# AGC-4 Mk II, AGC-4

4189341255C

Extended Power Management (>32 gensets)

**Option G7**

Improve Tomorrow

## 1. Description of option



## 2. Extended power management



## 3. Group controllers

# 1. Description of option

## 1.1 Option G7

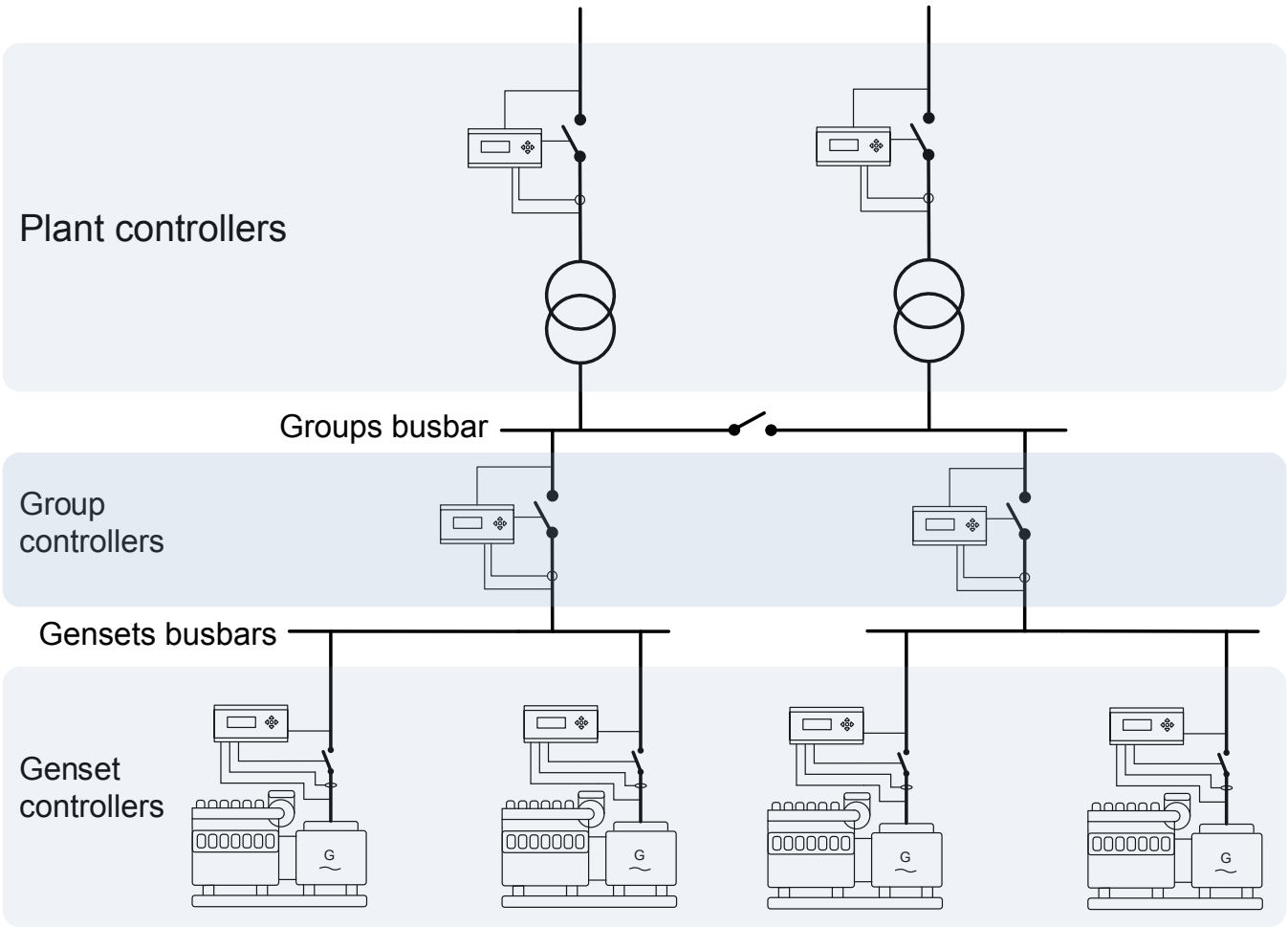
Option G7 is a software option for extended power management. The extended power management functions are similar to the functions for power management (option G5). However, power management only allows a 2-level arrangement of controllers. Extended power management allows a 3-level arrangement of controllers. The plant controllers are in the top level. The group controllers (and, if present, ASC-4 Solar) are in the middle. The genset controllers are in the bottom level. Using option G7, a single application can have up to 992 gensets.

**NOTE** The genset (and, if present, ASC-4 Solar) controllers must have both option G7 and option G5.

## 1.2 Extended power management applications

Extended power management is typically used when more than 32 controllers are needed. These are 3-level applications, which consist of plant, group and genset controllers. ASC-4 Solar and bus tie breakers (BTBs) can also be a part of these applications.

**NOTE** The operation of BTBs in option G7 is similar to option G5. However, you cannot use wrapped busbars.




The diagram shows a very simple extended power management application. In this configuration, there are two grid connections. If the plant controllers are removed, the gensets run in island mode. In this way, the controllers can be used in very big island applications.

In each genset group, there can be up to 31 gensets. If there are no grid connections, there can be up to 32 group (and/or ASC-4 Solar) controllers. This corresponds to a maximum of 992 gensets.

In each gensets busbar, there can be up to 8 BTB controllers or externally controlled BTBs. Similarly, in the groups busbar, there can be up to 8 BTB controllers or externally controlled BTBs.

## 1.3 Software version

This document is based on AGC-4 Mk II software version 6.09 and AGC-4 software version 4.82.4.

## 1.4 Glossary

| Term | Abbreviation | Description |
|---|---|---|
| AGC | AGC | For option G7 there are Genset, BTB, Group and Plant controllers. |
| Automatic Mains Failure | AMF | |
| Automatic transfer switch | ATS | |
| Available power | $P_{AVAILABLE}$ | $P_{TOTAL}$ - $P_{PRODUCED}$ |
| Bottom level | | The groups of genset controllers. |
| Bus tie breaker | BTB | The breaker used to separate gensets busbars, or groups busbars. The AGC controller that controls the breaker between gensets busbars is a BTB controller. |
| Connected | | The genset/group is running and its breaker is closed. |
| Current transformer | CT | |
| Display unit | DU-2 | An LCD display (with push-buttons) for AGC. |
| Extended power management | G7 | The controllers work together to control a system with up to 1024 controllers. |
| Genset | DG | The engine-generator set, or the controller for the engine-generator set. |
| Genset breaker | GB | The breaker between the genset and the gensets busbar. |
| Gensets busbar | | The busbar that connects the gensets in a group. |
| Group controller | Group | The option G7 controller for a group of genset controllers. This controller controls the tie breaker to the gensets busbar. These controllers each have two controller IDs. One ID is for the top level, and the other is for the bottom level. |
| Groups busbar | | The busbar that connects the groups in a plant. |
| Mains breaker | MB | The breaker to the mains/grid. |
| M-Logic | | The PLC-type tool accessible from the utility software. |
| Nominal power | P nom or $P_{NOMINAL}$ | |
| PC utility software | USW | |
| Plant controller | Plant/Mains | The option G7 controller for a group of group controllers. This controller controls the mains breaker. In the software, this is called the mains controller. |
| Power management | G5 | The controllers work together to control a system with up to 32 controllers. |
| Produced power | $P_{PRODUCED}$ | The sum of the measured power from the connected gensets/groups. If the gensets/groups are the only power sources, this is equal to the power consumed. |
| Tie breaker | TB | The breaker between the gensets busbar and the groups busbar. |

| Term | Abbreviation | Description |
|---|---|---|
| Top level | | The groups of group and plant controllers. |
| Total power | $P_{TOTAL}$ | The sum of the nominal power of the connected gensets/groups. |

## 1.5 Warnings, legal information and safety

### 1.5.1 Symbols for hazard statements

**DANGER!**

**This shows dangerous situations.**

If the guidelines are not followed, these situations will result in death, serious personal injury, and equipment damage or destruction.

**WARNING**

**This shows potentially dangerous situations.**

If the guidelines are not followed, these situations could result in death, serious personal injury, and equipment damage or destruction.

**CAUTION**

**This shows low level risk situation.**

If the guidelines are not followed, these situations could result in minor or moderate injury.

**NOTICE**

**This shows an important notice**

Make sure to read this information.

### 1.5.2 Symbols for general notes

**NOTE** This shows general information.

**More information**
This shows where you can find more information.

**Example**

This shows an example.

**How to ...**
This shows a link to a video for help and guidance.

### 1.5.3 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set or switchgear. If there is any doubt about how to install or operate the engine/generator or switchgear controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the equipment must be contacted.

**NOTE** The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

**Disclaimer**

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

### 1.5.4 Factory settings

The unit is delivered from the factory with default settings. These are not necessarily correct for the engine/generator set. Check all the settings before running the engine/generator set.

# 2. Extended power management

## 2.1 Extended power management principles and rules

### 2.1.1 Plant operating modes

The operating mode for each controller is set in parameter 6070. For extended power management, the operating mode in the genset controllers must be *Power management*. The operating mode in the group controllers must be *Extended power management*. The operating mode is then determined by a plant controller. If there is no plant controller, the plant uses island mode.

For information on power management operating modes, see **Option G5 Power management**.

#### Common for all plant operating modes

The load-dependent start and stop function is active in all the plant modes. The plant can either be started by an event, or by an operator.

These plant modes need a start signal:

- Load Take Over
- Fixed Power
- Mains Power Export
- Island mode

These plant modes are started by events:

- Automatic Mains Failure (At mains failure)
- Peak shaving (At load increase across the mains breaker)

### 2.1.2 Start and stop of the plant

The start signal for the plant can be from a display unit, or from a remote signal. A remote signal could be a digital input or Modbus command. If the start signal is from a display unit, this must be configured in parameter 8021.

For **Local**, the start signal must be given at a display unit. For **Remote**, the start signal must be a digital input or Modbus command. Some of the controller operating modes require a start signal while others start up automatically.

#### Plant application start signal

If parameter 8021 is **Local**, the start signal can only be given to specific controllers.

The start signal in extended power management must be given to a plant controller. If there is no plant controller in the application, it must be given to a group controller. The start signal does not have to go to a specific plant or group controller.

If there are bus tie breakers in the application, the start signal is not necessarily shared across these.

### 2.1.3 Test mode

Test mode in extended power management is similar to power management. The plant controllers control the test function, and they also activate it. The plant controller with *ID to run* determines the power set point, test timer and test type. Here is an overview and behaviour of the different test types in plant power management applications:

#### Simple test

When the simple test is initiated from the plant controller, the gensets start. The multi-start settings and power set point determine how many gensets start. The gensets run with open breakers in the time defined in the plant controller. If the

operator wants more than one group to start, the power set point has to be increased. In simple test, the island load-dependent start/stop settings are active.

### Load test

When this test is started, the gensets are started, synchronised to each other and afterwards the group tie breaker is synchronised to the grid. The gensets will then be parallel to the grid, and regulate towards a power set point. This power set point is defined by the plant controller with *ID to run*.

| NOTICE |
| --- |
| **There can be insufficient power**<br>If the plant controllers are set to *Run one mains*, the controller only synchronises to one grid connection. Ensure that this connection can supply the test set point load. The plant synchronises to the plant controller with *ID to run*. |

If the operator wants to synchronise to more plant connections, the operator has to allow the plants to be in parallel and set them to run all mains. If the operator then wants to synchronise some, but not synchronise others, he must use the exclude parameter or M-Logic to exclude the plant connections that he does not want the controller to synchronise. During the load test, the load-dependent start/stop is active (the load-dependent start/stop setting for parallel operation is active in this situation).

### Full test

When the full test is initiated, the gensets start and try to take the load from the grid connections. The controllers will deload the plant breaker(s), before they are opened. The load-dependent start/stop setting for island operation is active in this test mode. When using the full test, the possibilities with run one/run all mains are active, and so is the exclude function, so the operator has the option to exclude some grid connections from deloading.

### Mode after the test

For each controller, select the mode (for example, AUTO or SEMI) after the test is completed.

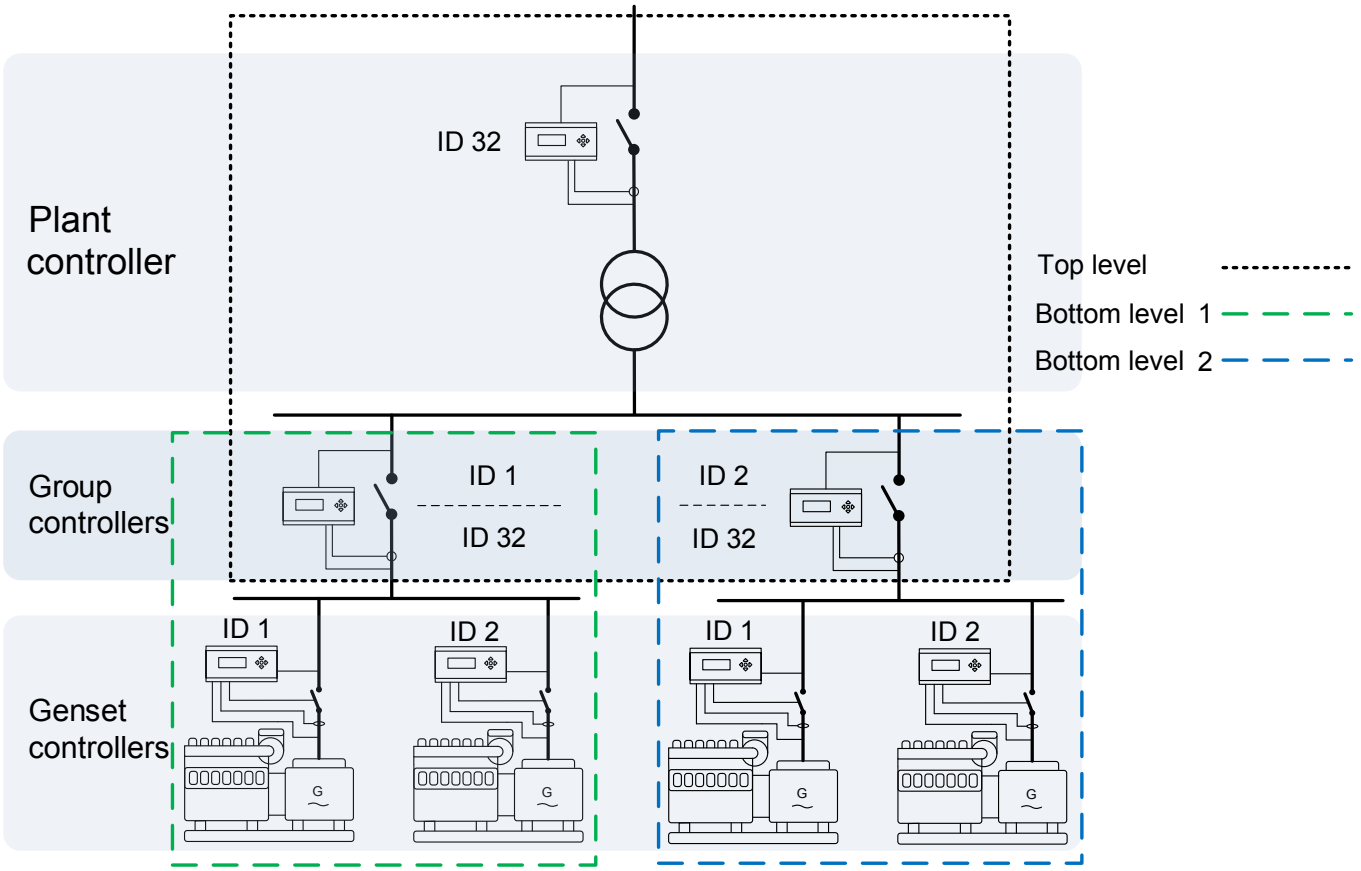
### Effect of bus tie breakers

If open BTBs are located between plant controllers, the test only take place in the section where the plant mode test has been started. If the load test is used, the cos phi that each genset uses is defined by different settings. These settings are described in cos phi control. The parameters used for the test in extended power management are the same as power management.

## 2.2 Setup of a plant application

The extended power management system is set up from the display of the controllers and from the utility software.

### Configuration example

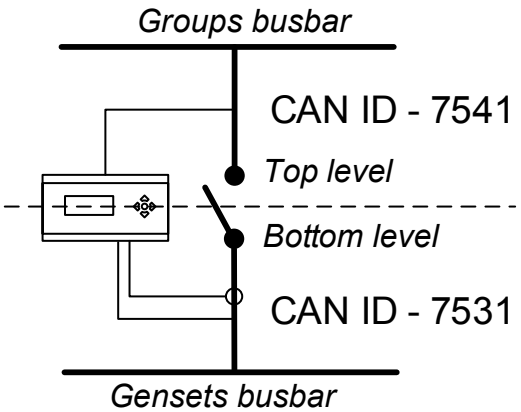



The configuration of this plant requires three steps:

1. Configuration of the top level: The plant controller and the group (and, if present, ASC-4 Solar) controllers.
2. Configuration of bottom level 1: Group controller 1 and its gensets.
3. Configuration of bottom level 2: Group controller 2 and its gensets.

### CAN IDs in extended power management

The ID for the plant controller is set in parameter 7531, and has to be unique for each plant controller. The group controllers in 3-level applications have dual IDs. The IDs in group controllers are shown in the drawing below:




The group controller has two different CAN IDs. In this way, the group controller has two application configurations active at once.

### 2.2.1 Set the controller type

For each controller:

1. Press the 

button on the display.
2. Go to menu 9100 and check the controller type.
3. If necessary, change the controller type.

**NOTE** If the controller type is changed, the controller is reset to factory settings. Make sure that the controller type is correct before doing any other configuration.

### 2.2.2 Set the controller IDs

Before configuring the plant, set the CAN IDs in each controller.

The controller ID in each controller must match the IDs in the application drawing. Note that group controllers must have two controller IDs configured (parameter 7531 and 7541). That is, each group controller must have a controller ID for the bottom level (7531), and a controller ID for the top level (7541).

#### Set the controller IDs in the top level application

Use parameter 7531 to set the controller ID in each plant controller, so that these match the IDs in the top level application. Use parameter 7541 to set the controller ID in each group controller, so that this matches the group controller ID in the top level application.

| Parameter | Item | Range | Note |
|---|---|---|---|
| 7531 | Internal communication ID | 1 to 32 | For the plant controllers. |
| 7541 | Internal communication ID for the genset group | 1 to 32 | For the group controllers. |

#### Set the controller IDs in the bottom level application

For each bottom level application, use parameter 7531 to set the controller ID in each controller, so that these match the IDs in that bottom level application.

| Parameter | Item | Range | Note |
|---|---|---|---|
| 7531 | Internal communication ID | 1 to 32 | For the genset and group controllers. |

### 2.2.3 Configuration of the top level

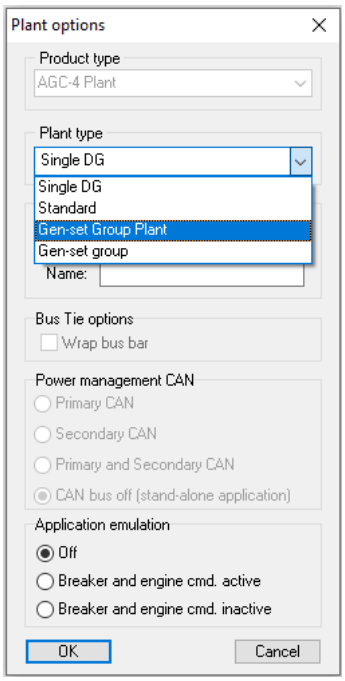
Connect to a plant controller with the Utility Software. Open *Application configuration* in the left bar.

Select the *Read plant configuration from device* icon on the top bar. 

The *Read* window opens. Select all applications to read.

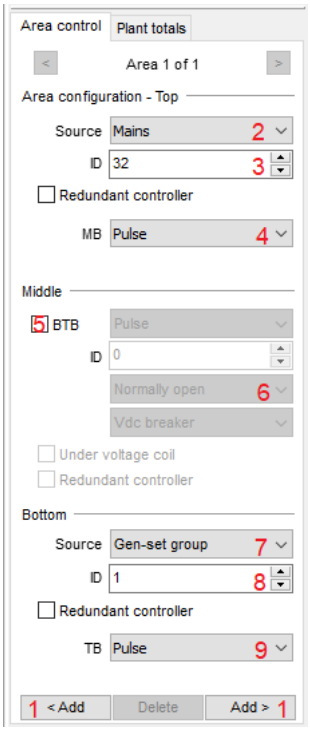
After reading the applications, select *Application 4*. Select the *New plant configuration* icon: 

The *Plant options* window opens:




For *Plant type*, select **Gen-set Group Plant**. Select the *Power management CAN* and whether the controllers should be using emulation, then select **OK**.

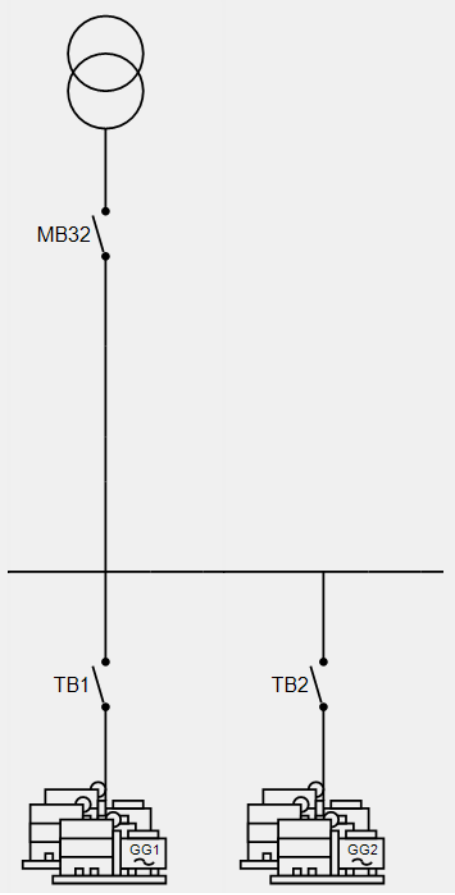
For a selected area, the left side of the application configuration can look like this:




| Number | Description |
|---|---|
| **1** | Add and delete areas. Adding areas makes the application/plant bigger. |
| **2** | Select the type of power source for the top of the selected area. |
| **3** | Set the internal command ID. This ID should correspond to the ID in the controller (parameter 7531). |
| **4** | Since *Mains* is selected in the source, you can choose the Mains Breaker type (Pulse, Ext/ATS no control, Continuous NE, Compact, None, or Continuous ND). |

| Number | Description |
|---|---|
| **5** | If there is a BTB at this position on the groups busbar, select BTB. Choose the breaker type (Pulse, Ext, Continuous NE, or Compact). |
| **6** | Select whether the BTB is normally closed or normally open. |
| **7** | Select the type of power source for the bottom of the area. |
| **8** | Set the internal command ID. This ID should correspond to the ID in the group controller (parameter 7541). |
| **9** | Since *Genset group* has been selected in the source, you can choose the Genset Group tie breaker type (Pulse, Continuous NE, Compact or None). |

After configuring the two areas, the top level in this example looks like this:




The configuration for the plant must be sent to the controllers. Select the *Write plant configuration to device* icon.

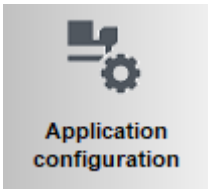
After this, only the plant controller has the new configuration. To send the new configuration to all other controllers, select the broadcast icon.

The broadcast function can also be used to check the CAN lines. The broadcasting controller shows a message that it is broadcasting in its display. All controllers that are receiving the new application, show a message that they are receiving an application. If some of the controllers are not receiving the application, there is most likely a problem with the CAN lines to the controller(s).

If some controllers have been added after the broadcast has started, the controllers will have an *Application Hazard* alarm. This means that there is a mismatch between the application configurations between the controllers. This can be solved by selecting the *Broadcast* icon again.

### 2.2.4 Configuration of the bottom level

For each group, connect to a genset controller with the Utility Software. Open the *Application configuration* tab in the left bar:

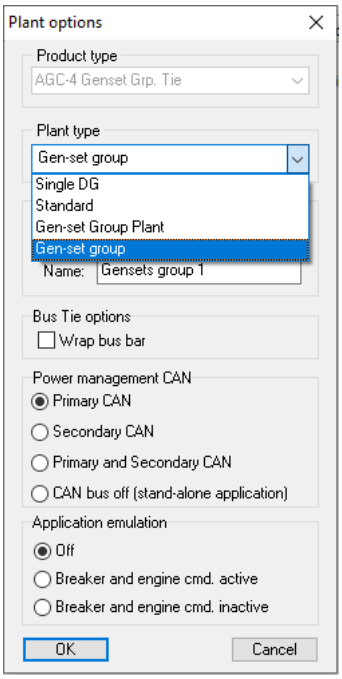



Select the *Read plant configuration from device* icon on the top bar. 

The *Read* window opens. Select all applications to read.

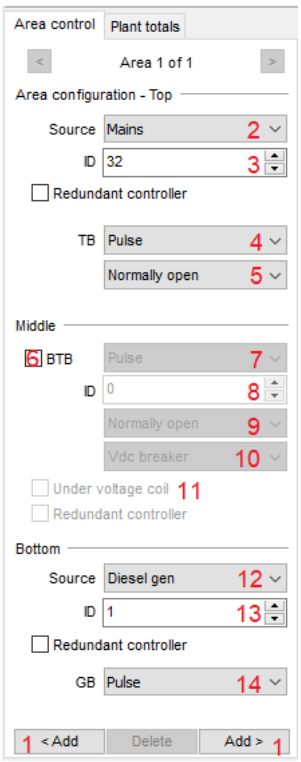
After reading the applications, select *Application 1, 2 or 3*. The bottom level configuration can only be configured in applications 1 to 3. Select the *New plant configuration* icon: 

The *Plant options* window opens:



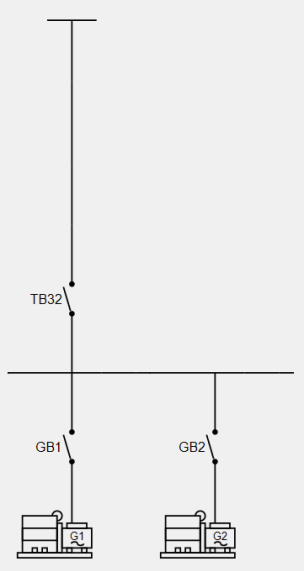

For *Plant type*, select **Genset group**. Select the *Power management CAN* and whether the controllers should be using emulation. After making the selections, select **OK**.

For a selected area, the left side of the application configuration can look like this:




| Number | Description |
|---|---|
| **1** | Add and delete areas. Adding areas makes the application/plant bigger. |
| **2** | Select the type of power source for the top of the selected area. Only *None*, *Mains* or *Diesel genset* can be selected. For the group controller, select *Mains*. |
| **3** | Set the internal command ID. This ID should correspond to the ID set in the controller (7531). |
| **4** | Since *Mains* is selected in the source, you can choose which type of breaker is used for the group tie breaker. |
| **5** | Here it is chosen whether the Tie Breaker should be normally open or normally closed. |
| **6** | If there is a BTB at this position on the gensets busbar, select BTB. |
| **7** | Choose the breaker type (Pulse, Continuous NE, Compact or External controlled). |
| **8** | Set the ID for the BTB controller. |
| **9** | Select whether the BTB is normally open or normally closed. |
| **10** | If V DC breaker is selected, the breaker can open and close when there is no voltage on the busbar.<br><br>If V AC breaker is selected, voltage must be present on the busbar before the breaker can be handled. |
| **11** | If the BTB has an under voltage coil, select this. |
| **12** | Select the type of power source for the bottom of the selected area. Only *None*, *Mains* or *Diesel genset* can be chosen. For a group controller, select *Mains*. |
| **13** | Set the internal command ID. This ID should correspond to the ID in the controller (parameter 7531). |
| **14** | Since *Diesel genset* is selected in the source, you can choose the Generator Breaker (Pulse, Continuous NE or Compact). |

After configuring the two areas, the bottom level in this example looks like this:




The configuration for the group must be sent to the controllers. Select the *Write plant configuration to device* icon.

After this, only the genset controller has the new configuration. To send the new configuration to all other controllers, select the broadcast icon.

The broadcast function can also be used to check the CAN lines. The broadcasting controller shows a message that it is broadcasting in its display. All controllers that are receiving the new application, show a message that they are receiving an application. If some of the controllers are not receiving the application, there is most likely a problem with the CAN lines to the controller(s).

If some controllers have been added after the broadcast has started, the controllers will have an *Application Hazard* alarm. This means that there is a mismatch between the application configurations between the controllers. This can be solved by selecting the *Broadcast* icon again.

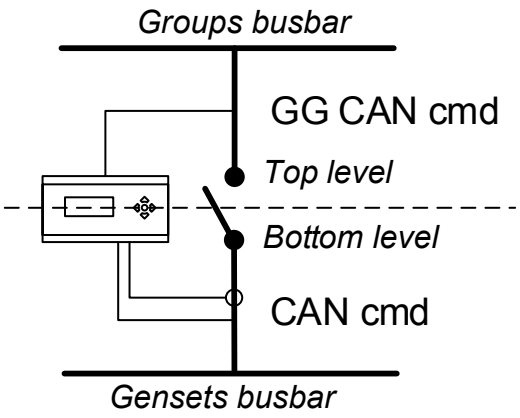
## 2.3 Redundancy

If the plant includes redundant controllers, extra M-Logic may be needed. See **Option T1, Critical power** for more information.

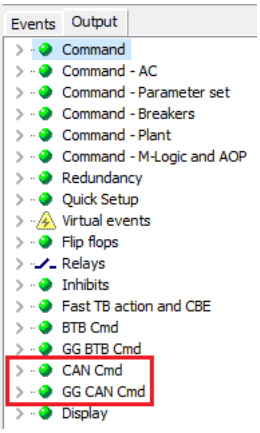
## 2.4 CAN commands

CAN commands in extended power management are similar to the CAN commands in power management. However, the CAN commands in a group stay in the group, and are not sent to another group. CAN commands are also not sent from a genset controller to a plant controller.

The group controller can see the CAN commands in the top level, and also the CAN commands in the genset group.



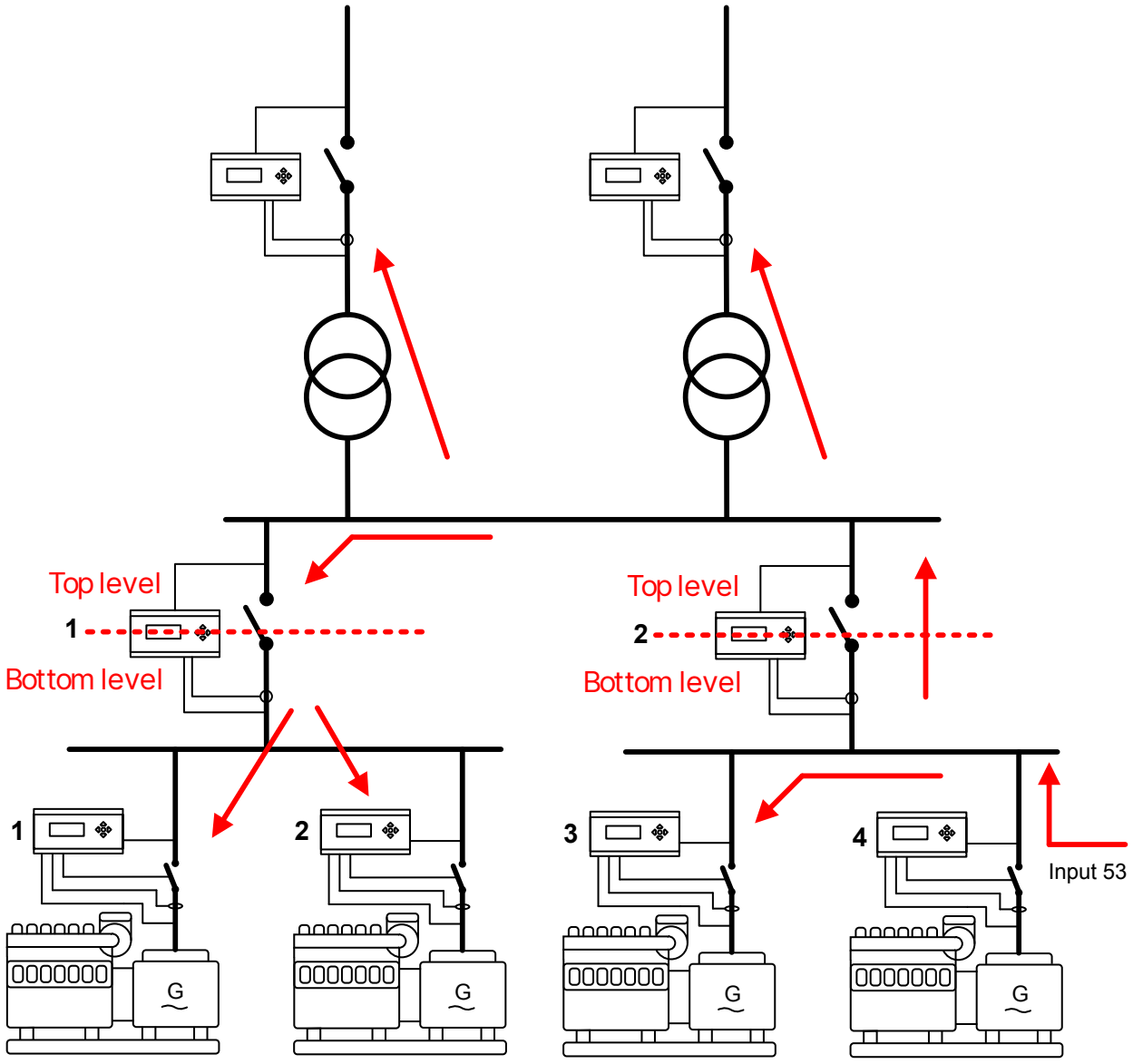

These two sets of commands can be found in the M-Logic for a group controller:




**Example: Change all controllers' mode based on a digital input**

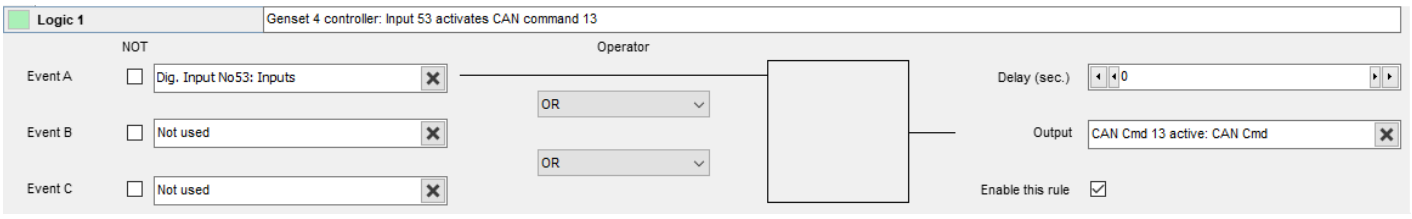
The operator wants all controllers in the plant changed into SEMI when input 53 on genset 4 is active.

### Flow of the CAN command



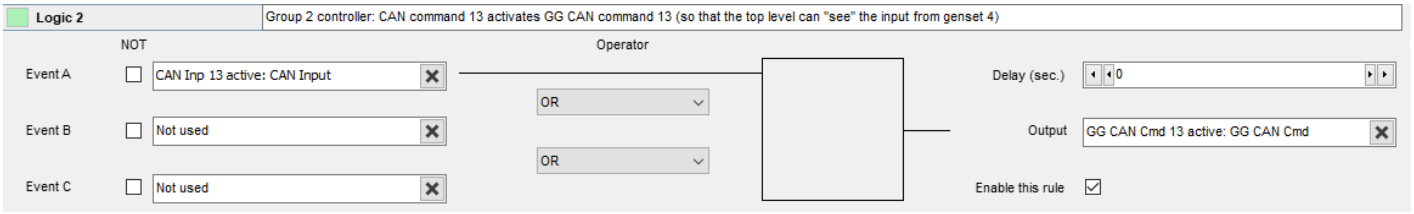

The input is wired to genset 4. When the input is activated, controller 4 activates CAN command 13.

### M-Logic in genset controller 4




Genset 3 and group controller 2 can see the CAN command. Group controller 2 must transfer the CAN command into the level above, so that the group controllers in the top level can see the GG CAN command.

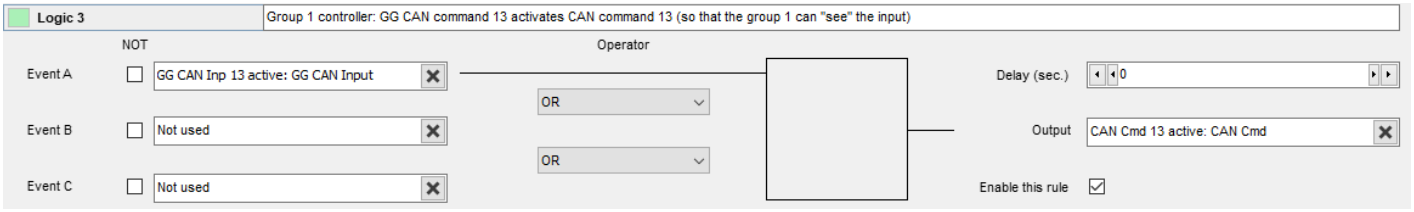
### M-Logic in group controller 2




All the group controllers in the top level can see the CAN command *GG CAN Input 13 active*.

Group controller 1 must send a CAN command so that the genset controllers in its group, as well as the plant controllers, can see *CAN Inp 13 active*.

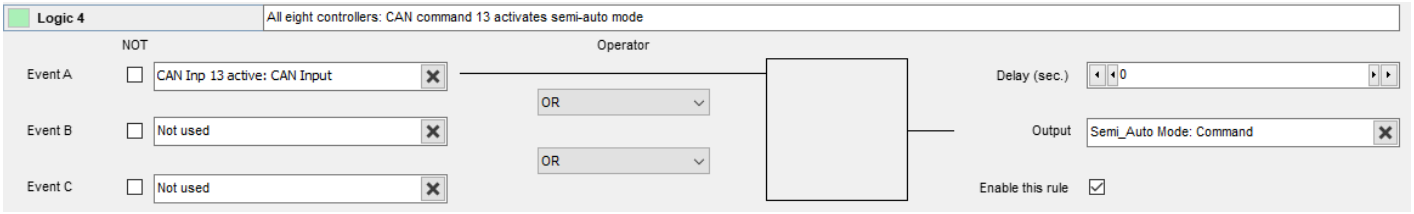
### M-Logic in group controller 1




The CAN command is now visible to all controllers in the plant.

Finally, each controller in the plant needs M-Logic so that the CAN input activates SEMI mode.

### M-Logic in all controllers




## 2.5 CAN bus failure handling

### 2.5.1 CAN failures

The controllers communicate over CAN bus. To work correctly, the wiring must follow the standards for CAN bus communication.

For a general description of CAN bus failures, see **Option G5 Power management**.

If a CAN bus failure occurs in a plant, the mode is not necessarily changed in every controller. For example, if there is a CAN bus failure in a genset group, only the gensets in that group (including the group controller) change mode. The rest of the plant is not affected. If there is a CAN bus failure in the top level, the plant and group controllers change mode.

### 2.5.2 CAN bus failures in the bottom level

In the genset controllers, these are the CAN bus failure alarms.

- **Missing all units** (7533): The controller cannot “see” any other controllers on the CAN bus line.
- **Fatal CAN error** (7534): Two or more controllers are not visible, but one or some controllers are still visible.
- **Any DG missing** (7535): At least one genset controller is missing.

- **Any Group Tie missing** (7536): The group controller is missing in the genset group. For the bottom level, it is only possible to set it in the genset controllers.

### 2.5.3 CAN bus failures in the top level

The top level in an extended power management application consists of plant and group controllers. In the plant controllers, the relevant parameters are 7533 to 7875. In group controllers, the relevant parameters are 7533 to 7881.

- **Missing all units** (7533): A controller cannot “see” any other controllers on the CAN bus line.
- **Fatal CAN error** (7534): Two or more controllers are not visible, but one or some controllers are still visible.
- **Any group missing** (only plant controllers, 7535): At least one group controller is missing.
- **Any mains missing** (only plant controllers, 7536): At least one plant controller is missing.
- **GG Grp. missing** (only group controllers, 7543): At least one group controller is missing.
- **GG mains missing** (only group controllers, 7544): The plant controller is missing.
- **GG missing all** (only group controllers, 7545): The group controller cannot “see” any other controllers on the CAN bus line.
- **Any BTB missing** (7871): At least one BTB controller is missing.
- **Any LG missing** (7873): At least one ALC is missing.
- **Any PV missing** (7874): At least one ASC Solar is missing.
- **Any Battery missing** (7875): At least one ASC Battery is missing.
- **GG BTB missing** (only group controllers, 7881): The tie breaker between groups is missing.

### 2.5.4 CAN bus alarms

The following alarms can be displayed on a controller in case of CAN bus communication failures:

- **CAN ID X P missing**: The controller has lost CAN bus communication to CAN ID X on the power management CAN primary line.
- **CAN ID X S missing**: The controller has lost CAN bus communication to CAN ID X on the power management CAN secondary line.
- **GG CAN ID X missing**: Seen on group controllers. The group has lost communication to CAN ID X in the top level.
- **CAN setup CH: 784x**: The controller can detect power management communication on a CAN port, but the correct protocol is not set. This alarm is also monitoring the CAN set between engine communication protocol (option H12) and the CAN port.

#### Load sharing backup

As part of power management, the controllers support backup load sharing. If the power management CAN bus fails, the genset controllers can use analogue load sharing.

## 2.6 Basic functions

### 2.6.1 Multi-start

Multi-start is active in extended power management.

#### Multi-start for gensets

The minimum gensets to start and minimum numbers running is set for each group. These settings are set in one of the genset controllers, and afterwards shared automatically to the other genset controllers in the group.

Auto-calculation is also set in each group.

#### Multi-start for groups

In addition to multi-start for gensets, you can use the multi-start parameters 8922 to 8926 in a group controller to set how many groups start.

**Example**

A plant consists of 20 gensets, with 1000 kW nominal power each. There are 10 gensets in each group. In the group with priority 1, multi-start is set to **Auto calculation**. In the group with priority 2, multi-start is set to start four gensets. The load-dependent start/stop settings require a minimum of three gensets running.

1. At the start, the plant is not running.
2. A plant controller requests 10500 kW of fixed power.
3. When the start signal from the plant is given, the auto-calculation in group 1 makes all ten gensets start. The first 10000 kW is delivered from group 1.
4. For the remaining 500 kW, one genset from group 2 is enough.
5. The settings in group 2 require at least four gensets to start at a time, and so four gensets will start.
6. When all the gensets are up and running, the load-dependent start/stop function allows some gensets to stop. In group 2, at least three gensets must run. So the load-dependent start/stop function can only stop one genset in group 2.
7. The 13 running gensets share the load equally.

If asymmetrical load-share has been activated in the group controllers, group 1 is loaded to the set point in the group controller, and the three gensets in group 2 take the deviations. If asymmetrical load-share is also activated in group 2, the gensets with the highest priority are loaded more than the others.

**Multi-start all in the section**

You can configure M-Logic in the group controller(s) to start all the gensets in the busbar section. Use *Output, Command, Multi start all sections - this section*. For more information, contact DEIF support.

### 2.6.2 Local update/update all

The local update/update all function only works in groups. This means that if all controllers in a group are set to *Update all*, and one is changed, all the controllers in this group are changed to this mode. This includes the group controller, if it is set to *Update all*.

If all controllers in the plant application is set to *Update all*, and the mode is changed in a genset controller, then all the controllers in the group change, including the group controller. If the mode is changed in a group controller, the mode changes in all the genset controllers in the group. The mode does not change in the other group or plant controllers.

If the mode is changed in a plant controller, the group controllers and other plant controllers are not affected by this, since this is always done individually for the controllers in the top level.

**NOTE** Be aware if the plant controller is changed from AUTO to SEMI, and the plant is started with an AUTO start/stop signal. When the plant is not in AUTO anymore, the AUTO start signal is inhibited and become a stop signal.

## 2.7 Load-dependent start and stop

### 2.7.1 Principles

Within each genset group, power management governs the load-dependent starts and stops.

For extended power management, if a group cannot supply the load, the group controller can request for help from another genset group. The next genset group must be in the same static section. If an open BTB is between the groups, the help request is not sent.

When the extended power management starts a group, the power management within the group decides which genset(s) to start.

## 2.7.2 Start of another group

Before a group controller can request help from another group, all the available gensets in the first group must be running. The load in the first group must also exceed the set point in parameter 8280.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8280 | Asymmetric LS | 1 to 100 % | 80 % | Only in group controllers. The set point for when a group requests help. If group asymmetric load sharing is enabled (parameter 8282), this is also the load set point for the group(s) with first priority. |

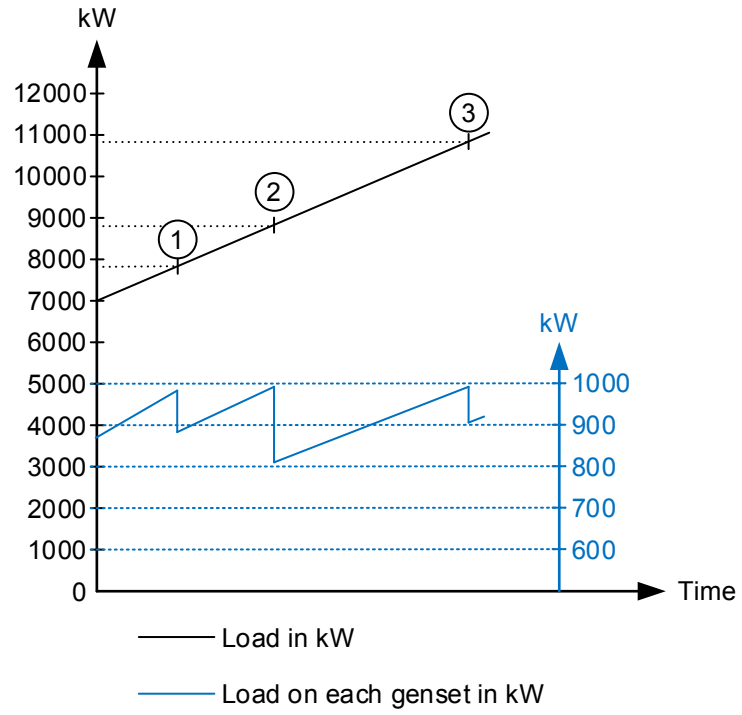
When help from another group is requested, the group with first priority starts. You can see the priority for each group controller in the lower right corner of its display.

Within the newly started group, the genset with the first priority starts. Note that all the running gensets share the load equally.

### Example with kW load-dependent start limit

Plant configuration:

- The plant has two groups, with 10 gensets of 1000 kW in each.
- The load-dependent start limit (8001) is 100 kW in each genset controller.
  - That is, when the available power is below 100 kW, the next genset starts.
- In the group controllers, parameter 8280 is 80 %.




At 7000 kW, the parameters require 8 gensets to supply the load. Gensets 1 to 8 (Group 1) are running. The load increases.

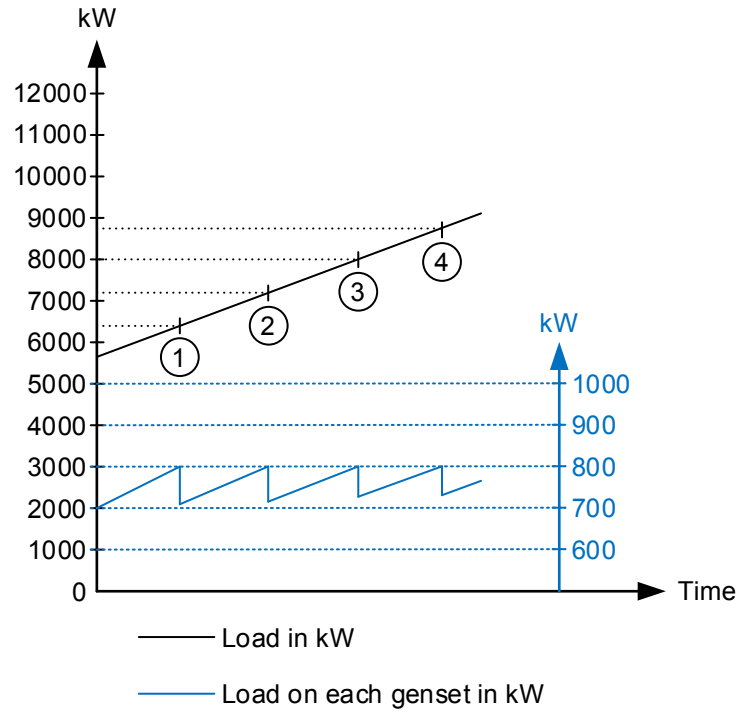
1. At 7900 kW, the available power drops to 100 kW, and so Genset 9 starts. The load on each genset drops when Genset 9 is connected to the busbar.
   - When the load exceeds 8000 kW, the load on the group is above 80 %.
   - However, the next group is not requested yet, since not all gensets in the first group are running.
2. The load has increased to 8900 kW. The available power again drops to 100 kW. Genset 10 starts.

- When Genset 10 starts, the load in the group is still more than 80 %.
- Therefore, the genset with the first priority in Group 2 also starts. That is, both Genset 10 (Group 1), and Genset 1 (Group 2) start.
- 11 gensets are load sharing and sharing the load equally. The load on each genset falls to about 809 kW.

3. The load rises above 10900 kW, so that the available power drops below 100 kW. Genset 2 (Group 2) starts and shares the load with the other gensets.

**Example with % load-dependent start limit**

For the same plant as above, but the load-dependent start limit is 80 %, the diagram looks like this:




At 5600 kW, the parameters require 8 gensets to supply the load. Gensets 1 to 8 (Group 1) are running. The load increases.

1. When the load is 6400 kW, the 8 gensets are 80 % loaded. Genset 9 starts.
2. The load increases to 7200 kW. The 9 gensets are 80 % loaded, so Genset 10 starts. When Genset 10 is connected, all the gensets in Group 1 are connected. However, the group load is below 80 %, and so Group 1 does not send a request for help.
3. The load increases to 8000 kW, so that Group 1 is 80 % loaded. Since all the Group 1 gensets are running, a request for help is sent. The genset with the first priority in Group 2 starts, and all the gensets load share equally across the groups.
4. The load increases to 8800 kW. Genset 2 in Group 2 starts.

## 2.8 CAN bus load sharing

### 2.8.1 Asymmetrical load sharing

The controllers can be configured to do asymmetrical load sharing in extended power management. There are two ways to do this.

**Asymmetrical load sharing internally in groups**

If the plant consists of more than one genset group, it is possible to do asymmetrical load sharing internally in one group, and equal load sharing in another. See **Option G5** for more information on asymmetrical load sharing.

### Asymmetrical load sharing on group controllers

The controllers can make the load sharing between groups asymmetrical. This is similar to the function in power management.

When this function is enabled in the group controllers (in parameter 8282), the group(s) with first priority is loaded to the set point in parameter 8280. The group with the last priority then takes all the deviations in the load so the group(s) with first priority can be kept at the set point.

If the load exceeds the asymmetrical load set point, all the genset groups share the load equally. This prevents a situation where the group with the last priority has to take the whole incoming load.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8282 | Asymmetric LS | Not enabled, Enabled | Not enabled | Only in group controllers. |

## 2.9 Set points and power across the plant

### 2.9.1 Cos phi control

When using cos phi-controlled export in extended power management, the set point can be decided from different places. To give an overview, it is easiest to explain how the set points react in different situations.

#### Genset controller cos phi set points

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 7055 | ContrSet cosphi or Q | Off<br>Superior<br>Fixed Q | Off | **Off**: The genset controller ignores the set point sent from other controllers. The cos phi set in the genset controller is used.<br>**Superior**: Allows the genset to receive the cos phi set point from another controller in one of the levels above. |

#### Group controller cos phi set points

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 7054 | Contr. sett. cosphi | Off<br>Superior<br>Fixed for DG(s)<br>Fixed for imp/exp | Superior | **Off**: If this is set in the group controllers, each genset controller always uses its own cos phi set point, even if the gensets are set to superior. The plant setting is also ignored.<br>**Superior**: The group allows the plant controller to control the cos phi set point. If the plant controller's 7054 is set to OFF, each genset controller uses its own cos phi set point.<br>**Fixed for DG(s)**: The genset controller set to superior all use the cos phi set point in the group controller (7052). If a genset is set to off, it uses its own cos phi set point. The plant setting is ignored.<br>**Fixed for imp/exp**: The group controller adjusts the set points in the gensets, to get the cos phi set in 7052 at the group tie breaker. If a genset is set to off, it run its own the set point, and the other gensets compensate for it. The plant setting is ignored. |

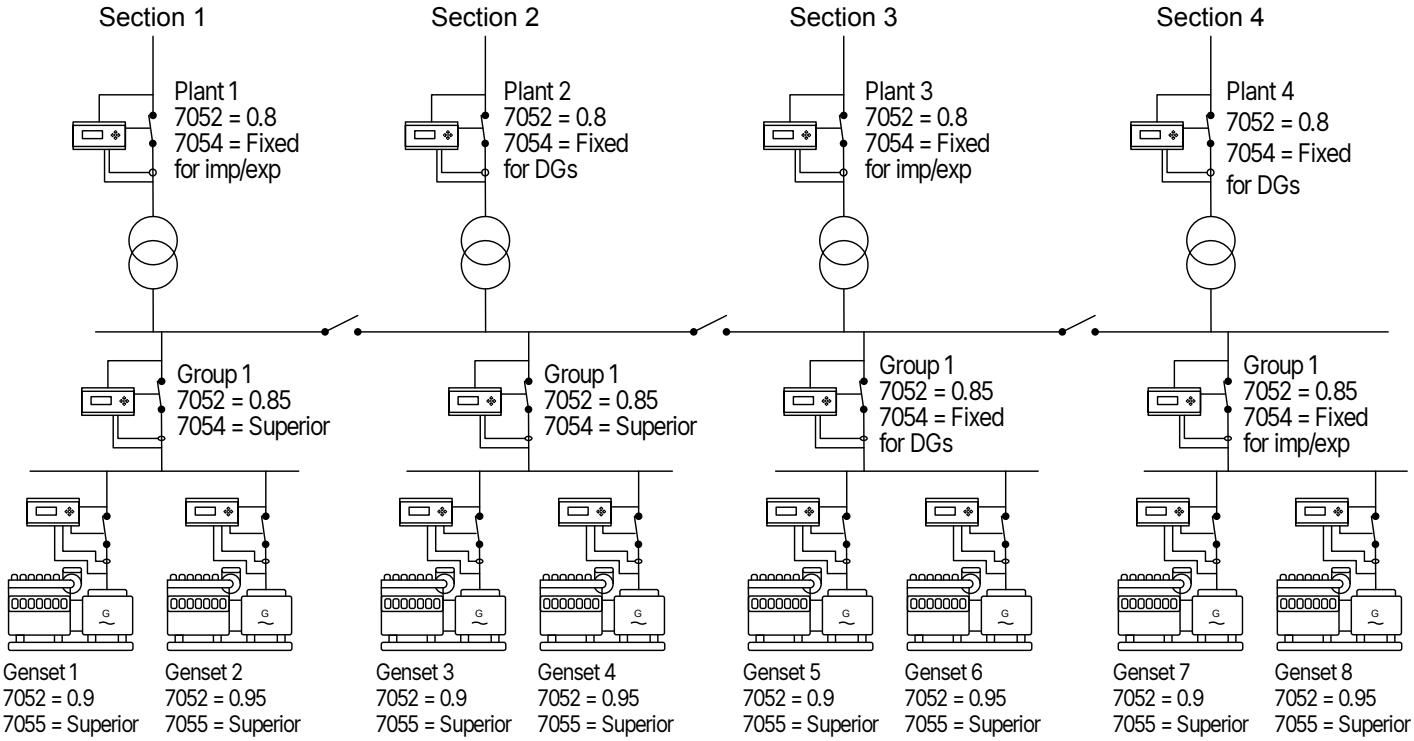
#### Plant controller cos phi set points

The set point can be sent from the plant controller. However, for the a plant controller to decide the cos phi set point, the genset and group must both be set to superior.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 7054 | Contr. sett. cosphi | Off<br>Fixed for DG(s)<br>Fixed for imp/exp | Off | **Off**: If the group and genset controllers are set to superior, the genset controllers use their own cos phi set points or are controlled from the group controllers. |

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| | | | | **Fixed for DG(s)**: Each genset controller uses the plant controller set point (7052) as the cos phi set point. Each genset controller regulates individually to achieve this set point.<br>**Fixed for imp/exp**: When the plant controller is set for this, the plant controller is changing the set points accordingly to the load. The plant controller will try to maintain a constant cos phi across the breaker on plant level. This cos phi is set in parameter 7052 in the plant controller. |

**Example**




The plant consists of 4 static sections (since the three BTBs are open). The cos phi settings for each controller are shown above.

- **Section 1:** The genset controllers are set to superior. The group controller is also set to superior, which means the group and genset controllers are ready to receive the cos phi set point from the plant controller. In the plant controller, 7054 is set for fixed for imp/emp. This section therefore tries to maintain a cos phi of 0.8 at the breaker at plant level. The cos phi of 0.8 is the set point in the plant controller. If genset 1 had been set to OFF in parameter 7055, it would run at cos phi 0.9. Genset 2 would then try to compensate for this, so the cos phi could be achieved at the plant breaker.
- **Section 2:** The gensets and group controllers are set to superior. This means that the plant controller can determine the cos phi. In the plant controller, parameter 7054 is set to fixed for DG(s). This means that the gensets should each run at the cos phi set in the plant controller. Gensets 3 and 4 will therefore run at cos phi 0.8. If parameter 7054 in the plant controller is changed to off, the gensets each use their own cos phi set point. This means that genset 3 runs at cos phi 0.9 and genset 4 at 0.95.
- **Section 3:** The genset controllers are set to superior. This means that the controller above can control the cos phi. In the group controller, parameter 7054 is set to fixed for DG(s). The plant controller can therefore not control the cos phi, since the group controller is not set to superior. The group controller controls the cos phi instead. Each genset therefore runs at cos phi 0.85 (set in the group controller).
- **Section 4:** The genset controllers are set to superior, so a controller above will control the cos phi. In the group controller, parameter 7054 is set to fixed for imp/exp. The genset controllers therefore maintain the cos phi at the group tie breaker at the set point in parameter 7052 (in the group controller). The cos phi that the gensets produce fluctuates according to this. If parameter 7054 in the group controller is set to off, each genset runs at the cos phi set in its own controller.

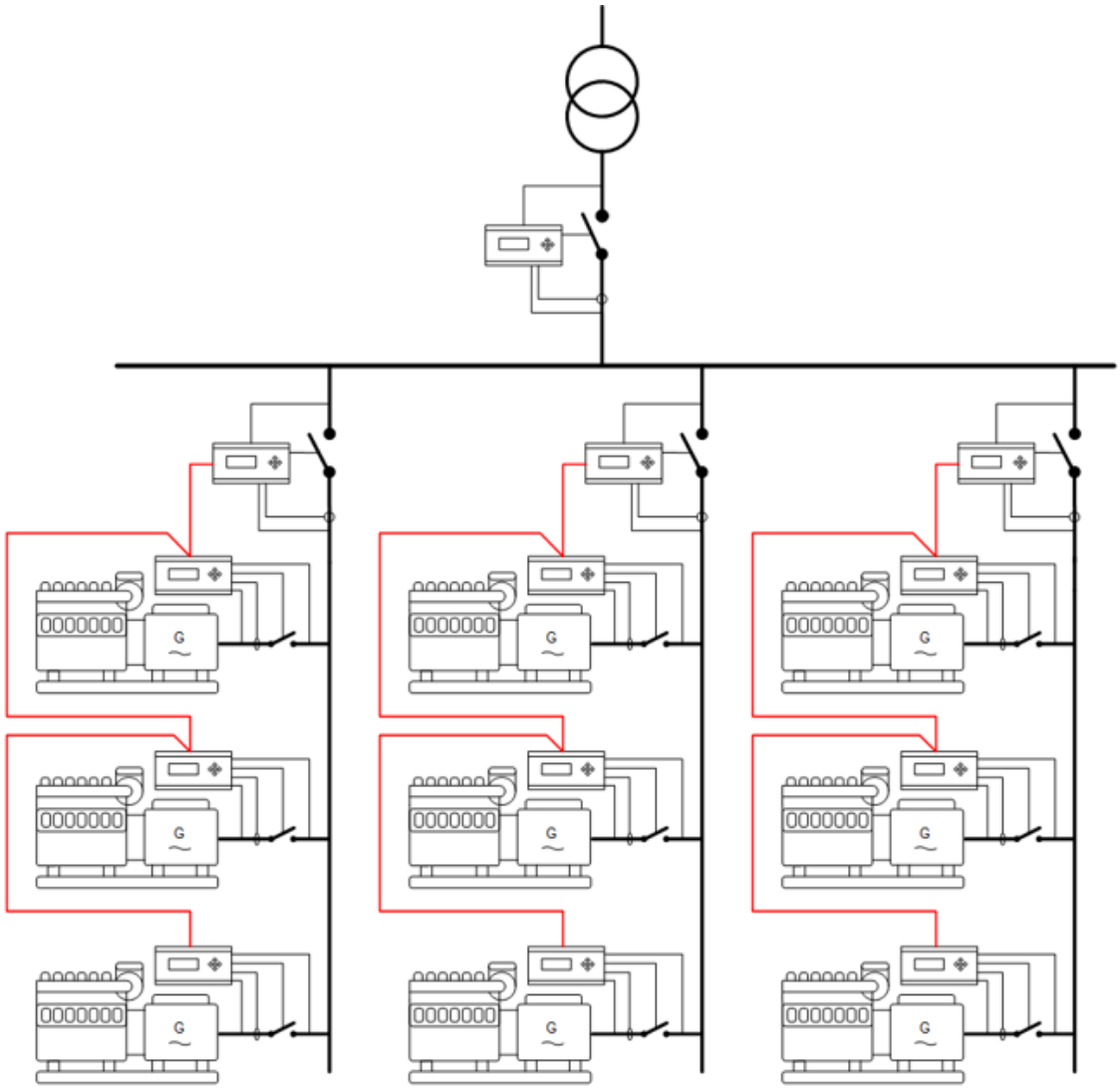
## 2.10 Close before excitation across groups

Close before excitation is possible for single genset controllers and for genset controllers in power management. See the **Designer's handbook** for more information.

With extended power management, close before excitation is possible across groups. A short overview is given below. Contact DEIF support for more information.

### Wiring

To ensure accurate timing, in each group, wire a digital output from the group controller to an input on each genset controller. In each genset controller, select the digital input function *CBE Activate AVR one* or *CBE Activate AVR two*. When this function is configured, the input must be activated for CBE.



### M-Logic

In each group controller, configure the M-Logic using *Output, Fast TB action and CBE, Activate CBE* and *Deactivate CBE*.

### Reaction to failures

If the start or breaker close for one genset is delayed, the CBE is delayed and all the other gensets wait. When the timers run out after the configured start and breaker close failures, CBE is aborted for those genset(s). The other gensets are then excited.

# 3. Group controllers

## 3.1 Tie breaker power transducer

Normally, the AC current and voltage inputs are used by the group controller to calculate the power. However, if the current transformers are far away from the group controller, a tie breaker power transducer can be used. A group controller can also work if there are no current inputs and no tie breaker power transducer.

The group controller however always needs the voltage measurements. These are used for synchronising the breaker and also to detect if any of the busbars are live.

If a transducer is used for plant power measurement, it must be wired to multi-input 105. Multi-input 105 is configured in the USW on the *I/O setup* page. For wiring, see the **Installation instructions**.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8271 | Transducer Range (max) | 0 kW to 20000 kW | 0 kW | The output of the transducer must be linear to the power. |
| 8272 | Transducer Range (min) | -20000 kW to 0 kW | 0 kW | |

## 3.2 Fail classes in group controller

Group controller fail classes are:

- Block: An open TB cannot close.
- Warning
- Trip TB: The tie breaker is opened. The TB close sequence is blocked.

## 3.3 Group priority selection

Priority determines the order in which the groups start. Group priority selection in extended power management is similar to genset priority selection in power management.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8031 | Priority select | Manual abs.<br>Running hours abs. | Manual abs. | See below. |
| 8081 to 8106 | Priority 1 to 17 | 1 to 32 | 1 to 17 | The manually defined priority for each group controller ID. |
| 8321 to 8343 | Priority 18 to 32 | 1 to 32 | 18 to 32 | The manually defined priority for each group controller ID. |
| 8111 | Priority update hour | 1 to 20000 hours | 175 hours | When the group has this many running hours, the extended power management starts the next priority group so that it can stop this group. |

### Manual abs. priority

The group controller priorities are defined in parameters 8081 to 8106 and 8321 to 8343.

### Running hours abs. priority

The group controller priority changes after the group has been running for the hours set in 8111.

### Changing the priority during operation

Group controller priorities can be changed during operation. If there is a group controller with a higher priority than the group that is running, the group with the higher priority starts and takes over the load. The group that had been running can then stop.

**More information**
See **Option G5 Power management AGC-4 Mk II** for more information.

## 3.4 Tie breaker functions

### 3.4.1 Tie breaker power capacity

The extended power management tie breaker power capacity is similar to the function in power management. The difference is that the power capacity function is for a Group Tie Breaker (GTB).

The function is always enabled. If you do not want to use it, set it to a very low value, so that it does not affect anything. The power capacity is set in the group controller.

| Parameter | Name | Range | Default |
|---|---|---|---|
| 8192 | Power capacity | 1 to 20000 kW | 50 kW |

**NOTE** Power capacity is active in all plant modes.

### 3.4.2 Tie breaker power capacity overrule

The power capacity overrule function in extended power management is similar to the function in power management. This is set in the group controller, since the function affects the group tie breaker.

| Parameter | Name | Range | Default |
|---|---|---|---|
| 8193 | P cap. overrule timer | 0 to 999.9 s | 30 s |
| 8194 | P cap. overrule | Not enabled, Enabled | Not enabled |

### 3.4.3 Tie breaker open point

The tie breaker open point function in extended power management is similar to the function in power management. This function is always active. If it is not desired, make the set point a low value.

| Parameter | Name | Range | Default |
|---|---|---|---|
| 8191 | TB open point | 0 to 20000 kW | 50 kW |

### 3.4.4 Fast closing

For automatic mains failure (AMF), fast closing is possible for the group tie breakers.

Fast closing is also possible for fixed power, mains power export (MPE) and load takeover (LTO). Each genset controller then synchronises to the busbar.

Use M-Logic *Output, Fast TB action and CBE, TB Direct close - fast* or *TB Direct close - skip power capacity*.

### 3.4.5 Normally open/normally closed

You can use M-Logic to change the configuration of the tie breaker. Use *Output, Command, TB configuration: Normal Close* or *TB configuration: Normal Open*.

**NOTE** The top level busbar must be live before closing the tie breaker.

## 3.5 N + X

N + X in extended power management is similar to the function in power management.

**Using N+X**
See the N + X feature video for a short overview.

### N + X in genset controllers

From power management, N + X can be used inside the groups. You can have N + X activated in the genset controllers in some groups and not in others.

Note that using N + X in the genset controllers only has an effect inside the group. The N + X setting in the genset controllers cannot trigger a request for another group.

### N + X in group controllers

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8921 | N + X setup | N + X OFF<br>N + 1 extra Group | N + X OFF | **N + 1 extra Group**: The extended power management runs one group more than is needed. |

## 3.6 Ground relay

In each group where the ground relay function is activated, the controllers in the group aim to connect the biggest running genset to the earth.

Ground relay information is not shared between groups. It is therefore possible to have the ground relay function activated in one group, and deactivated in another.

# 4. Plant controllers

## 4.1 Mains power transducer

Normally, the AC current and voltage inputs are used by the plant controller to calculate the power. However, if the current transformers are far away from the plant controller, a mains power transducer can be used. The plant controller however always needs the voltage measurements, since these are used for synchronising the breaker.

If a transducer is used for plant power measurement, it must be wired to multi-input 102. Multi-input 102 is configured in the USW on the *I/O setup* page. For wiring, see the **Installation instructions**.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 7261 | Transducer Range (max) | 0 to 20000 kW | 0 kW | The output of the transducer must be linear to the power. |
| 7262 | Transducer Range (min) | -20000 to 0 kW | 0 kW | |

The plant controller mains power transducers are configured independently. For example, one plant controller can use a transducer, while the other plant controller uses current inputs.

## 4.2 Fail classes in plant controller

Plant controller fail classes are:

- Block: An open MB cannot close.
- Warning
- Trip MB: The mains breaker is opened. The MB close sequence is blocked.

## 4.3 Multi-mains systems

### 4.3.1 MB fail start

The MB fail start function can also be used in extended power management.

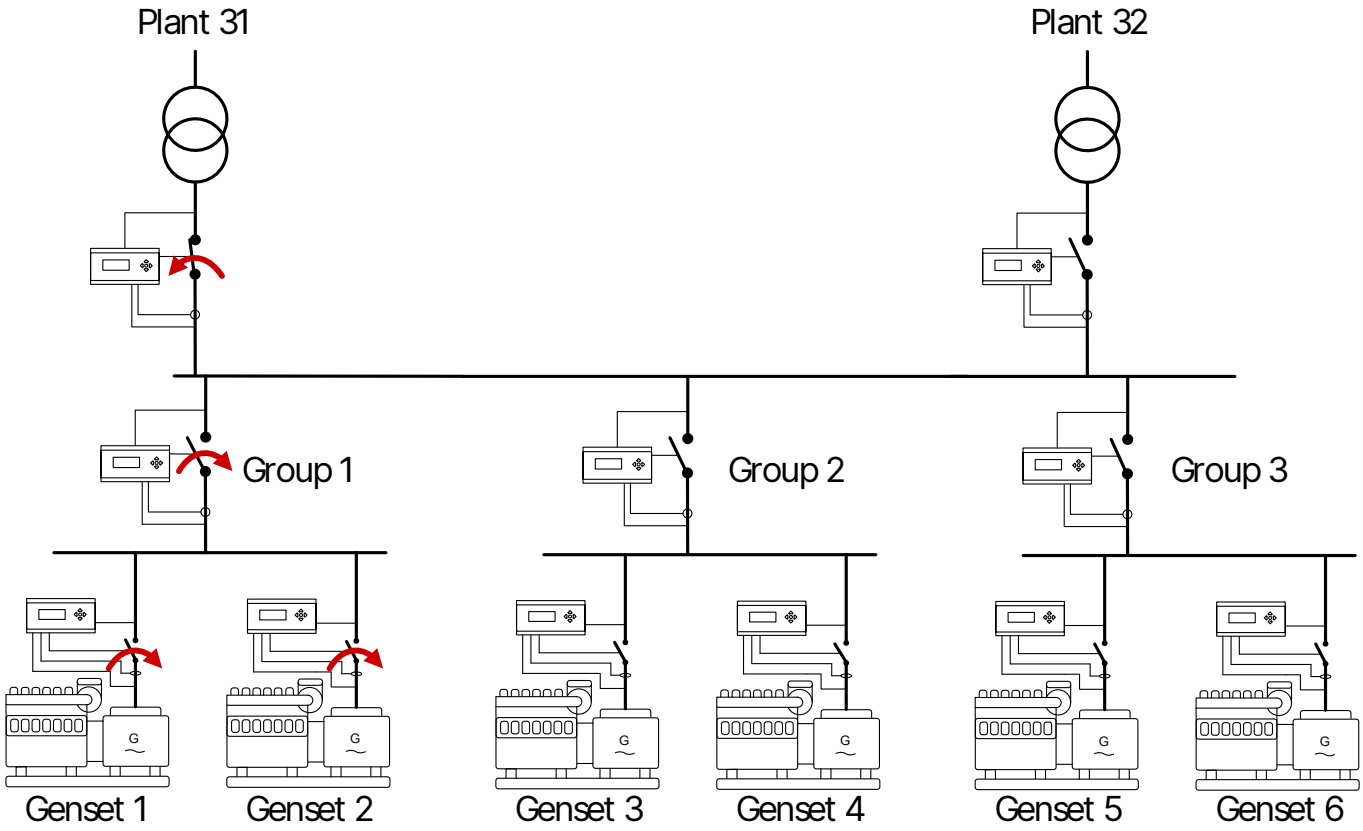
| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8181 | MB fail. start | Not enabled, Enabled | Not enabled | **Not enabled**: There is no automatic response to MB trips. |

#### Example of MB fail start

Plant configuration:

- MB fail start is enabled
- The two mains feeders are not allowed to be parallel
- Plant 31 is *ID to run*.

This means that MB32 is kept open. If Plant 32 has an alarm with the fail class *Trip MB*, the controllers do not start up the gensets, since the MB is already open.




The mains breaker that had previously been closed trips. This can be due to an overload, the breaker's own trip relay, or a digital input configured with the fail class *Trip MB*.

1. The alarm(s) with the fail class *Trip MB* in the plant controller activate the MB fail start.
2. The genset(s) in the group with first priority start. The number of gensets that start is determined by the load-dependent start/stop settings.
3. The genset(s) run until the alarm is acknowledged and the MB is able to close again.
4. If the trip is during running in, for example, mains power export operation, the gensets try to support the load.
5. When the alarm is acknowledged, if the MB is able to close, and the auto start signal is still active, the genset(s) synchronise to the grid and continue the mains power export operation.

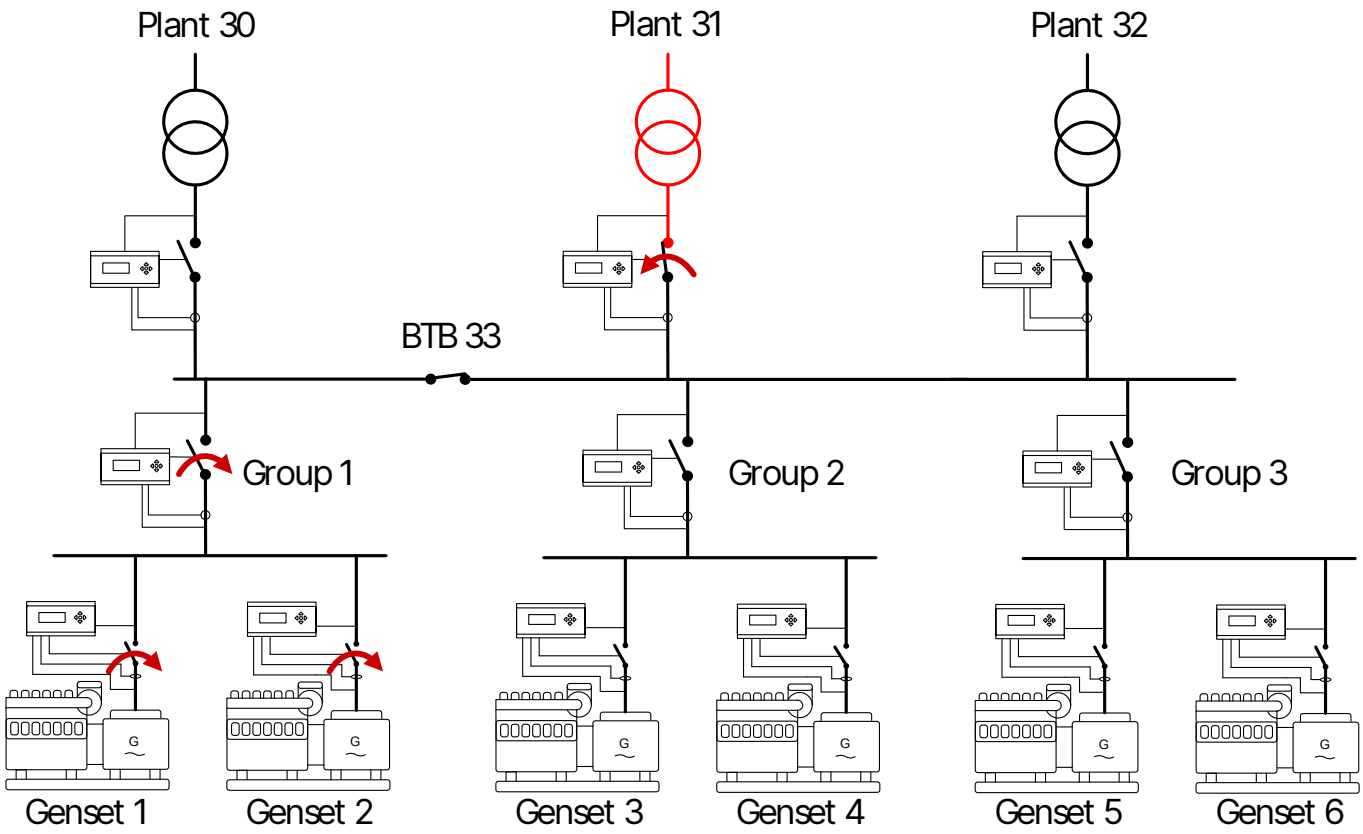
### 4.3.2 Auto switch

The controllers can do auto switch in extended power management. However, since there are no tie breakers between the mains feeders, the extended power management auto switch function is not the same as power management.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8184 | Auto switch | Off<br>Static section<br>Dynamic section<br>All sections | Off | See the examples below. |

**Auto switch *Off* example**

An application consists of 3 mains feeders, 1 BTB and 3 genset groups. The auto switch function is *Off*. The mains feeders are not allowed to be parallel, and plant 31 is *ID to run*. Plant 31 therefore supports the load.

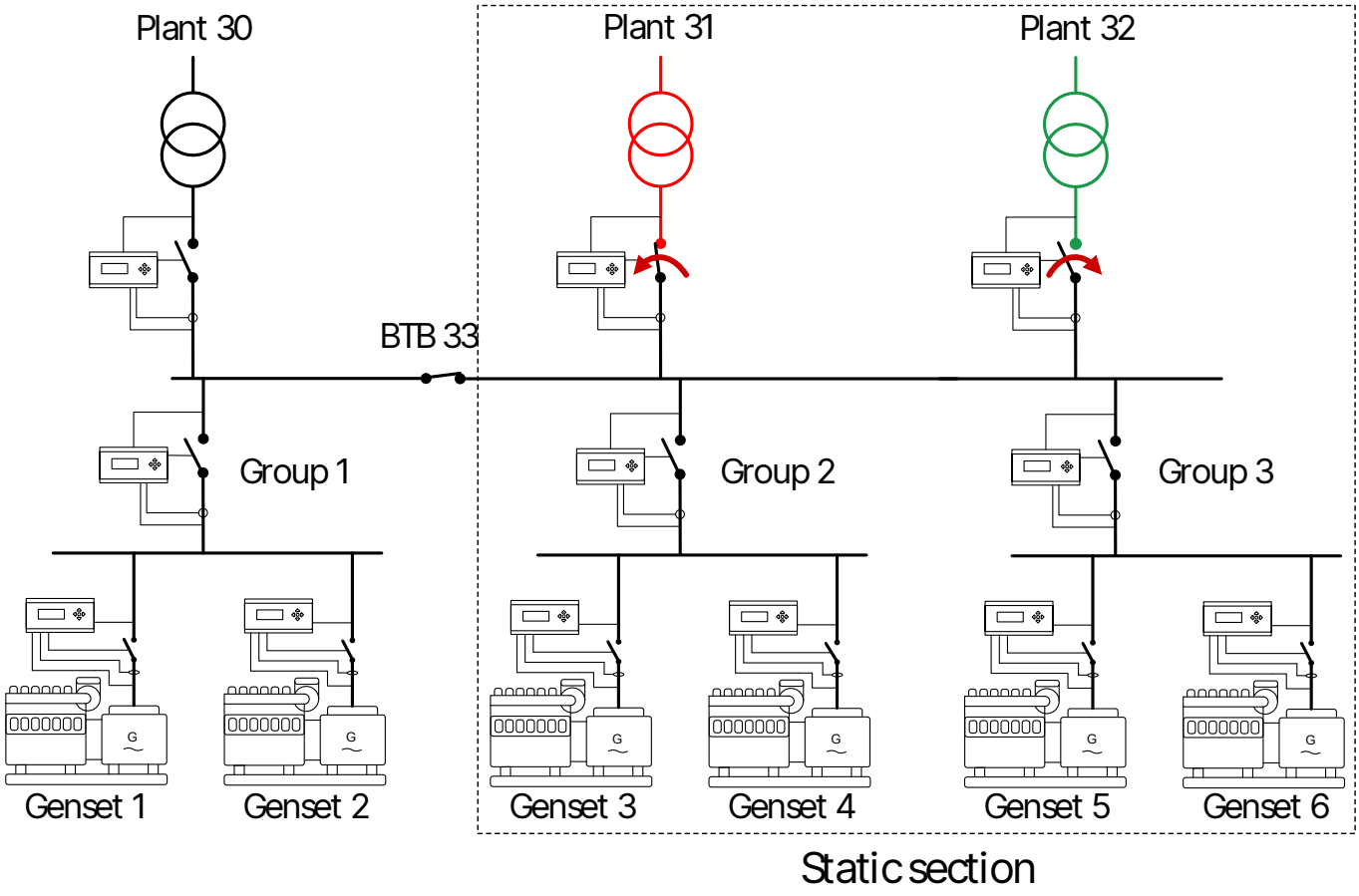



If the plant is set for AMF, or mode shift (7081) is on, when a mains failure appears, the group with the lowest ID gets a start signal. The multi-start setting in the genset controllers determines how many gensets start. The genset(s) then carry the load until the mains is back within normal limits.

If a mains failure appears at plant 30 or plant 32, but the voltage and frequency at plant 31 are within the limits, the controllers do not start genset(s). Since plant 30 and plant 32 are not connected to the load, plant 31 just continues to support the load. Only a mains failure at plant 31 could start genset(s).

### Auto switch *Static section* example

When the auto switch is set to static section, the plant controller can use another mains feeder as backup for supporting the load. The plant runs with the plant controller with *ID to run*, until the mains fails.

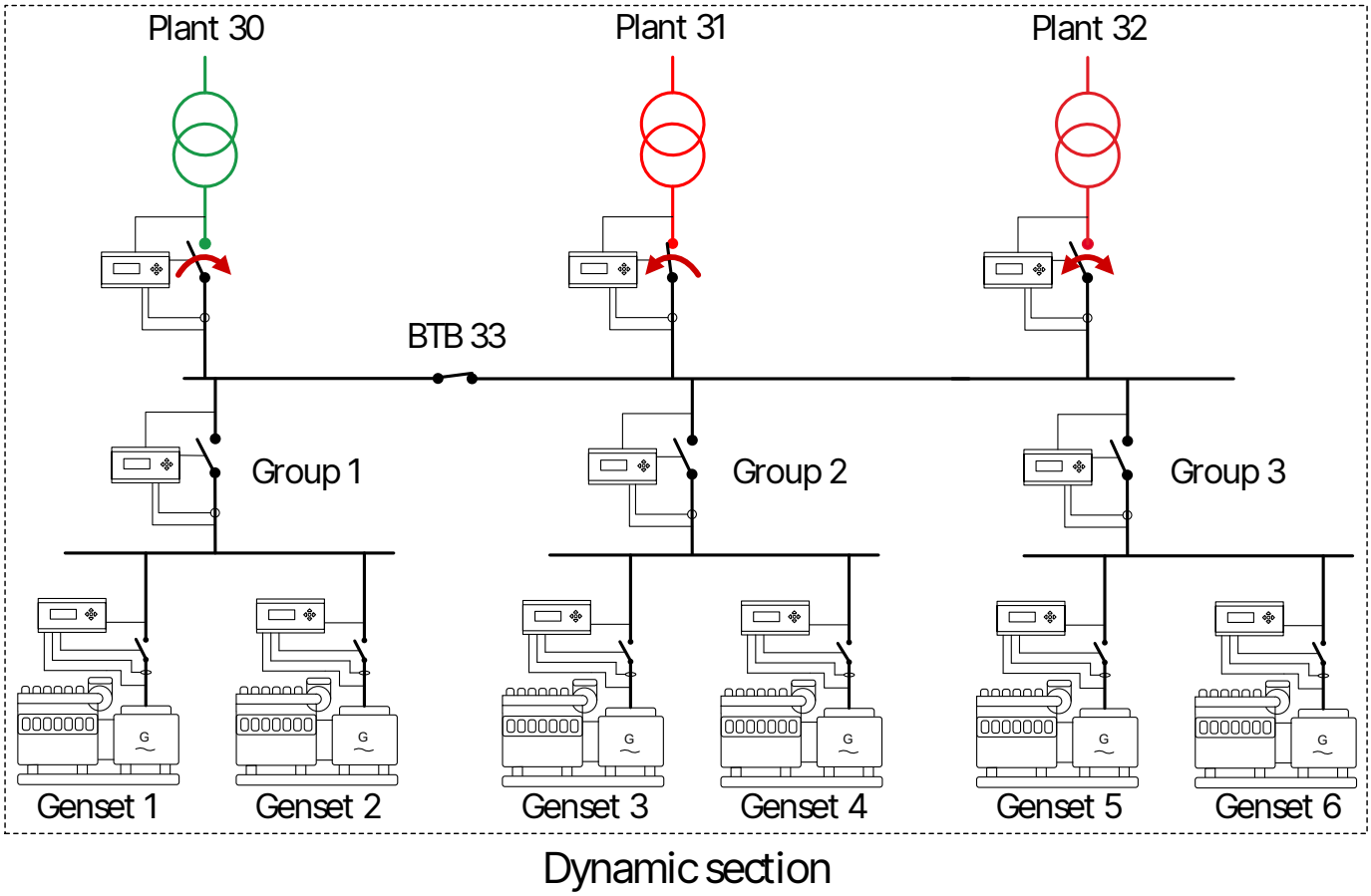



The controllers then check if another mains feeder within its static section is within the voltage and frequency limits, and ready to back up the mains feeder with failure. When auto switch is static section, the controllers can switch to mains feeders within the static section. So if plant 31 has a mains failure, it will switch to plant 32. If this one afterwards has a mains failure, the genset(s) start. The genset group with the first priority receives the start signal.

If mains feeder 32 comes back within the voltage and frequency limits first, the genset(s) synchronise to it, connect and deload. If mains 31 then afterwards comes back to normal, the mains 31 to support the load, since it has *ID to run*. If the mains feeders are not allowed to be parallel, or *no break transfer* is not enabled, the switch between mains feeders is handled as an open transition.

### Auto switch *Dynamic section* example

Dynamic section allows the use of mains feeders in another static section, but only if the BTB between the sections is closed.




The mains feeders are not allowed to be parallel, and the *ID to run* is plant 31. BTB33 is closed. That is, the application consists of one dynamic section (and two static sections). The mains feeders can be backups for each other across the closed BTB.

When plant 31 has a mains failure, the controllers first use the mains feeder in the same static section. This is plant 32. If plant 32 then has a mains failure, the mains feeder in another dynamic section can be used. In this case plant 30 is used as backup. If plant 30 then fails, the genset(s) start.

**Auto switch *All sections***

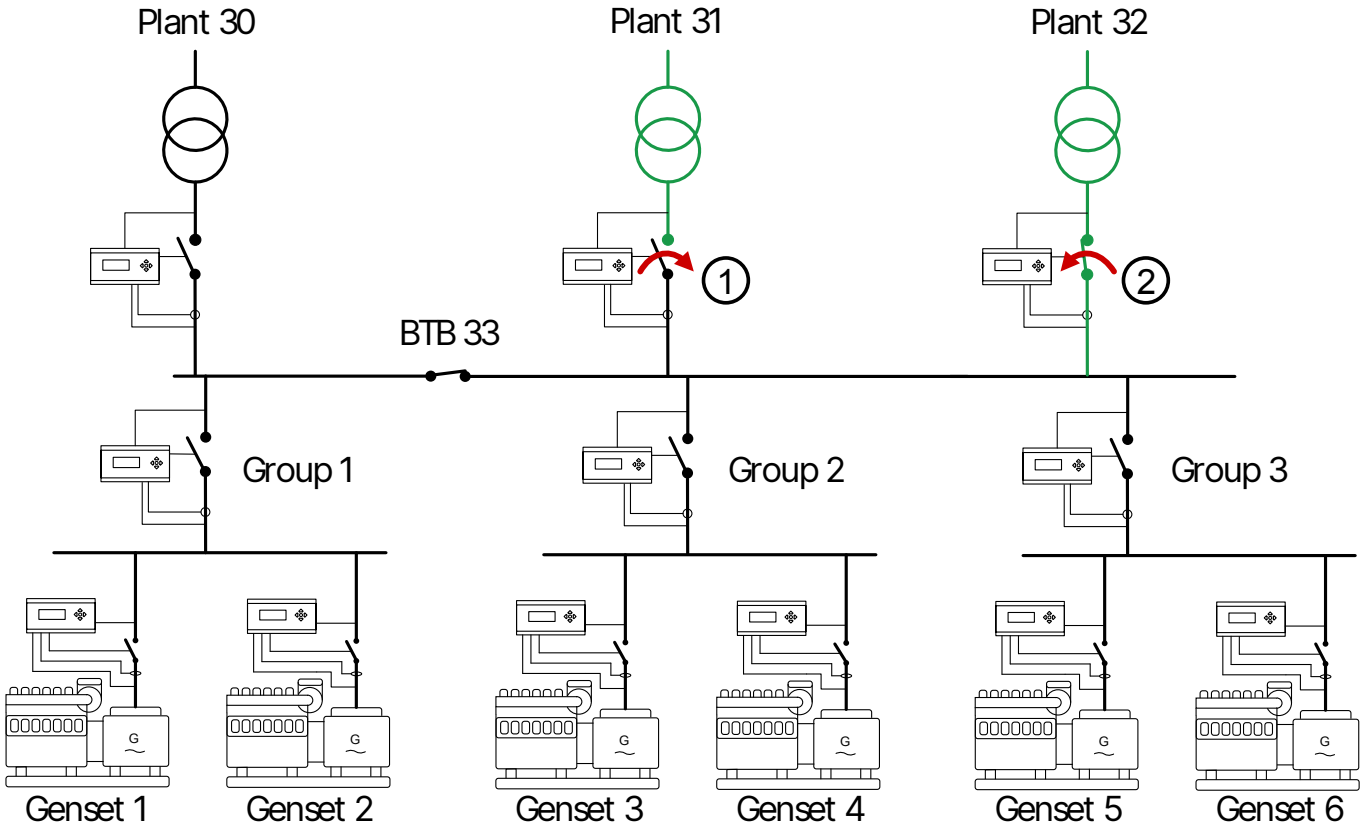
The extended power management auto switches between all mains, even if BTB are open when the switch is required. If required, the extended power management closes the BTB(s).

### 4.3.3 No break transfer

Extended power management includes the No Break Transfer (NBT) function. NBT allows mains feeders to be parallel when the plant is returning to normal after an auto switch sequence. It is basically a short-time parallel between mains feeders.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8183 | No break trans. | Not enabled, Enabled | Not enabled | See the example. |

**No break transfer example**




In this application, plant 31 is the *ID to run*, but has had a mains failure. The voltage and frequency are back within normal limits, so the mains feeder can again support the load.

NBT allows the two mains feeders to be parallel during this operation. The breaker at mains feeder 31 is therefore closed, and afterwards the breaker at mains feeder 32 is opened. If NBT was not enabled, this would have been handled as an open transition.

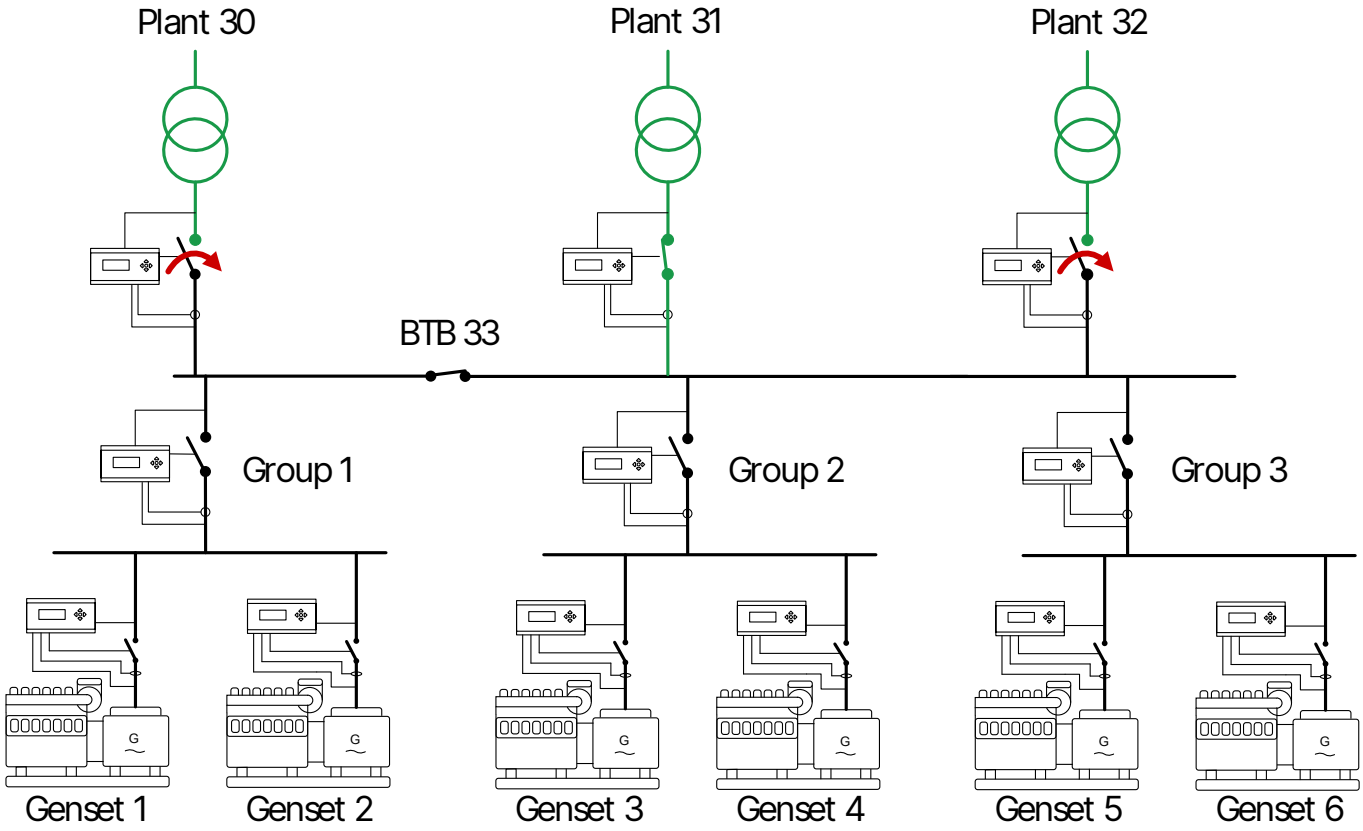
### 4.3.4 Parallel

The parallel function allows long-time parallel for two or more mains feeders. The parallel function can be used, for example, in mains power export, where the genset(s) have to be parallel to more than one mains feeder. Alternatively, the operator wants to have more than one mains feeder parallel while the genset(s) are not running.

**NOTE** When parallel is enabled, no break transfer is also enabled. You do not have set parameter 8183 to enabled.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8182 | Parallel | Not enabled, Enabled | Not enabled | See the example. |

**Parallel example**




The gensets are not running,. The run type (parameter 8185) is *Run all mains* and therefore all the mains feeders should be parallel when supporting the load. However, the controllers need to know that the mains feeders are allowed to be parallel. When parallel is enabled, the open mains breakers synchronise and close.

### 4.3.5 MB fail start + Auto switch + No break transfer

In extended power management, MB fail start and auto switch can be combined. When these settings are combined, the application should consist of more than one mains feeder (since the auto switch does not make any sense if the application only has one mains feeder). The systems' behaviour is similar to power management.

With the MB fail start and auto switch combined, the controllers use another mains feeder as backup if there is an alarm with the fail class of *Trip MB* on one of the plant controllers. Only alarms with *Trip MB* or a mains failure activate the auto switch to another mains feeder. If auto switch is used, and MB fail start is deactivated, then auto switch is only used when there is a mains failure.

With no break transfer activated, the controllers treat the auto switch as a closed transition.

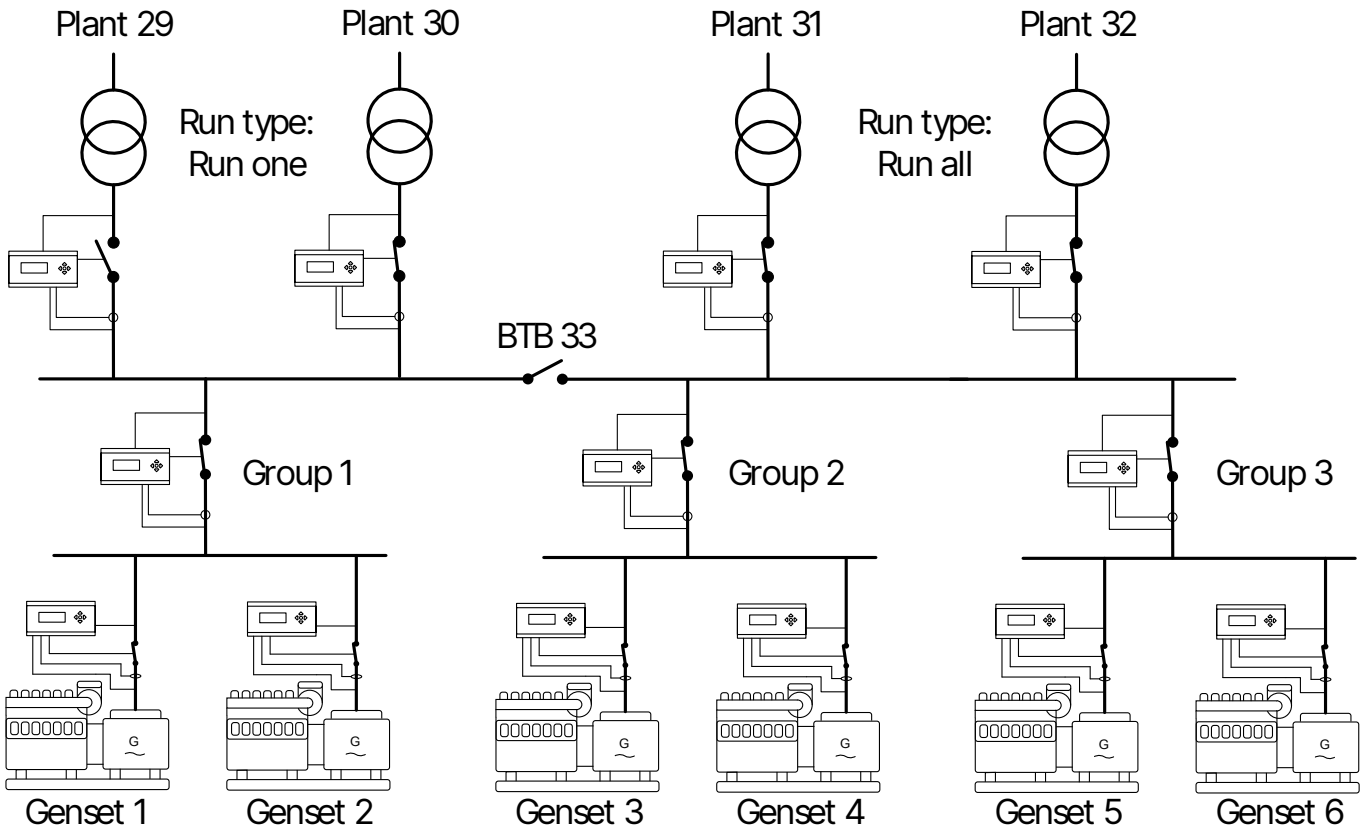
### 4.3.6 Run type + Include/exclude from run all

Like power management, the run type also influences the plant operating mode in extended power management.

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| 8185 | Run type | Run one mains | Run one mains | See the examples. |

| Parameter | Name | Range | Default | Note |
|---|---|---|---|---|
| | | Run all mains | | |
| 8186 | Run type (ID to run) | 1 to 32 | 32 | The plant controller to that decides the power set points. This mains feeder connection is also used if 8185 is *Run one mains*. |
| 8196 | Excl. run all | Not enabled, Enabled | Not enabled | **Enabled**: The mains feeder is excluded. Note that if the *ID to run* is excluded, that controller's power set points are still used.<br><br>Alternatively, use M-Logic, *Output > Inhibits > Exclude from Run All sequences/Include in Run All sequences*. |

**Two static sections example**

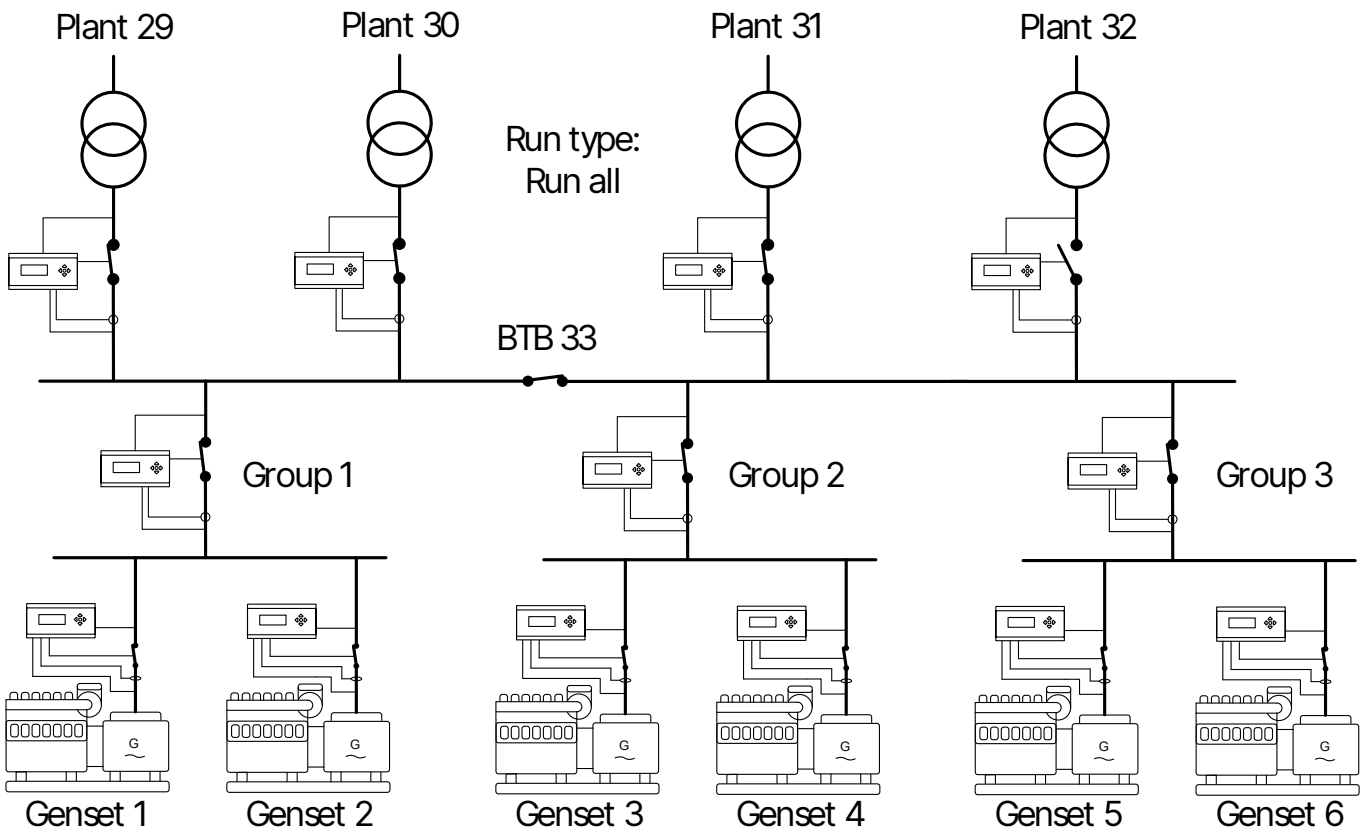



The BTB is open, so the system is divided into 2 static sections.

In the left section, the run type is *Run one mains*. The plant mode is, for example, mains power export. The gensets now only export to one mains feeder. The mains feeder to exported to is decided by the *ID to run*. This mains feeder also decides the power set point.

In the right section, the run type is *Run all*. When the plant operating mode is mains power export, the controllers will export to all the mains feeders. The plant with *ID to run* decides the power set point. If the gensets must run in parallel to all the mains feeders at once, the mains feeders must be allowed to be parallel.

**One section example**




The BTB is closed, so the application consists of one section. The run type is set to run all, and the plant mode is mains power export. Furthermore, the mains feeders are allowed to be parallel.

When the run type is set to run all, the controllers try to be parallel to all mains feeders. If this it is not intended, the mains feeders can be excluded individually from the run all sequence.

## 4.3.7 ID to run

In power management, the *ID to run* affects the operating modes. This is similar in extended power management. In extended power management, the controllers need at least one *ID to run*.

If the application is divided into 2 sections by an open BTB, the controllers need an *ID to run*, on each side of the BTB. The ID has to be located on each side of the open BTB. Otherwise, the controllers give the alarm *ID to run conf fail*. If the BTB is opened, then the dynamic section without an *ID to run* will return to how it was before the BTB was closed. The *ID to run* in the dynamic section which had the shared *ID to run* remains the same.

The *ID to run* decides the power set points for fixed power, mains power export and peak shaving. It also controls the cos phi and power offsets. Some of these must be allowed to be controlled from the plant controller.

**Effect of ID to run on test mode**

In extended power management, the plant controller also decides the power set points for the different test types.

If the run type is set to *Run one mains*, only this mains feeder is used for exports. In a load take over sequence, this feeder is also the only one that deloaded. In a load test, the gensets also run in parallel with this feeder. In a full test, only this mains breaker is deloaded.

# 5. ASC-4 Solar in extended power management

## 5.1 Overview

You can include photovoltaic power in an extended power management plant. The ASC-4 Solar is included in the top level application configuration (that is, the level with the plant and group controllers).

The ASC-4 Solar must have option G5 and option G7. For the *Operation mode* (parameter 6071), select *Power management*.

The power management system does not regulate the photovoltaic power, but accepts the photovoltaic power that is produced. As required, the power management system regulates the rest of the plant.

**NOTE** If the application includes ASC-4 Solar, the software version for AGC-4 controllers must be at least 4.82.4.

### CAN IDs for ASC-4 Solar

In an extended power management plant, the ASC-4 Solar controller uses one CAN ID. Configure the ID in *PM CAN ID* (parameter 7531).

## 5.2 Configuration of the top level for ASC-4

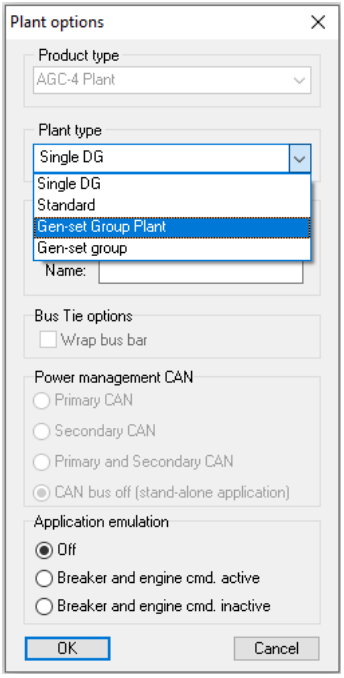
Connect to **a plant controller** with the Utility Software. Open *Application configuration* in the left bar.

Select the *Read plant configuration from device* icon on the top bar. 

The *Read* window opens. Select all applications to read.

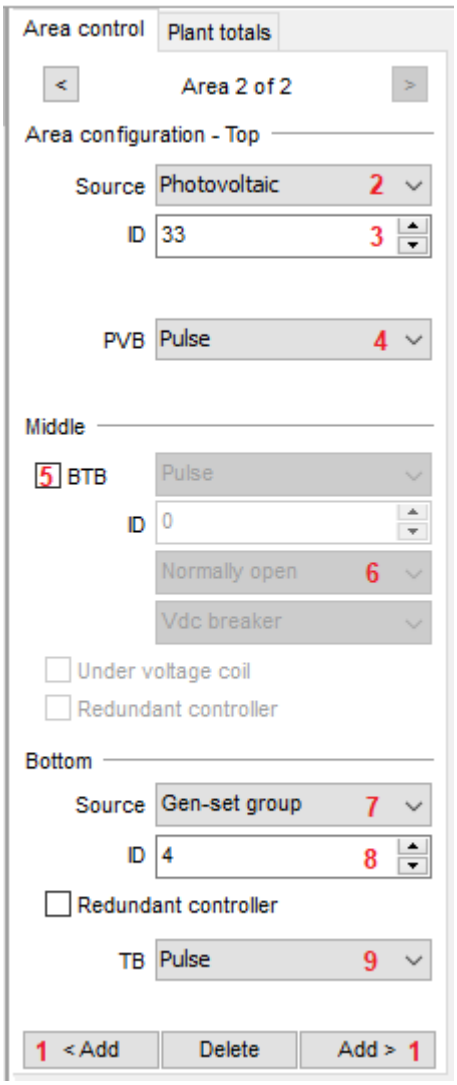
After reading the applications, select *Application 4*. Select the *New plant configuration* icon: 

The *Plant options* window opens:



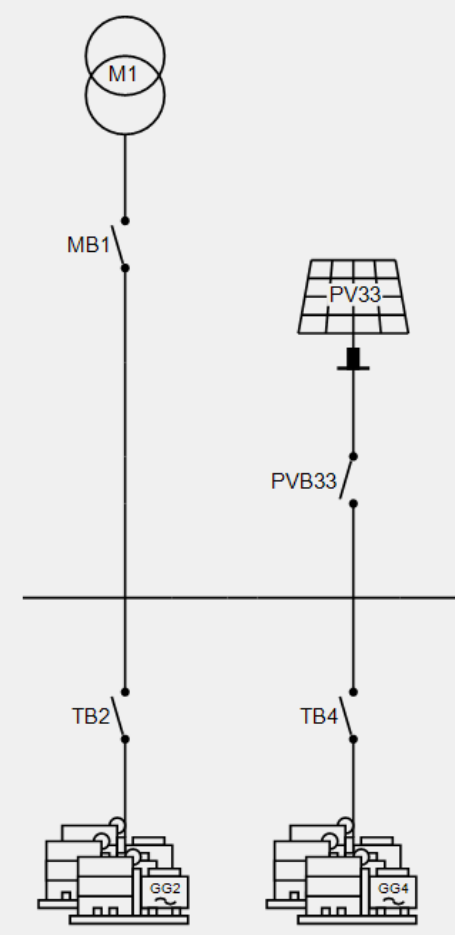

For *Plant type*, select **Gen-set Group Plant**. Select the *Power management CAN* and whether the controllers should be using emulation, then select **OK**.

For a selected area, the left side of the application configuration can look like this:




| Number | Description |
|---|---|
| **1** | Add and delete areas. Adding areas makes the application/plant bigger. |
| **2** | Select the type of power source for the top of the selected area. |
| **3** | Set the internal command ID. This ID should correspond to the ID in the controller (parameter 7531). |
| **4** | Since *Photovoltaic* is selected in the source, you can choose the photovoltaic breaker type (Pulse, Ext/ATS no control, Continuous NE, or None). |
| **5** | If there is a BTB at this position on the groups busbar, select BTB. Choose the breaker type (Pulse, Ext, Continuous NE, or Compact). |
| **6** | Select whether the BTB is normally closed or normally open. |
| **7** | Select the type of power source for the bottom of the area. |
| **8** | Set the internal command ID. This ID should correspond to the ID in the group controller (parameter 7541). |
| **9** | Since *Genset group* has been selected in the source, you can choose the Genset Group tie breaker type (Pulse, Continuous NE, Compact or None). |

After configuring the two areas, the top level in this example could look like this:




The configuration for the plant must be sent to the controllers. Select the *Write plant configuration to device* icon.

After this, only the plant controller has the new configuration. To send the new configuration to all other controllers, select the broadcast icon.