DEIF

-power in control

CE

MULTI-LINE 2
APPLICATION NOTES

M-Logic
Internal Logic Controller
for PM (Plant Management)

- Description of M-Logic
- Functional description
- List of possible selections for logics

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1. Delitimation

1.1 Scope of application notes, M-Logic

1.1.1 Scope of the application notes

This document covers: "AGC PM Genset" version 5.03.0, utility software USW version 3.41.0.

2. General information

2.1 Warnings, legal information and safety

2.1.1 Warnings and notes

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

Warnings

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

Notes

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

2.1.2 Legal information and disclaimer

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

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.

2.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

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

2.1.4 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.

2.1.5 Factory settings

The Multi-line 2 unit is delivered from factory with certain factory settings. These are based on average values and are not necessarily the correct settings for matching the engine/generator set in question. Precautions must be taken to check the settings before running the engine/generator set.

2.2 About the application notes

2.2.1 General purpose

This document includes application notes for DEIF's Multi-line 2 unit. It mainly includes examples of different applications suitable for the unit.

For functional descriptions, the procedure for parameter setup, parameter lists etc., please see the Designer's Reference Handbook.

The general purpose of the application notes is to offer the designer information about suitable applications for the Multi-line 2 unit.

Please make sure to read this document before starting to work with the Multi-line 2 unit and the genset to be controlled. Failure to do this could result in human injury or damage to the equipment.

2.2.2 Intended users

The Application Notes are mainly intended for the person responsible for designing Multi-line 2 systems. In most cases, this would be a panel builder designer. Naturally, other users might also find useful information in this document.

2.2.3 Contents and overall structure

This 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.

3. Purpose of M-Logic

3.1 Introduction

3.1.1 Introduction to M-Logic

The M-Logic is a small logic controller embedded in the Multi-line 2 unit. Even though it is a logic controller, it can not be equated with a PLC. The M-Logic can be compared with a PLC limited in functionality and can only be used for uncomplicated tasks. The M-Logic can only carry out binary control functions; there are no possibilities for analogue reading and/or control functions. It can be programmed from the free PC tool called DEIF Utility Software (USW version 3.41.0). From the software portal at **www.deif.com,** the USW can be downloaded.
M-Logic operations use command lines. There are 40 lines in all.
Each line contains:

- 3 Events* (Event A, Event B, Event C)
- 2 Operators (used for logic selection OR, AND)
- 1 Delay (sec.) (used for delaying the output, measured in seconds)

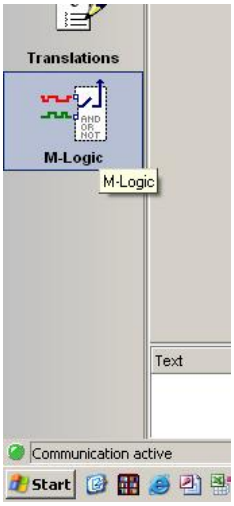
*If three events are not enough, a number of virtual events can be used to pass the control to another line and carry it out there. This makes it possible to build larger event-based controls.

4. Configuration

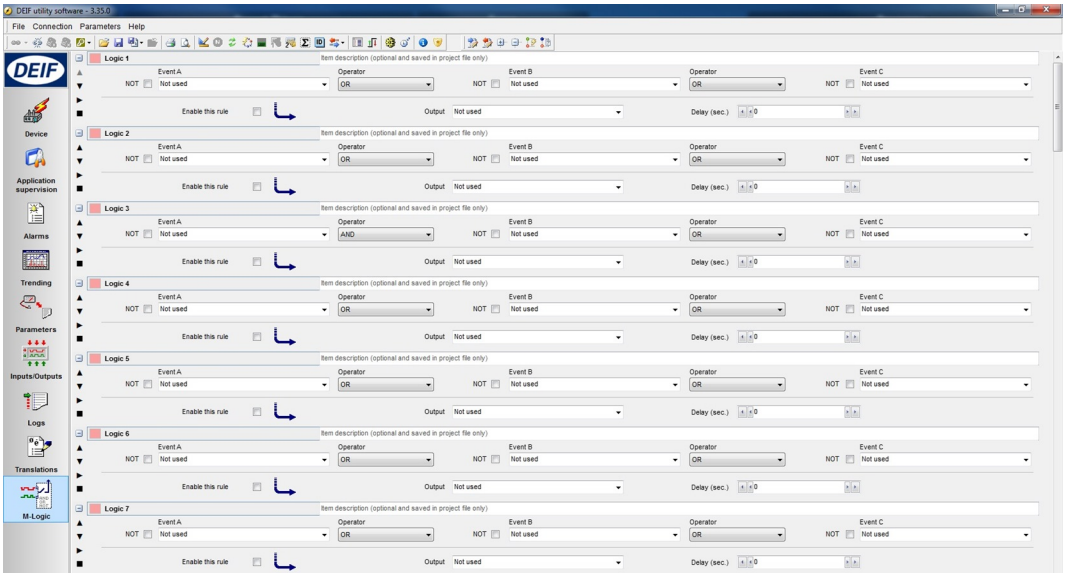
4.1 Starting

4.1.1 Starting the M-Logic

Once the USW has been started, there will be an icon on the lower left-hand side to activate M-Logic



Click the icon, and the following screen appears:



4.2 Read/write

When the M-Logic icon is selected, you will see a toolbar at the top of the screen, which contains the M-Logic menus:

There is a menu for writing and a menu for reading the M-Logic configuration.

Read M-Logic settings from the unit
Activating this button will read all M-Logic settings from the unit to the USW.

Write M-Logic settings to the unit
Activating this button will write the M-Logic settings from the USW to the unit.

4.3 Save/open

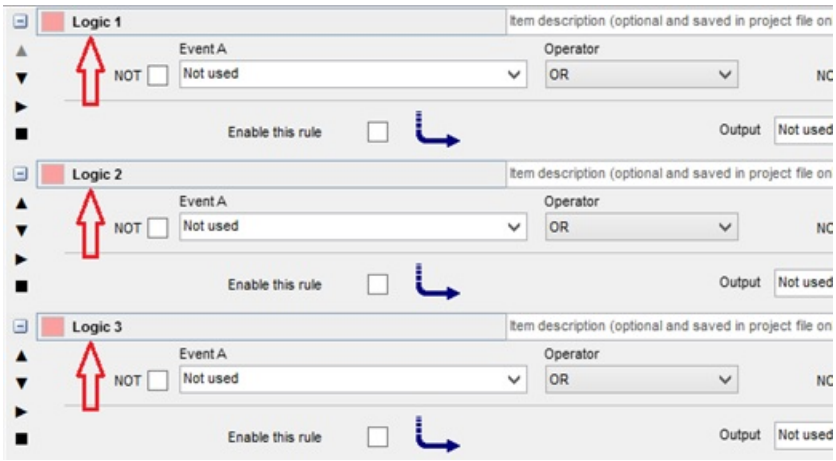
Save
Activating this button makes it possible to save the M-Logic configuration to file (part of the general Multi-line 2 configuration file ".USW").

Open
Activating this button makes it possible to open a previously saved logics file.

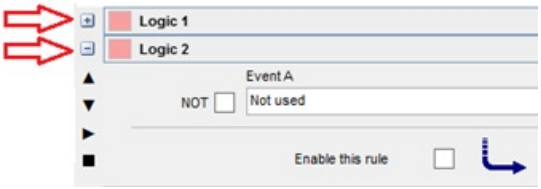
4.4 Basic functions

4.4.1 Logic lines

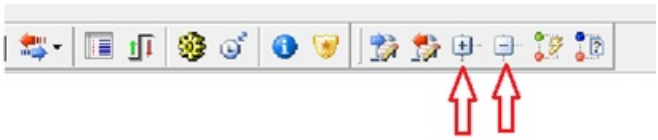
The M-Logic consists of a number of "lines": Logic 1, Logic 2, Logic 3, … Logic 40:



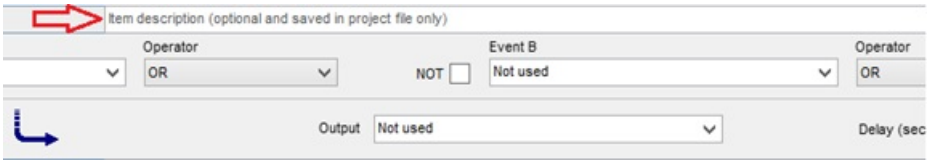
The logic lines can individually be collapsed or expanded by using the buttons (Click to collapse this item) or (Click to expand this item):



All logic lines can also be collapsed or expanded at once by using the buttons (Collapse all items) or (Expand all items) in the toolbar:

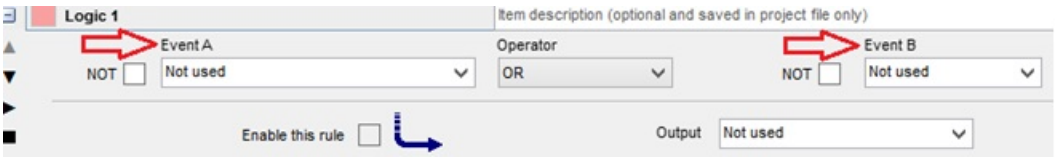


All logic lines have a text field “Item description (optional and saved in project file only)”, used for function description, which will be stored in the usw project file (.usw) only and not stored in the AGC:

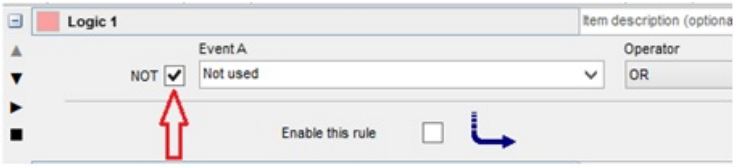


4.4.2 Event A, B, C

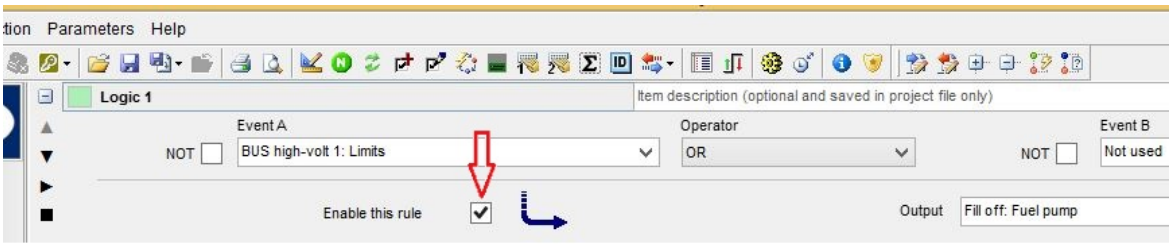
Every logic contains three events: Event A, Event B and Event C. They are triggering the logics:



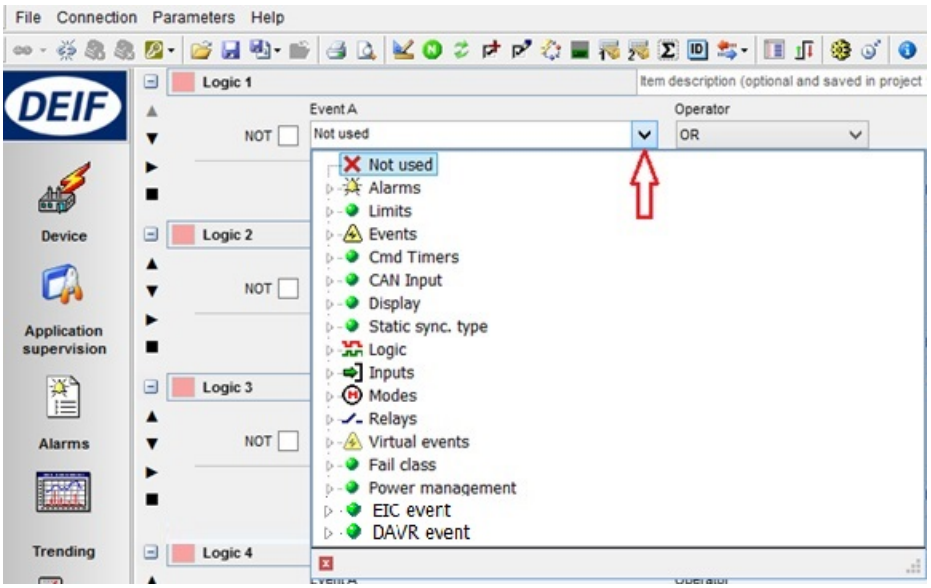
All events can be inverted by setting a tick at “NOT”. If there is no tick at “NOT”, the event is automatically not inverted:



The whole logic line, for example Logic 1, with the selected configuration, is only active if “Enable this rule” is marked. If this tick box is not ticked, the logic in question will not operate:



When opening the scroll down box at an event, all options for the chosen event are displayed. Note that Event A, Event B and Event C is different from “Events" (with yellow warning) in the scroll down box. They are randomly called similar (Events).



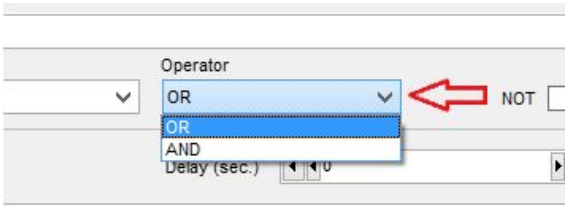
4.4.3 Explanation Event A, B, C

Alarms	Use an alarm to activate. All alarms are available as events in the alarm category. Note that the list will show all alarms, also those that are not available in the present configuration of basic unit and options.
Limits	Same as alarms, only with no time delay on binary inputs.
Events	Events that are not alarms, just information, for example "Engine running".
Cmd Timers	If the activating (triggering) event is required to be a pulse, these can be used (1 sec.pulse).

CAN Input	Status of M-Logic functions broadcasted on the power management CAN line. The CAN inputs are handled as binary inputs but are CAN telegrams in the power management CAN line.
Flip flop	The Flip Flop function can be used as latch/unlatch function.
Display	When multiple DU-2 (view button present) displays are used, the command will set the desired display as the primary.
Static sync. type	Selected static sync. functionality. If the activating (triggering) event is required to be a pulse, these can be used (1 sec. pulse). Selected static sync. functionality. If "Static synchroniser" is selected in menu 2000, then possibility to select GB or MB will be synchronised.
Logic	Can be TRUE or FALSE. TRUE means always, FALSE means never.
Inputs	Direct activation of a digital input. The availability of digital inputs is option-dependent.
Modes	Running modes and plant modes, e.g. "AUTO".
Relays	Activation when a relay activates. The availability of relay outputs is option-dependent.
Virtual events	A number of internal (virtual) events that can be activated (Status: ON) or deactivated (Status:OFF) and used in another logic line. By using these virtual events, the number of activating (triggering) events can be expanded from the three available in each logic line to, in theory, an unlimited number of events. Virtual events can also be triggered from Modbus. These are used as interconnection between multiple logics to enhance the possible number of events in one sequence.
Fail class	The event activates upon activation of any alarm with the chosen fail class.
Power management	Status related to power management, multiple gensets, option G5 needed.
EIC event	Engine Interface Communication event. Events that are related to engine communication. (The event is option H5/H7-dependent).
DAVR event	Digital Analogue Voltage Regulator event. Events that are related to Digital AVR. Digital AVR is called option T2 and is only functional if H5, H7, H12 or H13 and D1 is already used. Digital AVR is a device for voltage regulation at AGCs using J1939 CAN communication, e.g. DEIF DVC 310.

4.4.4 Operators

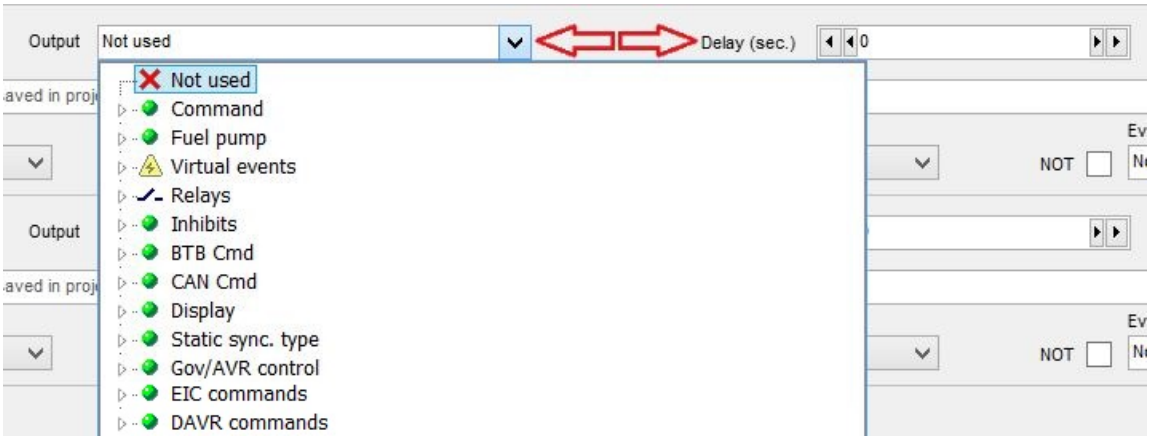
Two operators are available, and they can be: “OR” (any operator activates the function output), “AND” (all activated operators must have status ON to activate the function output)..



When building a Logic line notice:
Event A **OR** Event B **AND** Event C is equivalent to Event A **OR** (Event B **AND** Event C).
Event A **AND** Event B **OR** Event C is equivalent to (Event A **AND** Event B) **OR** Event C.

4.4.5 Output

This is the selection of the reaction of the system upon activation of the function. Note that the output has a delay function. If set to 0 s (default), there is no delay.



4.4.6 Explanation output

Command	Command to the Multi-line unit, e.g. select AUTO running mode.
Fuel pump	Different commands regarding the fuel pump logic can given with the commands located here. The fuel logic is described in the Power management chapter.

Virtual events	A number of internal (virtual) events that can be activated and used in another logic line. By using these virtual events, the number of activating (triggering) events can be expanded from the three available in each logic line, in theory, to an unlimited number of events. Virtual events can also be triggered from Modbus. These are used as interconnection between multiple logics to enhance the possible number of events in one sequence.
Relays	Relay output activated. Selection of a relay output; the selection is option-dependent. The number relates to the lowest terminal number of the output. If a relay output is chosen, the relay in question must be set up to be a limited relay output. This is done in the parameter list under "OUTPUTS".
Inhibits	A selection of inhibit functions for the alarms and other inhibits.
BTB Cmd	Command to the Multi-line unit to check status Bus Tie Breaker. Used when the feedbacks of the external BTBs has to be programmed.
CAN Cmd	Command to the Multi-line unit connected to the power management CAN line, e.g. select AUTO running mode in all Multi-line units.
Display	When multiple DU-2 displays are used, the command will set the selected display to be the primary one.
Flip flop	Used when a Flip Flop function either has to be activated or deactivated.
Hour count	How long each counter has been active can be programmed to be shown in the display of the controller.
Static sync. type	Selection between static sync. functionalities.
Gov/AVR control	Possibility to force the speed/voltage control up or down for 5 sec. When using the display arrows for increasing or decreasing, the output will change as long as the button is active. A timer is used to adjust how long (0.1-10.0 seconds, see Parameter 2782 "Man. Step GOV") one pulse from a digital input or one press on an AOP keeps the governor increase/governor decrease up. For example, if the timer is set to 5 sec., then one press on the AOP or one pulse from a digital input will give 5 sec. governor increase/governor decrease.
EIC commands	Commands that are related to engine communication. (The controller has to have engine communication established to the the ECU).
DAVR commands	Commands from DAVR to control the stator current in the genenrator. Digital AVR is a device for voltage regulation at AGCs using J1939 CAN communication.
GP PID commands	Commands for the "General purpose PIDs". This could be e.g. reset or force to a minimum or maximum.

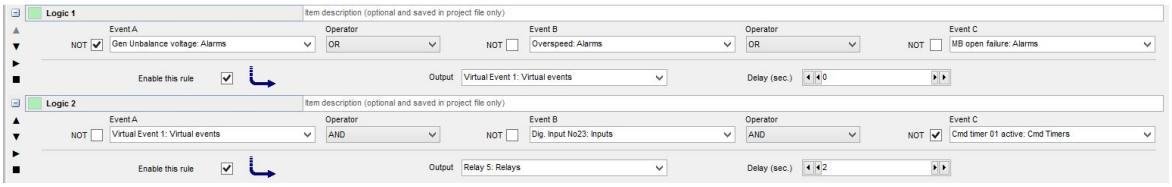
4.5 Examples

By selecting options in Event A, Event B, Event C, rules can be made for the use of the M-Logic.

4.5.1 Virtual events

Virtual events are used to expand the number of events in a logic sequence.
Status of virtual events (ON/OFF).

The following shows how the output of Logic 1 is used to continue the sequence in Logic 2.
Example:



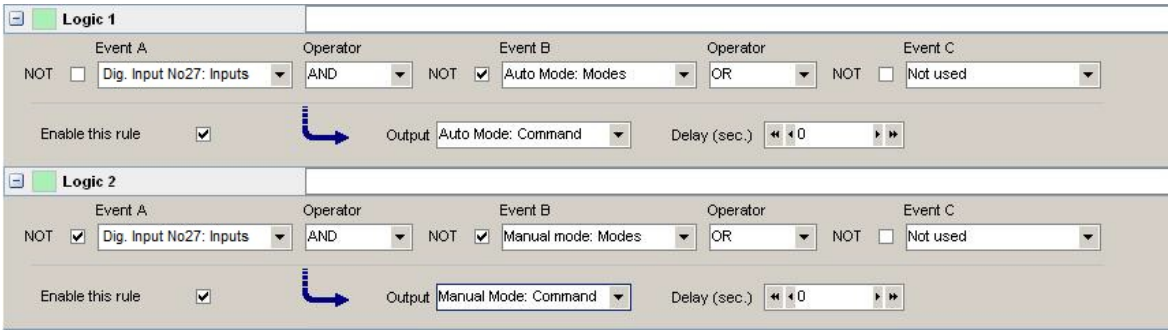
Both ticks in "Enable this rule" is activating Logic 1 and Logic 2.
WHEN there is no alarm (NOT is ticked in Event A) in "Gen Unbalance voltage" (selection in Event A)
OR (selected Operator) there is an alarm in "Overspeed" (selection in Event B)
OR (selected Operator) there is an alarm in "MB open failure" (selection in Event C)
THEN "Virtual Event 1" (selected Output) is active without delay (0 in "Delay (sec))

Output in Logic 2 is set to Virtual Event 1. (The Output "Virtual Event 1" of Logic 1 is transferred to the Event A of Logic 2).
This gives a total of five events to activate the selected Output, for example (Relay:5:Relays).
Three in Logic 1 (Event A + Event B + Event C) and two in Logic 2 (Event B + Event C).

4.5.2 Shift function with a single binary signal

If a single binary signal is used for example to change the running mode of an AGC PM from AUTO to MANUAL, a shift function can be defined in the M-Logic.
The function requires two digital inputs and resembles a set/reset function from a Flip-Flop.

In the following example, a binary signal "Dig. Input 27" is used to shift between AUTO (input ON) and MANUAL (input OFF).



In case the AUTO/MAN shifts happen too fast, the delay (sec) can be used to slow them down.

Explanation of the Logic lines:
Logic 1:
IF Dig. Input 27 (Event A) = ON (NOT is not ticked)
AND Auto Mode = OFF (NOT Auto operation mode, NOT is ticked),
THEN immediately trigger (Delay (sec.) = 0) at Output the Command: Auto Mode. (Shift to Auto Mode)

Logic 2:
IF Dig. Input 27 (Event A) = OFF (NOT is ticked)
AND Manual mode (Event B) = OFF (NOT Manual operation, NOT is ticked),
THEN immediately trigger (Delay (sec.) = 0) at Output the Command: Manual Mode. (Shift to Manual Mode)

The result of the two logics from above is a shifting running mode between Auto Mode and Manual Mode in the AGC PM every time Dig. Input 27 is activated and deactivated.

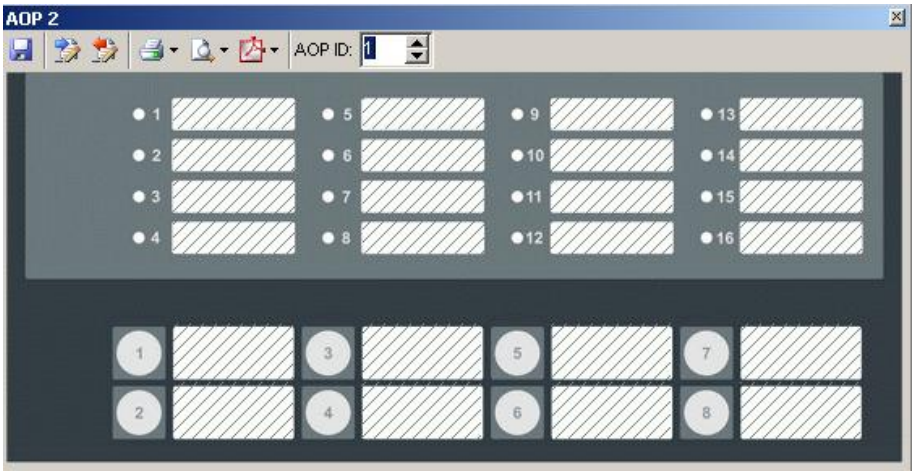
4.5.3 Toggle function with AOP-2

Using a single button to toggle between two running modes, AMF or Load Take Over (LTO).

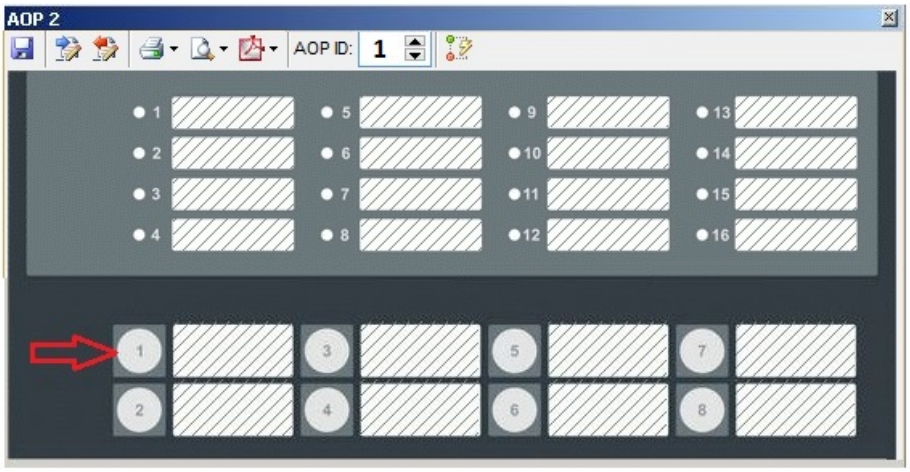
In this example, the button no. 1 on the AOP-2 (configured in a separate tool) is used to activate Virtual Event 1. Logic 1 selects AMF if the mode is NOT AMF, and Logic 2 selects LTO mode if the mode is NOT LTO. In this way, one single button can be used for toggling between AMF and LTO modes.

Open the AOP-2 configuration by pressing the keyboard 2 symbol from the USW menu list as shown below:

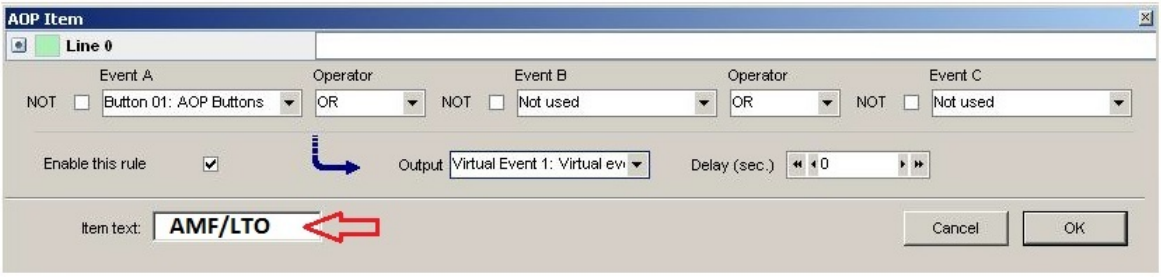
The window below appears.



Press button 1:

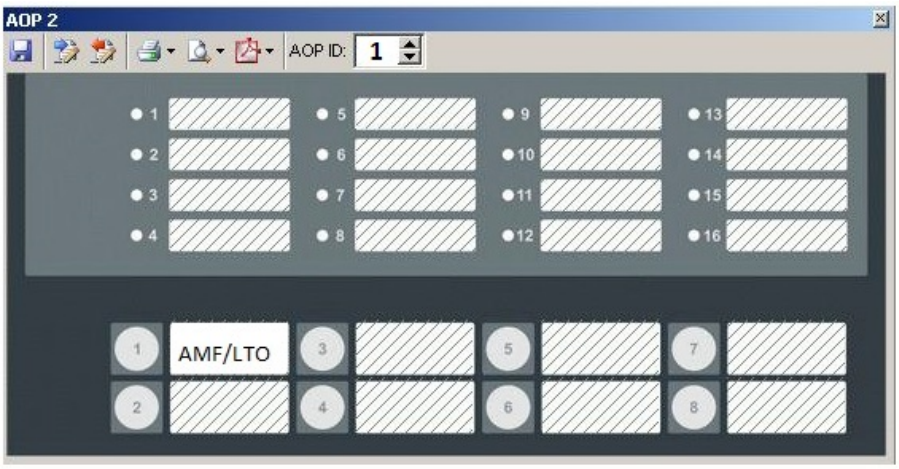


After clicking button 1, the pop-up must be configured as below:

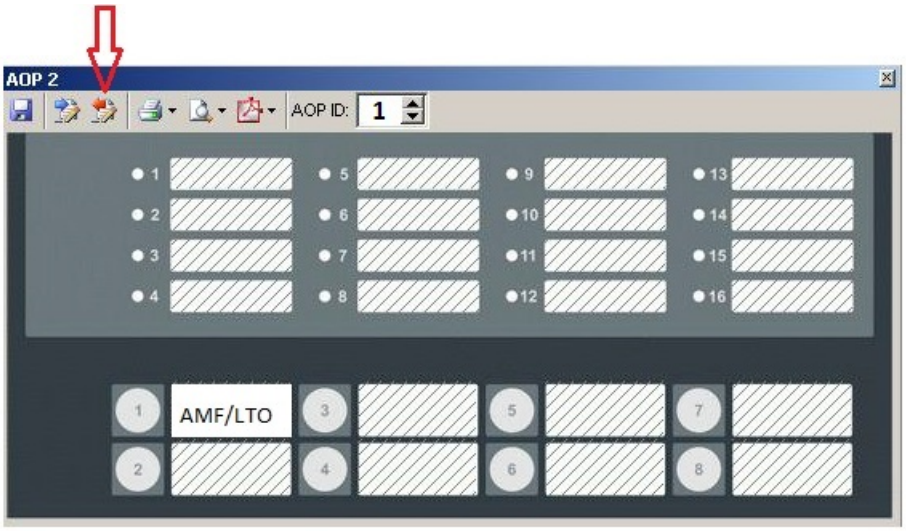


The item text can be written individually and printed, so it can be put in the AOP-2 front pockets. In this case, it is "AMF/LTO".

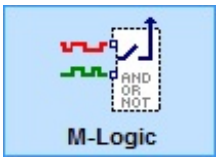
Click OK. The following will be seen:



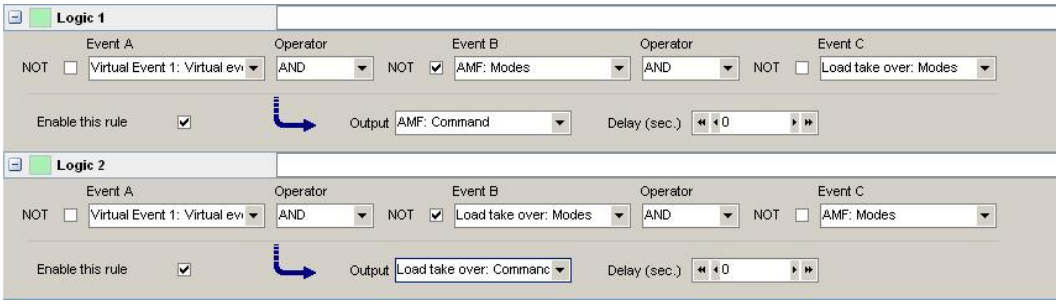
Now all changes for the AOP-2 must be saved in the AGC PM controller by using the writing symbol, see below:



Now close the window and select M-Logic (bottom left side):



Select the configuration from below:



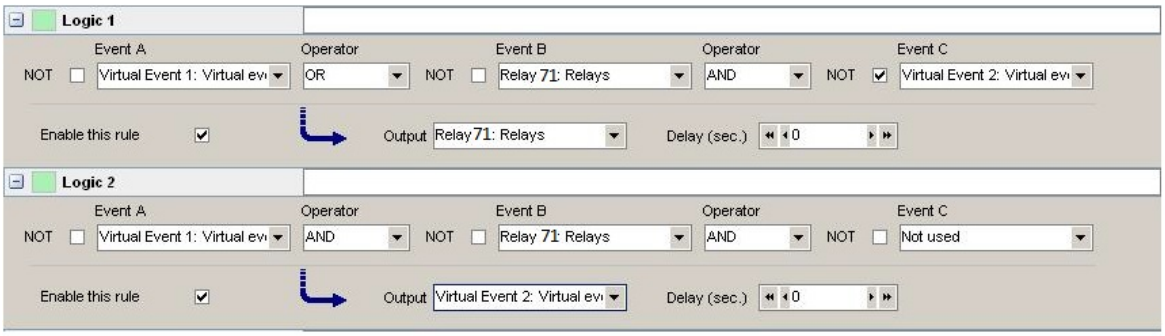
Write the selections to the AGC PM controller:

Now by pressing button 1 on the AOP-2 (AMF/LTO), the genset running modes can be changed between AMF and LTO.
The changing is shown on the AGC PM display.

4.5.4 Controlling a relay output with one single AOP-2 button

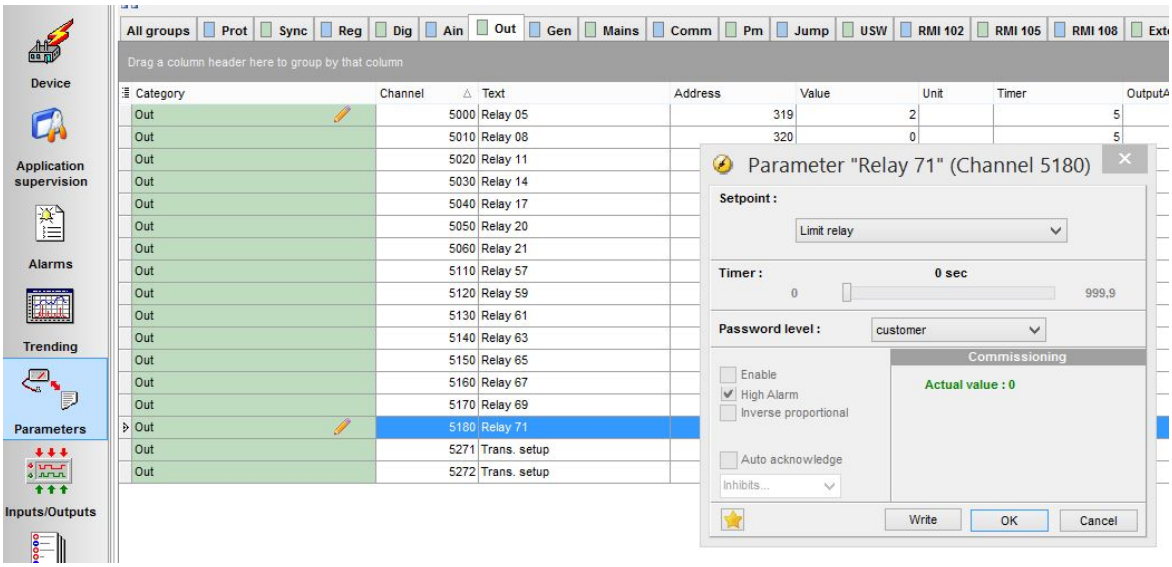
In this example, the relay can be replaced by any other output, and the AOP-2 button can be replaced by for example a digital input.
The button 1 of the AOP-2 must be set to activate Virtual Event 1 (VE 1) (in this case). See previous procedure "Toggle function".

After defining button 1 on the AOP-2, the M-Logic for controlling the relay, e.g. Relay 71, must be programmed:



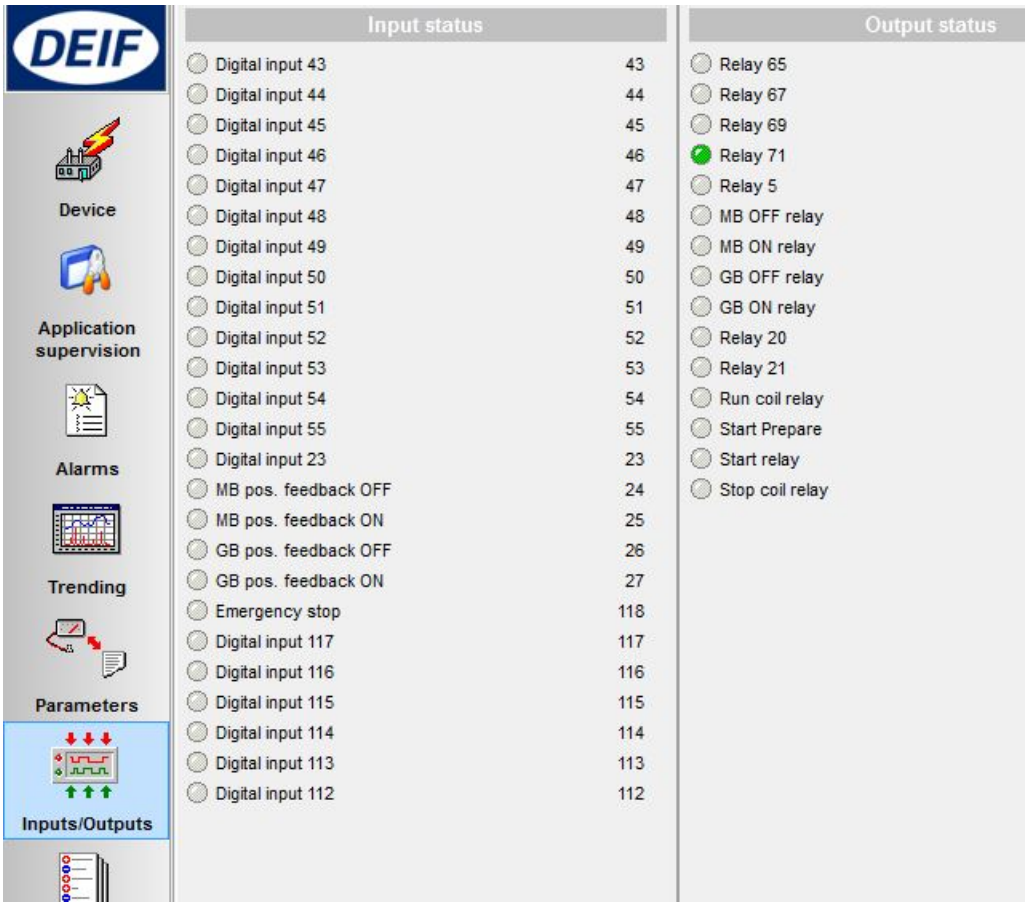
Explanation Logic 1 and Logic 2:
In Logic 1, the VE 1 will activate the relay output (71). At the same time, the relay output (71) will remain ON, unless Virtual Event 2 (VE 2) (pushing button 1 again) is activated (AND NOT VE 2).
In Logic 2, the VE 1 will activate VE 2 if the relay output (71) is ON (AND Relay output (71)).

Relay 71 must also be defined in the USW (utility software).
Find Relay 71 in "Parameters" in the USW. It is in Outputs and has channel number 5180.
Double-click the line with Relay 71 and a window pops up where the selection from below must be chosen:
Select for set point "Limit relay" and for Timer "0 sec".



After finishing selections, remember to press "Write" and "OK"

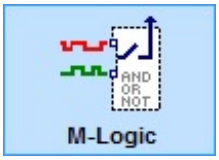
Select "Inputs/Outputs" on the left side of the USW to see the result for Relay 71:



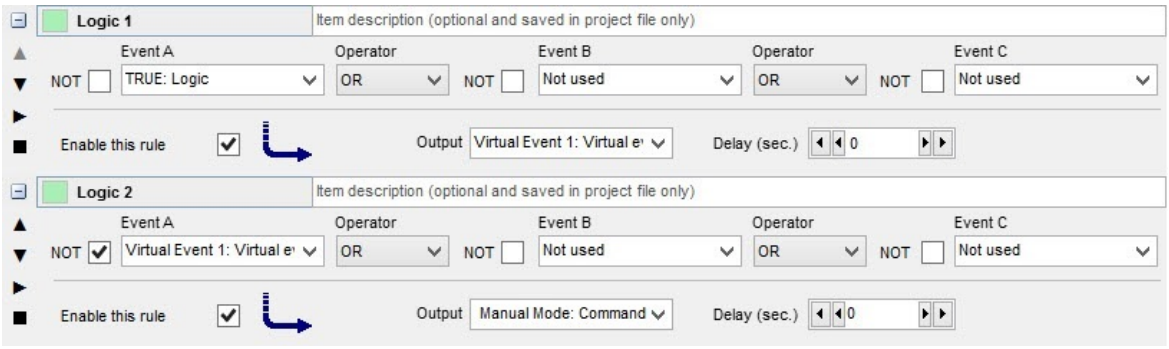
The result from defining Relay 71 under Parameters (Out) and programming Logic 1 and Logic 2 in the M-Logic is that Relay 71 changes status (green light: ON/OFF) every time button 1 on AOP-2 is pressed.

4.5.5 Power-up in a specific mode

It is possible to let the AGC PM always start in a predefined mode e.g. in "Manual Mode".
Select the M-Logic menu to the left:



Programme the logics according to the below:

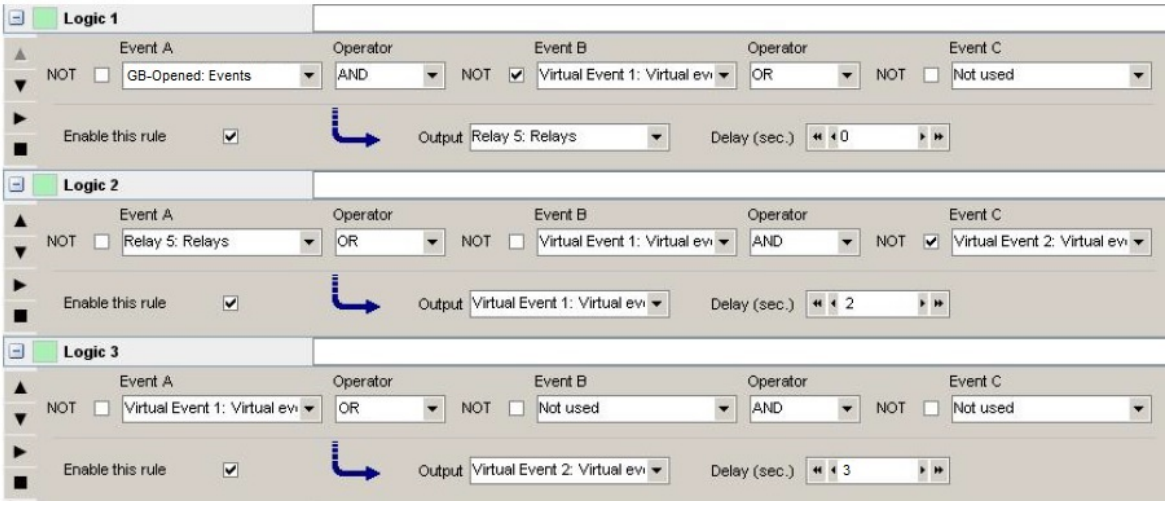


Do not forget to write the changes to the AGC-PM controller. After writing remove power from AGC-PM and power it up again. Now the unit will always power up in "Manual Mode".

4.5.6 Periodical relay output ON/OFF function

The following example is similar to a flip-flop function and shows how to configure a relay as an output for e.g. a flashing light (or similar) in case that a genset is deactivated.

If a periodical relay output ON/OFF function is required, the following example can be used:
At first, remember that the relay (Relay 5 in this case) has to be set to "Limit", according to the example with Relay 71 in section "Controlling a relay output with one single AOP-2 button".



Explanation of the logic lines :

Logic 1:

The event "GB-Opened" triggers Relay 5 immediately. Now Relay 5 is ON.
The relay output resets if the virtual event VE1 is active.

Logic 2:

The output with VE1 is triggered and after a delay of 2 seconds, Relay 5 is deactivated.
(Because an active VE1 in Logic 1 deactivates the whole Logic 1. This means the output of Logic 1 with relay 5 is also deactivated due to the new event conditions of Logic 1.) as long as VE2 is NOT active.

The Relay 5 was switched ON for 2 seconds.

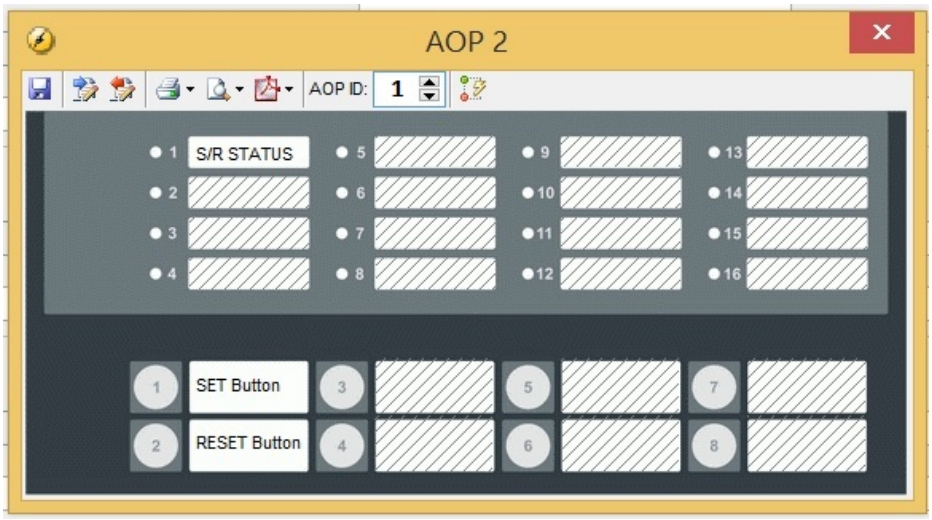
Logic 3:
VE1 re-establishes the conditions in Logic 1 (now Event B in Logic 1 is NOT active).
Then Relay 5 is switched ON again.
Then after a delay of 3 seconds, the output with VE2 cancels the whole Logic 2, due to the new condition of Event C in Logic 2 (Event C: VE2 is ACTIVE).
Now also the output with VE1 in Logic 2 is canceled.
The canceling of VE1 in Logic 2 re-establishes the conditions in Logic 1,
(now Event B in Logic 1 is NOT active) and activates the output with Relay 5 immediately.
Relay 5 is switched ON again and a new cycle starts; as long as Event A with GB-Open is still true.

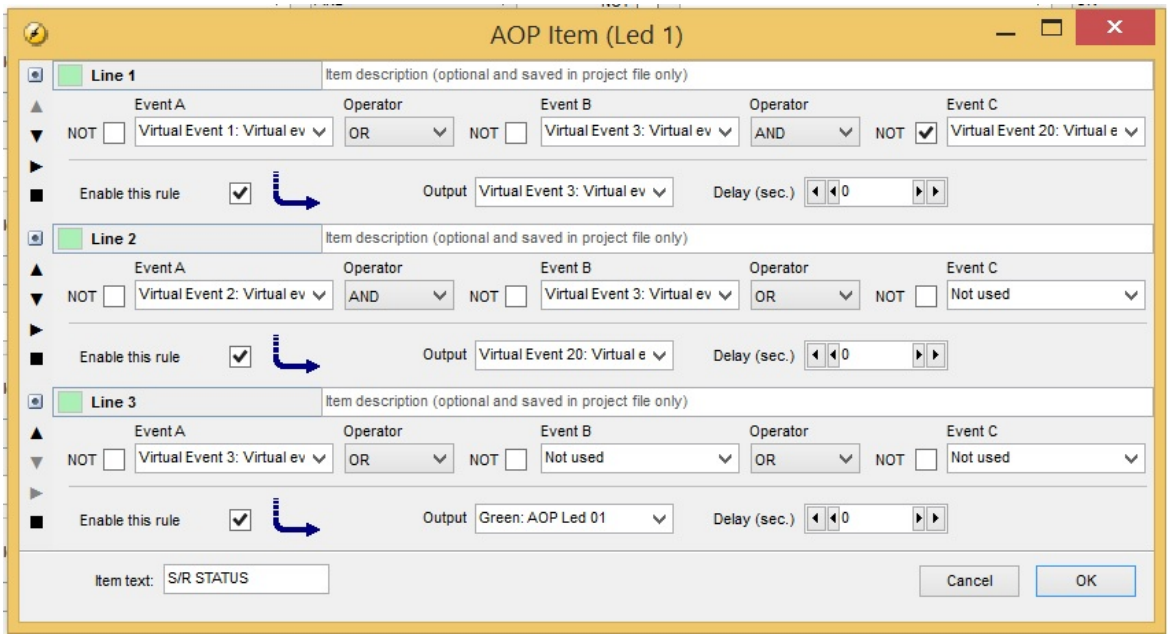
The result of the three logics from the above is a Relay 5 which continues with ON for 2 seconds and OFF for 3 seconds until it is stopped by deactivating the event "GB-Opened".

4.5.7 Set and reset functions

E.g. Simple set and reset function with two buttons on AOP-2:
The following example can be useful to set and reset an output from M-Logic.
It is similar to an SR-Flip-Flop.
For this example, one LED and two buttons on the AOP-2 are programmed according to section "Toggle function with AOP-2".

Configuration of lines, LEDs and buttons on AOP-2:





Explanation of the AOP-2 Lines:

Line 1:

Virtual Event VE1 is activated by pressing button 1 "SET Button" once, and this activates (sets) the Virtual Event VE3 and holds VE3 activated, because VE3 is also defined as output, as long as VE20 is **NOT** active. The status of VE3 in Line 1 is at the same time defined as Event A in Line 3 and immediately activates its output which is "Green:AOP Led 01".

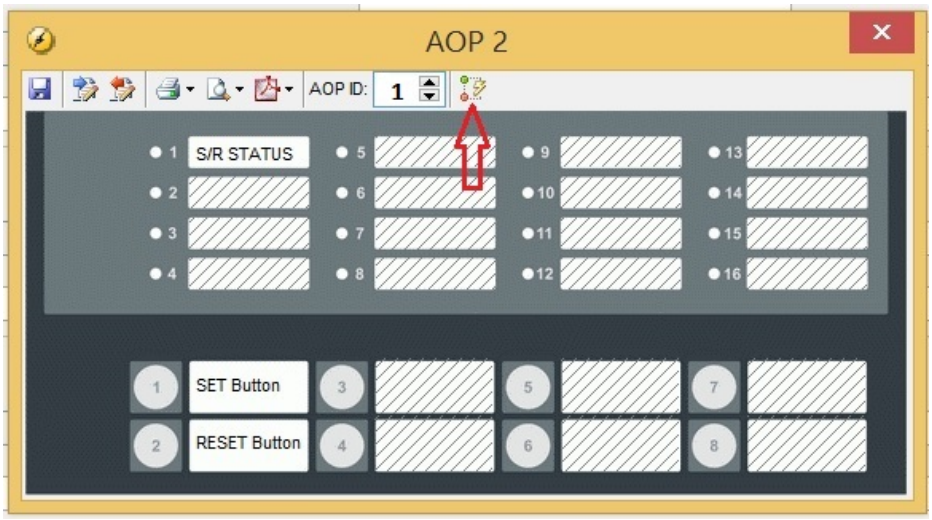
Now the LED 1 on AOP-2 is lightning green. **Button 1 has set LED 1**.

Line 2:

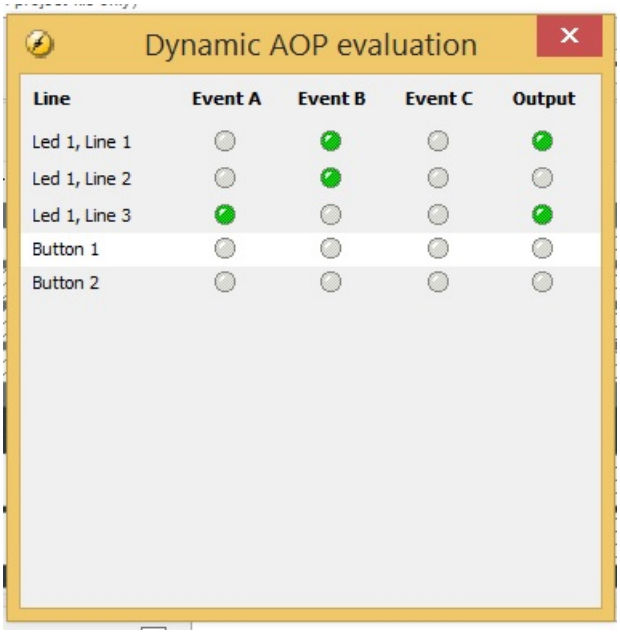
The Virtual Event VE3 is still activated (Event B). By pressing button 2 "RESET Button" once, the Virtual Event VE2 is activated (Event A).
The activation of VE2 **AND** the already active Virtual Event VE3 (Event B) activates (by one shot) the output with Virtual Event VE20.
ThEvent C in Line 1 cancels the output with Virtual Event VE3 in Line 1 immediately.
At the same time the cancelling of the output "Virtual Event:Virtual events" in Line 1 also cancels the output "Green: AOP Led 01" in Line 3.
Now the LED 1 on AOP-2 is not lightning green. **Button 2 has reset LED 1**.

Line 3:
The output "Green:AOP Led 01" is connected to LED 1 and triggered by the Virtual Event VE3.
Depending on the actual VE3 status, it switches the LED 1 ON/OFF.

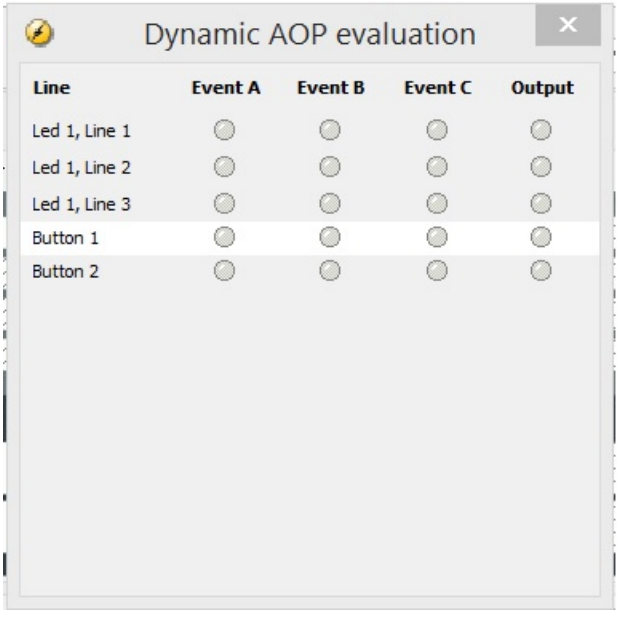
By using the menu "Dynamic AOP evaluation" on the AOP-2 programming window, it is possible to follow the status of the programmed set/reset function:



SET

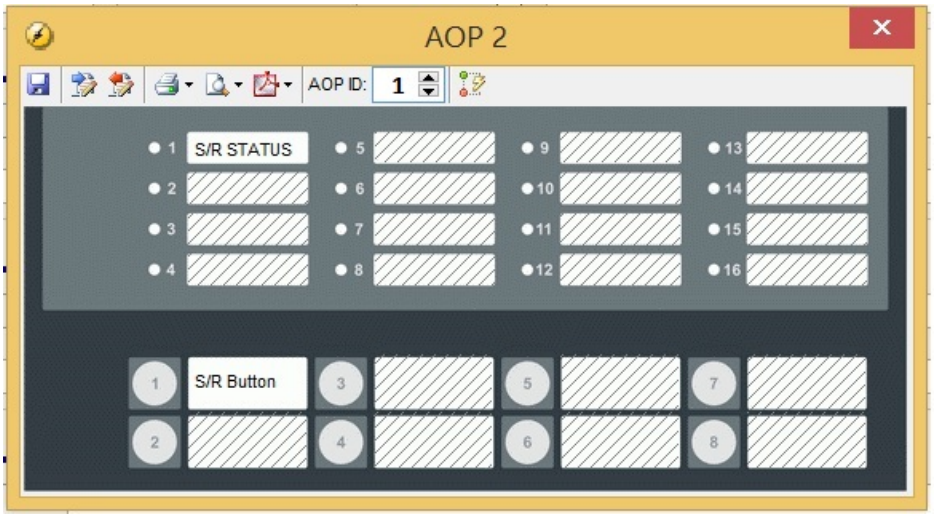


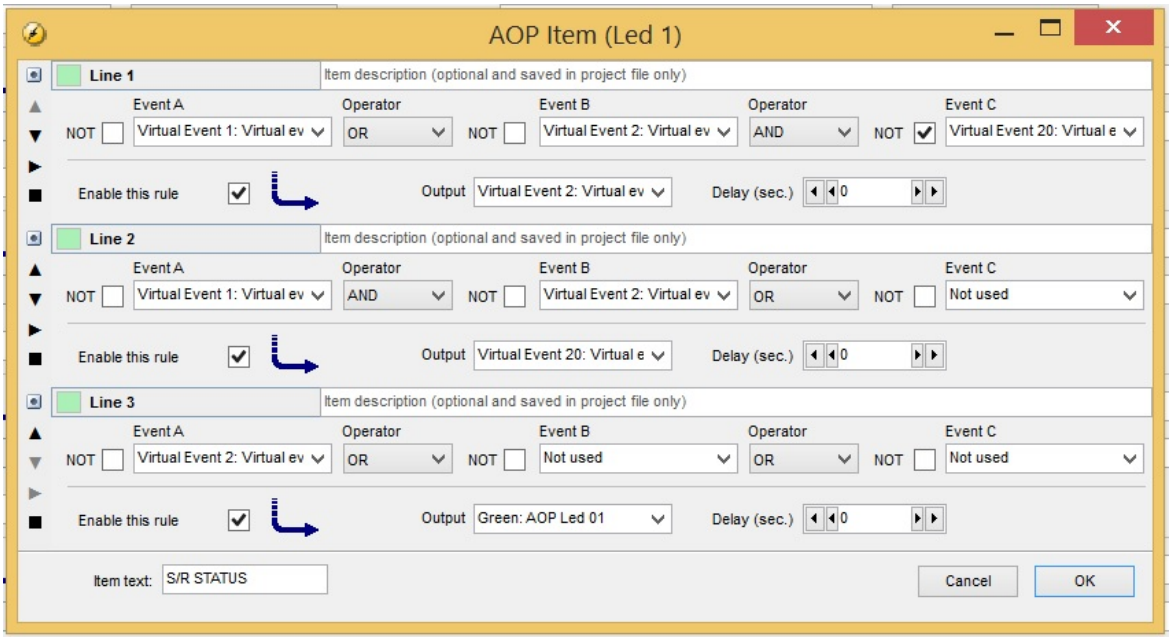
RESET



E.g. set/reset function with one button (toggle) on AOP-2:
This example can also be useful in order to set and reset an output from M-Logic.
It is similar to an SR-Flip-Flop.

Only one LED and just one button on the AOP-2 are programmed according to section "Toggle function with AOP-2".





Explanation of the AOP-2 lines :

Line 1:

Virtual Event VE1 is activated by pressing button 1 "S/R Button" once, and this activates (sets) the Virtual Event VE2 and holds VE2 activated, because VE2 is also defined as output, as long as VE20 is **NOT** active. The status of VE2 in Line 1 is at the same time defined as Event A in Line 3 and immediately activates its output which is "Green:AOP Led 01".

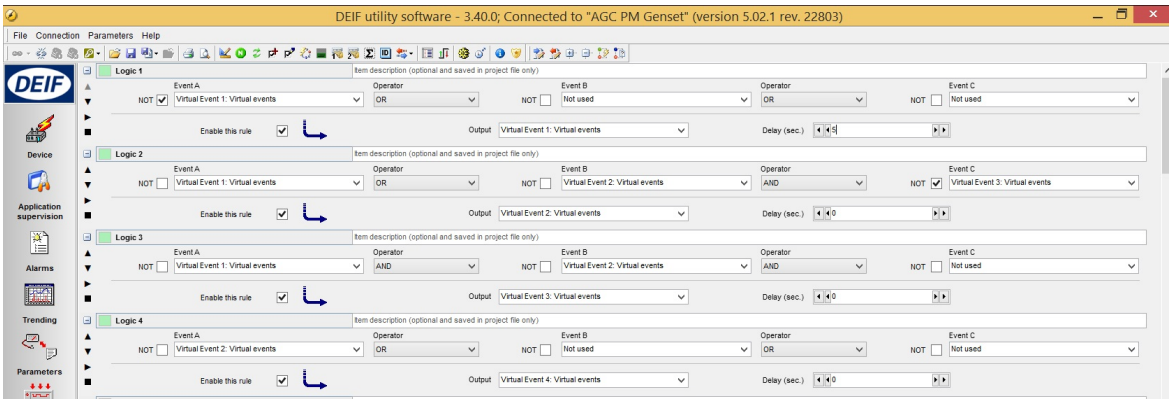
Now the LED 1 on AOP-2 is lightning green. **Button 1 has set LED 1**.

Line 2:
The Virtual Event VE2 is still activated (Event B). By pressing button 1 "S/R Button" once again, the Virtual Event VE1 is activated (Event A).
The activation of VE2 **AND** the already active Virtual Event VE2 (Event B) activates (by one shot) the output with Virtual Event VE20.
Then Event C in Line 1 cancels the output with Virtual Event VE2 in Line 1 immediately.
At the same time the cancelling of the output "Virtual Event:Virtual events" in Line 1 is also cancelling the output "Green: AOP Led 01" in Line 3.
Now the LED 1 on AOP-2 is not lightning green. **Button 1 has reset LED 1**.

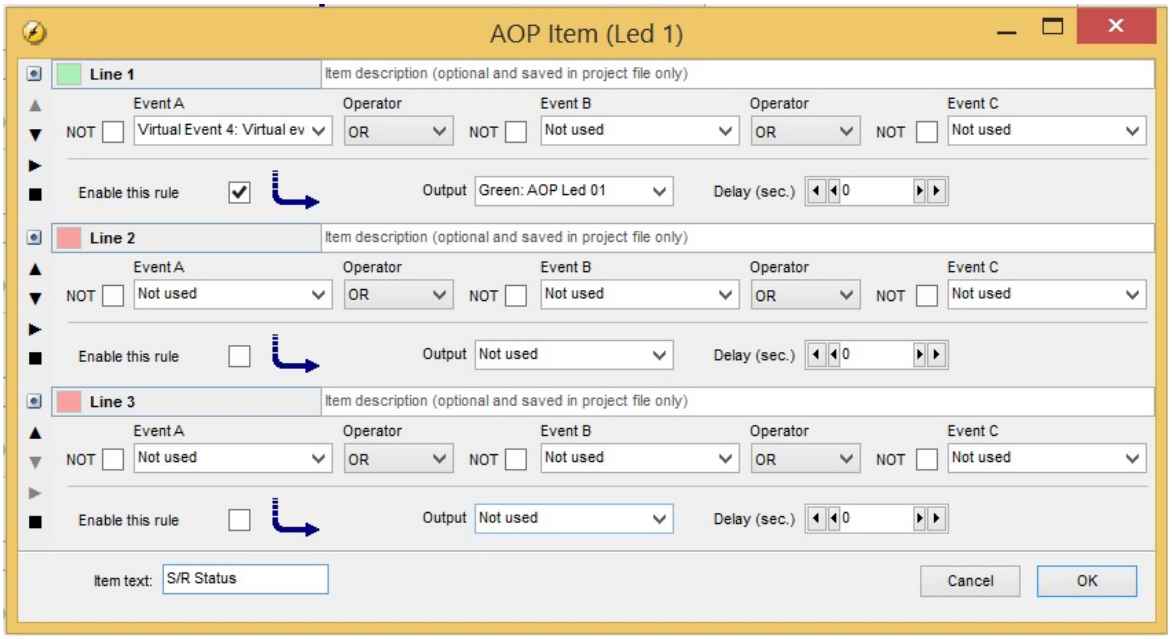
Line 3:
The output "Green:AOP Led 01" is connected to LED 1 and triggered by the Virtual Event VE2.
Depending on the actual VE2 status, it switches the LED 1 ON/OFF.

Like in the example from above by using the menu "Dynamic AOP evaluation" on the AOP-2 programming window, it is possible to follow the status of the programmed set/reset function. The result of the menu "Dynamic AOP evaluation" on AOP-2 is the same, but triggered by one button instead of two buttons (toggle function).

E.g. pulse generator driven set/reset function on AOP-2:
The following solution in M-Logic can be useful in order to set and reset an output by a pulse generator.
It is similar to a T-Flip-Flop.
For this example, one LED on the AOP-2 is configured according to section "Toggle function with AOP-2".
Configuration of Logics in the M-Logic menu:



Configuration of lines and LEDs on AOP-2 according to section "Toggle function with AOP-2":



Explanation :

Logic 1:

As long as Virtual Event VE1 is **NOT** active, VE1 gets activated after delay of five seconds.

Logic 2:

During this waiting time, the output with Virtual Event VE2 gets activated because of the **OR** operator between Event A and Event B and holds itself as long as the Virtual Event VE3 in Event C is not activated. LED 1 is activated, see Logic 4. **LED 1 is set.**

Logic 3:

Because the delay in Logic 1 has not reached five seconds yet, VE1 stays off, so the output with VE3 does not get activated due to the **AND** operator between Event A and Event B. After the delay time of five seconds, the activated VE1 will deactivate the output VE2 in Logic 2 (means LED 1 is getting off). **LED 1 is reset.**

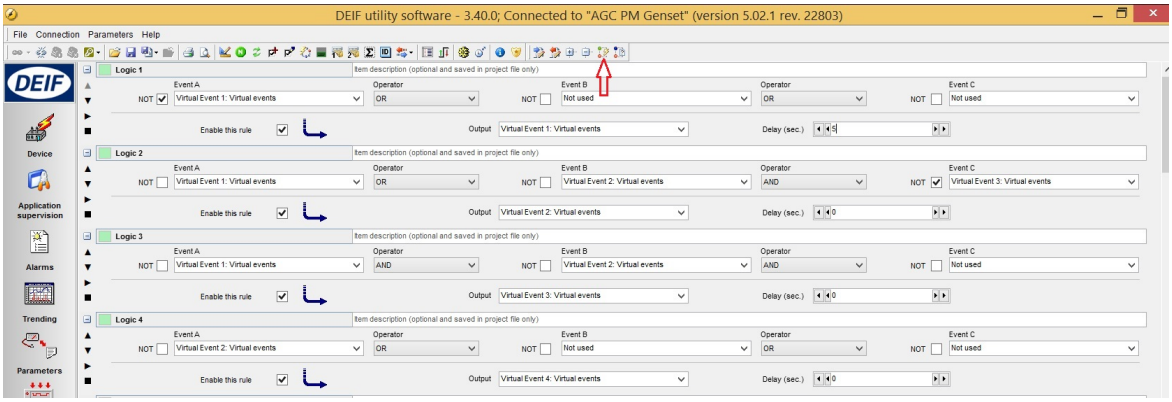
Logic 4:

VE2 from Logic 2 is defined as Event A and switches the LED 1 on/off by VE4 (VE4 is defined to trigger the output with Green:AOP Led01 in Line 1 of the AOP-2 programming window).

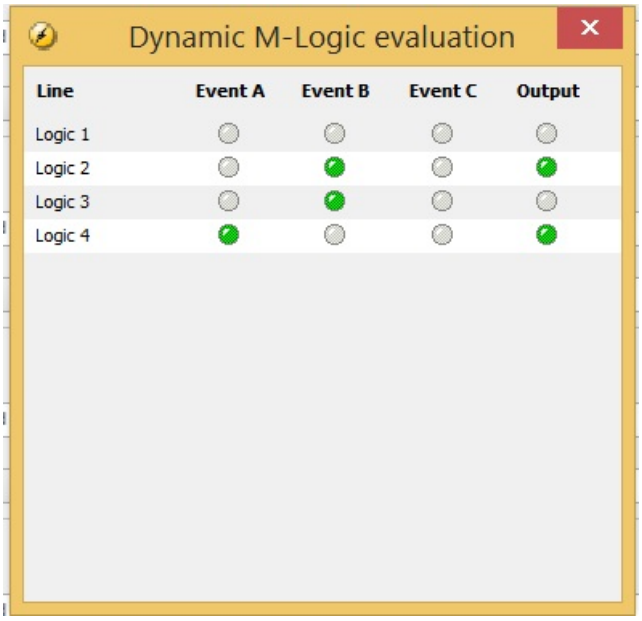
The result before the delay time of five seconds in Logic 1 is running off, is that during this time, the LED 1 is lightning green. LED 1 is set for five seconds.

After finishing the delay time VE1 in Logic 1, VE1 cancels itself. The starting condition (VE1 **NOT** active) for Logic 1 is established again, and a new activation of the output with VE1 after five seconds follows.

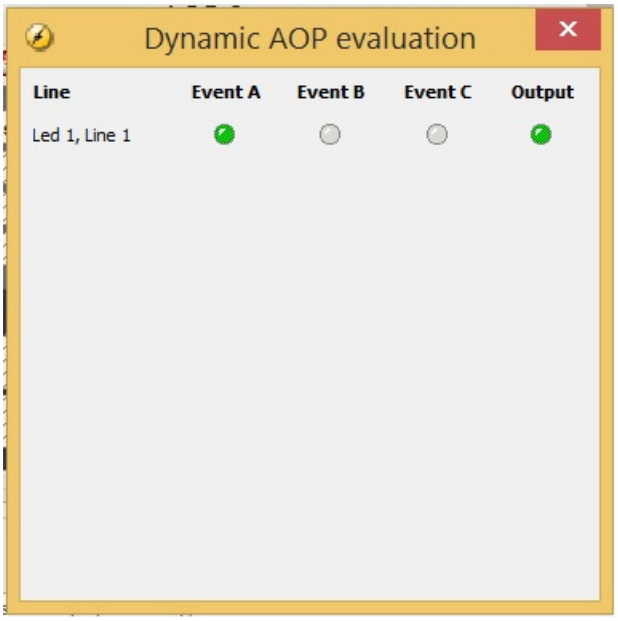
By using the menu "Dynamic M-Logic evaluation" from the top menu bar in the USW, it is possible to follow the status of the programmed pulse generator driven set/reset function:



Dynamic M-Logic evaluation:



Dynamic AOP evaluation on AOP-2 :



5. Event scope

5.1 AGC PM events

5.1.1 List of selectable events

Event A/B/C	Description	Notes/parameter
Alarms/Limits		Use an alarm to activate. All alarms are available as events in the alarm category. Note that the list will show all alarms, also those that are not available in the present configuration of basic unit and options.
	Un-acknowledge alarm	Alarm still present, waiting for acknowledgement.
	BUS high-volt 1 - 3	1270-1290
	BUS low-volt 1 - 4	1300-1330
	BUS high-freq 1 - 3	1350-1370
	BUS low-freq 1 - 4	1380-1410
	Over Current 1 - 4	1030-1060
	Over load 1 - 5	1450-1490
	Reverse power 1	1000
	Reverse power 2	1010
	Gen Unbalance current 1	1500
	Gen Unbalance current 2	1710
	Gen Unbalance voltage	1510
	Gen high-volt 1	1150
	Gen high-volt 2	1160
	Gen low-volt 1-3	1170-1190
	Gen high-freq 1-3	1210-1230
	Gen low-freq 1-3	1240-1260
	Overspeed	4520-4530.....
	Fast over current 1	1130
	Fast over current 2	1140
	Var import	1520
	Var export	1530
	GB open failure	2160
	GB close failure	2170
	GB pos. failure	2180
	GB sync. failure	2130
	MB open failure	2200
	MB close failure	2210
	MB pos. failure	2220

Event A/B/C	Description	Notes/parameter
	MB sync. failure	2140
	phase seq. failure	2150
	Digital input 23 - 27	3000-3040
	Digital input 112 - 117	3430-3480
	Multi input102 1	4120-4220
	Multi input105 1	4250-4350
	Multi input108 1	4380-4480
	Multi input102 2	4130-4230
	Multi input105 2	4260-4360
	Multi input108 2	4390-4490
	Supply low terminal 1	4960
	Supply High terminal 1	4970
	Supply low terminal 98	4980
	Supply High terminal 98	4990
	Missing all units	7533
	Fatal CAN error	7534
	Any DG missing	7535
	Any mains missing	7536
	BUS Unbalance voltage	1620
	Wire fail 102	4240
	Wire fail 105	4370
	Wire fail 108	4500
	CBE failure	2270
	Volt dep Over Current	1100
	Delta ana1 - 6 1	4610, 4630, 4650, 4680, 4700, 4720
	Delta ana1 - 6 2	4620, 4640, 4660, 4690, 4710, 4730
	Crank failure	4530
	Start failure	4570
	Mains sync. inhibit	2285
	Mlogic alarm 1 - 5	3570-3610
		Same as alarms, only with no time delay on digital inputs.
	BUS high-volt 1 - 3	1270-1290
	BUS low-volt 1 - 4	1300-1330
	BUS high-freq 1 - 3	1350-1370
	BUS low-freq 1 - 4	1380-1410
	Over Current 1 - 4	1030-1060
	Over load 1 - 5	1450-1490

Event A/B/C	Description	Notes/parameter
	Reverse power 1	1000
	Reverse power 2	1010
	Gen high-volt 1	1150
	Gen high-volt 2	1160
	Gen low-volt 1 - 3	1170-1190
	Gen high-freq 1 - 3	1210-1230
	Gen low-freq 1 - 3	1240-1260
	Digital input 23 - 27	3000-3040
	Digital input 112 - 117	3430-3480
	Multi input102 1	4120-4220
	Multi input105 1	4250-4350
	Multi input108 1	4380-4480
	Multi input102 2	4130-4230
	Multi input105 2	4260-4360
	Multi input108 2	4390-4490
	Volt dep Over Current	1100
	Delta analogue1 - 6 1	4610-4720
	Delta analogue1 - 6 2	4620-4730
	Mlogic alarm 1 - 5	3570-3610
Events		Events that are not alarms, just information, for example "Engine running".
	Mains-Fail	Mains failure condition
	MB-Closed	Mains breaker
	MB-Opened	Mains breaker
	GB-Closed	Generator breaker
	GB-Opened	Mains breaker
	GB synchronising	Generator breaker synchronising in progress
	MB synchronising	Mains breaker synchronising in progress
	Peak shaving active	Temporary extra power needs (peaks) are produced by parallel generator set
	G volt/freq Ok delay expired	Time check for diesel generator V/Hz OK
	GB direct in	Generator breaker is being closed on a dead busbar (de-energised busbar)
	Running	Engine is running
	Access lock	Digital input access lock activated
	Emergency stop	Emergency stop activated
	DG ready for auto start	Genset has no alarms, in AUTO mode and ready for auto start.

Event A/B/C	Description	Notes/parameter
	Cranking	Crank output activated
	Start activated	Start sequence activated
	Lamp test	Lamp test is running
	GB Black close request	Generator breaker direct close on request to dead (deenergised) busbar.
	Cool down active	Cool down sequence in progress
	Eng. heater in manual ctrl.	Manual control of external heating system to keep the engine at a minimum temperature
	Parameter set 1 - 4 used	The parameter sets can be selected internally or with binary input, settings 1 to 4 to choose the desired nominal setting, Parameters in settings are F, P, I, U RPM, e.g for rental systems.
	Test type simple selected	Selection of test mode: simple
	Test type load selected	Selection of test mode: load
	Test type full selected	Selection of test mode: full
	Multi start set 1 selected	See in menu 8030 S1,S2. Selection of multiple start gensets or auto calculation.
	Multi start set 2 selected	Select 1-32 DG for set 1 and set 2.
	BB voltage ok	Busbar voltage, busbar B for BTB unit
	Application 1 - 4 activated	Application 1-4 are the choices of the plant layout. Four different layouts can be stored at the same time.
	Single DG selected	Single DG application is selected
	Multi mains selected	Multi mains application is selected
	Dynamic section equal static section	An application consists of static and dynamic sections if one or more BTBs are installed. **Static section:** Part of the total application which is separated by one or two open BTBs. A section which is not possible to devide into other sections. There will be no closed BTBs within this section. A static section can also be a dynamic section (by closing BTB inside section), but not vice versa. **Dynamic section:** Part of the total application which is separated by one or two open BTBs. There may be one or more closed BTBs within this section. In case that it is not possible to divide a section into more sections, its dynamic section is equal to its static section.
	G volt/freq Ok	Generator voltage and frequency are within defined range. The timer is set in parameter 6220

Event A/B/C	Description	Notes/parameter
	Update mode local selected Update mode on all selected	Menu 8052. Update is used to define if the change of a running mode will affect all AGCs connected on the power management CAN line or only the local unit where the running mode is changed.
	Ack all alarms active	Alarm, see display symbol with warning symbol. Acknowledge all alarms.
	MB synchronisation to DG activated	Synchronisation of mains breaker to diesel generator is activated. Parameter 7083 is ON.
	MB synchronisation to DG deactivated	Synchronisation of mains breaker to diesel generator is deactivated. Parameter 7084 is ON.
	GB synchronisation to Mains activated	Synchronisation of generator breaker to mains is activated. Parameter 7083 is OFF.
	GB synchronisation to Mains deactivated	Synchronisation of generator reaker to mains is deactivated. Parameter 7084 is OFF
	Modeshift activated	Parameter 7081. Allow switch to AMF-mode
	Modeshift deactivated	Parameter 7081. Not allowed to switch to AMF-mode
	Gov up activated	Activated up pulse for governor increasement by activating an AOP button or a digital input
	Gov down activated	Activated down pulse for governor decreasement by activating an AOP button or a digital input
	AVR up activated	Activated up pulse for AVR increasement by activating an AOP button or a digital input
	AVR down activated	Activated down pulse for AVR decreasement by activating an AOP button or a digital input
	CBE activated	Activate close before excitation function. This will set parameter 2254 to ON.
	CBE deactivated	Deactivate close before excitation function. This will set parameter 2254 to OFF.
		AC configuration
	Three phase system	3-phase electrical system chosen. Refers to parameter 9130.
	Split L1L3 phase system	Split-phase electrical system with L1 and L3 chosen. Refers to parameter 9130
	Split L2L3 phase system	Split-phase electrical system with L2 and L3 chosen. Refers to parameter 9130.
	Single phase system	Single-phase electrical system chosen. Refers to parameter 9130.
	Gen-set group selected	??
	Gen-set group plant selected	??
	Dynamic sync selected	Dynamic synchronistation is selected.

Event A/B/C	Description	Notes/parameter
	Static sync selected	Static synchronisation is selected.
	Power offset 1 - 3 activated	Power reference offset. This function is for making a power offset from Pnom, 3 offsets are available. This event refers to parameter 7222, 7224 or 7226.
	Test application selected with output cmd enabled	Emulation with engine communication and breaker relay reaction enabled.
	Test application selected with output cmd disabled	Emulation without engine communication and relay reaction enabled.
	BB Parameter set 1 used	Nominal busbar settings 1 and 2.
	BB Parameter set 2 used	Busbar (BB) primary voltage range depends on scaling setting in menu 9030.
	60 Hz system	The event becomes true if the nominal frequency is higher than 55 Hz.
	Analogue offset set 1 - 4 active	The analogue offsets (1, 2, 3 and 4) follow the activated nominal settings (1, 2, 3 and 4)
	Mains sync. inhibit activated	Mains breaker sync. inhibit function is activated (this does not necessarily inhibit the synchronisation of the mains breaker). This refers to parameter 2285.
	Mains sync. inhibited	The mains breaker is in fact inhibited.
	Ethernet ready	The event becomes true if Option N is ok, and the Ethernet is ready.
	Deload active	Diesel generator being taken off busbar/grid.
	Ana. fan ref. set 1 active	Analogue fan reference set 1 is active
	Ana. fan ref. set 2 active	Analogue fan reference set 2 is active
Cmd Timers	Cmd timer 01 - 04 active Any Cmd timer active	Menu 6960-6996, setup of days, hour,minute for activation and deactivation for e.g. start and stop the genset automatically at specific times each weekday or certain weekdays. The command timers will operate in pairs of two to activate and deactivate a flip-flop function.
CAN Input	CAN Inp 01 - 16 active	Status of M-Logic functions broadcasted on the power management CAN line. The CAN inputs are handled as binary inputs but are CAN telegrams in the power management CAN line.
Display	Display 1- 3 primary	When multiple DU-2 (View button present) displays are used, the command will set the desired display as the primary.
Static sync. type	GB:Breaker	Static synchronisation is set to close the GB when the condition are within limits.
	GB:Infinite	Static synchronisation is set to never close the GB, even though the GB are within conditions.
	MB:Breaker	Static synchronisation is set to close the MB when the condition are within limits. Only possible in stand-alone applications.

Event A/B/C	Description	Notes/parameter
	MB:Infinite	Static synchronisation is set to never close the MB even though it is within conditions. Only possible in stand-alone applications.
Logic		Can be TRUE or FALSE.
	TRUE	Means signal is always present.
	FALSE	Means signal is never present.
Inputs		Direct activation of a digital input. The availability of digital inputs is option-dependent.
	Dig.Input No 23-27	
	Dig.Input No 112-117	
	Dig.Input No 102	
	Dig.Input No 105	
	Dig.Input No 108	
Modes		Running modes and plant modes:
	Island	Island is one or several generators running in an island NOT connected to mains grid.
	AMF	Automatic Mains Failure. Genset taking load automatic over in case of mains failure.
	Peak shaving	Peak shaving cuts the peak of the mains consumption (genset taking the temporary extra load needs) by paralle-ling the generator to the mains.
	Fixed power	Mains grid parallel fixed generator power.
	Mains power export	Export of power to the mains grid.
	Load take over	Load is transferred from mains to generator, and mains is disconnected.
	Power management	Power management active, multiple gensets, option G5 needed
		Indication of generator running mode:
	Semi-auto mode	
	Test mode	
	Auto mode	
	Manual mode	
	Block mode	
		DI=Digital Input for generator running mode:
	DI SemiAuto mode used	
	DI Test mode used	
	DI Auto mode used	
	DI Manual mode used	

Event A/B/C	Description	Notes/parameter
	DI Block mode used	
	Mode shift or AMF act.	Mode shift active or automatic mains failure sequence active. Mode shift allows switching to AMF mode. Menu 7080.
Relays	Relay 5,8,11,14,17,20,21,65,67,69,71	Selection of a relay output, the selection is option-dependent. The number relates to the lowest terminal number of the output.
Virtual Events	Virtual Event 1 - 32	A number of internal (virtual) events that can be activated and used in another logic line. By using these virtual events, the number of activating (triggering) events can be expanded from the three available in each logic line to, in theory, an unlimited number of events. Virtual events can also be triggered from Modbus. These are used as interconnection between multiple logics to enhance the possible number of events in one sequence.
Fail class		The event activates upon activation of any alarm with the chosen fail class.
	Block	Start blocking
	Warning	Warning
	Trip GB	Trip genset breaker
	Trip+stop	Trip breaker, cool down and stop
	Shutdown	Trip genset breaker and stop engine
	Trip MB	Trip mains breaker
	Safety stop	A failure condition is expected, and the generator will be taken out for safety reasons. This feature is only useful in power management.
	Trip MB/GB	MB will be primary breaker to trip. If no MB is available in the application, the GB will trip instead.
Power management		Status related to power management, multiple gensets, option G5 needed.
	All GBs opened	All genset breakers opened in a section
	Any GB closed	Minimum 1 genset breaker closed in a section
	Any MB closed	Minimum 1 mains breaker closed in a section
	Unit has command status	This unit is in command
	First standby	Indicates number of priority
	Second standby	Indicates number of priority
	Third standby	Indicates number of priority
	Secured mode	Run with required number of DGs + one extra
	LD start timer expired	Load-dependent start sequence is initiated.
	LD stop timer expired	Load-dependent stop sequence is initiated.

Event A/B/C	Description	Notes/parameter
	Any mains on busbar	Do any of the mains connections supply voltage to the busbar?
	Any MB synchronising	Are any of the mains breakers in the process of synchronising?
	Any TB synchronising	Are any of the tie breakers in the process of synchronising?
	Any TB deloading	Are any of the tie breakers in the process of being deloaded?
	Asymmetric LS enabled	Selection asymmetric LS loadshare
	Asymmetric LS active	Asymmetric LS loadshare active
	Any mains sync. Inhibit	Is any mains breaker sync. inhibit function activated? (this does not necessarily inhibit the synchronisation of the mains breaker). This function is used to inhibit the synchronising of the mains breaker after blackout.
	DG 1 - 32 GB closed	Genset breaker of diesel generator 1 - 32 closed
	DG 1 - 32 GB opened	Genset breaker of diesel generator 1 - 32 opened
	DG 1 - 32 volt/freq okay	Diesel generator 1 - 32 voltage and frequency OK
	DG 1 - 32 ready to auto start	Diesel generator 1 - 32 ready to auto start
	DG 1 - 32 running	Diesel generator 1 - 32 running
	DG 1 - 32 GB Synchronising	Diesel generator 1 - 32 synchronising genset breaker
	Mains 1 - 32 TB closed	Tie breaker controlled by mains unit 1-32 closed
	Mains 1 - 32 TB opened	Tie breaker controlled by mains unit 1-32 open
	Mains 1 - 32 Mains volt/freq okay	Mains 1-32 grid voltage and frequency OK
	Mains 1 - 32 in auto or test	Mains unit 1-32 in auto or test running mode
	Mains 1 - 32 MB closed	Mains breaker 1-32 closed
	Mains 1 - 32 MB opend	Mains breaker 1-32 closed
	Mains 1 - 32 MB Synchronising	Mains breaker 1-32 is being synchronised
	Mains 1 - 32 TB Synchronising	Tie breaker 1-32 is being synchronised
	Mains 1 - 32 mains failure	Mains 1-32 failure detected.
	ID 1 - 32 has any alarm present	CAN ID 1 - 32 has any alarms
	BTB 33 - 40 BTB Closed	Bus tie breaker 33-40 is closed
	BTB 33 - 40 BTB Opened	Bus tie breaker 33-40 is open
EIC event		Engine Interface Communication event. Events that are related to engine communication. (The event is option H5/H7-dependent).
	DPF Lamp OFF	Particulate filter is OK.

Event A/B/C	Description	Notes/parameter
	DPF Lamp ON (solid)	Indicates initial need for regeneration.
	DPF Lamp ON (blink)	Regeneration is necessary (after regeneration, the lamp turns OFF).
	DPF Active Regeneration not activated (status)	Regeneration status.
	DPF Active Regeneration activated (status)	Regeneration status.
	DPF Active Regeneration needed (status)	Regeneration status.
	DPF Regen not needed (status)	Level of needed regeneration.
	DPF Regen needed – lowest level (status)	Level of needed regeneration.
	DPF Regen needed – moderate level (status)	Level of needed regeneration.
	DPF Regen needed – highest level (status)	Level of needed regeneration.
	DPF Regen not inhibited (lamp)	Regeneration switch is disabled.
	DPF Regen inhibited (lamp)	Regeneration disable switch is active. Automatic and manual regeneration cannot occur.
	High Exh Syst Temp OFF (lamp)	Exhaust temp. below.
	High Exh Syst Temp ON (lamp)	Exhaust temp. above.
DAVR event		DAVR event. Events that are related to DVC 310. The DVC 310 is a digital voltage regulator, which monitors and regulates the alternator output voltage. The role of the DVC is to adjust the excitation current in the exciter field according to the desired alternator output. The DVC 310 has numerous LEDs that can be used for indication and information. The following events will be active, when e.g. the LEDs on the DVC is lit. Other events are also described below.
	LED:Power On	When the power LED is ON, this event is active.
	LED:U=U	When voltage matching is active, this event is active.
	LED:PFkVAR	When PF or kvar regulation is active in the DVC, this event is active.
	LED:Manual	Event is active when the DVC's regulation is in manual mode. Used when close before excitation is used.
	LED:Fault	If the DVC detects a diode fault in the alternator, this event is active.
	LED:Exc.	If the DVC has the alarm for over- or under-excitation, this event is active.

Event A/B/C	Description	Notes/parameter
	LED:Exc.blink	Very similar to the event above.
	LED:Volt	If the DVC has the low or high voltage alarm, this event is active.
	LED:Hz	If the Hz is below the knee set point, this event is active.
	General trip	Event is active if the DVC has any general trip alarms present.
	Short circuit	If the DVC has the short circuit alarm present, this event is active.
	Loss of voltage sensing	If the DVC detects a loss of sensing, this event will be active.
	Under excitation (level)	
	Over excitation (curve)	
	Over voltage	Voltage is over limit. There is a protection to prevent the alternator from running with high voltage over a long period of time. The timer and the limit are set in the EasyReg software. When the over-voltage alarm in the DVC is active, this event is also active.
	High temperature PT100_1	When temperature in winding is above, this event is active.
	High temperature PT100_2	When temperature in winding is above, this event is active.
	High temperature PT100_3	When temperature in winding is above, this event is active.
	High temperature PTC	If the winding temperature is above the set point for the PTC sensor, this event will be active.
	Stator over current U	Current of stator at U is over limit.
	Stator over current V	Current of stator at V is over limit.
	Stator over current W	Current of stator at W is over limit
	Imbalance Stator current	Disproportion of stator current.
	Diode fault	Detection of diode fault. Diode fault protection can be enabled with parameter 7824. When the alarm is active, this event will be active.
	Shutdown diodes	If the shutdown diodes alarm has been activated, this event will be active.
	Stator current limitation off	Event is active when stator current limitation is set to OFF, in parameter 7795.
	Stator current limitation TM	Event is active when stator current limitation is set to transformer magnetisation, in parameter 7795.
	Stator current limitation IM	Event is active when stator current limitation is set to Inductive motor starting, in parameter 7795.

6. Output scope

6.1 References

6.1.1 References to DRH and description of options

The terms used in the lists are those used in the Designer's Reference Handbook and the description of options. Please refer to these documents for detailed explanations.

If there are no references to the function in question, the reference can be found in the Designer's Reference Handbook.

6.2 AGC PM outputs

6.2.1 List of selectable outputs

Output	Description	Notes/parameter
Command		Running modes and plant modes, see DRH document
	Island	Island is one or several generators running in an island NOT connected to mains grid.
	AMF	Automatic mains failure. Genset taking load automatic over in case of mains failure.
	Peak shaving	Peak shaving cuts the peak of the mains consumption (genset taking the temporary extra load needs) by paralleling the generator to the mains.
	Fixed power	Mains grid parallel fixed generator power.
	Mains power export	Export of power to the mains grid.
	Load takeover	Load is transferred from mains to generator, and mains is disconnected.
	Power management	Power management active,multiple gensets. Load share via CAN.
	Activate Secured mode	Will activate secured mode. Secured mode is described in the handbook. This activates parameter 8031.
	Deactivate Secured mode	Will deactivate secured mode. Secured mode is described in the handbook. This deactivates parameter 8031.
		Indication of generator running mode
	Semi_Auto mode	Sets the unit in semi auto mode.
	Test Mode	Activates the test mode.
	Auto Mode	Sets the unit in auto mode.
	Manual Mode	Sets the unit in manual mode.
	Block Mode	Sets the unit in block mode.
	Lamp test	Activate lamp test (LEDs on display).
	Ack. all alarms	Acknowledge all alarms.
	Engine heater manual ctrl.	Force/release block of engine heater (this will disable/enable the engine heater function).
	Set to local start	Select local start in a power management application.
	Set to remote start	Select remote start in a power management application.
	Set clock to 4 AM	Set the device clock to for example 4 AM/04.00.
	Set parameter 1 - 4	Choose a parameter set (nominal settings). Refers to parameter 6006.
	Derate Pnom 1 - 3	Activate derate 1 - 3, which is parameter 6245.

Output	Description	Notes/parameter
	Derate Pnom 2	Activate derate 2, which is parameter 6255.
	Derate Pnom 3	Activate derate 3, which is parameter 6265.
	Select test type to simple	Sets test type to simple test, in parameter 7034 in the mains/plant/group or stand-alone controller.
	Select test type to load	Sets test type to load test, in parameter 7034 in the mains/plant/group or stand-alone controller.
	Select test type to full	Sets test type to full test, in parameter 7034 in the mains/plant/group or stand-alone controller.
	GB close inhibit	Avoid to close genset breaker. Can only be used in the unit controlling the GB.
	Select application 1 - 4	Power management: four different applications can be stored at the same time in the units.
	Update mode local	Running mode update for the single AGC PM.
	Update mode on all	Running mode update for all AGC PM.
	Open GB	Open genset breaker. This command can not be used in auto mode.
	Close GB	Close genset breaker. This command can not be used in auto mode.
	Open MB	Open mains breaker. This command can not be used in auto mode.
	Close MB	Close mains breaker. This command can not be used in auto mode.
	Auto start/stop	ON = Start, OFF = Stop
	Remote start	Pulse signal. This command can not be used in auto mode.
	Remote stop	Pulse signal. This command can not be used in auto mode.
	Start and close GB	Start the engine and close the genset breaker. This command can not be used in auto mode.
	GB open and stop	Open the genset breaker and stop engine. This command can not be used in auto mode.
	First priority	Forces this unit to have the first priority in a power management system.
	Freeze ramp	Locks the power ramp up function until the command is disabled again.
	Activate asymmetric LS	Activate asymmetric load share.
	Deactivate asymmetric LS	Deactivate asymmetric load share.
	Select 3-phase system	Selects the AGC PM to expect to measure AC voltage on a 3-phase system.
	Select split L1L3-phase system	Selects the AGC PM to expect to measure AC voltage on a 2-phase (L1L3) system.
	Select split L1L2-phase system	Selects the AGC PM to expect to measure AC voltage on a 2-phase (L1L2) system.

Output	Description	Notes/parameter
	Select single phase system	Selects the AGC PM to expect to measure AC voltage on a 1-phase system .
	Idle run low speed	Idle speed constant low speed.
	Idle run temp control	Idle speed temperature-dependent.
	Cool down threshold	Interrupts cool down sequence.
	Act. dynamic sync.	Selection of dynamic synchronising. Refers to parameter 2001 in units controlling a genset.
	Act. static sync.	Selection of static synchronising. Refers to parameter 2001 in units controlling a genset.
	Fan A running	Running feedback for cooling fan A.
	Fan B running	Running feedback for cooling fan B.
	Fan C running	Running feedback for cooling fan C.
	Fan D running	Running feedback for cooling fan D.
	Act. power offset 1	Power reference offset 1 activation. This line refers to parameter 7222.
	Act. power offset 2	Power reference offset 2 activation. This line refers to parameter 7224.
	Act. power offset 3	Power reference offset 3 activation. This line refers to parameter 7226.
	Deact. Power offset 1	Deactivates power reference offset 1. This line referes to parameter 7242.
	Deact. Power offset 2	Deactivates power reference offset 2. This line referes to parameter 7244.
	Deact. Power offset 3	Deactivates power reference offset 3. This line referes to parameter 7246.
	MB close inhibit	Inhibits the closing of MB. Will have to be set in the unit controlling the MB.
	Reset horn	Resets the horn relay.
	Reset I max. Demand	Resets the peak current detected in the unit. Refers to parameter 6843.
	Reset I thermal demand	Resets the thermal current detected in the unit. Refers to parameter 6842.
	Pulse counter 1	Increment pulse counter 1.
	Pulse counter 2	Increment pulse counter 2.
	Set parameter 1	Chooses a BB parameter set 1. Refers to parameter 6054.
	Set parameter 2	Chooses a BB parameter set 2. Refers to parameter 6054.
	Force use of analogue offset 1 - 4	This will force a particular analogue offset to be active. These commands refer to parameter 2551-2554 and 2671-2674.
	Mains sync. inhibit activate	Activates the mains sync inhibit function. Refers to parameter 2285.

Output	Description	Notes/parameter
	Mains sync. inhibit deactivate	Activates the mains sync inhibit function. Refers to parameter 2285.
	Ack. Mains protection alarms	Acknowledges all mains alarms
	M-Logic alarm 1 - 5	These re virtual alarms that can be triggered by different events. Afterwards the alarms can be used to give different commands. Each M-Logic alarm is configured in parameter 3570-3610.
	Act. Frequency droop regulation	This command activates the frequency droop regulation. If this is used, the other types of load sharing are inhibited.
	Access lock	Digital input access lock activated. Input has to be kept high as long as the access lock is used.
	Activate ana. Fan ref. Set 1	Selection of analogue fan reference settings 1. Refers to parameter 6655.
	Activate ana. Fan ref. Set 2	Selection of analogue fan reference settings 2. Refers to parameter 6655.
Fuel pump	Fill off	Commands the present unit to stop filling.
	Fill daytank	Commands the present unit to fill day tank.
Virtual events	Virtual Event 1 - 32	A number of internal (virtual) events that can be activated and used in another logic line. By using these virtual events, the number of activating (triggering) events can be expanded from the three available in each logic line to, in theory, an unlimited number of events. Virtual events can also be triggered from Modbus. These are used as interconnection between multiple logics to enhance the possible number of events in one sequence.
Relays	Relay 5, 8,11,14,17, 20, 21, 57, 59, 61, 63	Relay output activated. Selection of a relay output. The selection is option-dependent. The number relates to the lowest terminal number of the output. If a relay output is chosen, the relay in question must be set up to be a limit relay output. This is done in the parameter list under "OUTPUTS".
Inhibits		Prevention of selected output action.
	Deactivate Mode button	Avoiding deactivation mode button.
	Activate MB synchronisation to DG	Avoiding activation MB synchronisation to DG.
	Activate GB synchronisation to mains	Avoiding activation GB synchronisation to mains.
	Deactivate MB synchronisation to DG	Avoiding deactivation MB synchronisation to DG.
	Deactivate GB synchronisation to mains	Avoiding deactivation GB synchronisation to mains.
	Inh. analogue load share	Inhibition analogue load share

Output	Description	Notes/parameter
	Inh. acknowledge in AUTO	Inhibition acknowledge in auto
	Inh. modbus commands	Inhibition Modbus commands
	Inhibit 1	Selectable Inhibit 1
	Inhibit 2	Selectable Inhibit 2
	Inhibit 3	Selectable Inhibit 3
	Select Multi start set 1	Avoiding select multi-start set 1
	Select Multi start set 2	Avoiding of select multi-start set 2
	Activate modeshift	Avoiding activate mode shift
	Deactivate modeshift	Avoiding of deactivate mode shift
	Inh.. AOP1 buttons	Inhibition of AOP-1 buttons
	Inh. AOP2_1 buttons	Inhibition of AOP-2_1 buttons
	Inh. AOP2_2 buttons	Inhibition of AOP-2_2 buttons
	Inh. AOP2_3 buttons	Inhibition of AOP-2_3 buttons
	Inh. AOP2_4 buttons	Inhibition of AOP-2_4 buttons
	Inh. AOP2_5 buttons	Inhibition of AOP-2_5 buttons
	Activate CBE	Avoiding activate CBE (close before excitation)
	Deactivate CBE	Avoiding deactivate CBE (close before excitation)
	Inh. regulation	Inhibition of regulation
	Inh. start button	Inhibition of start button
	Inh. stop button	Inhibition of stop button
	Inh. GB button	Inhibition of GB button
	Inh. MB button	Inhibition of MB button
	Inh. engine start	Inhibition of engine start
	Inh. GB black close	Inhibition of GB black close
BTB Cmd		Command to the Multi-line unit to check status bus tie breaker.
	BTB 33-40 open feedback	Feedback from the bus tie breaker telling the breaker is open.
	BTB 33-40 closed feedback	Feedback from the bus tie breaker telling the breaker is closed.
CAN Cmd		Command to the Multi-line unit connected to the power management CAN line, for example select auto running mode in all Multi-line units.
	CAN Cmd 01-16 active	Selection of which CAN command 01-16 is active.
Display	Set display 1-3 to primary	When multiple DU-2 displays are used, the command will set the selected display as the primary.
	Act. view 1-20 on display 1	Activates a specific view (1-20) on display 1.
	Act. view 1-20 on display 2	Activates a specific view (1-20) on display 2.

Output	Description	Notes/parameter
	Act. view 1-20 on display 3	Activates a specific view (1-20) on display 3.
	Act. power reference menu on display 1-3	Makes the menu 7001 "Fixed Power" (fixed power set point) appear on display 1-3.
	Act. test power reference menu on display 1-3	Makes the menu 7031 "Test" (set point for load test) appear on display 1-3.
	Act. cosphi reference menu on display 1-3	Makes the menu 7053 "Cosphi" (set original cos phi reference) appear on display 1-3.
Static sync.type	GB:Breaker	Selection of "Breaker" in parameter 2035 "Static type" (static sync. type for GB). Only possible to perform static synchronisation on controllers that control a genset.
	GB:Infinite	Selection of "Infinite" in parameter 2035 "Static type" (static sync. type for GB). Only possible to perform static synchronisation on controllers that control a genset.
	MB:Breaker	Selection of "Breaker" in parameter 2036 "Static type" (static sync. type for MB). Only possible to perform static synchronisation on controllers that control a genset.
	MB:Infinite	Selection of "Infinite" in parameter 2036 "Static type" (static sync. type for MB). Only possible to perform static synchronisation on controllers that control a genset.
Gov/AVR control	Gov increase	When using the display arrows for increasing, the output will change as long as the button is active. A timer is used to adjust how long (0.1-10.0 seconds, see parameter 2782 "Man. Step Gov") one pulse from a digital input or one press on an AOP keeps the governor increase up. For example, if the timer is set to 5 sec., then one press on the AOP or one pulse from a digital input will give 5 sec. governor increase.
	Gov decrease	When using the display arrows for increasing or decreasing, the output will change as long as the button is active. A timer is used to adjust how long (0.1-10.0 seconds, see parameter 2782 "Man. Step Gov") one pulse from a digital input or one press on an AOP keeps the governor decrease up. For example, if the timer is set to 5 sec., then one press on the AOP or one pulse from a digital input will give 5 sec. governor decrease.
	AVR increase	Increases the AVR with the pulse length in parameter 2784. When using the display arrows for increasing or decreasing, the output will change as long as the button is active. A timer is used to adjust how long (0.1-10.0 seconds, see parameter 2784 "Man. Step AVR") one pulse from a digital input or one press on an AOP keeps the AVR increase up. For example if the timer is set to 5 sec., then one press on the AOP or one pulse from a digital input will give 5 sec.

Output	Description	Notes/parameter
	AVR decrease	Decreases the AVR with the pulse length in parameter 2784. When using the display arrows for increasing or decreasing, the output will change as long as the button is active. A timer is used to adjust how long (0.1-10.0 seconds, see parameter 2784 "Man. Step AVR") one pulse from a digital input or one press on an AOP keeps the AVR decrease up. For example, if the timer is set to 5 sec., then one press on the AOP or one pulse from a digital input will give 5 sec.
EIC commands		Engine Interface Communication command. Commands that are related to engine communication.
	EIC droop	Activates ECU droop. For engines where the droop command or set point can be sent to the engine controller, the droop setting in parameter 2771 is the actual droop that is being used and this set point is sent to the ECU. This method is referred to as "EIC droop".
	EIC droop emulation	Activate droop in the ML-2 (reference set point still nominal frequency/power, but regulation loop is with added droop for stability). Command for speed droop. For engines where the droop command or set point cannot be sent to the engine controller, the droop setting in parameter 2771 is used for droop emulation in the ML-2. This method is referred to as "EIC droop emulation". EIC droop emulation is a generic function developed by DEIF, which it is possible to use on every engine type.
	EIC Reset trip fuel	Resets fuel counter in the ECU.
	EIC Enable Cylinder Cut-out	Forces engaging all cylinders if the engine is running with one bank only. Allows cylinder cutout.
	EIC Engine overspeed test	Forces testing of the over-speed function at any given rpm.
	EIC Intermittent oil priming	Forces engaging the periodical pre-lubrication oil pump if installed.
	EIC Engine opr mode command	Forces switching the operating mode of the engine.
	EIC Engine speed gov param command	Forces parameter switch for selection between: default and variant 1. M-Logic is used to select variant 1 parameters.
	EIC DPF Regeneration Inhibit	The regeneration disabled (inhibit) switch disallows any automatic or manual (non-mission) regeneration of the diesel particulate filter. This may be used by the operator to prevent regeneration when the machine is operating in a hazardous environments and the user is concerned about high temperature.

Output	Description	Notes/parameter
	EIC Regeneration Force	The regeneration Initiate switch initiates a manual (non-mission) regeneration of the particulate filter when the machine is in non-mission condition and DPF soot levels are high enough to allow regeneration. This switch is for use in forcing a regeneration event to occur to troubleshoot the system. During a non-mission regeneration, the engine speed will increase to an optimum speed for regeneration.
	Inh. EIC alarms	Inhibition of EIC alarms
	EIC Select Cummins PCC1301	Command for engine speed control. Enable speed control for PCC 1301.
	EIC Start/Stop enable	Switches ON/OFF the start and stop commands.. Parameter 7563 (EIC Controls).
	EIC Speed Control Inhibit (TSC1)	Command to enable/disable start/stop and speed controls
	EIC Warning auto-ack	Auto acknowledge EIC alarms.
	EIC Interval Primin	(H13) Engine will enable lube oil priming with an interval.
	EIC Priming On Engine Start	(H13) Engine will enable lube oil priming at every start.
	EIC Speed Increase	This command increases the speed of the engine by a small amount. (H13) A manual "speed up" function (typically used with a DI).
	EIC Speed Decrease	This command decreases the speed of the engine. This is a manual speed up function, which is typically used with a digital input.
	EIC binary Speed In-De Enable	This command activates the use of the commands "EIC Speed Increase" and "EIC Speed Decrease". At the same time, it also deactivates the PID regulators.
DAVR commands		DAVR commands. Commands that are related to DVC 310. The DVC 310 is a digital voltage regulator, which monitors and regulates the alternator output voltage. The role of the DVC is to adjust the excitation current in the exciter field according to the desired alternator output.
	Set stator current limitation off	Stator current limitation disabling. Selection in parameter 7795 I.
	Set stator current limitation TM	Stator current limitation with TM (Transformer Magnetisation). Selection in parameter 7795 I stator limit.
	Set stator current limitation IM	Stator current limitation with IM (Inductive Motor) starting. Selection in parameter 7795 I stator limit.
	Reset trip alarms	Command to reset all tripped alarms.