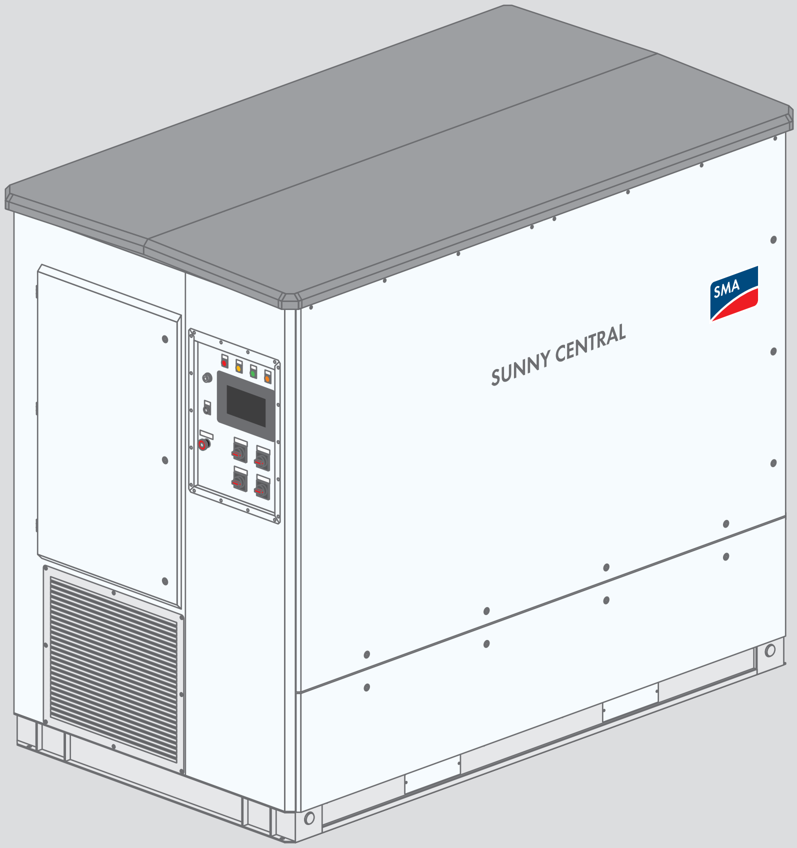
Technical Information

Requirement for MV Transformers and Transformer for Internal Power Supply for SUNNY CENTRAL



ENGLISH

SC_Trafo-TI-en-65 | Version 6.5

Table of Contents

1 Information on this Document

1.1 Validity

This document applied to all device types of the Sunny Central inverter.

It describes the requirements for MV transformers and transformers for internal power supply that are connected to Sunny Central inverters and provided by the customer.

Please note that not all Sunny Central inverters can be combined with all MV transformers. For more details, please refer to the following pages.

1.2 Limited statutory warranty

SMA Solar Technology AG only provides statutory warranty for products purchased from SMA Solar Technology AG.

SMA Solar Technology AG America LLC only provides statutory warranty for products purchased from SMA Solar Technology AG America LLC.

The statutory warranty for the inverters and other products purchased from SMA does not apply if the requirements described in this document are not met.

1.3 Nomenclature

Complete designation	Designation in this document
SMA Solar Technology America LLC	SMA
SMA Solar Technology AG	SMA
Sunny Central Sunny Central Storage	Inverter
Medium-voltage transformer	MV transformer

2 Technical requirements for the MV transformer

2.1 General Requirements

☐ The MV transformer can be of the liquid-immersed transformer type (for example, with mineral oil or organic oil) or of the dry-type transformer.

☐ The MV transformer must be designed at its low-voltage windings for voltages that arise during pulsed mode of the inverter.

☐ The power connection used must have suitable insulation resistance since voltages to ground of ±2400 V at the most occur when the inverter is in pulsed mode (see Section 4.1 "Technical data of the inverter", page 14).

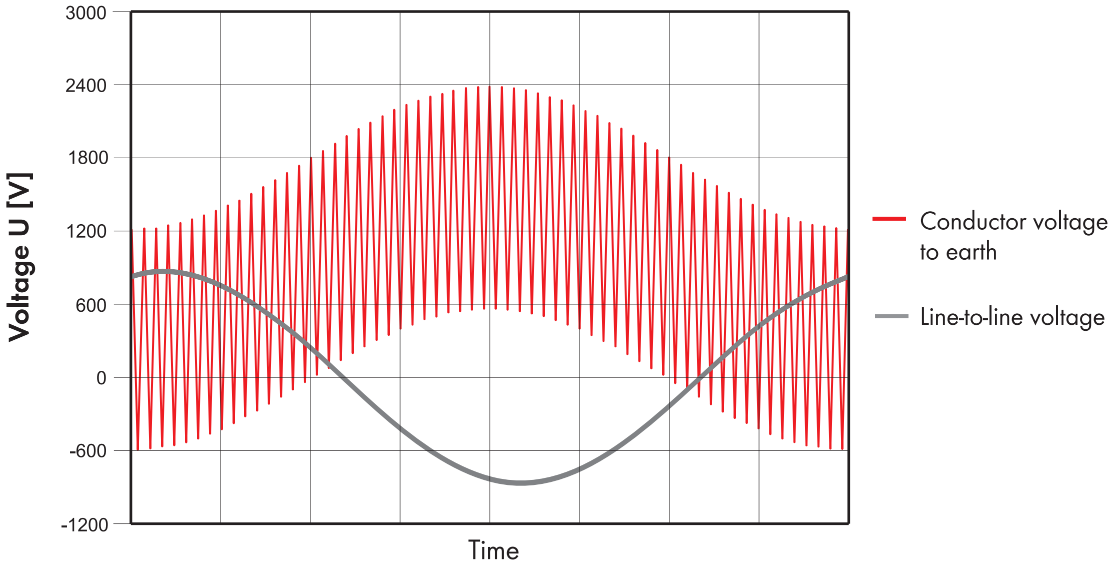


Figure 1: AC voltage level for SC 2500-EV

☐ The low-voltage windings of the MV transformer must be designed for voltages that are capable of a rate of rise in voltage dV/dt of up to 500 V/µs to ground. The line-to-line voltages are sinusoidal.

☐ A shield winding grounded on the tank must be provided between the low-voltage windings and the high-voltage windings. This serves as an additional dV/dt filter.

☐ Each inverter requires a separate, galvanically insulated low-voltage winding. Therefore, the parallel operation of several inverters on one low-voltage winding is not permissible.

☐ The voltages at the low-voltage windings of the MV transformer must match the AC output voltage of the inverter (see Section 4.1 "Technical data of the inverter", page 14).

☐ The voltage level on the high-voltage side of the MV transformer must be selected according to the grid-connection point. The MV transformer must be connected to the medium-voltage grid or the high-voltage grid. Connection to the low-voltage grid is not permissible.

☐ When connecting to the medium-voltage grid, the use of a MV transformer with tap changer on the high voltage side is recommended. MV transformer with tap changer on the high-voltage side enables an adaptation to the voltage level of the medium-voltage grid.

☐ The MV transformer must be rated according to the temperature-dependent power behavior of the inverter.

☐ For thermal design, the load curve of the MV transformer and the ambient conditions at the respective mounting location must be taken into account. When operating with an additional reactive power supply, the increased loads in the design of the MV transformer are to be observed (for information about the reactive power supply of the inverter, see the inverter documentation).

☐ When designing the MV transformer for use with the Sunny Central Storage, it is important to remember that due to battery operation the MV transformer hardly cools down at all at night.

- ☐ The MV transformer must be designed for the AC output currents of the inverter (see Section 4.1 "Technical data of the inverter", page 14).
- ☐ If grounding of the MV transformer on the medium voltage side is required, the type of grounding regarding the entire system including the MV transformer must be taken into consideration.
- ☐ The consequences of any error, such as a short circuit, ground fault or voltage failure, must be taken into account when considering the overall system.
- ☐ The country-specific power frequency must be taken into account.
- ☐ The applicable country-specific standards and directives must be taken into account.
- ☐ SMA reserves the right to measure the currents of the sine-wave filter capacitors during commissioning and, if necessary, to optimize the entire system.

2.2 Requirements for two-winding transformers used to connect one inverter

- ☐ The following vector groups are recommended for handling the corresponding neutral points.

Insulated neutral point on medium-voltage side	Resonant grounding on medium-voltage side	Low-resistance grounded neutral point
Dy11, Dy5, Dy1, Dd0, Dd6	YNy0	YNy0
Yd11, Yd5, Yd1	YNd11, YNd5, YNd1	

- ☐ If there is a neutral-point terminal on the low-voltage side, this neutral-point terminal must not be grounded or connected.

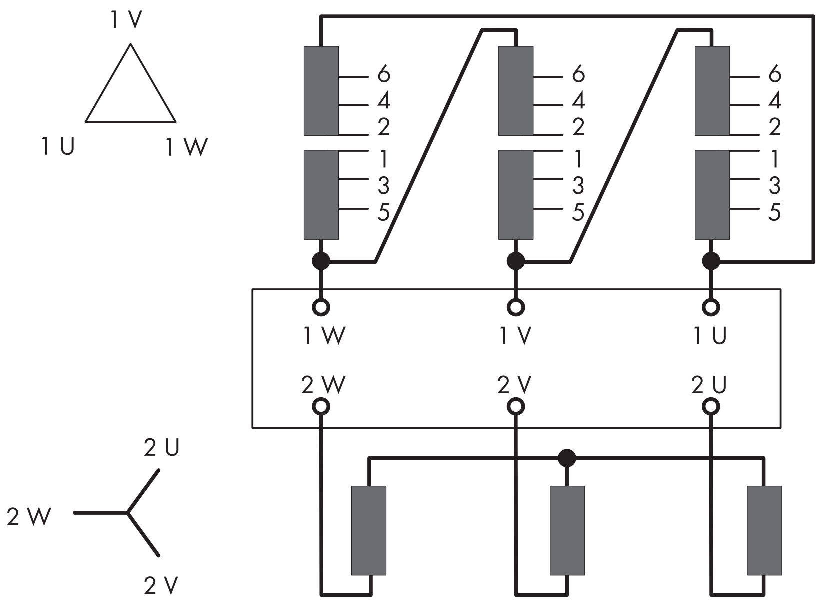


Figure 2: Circuit diagram of two-winding transformers (example)

- ☐ The relative impedance voltage V_k of the MV transformer between grid-connection point and AC output of the inverter must be between the minimum value $V_{k\ min}$ and the maximum value $V_{k\ max}$. The nominal power of the MV transformer (see Section 4.2 "Technical data of the transformers", page 15) is the basis of the relative impedance voltage.

2.3 Requirements for three-winding transformers used to connect two inverters

A three-winding transformer (low-high-low) consists of one high-voltage winding and two low-voltage windings.

☐ Only three-winding transformers with LHL windings are permitted. In such MV transformers, the high-voltage winding is located between two low-voltage windings.

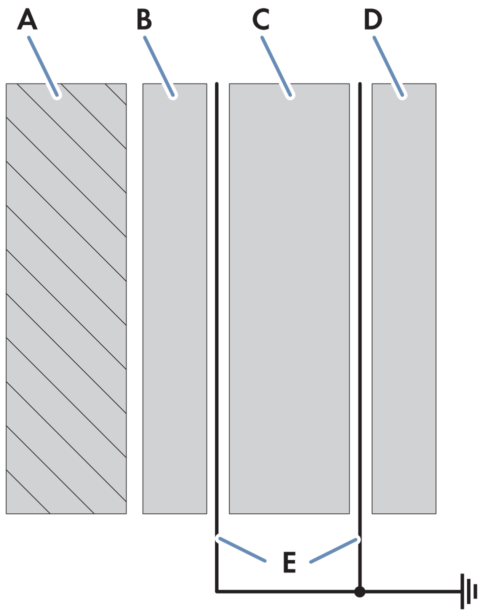


Figure 3: Design of a three-winding transformer

Position	Designation
A	Core
B	Low-voltage winding 1
C	High-voltage winding
D	Low-voltage winding 2
E	Shield winding

☐ Three-winding transformers may only be used with the following inverters starting from the specified production version. The production version can be found on the type label of the inverter.

Inverter	Starting from production version
Sunny Central CP-US	B9
Sunny Central CP XT	A4

☐ Three-winding transformers with varying vector groups can be used. The following vector groups are recommended for handling the corresponding neutral points.

Insulated neutral point on medium-voltage side	Resonant grounding on medium-voltage side	Low-resistance grounded neutral point
Dy11y11, Dy5y5, Dy1y1, Dd0d0, Dd6d6 Yd11d11, Yd5d5, Yd1d1	YNy0y0 YNd11d11, YNd5d5, YNd1d1	YNy0y0

☐ If there is a neutral-point terminal on the low-voltage side, this neutral-point terminal must not be grounded or connected.

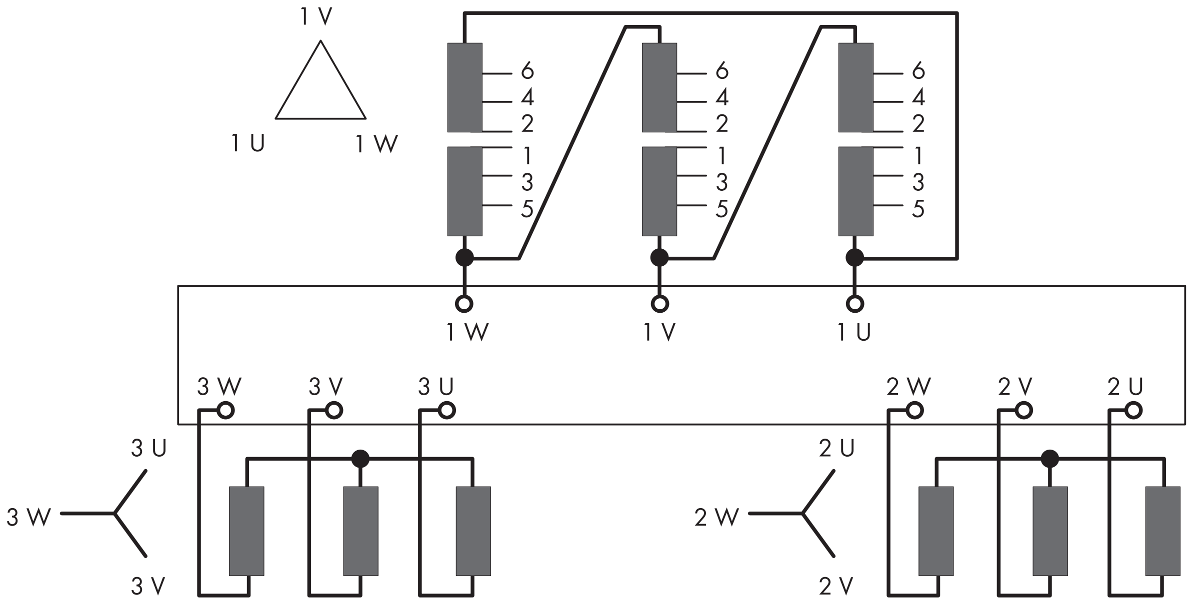


Figure 4: Circuit diagram of three-winding transformers (example)

☐ Three-winding transformers must be designed for an asymmetrical load flow in the low-voltage systems. This means that to ensure permanent operation, the transformer must be designed for feed-in with one inverter.

☐ Three-winding transformers must be designed for the use of inverters of the Sunny Central Storage series so that full power can be fed in at one of the low-voltage windings and that full power can be used at the other low-voltage winding. The transformer must be designed for continuous operation in this operating state.

☐ The relative impedance voltage V_k of the MV transformer between grid-connection point and AC output of the inverter must be between the minimum value $V_{k\ min}$ and the maximum value $V_{k\ max}$. The relative impedance voltage is based on half the nominal power of the MV transformer (see Section 4.2 "Technical data of the transformers", page 15).

☐ The difference of the relative impedance voltages between the grid-connection point of the AC outputs of the two inverters must not exceed 0.5% (see Section 4.2 "Technical data of the transformers", page 15).

Example: Permissible Difference of Impedance Voltages $V_{k\ dif\ max}$

The value of the relative impedance voltage from the high-voltage winding to low-voltage winding 1 is 6.0%. The value of the relative impedance voltage from the high-voltage winding to low-voltage winding 2 is 5.6%. The deviation of the relative impedance voltages is permissible since the difference amounts to 0.4% and is thus smaller than 0.5%.

Example: Non-Permissible Difference of Impedance Voltages $V_{k\ dif\ max}$

The value of the relative impedance voltage from the high-voltage winding to low-voltage winding 1 is 6.0%. The value of the relative impedance voltage from the high-voltage winding to low-voltage winding 2 is 5.4%. The deviation of the relative impedance voltages is not permissible since the difference amounts to 0.6% and is thus greater than 0.5%.

☐ The value of the relative impedance voltage $V_{k\ 1\text{-}2}$ between the two low-voltage winding must be at least 9%. The impedance voltage is based on half the nominal power of the MV transformer. This value can be determined by shorting a low-voltage winding and increasing the voltage on the other low-voltage winding until the nominal current of a low-voltage system flows. During this time, the high-voltage windings are in no-load operation.

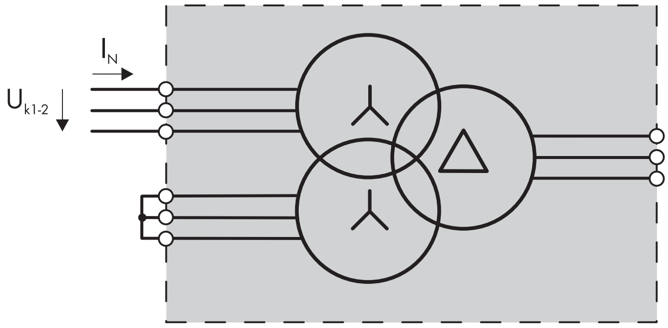


Figure 5: Circuit diagram for determining the impedance voltage $V_{k\ 1\text{-}2}$ in three-winding transformers (example)

2.4 Requirements for four-winding transformers used to connect two inverters

A four-winding transformer (double story transformer) consists of two high-voltage windings and two low-voltage windings.

☐ For four-winding transformers, a separate shield winding, grounded on the tank, is to be provided between each low-voltage winding and high-voltage winding.

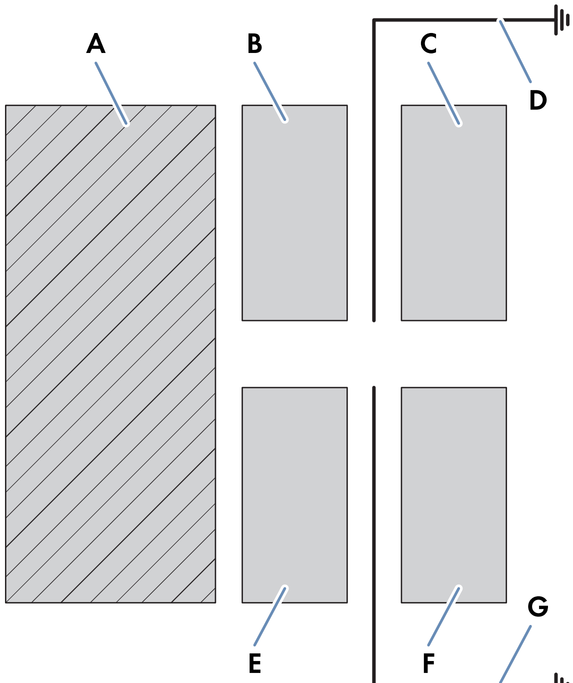


Figure 6: Four-winding transformers with separate shield windings

Position	Designation
A	Core
B	Low-voltage winding 1
C	High-voltage winding 1

Position	Designation
D	Shield winding 1
E	Low-voltage winding 2
F	High-voltage winding 2
G	Shield winding 2

☐ Four-winding transformers may only be used with the following inverters starting from the specified production version. The production version can be found on the type label of the inverter.

Inverter	Starting from production version
Sunny Central ≤ 1000 kVA	A4
Sunny Central > 1000 kVA	A7

☐ Four-winding transformers with varying vector groups can be used. The following vector groups are recommended for handling the corresponding neutral points.

Insulated neutral point on medium-voltage side	Resonant grounding on medium-voltage side	Low-resistance grounded neutral point
Dy11y11, Dy5y5, Dy1y1, Dd0d0, Dd6d6 Yd11d11, Yd5d5, Yd1d1	YNy0y0 YNd11d11, YNd5d5, YNd1d1	YNy0y0

☐ If there is a neutral-point terminal on the low-voltage side, this neutral-point terminal must not be grounded or connected.

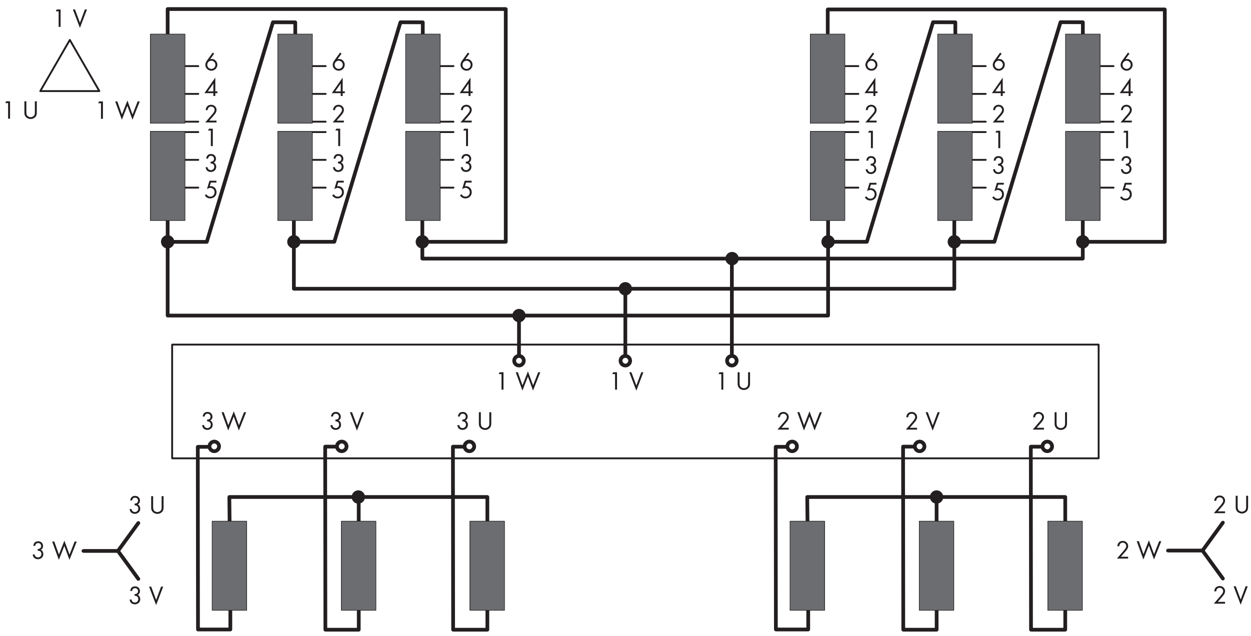


Figure 7: Circuit diagram of four-winding transformers (example)

☐ Four-winding transformers must be designed for an asymmetrical load flow in the low-voltage systems. This means that for long-term operation, the transformer must be designed for the feed-in of one inverter only.

☐ Four-winding transformers must be designed for the use of inverters of the Sunny Central Storage series so that full power can be fed in at one of the low-voltage windings and that full power can be used at the other low-voltage winding. The transformer must be designed for continuous operation in this operating state.

☐ The relative impedance voltage V_k of the MV transformer between grid-connection point and AC output of the inverter must be between the minimum value $V_{k\ min}$ and the maximum value $V_{k\ max}$. The relative impedance voltage is based on half the nominal power of the MV transformer (see Section 4.2 "Technical data of the transformers", page 15).

☐ The difference of the relative impedance voltages between the grid-connection point of the AC outputs of the two inverters must not exceed 0.5% (see Section 4.2 "Technical data of the transformers", page 15).

Example: Permissible Difference of Impedance Voltages $V_{k\ dif\ max}$

The value of the relative impedance voltage from the high-voltage winding to low-voltage winding 1 is 6.0%. The value of the relative impedance voltage from the high-voltage winding to low-voltage winding 2 is 5.6%. The deviation of the relative impedance voltages is permissible since the difference amounts to 0.4% and is thus smaller than 0.5%.

Example: Non-Permissible Difference of Impedance Voltages $V_{k\ dif\ max}$

The value of the relative impedance voltage from the high-voltage winding to low-voltage winding 1 is 6.0%. The value of the relative impedance voltage from the high-voltage winding to low-voltage winding 2 is 5.4%. The deviation of the relative impedance voltages is not permissible since the difference amounts to 0.6% and is thus greater than 0.5%.

☐ The value of the relative impedance voltage $V_{k\ 1\text{-}2}$ between the two low-voltage winding must be at least 9%. The impedance voltage is based on half the nominal power of the MV transformer. This value can be determined by shorting a low-voltage winding and increasing the voltage on the other low-voltage winding until the nominal current of a low-voltage system flows. During this time, the high-voltage windings are in no-load operation.

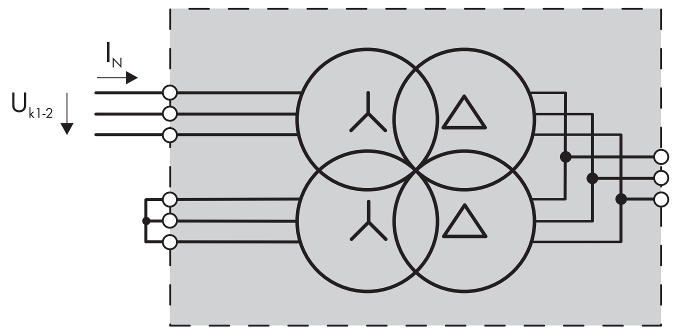


Figure 8: Circuit diagram for determining the impedance voltage $U_{k\ 1\text{-}2}$ in four-winding transformers (example)

2.5 Requirements for multi-winding transformers used to connect three inverters

The requirements for MV transformers to which three inverters are to be connected are the same as for two-winding transformers. Three two-winding active parts are mounted in a tank. All three active parts must be set up with separated cores.

2.6 Requirements for multi-winding transformers used to connect four inverters

The requirements for MV transformers to which four inverters are to be connected are the same as for four-winding transformers. Two four-winding active parts of double story design are mounted in a tank. Both active parts must be set up with separated cores.

3 Technical requirements for the transformer for internal power supply

3.1 General Requirements

The inverters up to 1000 kVA require an external AC voltage supply. The voltage for the inverters can be supplied by a transformer for internal power supply.

The inverters from 2200 kVA have an integrated transformer for internal power supply with a power of 8.4 kVA and are not dealt with here.

- ☐ The transformer for internal power supply must be of three-phase design.
- ☐ The secondary side of the transformer for internal power supply must supply a voltage of 230 V/400 V (3/N/PE) to connect to the inverter.
- ☐ The transformer for internal power supply must provide a power of at least 2.8 kVA per inverter.
- ☐ Several inverters can be supplied by one transformer for internal power supply if this transformer can provide a power of at least 2.8 kV per inverter.
- ☐ The transformer for internal power supply must be designed for an asymmetric load of 80%.
- ☐ A transformer for internal power supply with the Dyn5 or Dyn11 vector group is recommended.
- ☐ A shield winding that has to be grounded at the enclosure must be provided between the windings of the transformer for internal power supply.
- ☐ The transformer for internal power supply must be equipped with an external protection against overload.
- ☐ The transformer for internal power supply must have external short-circuit protection ensuring that any potential short-circuit currents are limited to 6 kA at the inverter.
- ☐ To protect the inverter, overvoltage protection must be provided between the inverter and the transformer for internal power supply.
- ☐ The ambient conditions of the transformer for internal power supply must be taken into account.
- ☐ The country-specific power frequencies must be taken into account.
- ☐ The applicable country-specific standards and directives must be taken into account.

3.2 Requirements for the connection to the park-side utility grid

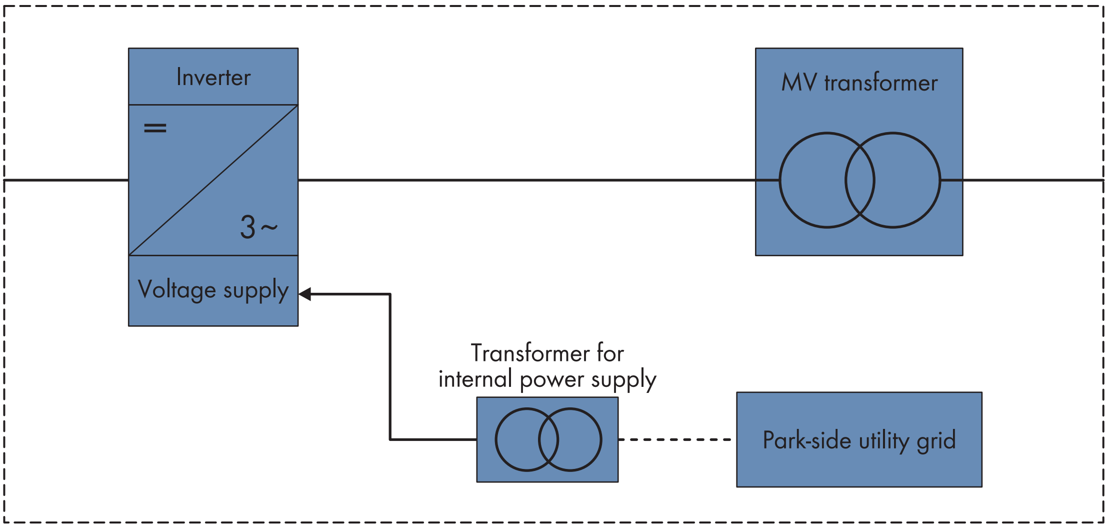


Figure 9: Connection of the transformer for internal power supply to the park-side utility grid

☐ For the connection to the park-side utility grid, the primary voltage of the transformer for internal power supply must be equal to the grid voltage.

3.3 Requirements for the connection to the AC output of the inverter

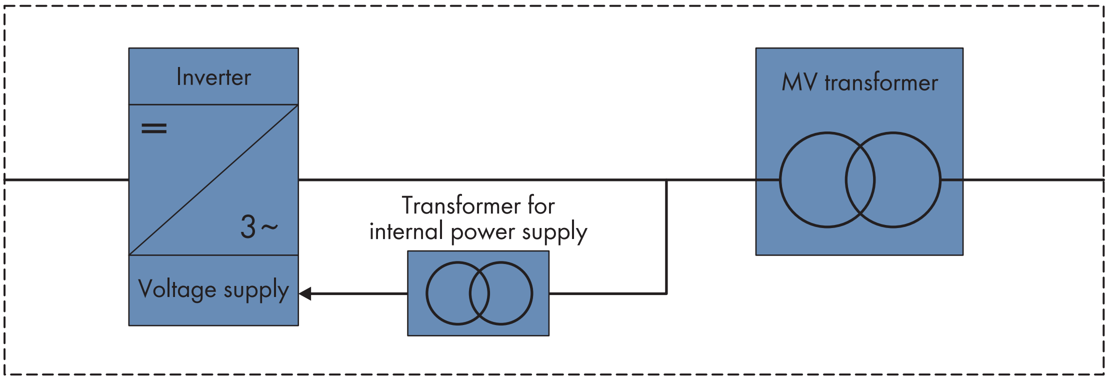


Figure 10: Connection of the transformer for internal power supply to the inverter's AC output

☐ The primary voltages of the transformer for internal power supply must correspond to the AC output voltages of the inverter (see Section 4.1 "Technical data of the inverter", page 14).

☐ On the primary side, the transformer for internal power supply must be suitable for the pulsed mode of an inverter.

☐ On the primary side, the transformer for internal power supply must be suitable for voltages that arise from pulsed mode of the inverter.

☐ The power connection used must have suitable insulation resistance since voltages to ground of ±2,400 V at the most occur when the inverter is in pulsed mode (see Section 4.1 "Technical data of the inverter", page 14).

☐ On the primary side, the transformer for internal power supply must be designed for voltages reaching a rate of rise in voltage dV/dt of up to 500 V/µs to ground. The line-to-line voltages are sinusoidal.

☐ The windings of the transformer for internal power supply must be galvanically insulated. Do not use autotransformers.

4 Appendix

4.1 Technical data of the inverter

Sunny Central

Inverter type	DC voltage	AC voltage	AC peak voltage to ground	AC current		
				at 25 °C	at 40 °C	at 50 °C
SC 500CP XT	1000 V	270 V	±1450 V	1176 A	1113 A	1070 A
SC 630CP XT	1000 V	315 V	±1450 V	1283 A	1202 A	1155 A
SC 720CP XT	1000 V	324 V	±1450 V	1411 A	1335 A	1283 A
SC 760CP XT	1000 V	342 V	±1450 V	1411 A	1335 A	1283 A
SC 800CP XT	1000 V	360 V	±1450 V	1411 A	1335 A	1283 A
SC 850CP XT	1000 V	386 V	±1600 V	1411 A	1335 A	1283 A
SC 900CP XT	1000 V	405 V	±1600 V	1411 A	1335 A	1283 A
SC 1000CP XT	1000 V	405 V	±1600 V	1586 A	1426 A	1283 A
SC 2200	1100 V	385 V	±1800 V	3300 A	3120 A	3000 A
SC 2500-EV	1500 V	550 V	±2400 V	2624 A	2467 A	2362 A
SC 2750-EV	1500 V	600 V	±2400 V	2646 A	2502 A	2406 A

Sunny Central US

Inverter type	DC voltage	AC voltage	AC peak voltage to ground	AC current		
				at 25 °C	at 40 °C	at 50 °C
SC 500CP-US	600 V	200 V	±800 V	1588 A	1502 A	1444 A
SC 500CP-US	1000 V	270 V	±1450 V	1176 A	1113 A	1070 A
SC 630CP-US	1000 V	315 V	±1450 V	1283 A	1202 A	1155 A
SC 720CP-US	1000 V	324 V	±1450 V	1411 A	1335 A	1283 A
SC 750CP-US	1000 V	342 V	±1450 V	1411 A	1335 A	1283 A
SC 800CP-US	1000 V	360 V	±1450 V	1411 A	1335 A	1283 A
SC 850CP-US	1000 V	386 V	±1600 V	1411 A	1335 A	1283 A
SC 900CP-US	1000 V	405 V	±1600 V	1411 A	1335 A	1283 A
SC 1850-US	1000 V	385 V	±1700 V	2774 A	2774 A	2774 A
SC 2200-US	1000 V	385 V	±1700 V	3300 A	3120 A	3000 A
SC 2500-EV-US	1500 V	550 V	±2400 V	2624 A	2467 A	2362 A
SC 2750-EV-US	1500 V	600 V	±2400 V	2646 A	2502 A	2406 A

Sunny Central CP JP

Inverter type	DC voltage	AC voltage	AC peak voltage to ground	AC current		
				at 25 °C	at 40 °C	at 50 °C
SC 500CP-JP	600 V	205 V	±800 V	1411 A	1335 A	1283 A
SC 630CP-JP	1000 V	315 V	±1450 V	1283 A	1202 A	1155 A
SC 800CP-JP	1000 V	360 V	±1450 V	1411 A	1335 A	1283 A
SC 1000CP-JP	1000 V	405 V	±1600 V	1586 A	1426 A	1283 A

Sunny Central Storage

Inverter type	DC voltage	AC voltage	AC peak voltage to ground	AC current		
				at 25 °C	at 40 °C	at 50 °C
SCS 500	850 V	270 V	±1450 V	1411 A	1113 A	1070 A
SCS 630	850 V	315 V	±1450 V	1411 A	1202 A	1155 A
SCS 720	850 V	324 V	±1450 V	1411 A	1335 A	1283 A
SCS 760	850 V	342 V	±1450 V	1411 A	1335 A	1283 A
SCS 800	950 V	360 V	±1450 V	1411 A	1335 A	1283 A
SCS 850	950 V	386 V	±1600 V	1411 A	1335 A	1283 A
SCS 900	950 V	405 V	±1600 V	1411 A	1335 A	1283 A
SCS 1000	900 V	405 V	±1600 V	1568 A	1426 A	1283 A
SCS 2200	1100 V	385 V	±1800 V	3300 A	3120 A	3000 A
SCS 2200-US	1100 V	385 V	±1800 V	3300 A	3120 A	3000 A
SCS 2475	1100 V	434 V	±1800 V	3292 A	3113 A	2993 A
SCS 2475-US	1100 V	434 V	±1800 V	3292 A	3113 A	2993 A
SCS 2500-EV	1500 V	550 V	±2400 V	2624 A	2467 A	2362 A
SCS 2500-EV-US	1500 V	550 V	±2400 V	2624 A	2467 A	2362 A
SCS 2750-EV	1500 V	600 V	±2400 V	2646 A	2502 A	2406 A
SCS 2750-EV-US	1500 V	600 V	±2400 V	2646 A	2502 A	2406 A

4.2 Technical data of the transformers

Inverters above 1000 kVA are not approved for three-winding transformers.

Sunny Central

Type of the Inverter	Two-winding transformers			Three-winding and four-winding transformers				
	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ dif\ max}$	$V_{k\ 1\text{-}2\ min}$
SC 500CP XT	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 630CP XT	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 720CP XT	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 760CP XT	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 800CP XT	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 850CP XT	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 900CP XT	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 1000CP XT	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %

Type of the Inverter	Two-winding transformers			Four-winding transformers				
	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ dif\ max}$	$V_{k\ 1\text{-}2\ min}$
SC 2200	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SC 2500-EV	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SC 2750-EV	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %

Sunny Central US

Type of the Inverter	Two-winding transformers			Three-winding and four-winding transformers				
	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ dif\ max}$	$V_{k\ 1\text{-}2\ min}$
SC 500CP-US*	5.4 %	6.0 %	6.6 %	5.4 %	6.0 %	6.6 %	0.5 %	9.0 %
SC 500CP-US**	5.4 %	6.0 %	6.6 %	5.4 %	6.0 %	6.6 %	0.5 %	9.0 %
SC 630CP-US	5.4 %	6.0 %	6.6 %	5.4 %	6.0 %	6.6 %	0.5 %	9.0 %
SC 720CP-US	5.4 %	6.0 %	6.6 %	5.4 %	6.0 %	6.6 %	0.5 %	9.0 %
SC 750CP-US	5.4 %	6.0 %	6.6 %	5.4 %	6.0 %	6.6 %	0.5 %	9.0 %
SC 800CP-US	5.4 %	6.0 %	6.6 %	5.4 %	6.0 %	6.6 %	0.5 %	9.0 %
SC 850CP-US	5.4 %	6.0 %	6.6 %	5.4 %	6.0 %	6.6 %	0.5 %	9.0 %
SC 900CP-US	5.4 %	6.0 %	6.6 %	5.4 %	6.0 %	6.6 %	0.5 %	9.0 %

* DC voltage = 600 V
** DC voltage = 1000 V

Type of the Inverter	Two-winding transformers			Four-winding transformers				
	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ dif\ max}$	$V_{k\ 1\text{-}2\ min}$
SC 1850-US	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SC 2200-US	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %

Type of the Inverter	Two-winding transformers			Four-winding transformers				
	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ dif\ max}$	$V_{k\ 1\text{-}2\ min}$
SC 2500-EV-US	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SC 2750-EV-US	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %

Sunny Central CP JP

Type of the Inverter	Two-winding transformers			Three-winding and four-winding transformers				
	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ dif\ max}$	$V_{k\ 1\text{-}2\ min}$
SC 500CP-JP	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 630CP-JP	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 800CP-JP	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SC 1000CP-JP	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %

Sunny Central Storage

Type of the Inverter	Two-winding transformers			Three-winding and four-winding transformers				
	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ dif\ max}$	$V_{k\ 1\text{-}2\ min}$
SCS 500	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SCS 630	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SCS 720	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SCS 760	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SCS 800	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SCS 850	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SCS 900	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %
SCS 1000	5.0 %	6.0 %	7.0 %	5.0 %	6.0 %	7.0 %	0.5 %	9.0 %

Type of the Inverter	Two-winding transformers			Four-winding transformers				
	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ min}$	$V_{k\ nom}$	$V_{k\ max}$	$V_{k\ dif\ max}$	$V_{k\ 1\text{-}2\ min}$
SCS 2200	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SCS 2200-US	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SCS 2475	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SCS 2475-US	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SCS 2500-EV	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SCS 2500-EV-US	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SCS 2750-EV	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %
SCS 2750-EV-US	5.0 %	6.0 %	8.5 %	5.0 %	6.0 %	8.5 %	0.5 %	9.0 %

ENERGY
THAT
CHANGES

SMA