

Software Change Note ARFIF106

Grid Converter + General Grid Code

Application: ARFIF106
Application Name: Grid Converter + General Grid Code
Verbal Name: GC + GGC
Manual: DPD01978A

Note 1: Frame size FR4 will be operational in uGrid and Island mode without a license key but this frame size is only for testing and demonstration purposes, not for real production.

Note 2: Grid Code functionality requires license regardless of the unit size.

Note 3: Grid Code functionality requires that OPT-D7 option board is used.

Update Note 1: When updating application, it's not recommended to use NCDrive parameter download function. Instead upload parameters from the unit and make compare to old parameter file. Application is constantly developed; this includes changing parameter default values, and if parameters are directly downloaded to drive improved default values will be lost.

ARFIF106V103

Replaced Application: ARFIF106V101

Used Firmware version: NXP4.94

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Factory Default was missing some parameters, added.
- Several System Load reductions changes.
- Own delay parameter for Reconnection RAMP release.
- Added own delay parameter for PI Power controller start delay.
- Reactive current priority selection.
 - Normal
 - Active
 - Reactive
 - CosPhii Reference
 - Reactive and CosPhii Reference
- Bi-Phase status B28 was showing three phase fault also, fixed.
- Possible activate separately Bi-Phase monitoring function, was previously included in normal tripping.
- More selection for voltage monitoring types.
 - Bit selections are removed.
- Added Frequency Monitor type selection.
 - Back word compatibility for CERE tests.
- Normal power ramp-up rate when using fast is also now including slow Iq current.
- Added delay to High Voltage power limit release.
- Added ramp rate for High voltage power limit release.
- Line Frequency Change rate executed every 10 ms.
- Datalogger VoltageAct_dc -> DCVoltageUnFilteredW
- MCB Feedback as default A.4
- Added MCB Close Mode 3.

ARFIF106V101

Replaced Application:	ARFIF106V097
Used Firmware version:	NXP4.94
System Software requirement:	NXPV197
Released to field:	22.3.2019
Used in production:	-
Changes in new application:	

- Factory Default was missing some parameters, added.
- PI Power Ti default changed to 500 ms from 200 ms
- New calculation for phase rms voltages.
 - Old mode can be activated with Grid Code options B1.
- Several System Load reductions changes.
- Bi-Phase voltage requires that also Negative Sequence Voltage has 7,5 Vac difference.
 - Sometimes tri-phase fault was identified as bi-phase fault.
- Increased frequency tripping limits to 1200 s

ARFIF106V097

Replaced Application: ARFIF106V095

Used Firmware version: NXP4.94

System Software requirement: NXPV197

Released to field: 13.3.2019

Used in production: -

Changes in new application:

- Added power limits for every voltage limit.
- Added Low Voltage level 4 tipping function.
- MCB Opening delay reduced by 50 ms.
- Voltage levels power limit has now option to set power limit ramp down rate.

ARFIF106V095

Replaced Application: ARFIF106V089

Used Firmware version: NXP4.94

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Using Isochronous for Grid Converter was affecting Anti-Islanding function, fixed.
- Several system load reduction code changes.
- Added off delay for fast frequency monitoring.
 - Fast is activated automatically when delay time is below 500 ms.
- Added Reaction time parameter for Voltage and frequency monitoring.
- Minimum tripping times limited internally that there will be no conflict with Off delays.

ARFIF106V089

Replaced Application: ARFIF106V088

Used Firmware version: NXP4.94

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Own tripping limits for Anti-Islanding.
- F96 THD is not active by default.
- Added MotPot Hz/Power reset modes AFE Mode, AFE or Stop.
- Added FB Analogue Output, was missing as monitoring variable, was in AO functions.
- Added External trip Grid Code Normally Closed DI
- Power limiting goes to Power PI controller directly if active, Limits to firmware goes with higher hysteresis.
- New logic for By-Phase fault detection
 - 100 ms faster than previous method.

ARFIF106V088

Replaced Application: ARFIF106V087

Used Firmware version: NXP4.94

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Added function to reset Power MotPot when drive is in stop state.
- Added digital input to reset Power MotPot function
- Added OPT-BH support.
- Added Brake Chopper Support.

ARFIF106V087

Replaced Application: ARFIF106V079
Used Firmware version: NXP4.94
System Software requirement: NXPV197
Released to field: -
Used in production: -
Changes in new application:

- Power PI Controller Reference max ramp rate to 320 %/s
 - Setting negative will bypass the ramp.
- GC; Power Ramp rate moved to G2.17.12
- Added P2.17.2 Set Grid Code to factory defaults.
- Added P2.17.8.14 FreqFiltering, possible to select low filtered frequency signal.
- Added P2.17.15.9 LineFreqLow TC.
- Line Frequency tripping limit max time increased from 120 s to 330 s.
- Power Ramp rate will use low filtered signal when ramp rate is faster than 50 %/s.
- Added delay parameter for High Frequency Power Limit P2.17.12.2.10
- Added delay parameter for Low Frequency Charge Power limit P2.17.12.5.7.
- Power PI controller reference limiter is moved after the reference ramp function.
- Q U Power uses High filtered line voltage.
- Added XY plot for reactive reference based on voltage.
 - Free programmability.
- When frequency was high Power ramp rate was not set parameter, fixed.
- Power PI controller limit hysteresis increased from 0,3 % to 1,0 % to avoid over shoots when any power limit function is active from Grid Code.
 - Added as parameter.
- Power PI Controller stops controlling when error is less than 1,5 %, delay to stop is 5 times the set integration time.
 - Added as parameter.
- Simultaneous Quick Stop command and MCB Breaker feedback loss were causing F64 unnecessarily, fixed.

- Execution order changed.
- Status Word B9 was not working when MCB pulse control was used, fixed.
- Only first start synchronization to grid is made with soft synch, if activated.
- AFE Options by default 544, Soft Synch.
- MCB Open command given always when there is F64 MCB State Fault.
- MCB 2 Control, Charging was started regardless of feedback, fixed.
- Pressing stop button 3 second when in keypad control, will open the MCB.
- In PC Control Coasting stop will open the MCB, and if Reverse command in on Coasting will open MCB regardless of control place.
- Normal Power ramp up was limiting power on low frequency when ramp rate > 50 %/s
 - Ramp function changed to use filtered signal in case of low frequency power increase active.
- Added maximum power limit in Grid Code mode.
- High Voltage power limit will use high filtered voltage when slope is more than 50 %/%
- High voltage power limit did not have Power Follower hysteresis included in functionality, fixed.
- When voltage compensation was used for Power PI function High Voltage Power limit was calculating too low power limit when exceeding voltage limit.
 - High Voltage power limit is reverse compensated if Power PI function with voltage compensation is used at the same time.
- Power PI voltage compensation is moved after the reference ramp function.
- If separate OK limits were higher than tripping limit Grid Code did not receive reset, fixed.
- If separate OK limits are used also tripping limit are monitored for Grid Code Reset.
- When voltage was above OK limit but below tripping limit, drive was able to start, fixed.
- Added software over current trip limit (F1 S4) P2.6.1.8 OverCurrTripLim.
- Island mode voltage controller uses #,# accurate voltage controller.
 - Voltage controller changed to 32-bit version.

- Added tripping function for high THD
- Active power drooping is possible to set negative.
- Added 4 mA fault functions.

ARFIF106V079

Replaced Application:	ARFIF106V078
Used Firmware version:	NXP4.90
System Software requirement:	NXPV197
Released to field:	-
Used in production:	-
Changes in new application:	

- **Minor Combability issue**
 - Phase Voltages ID number changed
 - Line L1-L2 2203 -> 3203
 - Line L2-L3 2204 -> 3204
 - Line L3-L1 2205 -> 3205

ARFIF106V078

Replaced Application: ARFIF106V076

Used Firmware version: NXP4.90

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Over voltage and under voltage reactive references are separated from common parameters.
- Line Voltage default tripping delay changed to 50 ms.
- Line Frequency default tripping delay changed to 50 ms.

ARFIF106V077

Replaced Application: ARFIF106V076

Used Firmware version: NXP4.90

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Added Line Voltage low 3, with a power limit when over voltage.
- Line Voltage monitoring mode made selectable
 - Individual phase monitoring
 - Average Voltage monitoring.
- Added Line Frequency High 3 monitoring.
- Added Line Frequency Low 3 monitoring.
- If Lock Out Values are not given, internally used 1 % lower or higher value for locking out from function starting point.
- Base Current Reference can be selected to be voltage compensated.
- Added linear voltage mode for Power Lock In Lock Out reactive injection.
- Added High filtered voltage for Power Lock In Lock Out linear reactive current reference.
- Added Lock Out function to 10 min average voltage monitoring.
- High Frequency Power limit has now second delay that can be used to limit power increase higher than original power was when frequency limit was exceeded.
- 10 min average trip logic moved to 5 ms time level.
- Added delay parameter for 10 min average voltage monitoring for tripping.
- Added B14 to Line State, indicating when 10 min average value is above set limit.

ARFIF106V076

Replaced Application: ARFIF106V075

Used Firmware version: NXP4.90

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Line Voltage High 3, with a power limit when over voltage.
- Added residual voltage monitoring for F91 Three phase fault.
- Added IU rms ID39, IV rms ID40 and IW rms ID41 monitoring signals. 1 second linear filtering to System Rated Current.

ARFIF106V075

Replaced Application: ARFIF106V074

Used Firmware version: NXP4.90

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Reactive reference with power lock without giving correct Lock Out Voltage was resulting in abnormal behavior, fixed.
- Voltage compensation added to all Grid Code reactive reference that are not used in zero voltage dips.
- Minimum voltage compensation limited to 50 % voltage.
- When grid codes were activated but drive was in Island or uGrid mode with Grid Code tripping active, starting to Island or uGrid mode was not possible, fixed.
 - Same situation when OPT-D7 installed but not wired.
- If Grid Code is activated and OPT-D7 is not installed drive will trip to Grid Code fault A15.
- Power limits from Grid Code disabled if Grid Code not running

ARFIF106V074

Replaced Application: ARFIF106V069

Used Firmware version: NXP4.90

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Added Stop Power ramp also for input power limit.
- Added Minimum selector for Low Frequency Charging power limit.
- Added voltage compensation for low and high voltage power limits.
- Low frequency power limit improvements.
- ID numbers updated to different area for NCDrive.
- Added more reference point for Cos Phii control.
- Delayed DO ID.Bit Control maximum to 4000,15

ARFIF106V069

Replaced Application:	ARFIF106V066
Used Firmware version:	NXP4.90
System Software requirement:	NXPV197
Released to field:	-
Used in production:	-
Changes in new application:	

- **Minor Combability issue**
 - CosPhii mode parameter added.
- Added Max Cos Phii Ref based on active current.
- Low voltage charging power limit
- Low frequency charging power limit function
- Added 10-minute average high voltage trip function.
- Added FRT Enable where both limits can be active at the same time.

ARFIF106V066

Replaced Application:	ARFIF106V065
Used Firmware version:	NXP4.90
System Software requirement:	NXPV197
Released to field:	-
Used in production:	-
Changes in new application:	

- Grid Code; Added Q(U) Reactive Power control.
- Phase 3 Air Cooled testing completed.

ARFIF106V065

Replaced Application: ARFIF106V064

Used Firmware version: NXP4.90

System Software requirement: NXPV197

Released to field: -

Used in production: -

Changes in new application:

- Grid Code; Restarting was not working when setting voltage limits were set to zero (disabled), fixed.

ARFIF106V064

Replaced Application: ARFIF106V063
Used Firmware version: NXP4.90
System Software requirement: NXPV197
Released to field: -
Used in production: -
Changes in new application:

- Grid Code; Reconnection power ramp up rate default to 20 %/s
- Grid Code; Normal operation power ramp up rate 50 %/s
- W91 disabled also if F91 is disabled.
- High Frequency Power Limit dead time removed.
- High Frequency power limit defined by Slope %/Hz

ARFIF106V063

Replaced Application:	ARFIF106V062
Used Firmware version:	NXP4.90
System Software requirement:	NXPV195
Released to field:	-
Used in production:	-
Changes in new application:	

- Some Grid Code functionalities are automatically disabled when drive is not in AFE mode.

ARFIF106V062

Replaced Application: ARFIF106V059

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field: -

Used in production: -

Changes in new application:

- Tripping to individual phase voltages is moved being Grid Code Options B1
- Few default values changed for Grid Code to allow easier commissioning.

ARFIF106V059

Replaced Application: ARFIF106V056

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field: 6.8.2018

Used in production:

Changes in new application:

- Added offset parameters for Grid Code monitored voltage.
 - Offset for Stop state
 - Offset for Run state
- High Frequency Power limit is not limited by given corner values.
 - Power limited linearly when frequency increases more than set value.

ARFIF106V056

Replaced Application: ARFIF106V055

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- Anti-Islanding delayed 500 ms when started.

ARFIF106V055

Replaced Application: ARFIF106V048

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- Minimum and maximum of individual main voltages are also monitored for Grid Code trip.
- F10 Line Synch fault disables when Grid Code functions are active.
- FRT active status to Line State B13
- Added 35 ms filtering to monitored frequency for Grid Code functionality.
- Power Follower hysteresis decreased to 3 %.
- Double Sampling active by default, disable CO2.B6.
- RegenCapSize compensation increase when negative power and negative CosPhi.
- F2 Over Voltage will open MCB immediately.
- Minimum reconnection time set to 1100 ms.
- Added Ramp function for power reference function.
- Ramp Down function for power when stop command is given.
- Power increase function added for low frequency.

ARFIF106V048

Replaced Application: ARFIF106V046

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- Process Data handling moved to 10 ms time level from 20 ms time level.
- Grid Code stop request will open MCB
- Added 50 ms delay to MCB Open state when no feedback from MCB.
 - MCB opening was happening faster than stop command, resulted in F64 A4 fault.
- Added Active Start Command status to Status Word B11, B12 goes down if Grid Code functions request a stop.

ARFIF106V046

Replaced Application: ARFIF106V045

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- The application now supports 16 fieldbus process data variables.
 - Settings for PD 9-16 are visible if a fieldbus board with support for 16 PD is inserted in option board slot D or E.
 - PD variables 9-16 can be enabled by setting an appropriate value for parameter P2.10.38 'Control Slot Selector'.

ARFIF106V045

Replaced Application: ARFIF106V043

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- Voltage Low Limit Warning limit for stopping the drive is only possible in AFE mode. See Control Options 1 B11.

ARFIF106V043

Replaced Application: ARFIF106V039

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- Power Ramp Rate is freezer during LVRT.
- Power Lock Low Voltage Reactive injection was stopping injection before reaching Lock Out Voltage Level, fixed.
- Power Lock High Voltage Reactive injection was stopping before reaching Lock Out Voltage Level, Fixed.
- Power reference will be 3 % smaller than a limit in case limiting, but not less than a zero.
- Added Lock Out Power parameter for High Voltage reactive injection for linear injection.
- FRT Enable has now selection
 - Disabled; Both curve and level will trip
 - Enabled; Voltage level will trip
 - Enabled; Curve will trip
 - Enabled; Neither will trip
- Added Control Options 2 B6; Double sampling
 - Reduces current measurement aliasing, needed e.g. in battery system when zero current reference needs to be accurate.
- Added Current Measurement offset identification.
- Possible to scale Capacitor Size based on Line Voltage.
- Power Follower hysteresis is also included in High Frequency Power limit trigger.
- Power limit that is given by Grid Code function block is no longer voltage compensated.

ARFIF106V039

Replaced Application: ARFIF106V030

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- Grid Converter grid protections were active while Grid Code functions were used.
 - F70 Supply Voltage
 - F92 D7 Voltage
 - F91 Short Circuit
- If FRT function is used drive will use G2.17.9 Volt. Dip Time for stopping the modulation.
- Two Phase trip time was using three phase voltages for trip time calculation, fixed.
- Functions monitoring active current will see motoring active current as zero.
- Over Voltage reactive slope format was wrong, fixed #,# -> #,##
- Active Current Reference is limited by Active Current Limits to reduce over shoot in PI controller.
- Power Follower hysteresis increased from 2 % to 5 %.
- On reconnection Grid Converter limits has priority for 400 ms, fixed to follow Grid Code limit when Grid Code functionality is active.
- Certain specific setting was giving reactive current while Reactive Current Injection was not active, fixed.
- Added AFE Options 3 parameter
- Tripping to Frequency Change Rate was not making reconnection, fixed.
- Power PI Controller freeze during LVRT.

ARFIF106V030

Replaced Application: ARFIF106V029

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- PI-Controller added for uGrid mode reactive reference.
 - Disabled when voltage controller or island mode is active.
 - User needs to disable reactive controller if true island but drive operating in uGrid mode.
- Added Output Power Limit as a monitoring value.

ARFIF106V029

Replaced Application: ARFIF106V028

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- Symmetrical reactive injection parameter did not work, fixed.
- Added Grid Code Options parameter.
 - B01: Faster reactive injection, needed only to certain grid code standards.

ARFIF106V028

Replaced Application: ARFIF106V025

Used Firmware version: NXP4.90

System Software requirement: NXPV195

Released to field:

Used in production:

Changes in new application:

- Changes in DataLogger default signals.
- Added parameter to enable symmetrical current injection.
- Added power increase rate limiter function.
- Added High Voltage Power limit functions.

ARFIF106V025

Replaced Application: ARFIF106V021

Used Firmware version: NXP4.83

System Software requirement: NXPV194

Released to field:

Used in production:

Changes in new application:

- Connection to power unit is confirmed before checking license.
- Pulse MCB control was giving in power up opening command, fixed.
- Added function to start with Grid Voltage -> Zero Q start.
- Added function to keep zero reactive power -> Keep Zero Q

ARFIF106V021

Replaced Application: ARFIF106V019

Used Firmware version: NXP4.83

System Software requirement: NXPV194

Released to field:

Used in production:

Changes in new application:

- MCB close command was given before correct closing level was updated. Added function to verify that close level is correct.
- MotPot function for reactive current reference was running even if maximum limit was reached if DIN was active, fixed.
- Added parameter to limit Reactive Current reference given by MotPot function.
- MotPot function for Voltage reference was running even if maximum limit was reached if DIN was active, fixed.
- Possibility to bypass normal maximum DC-Link voltage reference level with Control Option B10.
 - This is only for momentary use, not to be used for continues reference.

ARFIF106V020

Replaced Application: ARFIF106V019

Used Firmware version: NXP4.83

System Software requirement: NXPV192

Released to field:

Used in production:

Changes in new application:

- Added Dynamic Support Kp parameter.
- Added Synch Kp parameter.
- Added Synch Ti parameter.
- Moved Active Current Kp and Ti parameters to different group
- Moved Synch Kp Start to different group
- Added DC Voltage Kp and Ti parameters.

ARFIF106V019

Replaced Application: ARFIF106V016

Used Firmware version: NXP4.83

System Software requirement: NXPV192

Released to field:

Used in production:

Changes in new application:

- Added inversion parameter for PI Power controller for AFE mode.
- Removed unsupported Master-Follower modes.

ARFIF106V016

Replaced Application: ARFIF106V015

Used Firmware version: NXP4.83

System Software requirement: NXPV192

Released to field: 14.2.2017

Used in production:

Changes in new application:

- Active current limit change to Power limit and function so that voltage changes are compensated
- Reset datalogger parameter was shown wrong in the monitor
- Added PI controller for power in AFE mode.

ARFIF106V015

Replaced Application: ARFIF106V

Used Firmware version: NXP4.83

System Software requirement: NXPV192

Released to field:

Used in production:

Changes in new application:

- Grid Code Fault Sub codes had offset, fixed.
 - A1 is Grid Code license fault sub code.

ARFIF106V006

Replaced Application: First Test Release

Used Firmware version: NXP4.83

System Software requirement: NXPV192

Released to field: 13.4.2016

Used in production:

Changes in new application:

- Only for testing purposes.
 - No manual, only parameter list.
 - Only for functionality comments purposes.