Release Notes

Perception & GEN Series Firmware **Version v8.50**

HBK
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Contents

1 Update information

These release notes describe changes in Perception (including GEN series firmware) V8.50.

2 Mid and long-term support roadmap

Starting with Perception V8.00 some legacy features, mainframe and card support are no longer present. (A Perception V7.6x maintenance version is available for critical bug fix support.)

2.1 Supported on latest Windows versions

Including all updates until June 2023:

- Windows 10 Pro 1607 and higher (64 bit only)
- Windows 11 Pro

Installation requirements:

- Dot Net Framework V4.8 (distributed with the install CD and available for download on the internet)
- Microsoft Direct3D® capable graphics card.

2.2 Downgrade

Perception V8.50 can be downgraded to the following versions.

Note: When an EtherCAT card is installed, a downgrade to any version before V8.28 must go through version V8.28 first.

- Perception V8.4x
- Perception V8.3x
- Perception V8.2x
- Perception V8.1x
- Perception V8.0x
- Perception V7.6x
- Perception V7.5x

3 Perception Versions

Table 3.1: Perception Versions

Version	Description	
	Perception Standard	Free
1-PERC-AD-0x	Perception Advanced	Paid
1-PERC-VA-0x	Perception Viewer Enterprise	Paid
1-PERC-E64-0x	Perception Enterprise	Paid

Perception supports the following application extensions:

Table 3.2: Application Extensions

Version	Description	
1-PERC-OP-EDR	eDrive application (setup, live and efficiency mapping table)	Paid
1-PERC-OP-STL	Advanced High Voltage/High Power analysis according STL standards	Paid
1-PERC-OP-HIA	High Voltage Impulse Analysis	Paid
1-PERC-OP-CSI	CSI Runtime extensions (Customized Software Interfaces)	Paid

4 Known Issues

Table 4.1: Known Issues

GN310B Card	The GN310B card supports Power Calibration. Currently Perception fails to show the correct power calibration date. The date shown maps on ‘12/30/1899’.
Perception settings	Mainframe settings changed via the Fieldbus remote control are not updated in the UI. Reconnecting to the mainframe will show the changes.

5 New Features

5.1 Perception – General new features

Continuous fieldbus output and split recordings

When making a recording in GHS/Perception, various signals may be published on the fieldbuses, and data is written into the recording file. Depending on the acquisition mode that was selected for the recording, the data in the recording file may be a combination of continuous data (acquired at a reduced sample rate and written continuously during a recording) and on top of that sweep data (initiated by trigger events and acquired at a (higher) sample rate and written only around the time a trigger occurs).
Up until now:

- All data were written into a single recording file that could only be accessed by 3rd party applications when the whole recording was finished
- When recording files were getting very large, depending on what the file system could handle as maximum file size, recordings were cut up into several files. All files were required to be able to open a recording
- Fieldbus output was only available when the system was either in preview mode or in recording mode. No fieldbus output was available when the system was in Pause mode

In this release, several important changes were made to those mechanisms (see also in Perception, File → Preferences... → Perception → Recordings, the blue information buttons in the Recording creation box):

- It is possible to save every sweep as a separate recording that can be opened immediately after this sweep has been finished. Such recording files can be recognized by the post-fix Sxxxx, where xxxx is the number of the sweep. If a recording also contains continuous data, a separate recording file can be generated for each part of the recording between a resume (or start) and a pause (or stop). Such recording files can be recognized by the post-fix Cxxxx, where xxxx is the number of resume(or start) - pause(or stop) interval. Go to File → Preferences... → Perception → Recordings and, in the Recording creation box, check 'Split recording into....and pause/resume'
- It is also possible to split the continuous part of the recording into smaller individual recordings, for example to split the recording between each resume and a pause into segments of, e.g., 10 seconds. Go to File → Preferences... → Perception → Recordings and, in the Recording creation box, check 'Split continuous recording into subrecordings after', and choose the length of each part of the recording in seconds.
- When the user chooses not to generate a split recording, there is a choice to have a single recording file or to cut up the recording into several files. Go to File → Preferences... → Perception → Recordings and, in the Recording creation box choose either 'Create recording as single file' or 'Create recording as multiple files'. File size limitations of the underlying operating system apply. The files obtained for this situation are not individual recording files and all files are required to be able to open a recording
- Between a pause and resume, the system will continue publishing data on the fieldbuses

The continuous fieldbus output together with the split recording functionality allows a user to immediately inspect parts of the recording while at the same time the system keeps on interacting with 3rd party systems through the fieldbuses.

Start in pause mode	Normally, when starting a recording, the system immediately starts writing into the recording file. Once it is recording, the system can then be changed to pause mode where data is no longer written to the recording file but the fieldbuses keep generating output (see the new feature 'Continuous fieldbus output and split recordings'). In this release, it is possible to start recording in pause mode. In this case, fieldbuses start generating output from the start but no data is written until the system is changing from pause mode to resume. This is convenient to check if everything is set up correctly and if the fieldbuses are generating output without storing data yet. To enable starting a recording in pause mode, go to File → Preferences... → Perception → Recordings and, in the Recording creation box, check 'Suspend storage at start of recording'. This setting is only relevant for recordings with continuous data being stored and it also affects remote acquisition commands but only when Perception is connected.
Three new RTFDB formulas for determining efficiencies	Three new application-specific Real-Time Formula DataBase (RTFDB) formulas are now available called EfficiencyMode(), EfficiencyValue(), and PowerLoss(). Those functions are typically used with power signals as an input and in this case generate as an output the direction of the power flow, the efficiency (as ≤100%) for the given power flow direction and the power loss for the given power flow direction. For more details, also see the new feature ”Calculate efficiencies only once”.
Delete a component by clicking the 'X' in the header	A component (e.g. a Display) can now quickly be deleted by clicking the 'X' in the top-right of the component.
Temporarily allow maximizing one component	In Perception it is possible to have many components open simultaneously, possibly leading to the situation where the information in certain components is hard to read. It is now possible to temporarily maximize one component to have a closer look at its content without the need to rearrange the layout of all components: in a component header, click the (single) square icon on the right side of the header and the component will be shown temporarily covering all other components. For a maximized component, clicking the (double) square icon on the right side of the header will restore the initial layout of all components.
In the Harmonic Analysis Display, select a range of harmonics to be shown and scale the Y-axis.	The Harmonic Analysis Display shows harmonics of a signal in the form of a bar chart based on spectral signals. In earlier version it was possible to show a range of harmonics that is, the ranges always started with the zero-th harmonics (or, the harmonic of order zero). In the new release it is possible to show harmonics starting at a different order than zero. In the Harmonic Analysis Display, right-click → Properties... → Display Setup tab and choose the Start order in the Orders box. Furthermore, it is now possible to scale the Y-axis: in the Harmonic Analysis Display, right-click → Properties... → Display Setup tab and choose the scaling in the Y-axis scale box.
In the MU sheet, also store the input values as data sources	The MU sheet uses a number inputs to determine the measurement uncertainty of calculated powers. One set of inputs consist of the input values (for example, U_RMS, phi, I_in). Those input values are now also stored as data sources. After performing a calculation in the MU sheet, in Perception go to Data sources → MU and go the the folder DC, AC, or Mechanical.
Select which channels are to be exported	When exporting data to some other format (e.g., ASCII, Excel), it is now possible to select on a per channel bases which channels should be exported. In Perception, select File → Export Recording... , go to the Channels to export box, check Custom channel selection, click ... and select the channels to be exported.
Suppress duplicated range annotation	In the Yt display in Perception, the range of each signal is given close to the Y-axis. When many signals are present, also many range annotations are present which may lead to a cluttered and unclear view of the annotations. It is now possible to show only the range of the selected trace: right-click → Properties... → Annotation & Grid tab and check Show annotation only for selected trace in the Y-Annotation box.

Stabilize the Live signals by triggering on a cycle signal	The signals in the Live view of a Yt time display are often 'running' even though quite often, measured signals are often close to periodic due to the cycles of a machine. From this release onward, it is possible to trigger (like in an oscilloscope) the signals on a cycle signal. This functionality is currently recommended when there is only one cycle source present in the setup. To activate cycle-based triggering, right-click in the Live display → View mode and then select Cycle Triggered. Alternatively, select the hamburger menu in the top-left of the Live display and select Cycle Triggered.

5.2 Perception – New ePower Suite Features

In the ePower suite, also change user-defined names when a component name is changed	In the ePower suite, the names of the automatically generated RTFDB formulas are derived from the component/connector names in the ePower setup. The user can manually add user-defined formulas using the same names as in the automatically generated formulas. When the user changes the component/connector names, the names of the automatically generated RTFDB formulas are changed but in previous releases, the corresponding names of the user-defined formulas were not updated. In this release, if a user uses component/connector names in the user-defined formulas, those user-defined formulas will also be updated.
Calculate efficiencies only once	The efficiency blocks in the ePower suite take power signals as designated input and outputs. Currently, depending on the user-defined energy flow direction, from input to output or vice versa, the efficiency is calculated as P_out/P_in or as P_in/P_out, respectively. It is also possible to generate efficiencies for both directions if the direction is not known beforehand, and in the RTFDB formulas, two efficiencies are calculated with postfix I>O or O>I, respectively. In this case, in steady-state, one of the efficiencies will be >100% and the other one <100% and based on this information, the user currently has to find out the direction of the power flow. In some cases, outside steady-state behavior, it is possible for P_in and P_out to have opposite signs leading to negative efficiencies which can, in absolute value be <100% or >100%. In such situations, the efficiency is not defined. In this release, the user can define that an efficiency is always ≤100%. An additional signal then indicates the mode i.e., the actual direction of the power flow (either from input to output or vice versa). In the ePower suite, in the efficiency panel under Energy flow, select 'As ≤100% and mode'. When efficiencies are not defined, NaN will be published on the field buses for those signals.
Invert Timer/Counter channels	In some situations it is convenient to be able to invert the sign of a measurement channel immediately in the hardware rather than, for example, in the Real-Time Formula DataBase (RTFDB). This was already possible for standard analog input signals but from this release, it is now also possible for Timer/Counter input signals measured in frequency mode, for example used for digital torque signals. In the ePower suite, select a connector with a digital torque/speed sensor, go to the part Torque transducer and check the Invert signal box. In Perception, go to Settings → Input box and select Timer-Counter and check the box in the Invert signal column.
Artificial gearbox as connector	In an eDrive setup where a gearbox is included, it is not always possible to measure the mechanical power on both the input shaft and output shaft of the gearbox, for example due to space limitations. Measuring one of the shafts only, it is then useful to still have some information about the shaft that is not measured in terms of this non-measured shaft's torque and speed. For this reason, an artificial gearbox was added allowing to specify the RPM ratio between the input and output shaft, as well as artificially introduced mechanical losses (losses in terms of torque). In the ePower suite, select a connector and as connector type, select Mechanical - Gearbox.

Show Timer/Counter measuring time more prominently	In digital torque sensors, the actual torque value is related to the frequency of the sensor output. In order to get the torque from the frequency, the frequency is determined as the number of periods counted in a certain measuring time which has an impact on several properties of the measured torque (e.g., accuracy, time resolution). The user was always able to select this measuring time but only from Perception, not from the ePower suite. It is now possible to also select the measuring time from the ePower suite: in the ePower suite, select a connector with a digital torque/speed sensor, go to the part Torque transducer and fill out the box next to Measuring time.
Show meter values in review	In the ePower suite, the scope display and the meters are only populated during preview or recording and when a recording is stopped, the scope display and meters will become empty. Now, by clicking on Create Results, a new sheet is generated for the active component. The scope display contains the synchronous signals of the active component a cursor. The meters will be populated with the asynchronous signals of the active component at the time of cursor location.

5.3 New Features for Fieldbuses

RTFDB processing on CAN signal	In the mainframes, the regular analog inputs can be processed in real-time using the Real-Time Formula Database (RTFDB). The results of this processing can then be stored in a recording or be published on one of the field buses. From this release onward, CAN inputs can also be processed by the RTFDB and the results can be treated just like processed analog signals i.e., they can be stored in a recording and/or be published on one of the field buses. When CAN signals are available, they are shown in Data Source Navigator and they can be selected by name in RTFDB formulas, just like other signals. This allows to perform calculations on CAN signals (and then to publish the results on, for example, the CAN bus). Since some RTFDB functions can generate triggers, this also makes it possible to generate triggers based on CAN signals.
Extended acquisition status as a result channel	In terms of acquisition, a Genesis mainframe can be in several states such as, Recording, Waiting for Trigger, Trigger armed, etc. The number of states was extended to give more detail about the acquisition state the system is in. All those different states are now coded as a unique integer value which can now be published on the field buses: in Perception, go to Settings → Real-time Data → Publishing and select for relevant field buses to publish Acquisition State (predefined). For the Gen DAQ API, the method GHSGetExtendedAcquisitionState was added which returns the extended acquisition state. In Perception, the extended acquisition states can be seen in the Acquisition Control palette under Acquisition and in the Status palette under Acquisition in text format. The integer encoding for the states for publishing is as follows:

State	Integer	Explanation
Idle	1	Mainframe is idle. Storage is inactive
Starting	2	Mainframe is starting acquisition. Storage turn on
Preview	3	Mainframe is in preview state
Pause	4	Mainframe is in pause state. No storage jobs active, but storage is on
Storing	5	Mainframe is storing data. Could be start/end of recording, sweep or continuous data segment. There are active storage jobs
Reserved1	6	Reserved for future use
Reserved2	7	Reserved for future use
Recording	8	Mainframe is in Running state. There is continuous recording actively stored. This state is reachable only in Continuous mode
WaitingForArm	9	Mainframe is in Running state. Triggers are not armed
WaitingForTrigger	10	Mainframe is in Running state. Triggers are armed (or feature is not used). Waiting for trigger to start sweep
Triggered	11	Mainframe is Running and triggered. Recording a sweep

6 Improvements

6.1 Improvements in the Perception ePower Suite

Creating FDB formulas from RTFDB formulas in the ePower suite without hardware connected	In the ePower suite, real-time formulas (RTFDB formulas) are automatically generated and will lead to real-time results. In many cases it is useful to re-process the recorded data in post-process mode using the FDB formulas. The ePower suite could already automatically generate FDB formulas from RTFDB formulas but up until now, it was required for hardware to be connected. In the new release, FDB formulas can also be generated without connected hardware.
Improved interpolation for efficiency maps	Efficiency maps (and other 3D maps) use a limited number of points and values between those points are determined by interpolation. In some case, this interpolation gave unexpected results. In this release, the interpolation methods were adjusted to behave more as expected by the user.

6.2 Improvements for Fieldbuses

Change from relative addressing to absolute addressing	In earlier major releases, in CAN remote control, relative addressing was used for recorders. This means that: if we use the address x in a CAN command, this refers to the x-th occupied recorder slot. This means that the address of a recorder may change when recorders are added or removed. Because this is inconvenient and error prone, we implemented the following change: **This is the first major release where, absolute addressing will be used for all recorders in a mainframe.** In the 1-byte address available to address recorders, the range 1...127 is used for physical recorders and the range 128...255 for CAN recorders, irrespective of a physical recorder being present or not and a CAN recorder being used or not. **NOTE: With this change. The user already using a setup and using the old relative addressing may have to change their setup**
EtherCAT Compliance	New EEPROM contents will be applied when ESI file generation is triggered by Perception • Set unused FMMUs in EEPROM to 0xFF • Removed unused Sync Managers from EEPROM (SM 4, 5, 6, 7) • Added dynamic generation of default length for SM3. Saving EDI file will regenerate EEPROM to match configuration.
GN815 new flash	Added support for MT25Q FLASH on the GN815 card.

6.3 Improvements for Hardware

Support for new B-type mainframes	We have introduced three new B-type mainframes, the GEN7tB, GEN17tB and GEN7iB. The difference is that the updated mainframes support legacy cards not in all slots: • GEN2tB: no support of legacy cards • GEN4tB: no support of legacy cards • GEN7tB: limited support of legacy cards: slots A to C only! • GEN17tB: no support of legacy cards • GEN3iA: full support of legacy cards • GEN7iB: limited support of legacy cards slots: A to C only!
Increase the bandwidth of GN310B and GN610B cards to ~400 kHz	This feature increases the bandwidth for the GN310B, GN311B and the GN610B, GN611B cards to ~400 kHz. With this feature implementation, two additional filter type (analog only) options are being offered: • Bessel (analog only) - 7-pole Bessel, 395 kHz ± 25 kHz (-3 dB) • Butterworth (analog only) - 7-pole Butterworth,460 kHz ± 25 kHz To choose the analog-only filter option, in the Perception Settings sheet, go to Input ® Basic – Voltage/Current and in the Filter type column, select either “Bessel (Analog, Fc@-3dB)” or “Butterworth (Analog, Fc@-3dB)” This is the first major release where in total SIX filter type selections (as listed below) are supported: • Bessel IIR (Fc@-3dB) • Butterworth (Fc@-3dB) • Elliptic (Fc@-0.1dB) • Wideband (off) • Bessel (Analog, Fc@-3dB) • Butterworth (Analog, Fc@-3dB)

6.4 Support items and requests

Perception display freeze in Display Triggered mode	SUPEPT-142	A freeze occuring in Display Triggered mode was solved.
Perception forces downgrade of QX module and it fails (caused by new chip in the QX)	SUPEPT-150	If Perception cannot downgrade the firmware of a QuantumX module, a dedicated message is shown.
Part of ePower suite setpoint table empty	SUPEPT-204	A problem with RTFDB triggers not leading to setpoint table entries was solved.
Mistake in the RPC help file	SUPEPT-207	A mistake in the RPC manual for the newest release was solved.
Standard pulse length bug in Sequencer sheet	SUPEPT-211	A problem with interpreting the standard pulse length in the Sequencer sheet was solved.
Creating report makes Perception sluggish	SUPEPT-214	A problem requiring a very long time to generate reports in Perception was solved.
Y-scale annotation is wrongly displayed	SUPEPT-215	A problem with the Y-annotation in a Yt display was solved.
BE3200 standard pulse issue	SUPEPT-216	A problem with interpreting the standard pulse length in the Sequencer sheet was solved.

Sequencer pulses were gone with a Beta version of 8.40	SUPEPT-217	A problem with sequencer pulses no longer present in a Beta version of 8.40 was solved.
VFrameFormat in our dbc files not complete	SUPEPT-219	A problem with an incomplete definition of VFrameFormat was solved.
Add UTC indication in time stamp of a recording on a mainframe	SUPEPT-222	For mainframe recordings, it is now properly indicated when it concerns UTC.
Add explanation of the averaging method in ePower	SUPEPT-223	In the ePower suite, additional information was added concerning the difference between the different types of averaging that are now available.
The average value of current and voltage is calculated incorrectly with n-phase setup	SUPEPT-224	In some situations in the ePower suite, the average value of current and voltage was calculated incorrectly with an n-phase setup where n was not 3. The values are now correctly calculated for any n (solve
Corrected some settings in workbench not being visible	SUPEPT-227	For a certain sequence of actions, part of the settings in a virtual workbench were not visible in Perception. This is now solved.
Put a limitation/text into the Sensor Database itself to limit users to creating tables with 9 entries	SUPEPT-232	When doing sensor linearization using look-up tables. the maximum number of points that can be used is 9. This is now more clearly indicated.
Assigned CAN signals aren't assigned properly to CAN Recorder	SUPEPT-233	A problem where in some cases, CAN signals were incorrectly shown as analog channels was solved.
Improved text in properties window of the Phasor display	SUPEPT-235	An explanatory text in the properties window of the Phasor display concerning linked displays was clarified indicating that linkage for time reference only applies to Review mode.
The filter settings of the digital channels are not updated correctly	SUPEPT-240	A discrepancy between the filter settings of a digital channel in Perception and the ePower suite was solved.
Trigger source unknown when trigger arm via CAN is used	SUPEPT-241	A problem that the source of a trigger source was unknown when trigger arm via CAN was used is solved.
Harmonize trigger times in Perception display and for ePower setpoints	SUPEPT-244	Both the Perception display and the setpoint table in the ePower suite indicate the time of a trigger. Both had a different format which is now harmonized such that both have the same format.
Add cursor table to ReviewSweep display	SUPEPT-246	In regular displays, there is a small cursor table to show the values of a signal at the cursor position. This cursor table is now also added to the ReviewSweep display.
Garbled characters in calculator in Chinese	SUPEPT-249	A problem with garbled characters in the calculator when Perception is switched to Chinese was solved.
Perception 8.40 Live Display Flicker	SUPEPT-250	A problem of a flickering Live display possibly introduced in 8.40 was solved.
Missing entries in setpoint table	SUPEPT-253	A problem with missing entries in the setpoint table was solved.

Perception crash at opening PNRF file	SUPEPT-254	A problem with Perception crashing when opening a PNRF file was solved.* -
'Start and stop trigger on cycles' not properly restored in Perception	SUPEPT-255	When in the ePower suite 'Start and stop trigger on cycles' was toggled, the dependent settings in Perception were not correctly toggled. This is solved.
Configuration mismatch occurs when loading workbench	SUPEPT-256	A problem with loading a configuration in a mainframe and restarting and giving a configuration mismatch error is solved.
Fixed workbench sharing problem	SUPEPT-257	In some situations, virtual workbenches made on one system caused issues when using them on another system especially in the context of the ePower suite. This is now solved.
Rounding / truncating in display marker and user table harmonized	SUPEPT-258	In the display marker and user table, transforming non-integer values into an integer was done in a different way. This is now harmonized.
Additional robustness was added against illegal characters in the name of the logfile	SUPEPT-259	When there were illegal characters in the the name of the logfile, Perception would crash. This is now made more robust.
CAN bus load >100% now gives an error	SUPEPT-260	The user can configure the CAN output of a mainframe such that the total load is larger than 100%. An error message is now given when this occurs.
Part of a workbench was not saved	SUPEPT-261	Sometimes, recent edits to a virtual workbench were not saved, This is now solved.
Improved robustness triggering and trigger arm	SUPEPT-280	In some situation GHS/Perception could end up in an incorrect state saying ”5% loading”. This problem is now solved.
Merging of RTFDB formulas made more robust	SUPEPT-289	The ePower suite automatically generates RTFDB formulas between two special comments (*** Automatic formulas are created below this line, you can add your own formulas at the bottom *** and *** Automatic created formulas are finished, below this line you can add your own formulas ***) If one of those lines is removed, automatically generated formulas can be mixed with user-generated formulas. The approach to keeping both sets of formulas separate was made more robust.

7 Deprecated support

The following is no longer supported within Perception:

- GPS2750

8 Supported Genesis HighSpeed Mainframes

The following Genesis HighSpeed Mainframes are supported:

- GEN2tB
- GEN3t
- GEN4tB
- GEN7tA
- GEN17tA
- GEN3i
- GEN3iA
- GEN7i
- GEN7iA
- GEN7iB
- GEN7tB
- GEN17tB
- BE3200

9 Supported QuantumX Modules

Note: The support of QuantumX Modules in Perception will stop with future versions of Perception! QuantumX modules can be integrated in systems with tethered mainframes using the CAN-interface together with a QuantumX MX471C.

The following QuantumX models are supported:

- MX1609KB
- MX1609TB
- MX471B
- MX809B
- CX27B as single network access point only, no setup or control of CX27B

Patents no: 7,868,886

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