SHIFTING THE LIMITS

QUICK GUIDE – REACTIVE POWER SETTINGS IN DEPENDENCE OF THE GRID VOLTAGE

Quick Guide

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1. GENERAL

Solar PV systems may only feed energy into the grid if the grid voltage is within specified limits. With the ever increasing level of solar penetration on network, the LV grid voltage has become more difficult to control. In order to help control the gird voltage several power quality response modes were introduced to solar PV grid inverters via the AS/NZS4777.2:2015 Standard. These include:

- Volt response modes
- Fixed power factor or reactive power modes
- Power response mode
- Power rate limit

This document provides specific information on how to set up and activate the *Fixed Power factor mode* & *Volt-Var mode* on the Fronius SnapINverter range according to the **Energex & Ergon Connection Standard for Micro Embedded Generating Units (0 - ≤30 kVA) Version 4.** Other DNSP's may have different set point or requirements and therefore can be found in a separate document.

These functions are activated / adjusted in the hidden Service Menus on the Fronius SnapINverters (Galvo, Primo, Symo, ECO) are accessed via the inverter's display with use of a password. The Reactive Power Mode settings are a part of the 'PROFI' service menu and require the use of a password that is issued by Fronius Technical Support upon the completion of the "*Request_for_Access_code_Grid_parameters_Fronius_Inverters*" form.
Once this form has been completed and logged, Fronius Technical Support will provide the PROFI MENU access code.

For more detailed information regarding the Service Menu settings, please request the Service Menu Manual from Fronius Australia Technical Support. Contact details are at the end of this document

2. REQUIREMENTS

2.1 Software update on the Fronius inverters

Before programing the following settings the inverter must have the latest software version installed. The latest USB version for the SnapINverter range can be downloaded from the Fronius website via
https://www.fronius.com/en-au/australia/photovoltaics/infocentre/tech-support/software-updates-and-drivers

***In some cases the Country Setup will need to be re-loaded after the software update is completed.

2.2 Enter the hidden 'PROFI' service menu

Press the 3rd button 5 times

Type in the access code for the hidden *PROFI* menu*

*Available only upon request from Fronius Technical Support.

3. SETTINGS

3.1 DNSP Protection settings calculator:

We have developed an excel sheet – DNSP Protection settings, where you can enter the voltage and the power factor values by provided by your corresponding DNSP's, and obtain the Q setting range % for different Q (U) set points on Fronius inverters.

The excel sheet also has the information on Passive Anti-islanding set points values as per AS4777.2:2015 and how those values are interpreted in Fronius inverters, and as well as to calculate Volt-Watt settings.

Please click on this link to access the DNSP Protection settings tool.

3.2 Example: Volt – Var settings for Energex and Ergon (QLD)

Energy Queensland specify the voltage and reactive power settings in table 2 on page 11 in their Connection standards:

Standard for Micro Embedded Generating Units (0 - ≤30 kVA)

Table 2 – Prescribed Inverter Settings

Parameter	Setting (See Notes 1, 2 & 3)
Vnom-max	Energex - 257V Ergon Energy – 255V
Overvoltage 1 (V>)	260V
Overvoltage 2 (V>>)	265V
Undervoltage (V<)	180V
Overfrequency (F>)	52Hz
Underfrequency (F<)	47Hz
Disconnect time	As per AS4777.2
Reconnect time	60 – 90 seconds
Reactive Power Control	Fixed Power Factor of 0.9 lagging (inductive) OR Q(V) - As per Figure 1 V_1 = 207V; PF_1 = 0.95 leading V_2 = 220V; PF_2 = 1 V_3 = 248V; PF_3 = 1 V_4 = 253V; PF_4 = 0.9 lagging

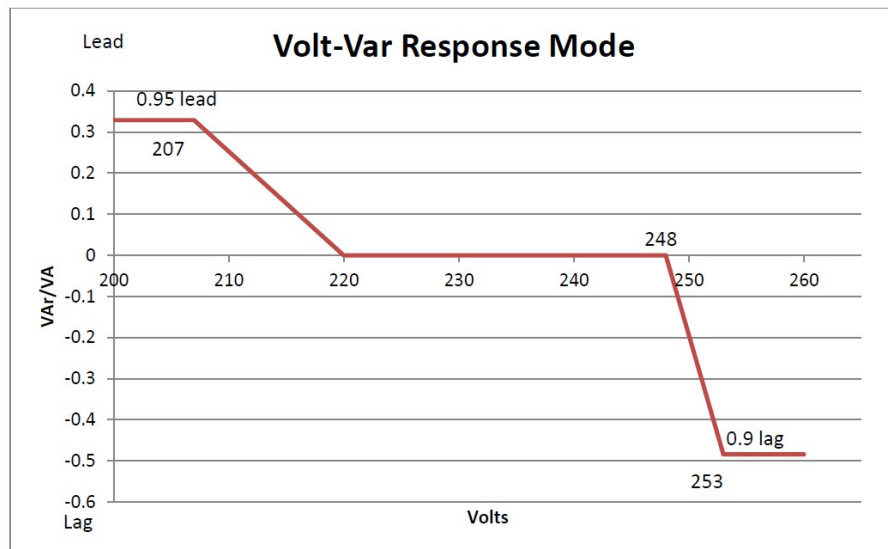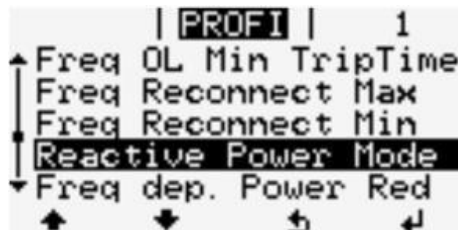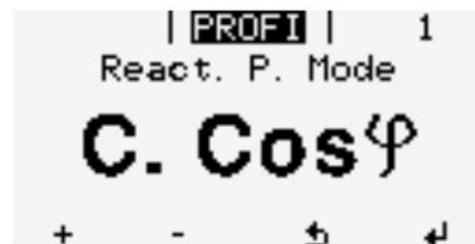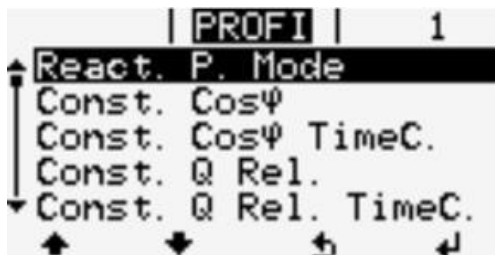## Standard for Micro Embedded Generating Units (0 - ≤30 kVA)

Figure 1 – Alternate Q-V Mode Settings
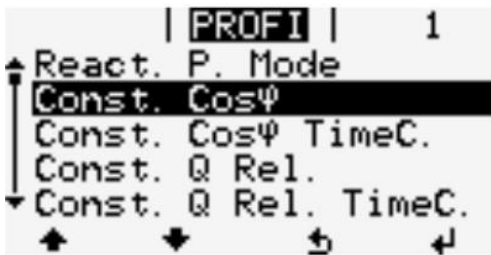
3.3 Setup and activation – Fixed Power Factor mode

Go to "*Reactive Power Mode*" and press Enter

Select "*React. P. Mode*" and then select "*C. Cos φ*" and press Enter (= Constant Cos Phi)

Scroll to "*Const. Cosφ*" press Enter, then toggle the + or - keys enter "*-0,900"*

Press Enter until you return to the previous Menu

The Fixed Power factor setup is now complete

## 3.4 Setup and activation - Volt- Var mode

In Fronius inverter it is only possible to enter the value in % Vars. Once you get the Volt- Var settings from the DNSP Protection settings calculator, please follow the steps below on how to enter those values on Fronius inverters

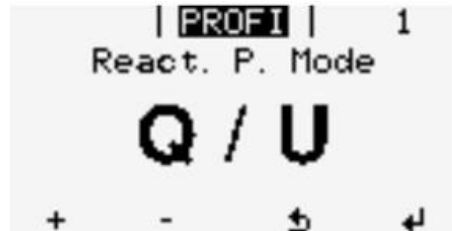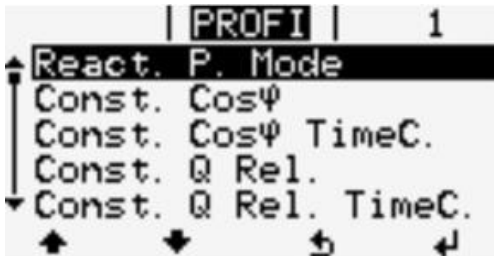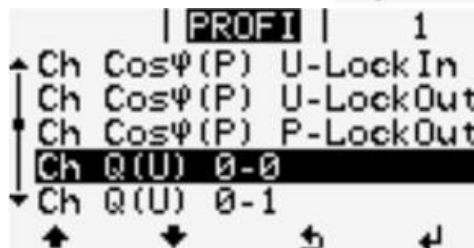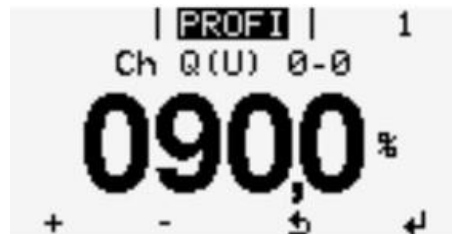| Reference point		Set Points	Setting Range
0 = V1	207V	0 - 0	90%
	PF=0.95	0 - 1	+31.22%
1 = V2	220V	1 - 0	95.6%
	PF=1	1 - 1	0%
2 = V3	248V	2 - 0	107.8%
	PF=1	2 - 1	0%
3 = V4	253V	3 - 0	110%
	PF=0.9	3 - 1	-43.58%
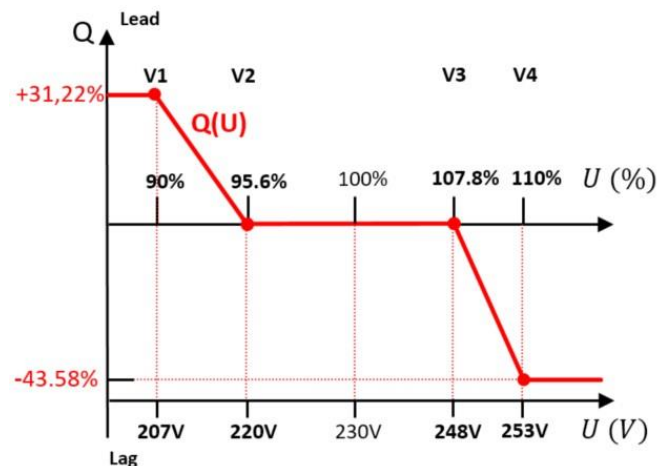
+ …. Leading value
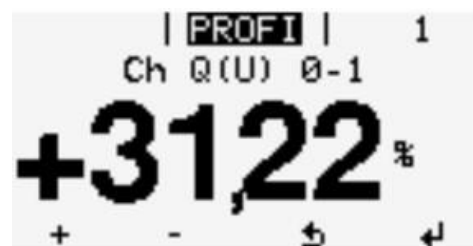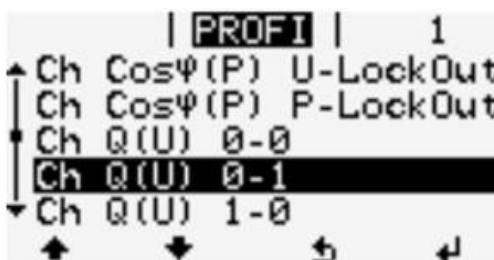- ….. Lagging value

Go to "*Reactive Power Mode*" and press enter
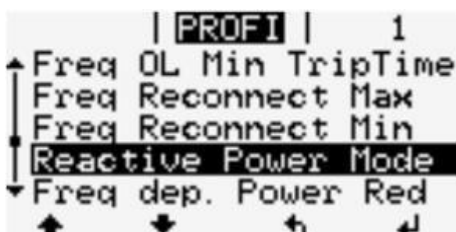
Enter "*React. P. Mode*" select "*Q / U*" and press Enter
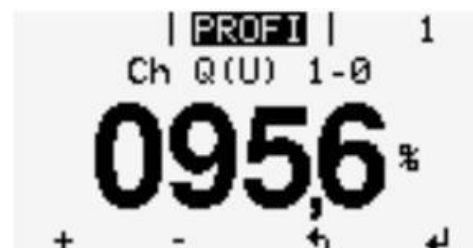(= Reactive Power (Q) dependent on Grid Voltage (U))

| PROFI | 1
React. P. Mode
Const. Cosψ
Const. Cosψ TimeC.
Const. Q Rel.
Const. Q Rel. TimeC.

| PROFI | 1
React. P. Mode
Q / U

Select tab "*CH Q (U) 0-0*" and enter *090.0 (%)*

| PROFI | 1
Ch Q(U) 0-0
0900,0 %

| PROFI | 1
Ch Cosψ(P) U-Lock In
Ch Cosψ(P) U-LockOut
Ch Cosψ(P) P-LockOut
Ch Q(U) 0-0
Ch Q(U) 0-1

Go down to tab "*CH Q (U) 0-1*" and enter +*31.22 (%)*

| PROFI | 1
Ch Cosψ(P) U-LockOut
Ch Cosψ(P) P-LockOut
Ch Q(U) 0-0
Ch Q(U) 0-1
Ch Q(U) 1-0

| PROFI | 1
Ch Q(U) 0-1
+31,22 %

Go down to tab "*CH Q (U) 1-0*" and enter *095.6 (%)*

| PROFI | 1
Ch Cosψ(P) P-LockOut
Ch Q(U) 0-0
Ch Q(U) 0-1
Ch Q(U) 1-0
Ch Q(U) 1-1

| PROFI | 1
Ch Q(U) 1-0
0956,0 %

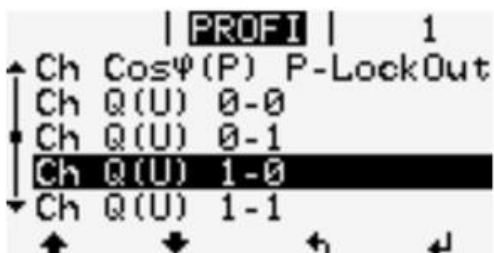Go down to tab "*CH Q (U) 1-1*" and enter +**00.*00 (%)***

Go down to tab "*CH Q (U) 2-0*" and enter **107.8 *(%)***
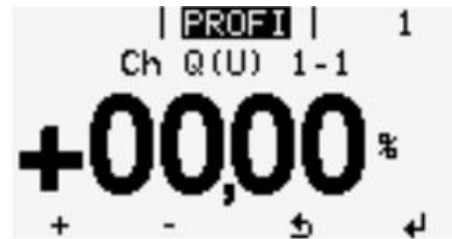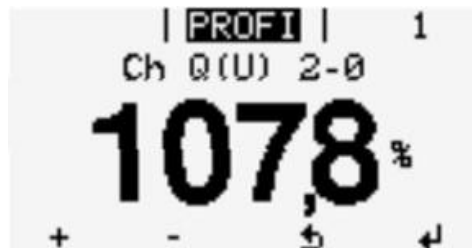

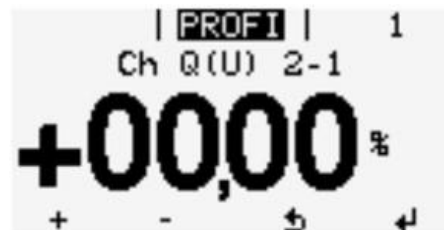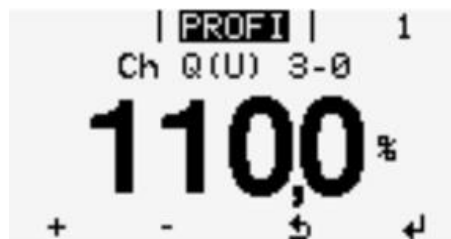Go down to tab "*CH Q (U) 2-1*" and enter **00.*00 (%)***

Go down to tab "*CH Q (U) 3-0*" and enter **110.0 *(%)***
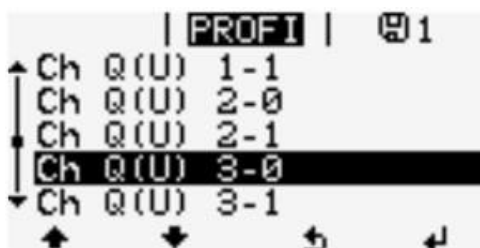
Go down to tab "*CH Q (U) 3-1*" and enter **-43.58 *(%)***

We also set a time constant in which the inverter will steadily adjust the power to the specific voltage level. This neither required by AS4777.2:2015 nor by the Energy Queensland connection standard, but it prevents the inverter from adjusting the reactive power abruptly.

Go to tab "*Ch Q (U) P - TimeC*" and enter *05.000 (sec)*
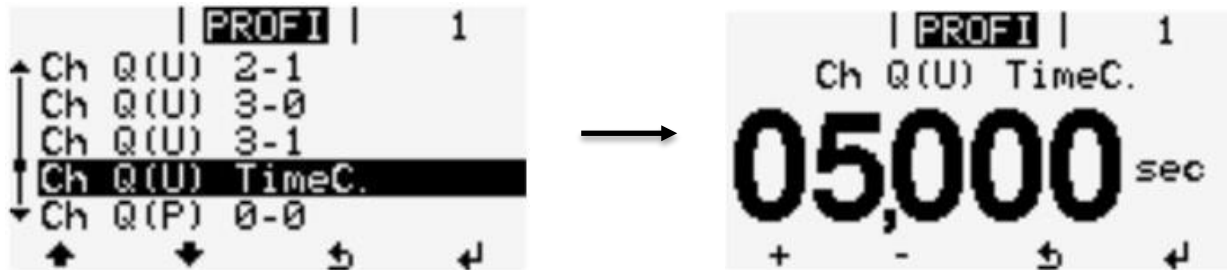
END OF DOCUMENT

Fronius Australia Technical Support
Email: PV-Support-Australia@fronius.com
Phone: 03 8340 2910

For more detailed information see the operation manual available on the product specific page on
http://www.fronius.com/en-au/australia