing acceptable voltage and frequency the **generator volts/frequency ok LED will illuminate** after a programmed time delay (programmable in TPS300 - channel 6221). Once the V/Hz Ok LED lights and the UCB Trip is given the GCB close push-button inhibit is removed and the GCB Close push-button becomes operational.
2. **Press the UCB Trip push-button** to release the UCB and enable the GCB Close push-button. This action may move the transfer mechanism to the off/open state or have no effect (operation will vary based on logic design).
3. **Press the GCB Close push-button.** This will move the essential load from the utility/mains supply to the generator supply. Note: The GCB LED may light prior to the breaker closing if switch position indication is not used, typically no breaker position feed back is incorporated and the LED follows the output contact action (breaker auxiliary contacts can be monitored, in this case the LEDs will follow the breaker action).
4. The transfer mechanism will remain in this position even if the generator stops for any reason.

The **stop sequence** is as follows:

1. **Press the GCB Trip push-button.** This releases the GCB breaker and enables the UCB Close push-button.
2. **Press the UCB Close push-button.** The transfer mechanism will open the generator breaker and close the utility/mains breaker.
3. **To stop the generator press OFF** after the generator has operated without load for a reasonable period of time. **Alternatively** the Auto Operation Mode can be selected by **pressing AUTO**. With the load on the utility/mains and within proper limits the engine cooldown will be initiated, the generator will continue to run until the cooldown timer expires then stop.

AMF - Automatic Operation

Pressing the AUTO Mode push-button selects Automatic Operation Mode; in Auto Operation Mode the AMF breaker control push-buttons are disabled.

The basic **start/stop sequence** for the generator is covered under automatic operation mode as previously described, the only exception is, the AMF feature starts and stops the engine generator set based on monitoring of the utility/main sensing voltage.

The following describes the automatic AMF operation:

1. On detection of utility/mains out of limits the engine generator starts, once producing acceptable voltage and frequency for a period of time as defined in program the **generator volts/frequency ok LED will illuminate**. (V/Hz delay time is programmable only using TPS300 software - channel 6221).
2. Once the V/Hz Ok LED illuminates the UCB Closed LED will extinguish and the GCB Closed LED will illuminate. This is the indication the transfer mechanism is in transition or transferred to the generator supply.
Note: Breaker auxiliary contacts can be added to permit the LED indicators to only illuminate once the breaker closes.
3. The MEC 310 will maintain generator operation until the load is retransferred to the utility/mains.
4. When the utility/mains voltage returns within acceptable limits the retransfer to utility/mains is inhibited is maintained until the transfer return delay timer has expired. This ensures the load is not returned to an unstable supply. Once the transfer return timer expires, the GCB close is removed and the UCB close permit given.
5. The transfer mechanism moves the essential load from the generator supply to the utility/mains supply.
6. Once the load transfer has occurred the generator continues to run for the programmed cooldown time then stops.

THOMSON TECHNOLOGY reserves the right to change any of the above.