MICROGRID

ASC PRESENTATION

Purpose

Introduction to DEIF ASC

Content

Introduction

ASC Solar

ASC Battery

Monitoring

Utility SW

HW layout

Microgrid definition

Micro-grid

When local load and power generation can be disconected from the Micro-grid and word independently.

Hybrid

Combination of different technologies to produce power.

Segments

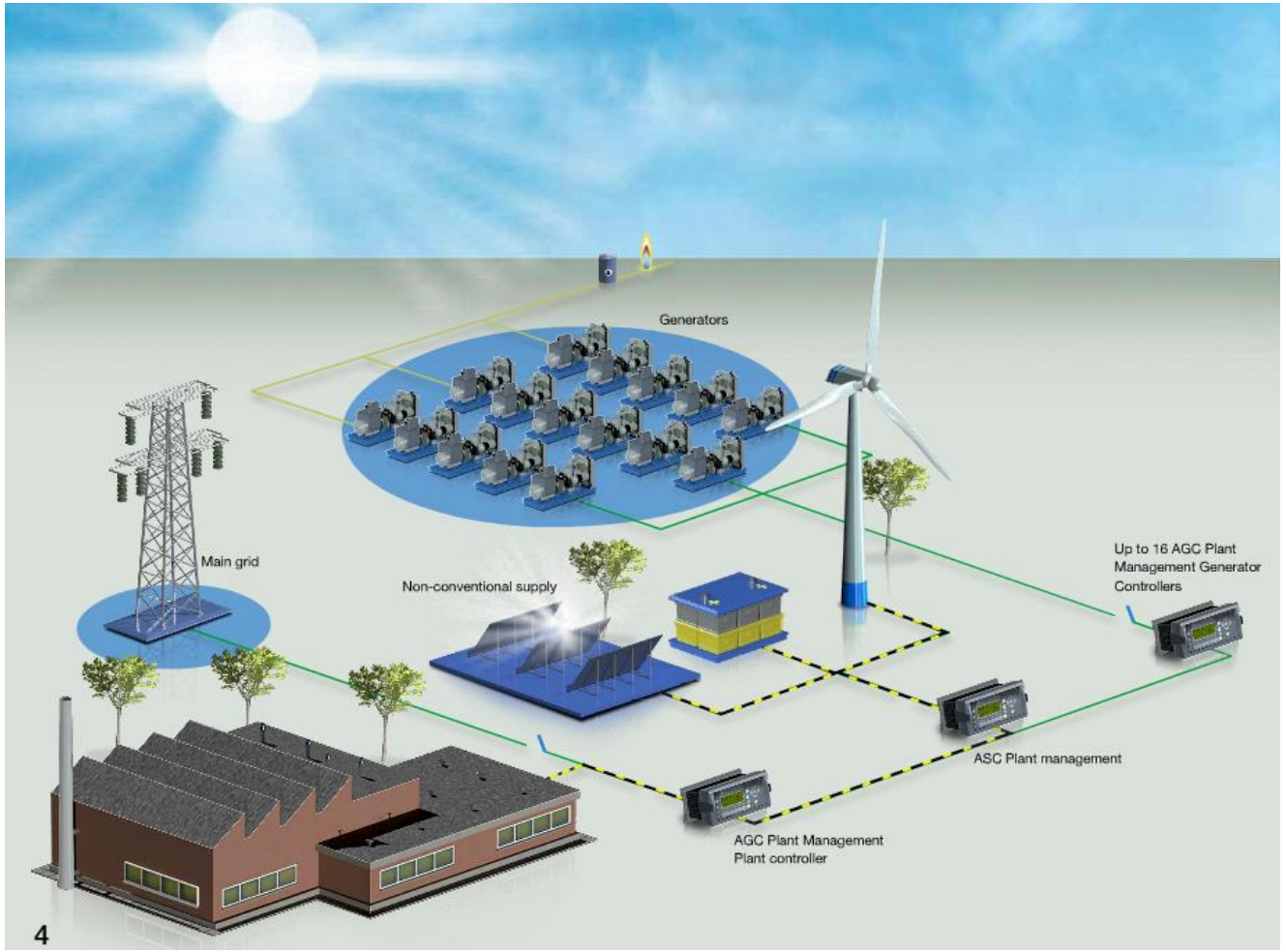
Grid-tied / Emergency power:

Factories, farms, hospitals, etc.

Self comsumption.

Off-grid:

Factories, farms, mines, vilages, etc.



AGC

Island

Only gensets and Renewables are connected to bus providing power to the consumer.

Automatic Mains Failure

The hybrid is started automatically in case of mains failing providing power to the consumer.

When the utility recovers, the system reverts to main supply.

This can be done as a closed transition or as an open transition.

Mains Power Export/Zero export

The utility is connected to the bus providing power to the consumer.

On demand the hybrid can be started producing according to a user configurable power and reactive power reference this is in relation to the mains connection point.

The system will thereby secure a fixed power flow to the mains independent of consumer fluctuations.

AGC

Peak shaving

The utility is connected to the bus providing power to the consumer.

According to user defined settings the hybrid will start automatically when the mains consumption exceeds selected threshold and take the remaining power from the hybrid.

Load Take Over

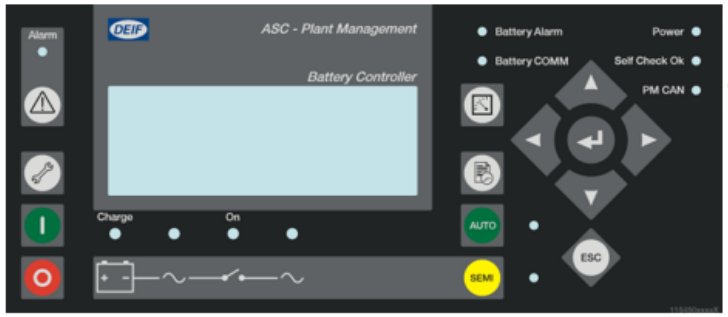
The utility is connected to the bus providing power to the consumer. On demand the hybrid can be started.

The system will then do a transition where the consumer is moved and disconnected from mains supply to run purely on hybrid supply

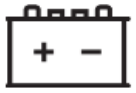
Afterwards system reverts to main supply. This can be done as a closed transition or as an open transition.

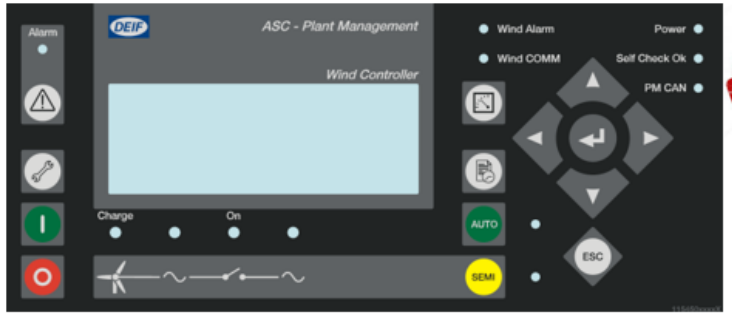
ASC

ASC Solar



ASC Battery





ASC Wind

ASC Solar

Presentation

Purpose

Introduction to DEIF ASC Solar.

Content

Main features

Genset/Utility interaction

Inverter interaction

Meteorological interation

ASC Solar

ASC-4 Solar, Maximizing PV penetration.

JUN 2016

Minimum genset load
The minimum genset load set point is available in the ASC-4. the purpose is to eliminate the risk of reverse power and engine probelms caused by the low load. It applies in *Island mode* only. The sustainable sources will be curtailed if the load set point is compromised.

Spinning reserve demand
Spinning reserve is available as a percentage of present production, spinning reserve by forecast systems or by ESS systems.

Zero export applications
Maintaining zero export at grid connection, preventing any power exported to the grid. The mode can also be used for power export to grid.

ASC Solar

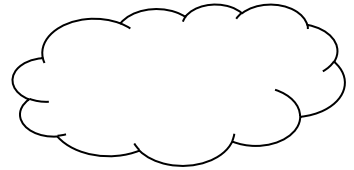
4-20mA

Energy meters

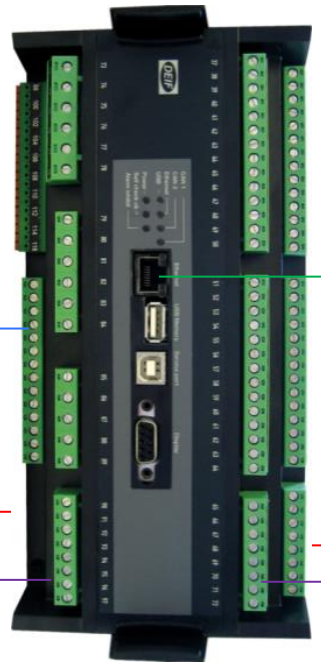
DEIF proprietary

Slave: DEIF proprietary

Data logger



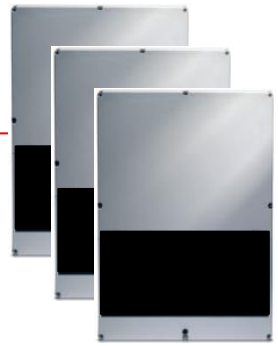
Remote monitoring



Slave: SunSpec/DEIF proprietary

Local monitoring

Master: ASC control/monitoring



4-20mA, PT100 and PT1000

Canbus

Modbus TCP

Modbus RTU

Analogue

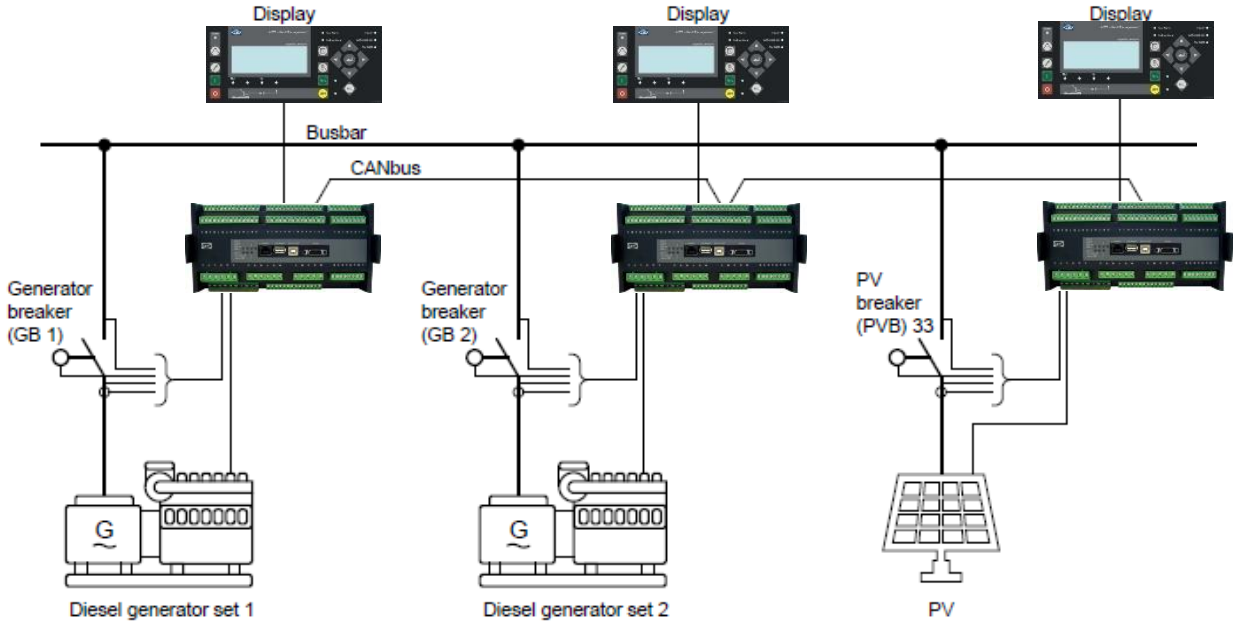
ASC Solar

Genset / Utility Interaction

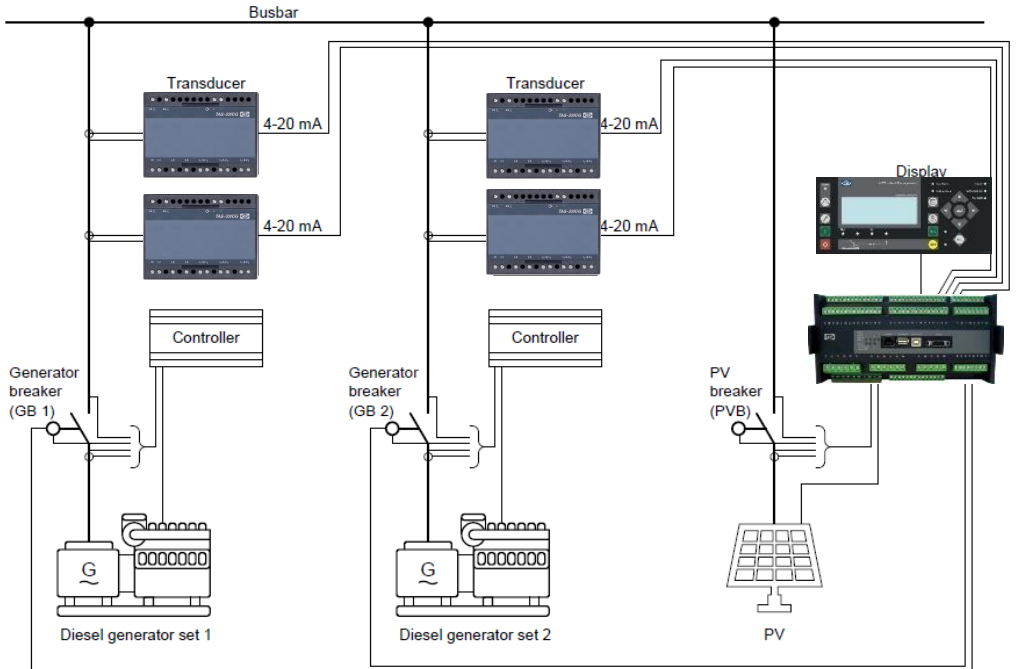
ASC Solar

Off-grid

- Integrated solution.
- Applicable with AGC PM controls.
- Applications up to 16 ASC-4
- Minimum genset load.
- Spinning reserve.
- Maximize PV penetration.



- Add-on solution.
- Applicable with all genset controls.
- Maximum 1 ASC-4
- Minimum genset load.
- Maximize PV penetration.

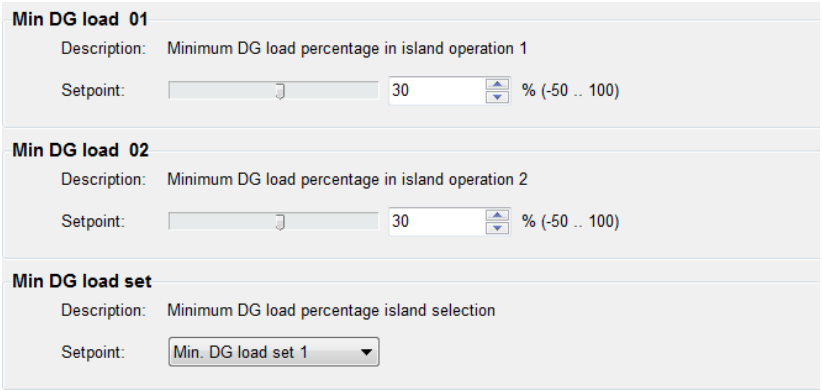


ASC Solar

Power reference in off-grid operation

Settings for determining minimum DG load in percentage are available.
They apply for both Stand-alone and Power management applications.

- Menu 8011 “Minimum DG load 1”
- Menu 8012 “Minimum DG load 2”
- Menu 8013 “Minimum DG load selector”



This is for securing a certain amount of load on the gensets eliminating the risk of reverse power situations and impure combustion and exhaust problems.

Without compromising minimum DG load constrain the ASC will maximize the power reference to the PV Plant
The ASC might decrease (or even completely remove) the power request to the PV Plant even though more PV power is available.

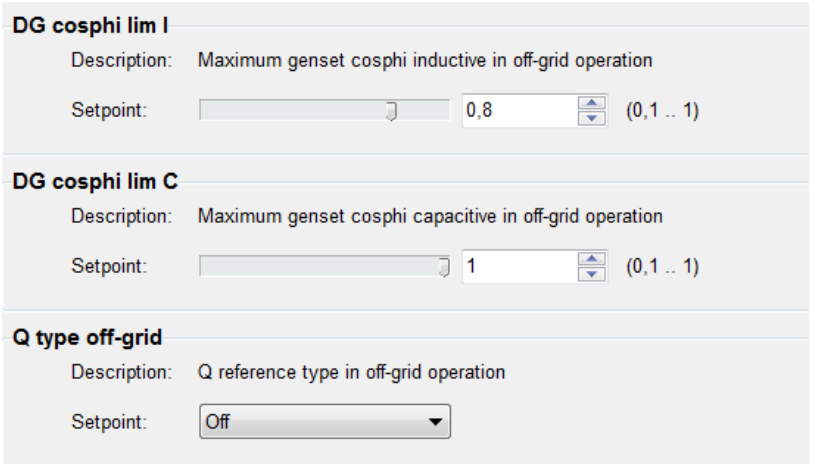
The power ramp is skipped when the PV plant carries the entire load or the DG’s are overloaded.

ASC Solar

Reactive power reference in off-grid operation

The reactive power reference can be applied in different manners.
The type to use and what reference is determined by following settings:

- Menu7031 “DG cosphi limit I”
- Menu7031 “DG cosphi limit C”
- Menu7033 “Q type off-grid”



The “Q type off-grid” can be set to the following selections:

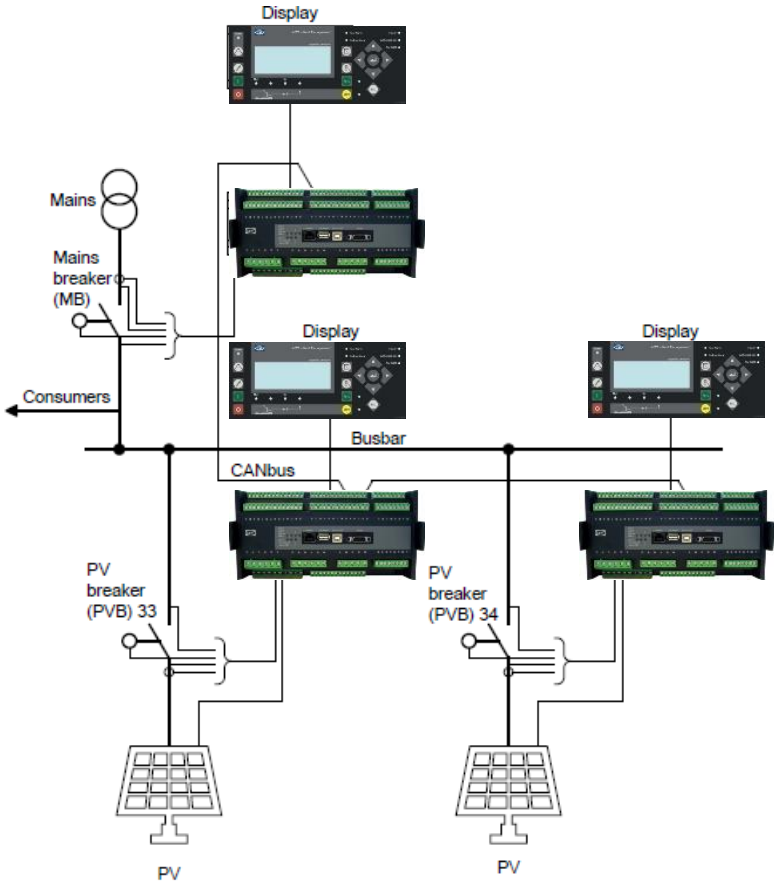
Selections	Functionality
OFF	0kvar used for reference.
Q share	ASC will have PV sharing the reactive power with the genset(s) in order to keep same cosphi on genset(s) and PV.

If the genset(s) are driven out of the cosphi operating window dictated by the settings in menu7031 and menu7032 the ASC will use the excessive Q load as reference for the PV-plant.

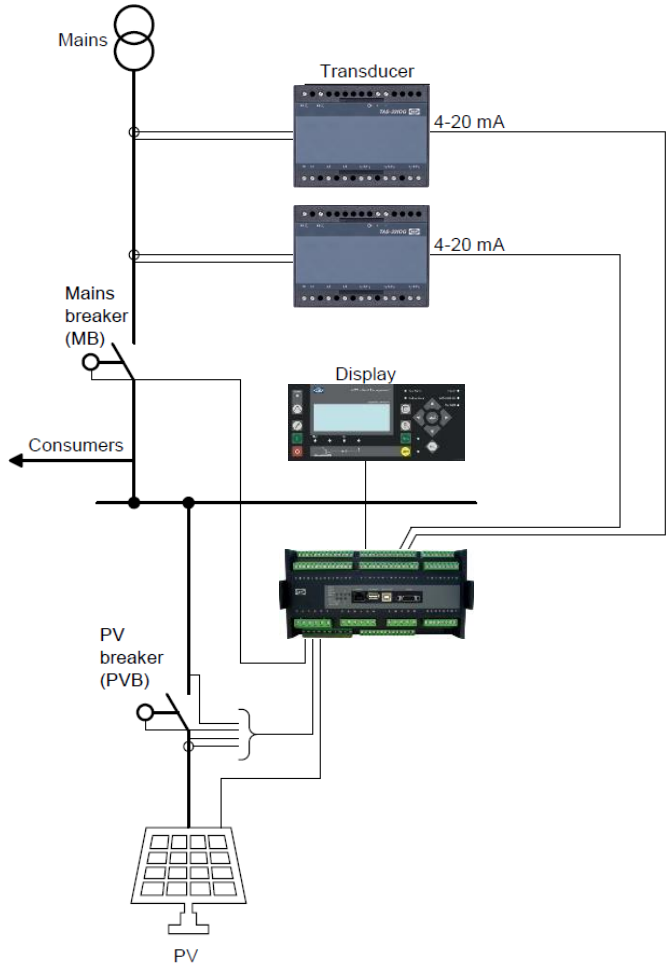
ASC Solar

Grid-tied

- Integrated solution.
- Applicable with AGC PM controls.
- Applications up to 16 ASC-4.



- Add-on solution.
- Maximum 1 ASC-4.

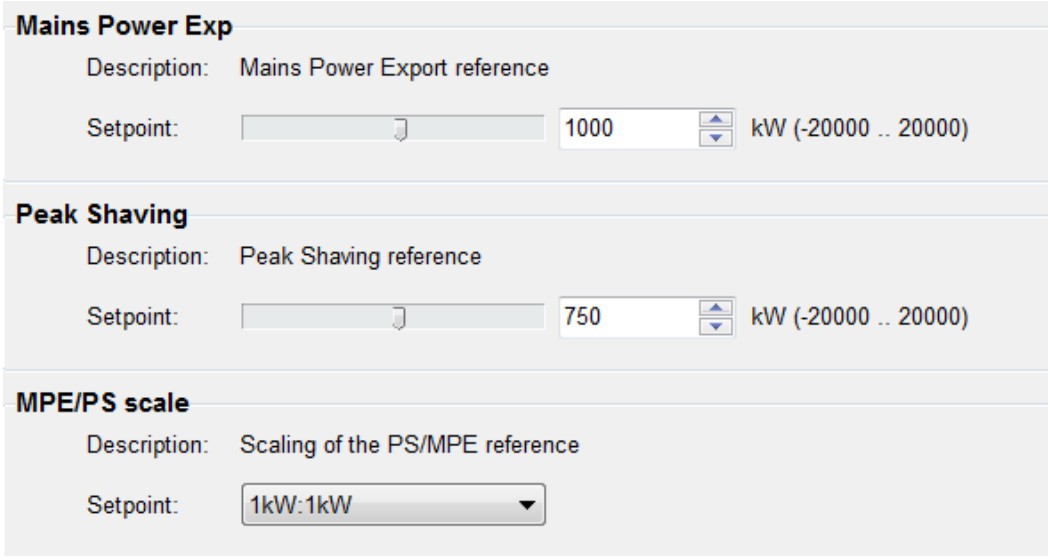


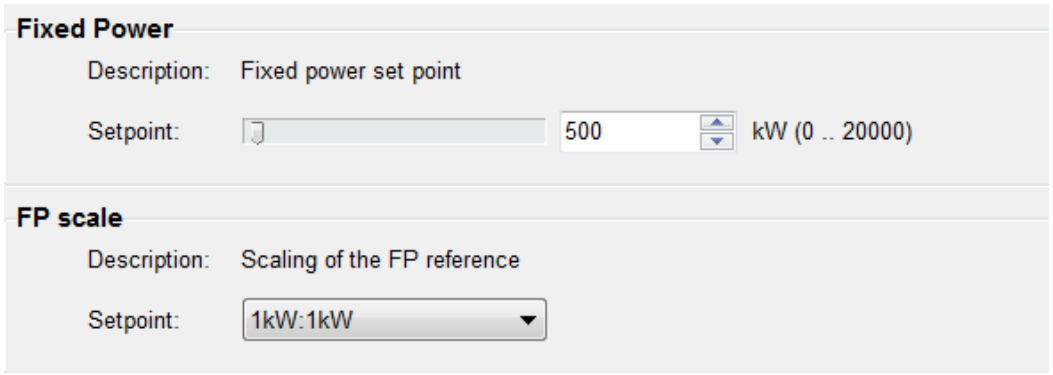
ASC Solar

Power reference in grid-tied operation

The active power reference is determined by the mode selected and the associated power reference setting and scaling:

Selections	Functionality
Fixed power mode	Menu 7001 “Fixed Power reference” Menu 7002 “Scale”
Mains power export mode	Menu 7011 “Mains power export reference” Menu 7013 “Scale”
Peak shaving mode	Menu 7012 “peak shaving reference” Menu 7013 “Scale”





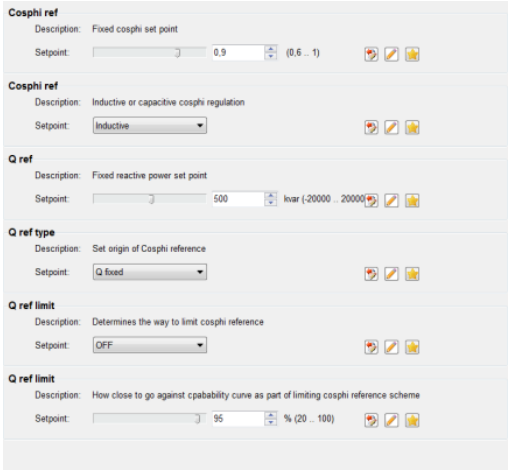
ASC Solar

Reactive power reference in grid-tied operation

The reactive power reference can be applied in various different manners.
The type to use and what reference is determined by following settings:

- Menu7021 “Cosphi reference”
- Menu7022 “inductive/Capacitive”
- Menu7023 “Q reference”
- Menu7024 “Q type grid-tied”

The “Q type grid-tied” can be set to the following selections:

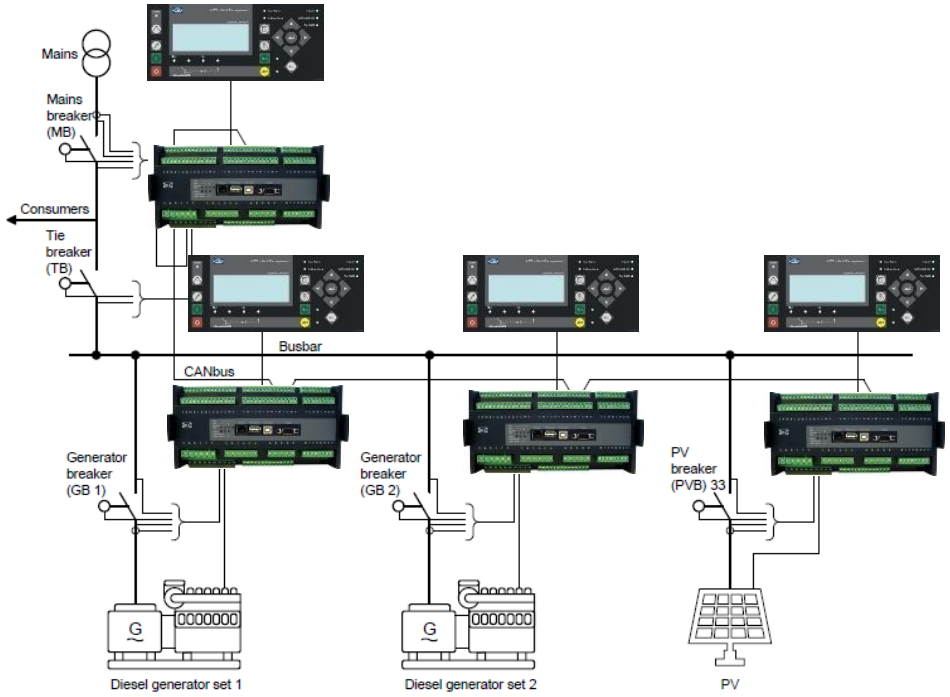


Selections	Functionality
OFF	0kvar used for reference.
Cosphi fixed	ASC will have PV producing according to menu7021 and menu7022. In case Cosphi control via control registers (communication) is enabled the ASC will take the references from there instead. In case Cosphi control via external input (analogue input) is enabled the ASC will take the references from there instead.
Cosphi import/export	ASC will have PV producing in order to have power imported/exported to utility at cosphi according to menu7021 and menu7022.
Cosphi superior	ASC will have PV producing according to cosphi reference received from Mains controller. If Mains controller is not setup up to distribute cosphi references the ASC will have PV producing as if “Cosphi fixed” was selected.
Q fixed	ASC will have PV producing according to menu7023. In case Q control via control registers (communication) is enabled the ASC will take the references from there instead. In case Q control via external input (analogue input) is enabled the ASC will take the references from there instead.
Q import/export	ASC will have PV producing in order to have reactive power imported from utility according to menu7023.

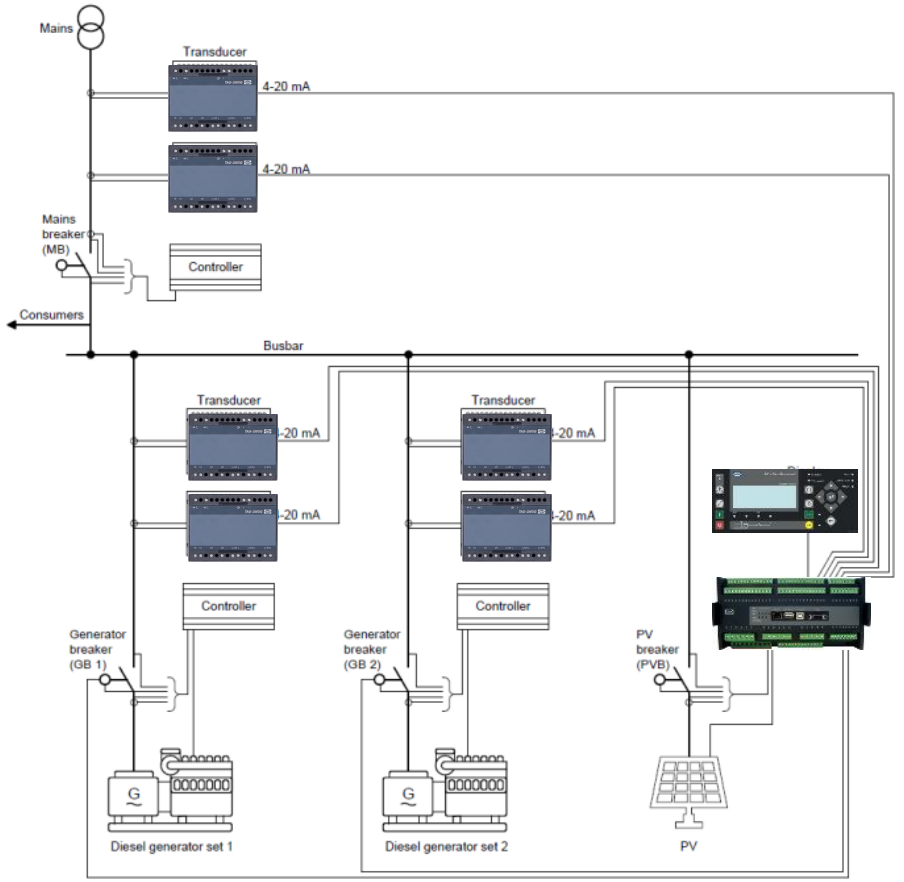
ASC Solar

Combination

- Integrated solution.
- Applicable with AGC PM controls.
- Applications up to 16 ASC-4.
- Minimum genset load.
- Spinning reserve.
- Maximize PV penetration in all operation modes.



- Add-on solution.
- Applicable with all genset controls.
- Maximum 1 ASC-4.
- Minimum genset load.



ASC Solar

Modbus RTU (H2.8)
Power meter comm.

iEM3000

U and I
sensing

Modbus RTU (H2)
Inverter comm.

MB pos.
Feedback

LOAD

MIC4002

GB pos.
Feedback

U and I
sensing

MIC4002

GB pos.
Feedback

U and I
sensing

MIC4002

GB pos.
Feedback

U and I
sensing

MIB7000C

U and I
sensing

MIB7000C

U and I
sensing

ASC Solar

Meters currently supported

Meter	P	Q	Inputs
MIB7000C	Yes	Yes	No
MIC4002	Yes	Yes	2
MIC4224	Yes	Yes	4
MIC-2	Yes	Yes	No
MTR-3	Yes	Yes	No
iEM3000	Yes	No	No
EM6400	Yes	Yes	No

Meter	P	Q	Inputs
Multis L40	Yes	Yes	No
PM5560	Yes	Yes	No
Diris A40	Yes	Yes	No
EDS MMCT3	Yes	Yes	No
Mavolog Pro	Yes	Yes	No
EDMI Genius	Yes	Yes	No







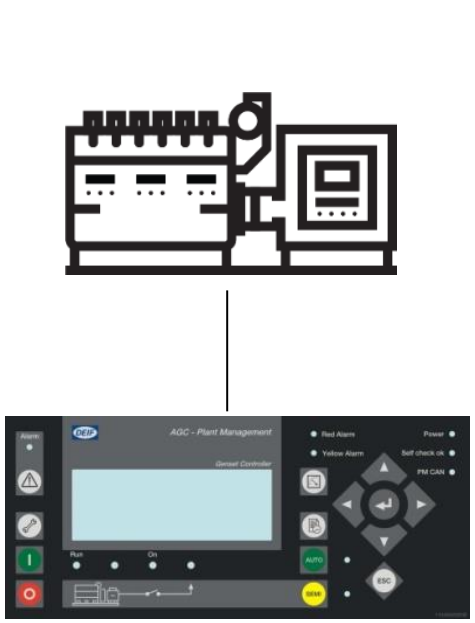




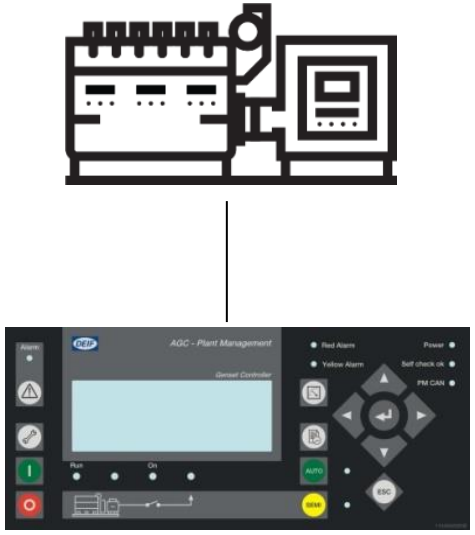
ASC Solar

Spinning reserve (Genset)

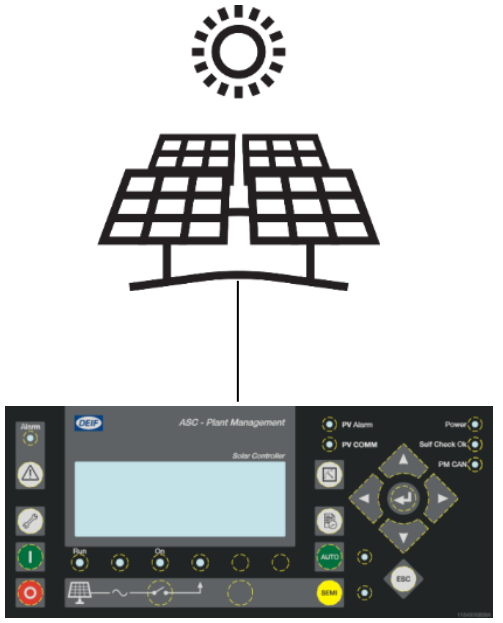
One way of obtaining spinning reserve is by having excessive amount of genset(s) on line being able to pick up the additional loading in case PV drops its share.
Traditional gensets have a minimum operating load at 30-40%. Running with excessive amount of genset(s) will impact on the PV penetration as the PV have to be curtailed in order to maintain minimum loading of the excessive genset(s) as well.



AGC Genset



AGC Genset

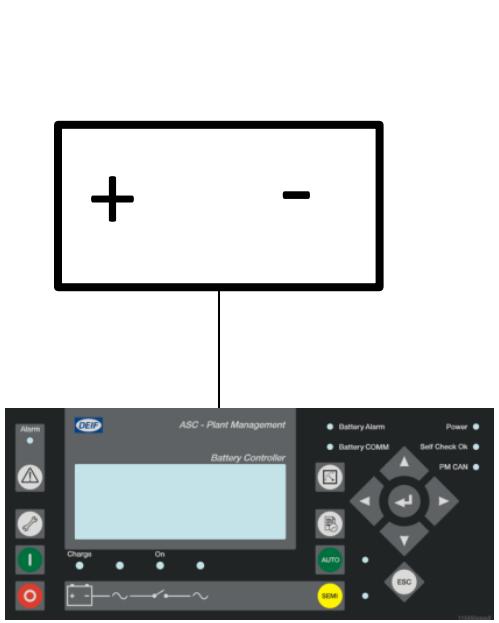


ASC Solar

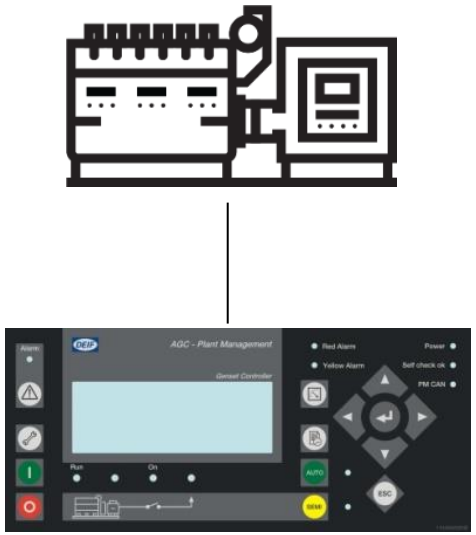
ASC Solar

Spinning reserve (Battery)

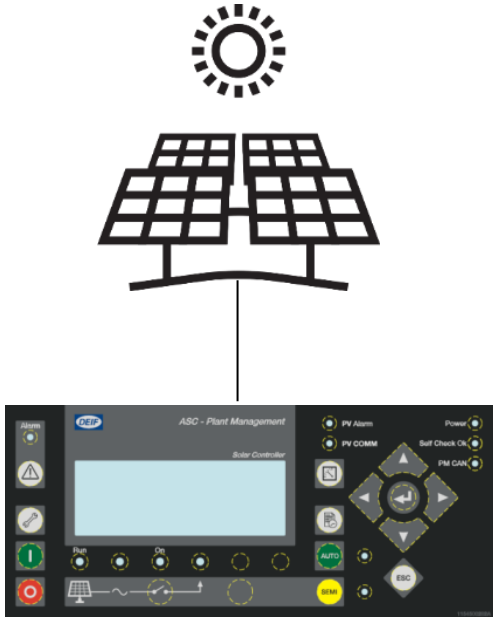
Another way of obtaining spinning reserve is by means of energy storage systems, typically battery based. The storage system will then pick up the load dropped by the PV source providing the system sufficient time to start additional genset(s) necessary to cope with the increased loading. This will result in higher PV penetration. However storage systems are still considered somewhat expensive.



ASC Battery



AGC Genset

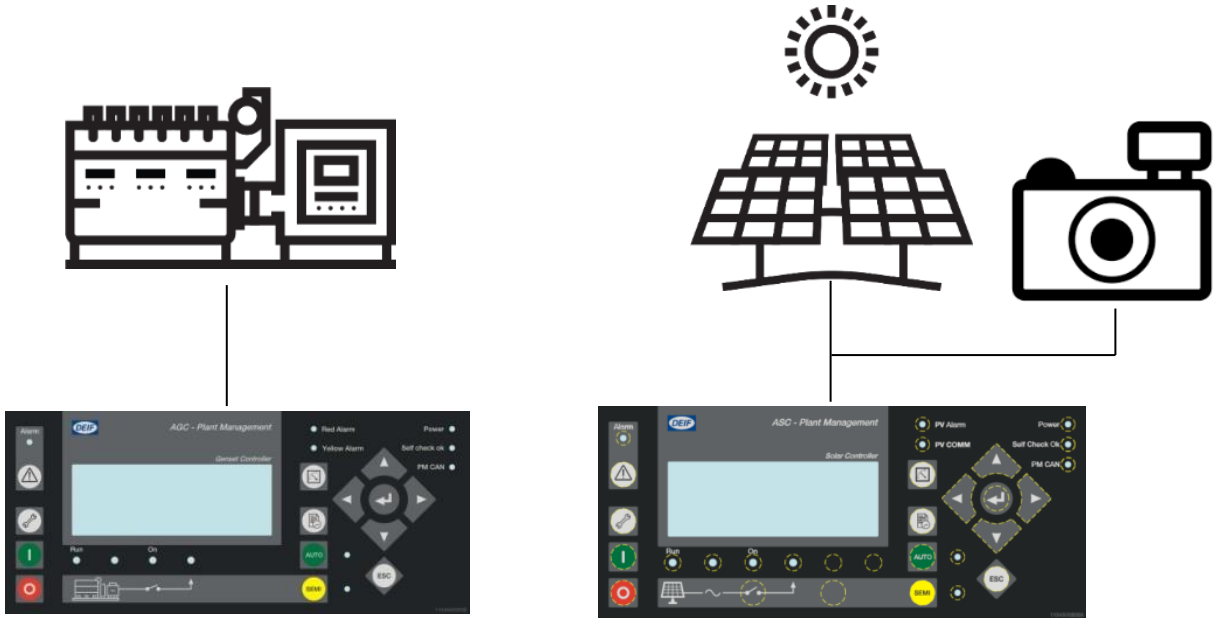


ASC Solar

ASC Solar

Spinning reserve (Forecast)

Finally and alternative solution exists. Short term forecasting of solar irradiation can predict the irradiation. Using sky image cameras the irradiation for the coming hour can be provided to the PV/diesel control system in one minute intervals. Based on this information genset(s) can be started in due time before the PV panels are shaded and the PV production drops. At the same time excessive genset(s) can be kept running in case forecasts shows that a new drop will come shortly thereby preventing unrequested start/stop cycles of the genset(s).



AGC Genset

ASC Solar

ASC Solar

SUN OR SHADE?

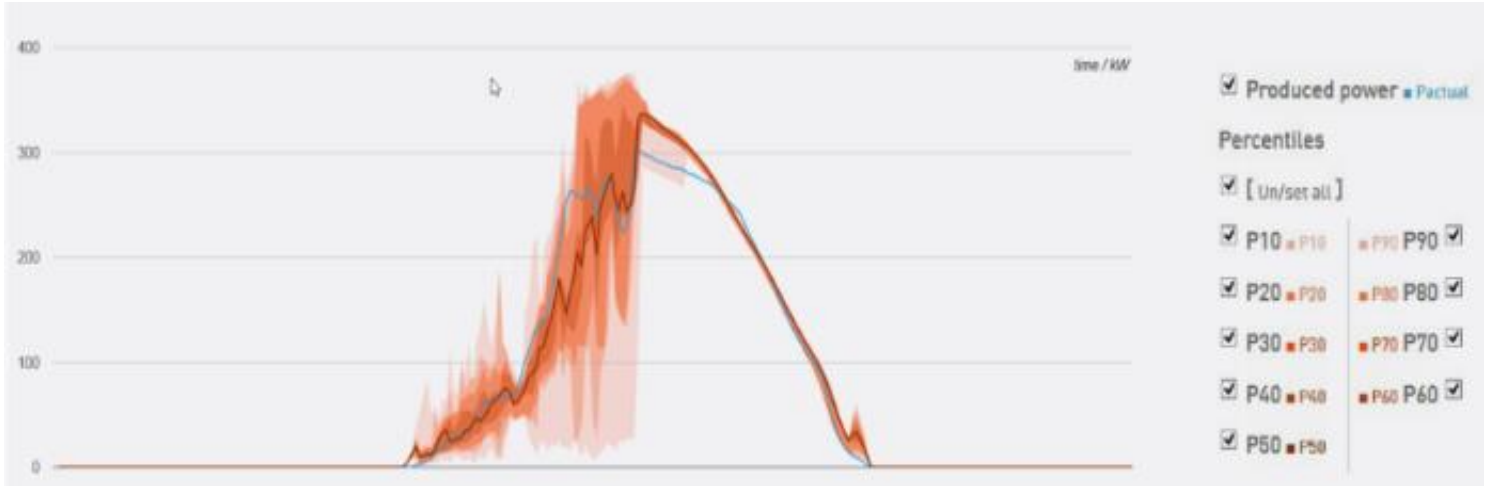
steadysun

Reuniwatt

SKY IMAGER ENABLES ADVANCED SOLAR PENETRATION TO YOUR MICROGRID APPLICATION

In PV/diesel hybrid applications, the intermittency of the PV source poses a stability challenge for the system when the installed PV capacity reaches a significant size.

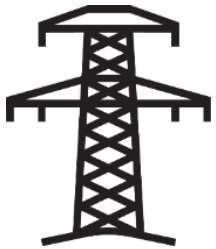
DEIF's ASC solutions are compatible with the leading short-term forecasting systems of the industry. The forecasting is directly coupled to the existing spinning reserve routine and will generate automated start/stop of genset(s) accordingly.



ASC Solar

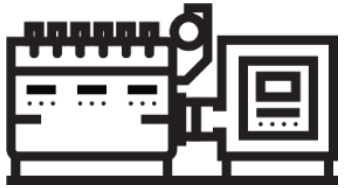
Inverter Interaction

ASC Solar



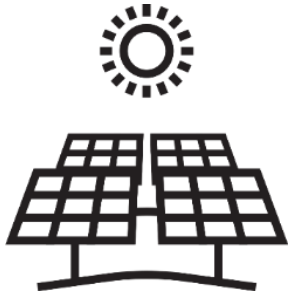
Utility

- Import/export
- Control of breakers
- Synch of plant to mains



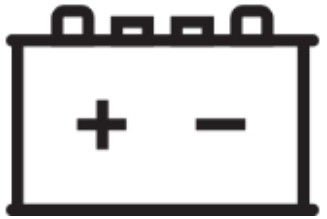
Genset

- AVR Control
- GOV Control
- ECU Communication
- Control of breaker



Photovoltaic

- P/Q control
- Inverter Communication
- Control of breaker



Energy storage

- P/Q control
- Charging/discharging
- PCS Communication
- BMS Communication
- Control of breaker

AGC Mains

AGC Genset

ASC Solar

ASC Battery

Energy Management System

ASC Solar


SMA


ABB


HUAWEI


HiQ
Solar


GOODWE
your solar engine


Schneider
Electric


Ingeteam


invt


DELTA


Fronius
SHIFTING THE LIMITS


KACO
new energy.


Gamesa


SUNGROW
Green and Effective

ASC Solar

Supported interfaces

Universal interface

The ASC communicates using the industry standard from SunSpec Alliance.

So what is SunSpec? It is a standardized Modbus communication protocol that includes information such as P and Q set points.

SunSpec Alliance is an association of manufacturers from the photovoltaic industry. The members support the goal of standardizing data and channels of communication for photovoltaic systems, regardless of the manufacturer.

SUNSPEC ALLIANCE

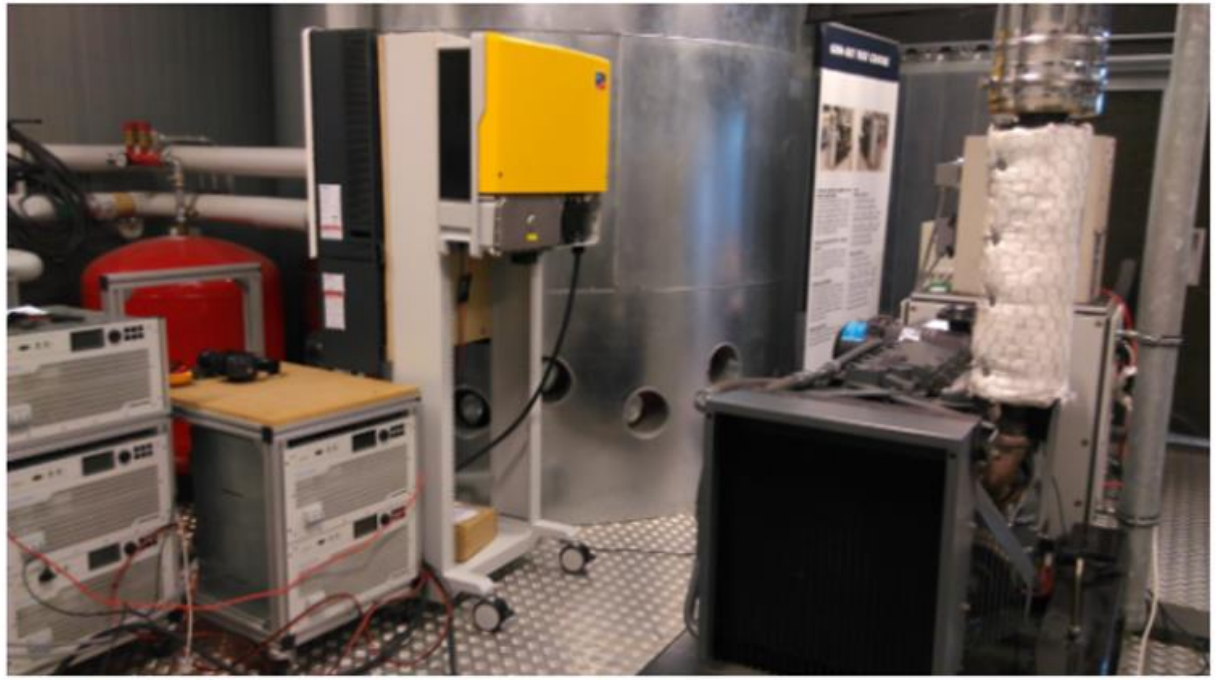
See full list at sunspec.org

ASC Solar

Interface validation at DEIF facility

-Five 10kW Regarton DC sources available to feed the inverters

-Possible to parallel PV both with utility and with gensets



ASC Solar

Interface validation at inverter maker facility

ASC Solar

RRCR support (input)

The input RRCR reference allows for a superior system via RRCR output signals to control the references applied from the ASC to the PV inverter/plant. The RRCR configuration window for input references is shown below.

RRCR

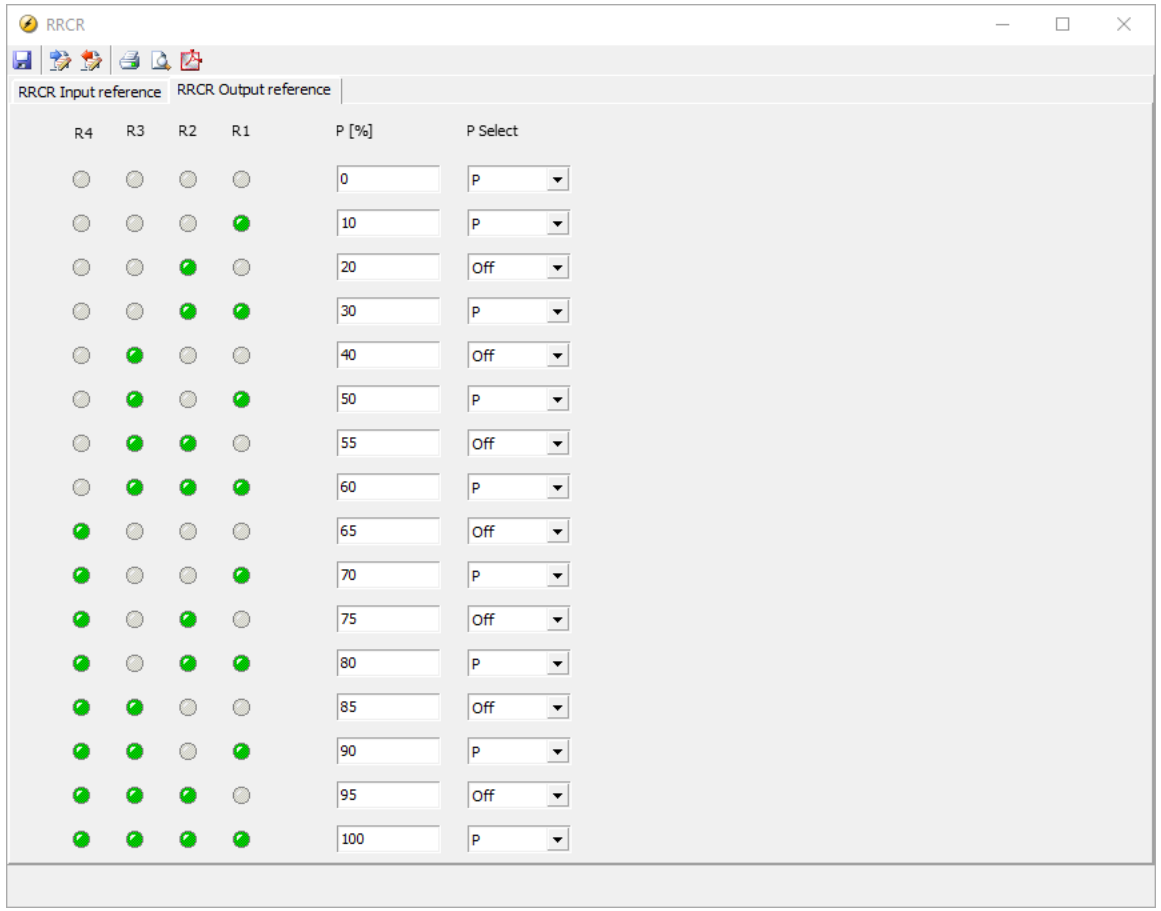
RRCR Input reference | RRCR Output reference

I4	I3	I2	I1	P [%]	P Select	Q [%]	Cosphi	Excitation	Q Select
○	○	○	○	0	P	0	0,99	Capacitive	Q
○	○	○	●	10	P	0	0,98	Inductive	Off
○	○	●	○	20	P	0	1,00	Capacitive	Off
○	○	●	●	30	Off	0	1,00	Inductive	Cosphi
○	●	○	○	40	P	0	0,90	Capacitive	Off
○	●	○	●	50	Off	0	1,00	Inductive	Off
○	●	●	○	55	P	0	1,00	Capacitive	Off
○	●	●	●	60	Off	0	1,00	Inductive	Off
●	○	○	○	65	P	0	1,00	Capacitive	Off
●	○	○	●	70	Off	0	0,43	Inductive	Off
●	○	●	○	75	P	0	1,00	Capacitive	Off
●	○	●	●	80	Off	0	1,00	Inductive	Off
●	●	○	○	85	P	0	1,00	Capacitive	Off
●	●	○	●	90	Off	0	1,00	Inductive	Off
●	●	●	○	95	P	0	1,00	Capacitive	Off
●	●	●	●	100	Off	0	0,13	Inductive	Off

ASC Solar

RRCR support (output)

The output RRCR reference enables the ASC to apply commands to a PV inverter/plant via RRCR interface. The RRCR configuration window for output references is shown below.



ASC Solar

Analogue outputs

Analogue outputs
P reference
Q reference
Cosphi reference

ASC Solar

Meteorological Interaction

ASC Solar

Weather data

The ASC provides support of sensors for the below listed weather data:

- 3 Plane of array irradiation sensors
- 3 Back of module temperature sensors
- 1 Global horizontal irradiation sensor
- 1 Ambient temperature sensor
- 1 Relative humidity sensor
- 1 Barometric pressure sensor
- 1 Wind speed sensor
- 1 Wind direction sensor
- 1 Rain fall sensor
- 1 Snow depth sensor

View 18	
Line 1: GH irr.	0W/m2
Line 2: Ambient temp.	0C
Line 3: Relative humidity	0%

View 11	
Line 1: POA irr. 1	0W/m2
Line 2: POA irr. 2	0W/m2
Line 3: POA irr. 3	0W/m2

View 19	
Line 1: Barometric pres	0hPa
Line 2: Wind speed	0m/s
Line 3: Wind direction	0deg

View 12	
Line 1: BOM Temp. 1	0C
Line 2: BOM Temp. 2	0C
Line 3: BOM Temp. 3	0C

View 20	
Line 1: Rain fall	0mm
Line 2: Snow depth	0mm
Line 3: No text	

ASC Solar

Active power limitation (Instant P max)

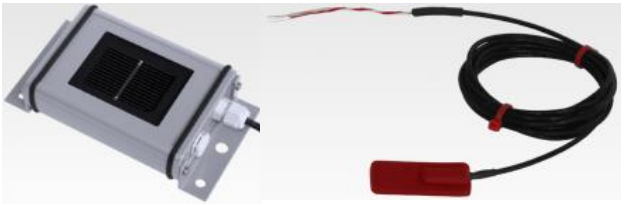
The power that can be generated by the PV plant at PCC is dependent on the PV panels and on the inverters.

PV Panel

The power that can be generated by the PV panels is dependent on plane of array (POA) solar irradiation and the back of module (BOM) temperature of the panels. The ASC supports 3 POA irradiation sensors and 3 BOM temperature sensors. These can be weighed against each other in order to generate representative POA irradiation and BOM temperature which eventually is used to determine the Instant maximum power possible to generate by the panels.

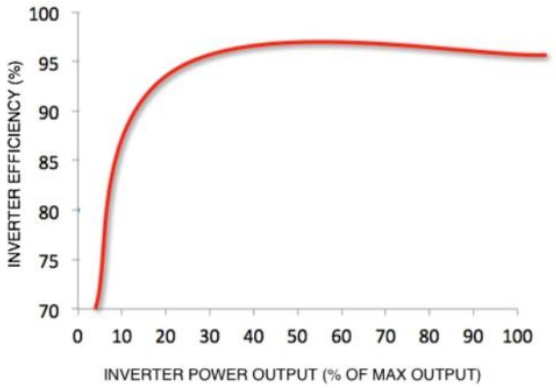
The Power Temperature Coefficient Model - This model applies a temperature correction to P_m to account for departures in cell temperature from those at SRC. P_m is assumed to be linear with respect to the effective irradiance if the temperature is constant. Eq. 2 represents this model. Zero subscripts denote performance at SRC.

$$P_m = \frac{E_e}{E_0} \cdot P_{m_0} \cdot \left[1 + \gamma \cdot (T - T_0)\right]$$



Inverter efficiency

The efficiency of the inverter is listed on the inverter data sheet.
Various definitions for efficiency exists; Peak, European (Euro), California (CEC).
Generally the efficiency depends on the power drawn from the inverter.
At low power the efficiency drops rapidly but from ~10% and up it is more or less static.
A single parameter is added for the inverter efficiency:



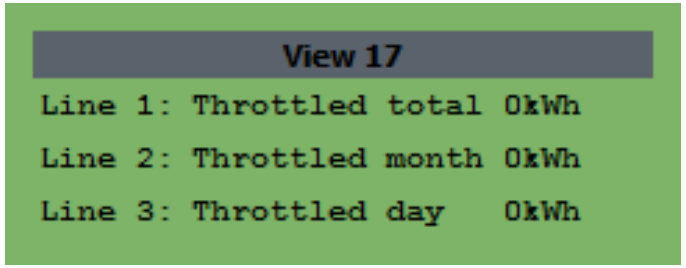
ASC Solar

Throttle Counters

The ASC PM provides throttle counters that keep track of unutilized excessive PV energy.
The ASC PM aggregates the delta between the requested power and the PV power available (Instant P max).
To obtain accurate values it is recommended to install plane of array irradiation sensor(s) and back of module temperature sensor(s) and utilize the Active power limitation functionality.
In case Active power limitation is not utilized the PV power available (Instant P max) will be equal to the nominal size.

Four counters are included:

- Day counter
- Week counter
- Month counter
- Total counter



The counters are incremented under below circumstances:

- Requested power < Instant P max.
- Requested power <= Actual power.

A setting is added to compensate for potential deviations between the ASC PM measurements and the measurements done by the inverter(s). Deviations can arise from transmission losses or merely measurement inaccuracy.

ASC Solar - CASE

ASC-4 Solar. Brazil, Dec 2017.

4 MW PV capacity, 12 MW genset capacity and a Reuniwatt forecast system.

It’s purpose is to reduce the use of diesel and supply power to Oiapoque city and rural areas.

ASC Battery

Presentation

Purpose

Introduction to DEIF ASC-4 Battery.

Content

Main features

Power source & Energy source

AC & DC couplings

Charge scheme

ESS interaction

ASC Battery

ASC-4 Battery, Seamless energy storage integration.

MAR 2018

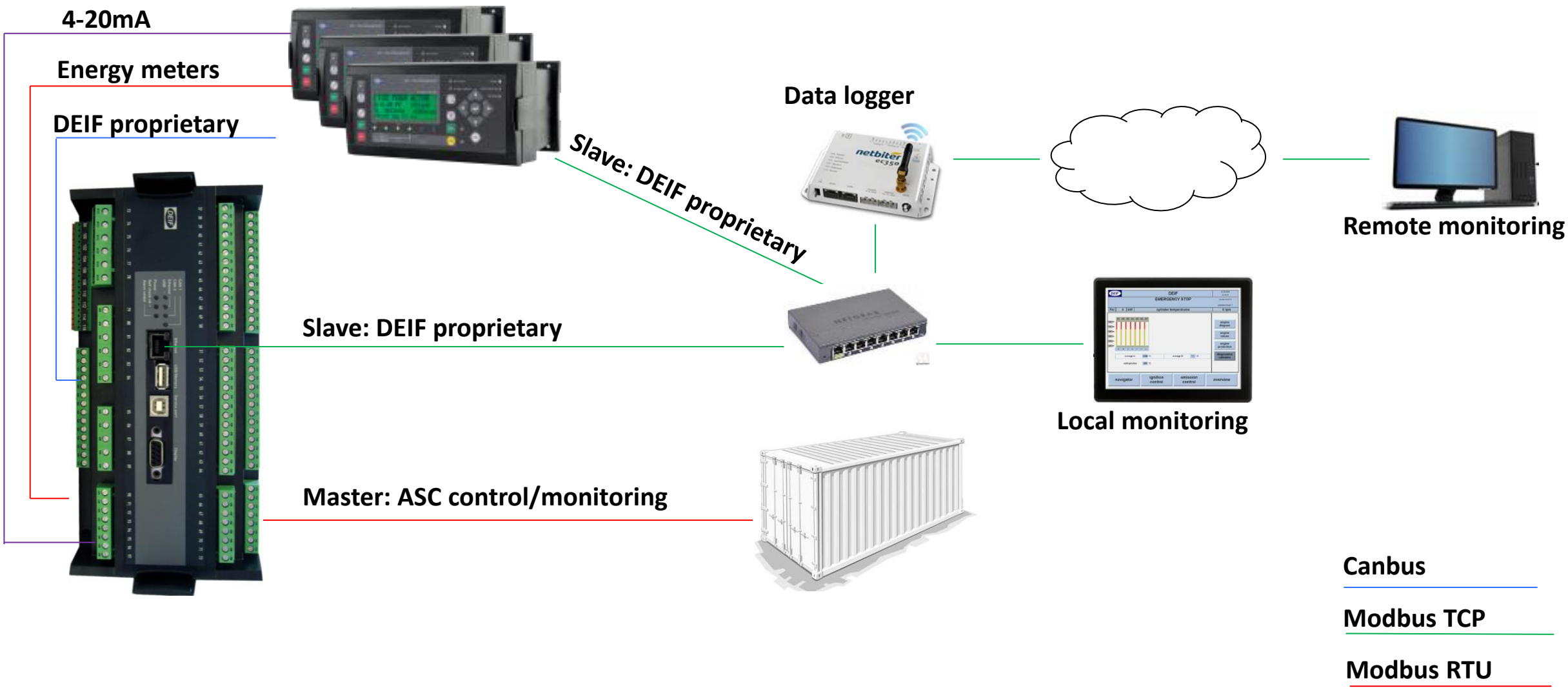
Energy or power source

The ASC-4 Battery handles applications that use battery power as the primary power source (instead of gensets) as well as applications that use battery power for short-term support (for instance to support gensets for a short period of time) equally well.

AC- or DC-coupled

ASC-4 Battery is ideal for both AC- and DC-coupled applications. For AC-coupled systems, you can define battery charging and discharging scheme. Using the chargeScheme, you'll also be able to define the energy sources (gensets, PV or Mains) you allow for charging purposes.

ASC Battery


4-20mA
Energy meters
DEIF proprietary
Slave: DEIF proprietary
Data logger
Remote monitoring
Slave: DEIF proprietary
Local monitoring
Master: ASC control/monitoring
Canbus
Modbus TCP
Modbus RTU

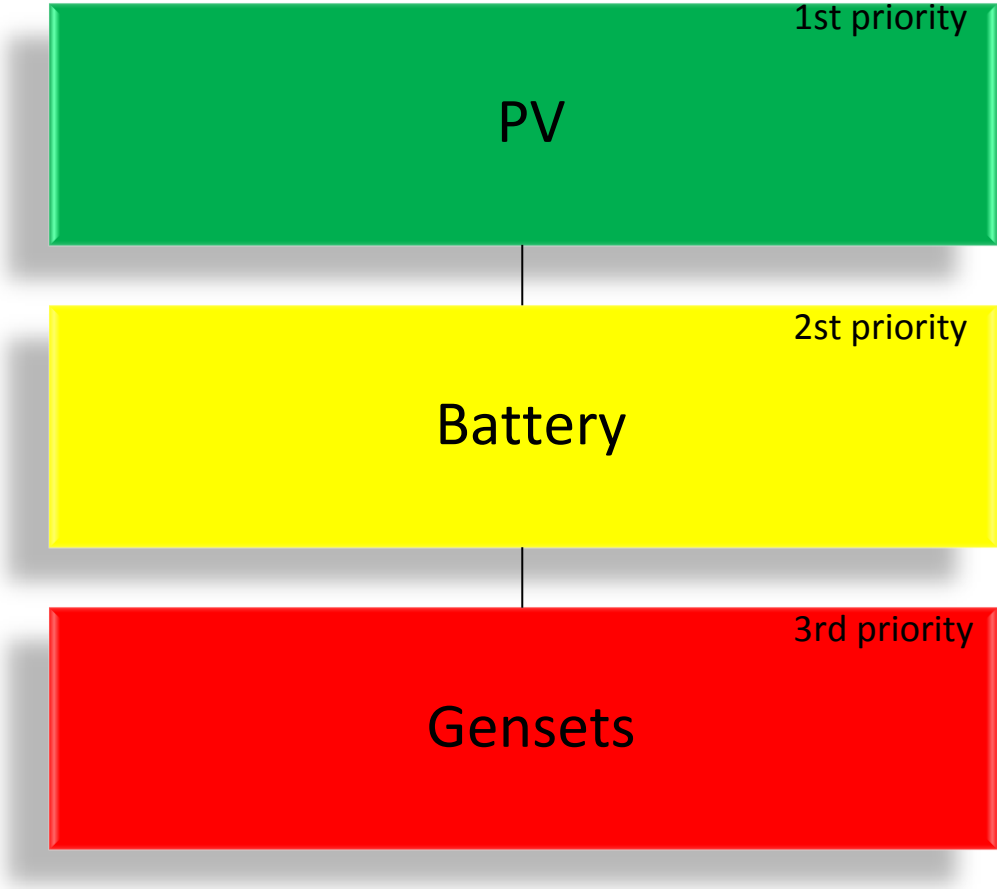
ASC Battery

Energy source & power source

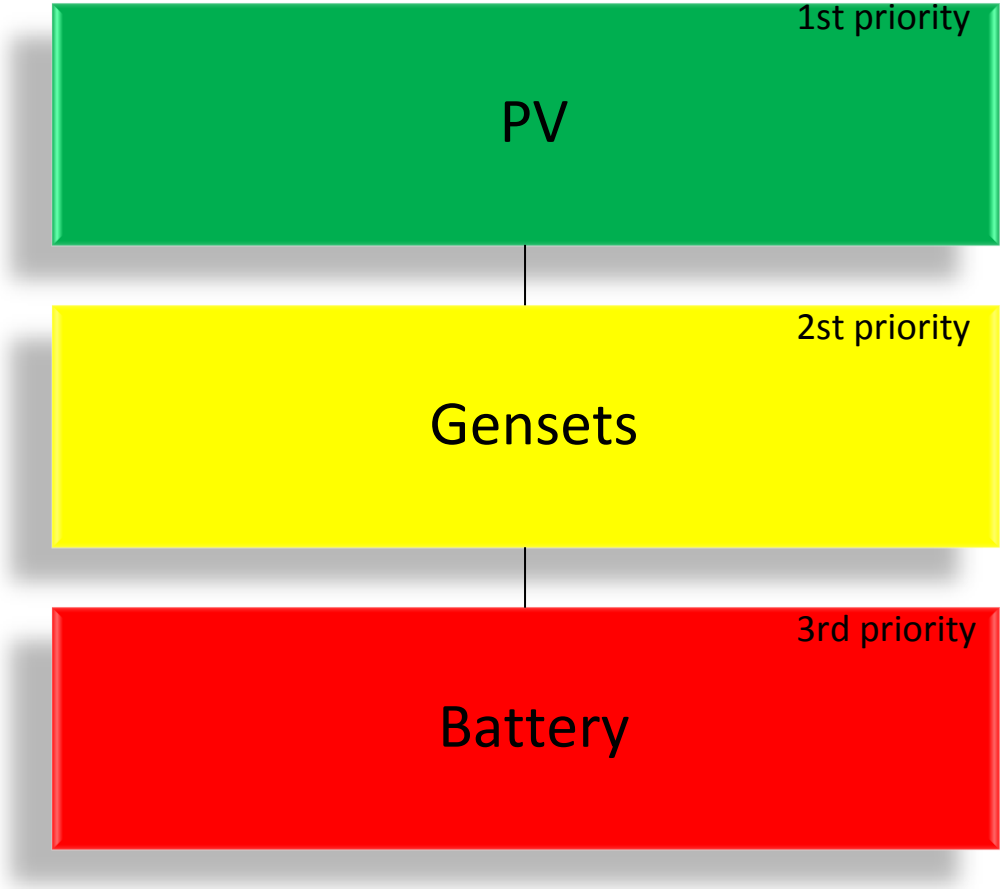
ASC Battery

The controller placed highest in below source hiraki is preferred source.

Energy source



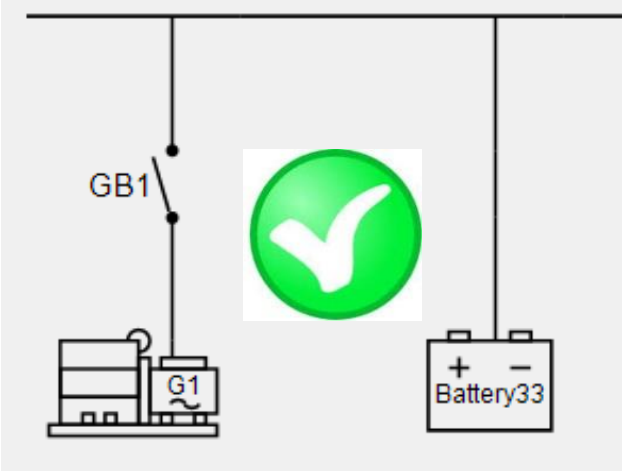
Power source



ASC Battery

Energy source: The battery is intended to supply a load being the only source connected to the AC bus. Generating capacity will be subtracted the spinning reserve requirement for the diesel genset plant. This may result in all gensets stopping depending on load demand.

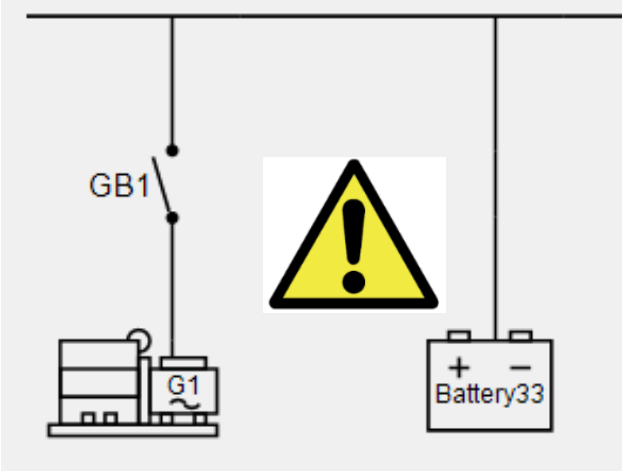
When the state of charge falls below the predefined power source threshold, the ASC will automatically switch into power source operation and startup the required number of gensets.Once the state of charge is above the energy source threshold, the ASC will return to energy source operation.



ASC Battery

Power source: The battery is not intended to supply a load being the only source connected to the AC bus. Power source is used to take peak loads until genset start and improving power quality. The power reference is zero per default.

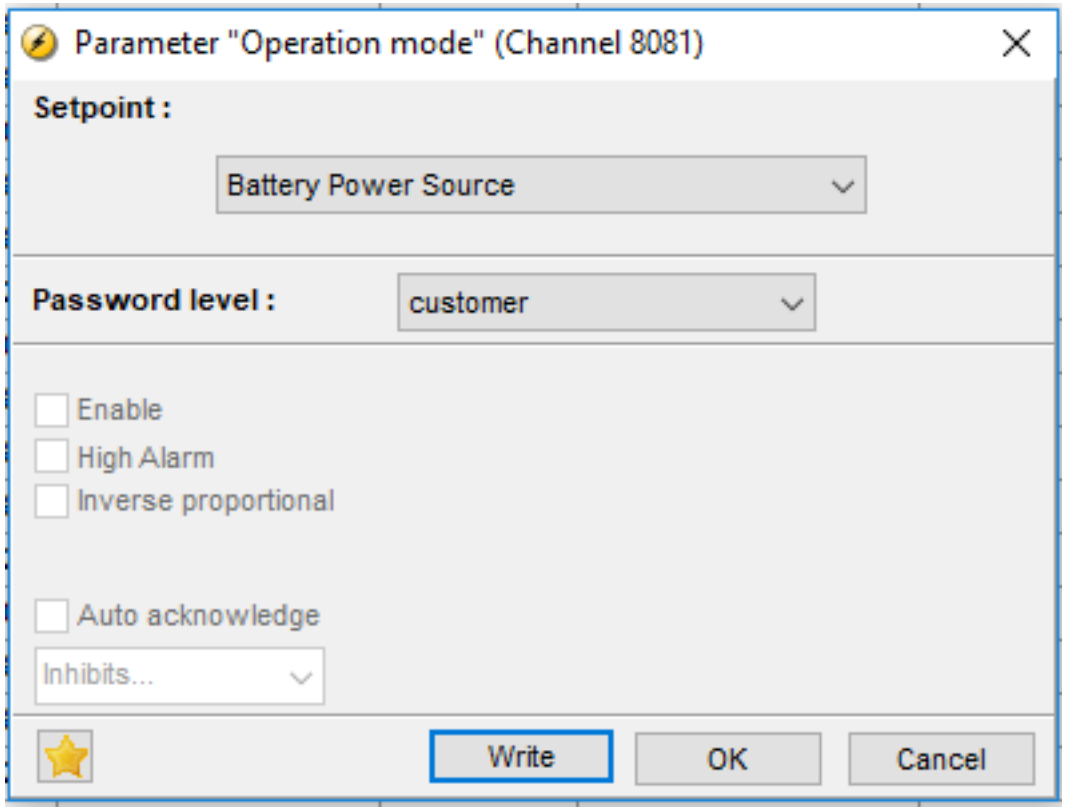
The reference will be set equal to the excessive loading only if the gensets are overloaded. The generating capacity will be subtracted any spinning reserve requested from PV, suppressing excessive diesel gensets on the busbar.



ASC Battery

Source type

Selection to determine whether ESS is Energy or Power source.



ASC Battery

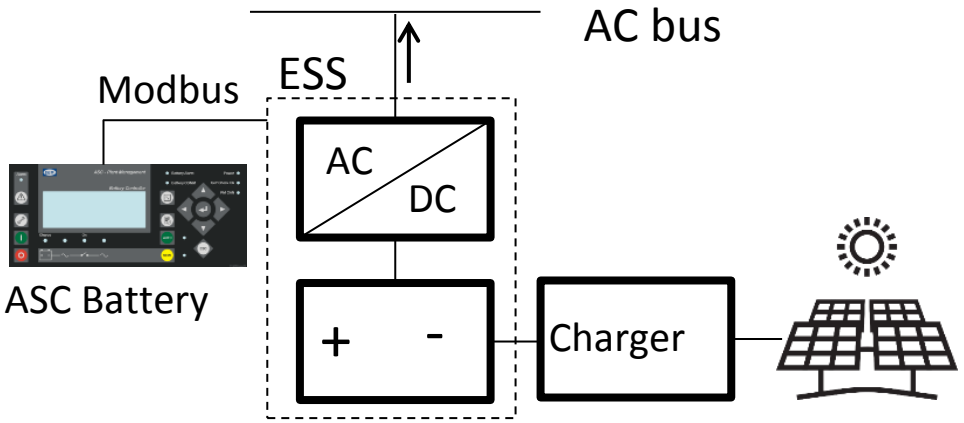
AC & DC Couplings

ASC Battery

AC- or DC-coupled

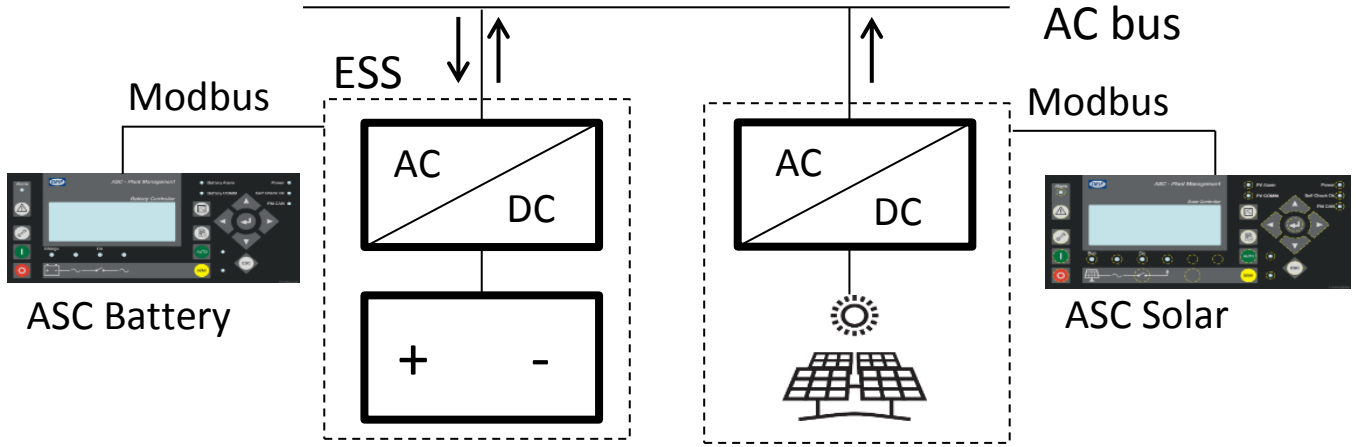
ASC-4 Battery is ideal for both AC- and DC-coupled applications. For AC-coupled systems, you can define battery charging and discharging scheme. Using the chargeScheme, you'll also be able to define the energy sources (gensets, PV or Mains) you allow for charging purposes.

DC-coupling



ASC Battery not responsible for charging.

AC-coupling

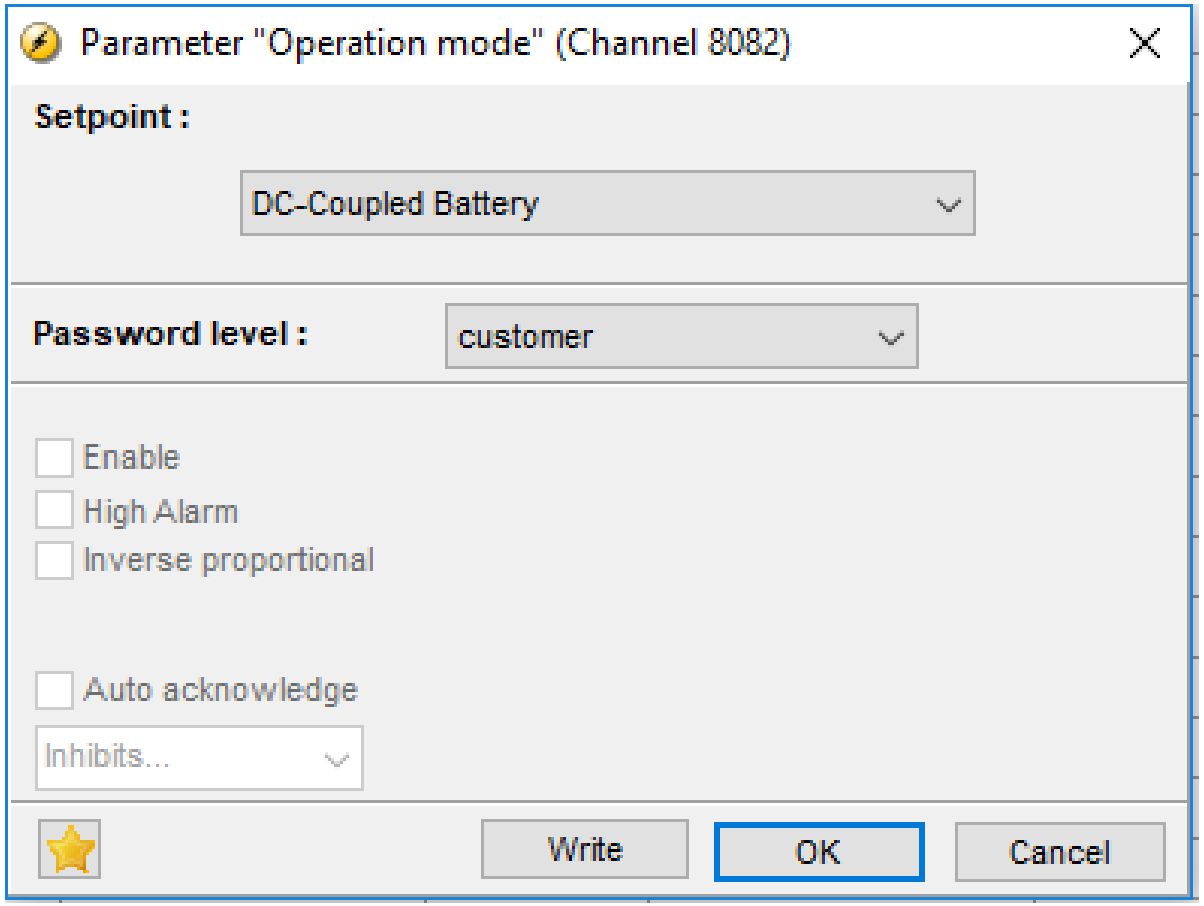


ASC Battery responsible for charging.

ASC Battery

Coupling type

Selection to determine whether ESS is DC or AC coupled.



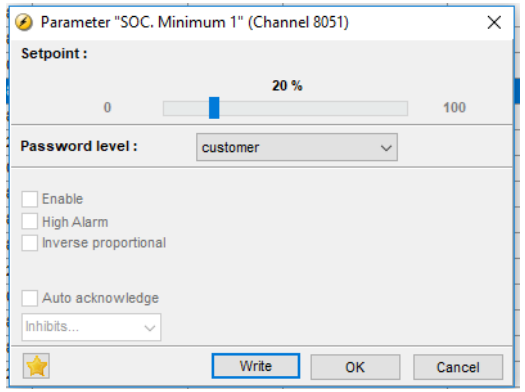
ASC Battery

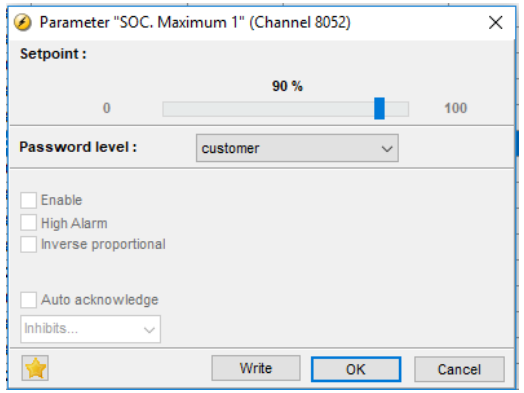
Charge scheme

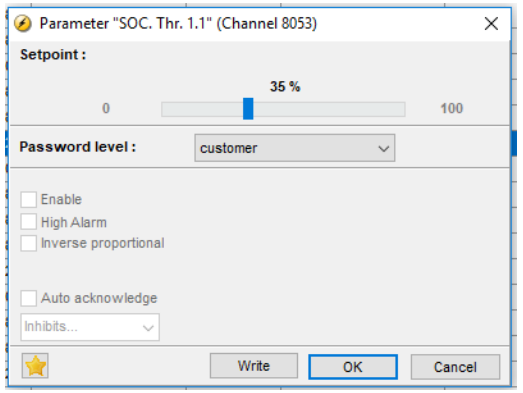
ASC Battery

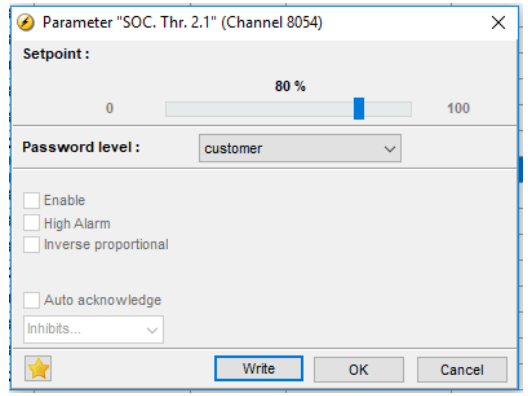
Charge/discharge

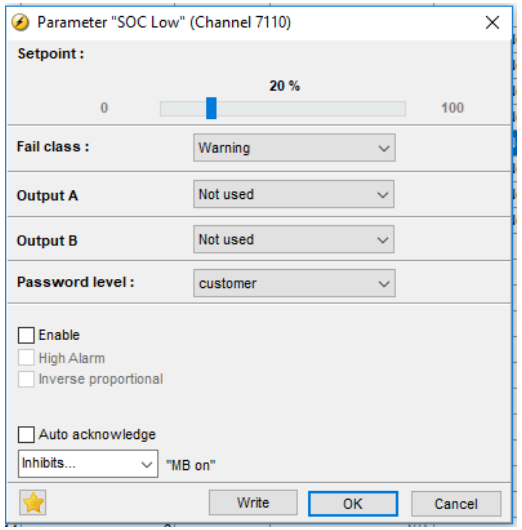
Charge scheme is defined by numorous settings.

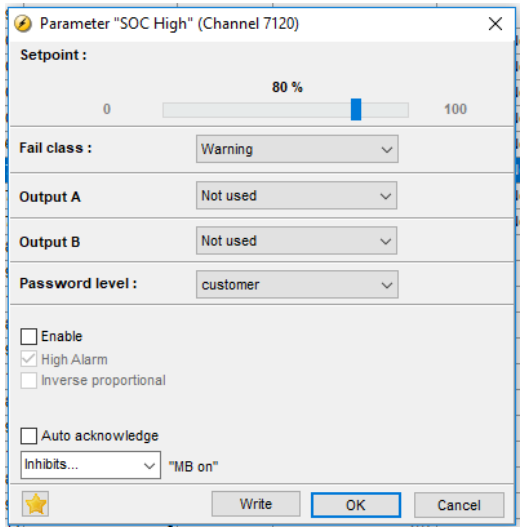






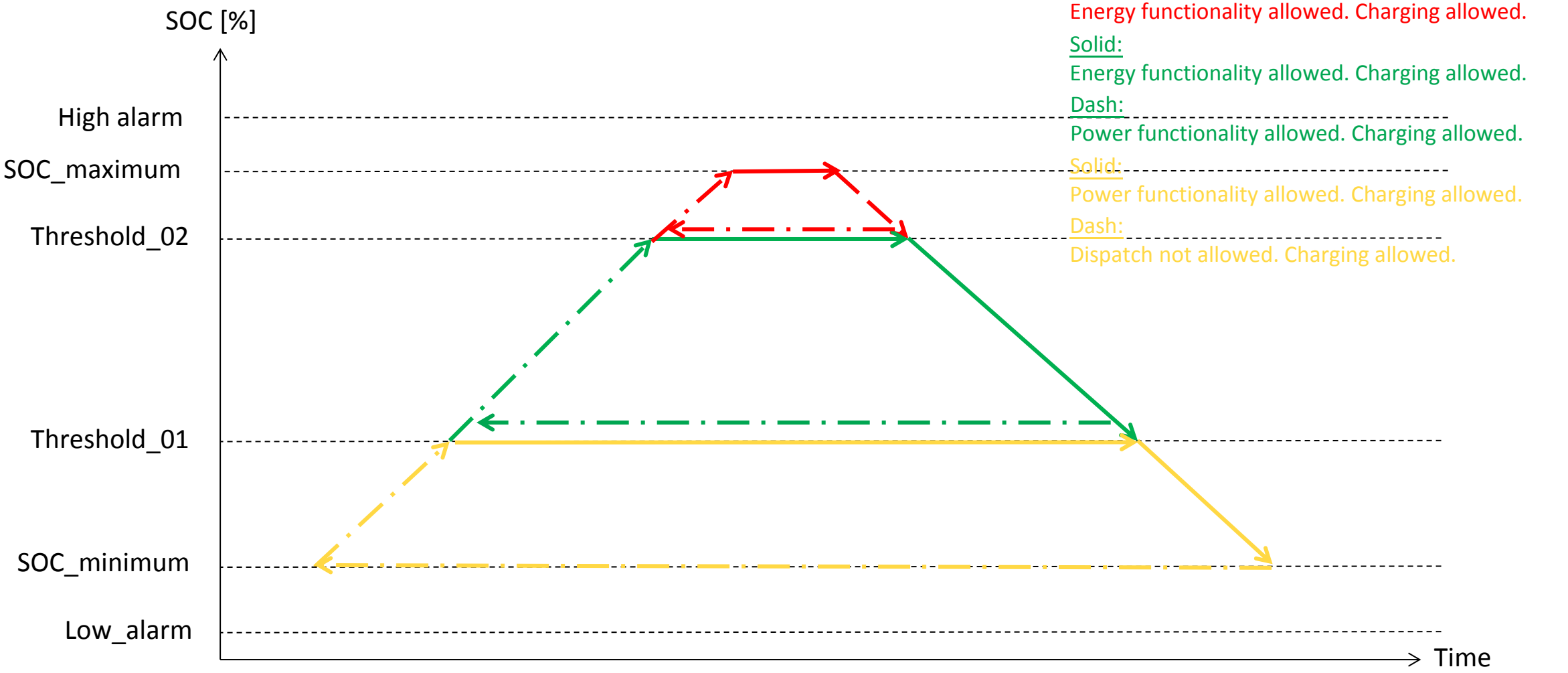






ASC Battery

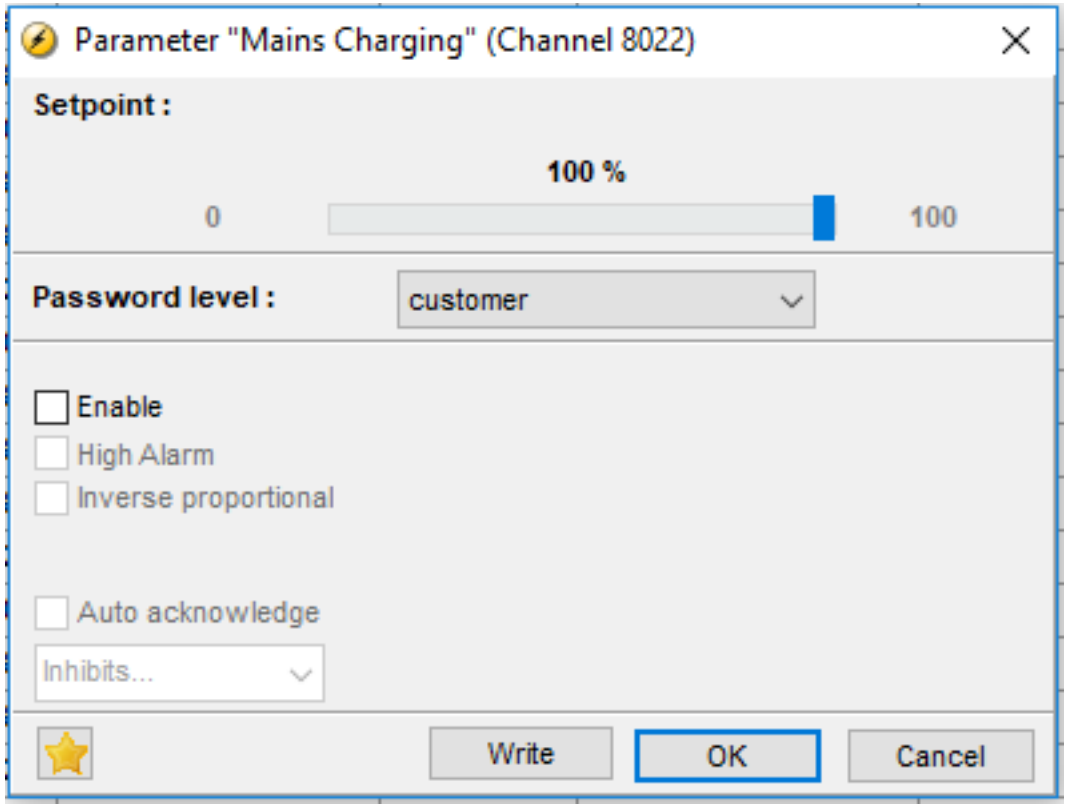
Charge/discharge



ASC Battery

Charge rule

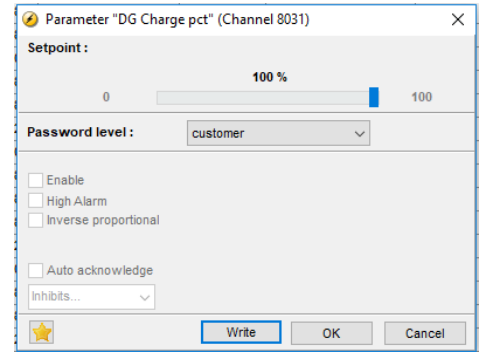
When charching, the maximum charge power is determined by this percentage of the rated battery power.
Enable determines if charging is allowed from Mains.



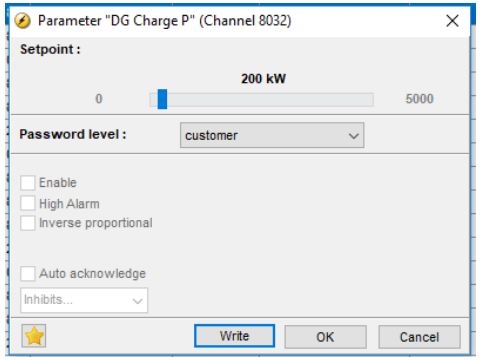
ASC Battery

Charge rule

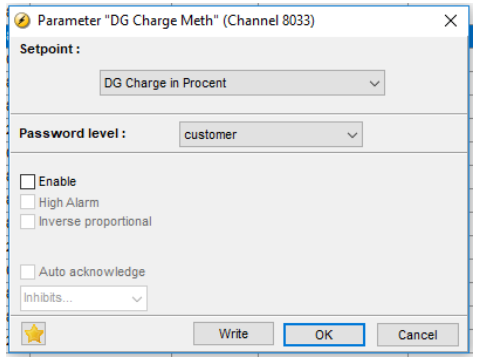
When charching, the maximum charge power is
Determined by not loading the gensets higher
than this percentage of the rated genset power on line.



When charching, the maximum charge power is
determined by not loading the gensets higher
than this value is available as spinning reserve.



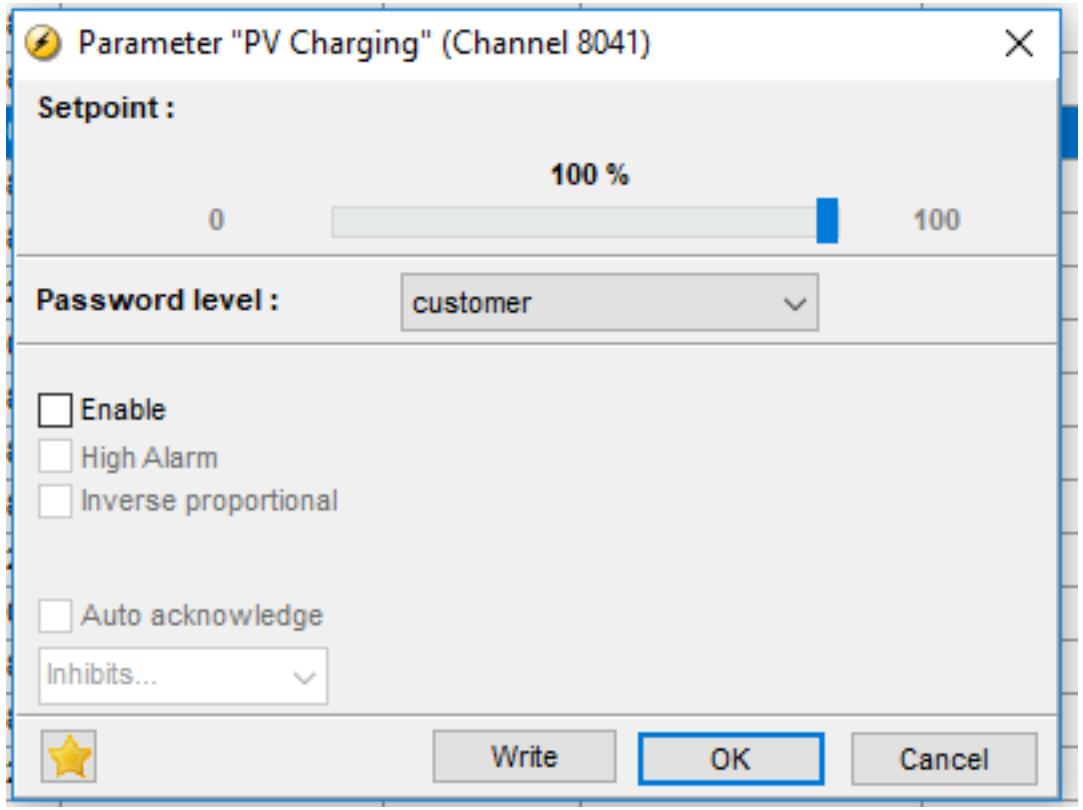
Determines if to use percentage or kW setting.
Enable determines if charging from gensets allowed.



ASC Battery

Charge rule

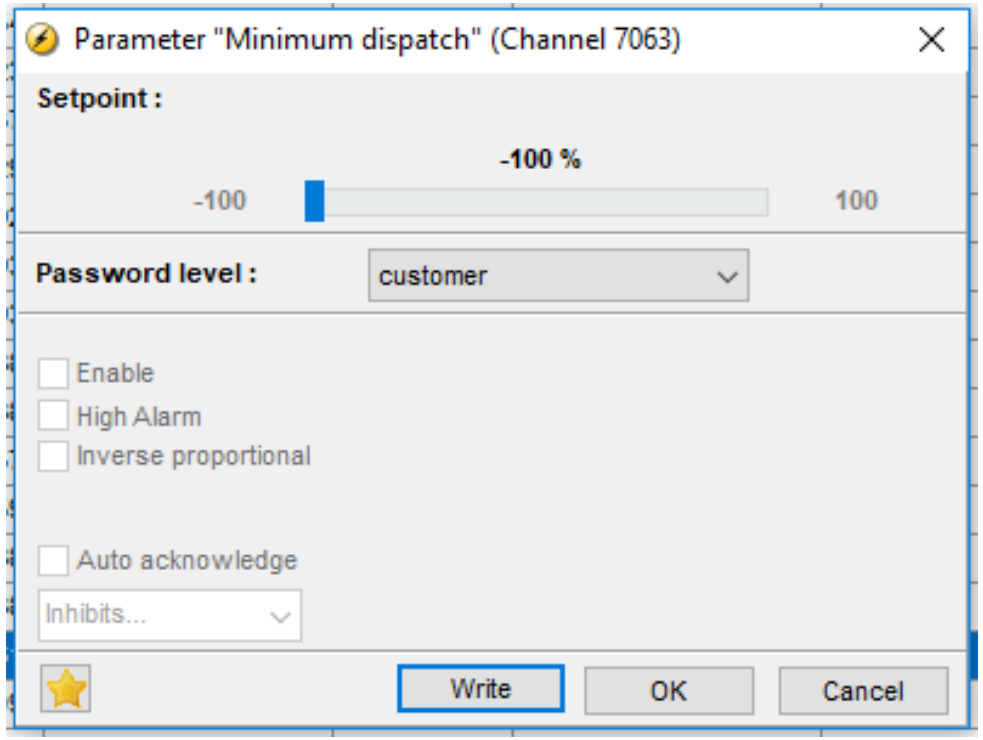
When charching, the maximum charge power is determined by this percentage of the available surplus PV power.
Enable determines if charging is allowed from PV.

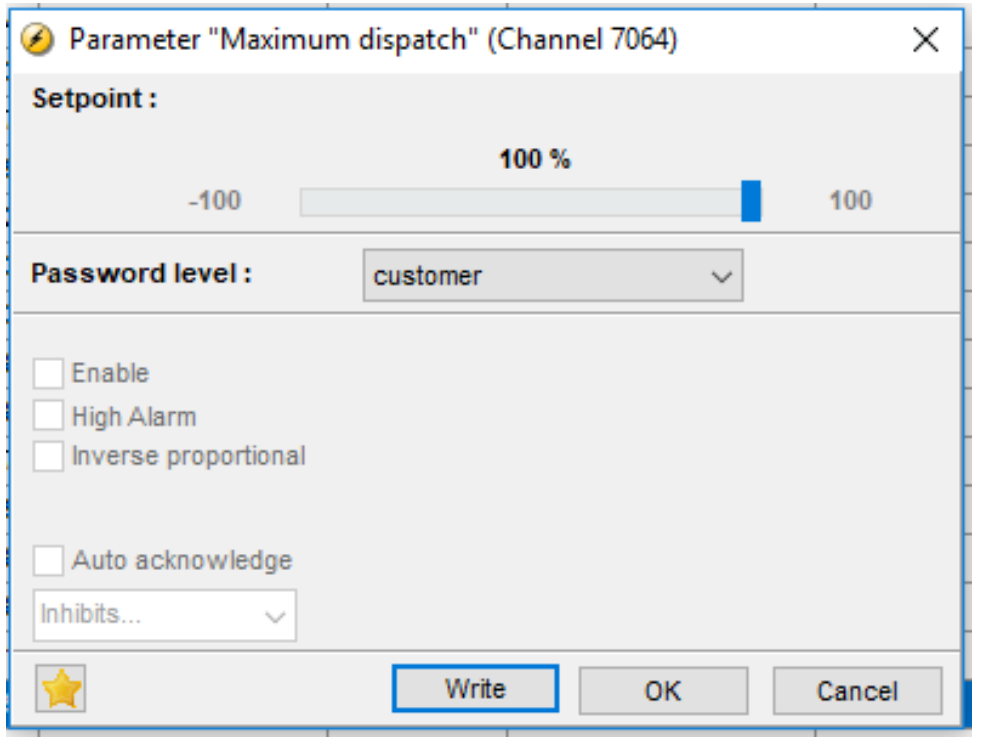


ASC BATTERY

Charge rule

Settings for defining maximum charge/discharge power.
In case informed by BCU(BMS) as well lowest boundary will prevail.





ASC Battery

Charge rule

Power source:

When acting as a Power source, or only charging is allowed, the power to charge with is determined by the connected sourced and associated charge rules.

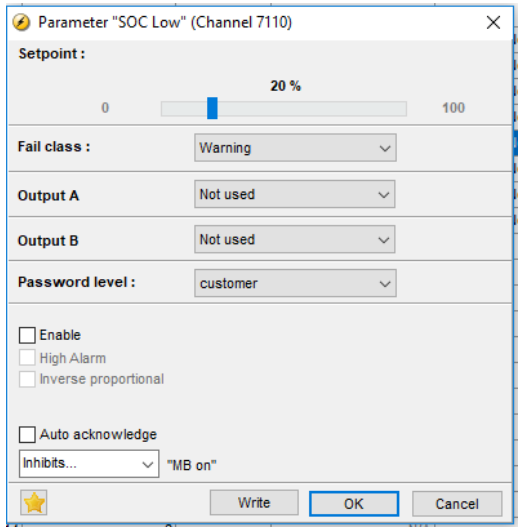
Energy source:

When acting as an Energy source, only PV power will be accepted for charging according to the associated charge rule for PV. Even though charging from DG and/or Mains is enabled it will be disregarded

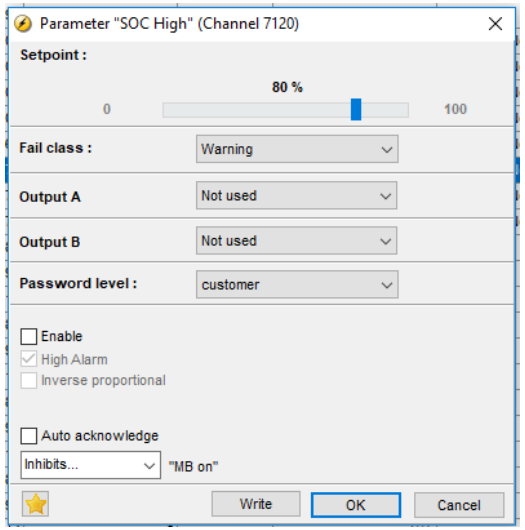
ASC Battery

Alarms and limits

When SOC goes below this level associated alarm can be activated.



When SOC goes above this level associated alarm can be activated.



ASC Battery

ESS Interaction

ASC Battery

ESS makers:

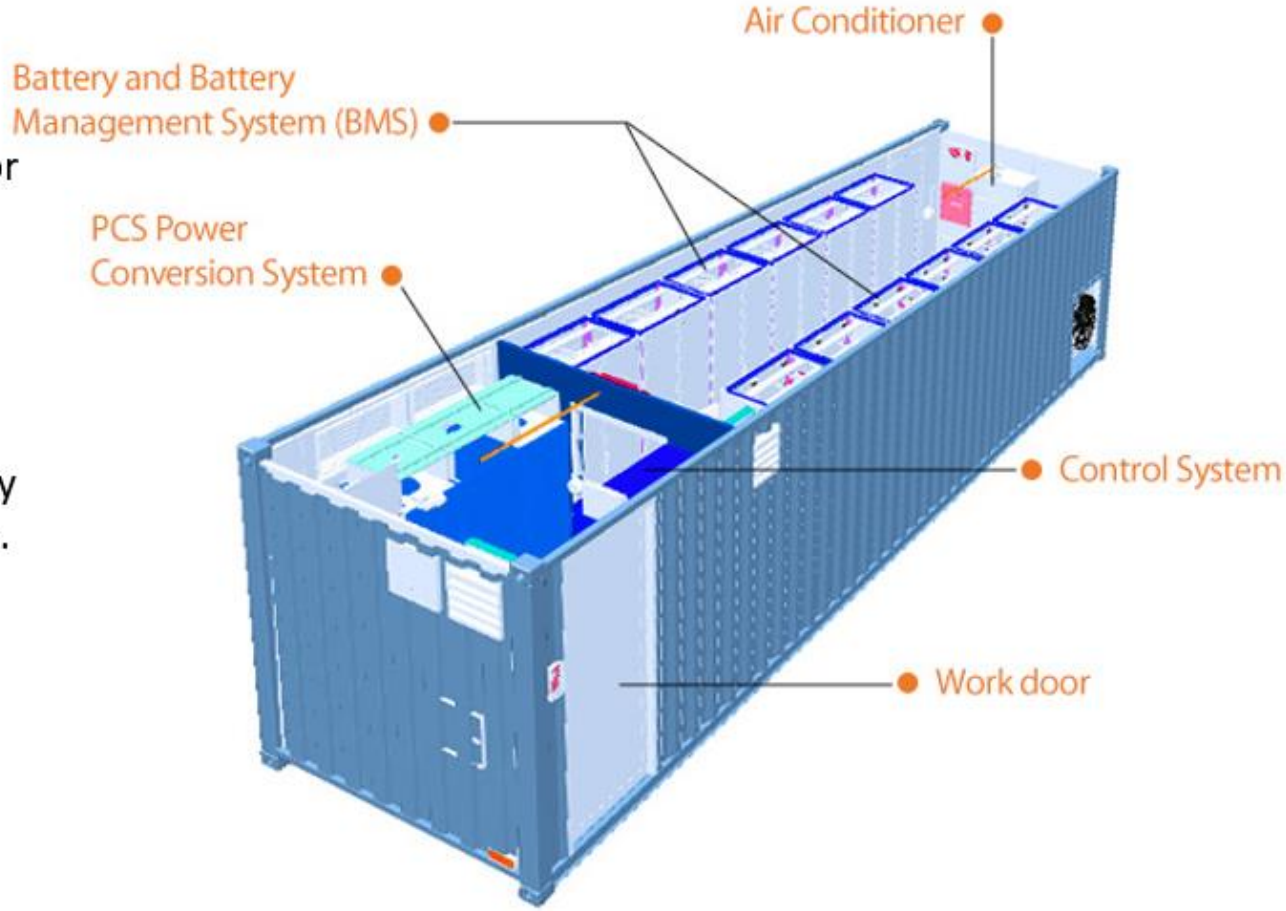
The companies packeging everything in a container. Can be purely packeging companies or also PCS and/or BMS makers.

PCS makers:

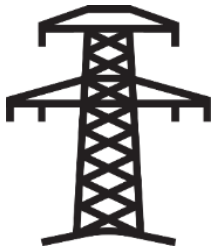
The companies supplying the inverters. Typically the companies we already work with on PV side.

BMS makers:

The companies supplying the batteries and the batrery management system.

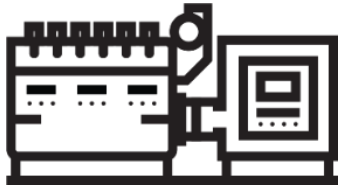


ASC Battery



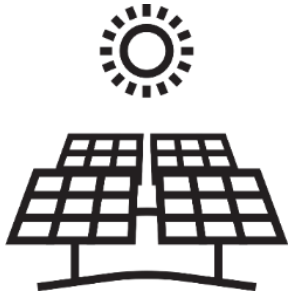
Utility

- Import/export
- Control of breakers
- Synch of plant to mains



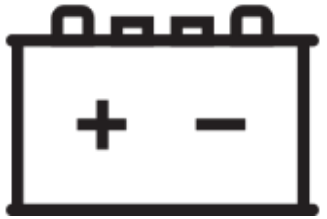
Genset

- AVR Control
- GOV Control
- ECU Communication
- Control of breaker



Photovoltaic

- P/Q control
- Inverter Communication
- Control of breaker



Energy storage

- P/Q control
- Charging/discharging
- PCS Communication
- BMS Communication
- Control of breaker

AGC Mains

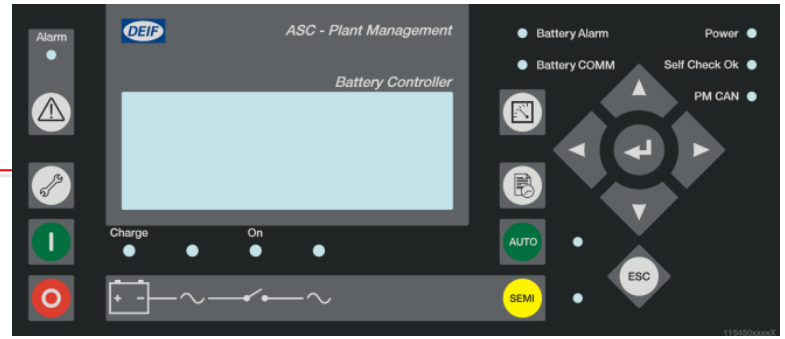
AGC Genset

ASC Solar

ASC Battery

Energy Management System

ASC Battery



ASC Battery

Modbus

ESS

BMS

PCS

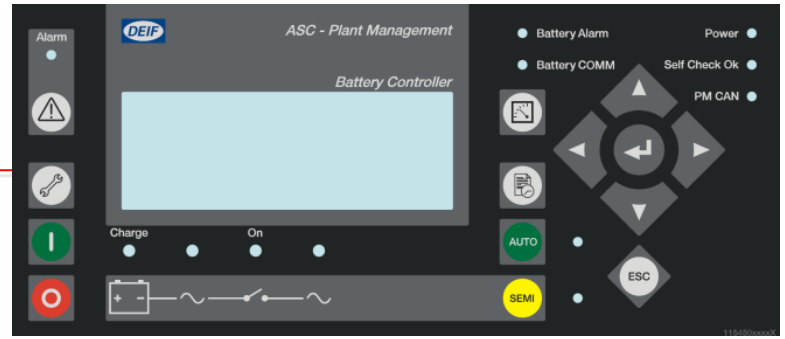
Battery Module

ESS: Energy Storage System

BMS: Battery Management System

PCS: Power Conversion System

ASC Battery



ASC Battery

Modbus

ESS

BCU

BMS

PCS

Battery Module

ESS: Energy Storage System

BCU: Battery Control Unit

BMS: Battery Management System

PCS: Power Conversion System

ASC Battery

QINOUS
smart energy storage

TESLA

ASC Battery - Case

ASC-4 Battery. Hawaii, Feb 2018.
200 kW PV capacity, a 150kW genset capacity, a 150kW/610kWh electrical storage and a 25kW utility incoming.

ASC

Monitoring

Monitoring

Local monitoring

Advanced Graphical Interface - AGI 300

Contact sales

The AGI 300 has been designed as an intuitive and user-friendly HMI for visualisation and active control for multiple applications and is available in 4.3", 7" and 15" sizes with a quality screen readable even in direct sunlight and at sharp angles, making it a safe and ideal choice for bridge installations.

Featuring touch screen system control and monitoring functionalities which eliminate the need for other instruments and save you both space and wiring, the AGI 300 connects both to all DEIF multi-line controllers and other brand controllers via standard communication protocols.

Data-sharing ability via Ethernet connections effectively enable the DEIF HMI to be used as a small SCADA system. Built-in Ethernet port switch functionality lets you connect the panels to small control systems without incurring extra costs for external switches. Connect to multiple serial devices with the multi-standard serial port or use the USB host to provide access for external storage devices.

Power Management Systems – Control & Supervision

One point management, control and supervision of multiple gensets and bus-tie breakers.

Alarm – Handling & Monitoring

View historical alarm data and accept active alarms.

Energy Monitoring System (EMS)

Track your energy consumption to optimise and implement the energy awareness on board your vessel.

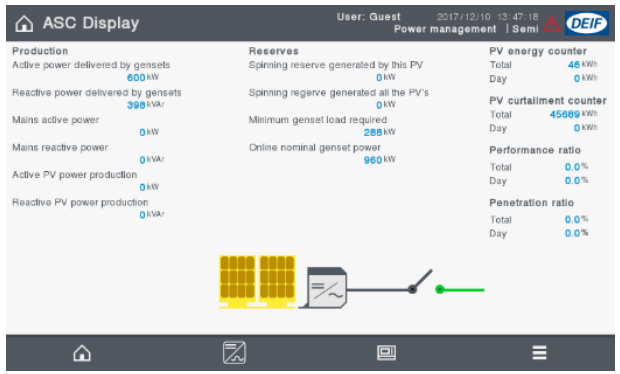
Graphical Interface – Mechanical & Electrical Systems

System overviews for mechanical and electrical equipment. Trend measured values to monitor operation performance or when carrying out fault finding procedures.

Features

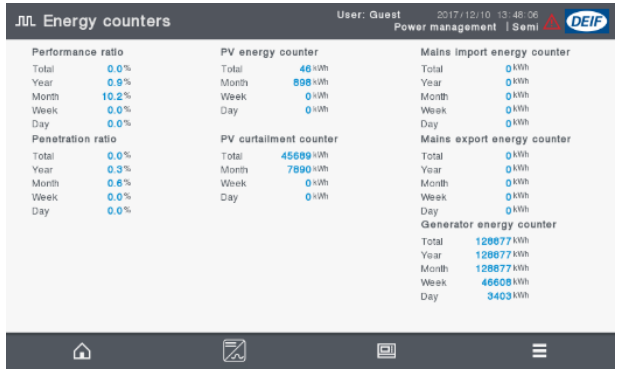
- State-of-the-art HMI
- Unique design tool
- Control and monitor your system
- Data-logging and alarm handling
- Designed for harsh environments

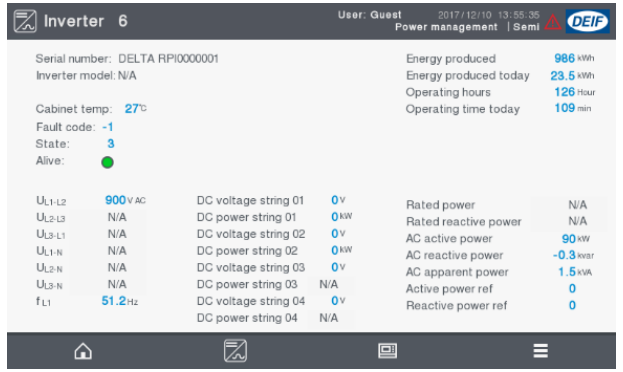
Monitoring

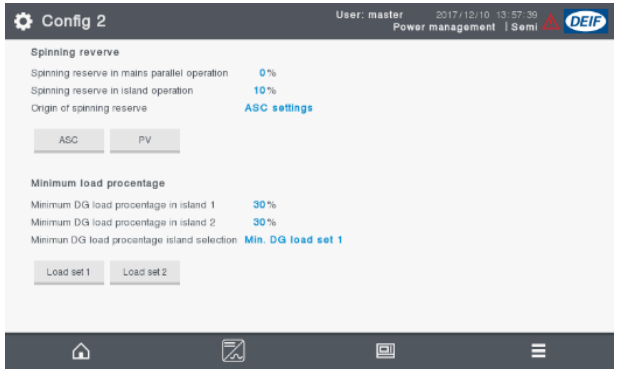

ASC Display
User: Guest
Power management | Semi
Production
Active power delivered by gensets
600 kW
Reactive power delivered by gensets
398 kVAr
Mains active power
0 kW
Mains reactive power
0 kVAr
Active PV power production
0 kW
Reactive PV power production
0 kVAr
Reserves
Spinning reserve generated by this PV
0 kW
Spinning regerve generated all the PV's
0 kW
Minimum genset load required
288 kW
Online nominal genset power
960 kW
PV energy counter
Total 46 kWh
Day 0 kWh
PV curtailment counter
Total 45689 kWh
Day 0 kWh
Performance ratio
Total 0.0 %
Day 0.0 %
Penetration ratio
Total 0.0 %
Day 0.0 %

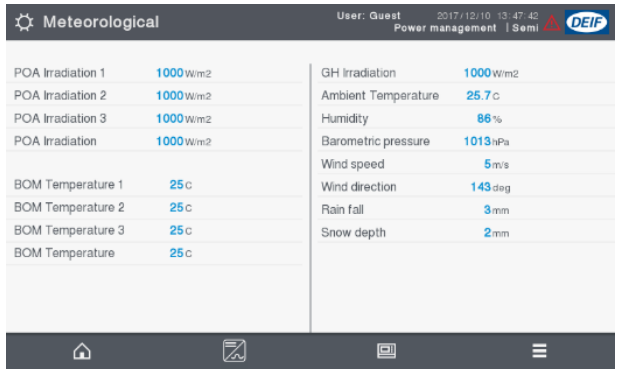

Inverter Data 1-21
User: Guest
Power management | Semi
Active power
Reactive power
Inverter #1 30 kW -0.3 kvar
Inverter #2 90 kW -0.3 kvar
Inverter #3 90 kW -0.3 kvar
Inverter #4 90 kW -0.3 kvar
Inverter #5 90 kW -0.3 kvar
Inverter #6 90 kW -0.3 kvar
Inverter #7 90 kW -0.3 kvar
Inverter #8 90 kW -0.3 kvar
Inverter #9 90 kW -0.3 kvar
Inverter #10 90 kW -0.3 kvar
Inverter #11 90 kW -0.3 kvar
PV protocol: Delta RPI
Inverter #12 90 kW -0.3 kvar
Inverter #13 90 kW -0.3 kvar
Inverter #14 90 kW -0.3 kvar
Inverter #15 90 kW -0.3 kvar
Inverter #16 90 kW -0.3 kvar
Inverter #17
Inverter #18
Inverter #19
Inverter #20
Inverter #21
Total power 1380 kW -4.8 kvar


Config 1
User: master
Power management | Semi
Set points kW
Fixed Power set point 500
Peak Shaving set point 750
Mains power export set point 1000
Set points kVAr
Fixed reactive power set point 500
Cosphi reference 0.90
Cosphi Inductive/capacitive Inductive
Inductive
Capacitive
Q reference type in grid-tied operation: Cosphi superior
Off
Cosphi fixed
Cosphi imp/exp
Cosphi superior
Q fixed
Q imp/exp
Operation mode
Island operation
Fixed power
Peak shaving
Mains power export
Power management


Energy counters
User: Guest
Power management | Semi
Performance ratio
Total 0.0 %
Year 0.9 %
Month 10.2 %
Week 0.0 %
Day 0.0 %
Penetration ratio
Total 0.0 %
Year 0.3 %
Month 0.6 %
Week 0.0 %
Day 0.0 %
PV energy counter
Total 46 kWh
Month 898 kWh
Week 0 kWh
Day 0 kWh
PV curtailment counter
Total 45689 kWh
Month 7890 kWh
Week 0 kWh
Day 0 kWh
Mains import energy counter
Total 0 kWh
Year 0 kWh
Month 0 kWh
Week 0 kWh
Day 0 kWh
Mains export energy counter
Total 0 kWh
Year 0 kWh
Month 0 kWh
Week 0 kWh
Day 0 kWh
Generator energy counter
Total 128677 kWh
Year 128677 kWh
Month 128677 kWh
Week 46608 kWh
Day 3403 kWh


Inverter 6
User: Guest
Power management | Semi
Serial number: DELTA RPI0000001
Inverter model: N/A
Cabinet temp: 27°C
Fault code: -1
State: 3
Alive:
UL1-L2 900 V AC
UL2-L3 N/A
UL3-L1 N/A
UL1-N N/A
UL2-N N/A
UL3-N N/A
fL1 51.2 Hz
DC voltage string 01 0 V
DC power string 01 0 kW
DC voltage string 02 0 V
DC power string 02 0 kW
DC voltage string 03 0 V
DC power string 03 N/A
DC voltage string 04 0 V
DC power string 04 N/A
Energy produced 986 kWh
Energy produced today 23.5 kWh
Operating hours 126 Hour
Operating time today 109 min
Rated power N/A
Rated reactive power N/A
AC active power 90 kW
AC reactive power -0.3 kvar
AC apparent power 1.5 kVA
Active power ref 0
Reactive power ref 0


Config 2
User: master
Power management | Semi
Spinning reverve
Spinning reserve in mains parallel operation 0 %
Spinning reserve in island operation 10 %
Origin of spinning reserve ASC settings
ASC
PV
Minimum load procentage
Minimum DG load procentage in island 1 30 %
Minimum DG load procentage in island 2 30 %
Minimum DG load procentage island selection Min. DG load set 1
Load set 1
Load set 2


Meteorological
User: Guest
Power management | Semi
POA Irradiation 1 1000 W/m2
POA Irradiation 2 1000 W/m2
POA Irradiation 3 1000 W/m2
POA Irradiation 1000 W/m2
BOM Temperature 1 25 C
BOM Temperature 2 25 C
BOM Temperature 3 25 C
BOM Temperature 25 C
GH Irradiation 1000 W/m2
Ambient Temperature 25.7 C
Humidity 86 %
Barometric pressure 1013 hPa
Wind speed 5 m/s
Wind direction 143 deg
Rain fall 3 mm
Snow depth 2 mm


Genset power meter
User: Guest
Power management | Semi
Meter Active power Reactive power Input
1 28 kW 13 kvar
2 26 kW 11 kvar
3 13 kW 9 kvar
4
5
6
7
8
DG power meter protocol: DEIF MIC 4000
9
10
11
12
13
14
15
16


Active Alarms
User: master
Power management | Semi
Time
Description
12-10-2017 13:46:50
7710 - External communication error 2
Ack. alarms

Monitoring

Remote monitoring

How it works:

CONNECTING THE GENERATOR

A Netbiter communication gateway connects to the solar panel using a serial, Ethernet or I/O connection. The gateway sends information via the Internet or the cellular network (GSM/GPRS/3G) to the cloud-based Netbiter Argos data center.

The data is encrypted both to, and from the Argos server.

ONLINE ACCESS

By logging on to Netbiter Argos at www.netbiter.net, you can see all parameters of your solar panel via a computer, tablet or smart phone.

SET UP AND CONFIGURE IN A MATTER OF MINUTES

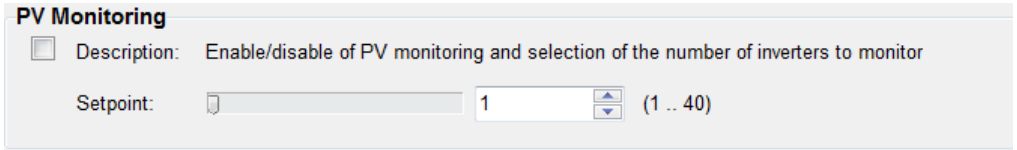
Just connect the Netbiter gateway to your solar panel and then configure it online at your leisure.

Example dashboard showing live values from a solar/diesel plant.

Monitoring

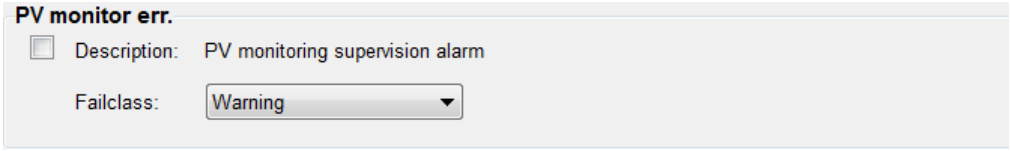
PV monitoring

It can be selected whether the ASC is to poll key data from the inverter(s) and place it in designated Modbus area for a monitoring system to read. PV monitoring can be used both together with unicast and broadcast topologies. The number of nodes determines the number of inverters the ASC should poll data from. A maximum of 42 nodes can be monitored. The ASC expects that the ModbusID's of the inverters are consecutive in order starting from the selected ModbusID and forward.



In addition a "PV monitoring error" is present.
It is functional in both unicast and broadcast topologies.
In case of a communication breakdown to one or more of the inverters on the communication line it is possible to provoke a reaction on the ASC.
A PV communication error protection menu is added:

- Menu 7580 "PV monitoring error"



This protection is provided with fail class handling.
The associated log entry will inform which inverter is missing on the communication line.

Monitoring

PV monitoring

70 registers is reserved for each inverter.
Below is the Modbus indexing for the first inverter presented. Registers for the following inverters will come consecutively.

Address	Name	Data type	Description
47000-47015	SN	String	Serial number (format maker dependent)
47016-47031	MODEL	String	Inverter model (format maker dependent)
47032	P_SIZE	U16	Rated power size [0.1kW]
47033	Q_SIZE	U16	Rated reactive power size [0.1kVAr]
47034	COUNTRY	U16	Country code (format maker dependent)
47035	DCU_01	U16	DC voltage string 01 [0.1V]
47036	DCP_01	S16	DC power string 01 [0.1kW]
47037	DCU_02	U16	DC voltage string 02 [0.1V]
47038	DCP_02	S16	DC power string 02 [0.1kW]
47039	DCU_03	U16	DC voltage string 03 [0.1V]
47040	DCP_03	S16	DC power string 03 [0.1kW]
47041	DCU_04	U16	DC voltage string 04 [0.1V]
47042	DCP_04	S16	DC power string 04 [0.1kW]
47043	ACP	S16	AC active power [0.1kW]
47044	ACQ	S16	AC reactive power [0.1kVAr]
47045	ACS	S16	AC apparent power [0.1kVA]
47046-47047	KWH	U32	Energy produced [kWh]
47048-47049	KWH_DAY	U32	Energy produced today [0.1kWh]
47050-47051	HOURS	U32	Operating hours [h]
47052	MINUTES_DAY	U16	Operating minutes today [min]
47053	CAB_TEMP	S16	Cabinet temperature [0.1C]
47054	L1N	U16	Phase1 to neutral voltage [0.1V]
47055	L2N	U16	Phase2 to neutral voltage [0.1V]
47056	L3N	U16	Phase3 to neutral voltage [0.1V]
47057	L1L2	U16	Phase1 to phase2 voltage [0.1V]
47058	L2L3	U16	Phase2 to phase3 voltage [0.1V]
47059	L3L1	U16	Phase3 to phase1 voltage [0.1V]
47060	GRIF_FREQ	U16	Grid frequency [0.1Hz]
47061	PREF	S16	Active power reference (format maker dependent).
47062	QREF	S16	Reactive power reference (format maker dependent).
47063	STATE	U16	Inverter state (format maker dependent)
47064	FAULT_CODE	U16	Fault code (format maker dependent)
47065-47068	RESERVED		-
47069	ALIVE	U16	0: Inverter not alive on communication link. 1: Inverter alive on communication link.

Version 1.00.0

Monitoring

Weather data monitoring

The weather data measured by ASC is placed in the Modbus for a monitoring system to read.
Below is the Modbus indexing for the weather related data.

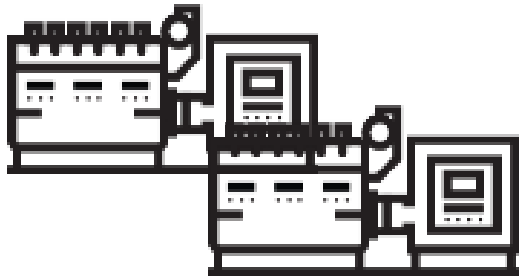
40036	POA_Irradiation_01	Plane of array irradiation sensor 1 [W/m2]
40037	POA_Irradiation_02	Plane of array irradiation sensor 2 [W/m2]
40038	POA_Irradiation_03	Plane of array irradiation sensor 3 [W/m2]
40039	POA_Irradiation	Plane of array irradiation weighted [W/m2]
40040	BOM_Temperature_01	Back of module temperature sensor 1 [0.1C]
40041	BOM_Temperature_02	Back of module temperature sensor 2 [0.1C]
40042	BOM_Temperature_03	Back of module temperature sensor 3 [0.1C]
40043	BOM_Temperature	Back of module temperature weighted [0.1C]
40062	GH_Irradiation	Global horizontal irradiation [W/m2]
40063	Ambient_Temperature	Ambient temperature [0.1C]
40064	Relative_Humidity	Relative humidity [%]
40065	Barometric_Pressure	Barometric pressure [hPa]
40066	Wind_Speed	Wind speed [m/s]
40067	Wind_Direction	Wind direction [deg]
40068	Rain_Fall	Rain fall [mm]
40069	Snow_Depth	Snow depth [mm]

40026	PV_P_throttling	PV active power reference [%].
40027	PV_P_throttling_act	PV throttling active 0: Inactive 1: Active
40028/40029	PV_P_throttled_tot_kwh	Throttled energy counter total [kWh] NOTE: Resolution follows ASC PM scaling selected in menu 9030!
40030/40031	PV_P_throttled_mth_kwh	Throttled energy counter month [kWh] NOTE: Resolution follows ASC PM scaling selected in menu 9030!
40032/40033	PV_P_throttled_wk_kwh	Throttled energy counter week [kWh] NOTE: Resolution follows ASC PM scaling selected in menu 9030!
40034/40035	PV_P_throttled_day_kwh	Throttled energy counter day [kWh] NOTE: Resolution follows ASC PM scaling selected in menu 9030!
40044/40045	Panel_Pmax_instant_kW	Instant maximum active power that can be generated by PV panels [kW] NOTE: Resolution follows ASC PM scaling selected in menu 9030!
40046/40047	Panel_Smax_instant_kVA	Instant maximum apparent power that can be generated by inverter(s) [kVA] NOTE: Resolution follows ASC PM scaling selected in menu 9030!

Monitoring

Genset data monitoring

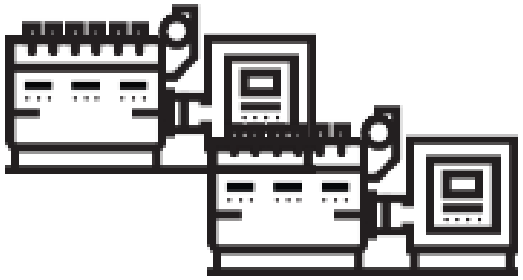
The genset data measured/received by ASC is placed in the Modbus for a monitoring system to read.
Below is the Modbus indexing for the genset related data.



40010/40011	DG_P_tot	Active power delivered by the gensets [kW].
40012/40013	DG_P_nom	Online nominal genset power [kW].
40014/40015	DG_Q_tot	Reactive power delivered by the gensets [kVAr].
40016/40017	DG_P_min	Minimum genset load required [kW].
40018/40019	Mains_P_tot	Mains active power [kW].
40020/40021	Mains_Q_tot	Mains reactive power [kVAr].

Monitoring

Genset data monitoring (Power Management)



The genset data measured/received by ASC is placed in the Modbus for a monitoring system to read. Below is the Modbus indexing for the genset related data.

Power nominal ID[1;16]	1510-1525
Power ID[1;16]	1526-1541
Reactive power ID[1;16]	1542-1557
Power ID[17;32]	1569-1584
Reactive power ID[17;32]	1585-1600
Power ID[33;40]	1601-1608
Reactive power ID[33;40]	1609-1616
TB power ID[17;32]	1633-1648
MB power transducer used (Bit Wise ID[17;32])	1649
TB power transducer used (Bit Wise ID[17;32])	1650
BTB power transducer used (Bit Wise ID[33;40])	1651
BTB NOT externally controlled (Bit Wise ID[33;40])	1652
Power nominal ID[17;32]	1653-1668
GB position ON (Bit Wise ID[1;16])	1701
GB position OFF (Bit Wise ID[1;16])	1702
DG Volt/Feq Ok (Bit Wise ID[1;16])	1703
DG Ready Auto start (Bit Wise ID[1;16])	1705
Any alarm present (Bit Wise ID[1;16])	1707
DG Running (Bit Wise ID[1;16])	1709
GB synchronizing (Bit Wise ID[1;16])	1711
MainsOk (Bit Wise ID[17;32])	1712
Mains in Auto (Bit Wise ID[17;32])	1713
Any alarms (Bit Wise ID[17;32])	1714
MB position ON (Bit Wise ID[17;32])	1715

Fuel volume litres ID[1;16].	31736-31751
FuelTripCounter(LOWORD) ID[17;32]	35000-35015
FuelTripCounter(HIWORD) ID[17;32]	35016-35031
FuelTotalCounter(LOWORD) ID[17;32]	35032-35047
FuelTotalCounter(HIWORD) ID[17;32]	35048-35063
Actual fuel rate ID[17;32]	35064-35079
Engine nominal power kWm ID[17;32]	35080-35095
Engine power kWm ID[17;32]	35096-35111
EngineLoadFactor ID[17;32]	35112-35127
Actual fuel Intensity l/kWhe ID[17;32].	35128-35143
Actual fuel efficiency kWhe/l ID[17;32].	35144-35159
RunningHourCounter (LOWORD) ID[17;32]	35160-35175
RunningHourCounter (HIWORD) ID[17;32]	35176-35191
OilPressure ID[17;32]	35192-35207
CoolingWater ID[17;32]	35208-35223
FuelLevel [ID17;32]	35224-35239

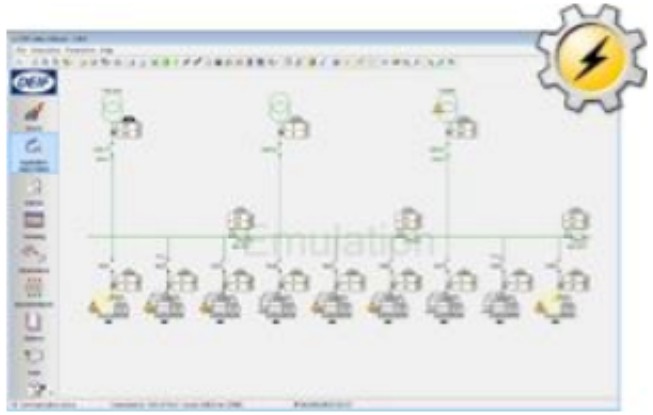
EngineType [ID17;32]. 16) Detroit (DDEC). 17) Deutch (EMR). 18) JohnDeere (JDEC). 19) Iveco (Iveco). 20) Perkins (Perkins). 21) Caterpillar (Caterpillar) 22) Volvo (VPDEC). 23) Volvo (VPDEC2). 24) Scania (EMS). 25) Scania (EMS2). 26) MTU (MDEC 302). 27) MTU (MDEC 303). 28) MTU (ADEC). 29) Cummins (Cummins). 30) Electronic J1939 eng. (GenericJ1939).	35240-35255
Conversion for OilPressure, CoolWater and FuelLevel.	35256-35271 BIT0-1: Oilpressure. BIT2-3: CoolWater. BIT4-5: FuelLevel.

ASC

USW

USW

DEIF Utility Software – USW-3



DEIF's Utility Software v.3 (USW-3) is a unique tool for engineers, service personel and end-users to configure and supervise one or several interconnected genset controllers, available for free download here.

Easy to install, the general purpose software works off-the-shelf using Ethernet or USB cable communication to configure, commission and supervise both single gensets and plants of up to 256 units.

The utility tool is compatible with a range of DEIF controllers; it adjusts easily to the capabilities of the connected devices and has been designed with versatility in view.

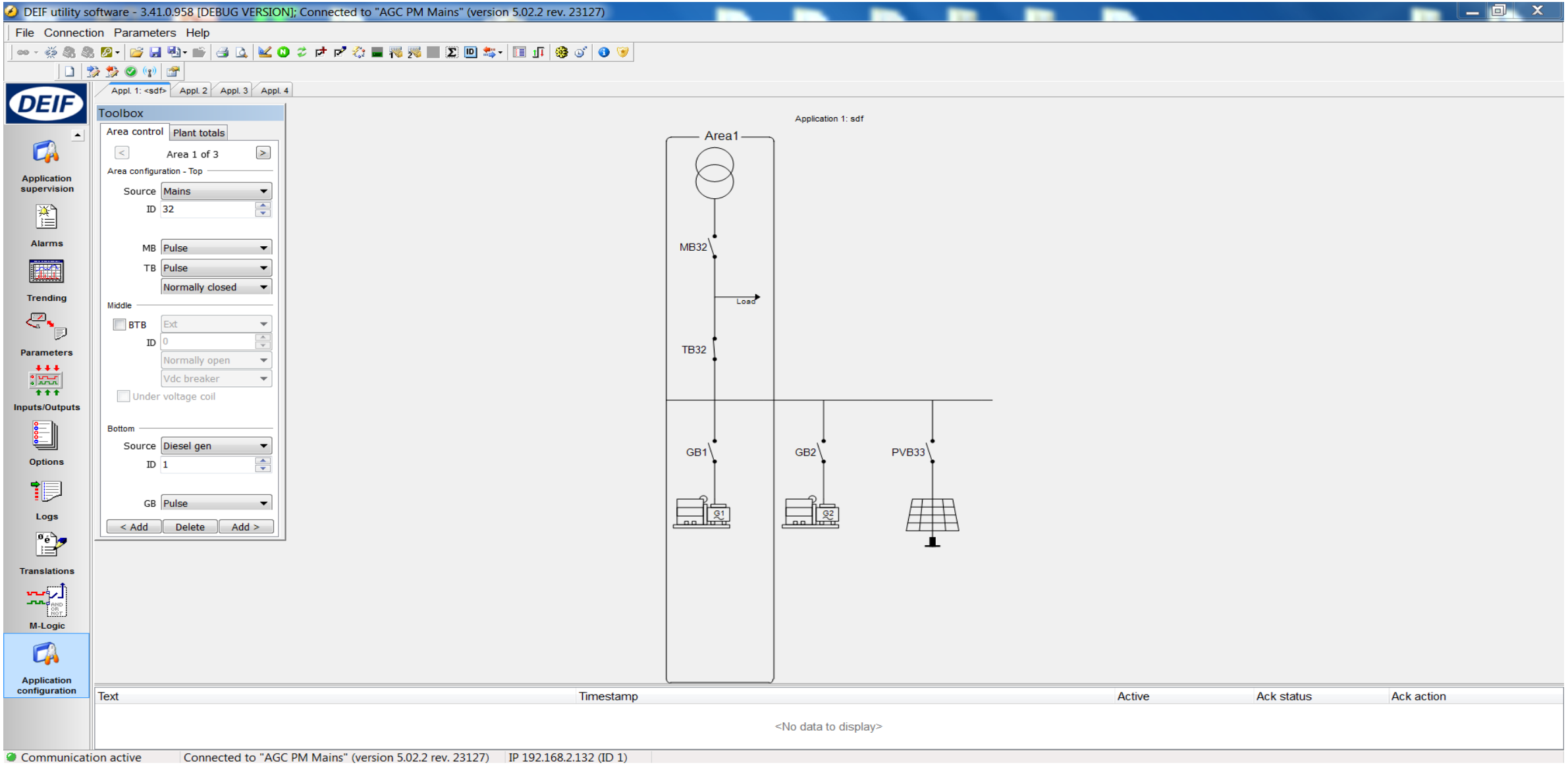
M-Logic allows complex logic customisation with configuration and evaluation of up to 40 logic expressions, including for instance configuration of user level access, and features innovative pre-installation configuration and emulation of plant design.

Incorporating extensive functionalities including overviews of alarms, coolant temperatures, plant values, and fuel consumption, the USW-3 is also an intuitive, easy-to-use tool for end users to operate on a day-to-day basis.

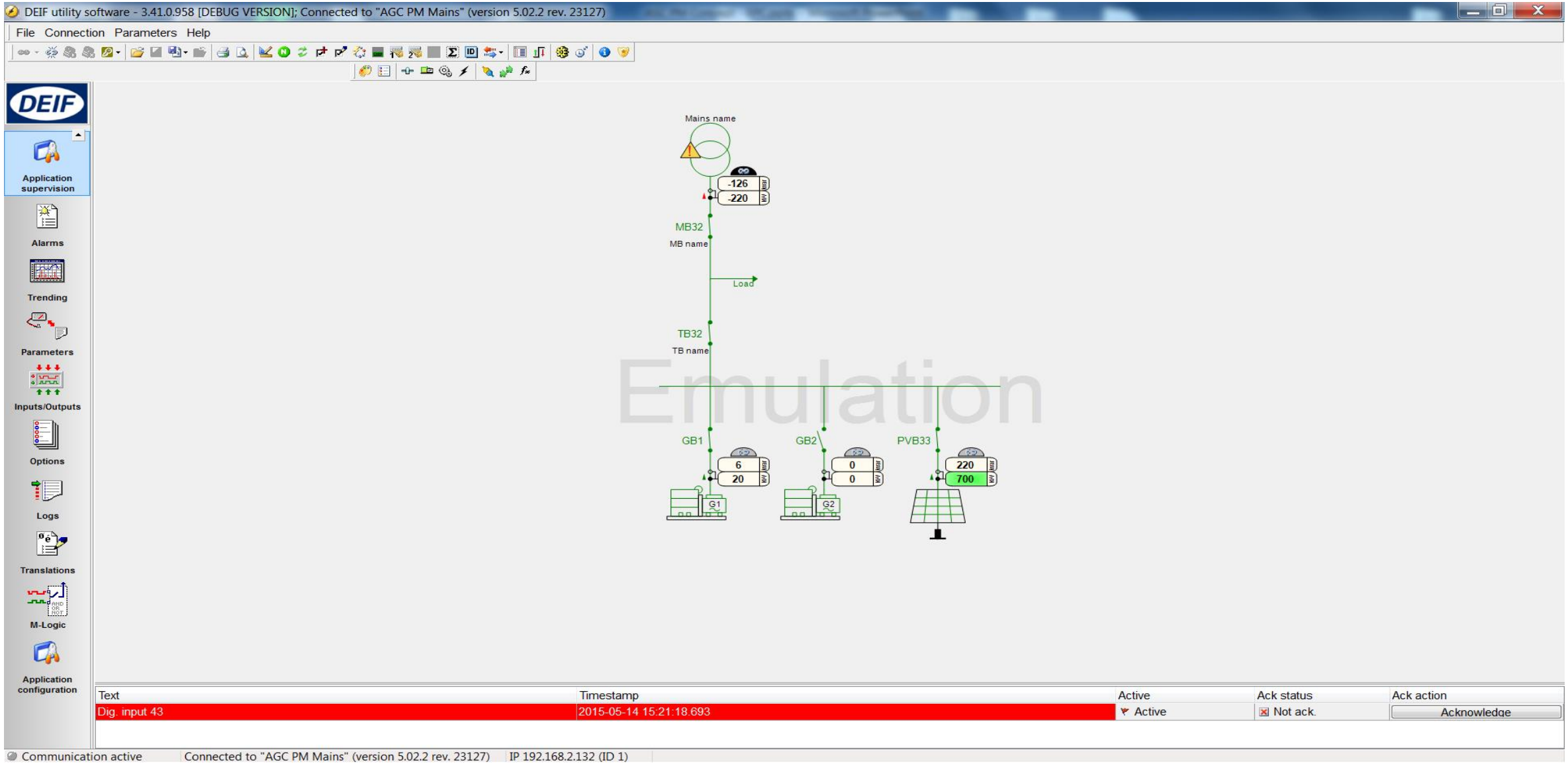
Application modes

- Graphical tool for plant single line diagram
- Set controller parameters and configure advanced logic
- Configure controller I/O and external I/O equipment
- Translation of controller display texts
- AOP push button configuration
- Controller firmware upgrade
- Security and access configuration
- Save/restore the entire plant setup to files
- User platform for Emulation Solutions
- Visualise dynamic plant and individual genset behaviour
- Display of all engine data
- Display of all electrical data
- Monitor the dynamic behaviour of measurements
- Display of fuel consumption and power production
- Emulate various external events
- Alarm monitoring
- Localised to English, Russian and Chinese
- Connects over USB, RS485 or TCP/IP to controllers

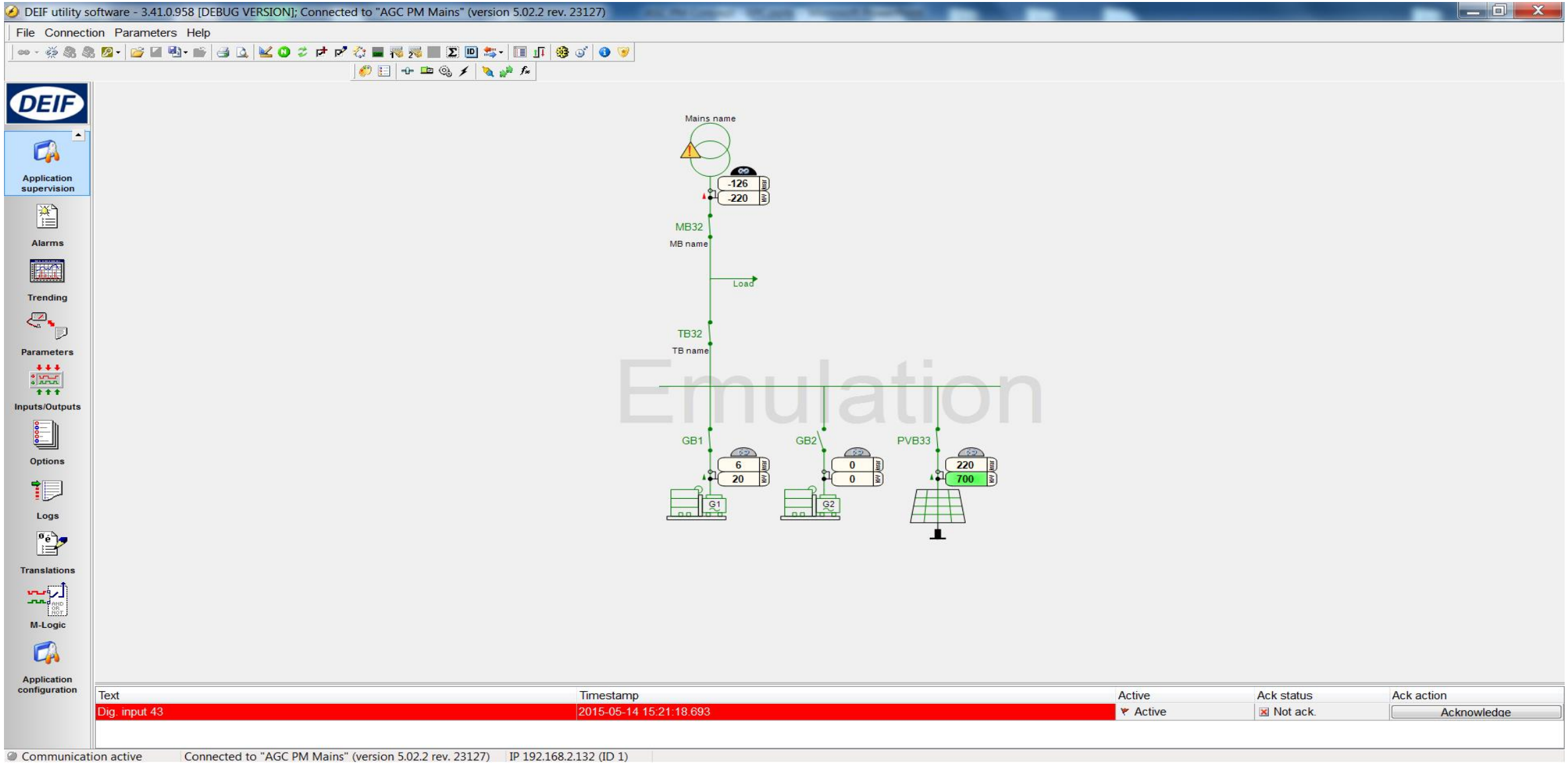
USW


DEIF utility software - 3.41.0.958 [DEBUG VERSION]; Connected to "AGC PM Mains" (version 5.02.2 rev. 23127)
File Connection Parameters Help
Appl. 1: <sdf> Appl. 2 Appl. 3 Appl. 4
Application supervision
Alarms
Trending
Parameters
Inputs/Outputs
Options
Logs
Translations
M-Logic
Application configuration
Toolbox
Area control Plant totals
Area 1 of 3
Area configuration - Top
Source Mains
ID 32
MB Pulse
TB Pulse
Normally closed
Middle
BTB Ext
ID 0
Normally open
Vdc breaker
Under voltage coil
Bottom
Source Diesel gen
ID 1
GB Pulse
< Add Delete Add >
Application 1: sdf
Area1
MB32
Load
TB32
GB1
GB2
PVB33
G1
G2
Text Timestamp Active Ack status Ack action
<No data to display>
Communication active
Connected to "AGC PM Mains" (version 5.02.2 rev. 23127)
IP 192.168.2.132 (ID 1)

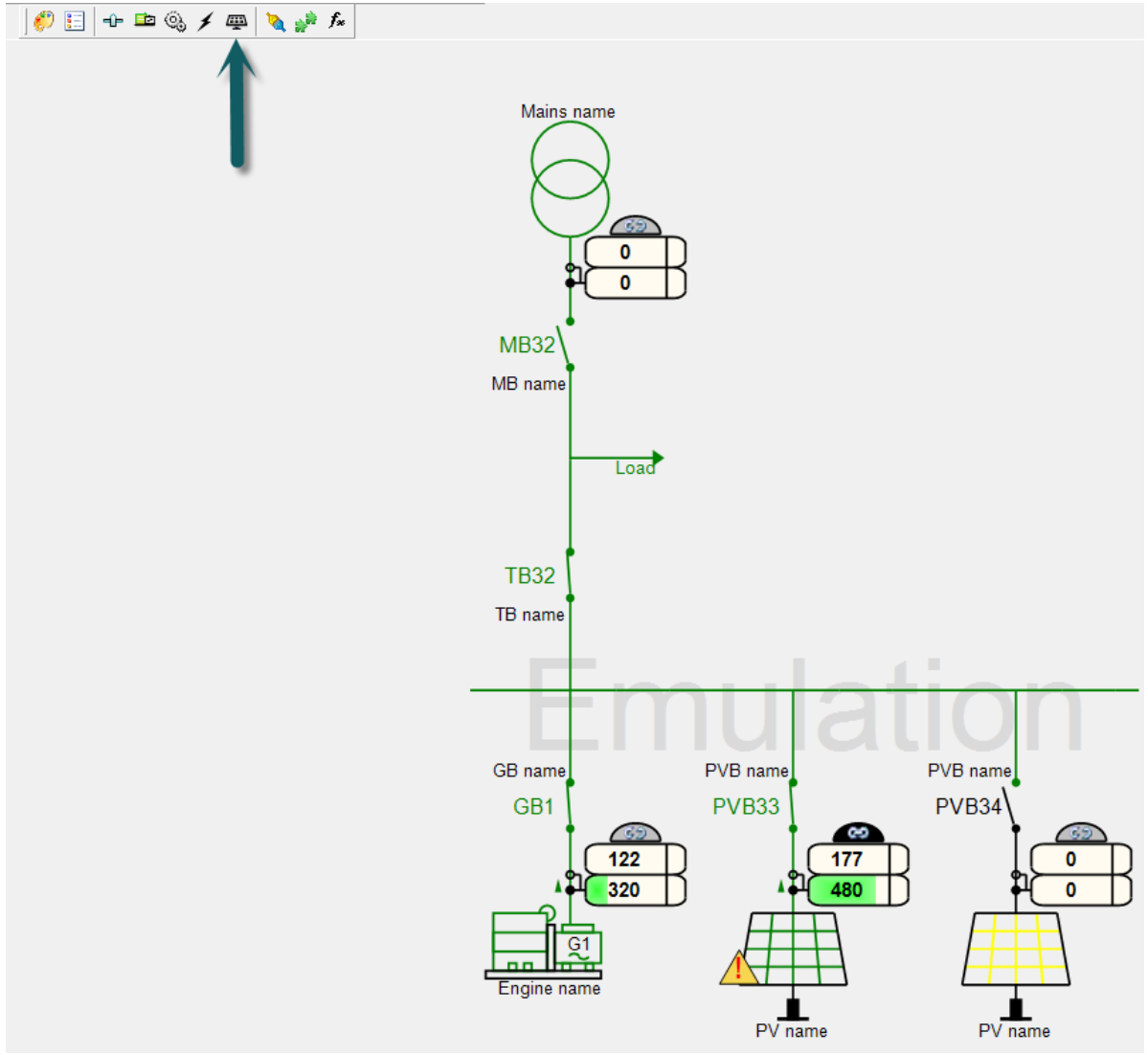
USW

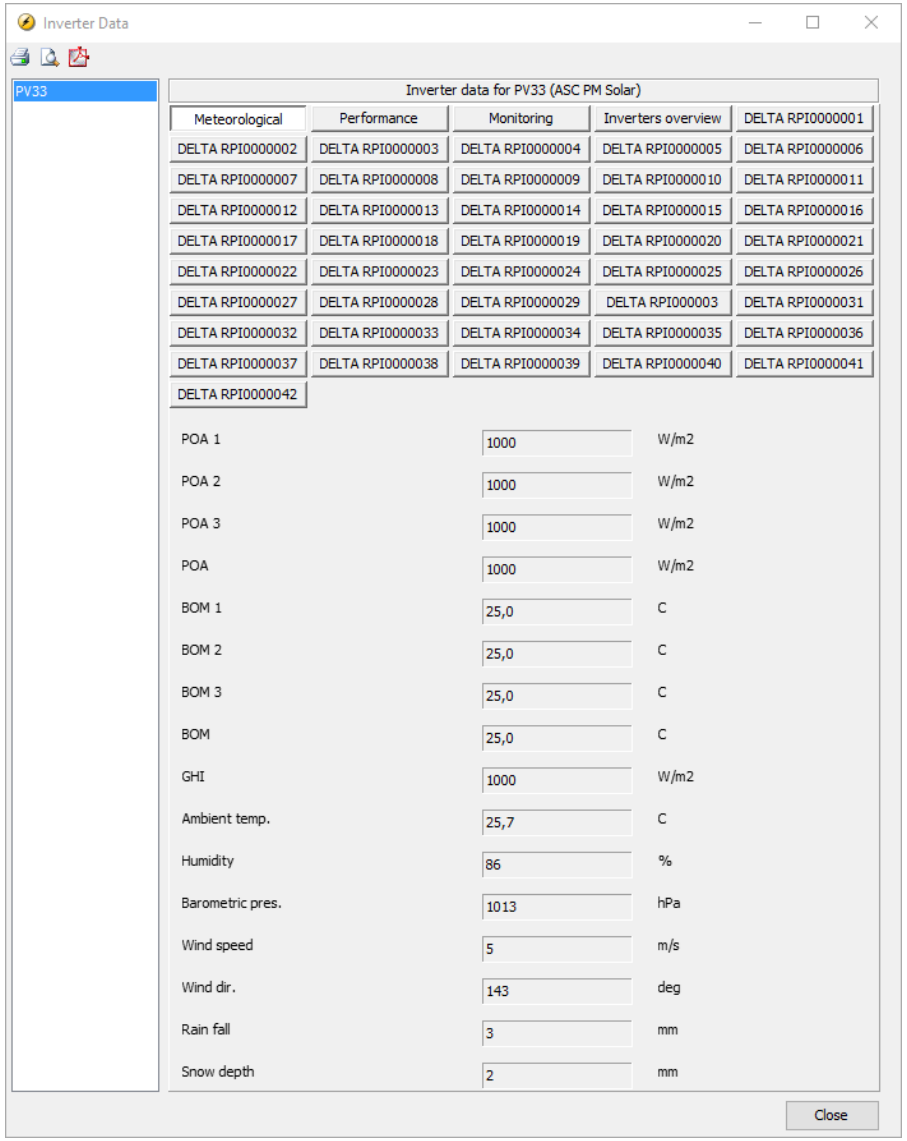

DEIF utility software - 3.41.0.958 [DEBUG VERSION]; Connected to "AGC PM Mains" (version 5.02.2 rev. 23127)
File Connection Parameters Help
Application supervision
Alarms
Trending
Parameters
Inputs/Outputs
Options
Logs
Translations
M-Logic
Application configuration
Mains name
-126
-220
MB32
MB name
Load
TB32
TB name
Emulation
GB1
6
20
G1
GB2
0
0
G2
PVB33
220
700
Text
Timestamp
Active
Ack status
Ack action
Dig. input 43
2015-05-14 15:21:18.693
Active
Not ack.
Acknowledge
Communication active
Connected to "AGC PM Mains" (version 5.02.2 rev. 23127)
IP 192.168.2.132 (ID 1)

USW


DEIF utility software - 3.41.0.958 [DEBUG VERSION]; Connected to "AGC PM Mains" (version 5.02.2 rev. 23127)
File Connection Parameters Help
Application supervision
Alarms
Trending
Parameters
Inputs/Outputs
Options
Logs
Translations
M-Logic
Application configuration
Mains name
-126
-220
MB32
MB name
Load
TB32
TB name
Emulation
GB1
6
20
G1
GB2
0
0
G2
PVB33
220
700
Text
Timestamp
Active
Ack status
Ack action
Dig. input 43
2015-05-14 15:21:18.693
Active
Not ack.
Acknowledge
Communication active
Connected to "AGC PM Mains" (version 5.02.2 rev. 23127)
IP 192.168.2.132 (ID 1)

USW


Mains name
0
0
MB32
MB name
Load
TB32
TB name
Emulation
GB name
GB1
122
320
G1
Engine name
PVB name
PVB33
177
480
PV name
PVB name
PVB34
0
0
PV name

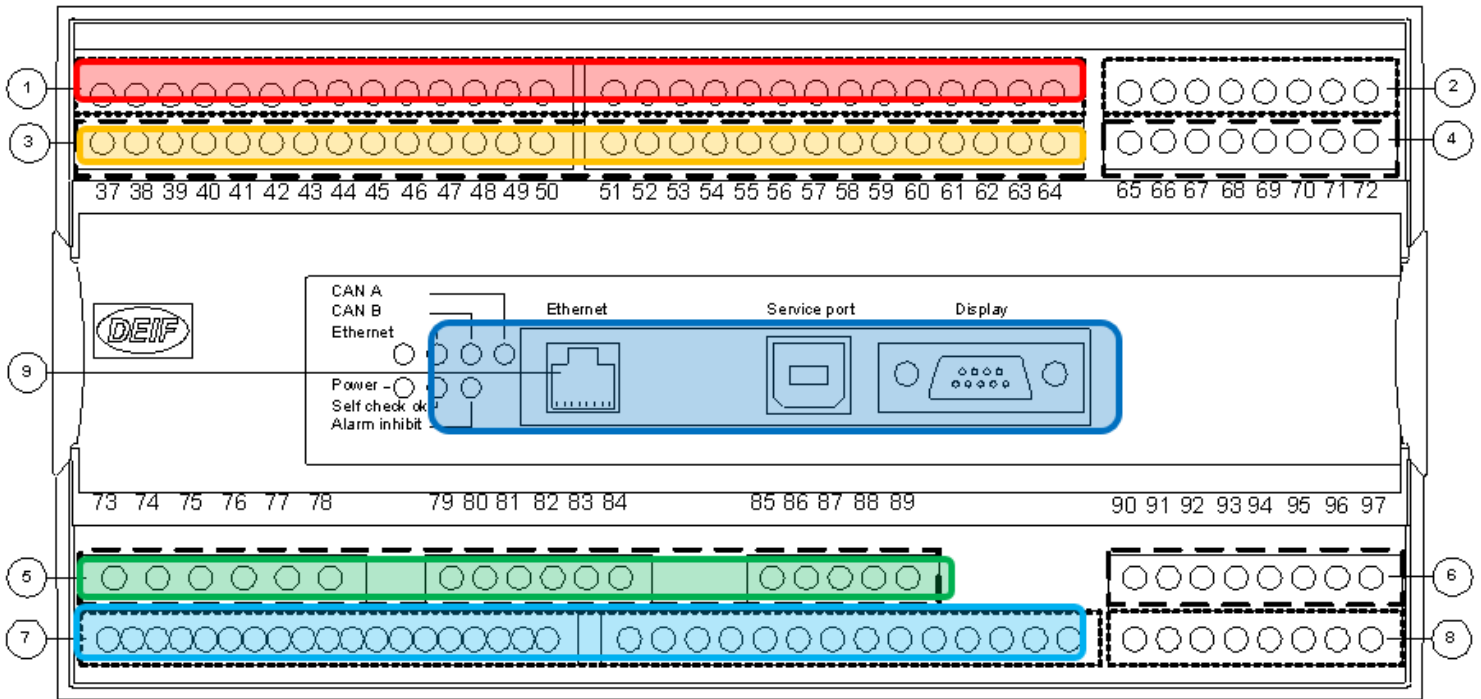

Inverter Data
PV33
Inverter data for PV33 (ASC PM Solar)
Meteorological
Performance
Monitoring
Inverters overview
DELTA RPI0000001
DELTA RPI0000002
DELTA RPI0000003
DELTA RPI0000004
DELTA RPI0000005
DELTA RPI0000006
DELTA RPI0000007
DELTA RPI0000008
DELTA RPI0000009
DELTA RPI0000010
DELTA RPI0000011
DELTA RPI0000012
DELTA RPI0000013
DELTA RPI0000014
DELTA RPI0000015
DELTA RPI0000016
DELTA RPI0000017
DELTA RPI0000018
DELTA RPI0000019
DELTA RPI0000020
DELTA RPI0000021
DELTA RPI0000022
DELTA RPI0000023
DELTA RPI0000024
DELTA RPI0000025
DELTA RPI0000026
DELTA RPI0000027
DELTA RPI0000028
DELTA RPI0000029
DELTA RPI000003
DELTA RPI0000031
DELTA RPI0000032
DELTA RPI0000033
DELTA RPI0000034
DELTA RPI0000035
DELTA RPI0000036
DELTA RPI0000037
DELTA RPI0000038
DELTA RPI0000039
DELTA RPI0000040
DELTA RPI0000041
DELTA RPI0000042
POA 1 1000 W/m2
POA 2 1000 W/m2
POA 3 1000 W/m2
POA 1000 W/m2
BOM 1 25,0 C
BOM 2 25,0 C
BOM 3 25,0 C
BOM 25,0 C
GHI 1000 W/m2
Ambient temp. 25,7 C
Humidity 86 %
Barometric pres. 1013 hPa
Wind speed 5 m/s
Wind dir. 143 deg
Rain fall 3 mm
Snow depth 2 mm
Close

ASC
HW

HW

- DEIF developed platform
- HW manufactured in Denmark
- Flexible configuration
- Marine approved platform

HW



(Option M4)

8-36Vdc Power supply 5W

3 x Multi inputs, (VDO, PT100, 0-40Vdc, 4-20mA)

2 x CAN ports, power management

7 x binary inputs

Power supply

8-36Vdc Power supply 11W

6 relay outputs

2 pulse inputs (kWh, kVArh)

5 digital inputs

I/O

13 x binary inputs, 4 relay outputs (Option M12)

Communication (Option N)

Modbus TCP/IP

sms/e-mail

AC measurements

3 x Current measurements

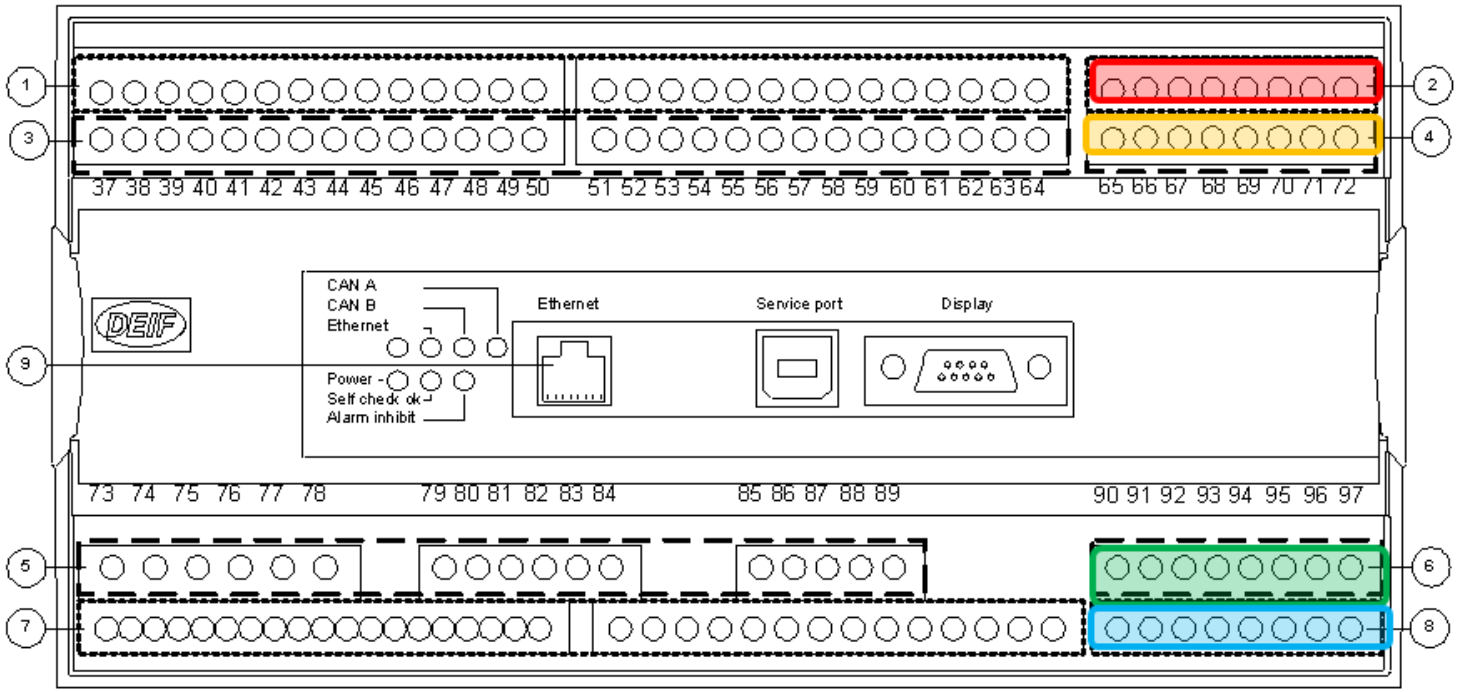
3 x Inverter voltage measurements

1 x Neutral

3 x BUS/Grid voltage measurements

1 x Neutral

HW



Extra communication or extra I/O

Modbus RTU, RS485 (Option H2)

7 x digital inputs (Option M13.2)

4 x relays (Option M14.2)

Extra I/O

7 x digital inputs (Option M13.6)

4 x relays (Option M14.6)

4 x 4…20mA inputs (Option M15.6)

2 x 0(4)…20mA outputs (Option F1)

Extra outputs (Inverter)

4 x relay outputs

2 x 0 - 20mA (Option E2)

Extra communication or extra I/O

Modbus RTU, RS485 (Option H2.8)

7 x digital inputs (Option M13.8)

4 x relays (Option M14.8)

4 x 4-20mA inputs (Option M15.8)