SIEMENS
Ingenuity for life

SINAMICS S Reactive power compensation with Active Line Module and DCC

SINAMICS S120/S150

https://support.industry.siemens.com/cs/ww/en/view/57886317

Siemens
Industry
Online
Support

Legal information

Use of application examples

Application examples illustrate the solution of automation tasks through an interaction of several components in the form of text, graphics and/or software modules. The application examples are a free service by Siemens AG and/or a subsidiary of Siemens AG ("Siemens"). They are non-binding and make no claim to completeness or functionality regarding configuration and equipment. The application examples merely offer help with typical tasks; they do not constitute customer-specific solutions. You yourself are responsible for the proper and safe operation of the products in accordance with applicable regulations and must also check the function of the respective application example and customize it for your system.
Siemens grants you the non-exclusive, non-sublicensable and non-transferable right to have the application examples used by technically trained personnel. Any change to the application examples is your responsibility. Sharing the application examples with third parties or copying the application examples or excerpts thereof is permitted only in combination with your own products. The application examples are not required to undergo the customary tests and quality inspections of a chargeable product; they may have functional and performance defects as well as errors. It is your responsibility to use them in such a manner that any malfunctions that may occur do not result in property damage or injury to persons.

Disclaimer of liability

Siemens shall not assume any liability, for any legal reason whatsoever, including, without limitation, liability for the usability, availability, completeness and freedom from defects of the application examples as well as for related information, configuration and performance data and any damage caused thereby. This shall not apply in cases of mandatory liability, for example under the German Product Liability Act, or in cases of intent, gross negligence, or culpable loss of life, bodily injury or damage to health, non-compliance with a guarantee, fraudulent non-disclosure of a defect, or culpable breach of material contractual obligations. Claims for damages arising from a breach of material contractual obligations shall however be limited to the foreseeable damage typical of the type of agreement, unless liability arises from intent or gross negligence or is based on loss of life, bodily injury or damage to health. The foregoing provisions do not imply any change in the burden of proof to your detriment. You shall indemnify Siemens against existing or future claims of third parties in this connection except where Siemens is mandatorily liable.
By using the application examples you acknowledge that Siemens cannot be held liable for any damage beyond the liability provisions described.

Other information

Siemens reserves the right to make changes to the application examples at any time without notice. In case of discrepancies between the suggestions in the application examples and other Siemens publications such as catalogs, the content of the other documentation shall have precedence.
The Siemens terms of use (https://support.industry.siemens.com) shall also apply.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.
In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.
Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.
For additional information on industrial security measures that may be implemented, please visit https://www.siemens.com/industrialsecurity.
Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.
To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed at: http://www.siemens.com/industrialsecurity.

Table of contents

1 Application description

1.1 Overview

Introduction

In industrial plants and systems, most of the loads connected to the line supply require both active and reactive power. The resulting apparent power S must be provided by the utility company and the power generating company. In this case, the reactive power increases the apparent power demand of the industrial plant. This means additional costs for the power supply equipment such as generators, transformers and switchgear as well as higher losses in the power transmission.

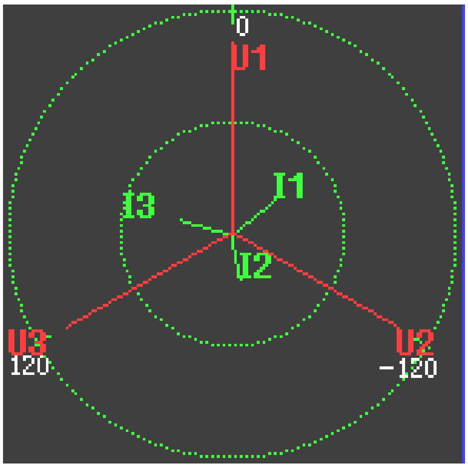
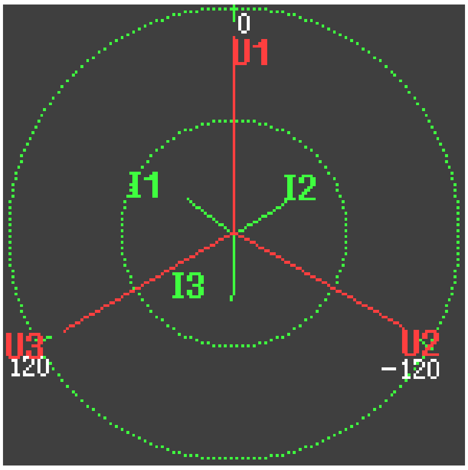
For that reason, utility companies usually charge customers for their reactive power consumption in addition.

However, if the required reactive power is already compensated at the line connection point, frequently the apparent power requirement can be significantly reduced. This also avoids having to pay the costs associated for providing reactive power:

Description of the application

The following diagram is obtained for the load at the line connection point if there is no compensation:

Table 1-1

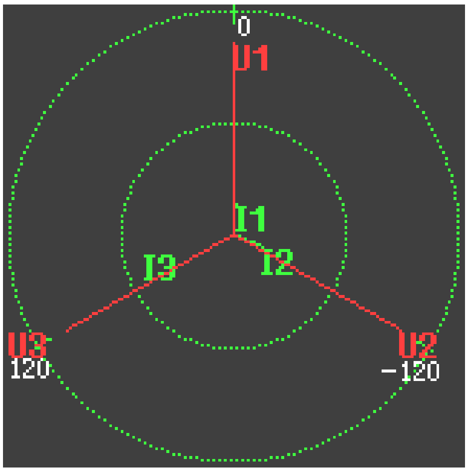
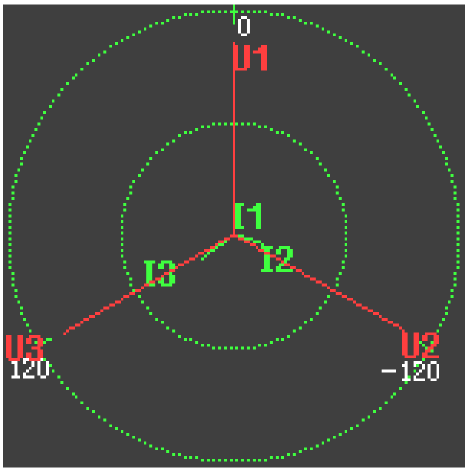
<table>
<tr><th></th><th></th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Vector diagram when drawing non-compensated inductive reactive power</td><td>Vector diagram when drawing non-compensated capacitive reactive power</td></tr>
</table>

In many drive applications the "SINAMICS S Active Line Module", self-commutated infeed/regenerative feedback unit, are used to feed the motor inverters. These devices can compensate their own reactive current consumption, resulting in a line power factor of 1.0.
In addition, it is possible to adjust an additional reactive current setpoint in either inductive or capacitive direction. Therefore, the reactive power demand of other loads connected to the same line connection point can be provided.

In conjunction with a measuring transducer used at the common line connection point to measure the reactive power, this application allows the reactive power occurring in the fundamental oscillation to be compensated.

Consequently, the following diagram is obtained for identical loads connected to the same line supply:

Table 1-2

	
Vector diagram when drawing compensated inductive reactive power	Vector diagram when drawing compensated capacitive reactive power

Preconditions for reactive power compensation which have to be considered are: Firstly, that the Active Line Module still has sufficient power reserve to additionally provide the required reactive power demand and secondly, that it is only possible to compensate symmetrically across all three phases.

Therefore, attention should be put on compensating the displacement factor

$$cos\varphi_1 = \frac{P}{S_1}$$

instead of compensating the power factor

$$\lambda = \frac{|P|}{S}$$

For that reason, no compensation for harmonic reactive power or distortion reactive power can be done.

Compared to classic compensation systems, where capacitors are switched in for compensation, by using this application it is possible to compensate both inductive as well as capacitive reactive power.
Furthermore, a not staged exact compensation is possible to precisely compensate the reactive power demand, resulting in a power factor of almost 1.0 at the measuring point.

Optionally from 1.0 varying displacement factors can be set.

1.2 Methods of closed-loop control

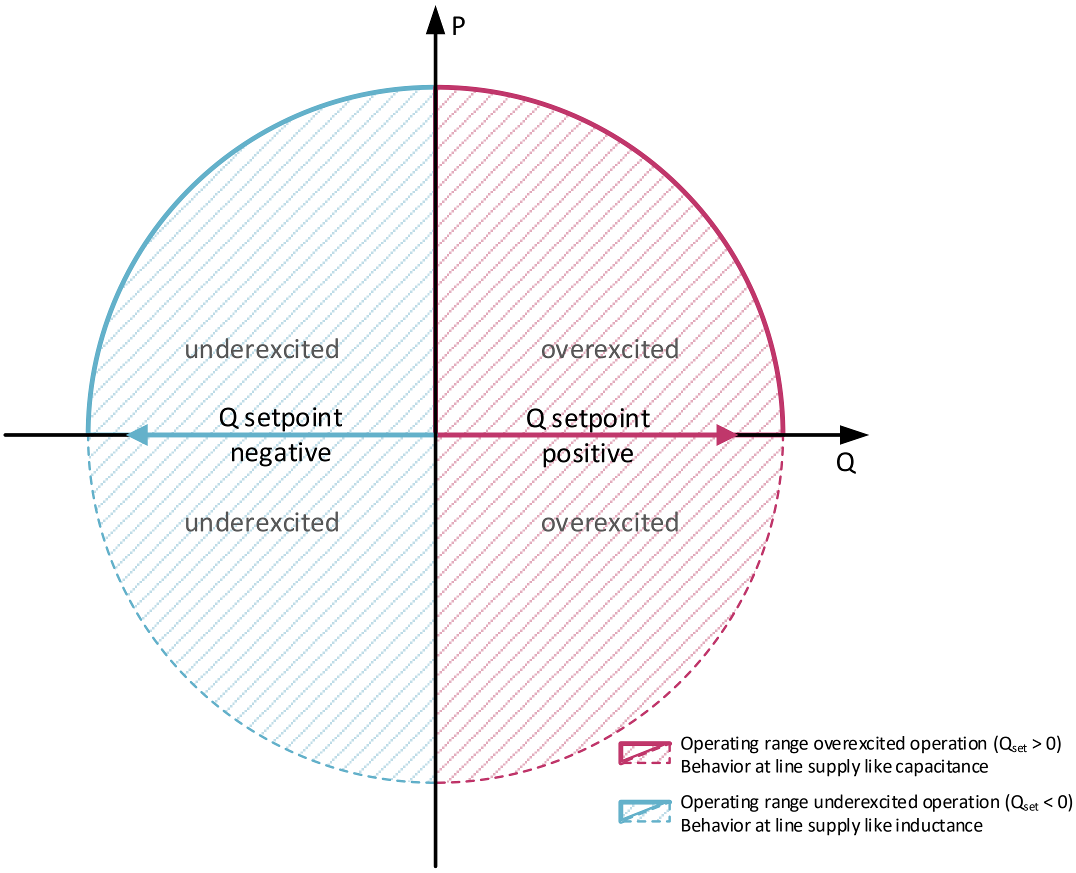
1.2.1 Reactive power control

This method directly controls the reactive power at the common grid connection. Advisable setpoint values for the compensation are close to zero (positive or negative) to keep the reactive power at the common grid connection as low as possible.

The setpoint signs are equal to the generator reference arrow system.

The signs and possible operating ranges for reactive power compensation are defined as follows:

Figure 1-1



The figure qualitatively shows the possibilities of reactive power setpoint specification by means of Q setpoint for the common grid connection point. A reactive power setpoint specification is thus possible independent of the magnitude or sign (motor or generator operation) of the active power at the common grid connection point.

1.2.2 Displacement factor control ($\cos\varphi_1$ control)

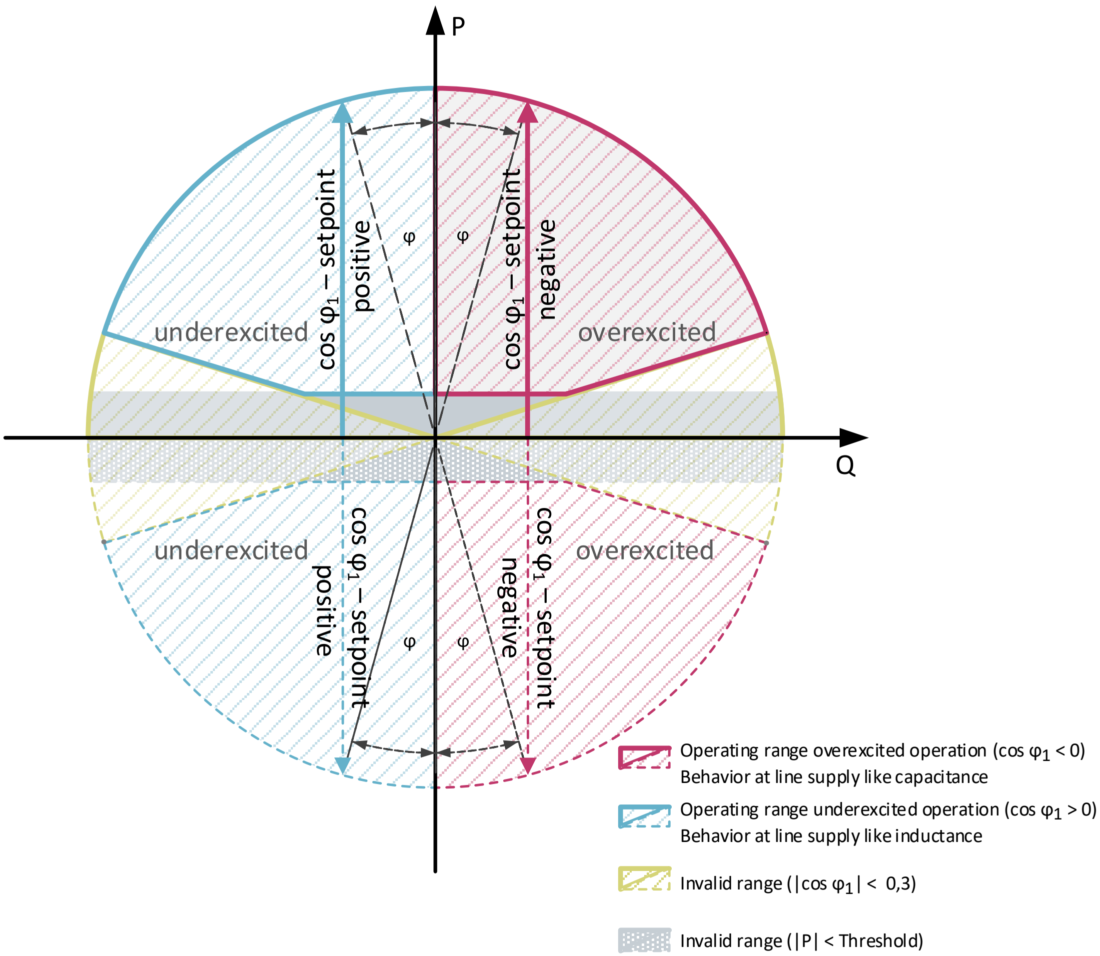
This method controls the active power in relation to the apparent power at the common line connection. Hereby the reactive power is controlled indirectly.

This control mode provides the possibility to specify variable setpoints for $\cos\varphi_1$, e.g. to implement requirements of the energy suppliers.

The setpoint signs are equal to the generator reference arrow system respectively matches the use in grid standards (e.g. VDE-AR-N 4105).

The signs and possible operating ranges for the control of $\cos\varphi_1$ are defined as follows:

Figure 1-2



The figure qualitatively shows the possibilities of the $\cos\varphi_1$ setpoint specification for the common grid connection point.

A setpoint specification is thus dependent of the magnitude of the active power at the common grid connection point - the control is active only from an adjustable active power threshold. In addition, the specification of the setpoint is limited to values $-1 \leq cos\varphi_1 \leq -0{,}3$ and $0{,}3 \leq cos\varphi_1 \leq 1$.

A setpoint specification is independent of the sign (motor or generator operation) of the active power at the common grid connection point.

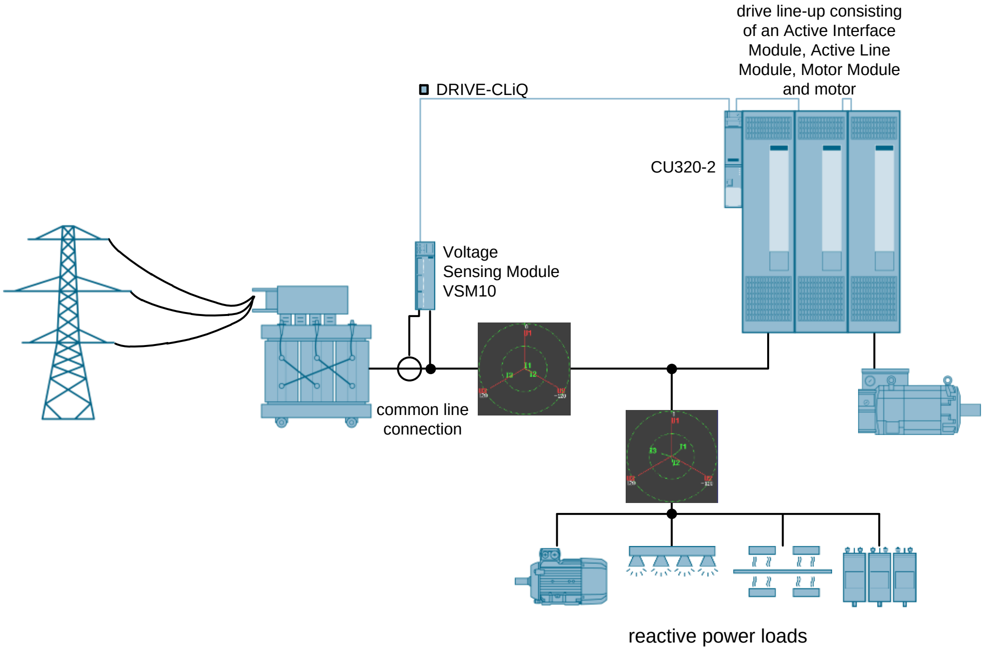
2 Solution

2.1 Overview hardware structure

Schematic

The most important components of the solution are schematically shown in the following figure.

Figure 2-1



Required know-how

Basic knowledge about the SINAMICS drive system, as well as handling the STARTER or Startdrive software and DCC (Drive Control Chart) are required.

2.2 Description of the functionality

Description of the application

A DCC-based closed-loop control is the core function of the reactive power compensation application. It controls the reactive current generated by the Active Line Module, so that at the measuring point – generally at the common line connection point of the system to be compensated – a reactive current of zero and therefore a line supply power factor (cos φ_1) of 1.0 is obtained. It is also possible to set a reactive current setpoint for the measuring point that is not zero. The application offers the possibility of controlling an input reactive power or the power factor.

Additionally a resettable, remanent storing Counter of the active energy is integrated.

Advantages of this application

The solution presented here offers the following advantages:

- Depending on the power reserve and the reactive current to be compensated, it is not necessary to use an additional, complex compensation system.
- Capacitive reactive powers, which for example occur in conjunction with frequency converters, can also be easily compensated.
- There is no additional control (PLC) required, respectively no changes have to be made at the communication to the control system.

Operating the Active Infeed with a power factor cosφ <1

Is the Active Infeed, whose reactive current is parameterizable in the firmware, operated with a power factor cosφ <1, power losses of the Active Line Module are increasing. Therefore the current has to be reduced according to the following derating-characterizations. There a different deratings depending on the Active Infeed’s design. The Application identifies the design and uses the correct derating-characterization automatically.

Figure 2-2: Derating Active Line Module Booksize up to 80 kW

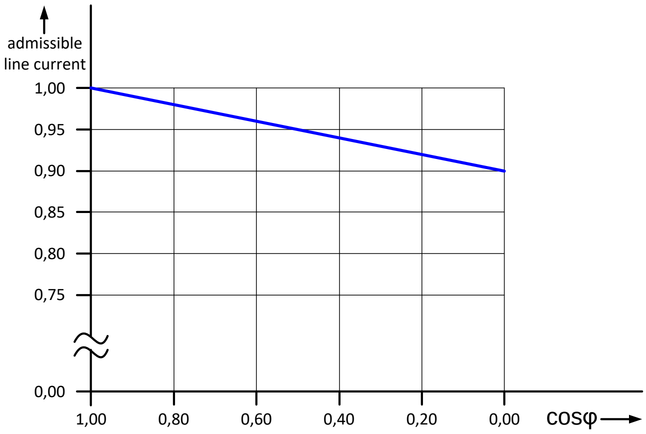
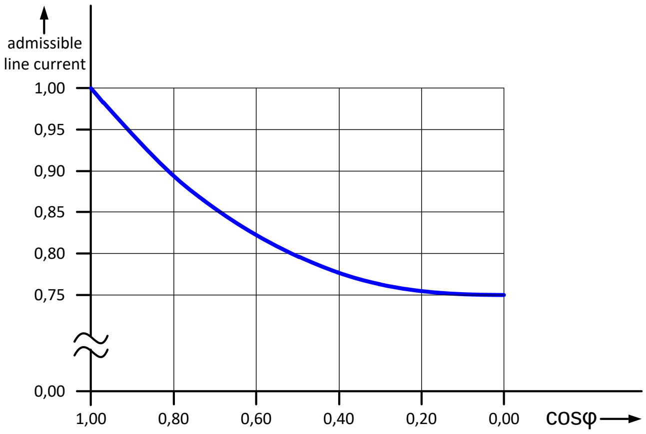


Figure 2-3: Derating Active Line Module Chassis and Booksize up to 120 kW



2.3 Hardware and software components used

Hardware components

- Control Unit CU320-2 for SINAMICS S from firmware version V4.8
- Active Infeed consisting of an Active Line Module with Active Interface Module
- VSM10 to measure actual voltage and current values at the common line connection
- Current-voltage-converters for +/- 10 V be connected to the VSM10's analog inputs, for example the series "HAT 200 .. 1500-S" and "HAL 50 .. 600-S" from the manufacturer LEM (www.lem.com)

  or
- Current transformers, such as Siemens 4NC51 .. window-type current transformers, used as a pin-wound transformer with suitable working resistance for the voltage input of the VSM10 (note the resolution of the analog input, this is optimized for input values of +/- 10V)

Software components

- Commissioning tool Starter from version 4.5.1 with installed DCC
- required engineering license from " SINAMICS DCC V2.4 SP1 full license" MLFB 6AU1810-1HA24-1XA0[1]

or

- Commissioning tool Startdrive from V15.1 (SINAMICS firmware from V5.2 required) with installed DCC or newer
- For use with Startdrive V15.1:

  required engineering license "SINAMICS DCC combo V15" for the use of:
  - SINAMICS DCC V15.1 with Startdrive V15.1
  - SINAMICS DCC V3.3 for STARTER V5.3 (with parallel installed Startdrive V15.1)

  MLFB 6SL3070-4FA01-0XA5 (DVD with USB stick) or MLFB 6SL3070-4FA01-0XG5 (Download) [2]

- For use with Startdrive V16:

  required engineering license "SINAMICS DCC combo V16" for the use of:
  - SINAMICS DCC V16 with Startdrive V16
  - SINAMICS DCC V3.3 for STARTER V5.3 (with parallel installed Startdrive V16)

  MLFB 6SL3070-4GA01-0XA5 (DVD with USB stick) or MLFB 6SL3070-4GA01-0XG5 (Download)

NOTE The application as of version V4.0 cannot be used with firmware versions smaller than V4.8, since the necessary connector of the signed cos phi actual value (r3496 of the drive object A_INF) has only been available since version V4.8.

[1] the license is required for integrating the application
[2] the license is recommended, but only required for possible adjustments or direct diagnosis in the charts

2.4 Notes for sizing

When determining how much reactive power can be provided by the Active Line Module for the grid, the following aspects have to be taken into account.

Voltage load

It should be noted that the reactive power compensation should be made at the same voltage level to which the converter is connected to. A reactive power compensation in a higher voltage level could mean that the line voltage at the converter connection point is raised, resulting in an overvoltage shutdown of the converter itself. Further, there could be a potential danger due to a faster aging of the motor insulation system as a result of the higher voltage. When engineering the system, it should therefore be ensured that the maximum DC link voltage for 400V devices should not exceed a permanent value of 720V; for 690V devices, a value of 1080V.

Load duty cycles

If the loads connected to the line supply require high levels of reactive powers periodically, then the power cycling capability derating (derating factor kIGBT‘) must be taken into account the same as for the corresponding Motor Modules. However, this is only required if the load duty cycle deviates from the standard duty cycle, i.e. if the value Δ I is greater than 1.5 and/or the load duty cycle is shorter than 300s. You can find more detailed information in the SINAMICS Low-Voltage engineering manual in the "Load duty cycles" section.

Conductor cross-sections

For the cabinet units SINAMICS S150, fuses and cable cross sections are recommended in the documentation. These recommendations are selected based on the type and rating of the motors to be connected; and the line currents that are obtained, assuming that the ALM is only drawing active power and therefore active current according to its factory setting. As a consequence, these values are not equivalent with the currents of the chassis format ALMs used in the S150. If the reactive current is determined from the rated currents of the Active Line Modules and the required active current of the Motor Modules, the required cable cross-sections must be observed carefully.

This is especially important at low power ratings. Another important issue here is that the ALM is not the limiting component, but the fuse, which is recommended. As a consequence, after determining the reactive power that is available, the absolute current should also be determined to ensure that the recommended fuse is not overloaded. The ALMs used in the converter cabinet units together with their lineside rated currents are listed in the following table.

Table 2-1

SINAMICS S150		
Voltage level 380V to 480V		
Power Motor Module [kW]	Power ALM [kW]	Rated Input Current ALM [A]
110	132	210
132	132	210
160	235	380
200	235	380
250	300	490
315	380	605
400	500	840
450	500	840
560	630	985
710	900	1405
Voltage level 500V to 690V		
Power Motor Module [kW]	Power ALM [kW]	Rated Input Current ALM [A]
75	150	140
90	150	140
110	150	140
132	150	140
160	330	310
200	330	310
250	330	310
315	330	310
400	560	575
450	560	575
560	560	575
710	800	735
800	1100	1025
900	1100	1025
1000	1100	1025
1200	1400	1270

The overview is only applicable if option L04 was **not selected**.

Determining reactive power

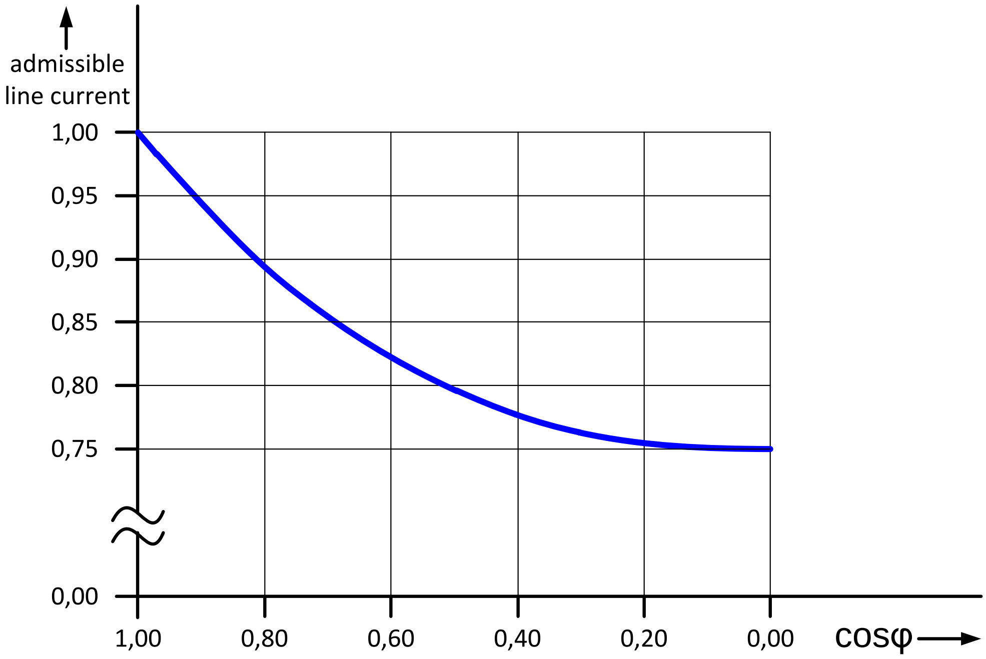
At the Active Line Module there is, according to its factory settings, no external setpoint set for a reactive current. Thereby the Active Line Module only provides the reactive current which is needed in the Clean Power Filter at the corresponding Active Interface Module. In this way, the Active Infeed or rather the converter only draws active power from the grid.

Using the DCC chart, an additional setpoint channel is interconnected which results in an additional reactive current, feed from the converter. As a consequence a basic fundamental power factor of cos φ < 1 occurs on the grid side.

If the Active Line Module is operated with a basic fundamental power factor of cos φ < 1 then losses in the Active Line Module increase as a result of the modulation system used. For that reason, the permissible input current of the Active Line Module must be reduced, based on the rated input current.

The values should be taken from the following derating characteristic. The first two characteristics are applicable for Chassis format devices as well as for cabinet units; the last two characteristics are valid for Booksize format devices.

Figure 2-4: Derating characteristic for ALM in Chassis and Booksize with 120 kW format



From the derating characteristics for chassis and booksize ALMs, a characteristic was derived. This can be used to determine the minimum possible basic fundamental power factor cos φ based on the ratio of active current and rated input current of the ALM. Using the cos φ, it is possible to determine the reactive power that can be provided for the line supply. At the end of this section, the procedure is shown in an example.

Figure 2-5: characteristic for ALM in Chassis and Booksize with 120 kW format

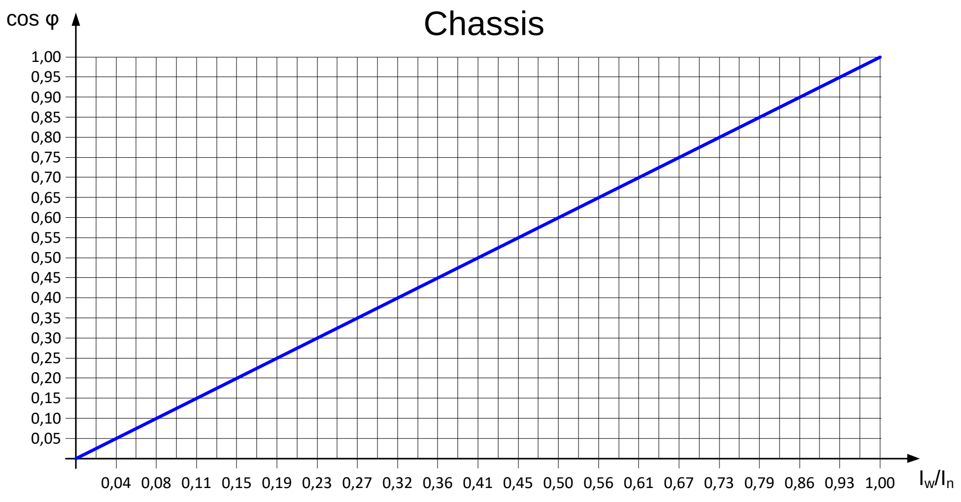


Figure 2-6: Derating characteristic for Booksize ALMs up to 80 kW

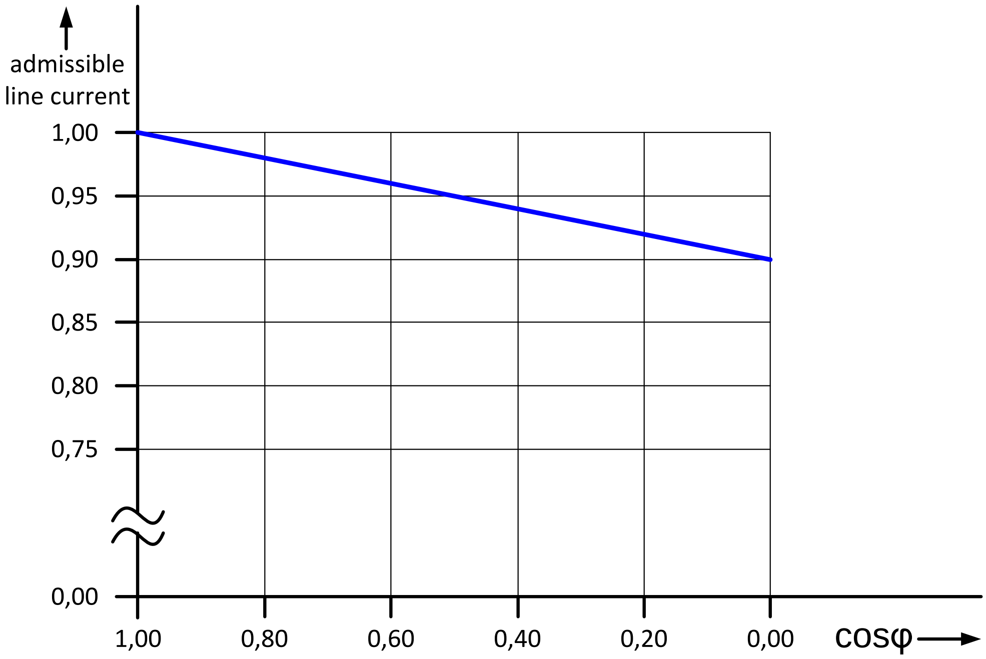
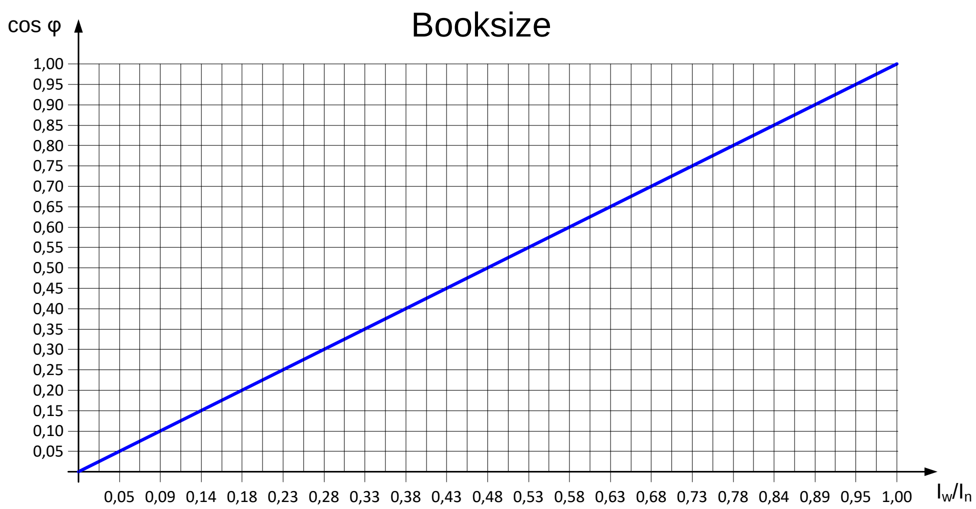


Figure 2-7: characteristic for Booksize ALMs up to 80 kW



Example for determining the available reactive power:

A SIMOTICS N-compact 1LA8407-4PM70 induction motor is to be controlled from a SINAMICS S150 / 710kW / 690V. In this example, it is assumed that the line supply has no significant voltage dips. Otherwise, this would have to be taken into account when determining active current I_w.

For this application, the operating point with the highest power is at 1300 rpm at a power of 600 kW. The motor has an efficiency of 96.4 %, the SINAMICS S150 has power losses of 30.25 kW (see catalog). The Motor Module only transfers active power to the Active Line Module via the DC link. So first it has to be determined how much power the motor draws. Furthermore the power loss of the SINAMICS S150 is taken from catalog.

$$P_{motor} = \frac{P_{shaft}}{\eta} = \frac{600\ kW}{0.964} = 620\ kW$$

$$P_{line} = P_{motor} + P_{losses\ S150} = 620\ kW + 30.25\ kW = 650.25\ kW$$

Determining the active current I_W:

$$I_W = \frac{P_{line}}{\sqrt{3} * U_{line}} = \frac{650.25\ kW}{\sqrt{3} * 690\ V} = 544\ A$$

SINAMICS S150 with 710kW has a rated current of I_N = 735A.

$$\frac{I_W}{I_N} = \frac{544\ A}{735\ A} = 0.74$$

From the characteristic, for I_W/I_N = 0.74, a cos φ of 0.82 can be determined. This is the lowest possible value for cos φ, when drawing active power.

Determining the available reactive current I_Q:

$$I_Q = I_W * \tan(arccos\varphi) = 544\ A * \tan(arccos 0.82) = 380\ A$$

Determining the reactive power Q available:

$$Q = \sqrt{3} * U_{line} * I_Q = \sqrt{3} * 690\ V * 380\ A = 454\ kvar$$

Determining the absolute current:

$$I_{total} = \sqrt{(I_W^2 + I_Q^2)} = \sqrt{544\ A^2 + 380\ A^2} = 663.6\ A$$

It is recommended to protect the device using 3NE1448-2 (850A) fuses. The rated fuse current of 850A is higher than the maximum occurring line current of 663.6A, meaning that the SINAMICS S150 can supply the reactive power.

3 Commissioning the application

3.1 Commissioning the cos phi-display

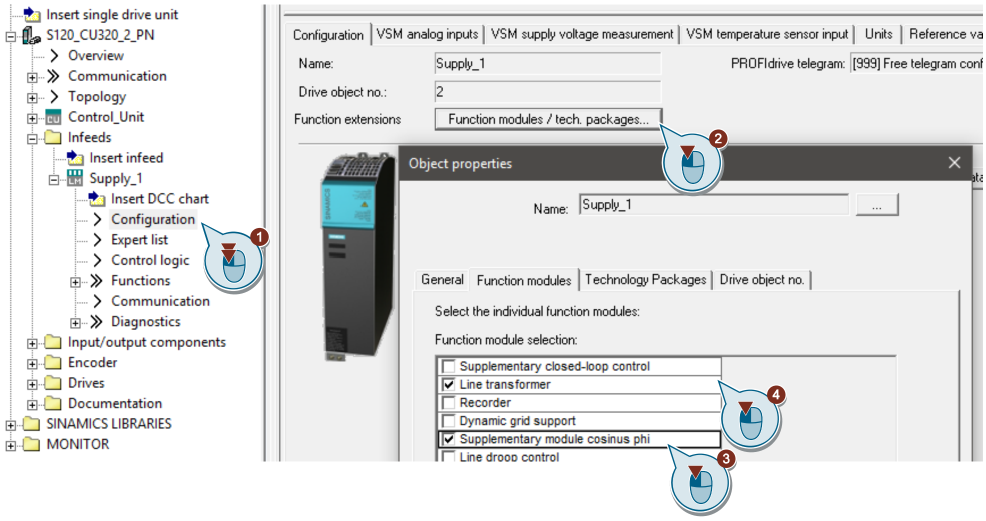
Preconditions

- For the cos φ - calculation function the function module “Supplementary module cosinus phi” has to be enabled while commissioning the Active Line Module. Hereby two additional parameters p3473 and p3479 will be available.

  If a second VSM10 is being used to display the cos φ, the function module “Line transformer” has to be enabled in addition:

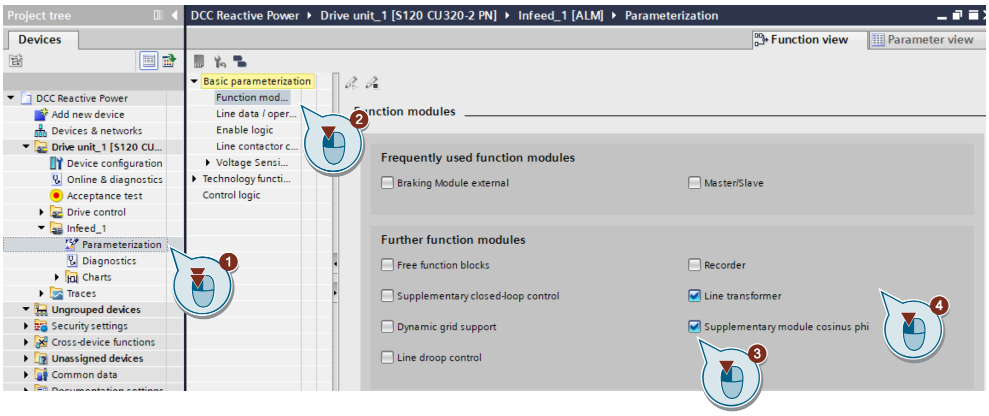
  - using Starter:

Figure 3-1



  - using Startdrive:

Figure 3-2



- Precondition for a valid cos φ display is, that both the Active Line Module and the Voltage Sensing Module are operated on the same power line; meaning with the same power line frequency.

  Especially in parameter r66 the correct power line frequency must be shown, respectively the Active Linen Module must be in operation. Transformers are permitted between the measuring point and the Active Line Modules connection point. A possible resulting phase rotation (mixed-up phase order) must be parameterized (see p3475).

Input variables for the cos φ display are the phase currents and phase voltages at the measuring point.

- Basically the measured values (i1, i2, u12, u23) can be gathered from or by any means and then been forwarded to the calculation block throughout BiCO-connections (p3473, p3474). Attention should be put on possible dead times due to the signal transmission (see calibration parameters p3479).
- Especially the VSM10 with two measurement inputs for line voltages up to 3 AC 690 V_{eff} and current-voltage-converters for +/- 10 V is well-suited for data logging. Depending on the application suitable current converters have to be selected and parameterize for conversion to the related current (p3670).

Application

- Two cos φ values for different connections at the same grid can be gathered and calculated simultaneously. (For example and outer cos φ at the common line connection for the entire system and an inner cos φ at the inverter's terminals). That's the reason why all parameter are indexed twice.
- By using p3475 both independent cos φ displays can be enabled (bit 0) and configured:
  - Configuration-bit-1 defines, whether the input signals for current and voltage are available in space-vector-coordinates (alpha/beta) or in three-phase-representation (phases R, S, T). Hereby either values from internal grid models (e.g. r3467, r3468) or VSM10 measurements (e.g. r5461, r5471) can be selected.
  - Configuration-bit-2 defines, whether phases are mixed-up between the cos φ measurement point (voltages and currents) and the terminals on the Active Line Module due to the usage of and transformer.
- Depending on the configuration selected, the signal sources of the actual current and voltage values must be parameterized (in p3473 and p3474) for the cos φ measuring point. The measurement value is shown in sign (r3477) and absolutely (r3478). Particularly when r3478 = 1, any phase shift between currents results in a change of sign. However, a matching smoothing (p3476) can prevent from toggling and ensure a required response time of the measurement.
- For the accuracy of the cos φ display, it is crucial to consider all dead and delay times of the current and voltage measurement. In p3479 the measurement can be adjusted in case no VSM10 is used for the current measurement or if additional dead times arise due to communication busses.

  For an easy calibration without any external measurement device, both cos φ displays can be used simultaneously to do so.
  The first display r3478[0] is using the internal current measurement from the Active Line Module and the voltages at the line filters, measured by the VSM10. The second display r3478[1] uses the application specific external measurement to gather the same currents between Active Line Module and Active Interface Module, as well as the same voltages from VSM10 in three-phase-coordinates:

  - p3473[0] = r3467[2],
  - p3473[1] = r3467[3],
  - p3474[0] = default,
  - p3474[1] = default,
  - p3475[0] = 1,
  - p3473[2] = e.g. r5471[0],

- p3473[3] = e.g. r5472[0],
- p3474[2] = r3661,
- p3474[3] = r3662,
- p3475[1] = 3

If all dead times are set correctly in p3479[1] both displays r3478[0] and r3478[1] are showing the same value in operation.

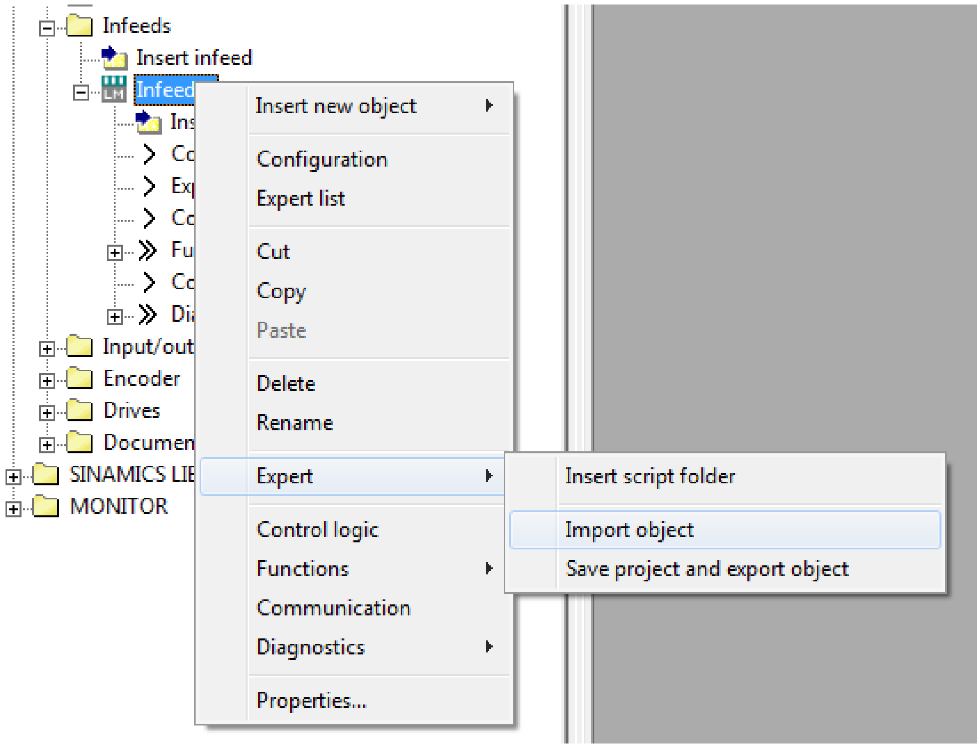
By using separate external reference instruments the accuracy of the calibration can be increased, if needed.

Calibration parameter p3479 is preset for the current measurement with the VSM’s 10 V inputs. When calibrated correctly, the cos φ display is typically < 0.01.

3.2 Installing the DCC charts with Starter

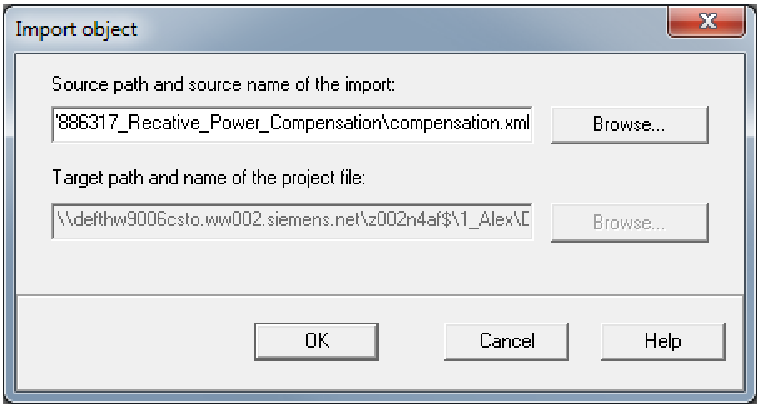
- Extract the zipped file with the application on your computer to any directory
- Right click on the infeed in your STARTER project and select “Expert > Import object”

Figure 3-3



- Next, select the file “compensation.xml” in the directory with the unzipped application

Figure 3-4

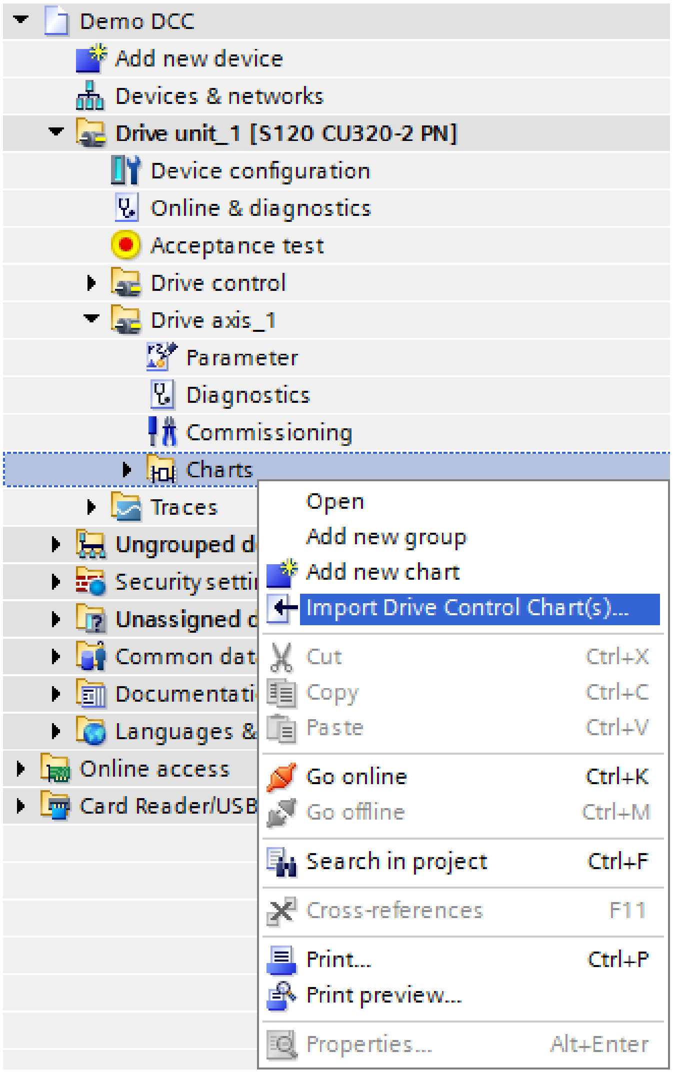


- Confirm the dialog box with “OK”
- Then, “Accept and compile” the DCC chart and safe your project

3.3 Installing the DCC charts with Startdrive

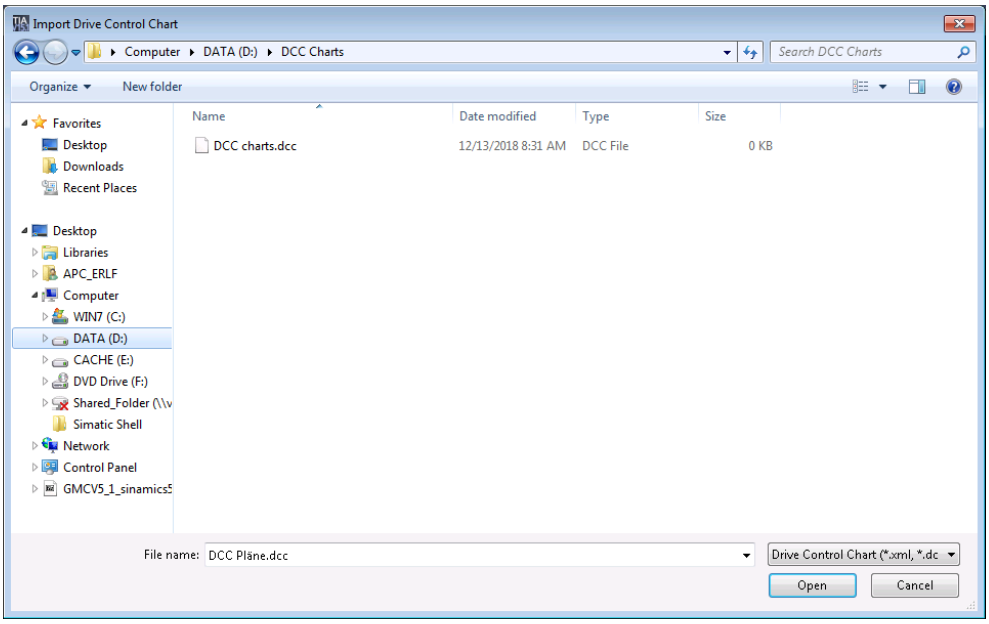
- Extract the software package with the application on your computer into any directory.
- In your project, right-click on the plan folder of the drive on which you want to use the application and select "Import Drive Control Chart(s)" from the context menu.

Figure 3-5



- Now select the ".dcc" file with the DCC plans in the directory with the unpacked application and click on "Open" to import them.

Figure 3-6



3.4 Interface adjustment

To start, the following parameters should be set. Recommendations are provided as far as possible. The interconnected value can be entered into the last column. The recommended value should be set for values, whose last column is grayed out.

Table 3-1

Parameter No.	Description	Factory setting	Recommendation	Own assignment
p21610	reference value reactive/active power [kvar/kW]	5.0		
p21510 resp. p21603	Technology control word 1 resp. method of closed-loop control (1=rp; 2=cos phi)			
p21628	CI: VSM actual input voltage	A_INF_02 : r3661	Select the VSM unit that measures the mains voltage upstream of loads: VSM_1: r3661 VSM_2: r5461[0] VSM_3: r5461[1]	
p21629	CI: VSM actual input current	A_INF_02 : r3671	Select the VSM unit that measures the mains voltage upstream of loads: VSM_1: r3671 VSM_2: r5471[0] VSM_3: r5471[1]	
p21636	CI: cos phi actual value signed	A_INF_02 : r3496[0]	Depending on the cos φ display: either r3496[0] or [1]	

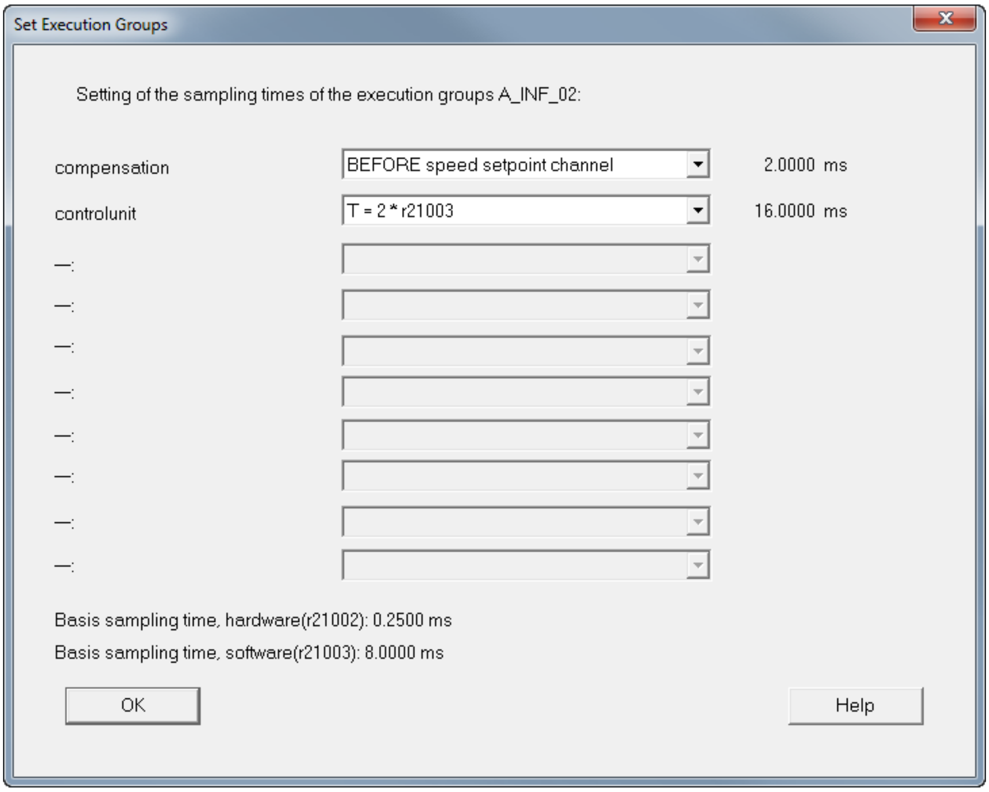
Additional setting options and their associated parameters can be seen in the function charts.

3.5 Information about processing time

The application has a modular structure and can therefore be scaled with regard to the required computing time. Depending on the configuration of the drive device and depending on the activated sequence groups (when used with starter) or DCC plans (when used with start drive) of the winder application, the Control Unit is used to different utilization rates.
The following sampling times are preset:

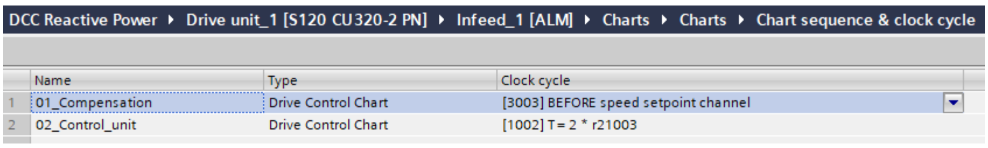
- Starter

Figure 3-7



- Startdrive:

Figure 3-8



This causes the following computing load:

Table 3-2

Execution group / DCC chart	Standard sampling time [ms]	Processing time required [%]	Own assignment
Compensation / 01_Compensation	2	7.8	
Control Unit / 02_Control_unit	16	0.1	

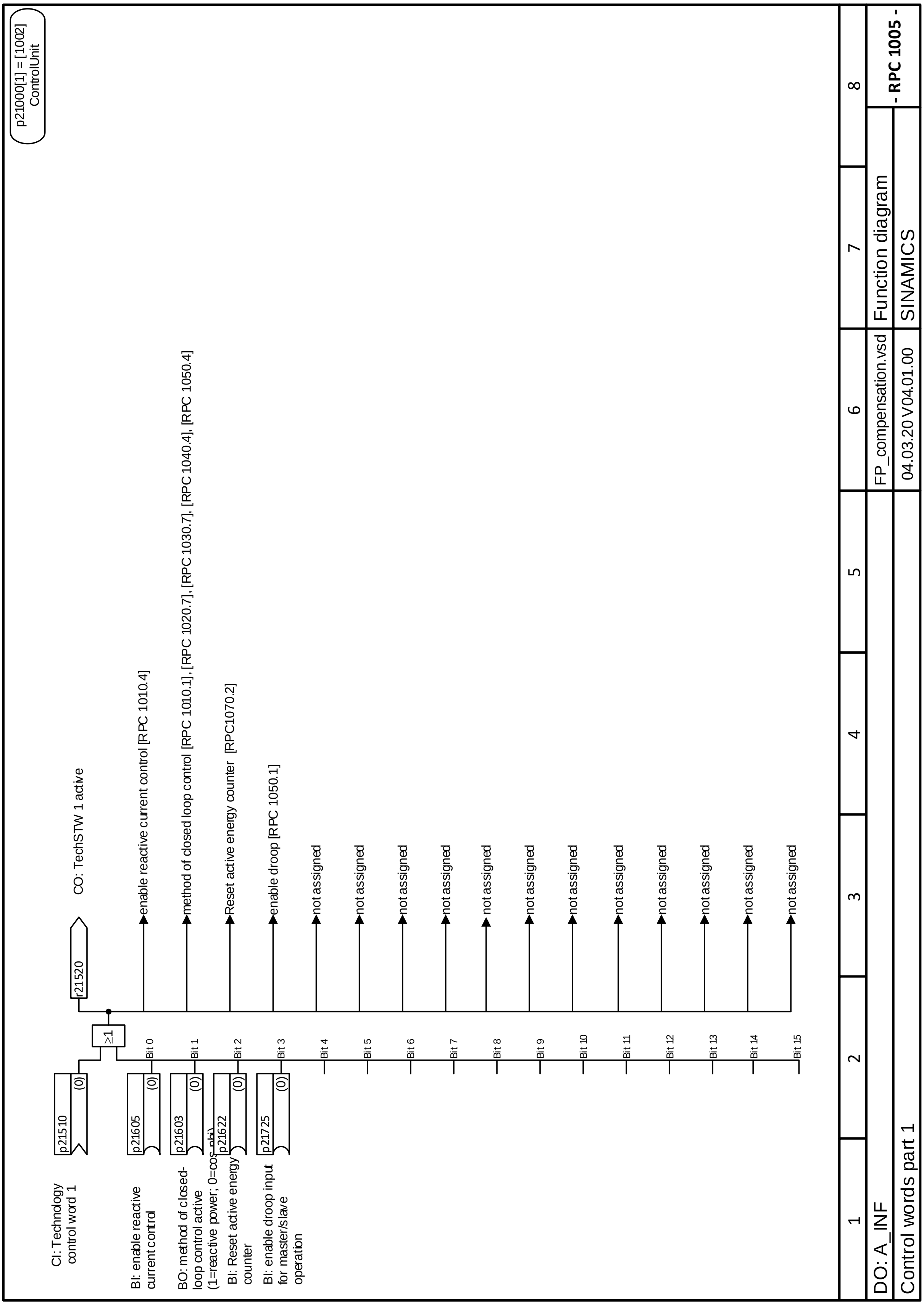
By setting larger times, a considerable reduction of the computing load is possible. This must be taken into account especially if, in addition to the Active Line Module, several drives are also created on the same CU320-2. This is shown in the following example:

Table 3-3

Execution group / DCC chart	Changed sampling time [ms]	Processing time required [%]
Compensation / 01_Compensation	16	0.9
Control Unit / 02_Control_unit	32	0.1

4 Program description

4.1 Function charts

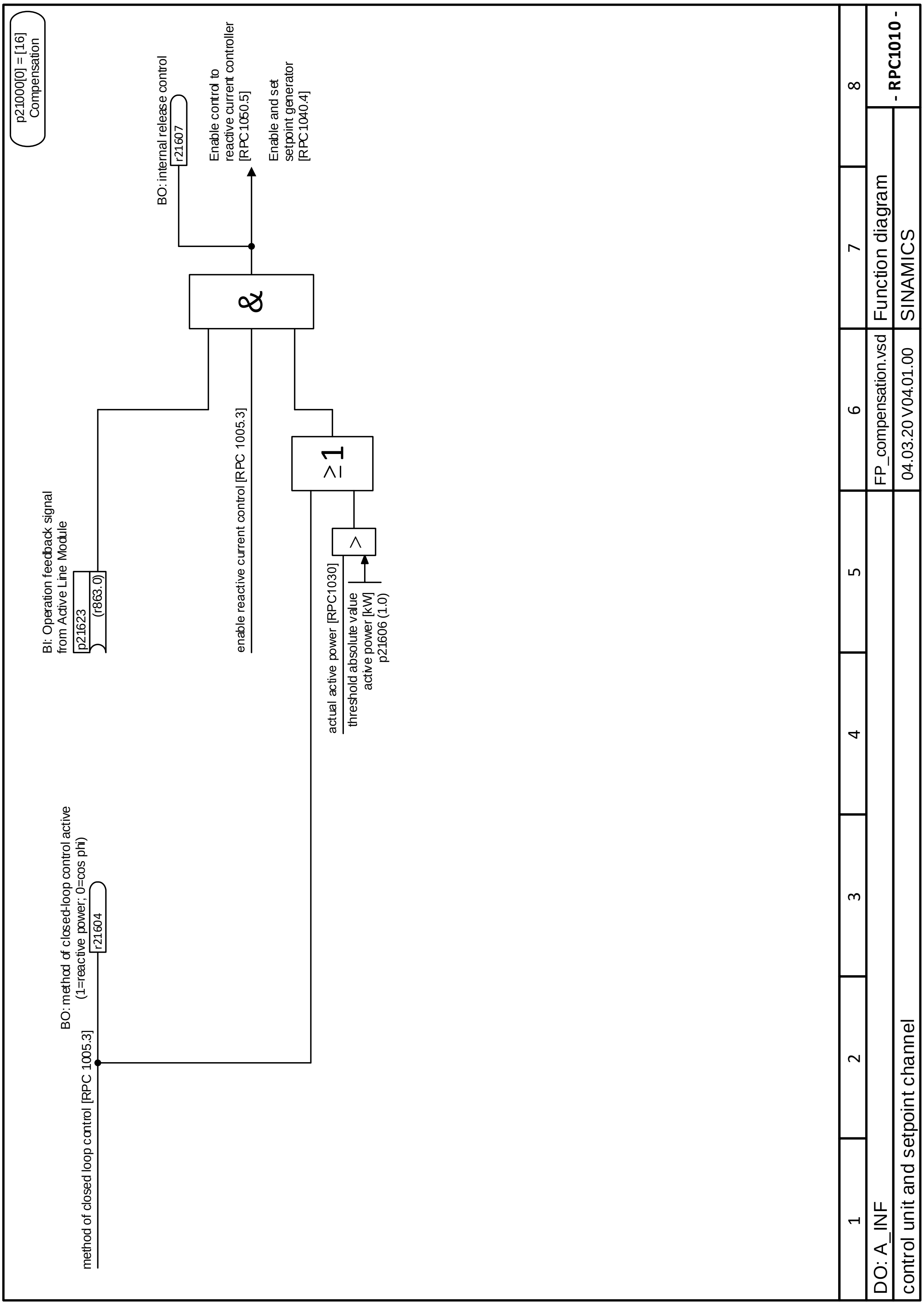

p21000[1] = [1002]
ControlUnit
CI: Technology control word 1
p21510
(0)
≥1
r21520
CO: TechSTW 1 active
BI: enable reactive current control
p21605
(0)
Bit 0
enable reactive current control [RPC 1010.4]
BO: method of closed-loop control active (1=reactive power; 0=cos phi)
p21603
(0)
Bit 1
method of closed loop control [RPC 1010.1], [RPC 1020.7], [RPC 1030.7], [RPC 1040.4], [RPC 1050.4]
BI: Reset active energy counter
p21622
(0)
Bit 2
Reset active energy counter [RPC1070.2]
BI: enable droop input for master/slave operation
p21725
(0)
Bit 3
enable droop [RPC 1050.1]
Bit 4
Bit 5
Bit 6
Bit 7
Bit 8
Bit 9
Bit 10
Bit 11
Bit 12
Bit 13
Bit 14
Bit 15
not assigned
1
2
3
4
5
6
7
8
DO: A_INF
Control words part 1
FP_compensation.vsd
04.03.20 V04.01.00
Function diagram
SINAMICS
- RPC 1005 -

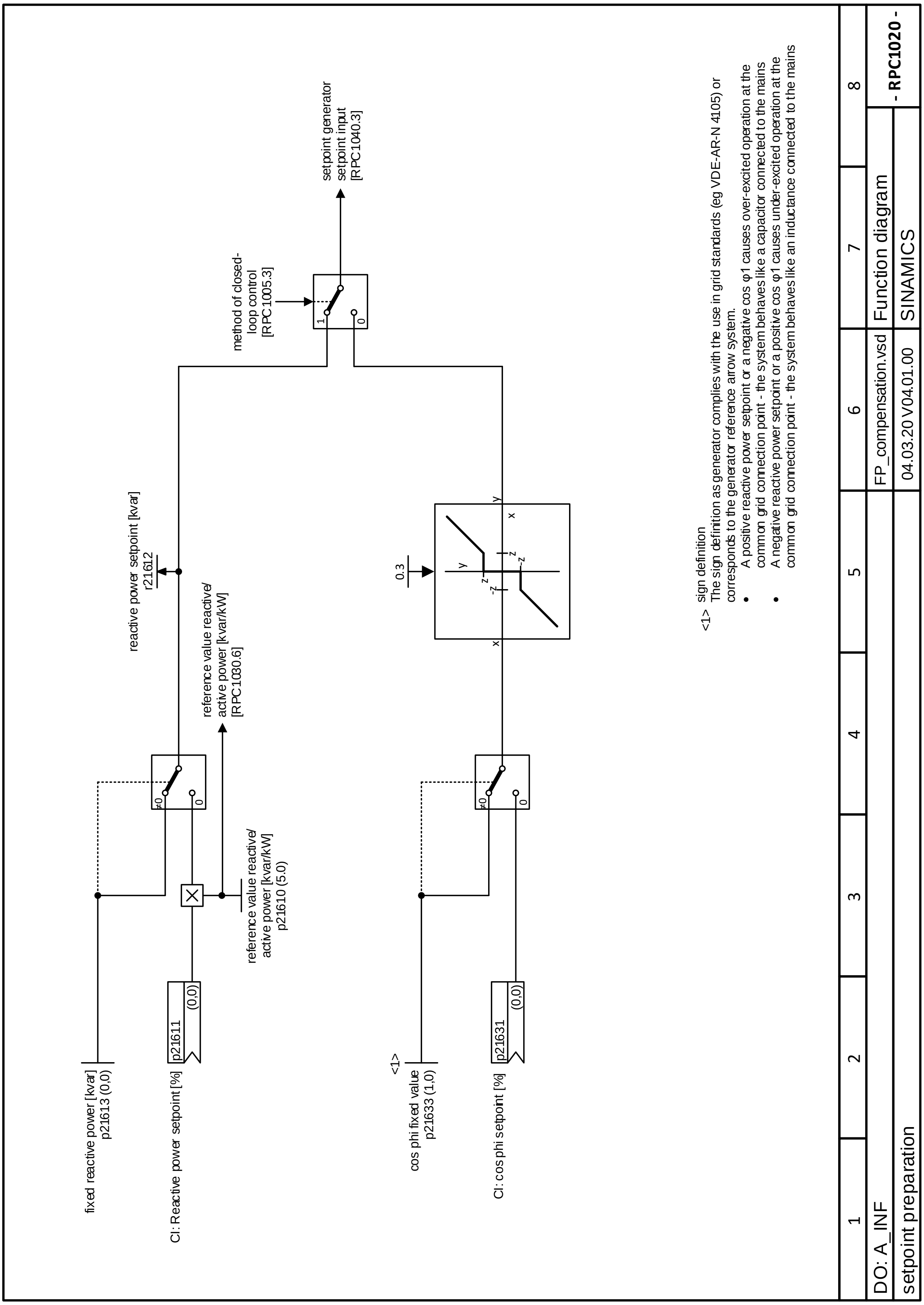
p21000[1] = [1002]
ControlUnit

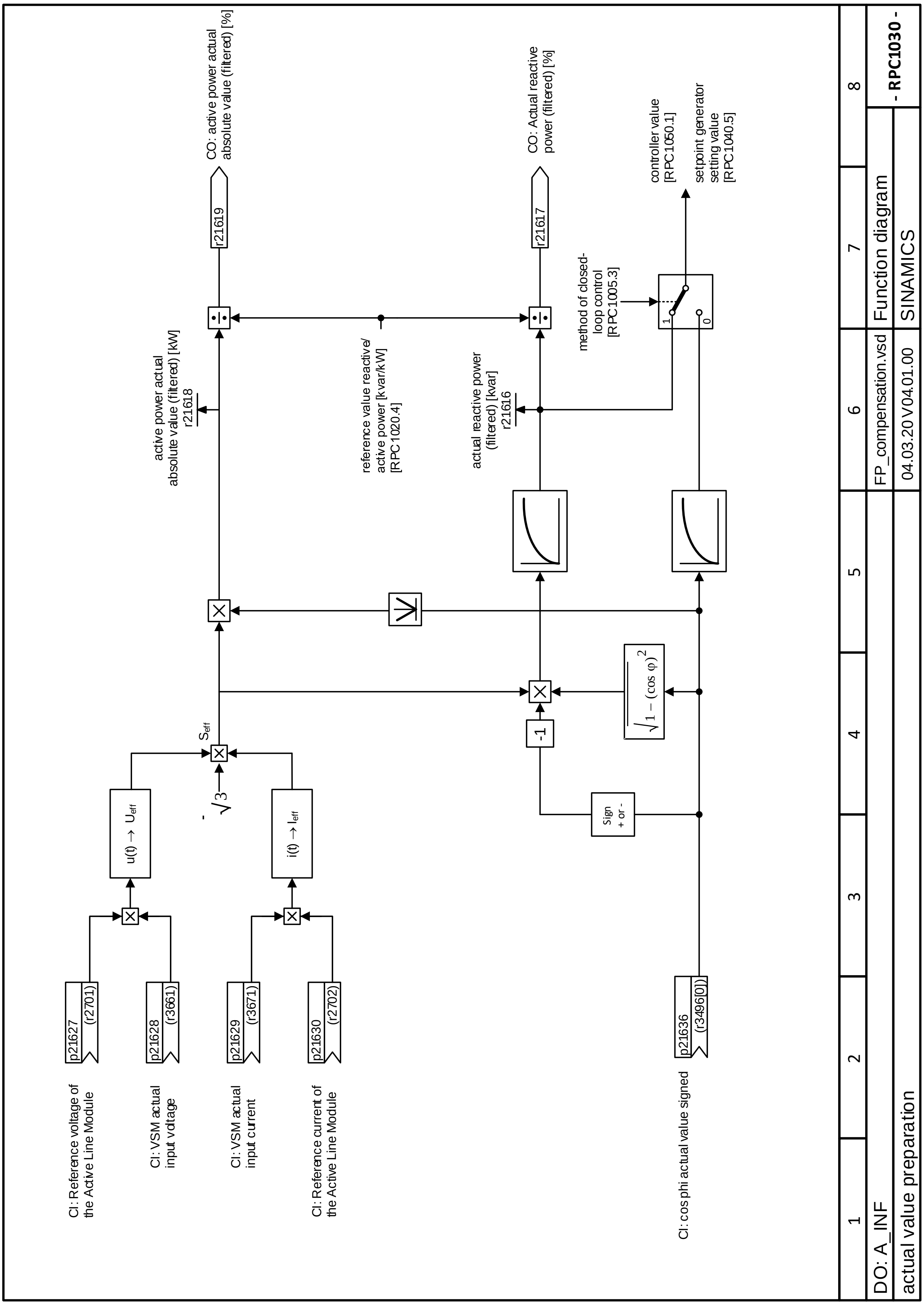
CO: Technology status word 1
r21541

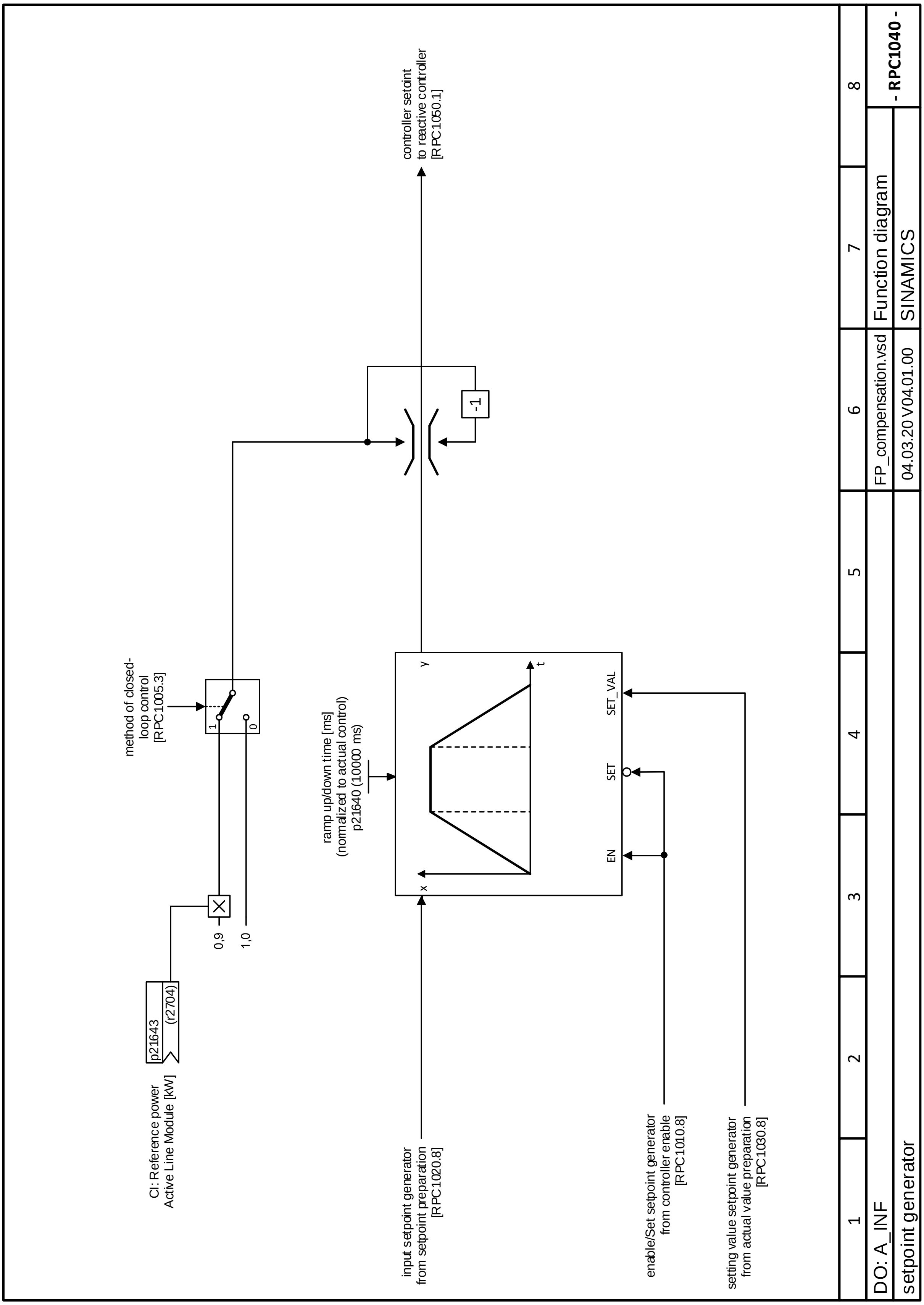
Bit No.	Technology status word 1
0	**1 = closed loop control released**
1	**1 = reactive power compensation active**
2	**1 = reserved**
3	**1 = reactive current controller at upper limit**
4	**1 = reactive current controller at lower limit**
5	**1 = reserved**
6	**1 = reserved**
7	**1 = reserved**
8	**1 = reserved**
9	**1 = reserved**
10	**1 = reserved**
11	**1 = reserved**
12	**1 = reserved**
13	**1 = reserved**
14	**1 = reserved**
15	**1 = reserved**

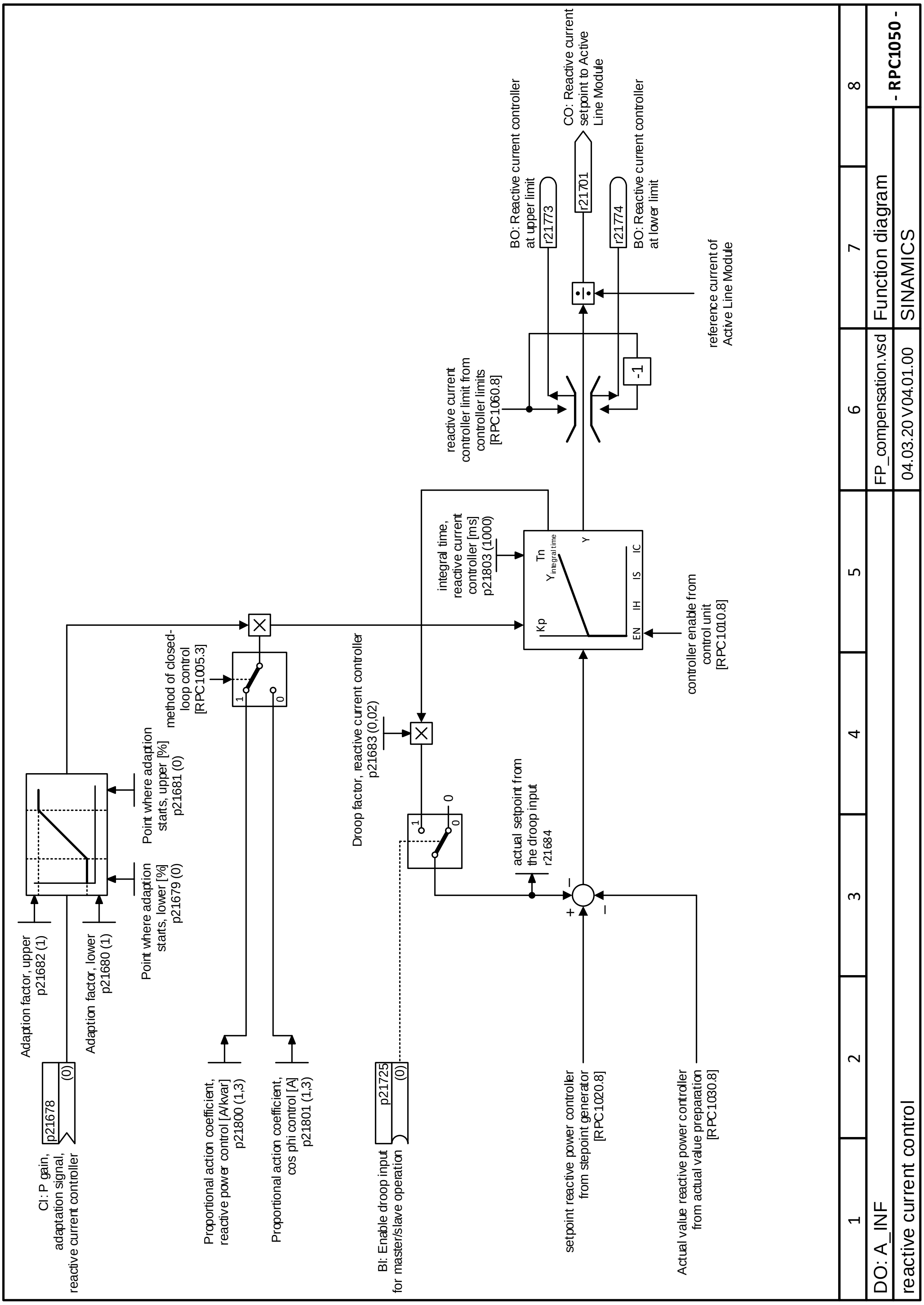
1	2	3	4	5	6	7	8
DO: A_INF					FP_compensation.vsd	Function diagram	**- RPC 1007 -**
Status words part 1					04.03.20 V04.01.00	SINAMICS	


p21000[0] = [16]
Compensation
BO: internal release control
r21607
Enable control to
reactive current controller
[RPC1050.5]
Enable and set
setpoint generator
[RPC1040.4]
&
BI: Operation feedback signal
from Active Line Module
p21623
(r863.0)
enable reactive current control [RPC 1005.3]
≥1
>
actual active power [RPC1030]
threshold absolute value
active power [kW]
p21606 (1.0)
BO: method of closed-loop control active
(1=reactive power; 0=cos phi)
r21604
method of closed loop control [RPC 1005.3]
1
2
3
4
5
6
7
8
DO: A_INF
control unit and setpoint channel
FP_compensation.vsd
04.03.20 V04.01.00
Function diagram
SINAMICS
- RPC1010 -

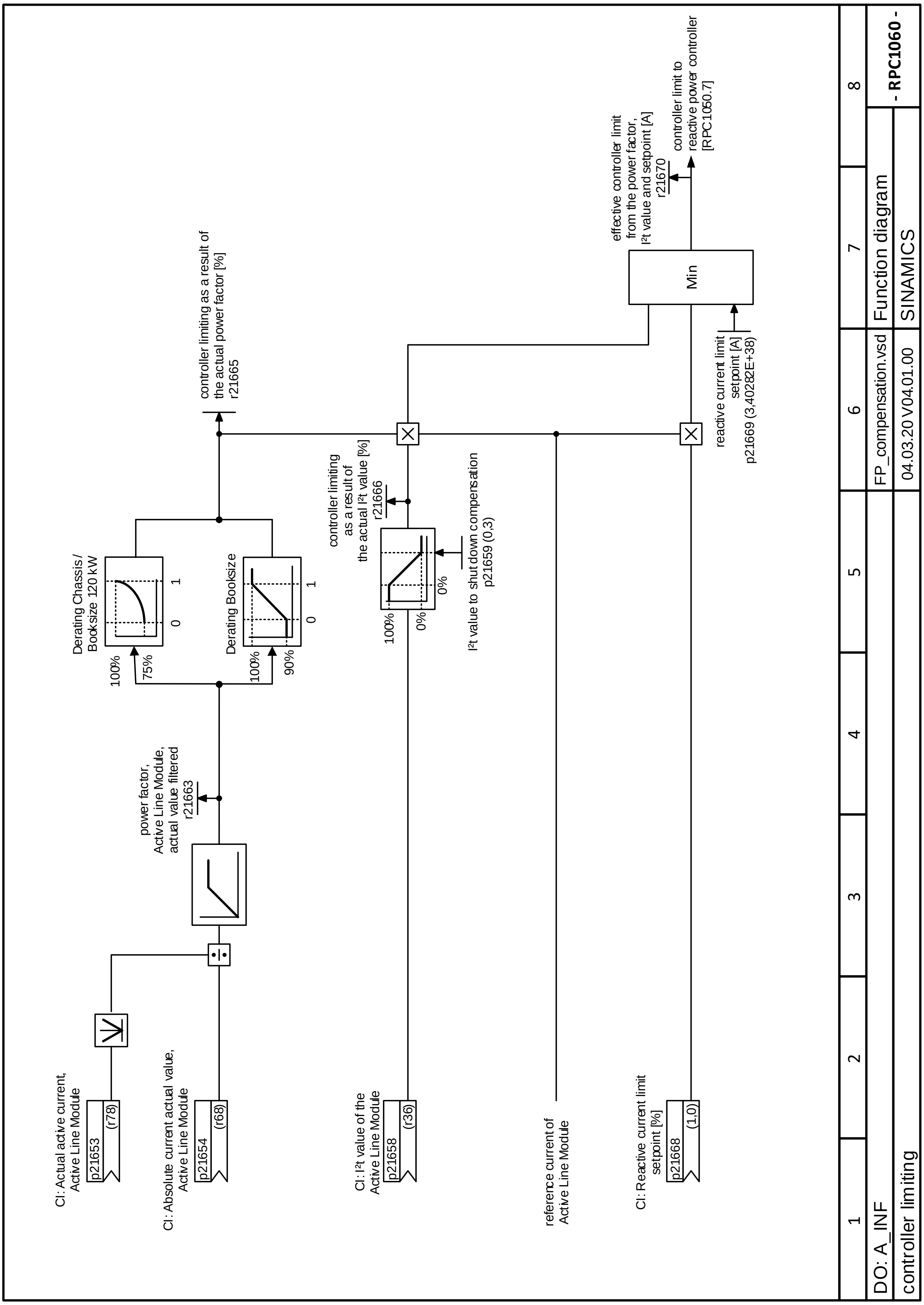

fixed reactive power [kvar]
p21613 (0,0)
CI: Reactive power setpoint [%]
p21611
(0,0)
reference value reactive/
active power [kvar/kW]
p21610 (5.0)
≠0
0
reference value reactive/
active power [kvar/kW]
[RPC1030.6]
reactive power setpoint [kvar]
r21612
<1>
cos phi fixed value
p21633 (1,0)
CI: cos phi setpoint [%]
p21631
(0,0)
0.3
x
y
z
-z
method of closed-
loop control
[RPC1005.3]
1
0
setpoint generator
setpoint input
[RPC1040.3]
<1> sign definition
The sign definition as generator complies with the use in grid standards (eg VDE-AR-N 4105) or
corresponds to the generator reference arrow system.
A positive reactive power setpoint or a negative cos φ1 causes over-excited operation at the
common grid connection point - the system behaves like a capacitor connected to the mains
A negative reactive power setpoint or a positive cos φ1 causes under-excited operation at the
common grid connection point - the system behaves like an inductance connected to the mains
1
2
3
4
5
6
7
8
DO: A_INF
setpoint preparation
FP_compensation.vsd
04.03.20 V04.01.00
Function diagram
SINAMICS
- RPC1020 -

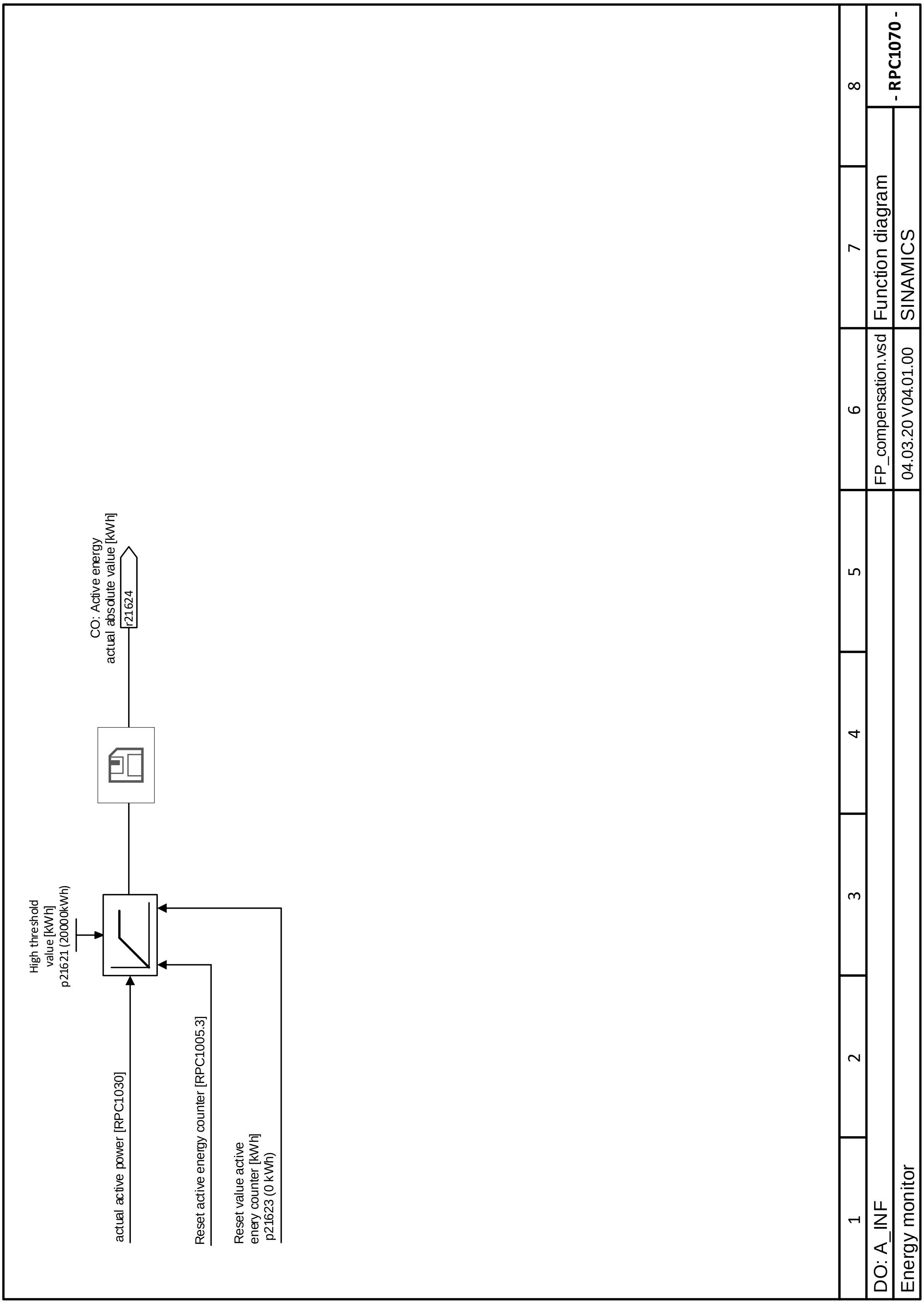

CI: Reference voltage of the Active Line Module
p21627 (r2701)
CI: VSM actual input voltage
p21628 (r3661)
CI: VSM actual input current
p21629 (r3671)
CI: Reference current of the Active Line Module
p21630 (r2702)
CI: cos phi actual value signed
p21636 (r3496[0])
u(t) → Ueff
i(t) → Ieff
√3
Seff
Sign + or -
-1
√1 − (cos φ)²
active power actual absolute value (filtered) [kW]
r21618
reference value reactive/ active power [kvar/kW] [RPC1020.4]
actual reactive power (filtered) [kvar]
r21616
r21619
CO: active power actual absolute value (filtered) [%]
r21617
CO: Actual reactive power (filtered) [%]
method of closed-loop control [RPC1005.3]
1
0
controller value [RPC1050.1]
setpoint generator setting value [RPC1040.5]
1
2
3
4
5
6
7
8
DO: A_INF
actual value preparation
FP_compensation.vsd
04.03.20 V04.01.00
Function diagram
SINAMICS
- RPC1030 -


controller setoint
to reactive controller
[RPC1050.1]
-1
method of closed-
loop control
[RPC1005.3]
1
0
CI: Reference power
Active Line Module [kW]
p21643
(r2704)
0,9
1,0
ramp up/down time [ms]
(normalized to actual control)
p21640 (10000 ms)
y
t
x
EN
SET
SET_VAL
input setpoint generator
from setpoint preparation
[RPC1020.8]
enable/Set setpoint generator
from controller enable
[RPC1010.8]
setting value setpoint generator
from actual value preparation
[RPC1030.8]
1
2
3
4
5
6
7
8
DO: A_INF
setpoint generator
FP_compensation.vsd
04.03.20 V04.01.00
Function diagram
SINAMICS
- RPC1040 -



CI: P gain, adaptation signal, reactive current controller
p21678
(0)
Adaption factor, upper p21682 (1)
Adaption factor, lower p21680 (1)
Point where adaption starts, lower [%] p21679 (0)
Point where adaption starts, upper [%] p21681 (0)
method of closed-loop control [RPC1005.3]
1
0
Proportional action coefficient, reactive power control [A/kvar] p21800 (1,3)
Proportional action coefficient, cos phi control [A] p21801 (1,3)
BI: Enable droop input for master/slave operation
p21725
(0)
Droop factor, reactive current controller p21683 (0,02)
actual setpoint from the droop input r21684
setpoint reactive power controller from stepoint generator [RPC1020.8]
Actual value reactive power controller from actual value preparation [RPC1030.8]
integral time, reactive current controller [ms] p21803 (1000)
Kp
Tn
Y
EN
IH
IS
IC
controller enable from control unit [RPC1010.8]
reactive current controller limit from controller limits [RPC1060.8]
-1
BO: Reactive current controller at upper limit
r21773
CO: Reactive current setpoint to Active Line Module
r21701
BO: Reactive current controller at lower limit
r21774
reference current of Active Line Module
1
2
3
4
5
6
7
8
DO: A_INF
reactive current control
FP_compensation.vsd
04.03.20 V04.01.00
Function diagram
SINAMICS
- RPC1050 -


CI: Actual active current, Active Line Module
p21653
(r78)
CI: Absolute current actual value, Active Line Module
p21654
(r68)
power factor, Active Line Module, actual value filtered
r21663
Derating Chassis / Booksize 120 kW
100%
75%
0
1
Derating Booksize
100%
90%
0
1
controller limiting as a result of the actual power factor [%]
r21665
CI: I²t value of the Active Line Module
p21658
(r36)
100%
0%
0%
I²t value to shut down compensation
p21659 (0,3)
controller limiting as a result of the actual I²t value [%]
r21666
reference current of Active Line Module
CI: Reactive current limit setpoint [%]
p21668
(1,0)
reactive current limit setpoint [A]
p21669 (3,40282E+38)
Min
effective controller limit from the power factor, I²t value and setpoint [A]
r21670
controller limit to reactive power controller
[RPC1050.7]
1
2
3
4
5
6
7
8
DO: A_INF
controller limiting
FP_compensation.vsd
04.03.20 V04.01.00
Function diagram
SINAMICS
- RPC1060 -



actual active power [RPC1030]
Reset active energy counter [RPC1005.3]
Reset value active enery counter [kWh] p21623 (0 kWh)
High threshold value [kWh] p21621 (20000kWh)
CO: Active energy actual absolute value [kWh]
r21624
1
2
3
4
5
6
7
8
DO: A_INF
Energy monitor
FP_compensation.vsd
04.03.20 V04.01.00
Function diagram
SINAMICS
- RPC1070 -

4.2 Parameter list

4.2.1 Basic structure of parameter descriptions

The data in the following example has been chosen at random. The table below contains all the information that can be included in a parameter description. Some of the information is optional.

The parameter lists have the following structure:

- Start of example -

pxxxx[0...n]	**BICO: Full parameter name / abbreviated name**				
Drive object	**Can be changed:** U, T		**Calculated:** -		**Access level:** 2
	Data type:		**Dynamic index: -**		**Function diagram:** ASC 1012
	P-Group:		**Unit group: -**		**Unit selection: -**
	Not for motor type: -				**Expert list:** 1
	Min		**Max**		**Factory setting**
	0.00 [Nm]		10.00 [Nm]		0.00 [Nm]
Description:	Text				
Values:	0: Name and meaning of value 0 1: Name and meaning of value 1 2: Name and meaning of value 2 etc.				
Recommendation:	Text				
Bit array:	**Bit**	**Signal name**	**1 signal**	**0 signal**	**FP**
	00	Name and meaning of bit 0	Yes	No	ASC 1620
	01	Name and meaning of bit 1	Yes	No	ASC 1620
	02	Name and meaning of bit 2 etc.	Yes	No	ASC 1620
Dependency:	Text See also: pxxxx, rxxxx See also: Fxxxxx, Axxxxx				
Danger: DANGER	**Warning:** WARNING	**Caution:** CAUTION	Safety notices with a warning triangle		
Caution:	**Notice:**		Safety notices without a warning triangle		
Note:	Information that might be useful.				

- End of example - - - -

The individual pieces of information are described in detail below.

pxxxx[0...n] Parameter number

The parameter number is made up of a "p" or "r", followed by the parameter number and the index or bit field (optional).

Examples of the representation in the parameter list:

p...	adjustable parameters (can be read and written)
r...	display parameters (read only)
p0918	Adjustable parameter 918
p0099[0...3]	Adjustable parameter 99 indices 0 to 3
p1001[0...n]	Adjustable parameter 1001 indices 0 to n (n = configurable)
r0944	Display parameter 944
r2129.0...15	Display parameter 2129 with bit array from Bit 0 (lowest bit) to bit 15 (highest bit)

Other examples for the notation in the documentation:

p1070[1]	Adjustable parameter 1070, index 1
p2098[1].3	Adjustable parameter 2098, index 1 bit 3
r0945[2](3)	Display parameter 945, index 2 of Drive object 3
p0795.4	Adjustable parameter 795, bit 4

The following applies to adjustable parameters:

The parameter value "when shipped from the factory" is specified under "Factory setting" with the relevant unit in square parentheses. The value can be adjusted within the range defined by "Min" and "Max".

The term "linked parameterization" is used in cases where changes to adjustable parameters affect the settings of other parameters.

Linked parameterization can occur, for example, as a result of the following actions and parameters:

Executing macros

p0015, p0700, p1000, p1500

Setting the PROFIBUS telegram (BICO interconnection)

p0922

Setting component lists

p0230, p0300, p0301, p0400

Automatically calculating and preassigning

p0112, p0340, p0578, p3900

Restoring factory settings

p0970

The following applies to display parameters:

The fields "Min", "Max" and "Factory setting" are specified with a dash "-" and the relevant unit in square brackets.

Note The parameter list can contain parameters that are not visible in the expert lists of the respective commissioning software (e.g. parameters for trace functions).

The parameters of the application example are completely visible in the expert list.

BICO: Full parameter name / abbreviated name

The following abbreviations can appear in front of the BICO parameter name:

BI: Binector Input Binector input)

This parameter selects the source of a digital signal.

BO: Binector output Binector output)

This parameter is available as an digital signal for interconnection with other parameters.

CI: Connector Input Connector input)

This parameter selects the source of an "analog" signal.

CO: Connector output Connector output)

This parameter is available as an "analog" signal for interconnection with other parameters.

CO/BO: Connector/Binector Output Connector/Binector Output)

This parameter is available as both an "analog" and also as digital signals for interconnection with other parameters.

Note A BICO input (BI/CI) cannot be just interconnected with any BICO output (BO/CO, signal source).

When interconnecting a BICO input using the commissioning software, only the signal sources that are actually possible are listed.

Function diagrams 1020 ... 1030 of the List Manual explain the symbols for BICO parameters and how to handle BICO technology.

Drive object (function module)

A drive object (DO) is an independent, "self-contained" functional unit that has its own parameters and, in some cases, faults and alarms.

When carrying out commissioning using the commissioning software, you can select/deselect additional functions and their parameters by activating/deactivating function modules accordingly.

Note References: /FH1/ SINAMICS S120 Function Manual Drive Functions

The parameter list specifies the associated drive object and function module for each individual parameter.

Examples:

p1070 CI: Main setpoint

SERVO (extended setpoint), VECTOR

The parameter is available only in association with drive object SERVO and the "Extended setpoint channel" Function Module or with drive object VECTOR irrespective of activated Function Modules.

p1055 BI: Jogging bit 0

SERVO, VECTOR

For drive objects SERVO and VECTOR, regardless of which function modules have been activated, this parameter is always available. This means that it is available with every activated function module belonging to the drive object.

A parameter can belong to one, several, or all drive objects.

Note All parameters of this application example are also available after installation at the SERVO and VECTOR drive objects. The "Position controller" function module is required for the functionality.

Can be changed

The "-" sign indicates that the parameter can be changed in any object state and that the change will be effective immediately.

The information "C1(x), C2(x), T, U" ((x): optional) means that the parameter can be changed only in the specified drive unit state and that the change will not take effect until the unit switches to another state. One or more states are possible.

The following states are available for the parameter:

C1(x) Device commissioning C1: Commissioning 1

Device is in the process of being commissioned (p0009 > 0).

Pulses cannot be enabled.

The parameter can only be changed in the following device commissioning settings (p0009 > 0):

- C1: Can be changed for all settings p0009 > 0.
- C1(x): Can only be changed for settings p0009 = x

A modified parameter value does not take effect until the device commissioning mode is exited with p0009 = 0.

C2(x) Drive object commissioning C2: Commissioning 2

The drive is in the process of being commissioned (p0009 = 0 and p0010 > 0).

Pulses cannot be enabled.

The parameter can only be changed in the following drive commissioning settings (p0010 > 0):

- C2: Can be changed for all settings p0010 > 0.
- C2(x): Can only be changed for settings p0010 = x.

A modified parameter value does not take effect until the device commissioning mode is exited with p0010 = 0.

U Operation U: R**u**n

Pulses are enabled.

T Ready to operate T: Ready **t**o run

The pulses are not enabled and the state "C1(x)" or "C2(x)" is not active.

Note

Parameter p0009 is CU-specific (available on the Control Unit).

Parameter p0010 is drive-specific (available for each drive object).

The operating state of individual drive objects is displayed in r0002.

Calculated

Specifies whether the parameter is influenced by automatic calculations. The calculation attribute defines which activities influence the parameter.

Note This attribute is not relevant for the application parameters.

Access level

Specifies the minimum access level required to be able to display and change the relevant parameter. The required access level can be set using p0003.

The system uses the following access levels:

1: Standard

2: Extended

3: Expert

4: Service

Note Parameter p0003 is CU-specific (available on the Control Unit). A higher access level will also include the functions of the lower levels.

Data type

Note The data type attribute is not listed for the application parameters.

Dynamic index

Note This dynamic index attribute is not relevant for the application parameters.

Function diagram

The parameter is included in this function diagram. The structure of the parameter function and its relationship with other parameters is shown in the specified function diagram.

P-Group (refers only to access via BOP (Basic Operator Panel))

Specifies the functional group to which this parameter belongs. The required parameter group can be set via p0004.

Note Parameter p0004 is CU-specific (is available on the Control Unit).

Unit, unit group and unit selection

Note These attributes are not relevant for the parameters of the application example; it is not possible to switch over the units.

Parameter values

Min	Minimum value of the parameter [unit]
Max	Maximum value of the parameter [unit]
Factory setting	Value when shipped [unit]

In the case of a binector/connector input, the signal source of the default BICO interconnection is specified. A non-indexed connector output is assigned the index [0].

Not for motor type

Note The motor type attribute is not relevant for the application parameters.

Scaling

Note The scaling attribute is not relevant for the application parameters. If there is a reference to another parameter, then this is indicated in the parameter list.

Expert list

Specifies whether this parameter is available in the expert list of the specified drive objects in the commissioning software.

1: Parameter is available in the expert list.

0: Parameter does not exist in the expert list.

Note The application does not have any parameters that do not exist in the expert list.

The support for the parameters and functions of the application example is realized via the contact specified in this document.

Description

Explanation of the function of a parameter.

Values

Lists of the possible values of a parameter.

Recommendation

Information about recommended settings.

Index

Note	The index attribute is not relevant for the application parameters.

Bit array

For parameters with bit arrays, the following information is provided about each bit:

Bit number and signal name

Meaning for signal states 1 and 0

Function diagram (optional)

The signal is shown in this function diagram.

Dependency

Conditions that must be fulfilled in conjunction with this parameter. Also includes special effects that can occur between this parameter and others.

Where necessary, "Refer to:" indicates the following information:

List of other relevant parameters to be considered.

List of faults and alarms to be considered.

Safety notices

Important information that must be observed to avoid the risk of physical injury or material damage.

Information that must be observed to avoid any problems. Information that the user may find useful.

Number ranges of parameters

The parameters of the application example are in the number range for Drive Control Chart (DCC) from 21000 to 25999.

4.2.2 Parameter list

r21500	**Softwareversion reactive power compensation**		
A_INF	**Can be changed:** -	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:**
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-
Description:	Displays the software version of the reactive power compensation application		

p21501	**Entry ID**		
A_INF	**Can be changed:** -	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:**
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	57886317
Description:	Entry ID of the application (Siemens Industry Online Support)		

p21502	**Internal ID**		
A_INF	**Can be changed:** -	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:**
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	82806769
Description:	Internal identifier of the DCC chart (language dependent)		

p21510	**CI: Technology control word 1**		
A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function diagram:** RPC 1005
	P-Group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
			0
Description:	Sets the signal source for technology control word 1		

Bit array:

Bit	**Signal name**	**1 signal**	**0 signal**	**FP**
0	Enable reactive current closed loop control	Control enable	Control disable	
1	Closed loop control method selection	Reactive power control	cos phi control	
2	Reset active energy counter	Reset	Counter active	
3	Enable droop control	droop control enable	droop control disable	

Dependency: see also: r21520, p21603, p21605, p21725

Note: The control word is OR'ed with the corresponding control bits of the expert list. The application should either be controlled by the control word or via the control bits of the expert list.

r21520 **CO: TechSTW 1 active**

A_INF

Can be changed: -	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function diagram:** RPC 1005
P-Group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
		-

Description: Active output of the technology control word 1 after OR'ing with the discrete control bits.

Bit array:

Bit	Signal name	1 signal	0 signal	FP
0	Enable reactive current closed loop control	Control enable	Control disable	
1	Closed loop control method selection	Reactive power control	cos phi control	
2	Reset active energy counter	Reset	Counter active	
3	Enable droop control	droop control enable	droop control disable	

Dependency: see also: p21510, p21603, p21605, p21725

r21541 **CO: Technology status word 1**

A_INF

Can be changed: -	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function diagram:** RPC 1007
P-Group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
		-

Description: Displays technology status word 1 of the application

Bit array:

Bit	Signal name	1 signal	0 signal	FP
0	Internal release closed loop control	control enabled	control disabled	
1	control method active	Reactive power control	cos phi control	
3	reactive current controller at upper limit	limitation active	limitation inactive	
4	reactive current controller at lower limit	limitation active	limitation inactive	

Dependency: see also: r21604, r21607, r21773, r21774,

p21603 **BI: method of closed-loop control (1=reactive power; 0=cos phi)**

A_INF

Can be changed: U/T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1005
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	1

Description: Parameter to choose the closed-loop control method

Dependency: see also: p21510, p21603

Note: "1" = reactive power control (reactive power actual and setpoint value are connected to the control)
"0" = power factor control (cos phi actual and setpoint value are connected to the control)
A change in operation via p2510 or p21603 gets not active until the next pulse disable of the infeed module.

r21604 **BO: method of closed-loop control active (1=reactive power; 0=cos phi)**

A_INF

Can be changed: -	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1010
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	1

Description: Parameter to choose the closed-loop control method

Dependency: see also: p21510, p21603

Note: “1” = reactive power control (reactive power actual and setpoint value are connected to the control)
“0” = power factor control (cos phi actual and setpoint value are connected to the control)
A change in operation via p2510 or p21603 gets not active until the next pulse disable of the infeed module.

p21605 **BI: Enable reactive current control**

A_INF

Can be changed: U/T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1005
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	1

Description: Sets the signal source to enable reactive power compensation

Dependency: see also: p21510

Note: If the reactive power compensation should operate permanently, then it can be permanently enabled using a fixed binector "1".

p21606 **threshold absolute value active power [kW]**

A_INF

Can be changed: U/T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1010
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
0	3.40282E+43	1.0

Description: Parameter to set threshold for the absolute value of the active power, which disables the closed-loop control, if its value is not reached.

Note: In this parameter is set the minimum value of active power that must be reached to enable the closed-loop control.

r21607 **BO: internal release control**

A_INF

Can be changed: -	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1010
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-1.0

Description: Feedback for the internal release of the closed loop reactive current control

Dependency: see also: p21603, p21606

Note: The control is dependent from the operation mode of the Active Line Module and in case of cos phi control from reaching the threshold set for active power.

r21609	**apparent power**		
A_INF	**Can be changed:**	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:**
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Displays the actual apparent power power at the point of common grid coupling

p21610	**reference value reactive/active power [kvar]**		
A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1020
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	5.0

Description: Parameters to set the reference value for the variable reactive power setpoint

Dependency: see also: p21610, p21613

Note: In this parameter the equivalent value for a 100% reactive power setpoint must be set.

p21611	**CI: Reactive power setpoint [%]**		
A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1020
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Setting of the signal source for the reactive power setpoint

Dependency: see also: p21610, p21613

Note: If a reactive power value not equal to zero is to be set at the common grid connection point, the desired reactive power value can be preset via a connector interconnected to p21611. In this case, make sure that parameter p21613 is set to zero.
A value greater than zero (with a positive gain factor on the compensation controller) leads to overexcited operation at the common grid connection point, thus the overall system behaving like a capacitance, a value less than zero leads to underexcited operation at the common grid connection point and the overall system behaves like an inductance.

r21612	**reactive power setpoint [kvar]**		
A_INF	**Can be changed:**	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1020
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Display of the reactive power setpoint for the line connection point in kvar

Dependency: see also: p21613

Note: The setpoint is obtained from the source set in p21611 multiplied by the reference value p21610.

p21613 **fixed reactive power [kvar]**

A_INF

Can be changed: U/T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1020
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	0.0

Description: Parameters to set an absolute value for reactive power setpoint in kvar

Note: The value of this parameter is used as setpoint for the closed-loop control, if it is not equal to zero. Otherwise the input interconnected to p21611 is used as the setpoint for the closed-loop control. So this parameter has to be set to zero, if the input interconnected to p21611 should be used as setpoint for the closed-loop control. If you want to use the value from p21613 as setpoint for the closed-loop control and want to set the value to zero, you have to pay attention that the value connected to p21611 is also zero.
A value greater than zero (with a positive gain factor on the compensation controller) leads to overexcited operation at the common grid connection point, thus the overall system behaving like a capacitance, a value less than zero leads to underexcited operation at the common grid connection point and the overall system behaves like an inductance.

r21616 **actual reactive power (filtered) [kvar]**

A_INF

Can be changed:	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Displays the actual reactive power in kvar

Note: The value is obtained from VSM10’s measurement. It is averaged over 10 cycles.

r21617 **CO: Actual reactive power (filtered) [%]**

A_INF

Can be changed:	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Displays the normalized actual reactive power value

Dependency: see also p21610

Note: The value shows the actual reactive power value, based on to the set normalization value. This value can be connected to the communication for example.

r21618 **active power actual absolute value (filtered) [kW]**

A_INF

Can be changed:	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Displays the actual active power in kW

Note: The value is obtained from VSM10’s measurement. It is averaged over 10 cycles.

p21619	**CO: active power actual absolute value (filtered) [%]**		
A_INF	**Can be changed:**	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Displays the normalized actual active power value

Dependency: see also p21510

Note: The value shows the actual active power value, based on to the set normalization value. This value can be connected to the communication for example.

p21621	**High threshold Value [kWh]**		
A_INF	**Can be changed:**	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1070
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-3.40282E+38	3.40282E+38	20000

Description: Threshold value for the integrator of the active power

p21622	**BI: Reset active energy counter**		
A_INF	**Can be changed:**	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1005
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	FALSE

Description: Binector-input for the Reset of the active energy counter. (integrator and remanent store).
TRUE = Reset
FALSE = Counter active (again)

p21623	**Reset value active energy counter [kWh]**		
A_INF	**Can be changed:**	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1070
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-3.40282E+38	3.40282E+38	0

Description: Reset value for the active energy counter, modifiable only under special terms.

r21624	**CO: Active energy actual absolute value [kWh]**		
A_INF	**Can be changed:**	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1070
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Displays the value of the countered active energy (kWh)

Note: The value is determined by the actual value of the active power (p21619)

p21627	**CI: Reference voltage of the Active Line Module (r2701)**		
A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	r2701

Description: Sets the signal source for the reference voltage of the Active Line Module.

Note: Here r2701 of the Active Line Module has to be set.

p21628	**CI: VSM actual input voltage**		
A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	r3661

Description: Sets the signal source for the actual voltage, measured by the VSM at the point of common connection (PCC).

Note: Depending on the number on VSMs used, here the connector output of the measured voltage has to be set:
VSM_1: r3661; VSM_2: r 5461[0]; VSM_3: r5461[1]

p21629	**CI: VSM actual input current**		
A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	r3671

Description: Sets the signal source for the actual current, measured by the VSM at the point of common connection (PCC).

Note: Depending on the number on VSMs used, here the connector output of the measured curent has to be set:
VSM_1: r3671; VSM_2: r 5471[0]; VSM_3: r5471[1]

p21630	**CI: Reference current of the Active Line Module**		
A_INF	**Can be changed:**	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	r2702

Description: Sets the signal source for the reference current of the Active Line Module.

Note: Here r2702 of the Active Line Module has to be set.

p21631 **CI: cos phi setpoint [%]**

A_INF

Can be changed: T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1020
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Setting of the signal source for the displacement factor setpoint

Note: If a displacement factor not equal to one is obtained at the common line connection point, then the required displacement factor can be specified at a connector interconnected at p21631. In this case you have to pay attention that the value in p21633 is set to zero.
A value less than zero (with a positive gain factor on the compensation controller) leads to overexcited operation at the common grid connection point, thus the overall system behaving like a capacitance, a value greater than zero leads to underexcited operation at the common grid connection point and the overall system behaves like an inductance.

p21633 **cos phi fixed value**

A_INF

Can be changed: U/T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1020
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-1.0 ≤ p21633 ≤ -0.3	0.3 ≤ p21633 ≤ 1.0	1.0

Description: Parameters to set a fixed value for the displacement factor setpoint

Note: The value of this parameter is used as setpoint for the closed-loop control, if it is not equal to zero. Otherwise the input interconnected to p21631 is used as the setpoint for the closed-loop control. So this parameter has to be set to zero, if the input interconnected to p21631 should be used as setpoint for the closed-loop control. If you want to use the value from p21633 as setpoint for the closed-loop control and want to set the value to zero, you have to pay attention that p21531 is also set to zero.
A value less than zero (with a positive gain factor on the compensation controller) leads to overexcited operation at the common grid connection point, thus the overall system behaving like a capacitance, a value greater than zero leads to underexcited operation at the common grid connection point and the overall system behaves like an inductance.

p21636 **CI: cos phi actual value signed**

A_INF

Can be changed: T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1030
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	r3496[0]

Description: Sets the signal source for the signed value of the displacement factor.

Note: Here the output of the cos phi display r3496[0] respectively r3496[1] has to be connected.

p21640 **ramp up/down time [ms] (normalized to actual control)**

A_INF

Can be changed: U/T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1040
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	10000 ms

Description: Setting the ramp-up and ramp-down time of the setpoint depending on the control method referred to the normalization value. For reactive power control the normalization results from the reference power value of the Active Line Module multiplied by the factor 0.9. For cos phi control the normalization is set to 1.0.

p21643	CI: Reference power Active Line Module [kW]		
A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1040
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	r2704

Description: Sets the signal source for the reference power of the Active Line Module

Recommendation: r2704 of the infeed should be interconnected here.

p21653	CI: Actual active current, Active Line Module		
A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	r0078

Description: Sets the signal source for the actual active current of the Active Line Module

Recommendation: r0078 of the infeed should be interconnected here.

Note: The displacement factor is calculated from the actual active current and total current.

p21654	CI: Absolute current actual value, Active Line Module		
A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	r0068

Description: Sets the signal source for the absolute current actual value of the Active Line Module

Recommendation: r0068 of the infeed should be interconnected here.

Note: The displacement factor is calculated from the actual active current and total current values.

p21658	CI: I^2t value of the Active Line Module		
A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	r0036

Description: Sets the signal source for the I^2t value of the Active Line Module.

Recommendation: r0036 of the infeed should be interconnected here.

Note: By evaluating the I^2t value of the infeed, the reactive power compensation can be reduced, if the thermal load increases. Therefore, it can be ensured that the infeed of a DC link group (line-up) is not thermally overloaded due to the additional reactive current compensation function.

p21659	I^2t value to shut down compensation		
A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	0,3

Description: Setting the I^2t value, where the reactive current compensation function is completely shut down.

Note: By evaluating the I^2t value of the infeed, the reactive power compensation can be reduced, if the thermal load increases. Therefore, it can be ensured that the infeed of a DC link group (line-up) is not thermally overloaded due to the additional reactive current compensation function.

r21663 **power factor, Active Line Module, actual value filtered**

A_INF

Can be changed: -	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Displays the actual power factor of the Active Line Module. This is only the value of the power factor of the Active Line Module and does not represent the power factor at the common line connection point.

Note: The value is used for internal limitations.

r21665 **controller limiting as a result of the actual power factor [%]**

A_INF

Can be changed: -	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display of the percentage controller limiting as a result of the Active Line Module power factor

Dependency: also refer to: p21653, p21654

Note: If the Active Line Module is only loaded with the reactive current, then the output current is limited to 90% of the rated module current. This is the case if the Active Line Module is only used to compensate reactive currents.

r21666 **controller limiting as a result of the actual I²t value [%]**

A_INF

Can be changed: -	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	-

Description: Display of the percentage controller limiting as a result of the actual I²t value of the Active Line Module

Dependency: also refer to: p21658, p21659

p21668 **CI: Reactive current limit setpoint [%]**

A_INF

Can be changed: T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	100%

Description: Setting the signal source for a variable limitation of the reactive current compensation referred to the rated current of the Active Line Module

p21669 **reactive current limit setpoint [A]**

A_INF

Can be changed: U/T	**Calculated: -**	**Access level:** 1
Data type:	**Dynamic index: -**	**Function chart:** RPC 1060
P group: -	**Unit group: -**	**Unit selection: -**
Not for motor type: -		**Expert list:** 1
Min	**Max**	**Factory setting**
-	-	3.4E+38

Description: Setting a fixed limit for the reactive current compensation

r21670 **effective controller limit from the power factor, I²t value and setpoint [A]**

A_INF

Can be changed: - | **Calculated: -** | **Access level:** 1
Data type: | **Dynamic index: -** | **Function chart:** RPC 1060
P group: - | **Unit group: -** | **Unit selection: -**
Not for motor type: - | | **Expert list:** 1

Min	**Max**	**Factory setting**
-	-	-

Description: Display of the currently effective controller limiting

p21678 **CI: P gain, adaptation signal, reactive current controller**

A_INF

Can be changed: T | **Calculated: -** | **Access level:** 1
Data type: | **Dynamic index: -** | **Function chart:** RPC 1050
P group: - | **Unit group: -** | **Unit selection: -**
Not for motor type: - | | **Expert list:** 1

Min	**Max**	**Factory setting**
-	-	0%

Description: Setting the signal source to adapt the P gain of the compensation controller

Dependency: also refer to: p21800, p21801, p21802, p21679, p21680, p21681, p21682

p21679 **adaption point, lower [%]**

A_INF

Can be changed: U/T | **Calculated: -** | **Access level:** 1
Data type: | **Dynamic index: -** | **Function chart:** RPC 1050
P group: - | **Unit group: -** | **Unit selection: -**
Not for motor type: - | | **Expert list:** 1

Min	**Max**	**Factory setting**
-	-	0,0%

Description: Setting the lower point where adaptation of the P gain starts

Dependency: also refer to: p21800, p21801, p21802, p21678, p21680, p21681, p21682

p21680 **Adaptation factor, lower**

A_INF

Can be changed: U/T | **Calculated: -** | **Access level:** 1
Data type: | **Dynamic index: -** | **Function chart:** RPC 1050
P group: - | **Unit group: -** | **Unit selection: -**
Not for motor type: - | | **Expert list:** 1

Min	**Max**	**Factory setting**
-	-	1,0

Description: Setting the adaptation factor at the lower point where adaptation starts

Dependency: also refer to: p21800, p21801, p21802, p21678, p21679, p21681, p21682

p21681 **adaption point, upper [%]**

A_INF

Can be changed: U/T | **Calculated: -** | **Access level:** 1
Data type: | **Dynamic index: -** | **Function chart:** RPC 1050
P group: - | **Unit group: -** | **Unit selection: -**
Not for motor type: - | | **Expert list:** 1

Min	**Max**	**Factory setting**
-	-	0,0%

Description: Setting the upper point where the adaptation of the P gain starts

Dependency: also refer to: p21800, p21801, p21802, p21678, p21679, p21680, p21682

p21682	**Adaptation factor, upper**		
A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min -	**Max** -	**Factory setting** 1,0
Description:	Setting the adaptation factor at the upper point where adaptation starts		
Dependency:	also refer to: p21800, p21801, p21802, p21678, p21679, p21680, p21681		

p21683	**Droop factor, reactive current controller**		
A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min -	**Max** -	**Factory setting** 0.02 (2%)
Description:	Setting of the droop factor for the compensation controller		
Dependency:	also refer to: p21725		
Note:	In order to prevent the compensation controllers acting against one another in master/slave operation, droop can be implemented using p21725.		

r21684	**actual setpoint from the droop input**		
A_INF	**Can be changed:** -	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min -	**Max** -	**Factory setting** -
Description:	Display of the actual setpoint from the droop input		
Dependency:	also refer to: p21725		

r21701	**CO: Reactive current setpoint to the Active Line Module**		
A_INF	**Can be changed:** -	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min -	**Max** -	**Factory setting** -
Description:	Actual reactive current setpoint from the compensation controller		
Note:	This parameter should be interconnected to p3611 as supplementary reactive current setpoint.		

p21723	**BI: Operation feedback signal from Active Line Module**		
A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1010
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min -	**Max** -	**Factory setting** r0863.0
Description:	Sets the signal source for the operation feedback signal of the Active Line Module		
Recommendation:	r0863.0 of the Active Line Module should be interconnected here.		

p21725 BI: Enable droop input for master/slave operation

A_INF	**Can be changed:** T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Sets the signal source to enable the droop input

Dependency: also refer to: p21683

r21773 BO: Reactive current controller at upper limit

A_INF	**Can be changed:** -	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Feedback signal that the compensation controller is at the upper control limit

r21774 BO: Reactive current controller at the lower limit

A_INF	**Can be changed:** -	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	-

Description: Feedback signal that the compensation controller is at the lower control limit

p21800 Proportional action coefficient, reactive power control [A/kvar]

A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	1,0

Description: Setting of the gain factor for the reactive current controller when reactive power control is enabled

Note: For an inverted sign of the externally acquired actual reactive power value, a negative value can be set here in order to correct the control sense again.

p21801 Proportional action coefficient, cos phi control [A]

A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min	**Max**	**Factory setting**
	-	-	1.3

Description: Setting of the gain factor for the reactive current controller when power factor control is enabled

Note: For an inverted sign of the externally acquired actual reactive power value, a negative value can be set here in order to correct the control sense again.

p21803	integral time, reactive current controller [ms]		
A_INF	**Can be changed:** U/T	**Calculated: -**	**Access level:** 1
	Data type:	**Dynamic index: -**	**Function chart:** RPC 1050
	P group: -	**Unit group: -**	**Unit selection: -**
	Not for motor type: -		**Expert list:** 1
	Min -	**Max** -	**Factory setting** 1000 ms
Description:	Setting of the integral time for the compensation controller		

4.3 Faults and alarms

F51050	**The reference current of the infeed is zero**
Drive object:	A_INF
Response:	OFF2
Acknowledgement:	IMMEDIATELY
Cause:	The reference current of the Active Line Module is not interconnected at p21630.
Remedy	Interconnect p21630 with r2702 of the Active Line Module

5 Appendix

5.1 Application Support

Siemens AG
Digital Factory Division
Factory Automation
Production Machines
DF FA PMA APC
Frauenauracher Str. 80
91056 Erlangen, Germany

mailto: tech.team.motioncontrol@siemens.com

5.2 Links and Literature

Table 5-1

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/57886317
\3\	SINAMICS S120 System Manual Grid Infeed https://support.industry.siemens.com/cs/ww/en/view/109760371

5.3 Change documentation

Table 5-2

Version	Date	Modifications
V1.0	01/2012	First Version
V2.0	05/2012	Selection of closed loop control methods
V3.0	06/2015	Sensing of power factor actual values switched to VSM10
V4.0	01/2018	using signed cos phi value, stable closed loop control also with changing actual power signs, improved documentation of signs for setpoints
V4.0.1	01/2019	Expansion by DCC V15.1, no functional changes or bugfixes
V4.1	10/2019	Expansion by a remanent saving, resettable active energy counter