

# InteliNeo 6000

## Controller for parallel hybrid microgrid applications

### SW version 2.3.1

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# 1 General information

## 1.1 Version information

This FW version is compatible with:

- IntelliConfig version 2.38.0.38 and newer
- IntelliSCADA version 2.5.0.10 and newer
- IntelliVision 5.2 FW 1.6.1.1 and newer

## 1.2 Clarification of Notation

**Note:** This type of paragraph calls the reader's attention to a notice or related theme.

**IMPORTANT:** This type of paragraph highlights a procedure, adjustment etc., which can cause a damage or improper function of the equipment if not performed correctly and may not be clear at first sight.

**WARNING:** This type of paragraph highlights a procedure, adjustment etc., which can cause a damage or improper function of the equipment if not performed correctly and may not be clear at first sight.

**CAUTION:** This type of paragraph highlights a procedure, adjustment etc., which can cause a damage or improper function of the equipment if not performed correctly and may not be clear at first sight.

**Example:** This type of paragraph contains information that is used to illustrate how a specific function works.

## 2 Changes in the version 2.3.1

**CAUTION:** When using the IntelliConfig functions FW Upgrade / Current Configuration and Bulk/Offline Upgrade, we strongly recommend paying close attention to the report generated by this operation. Due to the nature of firmware upgrades, inconsistencies between the original and new configuration may occur, which can result in a non-functional configuration or, in certain situations, even create hazardous states. Careful review of the logs can prevent this issue.

**Note:** Specifically, when upgrading from version 2.0.0 or older to version 2.1.0 or newer, there is a change in the startup sequence settings: Setpoint Precharge Type = AC is imported into the new configuration as Setpoint Starting Sequence BCB Control = Start With Closed BCB. This reverses the order of steps in the startup sequence.

### 2.1 New features

- Range of Modbus ECU device addresses was extended to include addresses 0, 248 - 255

### 2.2 Bug Fixes

- The Settings for Timer BESS Start Timeout using the setpoint Precharge TO did not work for values higher than 64 s. The bug has been fixed.
- PLC: PID Block - Incorrect Behavior of Output If Lo Hi Limits is Reached. The bug has been fixed.

# 3 Changes in the version 2.2.1

**CAUTION:** When using the IntelliConfig functions FW Upgrade / Current Configuration and Bulk/Offline Upgrade, we strongly recommend paying close attention to the report generated by this operation. Due to the nature of firmware upgrades, inconsistencies between the original and new configuration may occur, which can result in a non-functional configuration or, in certain situations, even create hazardous states. Careful review of the logs can prevent this issue.

**Note:** Specifically, when upgrading from version 2.0.0 or older to version 2.1.0 or newer, there is a change in the startup sequence settings: Setpoint Precharge Type = AC is imported into the new configuration as Setpoint Starting Sequence BCB Control = Start With Closed BCB. This reverses the order of steps in the startup sequence.

## 3.1 New features

- **Mains Preference and Other Power Management Options in Parallel with the Grid**
  - This feature primarily applies to MPTM applications. In cooperation with IntelliMains 1010 v. 3.8.0 or IntelliMains 510 v. 1.4.0, the function is also available for MINT applications.
- **Gen P Optimal**
  - The BESS targets the Gen P Optimal power value, while PV curtailment continues to target the #Gen P Min value. The difference between these two power levels allows for more efficient genset operation while maintaining curtailment functionality aimed at #Gen P Min.
- **Switchable ECU CAN Speed**
  - CAN baud rate can be set to either 250 or 500 kbps.
- **State Decoders**
  - Analog E-num values can be converted into multiple binary values.
- **UGCB LED Support**
  - Enables easier management of UGCB and Universal genset via displays or IntelliSCADA.
- **Extended Range of Maximum Value Integrated via One PV/WT/BESS Slot**
  - Originally limited to 3276 kW, now extended to 3276.0 kW / 32760 kW / 327.60 MW depending on the selected power format.
- **Transition of BESS Power to Zero Follows Soft Unload Ramp**
  - Realized through ramping of the BESS Max Charging/Discharging Power.
- **BESS Time to Unload Counter**
  - BESS remains loaded even after reaching the BESS High SOC Target until the genset is started and connected to the bus (if available).
- **PVCB Pre-Close Function**
  - This function can be used if the PV inverter is energized from the AC bus.
- **Load Shedding Function Improvement**
  - Defines the number of stages to be shed when BESS enters island operation.
- **BESS Q Control in Island Operation Accepts Request in BESS Q Control = Analog**
  - Previously, the BESS performed Var Sharing. Now, it accepts requests from the analog input without limitations and does not consider current Q control limits of other sources.

- **VT Ratio Setpoint Extended to 3 Decimals**
- **The PLC block Breaker** has been changed - It includes the internal failure states now.
- **Gridcodes for CZ** - LFSM-O situation support.

## 3.2 Bug Fixes

- Under specific conditions, the controller does not resume communication with the ECU over Modbus RTU after a connection loss. **Bug fixed.**
- The settings for VT Ratios — “*BESS VT Ratio*” and “*Mains/Bus VT Ratio*” — are swapped after a controller restart when “*3Ph CT Location*” is set to **Mains**. **Bug fixed.**
- ROCOF protection does not trip when there is a **negative frequency change**. **Bug fixed**
- The *Setpoint Grid Code Test*, used for testing certain grid code features, is automatically switched to **enabled**. In this state, the value of *BESS P (kW)* remains at **0 kW**, regardless of the actual measurement by the controller. **Bug fixed.**
- When only the proportional gain is set (**P > 0**) and both **I** and **D** gains are zero, the output may shift even if the input matches the requested value. This occurs when the input crosses a limit and returns — the output remains offset until the PLC block is reset.

# 4 Changes in the version 2.1.0

We recommend studying the detailed description of the current functionalities of the IntelliNeo controller, which can be found in the ***IntelliNeo Global Guide 2.1.0*** document.

## 4.1 New features

- Total number of ECU Inputs and outputs extended:
  - 600 analog inputs
  - 128 analog outputs
  - Inputs and outputs for J139 User Devices extended:
    - 24 analog inputs
    - 24 analog outputs
    - 32 binary inputs
    - 32 binary outputs
- Changes in terminology and settings for BESS starting sequence:
  - Setpoint *BESS Precharge Type* was replaced by two new setpoints:
    - *Starting Sequence BCB Control*
    - *Start To Dead Bus*
  - Operation without BCB or BCB as fuse now available
- Dynamic Isochronous Frequency and Voltage Control available in App. Curves
- MultiBESS Support
  - Banking of up to 32 units of *IntelliNeo 530 BESS* under *IntelliNeo 6000*
- Gen Partial Load control
  - Requested value of the Genset Minimal Power is accessible via *LAI Gen P Min*
- New setpoint for Manual Curtailment of PV generation is available
- Number of Schedulers> Timers extended from 12 to 30
- Additional BESS power ramping setpoints in Frequency/Load Control for Load Transfer available
  - New setpoints for definition of independent load ramps for Soft Load, Soft Unload, Loaded state for Island and Parallel to Mains.
  - BESS power in Island operation is ramped even in loaded state according to the load ramp

## 4.2 Bug Fixes

- User Interface / Display
  - Breakers disappear from the screen (IV5.2)
- Protection & Grid Compliance
  - Binary protections for DIST-OUT on BOUT 17+ not working
  - ROCOF frequency and timing error fixed
- Power Factor & Measurement Errors
  - Wrong PF calculation when Q123 has both positive & negative kVAr
  - Incorrect PF calculation over LAIs

- Power Control / Curtailment
  - MPTM - Mains import not fulfilled due to internal P limitation
  - MPTM - Load control PTM import/export setpoint not affecting BESS P control
  - PV curtailment not working (BESS P control issue)
- PLC / PID Control
  - PLC PID block saturation failure
- Modbus Communication
  - Dropouts in Modbus I/O reception
  - Modbus RTU fails after controller restart
  - No communication with certain Modbus devices
- Networking / Email
  - Email sending fails from 4G module if ETH port is connected

# 5 Changes in the version 2.0.1

## 5.1 Bug Fixes

### **Bugs related to the function of AC measurement over analog inputs.**

- Settings BESS AC Measurement = Current & Voltage (together with BESS Precharge Type = DC) could cause the critical failure of the system due to the synchronization to the energized bus. The bug was fixed and synchronization to the energized bus is no longer allowed.
- Settings BESS AC Measurement = Current & Voltage together with settings BESS Precharge Type = AC resulted in the blocking of the start of the BESS in AUTO mode. The bug was fixed.

### **CT location settings bug**

- For settings 3Ph CT Location = Mains the BESS CT/VT ratio took an effect for the Mains AC Values calculation and vice versa. The bug was fixed.



# 6 Changes in the version 2.0.0

For this version, significant changes have been made to the operating principles of the entire system in IntelliNeo, as well as in other controllers that are part of the microgrid systems solution.

To understand these principles, we recommend studying the detailed description of the current functionalities of the IntelliNeo controller, which can be found in the **IntelliNeo Global Guide 2.0.0** document, specifically chapters 6.2 *Hybrid-Microgrid application Functions*, 6.3 *Multiple source-types operating in MINT application*, 6.4 *MPTM application*.

The most significant changes have been made in the following areas:

- **Multiple IntelliNeo operation within one site** – Adjustments to inter-controller communication leading to the differentiation of individual types of sources within the system. Based on this change, it is possible to aggregate similar information across the entire system, contributing to an easier and more stable way of managing energy flows across the entire site. Among other things, this principle allows the cooperation of multiple IntelliNeo controllers within one site.
- **Compatibility with other ComAp controllers** – The above-described changes in principles also apply to other controllers that are part of the microgrid solution, namely IntelliGen and IntelliMains. To ensure mutual compatibility, it is necessary to combine versions according to the following list:
  - IntelliNeo 6000 – v. 2.0.0
  - IntelliNeo 5500 – v. 2.0.0
  - IntelliGen 1000 – v. 3.3.0
  - IntelliMains 1010 – v. 3.3.0
  - IntelliNeo 530 BESS – Not compatible yet
  - IntelliGen 500 – Not compatible yet
  - IntelliMains 510 – Not compatible yet
  - IntelliGen 200 – Not compatible yet
  - IntelliMains 210 – Not compatible yet
- **IntelliGen NT, IntelliSys NT, Intelli Mains NT line are not supported** – The controllers are not directly compatible with IntelliNeo over CAN communication once the firmware is updated to version 2.0. Alternative solutions can be implemented in the following ways:
  - Integration of existing gensets equipped with NT-line controllers using the Universal Genset function.
- **PV curtailment calculation algorithm has been updated** – is based on different principles - see chapters 6.2.17 *PV Output control*, 6.2.18 *PVCB Control* in IntelliNeo 6000 Global Guide.
- **New Dynamic Spinning Reserve (DSR) calculation** – see chapter 6.3.2 *Power management in a system combining BESS, PV and Gensets* in IntelliNeo 6000 Global Guide.
- **New principles of P and Q control in on-grid application** – see chapters 6.3.5 *Active Power Control in On-grid application*, 6.3.6 *Reactive Power Control in On-grid application* in IntelliNeo 6000 Global Guide.
- **BESS AC Values measured over Modbus** – see chapter 6.2.14 *BESS AC values measured over LAIs* in IntelliNeo 6000 Global Guide.
- **HMI for IntelliNeo has been changed** – The principles of HMI view has been changed for IntelliNeo, especially for MINT application. IntelliNeo is considered as MINT controller and HMI is designed to display only information about sources integrated by this specific IntelliNeo. The "Site view" has been removed.

# 7 Changes in the version 1.5.1

## 7.1 Bug Fixes

- Issue with Modbus RTU communication timing out to multiple server devices has been fixed
- ECU BOUTs mapping incorrectly has been fixed
- Other CB Trip alarm cyclically appears in history has been fixed

# 8 Changes in the version 1.5.0

## 8.1 New features

### > Universal Genset Support

- » IntelliNeo 6000 can integrate up to 16 universal gen-sets.
- » Universal Genset is only supported in the MINT application.
- » Universal Genset Support functionality requires the gen-set to operate as Modbus server device. Universal Genset can be configured as User Modbus Device or as standard device via ECU list.
- » BESS integrated via IntelliNeo no longer uses the power management settings (like priority etc.). These settings have been transferred to the Universal Genset.
- » BESS running is no longer influenced by load reserves. It is driven by the new LBI BESS Remote Start/Stop.
- » The BESS Start/Stop is no longer associated with the common System Start/Stop signal shared on inter-controller CAN line. This signal is only accepted by Universal Genset.

### > Support of plug-in modules has been extended to these modules:

- » EM-BIO8-EFCP
- » CM2-4G-GPS
- » RS 232/485

### > **Modbus Master** - broadcast control supported. Broadcast is realized via usage of Modbus device with address "0". Commands 5, 6, 15, 16 are supported.

### > The **number** of PV inverter LAI/LBI has been extended to **32**.

### > **Hot Swap improvements:**

- » Hot Swap Recovery (transfer of control functions between Backup and Master) is possible even if the system is running without limitation.
- » Hot Swap Function supports the usage of redundant CAN modules (independent modules managed by Master and Backup controller).
- » Fault reset command is synchronized between Master and Backup.

### > **Ethernet ports** are represented each by individual MAC address. It allows connection of independent ETH ports in one network (e.g. Ethernet 2 for monitoring and Ethernet 3 for Modbus communication.)

### > **Combination of datapoints** achievable and direct Modbus reading/writing is possible using the standard ECU Generic Unit- Sunspec. This combination is not available for User Devices.

### > **Support of CAN J1939** has been added as ECU User Device and supports communication speeds of 25 kbps.

### > **Load Shedding function** has been extended to include options based on BESS Frequency, BESS kVA and BESS SOC.

### > **PLC**

- » I. Interpolation8 PLC block has been added. This block performs a linear transformation of the input to output. The transfer curve is defined in 8 points. 16 PLC blocks are available. This PLC Block replaces the original Interpolation block.
- » The number of PLC blocks Convert has been extended to 64. This PLC block is recommended for the conversion of user setpoint to Value inside the configuration.

- » The PLC Block Ramp has the new option to set the time units for definition of ramping rate per second or per minute.
- **PV Curtailment** Counter function has been extended. New Values Maximal PV kWh and values of PV curtailed energy were added.

## 8.2 Bug Fixes

- Control of the load via LAI Analog External Baseload has been fixed.
- Modbus Server RTU-RS485 - Communication break after restart when slave terminal address is 1. Bug has been fixed.
- LBO System Reserve OK - The LBO System Reserve OK shows the correct value even the BESS is disabled for discharging.
- MPTM - LAI Analog External Imp/Exp works correctly. Bug has been fixed.

# 9 Changes in the version 1.4.0

## 9.1 New features

- 32-bit value reading available for User Defined Modbus ECU Modules.
- Number of supported devices communicating via Modbus TCP is extended to 32 devices on IntelliNeo 6000. Number of devices supported via Modbus RTU is 16. Total number of connected Modbus devices cannot exceed 32.
- Anti-islanding protection type of the BESS operated in P-Q mode has changed from Shutdown to 'BCB Open'. New behavior when anti-islanding protection is triggered, the BESS opens the BCB, shuts down the Precharge request to deenergize the PCS DC circuit and is ready to reconnect to bus via AC precharge when busbar gets energized again.

# 10 Changes in the version 1.3.0

## 10.1 New features

- Option "Write On Change" has been implemented in functionality Modbus Master. See the "Refresh Type" parameter in datapoint configuration in IntelliConfig.
- The function Modbus Registers Block Reading has been implemented. User is allowed to create the datapoints and assign them a register group. The Group of registers is then read at once using the one modbus poll request. See configuration of a modbus user device in IntelliConfig.
- Option to select if the Voltage protection are evaluated upon the Ph-Ph Voltage or Ph-N Voltage. See the setpoint *Basic Settings/ Voltage Settings/ Evaluated Voltage Protections*.
- Vector Shift and ROCOF protection settings available in MINT application. See the Setpoints in the group Lost Of Mains Protections.
- Sunrise/Sunset function has been implemented. See the Setpoints in the group *Scheduler/ Sunrise/Sunset Function*.
- The Hot Swap Redundancy function supports two independent redundant sets of CAN peripheral modules.

## 10.2 Bug Fixes

- The User protection configured as a Shutdown type and with fast reaction was not evaluated as fast. The bug has been fixed.

# 11 Changes in the version 1.2.0

**IMPORTANT:** The Hot Swap functionality is temporarily not recommended for use in IntelliNeo 6000. This issue is present only in this version.

## 11.1 New features

- In on-grid operation (with IntelliMains), when only BESS and PV is connected to the mains (no genset). IntelliNeo now accepts the Low Target SOC and High Target SOC limits and discharging / charging is stopped regardless the IntelliMains request.
- Disabling of protections BESS >V, BESS >>V, BESS <V, BESS >f, BESS <f leads to blocking of the BCB Close Command. Now this situation is signaled by alarm LAI BCB Closing Is Blocked.
- Operation without the PVCB is now supported in IntelliNeo. Use the settings Setpoint: Process Control/Breaker Control/PVCB Control Mode = Not Installed.
- The Follow Mode in PVCB Control was added. This option allows opening of the PVCB unexpectedly e.g. In case of lost of mains. In this mode the alarm PVCB Fail is suppressed. Set the Setpoint: Process Control/Breaker Control/PVCB Control Mode = Follow.
- Some parameters in the controller can now be renamed in the IntelliConfig even in default language e.g. User Buttons, Remote Control Registers, Timers, pulse counters, etc.
- The solution of the wind up effect of curtailment function was integrated. In case of need of the curtailment the limitation always starts on the actual level of the PV output.
- The PV control (Curtailment Output) can be programmed to have ramp up/down time in seconds. The maximal rate of the output change is limited by the ramp. See the setpoints Curtailment/PV/WT Ramp Up and PV/WT Ramp Down.
- New option "Soft Bus Energize" was added in DC Precharge sequence. Activation of the LBI Soft Bus Energize during the start sequence of the BESS allows starting with closed BCB and soft energizing of the bus.
- The new function of PV Curtailment Counter was integrated. The controller counts the energy lost during the curtailment, reports the value of lost PV output and calculates the total loss of energy from the theoretical output calculated at the site of generation. The function requires use of a irradiation sensor located at the PV array.
- For BESS operated in the U-f Control mode, the controller supports additional analog output for BESS PCS voltage and frequency regulation. See analog values for Frequency/Load Control for BESS Frequency Required, BESS Frequency Offset, BESS P Required %. See analog values Voltage/PF Control for BESS Voltage Required, BESS Voltage Offset, BESS Q Required %.

## 11.2 Bug Fixes

- Some limits of the modbus client functionality were fixed, e.g. Limit of 128 polls in the configuration of the modbus client functionality.
- Soft unloading process of the BESS in on-grid application was fixed. Originally the BESS stays fully loaded until the soft unload ramp elapsed.
- In on-grid application, where curtailment function only started limiting the PV output if the BESS reached the request from the IntelliMains. Scenario of PV > BESS Nominal Power led to the situation that PV was not curtailed to fulfill the request of zero Export. The bug was fixed.

- The SD Protection configured as a "Fast Protection" did not trip the BCB in the short (20ms) application loop. The Problem was fixed.
- A number of minor bugs were fixed.



# 12 Changes in the version 1.1.1.1

- **SW version 1.1.1.1 is UL witness tested for Multiple Generator Paralleling Control Equipment**

# 13 Available related information

Documents (*.pdf)	Description
InteliNeo 6000 2.3.1 Global Guide	The manual provides general information how to install and operate InteliNeo 6000 controller.
InteliNeo 6000 Datasheet	Basic technical information about the InteliNeo 6000 controller.

Table 9.1 Available documentation

## 13.1 Available files

Firmware (*.exe)
For InteliNeo 6000
InteliNeo6000-Product-Suite-2.0.1.exe

Table 9.2 Available firmware

Archives (*.aig4)
For InteliNeo 6000
InteliNeo6000-HC-2.0.1.aig4
InteliNeo6000-HC-ExtendedFeatures-2.0.1.aig4

Table 9.3 Available archives

# 14 Notes

## 14.1 Document history

Revision number	Related sw. version	Date	Author
12	2.3.1	14.1.2026	ComAp
11	2.2.1	31.10.2025	ComAp
10	2.1.0	4.7.2025	ComAp
9	2.0.1	4.11.2024	ComAp
8	2.0.0	27.9.2024	ComAp
7	1.5.1	2.7.2024	ComAp
6	1.5.0	12.4.2024	ComAp
5	1.4.0	1.2.2024	ComAp
4	1.3.0	12.12.2023	ComAp
3	1.3.0	16.11.2023	ComAp
2	1.2.0	18.10.2023	ComAp
1	1.2.0	17.10.2023	ComAp