VOLTWERK
outperforming the sun

Voltwerk **VIS 1050 / 1400**

Pre-assembled central inverter stations 1,050 and 1,400 kW

- Station for high performance modules
- Fully integrated central inverter stations including medium voltage transformer, ventilation and monitoring system
- Minimum planning, transport and installation costs
- Optimised ventilation concept for reliable operation

The new central inverter stations of the Voltwerk VIS series are complete systems for large-scale PV power plants with high performance modules. The stations consist of the new VC 350 central inverters of the Voltwerk VC series, high performance medium voltage transformer and the monitoring system VM Touch and achieve a system efficiency factor of over 98 %.

Ready-for-connection comprehensive system

The new central inverter stations are pre-assembled complete solutions, available in the power classes 1,050 kW and 1,400 kW. They have been developed especially for the quick and error-free planning and installation of large-scale PV power plants and contain Voltwerk VC central inverters and a highly efficient medium voltage transformer. An optional medium voltage switch gear can be integrated ex works. All connection and ventilation devices as well as the monitoring system are pre-installed and tested ex works. This allows an on-site plug & play installation.

Future-proof

The Voltwerk VIS series guarantees the operators of PV plants a maximum return throughout the entire service life. The central inverters of the Voltwerk VC series comply with all European legal norms and standards, such as the German “Medium Voltage Directive”. The entire stations are design approved and comply in dimension and lay-out with the European standard requirements.

Long maintenance intervals

Voltwerk central inverter stations reduce planning, transport and installation costs significantly. Besides the medium voltage connection, only the solar generator, a remote transmission line for the data telecommunication and any given optional components have to be connected. Moreover, the integrated ventilation system has generous air flow and filter volume reserves, which allow very long maintenance intervals.

Flexibility

For project-specific adaptations the stations can be equipped with various optional equipment ex works. For example, dry type transformers are available in addition to medium voltage switch gears.

Voltwerk VIS series

Input values (solar generator)	
Maximum DC input voltage (V_{dcmax})	1,000 V
Minimum DC input voltage (V_{dcmin})	580 V
Maximum MPP voltage (V_{mppmax})	800 V
Minimum MPP voltage (V_{mppmin})	580 V
Maximum input current (I_{pcmax})	650 A per inverter
Number of inputs	4 per inverter
Fuse per input	175 to 250 A (adjustable)
Connection design	M 12 bolts on copper bar
Generator junction box	integrated in inverter
Output data (grid)	
Rated grid voltage ($V_{ac,r}$)	20 kV with tappings 2x +/-5%
Rated frequency (f_r)	50 Hz
Frequency min. (f_{min}) / max. (f_{max})	45 Hz / 65 Hz
Power factor (cos φ)	Adjustable 0.7 inductive to 0.7 capacitive
Distortion factor (at rated capacity)	≤ 3 %
Connection design[7]	connection type A acc. EN 50180 and EN 50181, external cone 250 A
Auxiliary supply	
Required supply	400 V / 50 Hz / 14kVA / 3-phases with N / TN grid
Required pre-fuses	C20 A 3 phases
Supply for customer devices	K16 A / 230 V / with RCD (one connection per inverter)
Optional auxiliary transformer	Dry-type transformator 400 V / 14kVA
Cooling	
Cooling type	Air cooling, individually thermally controlled fan
Type of air filter	Pocket filter in accordance with G3 EN 779
Filter surface	45 m²
Maximum counterpressure with additional station conversion	50 Pa in total for feed and exhaust air
Environmental / ambient conditions	
Temperature range[1]	–20 °C / +45 °C
Maximum temperature for permanent rated capacity[1]	+45 °C
Relative humidity (non-condensing)	≤ 95 %
Installation altitude above sea level	≤ 2,000 m
Safety / protective equipment	
Protection type	Operating room IP 54, medium voltage room IP 43 in accordance with EN 60529
Ground fault monitoring	Yes, with adjustable reaction type
Surge arrester	Integrated in inverter: DC-side type I / II. Grid-side type I / II in acc. with IEC 61643-1
Isolation of solar generator from the grid	Galvanic isolation by means of the medium-voltage transformer
Medium-voltage transformer [7]	
Construction	Oil transformer, hermetic design
Cooling	ONAN
Charging	Dry and vented mineral oil
Tappings	22.0 kV / 21.0 kV / 20.0 kV / 19.0 kV / 18.0 kV

[1] Depending from the operating status a derating resulting from the transformer monitoring may be possible
[2] Values at external auxiliary supply; values may vary with development condition and filter pollution grade
[3] Fans inside the station work speed controlled
[4] Values when an external auxiliary supply is used
[5] Height specification without exhaust air hoods; Measurements without special equipment; height for transport: 3.25 m
[6] Typical values
[7] Differing values when using optional equipment, e.g. dry type transformers

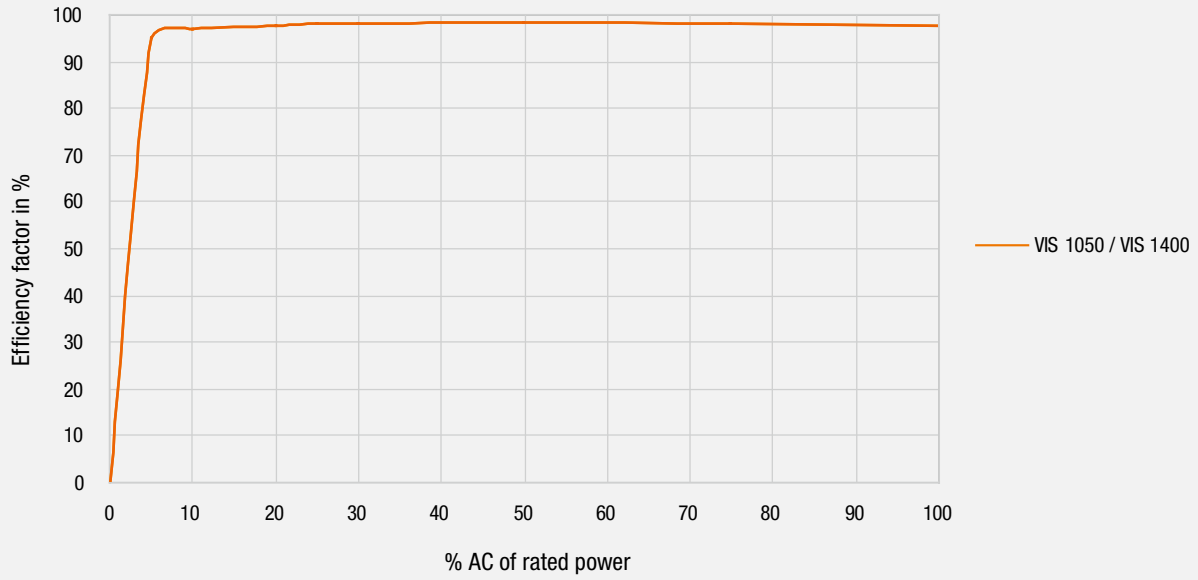
Voltwerk VIS series

Inverter	
Transient emissions (EMC)	DIN EN 61000-6-4:2007-09
Interference resistance (EMC)	DIN EN 61000-6-2:2006-03
Equipment reliability	DIN EN 50178:1998-04
Pre-configured standards for grid monitoring	VDE 0126-1-1, ENEL, RD661, RD1565, RD1663, EN50438:2007, ÖVE E 2750
Station design	
Material	wu lightweight concrete LC 25 / 28 in acc. with DIN 1045:2001-07
Exposition class for exterior parts	XC4, XF1, XA1 in accordance with DIN 1045:2001-07
Exposition class for interior parts	XC1 in accordance with DIN 1045:2001-07
Exterior walls	Washed-out concrete, granularity 8/16 (other options available)
Roof	Concrete, floating design
Foundation trough	Oil-proof (metal oil pan optional)
Exhaust air hood	Aluminium
Air grilles / doors / frames	Aluminium
Attachment points	4 x Deha anchors, type 20 T
Number of cable inputs	Hauff HSI 150 system
Earthing bushing	Hauff earthing bushing HEA-I-M12
Standards	
Grid quality	DIN EN 61000-3-11:2001-04 / DIN EN 61000-3-12:2005-09
CE conformity	Yes
Design approval	Yes (Bureau Veritas)
Conformity with German Renewable Energies Act § 6.1 EEG 2009 §6.1	Yes (GridControl necessary)
Conformaty of Medium Voltage Directive (BDEW) of June 2008	Yes (GridControl necessary)

Type Item no.	**VIS 1050** V1-120-025	**VIS 1400** V1-120-024
AC Rated power (inverter) ($S_{ac,r}$)	1,050 kVA	1,400 kVA
Recommended DC output (kWp)	1,155	1,540
Maximum DC Power (kWp)	1,200	1,600
AC rated current (A)	30.3	40.4
System efficiency factor[4,7]		
Maximum efficiency factor	98.3 %	98.3 %
European efficiency factor	97.9 %	97.9 %
Californian efficiency factor	98.1 %	98.1 %
Auxiliary supply[2]		
Stand-by / nighttime performance (P_{night})	330 W	440 W
Power consumption (P_{day})[3,7]	330 W to 6,500W	440 W to 8,700 W
Medium Voltage transformer		
Rated power	1,420 kVA	1,420 kVA
Vector group	Dyn5	Dyn5
Short circuit voltage[6]	5.5 %	5.5 %
No-load losses[6]	630 W	630 W
Dimensions / Weight		
Dimensions (W x H x D)[5]	2.980 x 2.980 x 6.980 mm	2.980 x 2.980 x 6.980 mm
Weight of entire station[6,7]	35 t	35 t

Voltwerk VIS series

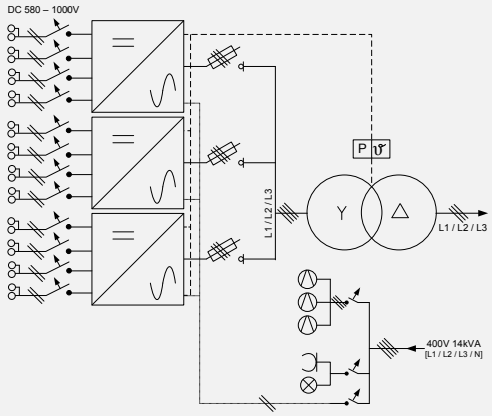
Efficiency curves at 540 VDC[4,7,8]



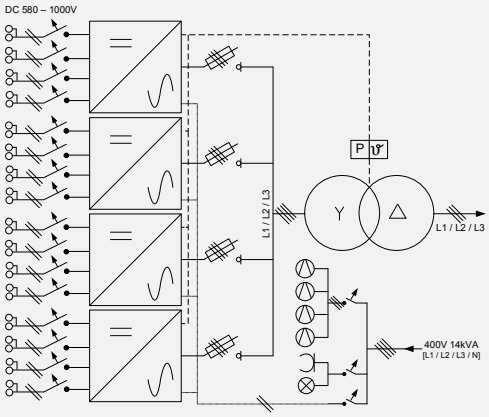
P_r	VIS 1050	VIS 1400
5 %	95.0 %	95.0 %
10 %	96.9 %	96.9 %
20 %	97.7 %	97.7 %
25 %	98.2 %	98.2 %
30 %	98.2 %	98.2 %
50 %	98.3 %	98.3 %
75 %	98.1 %	98.1 %
100 %	97.7 %	97.7 %

Internal layout

VIS 1050



VIS 1400



[8] With AC/DC rated voltage, Cos φ = 1 and external auxiliary supply

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