Technical Information

SMA GRID GUARD 10.0

Grid Management Services through SMA Inverters

ENGLISH

NSM-GG10-TI-en-11 | Version 1.1

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1 Information on this Document

1.1 Validity

This document is valid for:

- SMA inverters that comply with European Grid Connection Regulations through SMA Grid Guard 10.0 according to Regulation (EU) 2016/631 for Establishing a Network Code on Requirements for Connection of Generators (also known as Requirements for Generators (RfG))

1.2 Target Group

The functions described in this document are to be configured by qualified persons only. Qualified persons must have the following skills:

- Detailed knowledge of the grid management services
- Knowledge of how an inverter works and is operated
- Knowledge of how the product works and is operated
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, standards and directives

1.3 Content and Structure of this Document

In this document the grid management service functions of the inverters are described and the object names of the parameters are stated that can be used to set the functions.

Abbreviations used

Frequently used abbreviations are listed and described in the following:

Designation in the document	Complete designation	Explanation
W	Watt	Contained in object names of active power parameters
VAr	Volt-ampere reactive	Contained in object names of reactive power parameters
Pu	Per unit	Contained in object names of parameters that refer to another size (e.g. to the grid nominal voltage).
Ena	Enable	Contained in object names of activation/deactivation parameters
Mod	Mode	Contained in object names for which a setting can be selected from a list.
Q1	Quadrant 1	1st quadrant of the P/Q diagram
Q2	Quadrant 2	2nd quadrant of the P/Q diagram
Q3	Quadrant 3	3rd quadrant of the P/Q diagram
Q4	Quadrant 4	4th quadrant of the P/Q diagram
Rtg	Rating	Contained in object names of rating parameters
Stt	State	Contained in object names of state parameters
PF	Power factor	Contained in object names of cos phi parameters

1.4 Additional Information

For more information, please go to www.SMA-Solar.com.

Title and information content	Type of information
"Application for SMA Grid Guard Code"	Form
"PUBLIC CYBER SECURITY - Guidelines for a Secure PV System Communication"	Technical information
"Parameters and Measured Values" Overview of all inverter operating parameters and their configuration options	Technical Information
"SMA and SunSpec Modbus® Interface" Information on the Modbus interface	Technical Information
"Modbus® parameters and measured values" Device-specific register HTML file	Technical Information

2 General Information

Country data sets and parameter settings

The inverters are equipped with various country data sets that contain useful settings for the functions described in this document in order to comply with local standards and directives. These country data sets can be identified by the year ≥ 2018. After commissioning, the country data set must be set either on the user interface of the inverter via the installation assistant or via the higher-level control unit (e.g. SMA Data Manager or Modbus control).

The parameters for setting the functions described in this document can either be set via the user interface of the inverter or via a higher-level control unit. An overview of all parameter settings of the inverter can be exported via the user interface of the inverter or, in the case of systems with SMA Data Manager, via the user interface of the SMA Data Manager. If a Sunny Portal system is present, the parameter settings can also be exported via the Sunny Portal

Communication protocols

SMA Data

All parameters of the inverter are listed in the product-specific parameter list. The object name can be used to determine the parameter name for SMA Data as well as the path via which the parameter can be reached. You can also find additional information in the list (e.g. setting range, setting values, default value). The product-specific parameter list can be found in the download area at www.SMA-Solar.com. The list is assigned to the document type "Technical Information".

SMA Modbus

The product-specific Modbus list contains all parameters of the inverter with associated SMA Modbus register address. The object name can be used to determine the register address for SMA Modbus. You can also find additional information in the list (e.g. format, type, access). The product-specific Modbus list can be found in the download area at www.SMA-Solar.com. The list is assigned to the document type "Technical Information".

SunSpec Modbus

The product-specific Modbus list contains all parameters of the inverter with associated SunSpec Modbus register address. The object name can be used to determine the register address for SunSpec Modbus. You can also find additional information in the list (e.g. information model, access, scaling factor). The product-specific Modbus list can be found in the download area at www.SMA-Solar.com. The list is assigned to the document type "Technical Information".

SMA Grid Guard protection

All grid-relevant parameters for PV inverters are provided with SMA Grid Guard protection after the first ten feed-in hours have elapsed, and for battery inverters after the first ten operating hours have elapsed. When SMA Grid Guard protection is active, it is necessary to enter the SMA Grid Guard code in order to change grid-relevant parameters. The order form for the SMA Grid Guard code is available in the download area at www.SMA-Solar.com.

In the "Grid Guard" column of the product-specific parameter and Modbus list you can see which parameters are provided with the Grid Guard protection. The product-specific parameter and Modbus list is available in the download area at www.SMA-Solar.com.

3 General Operating Behavior

3.1 Electrical Connection Point

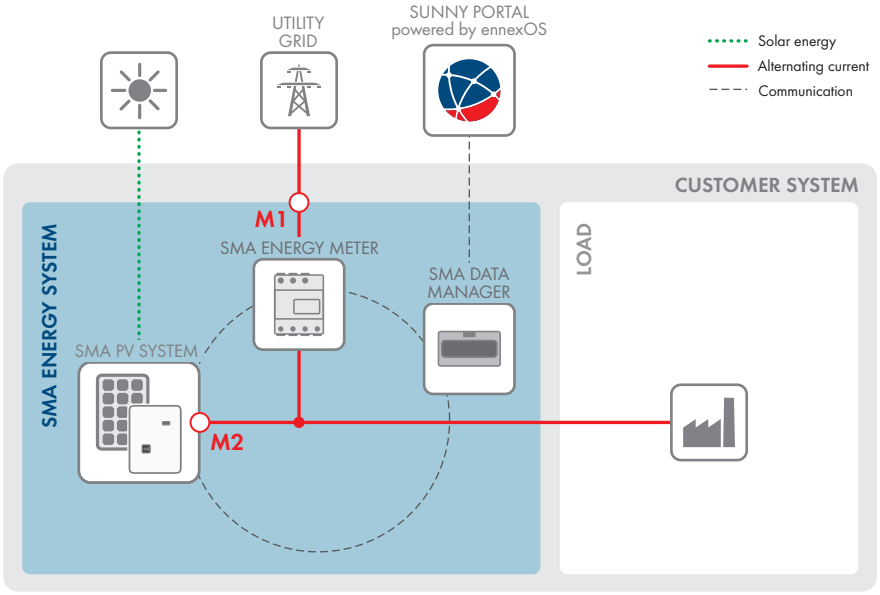


Figure 1: System overview with different electrical reference points

In the technical connection conditions, a distinction is typically made as to whether the requirements relate to the grid-connection point (M1) or to the inverter terminals (M2). The grid operator specifies the reference point for your system.

Reference point	Explanation
M1	Reference point is the grid-connection point • Grid management services are generally implemented via a higher-level control unit (e.g. SMA Data Manager). • The measuring device at the grid-connection point must be selected. • The P/Q diagram must be set separately for the system. • Setpoints to the system refer to this P/Q diagram. • Disturbances between inverter and reference point M1 are adjusted for active and reactive power.
M2	Reference point are the inverter terminals • All grid management services are implemented by the inverter and not by a higher-level control unit.

Adjustable parameters:

The grid nominal voltage for the reference point is indicated in the country data set. Normally, all voltage-related parameters (e.g. the shut-down limits of the voltage monitoring) refer to the grid nominal voltage. The inverter nominal voltage is a device-specific nominal size that must match the grid nominal voltage. Otherwise, a suitable transformer must be used and the inverter nominal voltage must be selected as reference voltage for voltage-related sizes.

Object name	Definition	Explanation
Inverter.PlntCtl.VRef	Rated grid voltage	

Object name	Definition	Explanation
Inverter.VRtg*	Inverter nominal voltage	Indicated as phase voltage for single-phase inverters, otherwise as outer conductor voltage.
Inverter.VRefIntMod*	Reference voltage selection	Specifies whether the grid nominal voltage (Inverter.PlntCtl.VRef) or the inverter nominal voltage (Inverter.VRtg) is used as reference voltage for voltage-related sizes.
Inverter.PlntCtl.AppVol*	Applicable voltages	Specifies whether the phase voltage, outer conductor voltage or both voltages are to be used for dynamic grid support and voltage monitoring.
Inverter.PlntCtl.VRefMod	Phase reference of grid nominal voltage	Outer conductor / phase voltage

* Only three-phase inverters have this parameter.

3.2 Operating Ranges in the P/Q Diagram

At SMA Solar Technology AG all information always refers to the generator reference-arrow system. The electricity and power flow from the generating plant into the utility grid always has a positive sign. The active power output is positive and the active power input is negative. Positive reactive power corresponds to an overexcited operation and increases the voltage. Negative reactive power corresponds to an underexcited operation and lowers the voltage. The generator reference-arrow system is used internationally by IEC (International Electrotechnical Commission) and IEEE (Institute of Electrical and Electronics Engineers). In contrast, the VDE application guide, for example, refers to the consumer reference-arrow system. To translate the information into the generator reference-arrow system, the signs of the active and reactive power must be inverted. In the P/Q diagram, this corresponds to a mirroring at the origin.

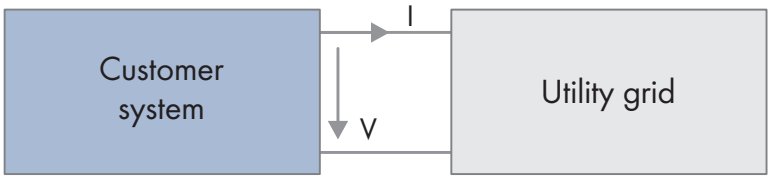


Figure 2: Generator reference-arrow system

In order to adjust the inverter or the system control to the local conditions, there are adjustable nominal sizes. The following figure provides an overview of the required nominal sizes.

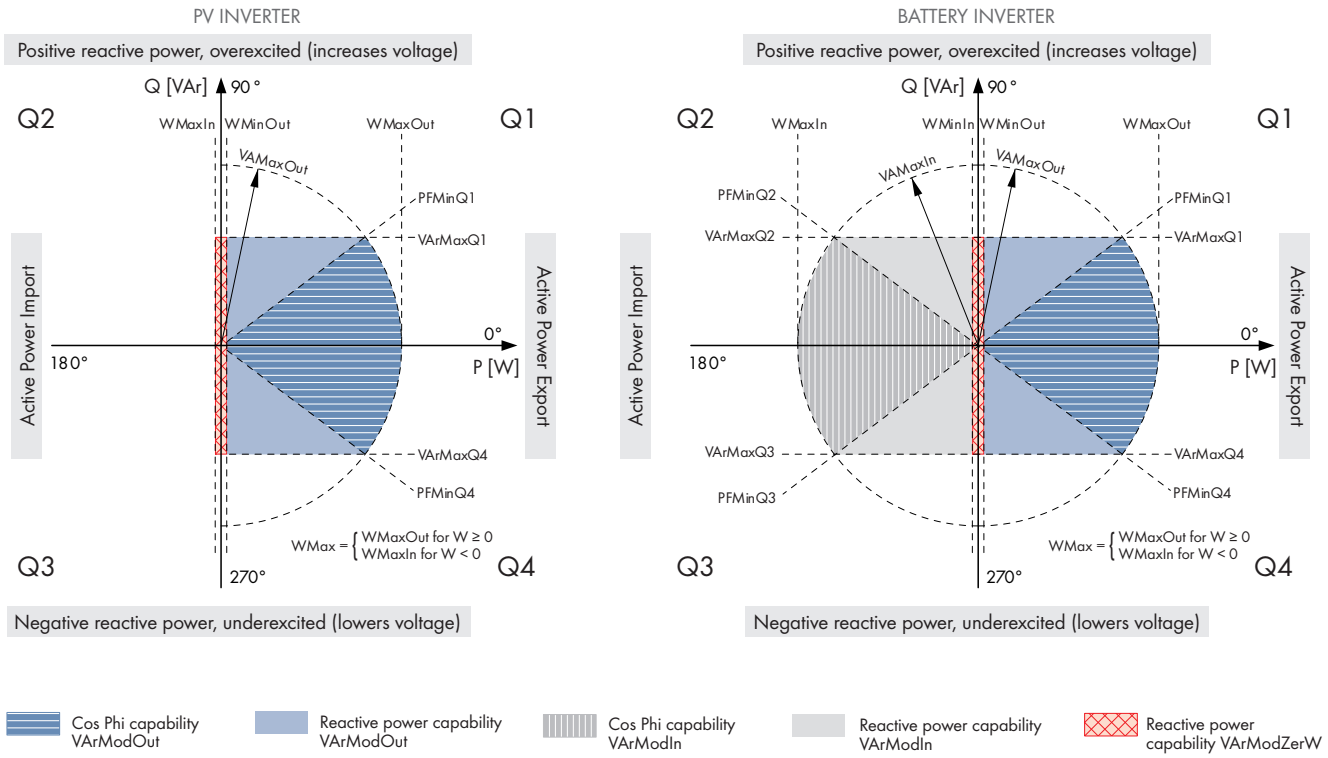


Figure 3: Nominal sizes and reactive power ranges in the P/Q diagram in the generator reference-arrow system for PV and battery inverters

Object name	Definition
Inverter.VAMaxOut	Nominal apparent power VAMaxOut
Inverter.VAMaxIn	Nominal apparent power VAMaxIn
Inverter.WMax	Nominal active power WMaxOut
Inverter.WMaxIn	Nominal active power WMaxIn
InWNomLimAct	Activation threshold of the reactive power mode in case of grid-supplied power
InWNomLimDeAct	Deactivation threshold of the reactive power mode in case of grid-supplied power
OutWNomLimAct	Activation threshold of the reactive power mode in case of grid feed-in
OutWNomLimDeAct	Deactivation threshold of the reactive power mode in case of grid feed-in
Inverter.VArMaxQ1-Q4	Nominal reactive power VArMaxQ1-Q4 (minimum power factor that limits the reactive power in each quadrant Q1-Q4)

Object name	Definition
Inverter.PFMinQ1-Q4	Nominal cos phi PFMinQ1-Q4 (limits reactive power mode with cos phi setting or cos phi characteristic curve)
Inverter.VArMaxZerWQ1-Q4	Nominal reactive power VArMaxZerWQ1-Q4 (limits reactive power mode with reactive power setpoint or reactive power characteristic curve at zero active power)

The inverter or the system control is dimensioned for a certain P/Q power range. The power range is limited by several rating parameters for apparent power, active and reactive power and cos phi. All nominal sizes have an associated rating parameter with the ending "Rtg".

3.3 Enable Behavior

The customer system connects to the utility grid when voltage and frequency are within the connection limits for a certain time. The connection time depends on whether the system connects after a grid fault, a short interruption or a normal restart. A grid fault is present when the voltage or frequency monitoring has triggered. A short interruption is present when the grid fault was shorter than the maximum duration of a short interruption.

3.3.1 Connection Times

Object name	Definition	Explanation
GridGuard.Cntry.GriStrTms	Reconnection time upon restart	
GridGuard.Cntry.GriFltMonTms	Reconnection time after grid fault	A grid fault is present when the voltage or frequency monitoring has triggered.
GridGuard.Cntry.GriFltReConTms	Reconnection time upon short interruption	A short interruption is present when the grid fault was shorter than the maximum duration of a short interruption.
GridGuard.Cntry.GriFltTms	Maximum duration of a short interruption	If the grid fault is shorter than the set duration, then the quick reconnection time is used. Otherwise, the connection time after grid fault is used.

3.3.2 Connection Limits

Object name	Definition	Explanation
GridGuard.Cntry.VolCtl.ReconMaxPu	Maximum connection voltage	
GridGuard.Cntry.VolCtl.ReconMinPu	Minimum connection voltage	
GridGuard.Cntry.FrqCtl.ReconMax	Maximum connection frequency	
GridGuard.Cntry.FrqCtl.ReconMin	Minimum connection frequency	

3.4 Operating Status Control

Object name	Definition	Explanation
Operation.OpMod	General operating mode	Adjustable: Stop/Stop Str / Start
Operation.CtrlType	DC voltage control type	Adjustable: Mpp / MPP VoDcConst / constant voltage
Inverter.FstStop	Fast shut-down	Adjustable: Stop/Stop Str / Start
Operation.EnSavMod	Energy-saving mode	Adjustable: Off / Off On / On

3.5 Operating Status Indication

Object name	Definition	Explanation
Operation.OpStt	General operating status	Possible statuses: Off / Off Stdby / Standby Run / switched on Lok / blocked

Object name	Definition	Explanation
Operation.RstrLokStt	Block status	Substatus for the operating status Lok Possible statuses: HzFlt / frequency not permitted EvtAfci / electric arc detected FstStop / fast stop OvVol / overvoltage UnVol / undervoltage OvHz / overfrequency UnHz / underfrequency PID / passive islanding detection PLD / phase loss PLL / PLL error PLDLoVol / phase loss on low-voltage side ActIsldDet / active islanding detection ManRstrRCD / after fault current WaitStr / wait for enable operation NaNStt / information not available
Operation.StandbyStt	Standby status	Substatus for the operating status Standby Possible statuses: WaitPV / waiting for PV voltage WaitGri / waiting for valid AC grid EnSavMod / energy saving mode NaNStt / information not available
Operation.RunStt	Operating status	Substatus for the operating status "Run" Possible statuses: Mpp / MPP tracking VolDCConst / constant voltage Bck / Backup Shtdwn / shutdown Drt / derating NaNStt / information not available

4 Behavior in Case of Undisturbed Utility Grid

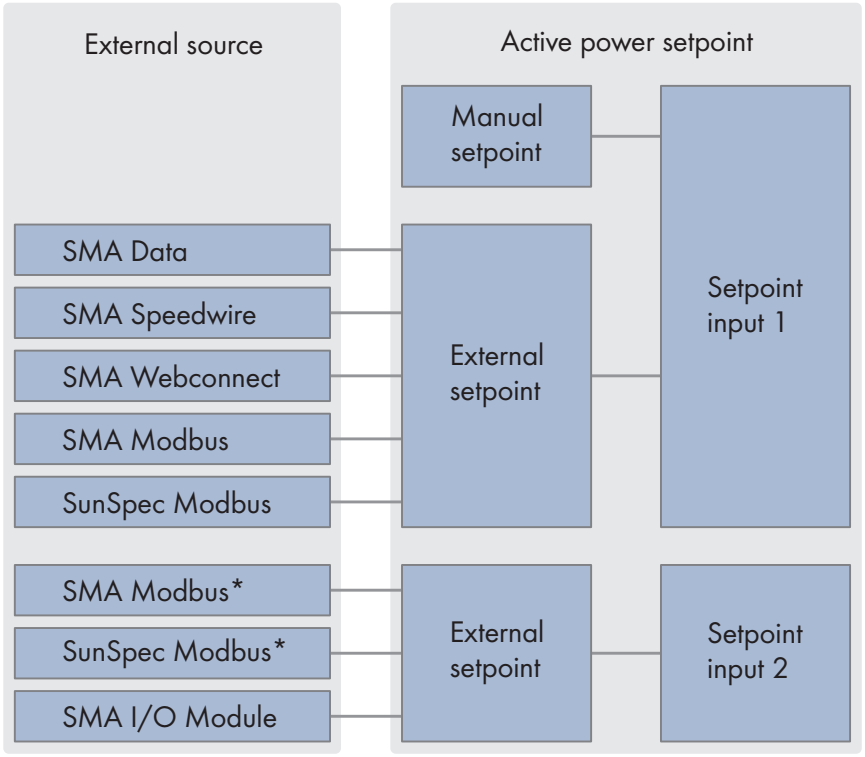
4.1 Active Power Mode

There are several active power modes that affect the active power flow of the customer system. One or two setpoint inputs (e.g. for specifications from the market and grid) and one P(U) characteristic curve are implemented for operation on the undisturbed utility grid. In case of frequency errors, the P(f) characteristic curve also applies (see Section 5.2.2, page 35). The specifications resulting from these procedures are processed and prioritized in parallel as follows:

1.	The minimum value is created from the maximum specifications
2.	The maximum value is created from minimum specifications
3.	In the case of conflicts, the specifications are taken into account in the following order: • Setpoint input 2 with high priority • Setpoint input 1 with high priority • P(V) Characteristic Curve • P(f) Characteristic Curve • Setpoint input 2 with low priority • Setpoint input 1 with low priority

4.1.1 Active Power Setpoint

To avoid grid overloading, generating plants must reduce their active power at the grid-connection point if specified by the grid operator without disconnecting themselves from the utility grid. The setpoint for the active power setpoint can be specified manually via the user interface of the inverter or externally (e.g. through telecontrol or a system controller).



*When setting external setpoints via Modbus, the input, via which the setpoint value is to be processed, can be set accordingly.

Figure 4: Schematic diagram of the active power setpoint with two setpoint inputs

Manual setpoint at setpoint input 1

In case of a manual setpoint, you must enter the setpoint specified by the grid operator as a value in watt or in percent via parameters.

External setpoint at setpoint input 1

In case of an external setpoint, the inverter receives the setpoint through a higher-level control unit. The dynamic behavior for the implementation of the setpoint and the fallback behavior for the absent active power setpoint can be adjusted via parameters. The setpoint is specified in the form of maximum and minimum value. As a result, both a one-sided limit and exact operating points can be specified.

External setpoint at setpoint input 2

Products with a second input for external setpoints can process an additional setpoint from a second external source. This lets you process, for example, specifications of the direct marketer via SMA Spot at setpoint input 1 and, at the same time, the grid operator's specifications can be processed at setpoint input 2 via the SMA I/O module. Just as with setpoint input 1, you can set the dynamic behavior for the implementation of the setpoint and the fallback behavior for absent setpoints.

Setting operating mode for active power setpoint at setpoint input 1

Object name	Definition	Explanation
Inverter.WModCfg.WMod	Operating mode active power	Adjustable: Active power setpoint deactivated Manual setting in W Manual setting in % External setting

4.1.1.1 Manual setting at setpoint input 1

Object name	Definition	Explanation
Inverter.WModCfg.WCnstCfg.W	Active power limitation P, in W	
Inverter.WModCfg.WCnstCfg.WNom	Active power limitation in %	The reference value is WMax

4.1.1.2 External Setting at Setpoint Input 1

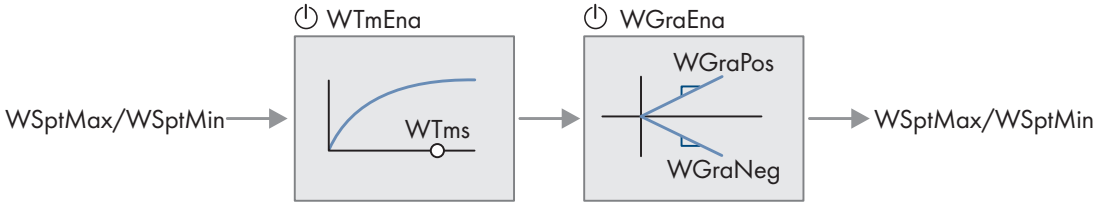
Object name	Definition	Explanation
Inverter.WModCfg.WCtlComCfg.WSptMaxNom	Maximum active power in %	The reference value is WMax
Inverter.WModCfg.WCtlComCfg.WSptMinNom	Minimum active power in %	The reference value is WMax

Setting the priority of setpoint input 1

For the first setpoint input, it can be specified for each setpoint whether it has a higher or lower priority than the P(V) characteristic curve and the P(f) characteristic curve.

Object name	Definition	Explanation
Inverter.WModCfg.WCtlComCfg.W	Low priority for maximum setpoint	Activation / deactivation
Inverter.WModCfg.WCtlCom-Cfg.WSptMinPrioCat	Low priority for minimum setpoint	Activation / deactivation

Setting the dynamic behavior for implementing the external setpoint at setpoint input 1



Object name	Definition	Explanation
Inverter.WModCfg.WCtlCom-Cfg.Dyn.WTmEna	Setpoint filter	Activation / deactivation
Inverter.WModCfg.WCtlCom-Cfg.Dyn.WTms	Setting time for nominal value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.WModCfg.WCtlCom-Cfg.Dyn.WGraEna	Limitation of change rate	Activation / deactivation
Inverter.WModCfg.WCtlCom-Cfg.Dyn.WGraPos	Increase rate	The reference value is WMax
Inverter.WModCfg.WCtlCom-Cfg.Dyn.WGraNeg	Decrease rate	The reference value is WMax

Setting the fallback behavior for absent external setpoint at setpoint input 1

Object name	Definition	Explanation
Inverter.CtlComCfg.WCtlCom.Ctl-ComMssMod	Fallback behavior	Adjustable: Values maintained (maintain the values received last) Apply fallback values
Inverter.CtlComCfg.WCtlCom.Flb-WMin	Fallback value of minimum active power	
Inverter.CtlComCfg.WCtlCom.FlbW-Max	Fallback value of maximum active power	
Inverter.CtlComCfg.WCtlCom.Tm-sOut	Timeout	Time until switching to the set fallback behavior

4.1.1.3 External Setting at Setpoint Input 2

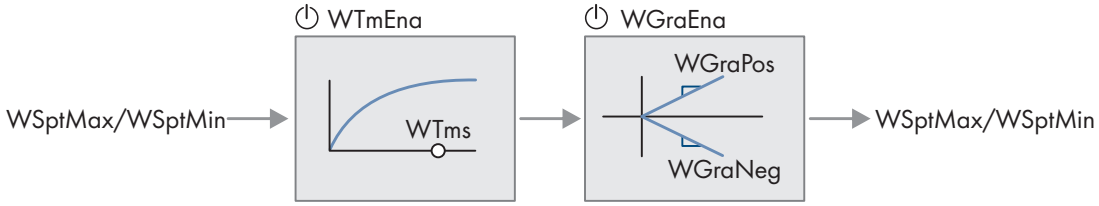
Object name	Definition	Explanation
Inverter.WModCfg.WCtlCom-Cfg.WSptMaxNom	Maximum active power in %	The reference value is WMax
Inverter.WModCfg.WCtlCom-Cfg.WSptMinNom	Minimum active power in %	The reference value is WMax
Mb.ScdInEna	Modbus P-settings at input 2	Active power setpoints via Modbus are processed at setpoint input 2. This enables parallel operation with SMA system control.

Setting the priority of setpoint input 2

When the second setpoint input is activated with low priority, the active power setpoint has lower priority than the P(V) characteristic curve and the P(f) characteristic curve.

Object name	Definition	Explanation
Inverter.WModCfg.WCtlCom-Cfg2.LoPrioEna	Low priority	Activation / deactivation

Setting the dynamic behavior for implementing the external setpoint at setpoint input 2



Object name	Definition	Explanation
Inverter.WModCfg.WCtlCom-Cfg2.Dyn.WTmEna	Setpoint filter	Activation / deactivation
Inverter.WModCfg.WCtlCom-Cfg2.Dyn.WTms	Setting time for nominal value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.WModCfg.WCtlCom-Cfg2.Dyn.WGraEna	Limitation of change rate	Activation / deactivation
Inverter.WModCfg.WCtlCom-Cfg2.Dyn.WGraPos	Increase rate	The reference value is WMax
Inverter.WModCfg.WCtlCom-Cfg2.Dyn.WGraNeg	Decrease rate	The reference value is WMax

Setting the fallback behavior for absent external setpoint at setpoint input 2

Object name	Definition	Explanation
Inverter.CtlComCfg.WCtlCom2.CtlComMssMod	Fallback behavior	Adjustable: Values maintained (maintain the values received last) Apply fallback values
Inverter.CtlComCfg.WCtlCom2.FlbWMin	Fallback value of minimum active power	
Inverter.CtlComCfg.WCtlCom2.FlbWMax	Fallback value of maximum active power	
Inverter.CtlComCfg.WCtlCom2.TmsOut	Timeout	Time until switching to the set fallback behavior

4.1.2 Voltage-Dependent Reactive Power Adjustment P(U)

The voltage-dependent active power adjustment reduces the feed-in power as a function of the measured grid voltage and, if necessary, can also lead to a power reversal and an active power consumption (e.g. in the case of storage systems).

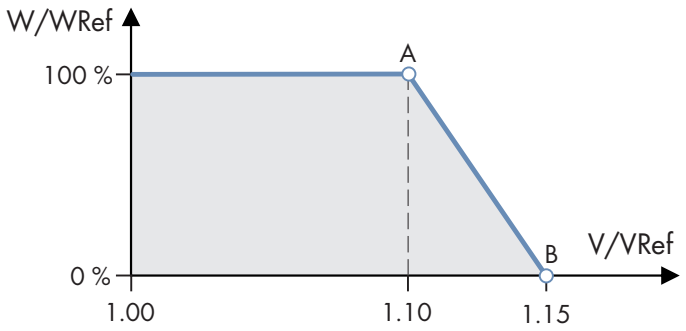


Figure 5: Example of a P(U) characteristic curve with two support points

WRef depends on WRefMod and on the current active power:

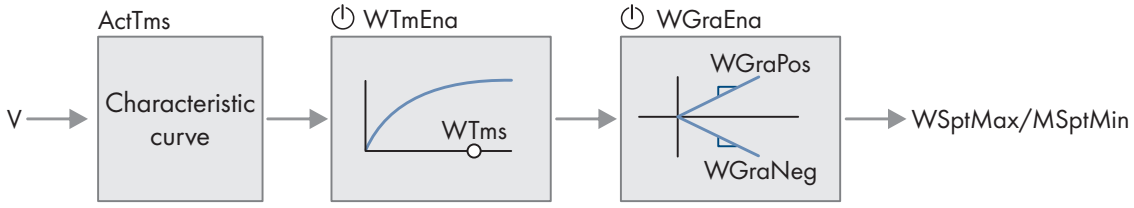
		Active power output	Active power input
WRefMod	Maximum power	WRef = WMaxOut	WRef = WMaxIn
	Current power	WRef = WMom	WRef = 0
	Potential power	WRef = WMom - WMaxIn	

Setting the characteristic curve

Object name	Definition	Explanation
Inverter.WModCfg.WCtlVolCfg.Ena	P(V) Characteristic Curve	Activation / deactivation
Inverter.WModCfg.WCtlVolCfg.VRefMod	Type of reference voltage	Adjustable: PhsAvg / mean value of phase voltages PhsMax / maximum phase voltage

Object name	Definition	Explanation
Inverter.WModCfg.WCtlVolCfg.WRefMod	Type of reference voltage	Adjustable: WMax / maximum active power WSnpt / current power WSnptMax / potential power
Inverter.WModCfg.WCtlVolCfg.Crv.NumPtMax	Maximum number of support points	
Inverter.WModCfg.WCtlVolCfg.Crv.NumPt	Number of used support points	
Inverter.WModCfg.WCtlVolCfg.Crv.XVal	Voltage values	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN. Related to median or maximum value (depending on the setting of Inverter.WModCfg.WCtlVolCfg.VRefMod).
Inverter.WModCfg.WCtlVolCfg.Crv.YVal	Active power values	Indicated in % of the maximum, current or potential active power (depending on the setting of Inverter.WModCfg.WCtlVolCfg.WRefMod).

Setting the dynamics



Object name	Definition	Explanation
Inverter.WModCfg.WCtlVolCfg.WTmEna	Setpoint filter	Activation / deactivation
Inverter.WModCfg.WCtlVolCfg.WTms	Setting time for nominal value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.WModCfg.WCtlVolCfg.WGraEna	Limitation of change rate	Activation / deactivation
Inverter.WModCfg.WCtlVolCfg.WGraPos	Increase rate	The reference value is WMax
Inverter.WModCfg.WCtlVolCfg.WGraNeg	Decrease rate	The reference value is WMax
Inverter.WModCfg.WCtlVolCfg.ActTms	Tripping delay	Delay of the active power adjustment after exceeding the first buckling point

4.1.3 Active Power Increase in Case of Change in Irradiation

When there is a change in irradiation, the inverter can limit its active power by means of the increase rate.

Object name	Definition	Explanation
Inverter.WGraMppEna	Increase rate in case of change in irradiation	Activation/deactivation
Inverter.WGraMpp	Increase rate in case of change in irradiation	The reference value is WMax

4.2 Reactive Power Mode

Generating and electricity-drawing plants must provide reactive power to support the utility grid. By providing reactive power, voltage changes in the utility grid are kept within acceptable limits. The dimensioning of the generating plant with regard to the required reactive power provision at the grid-connection point is the responsibility of the PV system operator. The grid operator specifies the reactive power mode and the parameters to be set.

The grid operator typically has different demands for generating and electricity-drawing plants. Accordingly, the process can be activated and adjusted for active power consumption (consumption) regardless of the process for active power output (grid feed-in). Since the grid operator's requirements usually only apply from a certain minimum active power, a separate procedure can be activated and set for the range between zero active power and minimum active power. The cos phi procedure cannot be selected in this range due to technical reasons.

When the inverter is disconnected from the AC voltage or disconnects itself, a connection can only be made again if sufficient DC power is available at the inputs of the inverter.

The parameters OutWNomLimAc and OutWNomLimDeAct describe the limits between the reactive power mode ranges VArModOut and VArModZerW. The parameters InWNomLimAc and InWNomLimDeAct describe the limits between the reactive power mode ranges VArModIn and VArModZerW. In these three reactive power ranges the reactive power mode required by the grid operator is set.

Reactive power range	Explanation
VArModOut	Reactive power range in case of active power output
VArModZerW	Reactive power range for zero active power
VArModIn	Reactive power range in case of active power draw

The following table gives an overview of which methods can be set for active power input, output and zero active power.

Mode	Active power input	Zero active power	Active power output
Q setting	x	x	x
Cos phi setting	x	-	x
Q(P) characteristic curve	x	x	x
Q(V) Characteristic Curve	x	x	x
Cos phi(P) characteristic curve	x	-	x
Cos phi(U) characteristic curve	x	-	x

Setting the reactive power mode

Object name	Definition	Explanation
Inverter.VArModCfg.VArModOut	Reactive power mode in case of active power output	
Inverter.VArModCfg.VArModIn	Reactive power mode in case of active power draw	
Inverter.VArModCfg.VArModZerW	Reactive power for zero active power	

Setting the reactive power mode for absent setpoints

If the setpoint is absent (e.g. due to communication failure between the inverter and the higher-level control unit), the grid operator can request switching to a specified reactive power mode.

Object name	Definition	Explanation
Inverter.VArModCfg.VArModOutFlb	Reactive power fallback process in case of active power output	
Inverter.VArModCfg.VArModInFlb	Reactive power fallback process in case of active power draw	
Inverter.VArModCfg.VArModZerWFlb	Reactive power fallback process in case of zero active power	

The parameters for setting the individual modes are listed in the following sections.

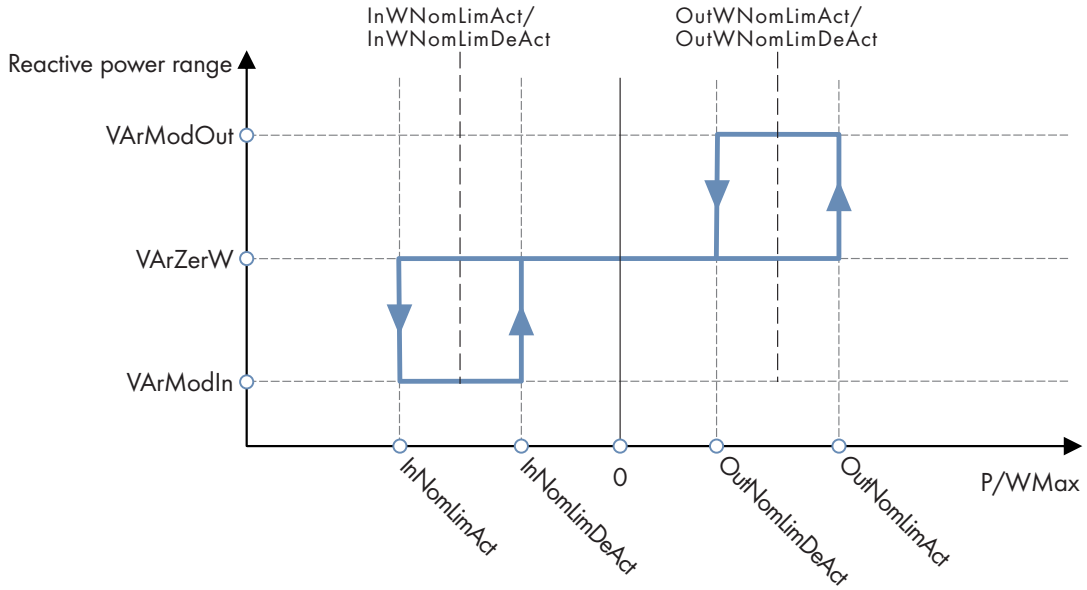
Setting the general parameters for the reactive power provision

In addition to the selection and settings of the reactive power mode, the following parameters for the reactive power provision must be set.

Object name	Definition	Explanation
Inverter.VArModCfg.VArNomRefMod	Reference size for reactive power setting	Reactive power settings as a percentage can refer either to the nominal active power WMax or to the nominal reactive power VArMax. The nominal active power depends on the current active power and corresponds to WMaxOut for active power output and WMaxIn for active power input. The nominal reactive power depends on the quadrant and corresponds to the respective nominal reactive power VArMaxQ1-Q4 or VArMaxZerWQ1-Q4. This setting then applies to all reactive power modes. The setting is specified by the grid operator and is typically already set by the country data set accordingly.

Object name	Definition	Explanation
Inverter.VArModCfg.HystTms	Hysteresis time	The hysteresis time is intended to prevent unnecessary changes between the reactive power ranges.
Inverter.VArModCfg.PFMinEna	Nominal-cos φ PFMinQ1-Q4	Activation/deactivation of the nominal-cos phi PFMinQ1-Q4.

Setting the activation and deactivation thresholds for reactive power provision



Object name	Definition	Explanation
Inverter.VArModCfg.OutWNomLimAct	Activation threshold in case of active power output	When the activation threshold is exceeded, the reactive power mode in case of active power output is activated.
Inverter.VArModCfg.OutWNomLimDeAct	Deactivation threshold in case of active power output	When the deactivation threshold is fallen short of, the reactive power mode in case of active power output is deactivated and the reactive power mode in case of zero active power is activated.
Inverter.VArModCfg.InWNomLimAct	Activation threshold in case of active power draw	When the activation threshold is exceeded, the reactive power mode in case of active power draw is activated.
Inverter.VArModCfg.InWNomLimDeAct	Deactivation threshold in case of active power draw	When the deactivation threshold is fallen short of, the reactive power mode in case of active power draw is deactivated and the reactive power mode in case of zero active power is activated.

4.2.1 Reactive Power Setpoint

The reactive power setpoint can be specified manually via the user interface or externally via a higher-level control unit.

Manual setpoint

In case of a manual setpoint, you must set the reactive power specified by the grid operator as a value in VAr or in percent of WMax or VArMax (depending on the setting in VArNomRefMod) via parameters. You can make a different specification for each of the three reactive power ranges.

External setpoint

In case of an external setpoint, the inverter receives the reactive power setpoint through a higher-level control unit. In case of an external setpoint, the dynamic behavior for the implementation of the setpoint and the specified fallback value for the absent setpoint must be entered. In addition, depending on the specifications of the grid operator, the voltage-limiting function can be activated and set.

4.2.1.1 Manual Setting

Object name	Definition	Explanation
Inverter.VArModCfg.VArCnstCfg.VAr	Manual reactive power setting for active power output	Indicated in VAr
Inverter.VArModCfg.VArCnstCfgIn.VAr	Manual reactive power setting in case of active power draw	Indicated in VAr
Inverter.VArModCfg.VArCnstCfgDmd.VAr	Manual reactive power setpoint at zero power output	Indicated in VAr

Object name	Definition	Explanation
Inverter.VArModCfg.VArCnstCfg.VArNom	Manual reactive power setting for active power output	Indicated in % of WMax or VArMax (depending on setting in VAr- NomRefMod)
Inverter.VArModCfg.VArCnstCfgIn.VArNom	Manual reactive power setting in case of active power draw	Indicated in % of WMax or VArMax (depending on setting in VAr- NomRefMod)
Inverter.VArModCfg.VArCnstCfgDmd.VArNom	Manual reactive power setpoint at zero power output	Indicated in % of WMax or VArMax (depending on setting in VAr- NomRefMod)

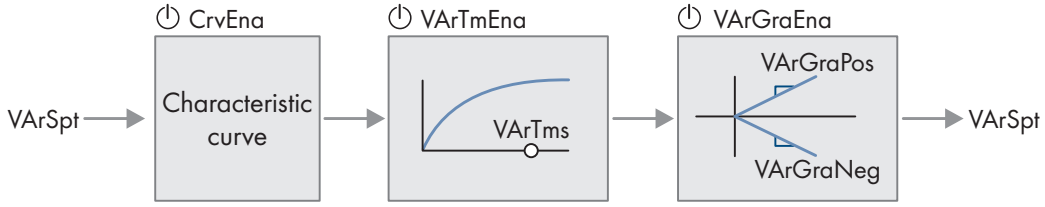
4.2.1.2 External Setting

Object name	Definition	Explanation
Inverter.VArModCfg.VArCtlComCfg.VArNomPrc	Reactive power setpoint Q	The reference value is WMax or VArMax (depending on setting in VArNomRefMod)

Setting fallback value for absent external setpoint

Object name	Definition	Explanation
Inverter.CtlComCfg.VArCtlCom.CtlComMssMod	Fallback behavior	Adjustable: UsStp / values maintained (maintain the values received last) UsFlb / apply fallback values
Inverter.CtlComCfg.VArCtlCom.FlbVArNom	Fallback value	
Inverter.CtlComCfg.VArCtlCom.TmsOut	Timeout	Time until switching to the set fallback behavior

Setting the dynamic behavior for implementing the external setpoint



Object name	Definition	Explanation
Inverter.VArModCfg.VArCfg.Dyn.VArTmEna	Setpoint filter	Activation / deactivation
Inverter.VArModCfg.VArCfg.Dyn.VArTms	Setting time for nominal value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.VArModCfg.VArCfg.Dyn.VArGraEna	Limitation of change rate	Activation / deactivation
Inverter.VArModCfg.VArCfg.Dyn.VArGraPos	Increase rate	The references value is VArMaxQ1
Inverter.VArModCfg.VArCfg.Dyn.VArGraNeg	Decrease rate	The references value is VArMaxQ1

Setting the voltage limitation function

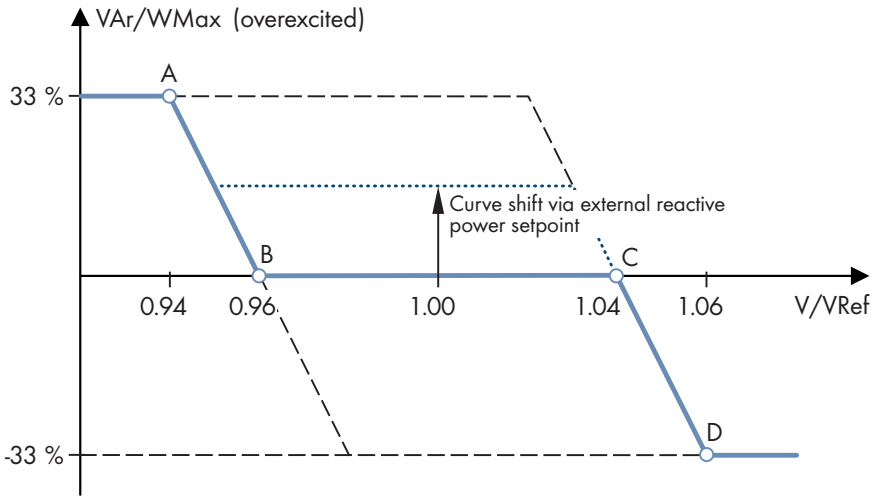


Figure 6: Characteristic curve for dynamic setpoint with activated voltage limitation function (example)

Object name	Definition	Explanation
Inverter.VArModCfg.VArCfg.Crv.CrvEna	Reactive power setting with voltage limitation, voltage value	Activation / deactivation
Inverter.VArModCfg.VArCfg.Crv.XVal	Voltage values	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN. Related to median or maximum value (depending on setting of Inverter.VArModCfg.VRefMod)
Inverter.VArModCfg.VArCfg.Crv.YVal	Reactive power values	The reference value is WMax or VArMax (depending on setting in VArNomRefMod)

4.2.2 Cos phi Specification

The cos phi setpoint can be specified manually via the user interface or externally via a higher-level control unit.

Manual setpoint

In case of a manual setpoint, you must enter the cos phi specified by the grid operator and the excitation type via parameters. There are separate parameters for active power output and active power input.

External setpoint

In case of an external setpoint, the inverter receives the reactive power setpoint through a higher-level control unit. In case of an external setpoint, the dynamic behavior for the implementation of the setpoint and the specified fallback value for the absent setpoint must be entered.

4.2.2.1 Manual Setting

Object name	Definition	Explanation
Inverter.VArModCfg.PFCnstCfg.PFOut	Cos Phi nominal value in case of active power output	
Inverter.VArModCfg.PFCnstCfg.PFExtOut	Excitation type in case of active power output	overexcited / underexcited

Object name	Definition	Explanation
Inverter.VArModCfg.PFCnstCfg.PFIn	Cos Phi nominal value in case of active power draw	
Inverter.VArModCfg.PFCnstCfg.PFExtIn	Excitation type in case of active power draw	overexcited / underexcited

4.2.2.2 External Setting

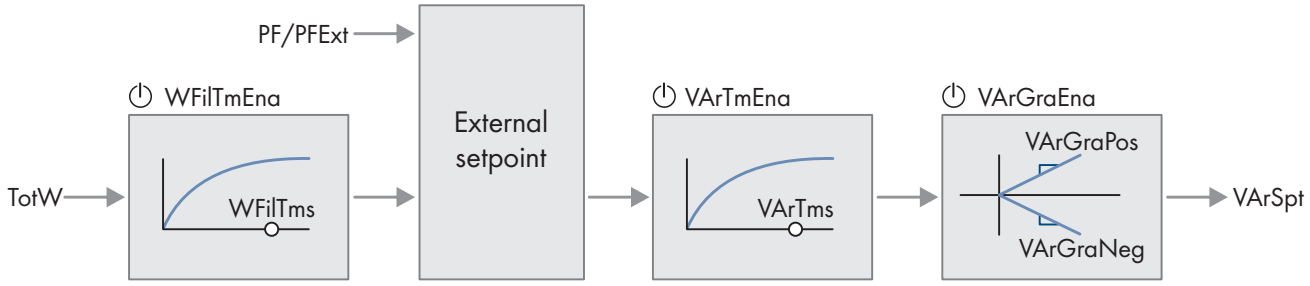
Setpoint

Object name	Definition	Explanation
Inverter.VArModCfg.PFCtlComCfg.PF	Cos Phi nominal value in case of active power output	
Inverter.VArModCfg.PFCtlComCfg.PFExt	Excitation type in case of active power output	underexcited/overexcited
Inverter.VArModCfg.PFCtlComCfg.PFIn	Cos Phi nominal value in case of active power draw	
Inverter.VArModCfg.PFCtlComCfg.PFExtIn	Excitation type in case of active power draw	underexcited/overexcited

Setting fallback value for absent external setpoint

Object name	Definition	Explanation
Inverter.CtlComCfg.PFCtlCom.CtlComMssMod	Fallback behavior	Adjustable: Values maintained (maintain the values received last) Apply fallback values
Inverter.CtlComCfg.PFCtlCom.FlbPF	Fallback value of Cos Phi in case of active power output	
Inverter.CtlComCfg.PFCtlCom.FlbPFExt	Fallback value of excitation type in case of active power output	underexcited/overexcited
Inverter.CtlComCfg.PFCtlCom.FlbPFIn	Fallback value of Cos Phi in case of active power draw	
Inverter.CtlComCfg.PFCtlCom.FlbPFExtIn	Fallback value of excitation type in case of active power draw	underexcited/overexcited
Inverter.CtlComCfg.PFCtlCom.TmsOut	Timeout	Time until switching to the set fallback behavior

Setting the dynamic behavior for implementing the external setpoint



Object name	Definition	Explanation
Inverter.VArMod-Cfg.PFCfg.Dyn.WFilTmEna	Actual value filter for active power value	Activation / deactivation
Inverter.VArMod-Cfg.PFCfg.Dyn.WFilTms	Setting time actual value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.VArModCfg.PFCfg.Dyn.VArTmEna	Setpoint filter	Activation / deactivation
Inverter.VArMod-Cfg.PFCfg.Dyn.VArTms	Setting time for nominal value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.VArModCfg.PFCfg.Dyn.VArGraEna	Limitation of change rate	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.VArModCfg.PFCfg.Dyn.VArGraPos	Increase rate	The references value is VArMaxQ1
Inverter.VArModCfg.PFCfg.Dyn.VArGraNeg	Decrease rate	The references value is VArMaxQ1

4.2.3 Reactive power/active power char. curve Q(P)

With this characteristic curve, the system is supposed to feed reactive power into the utility grid depending on the current active power output. The characteristic points are given as percentages based on the respective reference value.

The characteristic curve is defined from a maximum of eight support points.

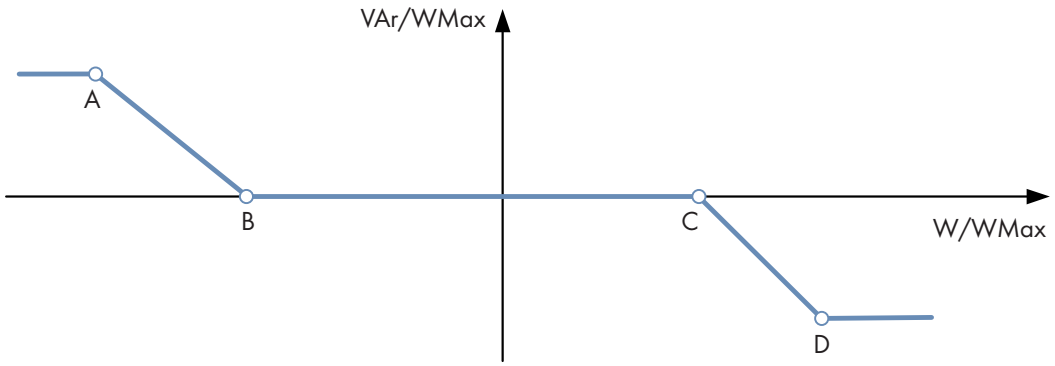


Figure 7: Example of a Q(P) characteristic curve for generators and loads with four support points

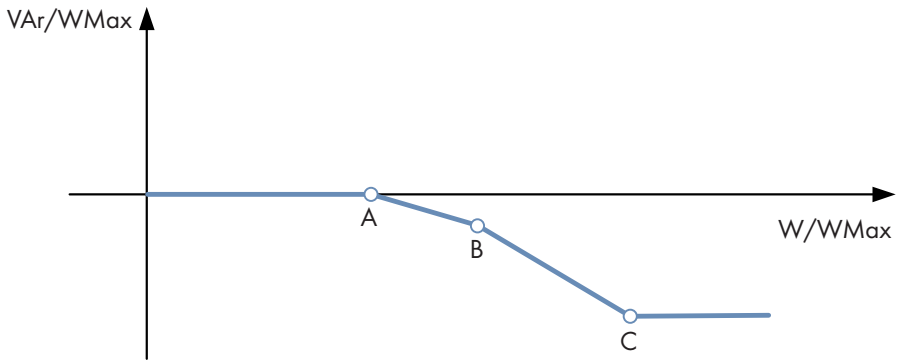
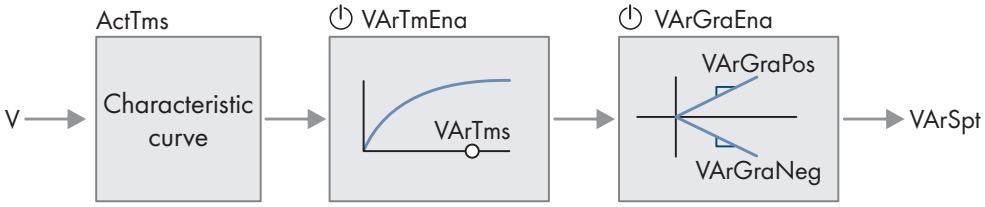


Figure 8: Example of a Q(P) characteristic curve for pure generators with three support points

Setting the characteristic curve

Object name	Definition	Explanation
Inverter.VArModCfg.VArCtlWCfg.Crv.NumPtMax	Maximum number of support points	
Inverter.VArModCfg.VArCtlWCfg.Crv.NumPt	Number of used support points	
Inverter.VArModCfg.VArCtlWCfg.Crv.XVal	Active power values	The reference value is WMax
Inverter.VArModCfg.VArCtlWCfg.Crv.YVal	Reactive power values	The reference value is WMax or VArMax (depending on setting in VArNomRefMod)

Setting the dynamics



Object name	Definition	Explanation
Inverter.VArModCfg.VArCtlVolCfg.Dyn.VArTmEna	Setpoint filter	Activation / deactivation
Inverter.VArModCfg.VArCtlWCfg.Dyn.VArTms	Setting time for nominal value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.VArModCfg.VArCtlWCfg.Dyn.VArGraEna	Limitation of change rate	Activation / deactivation
Inverter.VArModCfg.VArCtlWCfg.Dyn.VArGraPos	Increase rate	The references value is VArMaxQ1
Inverter.VArModCfg.VArCtlWCfg.Dyn.VArGraNeg	Decrease rate	The references value is VArMaxQ1

Setting the voltage-dependent activation

In order to avoid that the system feeds reactive power permanently for static voltage stability, even though the grid voltage is OK, the reactive power/active power characteristic curve Q(P) can be activated and deactivated depending on the voltage.

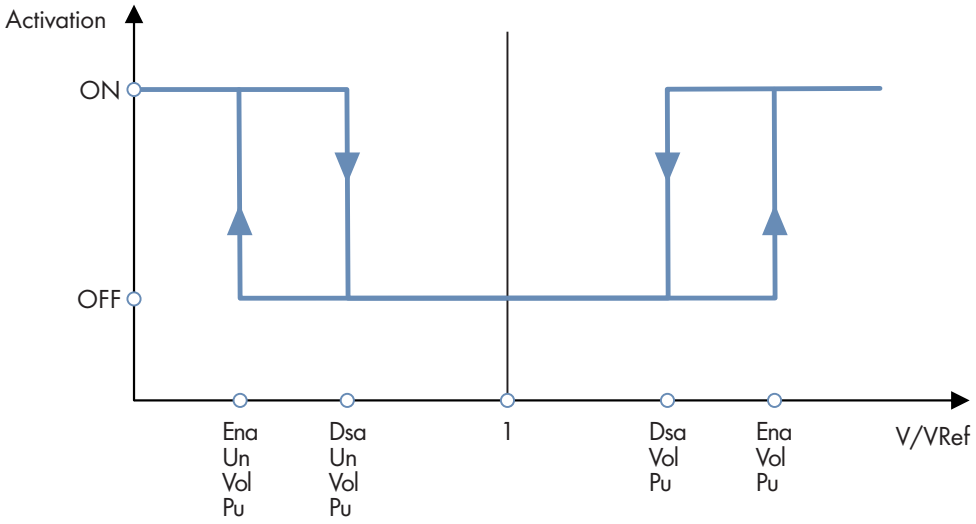


Figure 9: Principle of voltage-dependent activation

Object name	Definition	Explanation
Inverter.VArModCfg.VArCtlWCfg.Trg.EnaVolPu	Upper activation voltage	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
Inverter.VArModCfg.VArCtlWCfg.Trg.DsaVolPu	Upper deactivation voltage	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
Inverter.VArModCfg.VArCtlWCfg.Trg.EnaUnVolPu	Lower activation voltage	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
Inverter.VArModCfg.VArCtlWCfg.Trg.DsaUnVolPu	Lower deactivation voltage	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.

4.2.4 React. power/volt. char. Q(U)

With this characteristic curve, the system is supposed to feed reactive power into the utility grid as a function of the grid voltage. The characteristic points are given as percentages based on the reference value.

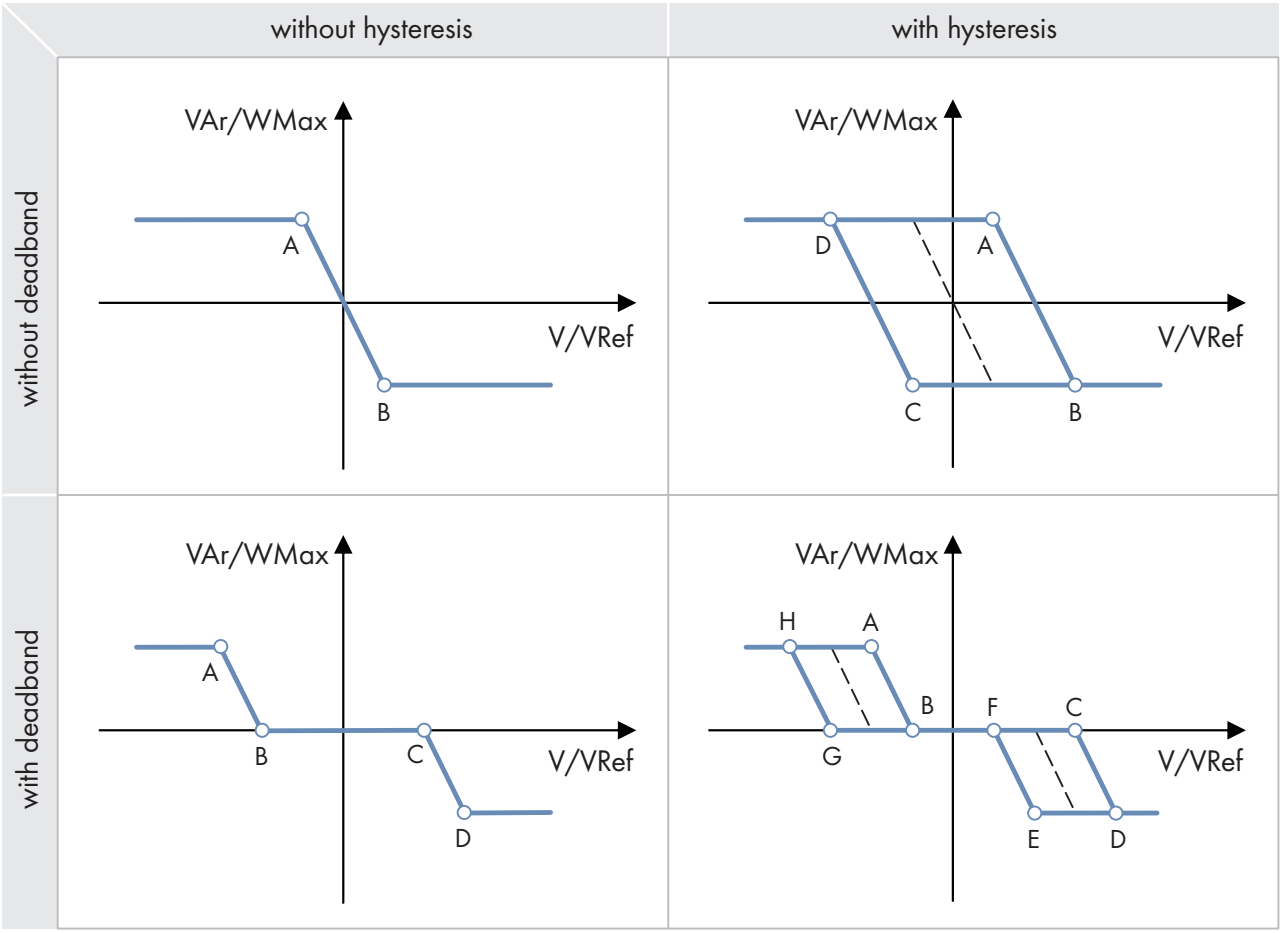


Figure 10: Q(U) characteristic curve (examples)

Setting the characteristic curve

Object name	Definition	Explanation
Inverter.VArModCfg.VArCtlVolCfg.Crv.NumPtMax	Maximum number of support points	
Inverter.VArModCfg.VArCtlVolCfg.Crv.NumPt	Number of used support points	
Inverter.VArModCfg.VArCtlVolCfg.Crv.XVal	Voltage values	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN. With regard to the mean or maximum value (depending on setting of Inverter.VArModCfg.VRefMod).
Inverter.VArModCfg.VArCtlVolCfg.Crv.YVal	Reactive power values	The reference value is WMax or VArMax (depending on setting of VArNomRefMod)

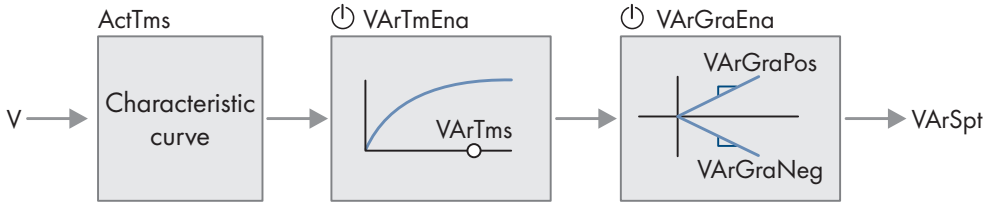
Setting the reference voltage adjustment

Object name	Definition	Explanation
Inverter.VArModCfg.VArCtlVolCfg.VolRef.AutnAdjMod	Operating mode of the reference voltage adjustment	Adjustable: Off (no adjustment) On (adjustment through external setting) Automatic (automatic adjustment)
Inverter.VArModCfg.VArCtlVolCfg.VolRef.AutnAdjTms	Adjustment time of the automatic reference voltage adjustment	
Inverter.VArModCfg.VArCtlVolCfg.VolRef.VolRefPu	External reference voltage setting	

Setting the behavior in case of absent reference voltage

Object name	Definition	Explanation
Inverter.CtlComCfg.VArCtlVolCom.CtlComMssMod	Fallback behavior	Adjustable: Values maintained (the values received last are maintained) Apply fallback values
Inverter.CtlComCfg.VArCtlVolCom.FlbVolRefPu	Fallback of reference voltage	
Inverter.CtlComCfg.VArCtlVolCom.TmsOut	Timeout	Time until switching to the set fallback behavior

Setting the dynamics



Object name	Definition	Explanation
Inverter.VArModCfg.VArCtlVolCfg.Dyn.VArTmEna	Setpoint filter	Activation / deactivation
Inverter.VArModCfg.VArCtlVolCfg.Dyn.VArTms	Setting time for nominal value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.VArModCfg.VArCtlVolCfg.Dyn.VArGraEna	Limitation of change rate	Activation / deactivation
Inverter.VArModCfg.VArCtlVolCfg.Dyn.VArGraPos	Increase rate	The references value is VArMaxQ1

Object name	Definition	Explanation
Inverter.VArModCfg.VArCtlVolCfg.Dyn.VArGraNeg	Decrease rate	The references value is VArMaxQ1
Inverter.VArModCfg.VArCtlVolCfg.Dyn.ActTms	Tripping delay	

4.2.5 Cos phi/active power characteristic curve cos phi(P)

With this characteristic curve, the system is supposed to feed reactive power into the utility grid depending on the current active power output. Cos phi is specified based on the set reference value.

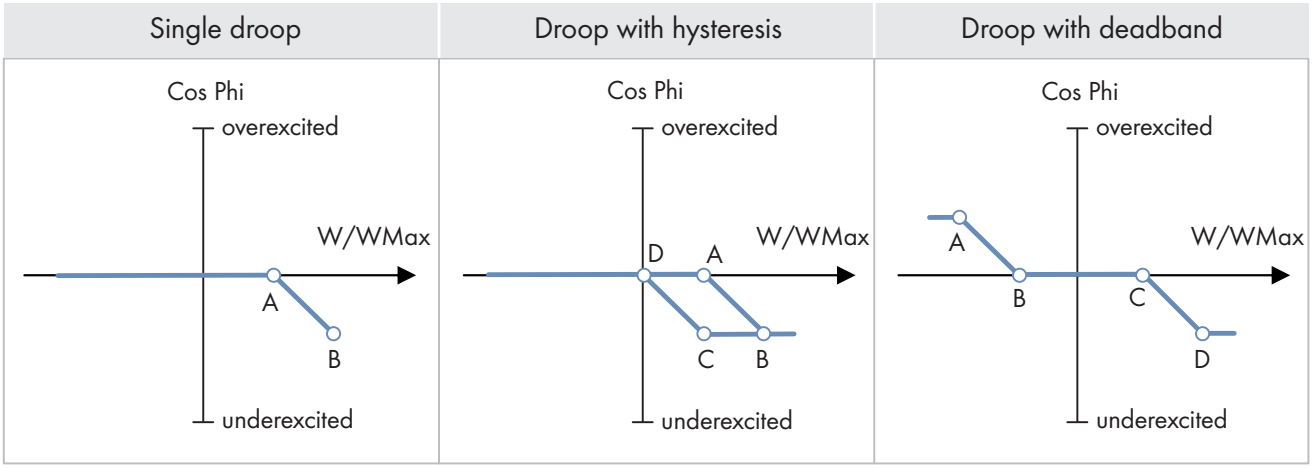
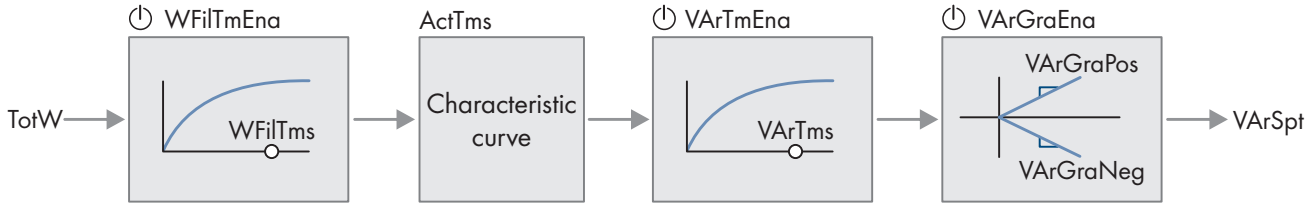


Figure 11: Cos phi/active power characteristic curve cos phi(P) (examples)

Setting the characteristic curve

Object name	Definition	Explanation
Inverter.VArModCfg.PFCtlWCfg.Crv.NumPtMax	Maximum number of support points	
Inverter.VArModCfg.PFCtlWCfg.Crv.NumPt	Number of used support points	
Inverter.VArModCfg.PFCtlWCfg.Crv.WNom	Active power	The reference value is WMax
Inverter.VArModCfg.PFCtlWCfg.Crv.PF	Cos phi setpoint	
Inverter.VArModCfg.PFCtlWCfg.Crv.PFExt	Excitation type	For each cos phi setpoint, the excitation type must always be specified as well: underexcited / overexcited

Setting the dynamics



Object name	Definition	Explanation
Inverter.VArModCfg.PFCtlWCfg.Dyn.WFilTmEna	Actual value filter for active power value	Activation / deactivation
Inverter.VArModCfg.PFCtlWCfg.Dyn.WFilTms	Setting time actual value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.VArModCfg.PFCtlWCfg.Dyn.VArTmEna	Setpoint filter	Activation / deactivation
Inverter.VArModCfg.PFCtlWCfg.Dyn.VArTms	Setting time for nominal value filter	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.VArModCfg.PFCtlWCfg.Dyn.VArGraEna	Limitation of change rate	Activation / deactivation
Inverter.VArModCfg.PFCtlWCfg.Dyn.VArGraPos	Increase rate	The reference value is VArMax
Inverter.VArModCfg.PFCtlWCfg.Dyn.VArGraNeg	Decrease rate	The reference value is VArMax
Inverter.VArModCfg.PFCtlWCfg.Dyn.ActTms	Tripping delay	

Setting the voltage-dependent activation

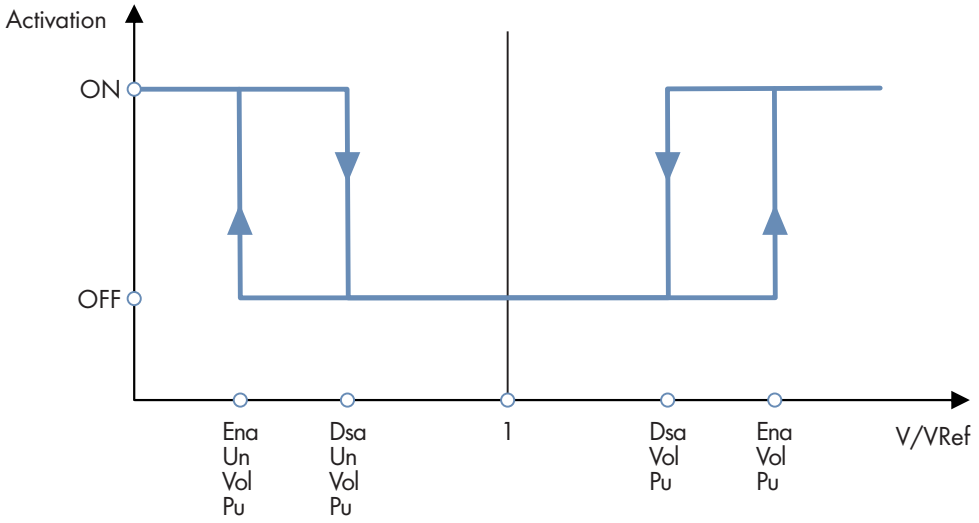


Figure 12: Principle of voltage-dependent activation

Object name	Definition	Explanation
Inverter.VArModCfg.PFCtlWCfg.Trg.EnaVolPu	Upper activation voltage	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
Inverter.VArModCfg.PFCtlWCfg.Trg.DsaVolPu	Upper deactivation voltage	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
Inverter.VArModCfg.PFCtlWCfg.Trg.EnaUnVolPu	Lower activation voltage	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
Inverter.VArModCfg.PFCtlWCfg.Trg.DsaUnVolPu	Lower deactivation voltage	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.

5 Behavior in case of disturbed utility grid

5.1 Behavior in case of voltage errors

5.1.1 Voltage Monitoring

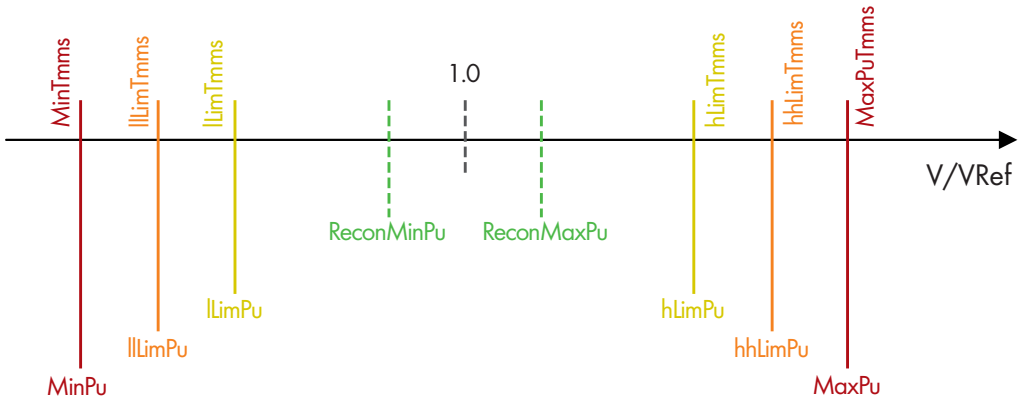


Figure 13: Voltage monitoring

Overvoltage limits

Object name	Definition	Explanation
GridGuard.Cntry.VolCtl.MaxPu	Upper maximum threshold	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
GridGuard.Cntry.VolCtl.MaxPuTmms	Upper maximum threshold tripping time	
GridGuard.Cntry.VolCtl.hhLimPu	Median maximum threshold	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
GridGuard.Cntry.VolCtl.hhLimTmms	Median maximum threshold tripping time	
GridGuard.Cntry.VolCtl.hLimPu	Lower maximum threshold	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
GridGuard.Cntry.VolCtl.hLimTmms	Lower maximum threshold tripping time	

Undervoltage limits

Object name	Definition	Explanation
GridGuard.Cntry.VolCtl.MinPu	Lower minimum threshold	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
GridGuard.Cntry.VolCtl.MinTmms	Lower minimum threshold tripping time	
GridGuard.Cntry.VolCtl.llLimPu	Median minimum threshold	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
GridGuard.Cntry.VolCtl.llLimTmms	Median minimum threshold tripping time	

Object name	Definition	Explanation
GridGuard.Cntry.VolCtl.lLimPu	Upper minimum threshold	Indicated in p.u. of the reference voltage selected via Inverter.VRefIntLN.
GridGuard.Cntry.VolCtl.lLimTmms	Upper minimum threshold tripping time	

5.1.2 Dynamic Grid Support

With dynamic grid support, the inverter supports the utility grid during a brief grid-voltage dip or during a short period of overvoltage. With full dynamic grid support, grid support is ensured by providing reactive power. With limited dynamic grid support, the feed-in operation is interrupted during a grid instability, but without the inverter disconnecting from the utility grid.

The grid limits and deactivation delays are set by default according to the local grid connection regulations when selecting the country data set. When the full dynamic grid support is activated, the islanding detection cannot be activated at the same time. Both functions cannot be used simultaneously.

Object name	Definition	Explanation
Inverter.DGSModCfg.DGSMod	Dynamic grid support operating mode	Adjustable: Off Limited dynamic grid support Complete dynamic grid support

5.2 Behavior in case of frequency errors

5.2.1 Frequency Monitoring

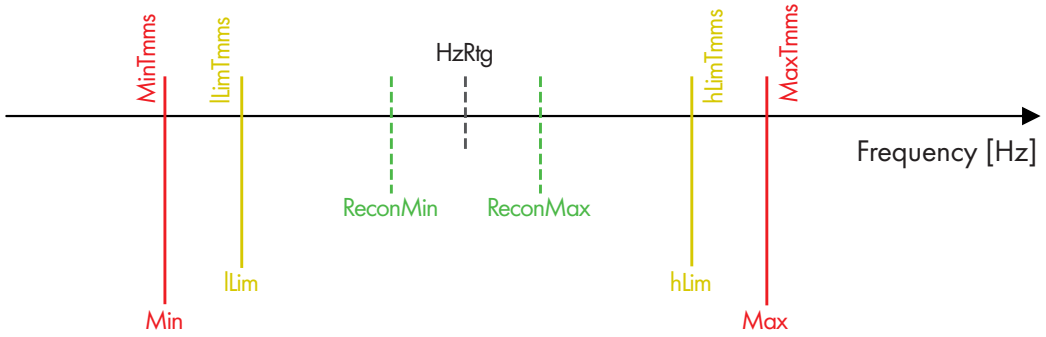


Figure 14: Frequency monitoring

Overfrequency limits

Object name	Definition	Explanation
GridGuard.Cntry.FrqCtl.Max	Upper maximum threshold	
GridGuard.Cntry.FrqCtl.MaxTmms	Upper maximum threshold tripping time	
GridGuard.Cntry.FrqCtl.hLim	Lower maximum threshold	
GridGuard.Cntry.FrqCtl.hLimTmms	Lower maximum threshold tripping time	

Underfrequency limits

Object name	Definition	Explanation
GridGuard.Cntry.FrqCtl.lLim	Upper minimum threshold	
GridGuard.Cntry.FrqCtl.lLimTmms	Upper minimum threshold tripping time	
GridGuard.Cntry.FrqCtl.Min	Lower minimum threshold	
GridGuard.Cntry.FrqCtl.MinTmms	Lower minimum threshold tripping time	

5.2.2 P(f) Characteristic Curve

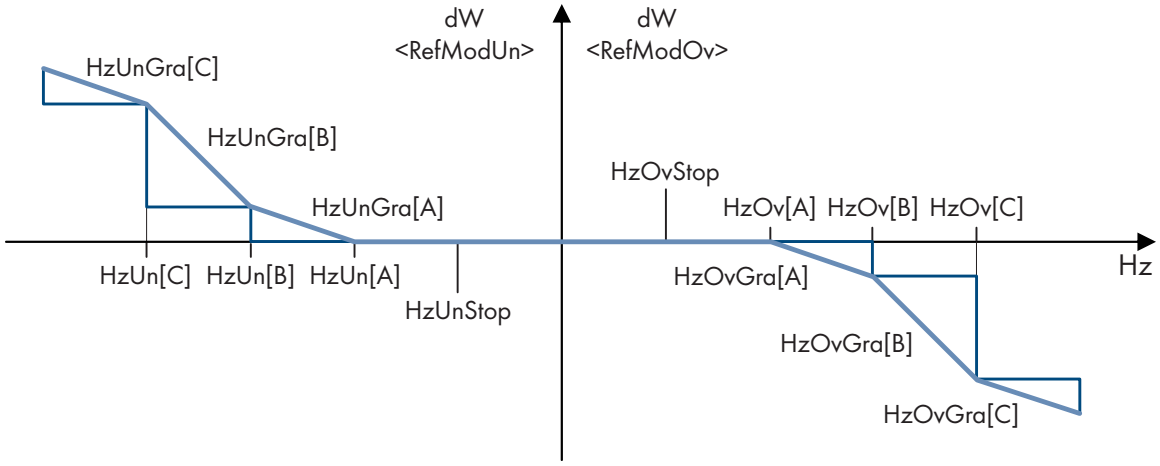


Figure 15: Example of a P(f) characteristic curve

Activating the characteristic curve

Object name	Definition	Explanation
Inverter.WCtlHzModCfg.Ena	P(f) Characteristic Curve	Activation / deactivation

Setting the characteristic curve

Object name	Definition	Explanation
Inverter.WCtlHzModCfg.RefModOv	Reference value for active power in case of overfrequency	Nominal power, current power or potential power
Inverter.WCtlHzModCfg.RefModUn	Reference value for active power in case of underfrequency	Nominal power, current power or potential power
Inverter.WCtlHzModCfg.WTms	Setting time	Response time corresponds to three taus (RC time constant) of a PT1 element
Inverter.WCtlHzModCfg.WCtlHzCfg.HystEnaOv	Hysteresis in case of overfrequency	When the hysteresis is activated in case of overfrequency, the characteristic value remains constant when the frequency drops again until falling below the reset overfrequency.

Object name	Definition	Explanation
Inverter.WCtlHzModCfg.WCtlHzCfg.HystEnaUn	Hysteresis in case of underfrequency	When the hysteresis is activated in case of underfrequency, the characteristic value remains constant when the frequency increases again until the reset underfrequency is exceeded.
Inverter.WCtlHzModCfg.WCtlHzCfg.HzOv	Buckling overfrequencies	
Inverter.WCtlHzModCfg.WCtlHzCfg.HzOvGra	Active power change per Hz in case of overfrequency	Indicated in % of the maximum, current or potential active power (depending on the setting of Inverter.WCtlHzModCfg.RefModOv).
Inverter.WCtlHzModCfg.WCtlHzCfg.HzOvStop	Reset overfrequency	Upon falling below this frequency, the characteristic curve is deactivated and the transition to normal operation is started.
Inverter.WCtlHzModCfg.WCtlHzCfg.HzUn	Buckling underfrequency	
Inverter.WCtlHzModCfg.WCtlHzCfg.HzUnGra	Active power change per Hz in case of underfrequency	Indicated in % of the maximum, current or potential active power (depending on the setting of Inverter.WCtlHzModCfg.RefModUn).
Inverter.WCtlHzModCfg.WCtlHzCfg.HzUnStop	Reset underfrequency	When this frequency is exceeded, the characteristic curve is deactivated and the transition to normal operation started.

Behavior when activating / deactivating the characteristic curve

Object name	Definition	Explanation
Inverter.WCtlHzModCfg.WCtlHzCfg.WCtlTmms	Tripping delay	Initial delay of the power change after exceeding the first buckling frequency.
Inverter.WCtlHzModCfg.WCtlHzCfg.HzStopWGraTms	Power-down time	Waiting time until the transition to normal operation is started.
Inverter.WCtlHzModCfg.WCtlHzCfg.HzStopWGra	Active power change rate after fault end	The reference value is WMax.

5.3 Islanding Detection

The islanding detection function detects the formation of unwanted electrical islands and disconnects the inverter from the utility grid. Unwanted islanding can occur when at the time of utility grid failure, the load in the shut-down sub-grid is roughly equivalent to the current feed-in power of the PV system or battery storage system. With active islanding detection, the inverter continuously checks the stability of the utility grid. There are two modes for this. One mode

monitors the frequency and the other detects unbalanced loads between the line conductors. The unbalance detection is only supported by three-phase inverters. If the utility grid is intact, the modes for islanding detection have no impact on the utility grid and the inverter continues to feed in. Only if an unwanted electrical island has formed will the inverter disconnect from the utility grid.

By selecting the country data set, the islanding detection is deactivated or activated and adjusted according to the country standard. When the islanding detection is activated, the complete dynamic grid support cannot be activated at the same time. Both functions cannot be used simultaneously.

Object name	Definition	Explanation
GridGuard.Cntry.Aid.HzMon.Stt	Islanding detection, status of frequency monitor	Adjustable: On / On Off / Off
GridGuard.Cntry.Aid.AsymDet.Stt	Islanding detection, status of the unbalanced detection	Adjustable: On / On Off / Off

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