

## Configuration of an Emergency Standby Generator for Mains Fail Transfer

Some facilities have an extreme need for reliable power. These include health care facilities, such as hospitals and nursing homes, as well as manufacturing facilities that could lose valuable product or revenue if power is lost. In these instances, an Auto Transfer Switch and means for detecting a power failure or mains failure is critical.

The DGC-2020 has an internal ATS feature with mains failure detection that allows it to monitor the utility. When the utility fails, the DGC-2020 will open the mains breaker, start the generator, then close the generator breaker to feed the load. When the utility returns and is deemed stable, it will return the load to utility power. When using the Mains Fail Transfer feature, the DGC-2020 will control the breakers to open and close them to achieve the transition from utility power to the generator. Physical inputs also can be configured through logic to implement open and close commands for the generator and mains breakers.

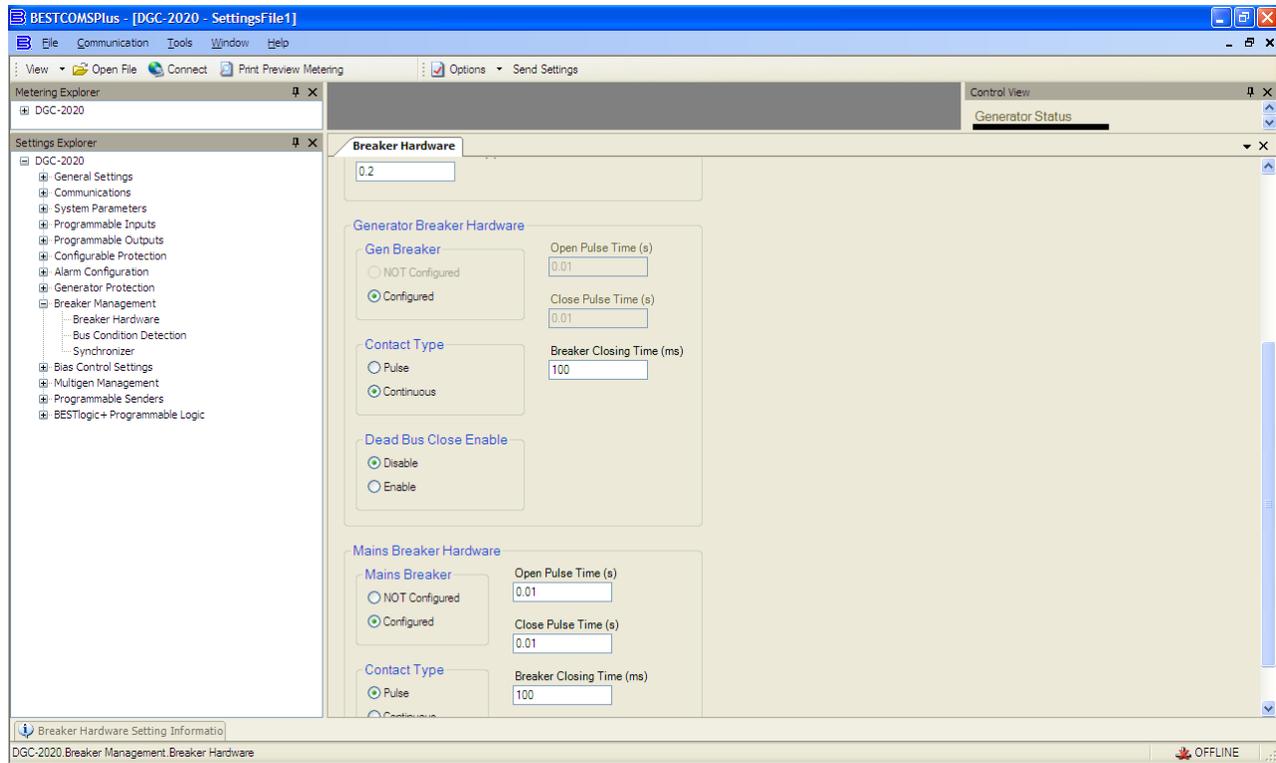
Breaker status for a breaker is communicated to the DGC-2020 **ONLY** by having the breaker element (either generator breaker or mains breaker) in the logic diagram, and a physical input connected to the STATUS input of the applicable breaker block.

When the DGC-2020 controls a breaker, the following criteria must be satisfied for a breaker to change state:

1. A gen or mains breaker cannot be closed unless the generator voltage is stable, and the bus voltage is stable or dead. A breaker will not close to a dead bus unless the Dead Bus Close Enable parameter found in BESTCOMS*Plus* under Settings Explorer->Breaker Management->Breaker Hardware is enabled.
2. A breaker will not change state if it receives conflicting commands. In other words, if a physical input is indicating an open command at the same time another physical input is indicating a close command, the breaker will not change state.

### Steps required to configure a DGC-2020 for mains fail transfer operation:

1. Configure the main and gen breaker parameters under Settings Explorer-> Breaker Management->Breaker Hardware:



*Figure 1: Breaker Hardware Screen*

- a. Set up Mains Fail Transfer Parameters:
  - i. Enable Mains Fail Transfer
  - ii. Set the Transfer and return delays
  - iii. Set the Max Transfer Time. This is the maximum amount of time allowed for the transfer to be accomplished. If this time is exceeded, a mains fail transfer fail pre-alarm will be annunciated.
- b. Set up the Breaker Close Wait Time. This is a time interval in which it is expected that the breaker will transition from open to closed or closed to open. If it does not change state in that time, either a Gen Breaker Close Fail or Gen Breaker Open Fail will be annunciated for Generator breaker failures, and/or Mains Breaker Close Fail or Mains Breaker Open Fail will be annunciated for mains breaker failures
- c. Set up the Generator Breaker Parameters
  - i. Set Dead Bus Close Enable to Enabled.
  - ii. Set the contact type and pulse times, if pulsed contacts are used.
  - iii. Set the breaker close time. This is the time used by the Anticipatory Synchronizer to calculate the advance angle before 0 degrees slip angle at which to issue the breaker close command.
- d. Set up the Mains Breaker Parameters
- e. Set the mains breaker as configured
  - i. Set the contact type and pulse times, if pulsed contacts are used.
  - ii. Set the breaker close time. This is the time used by the Anticipatory Synchronizer to calculate the advance angle before 0 degrees slip angle at which to issue the breaker close command.

2. Set up the Mains Breaker and Gen Breaker in the PLC logic under Settings Explorer->BESTLogicPlus Programmable Logic
  - a. Mains Breaker:
    - i. Drag the Mains Breaker element into the logic diagram.
    - ii. Connect the breaker element open and close outputs to the contact outputs that will drive the breaker.
    - iii. Connect the physical input or remote input that has the breaker status (closed if breaker is closed, open when breaker is open) to the Status input of the breaker element. **THIS IS THE ONLY WAY TO INDICATE BREAKER STATUS TO THE DGC-2020.**
    - iv. If it is desired to have physical inputs that can request breaker open and close commands, connect the desired inputs to the open and close command inputs of the breaker element. Note these are to be pulsed inputs; if they are both closed at the same time, the breaker will not change state. If it is not desired to have inputs for breaker commands, just tie a Logic 0 input object to the open and close command inputs of the breaker block.
  - b. Generator Breaker
    - i. Drag the Gen Breaker element into the logic diagram.
    - ii. Connect the breaker element open and close outputs to the contact outputs that will drive the breaker.
    - iii. Connect the physical input or remote input that has the breaker status (closed if breaker is closed, open when breaker is open) to the Status input of the breaker element. **THIS IS THE ONLY WAY TO INDICATE BREAKER STATUS TO THE DGC-2020.**
    - iv. If it is desired to have physical inputs that can request breaker open and close commands, connect the desired inputs to the open and close command inputs of the breaker element. Note these are to be pulsed inputs; if they are both closed at the same time, the breaker will not change state. If it is not desired to have inputs for breaker commands, just tie a Logic 0 input object to the open and close command inputs of the breaker block.
  - c. Click the save button when the logic is complete
  - d. Click Communication->Upload logic to load the logic into the DGC-2020 if you are connected to it, or save the settings file if you are working off line.

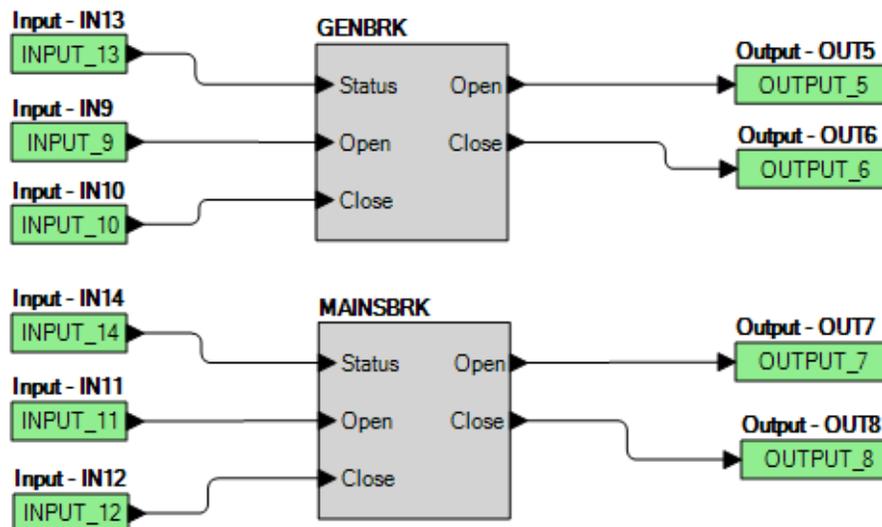
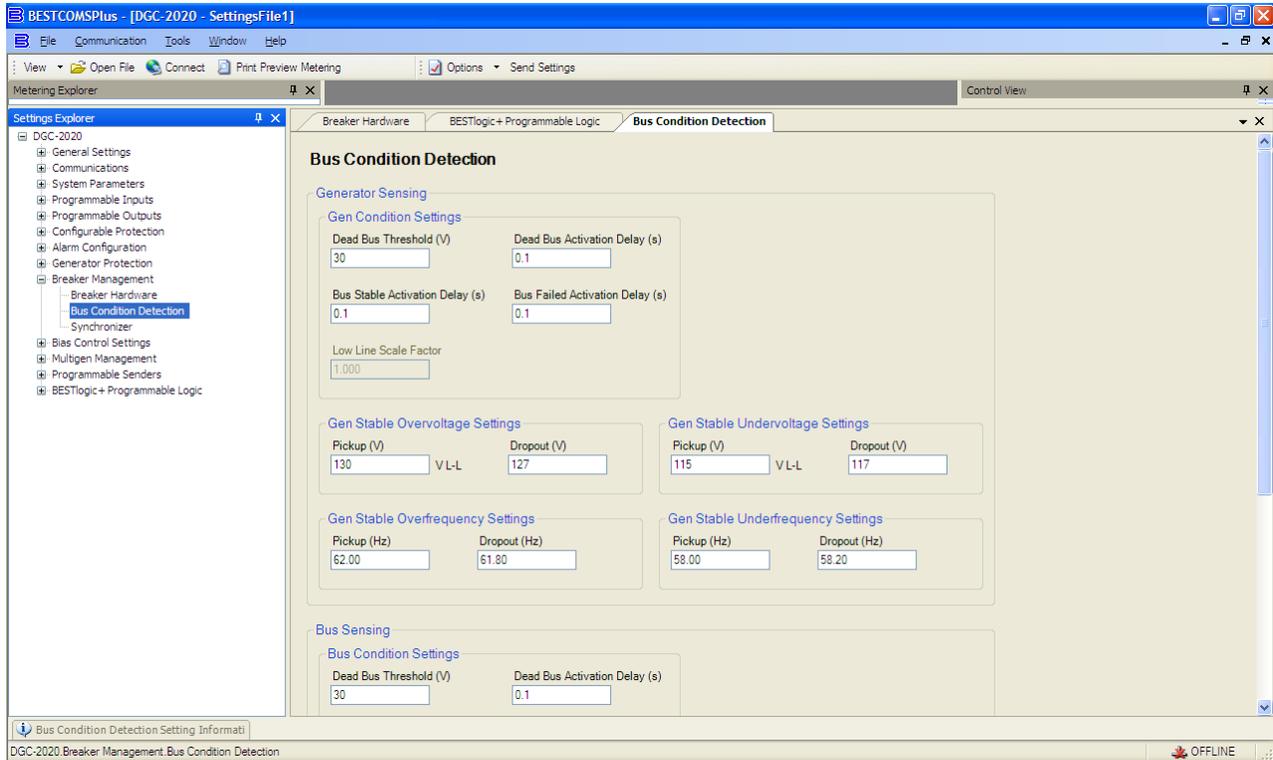


Figure 2: Sample logic diagram

3. Set the parameters for detecting stable and failed bus and generator under Settings Explorer->Breaker Management->Bus Condition Detection



*Figure 3: Bus Condition Detection Screen*

- a. Set the Dead Bus Voltage Threshold and Activation Delay. When the voltage of either the generator or bus is below this threshold for a time equal the activation delay, the generator or bus is deemed to be “Dead”
- b. Set the Gen Stable Over and Under Voltage Thresholds and Over and Under Frequency thresholds and the Bus Stable and Bus Failed Activation delay times. When the generator voltage and frequencies are within the specified ranges for a time equal to the Bus Stable Activation Delay, the generator is deemed to be “Stable”. Otherwise it is deemed to be “Failed”.
- c. Set the Bus Stable Over and Under Voltage Thresholds, and Over and Under Frequency thresholds. When the bus input voltage and frequencies are within the specified ranges for a time equal to the Bus Stable Activation Delay, the bus input is deemed to be “Stable”. Otherwise it is deemed to be “Failed”.
- d. The bus condition parameters are critical, since a breaker can be closed only when first, the generator is stable, and second, the bus is either stable or dead ; or both generator and mains breaker are open.
- e. Place the unit in AUTO. The unit is now configured for Mains Fail Transfer operation. It can be tested by removing the input to the bus input terminals or temporarily modifying the bus condition parameter for the bus input to indicate the bus input has failed. After the mains fail transfer delay has expired, the mains breaker should open, generator should start, and the gen breaker should close. When the bus is reapplied or the bus condition parameters are re-

adjusted to indicate a stable bus input, after the mains fail return delay has expired , the unit will open the generator breaker, close the mains breaker, cool down and stop.

For more information on the DGC-2020, consult the Basler factory at 618/654-2341 or visit [www.basler.com](http://www.basler.com).



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