

Voltwerk VIS 400-1200

Pre-assembled central inverter stations 400 to 1,200 kW



- | Fully integrated central inverter stations including medium voltage transformer, ventilation and monitoring system
- | Modular design: available in power classes 400kW to 1,2MW
- | 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. The stations consist of 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 400kW to 1,2MW. 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.

Thin film compatibility

For the use of thin film modules, which require an earthing option of the solar generator, stations can be equipped with a special transformer. The necessary earthing kit including pre-fuse and ground fault monitoring is already integrated in the inverters ex works.

Voltwerk VIS series

| Input values (solar generator) | |
|---|---|
| Maximum DC input voltage (V_{dcmax}) | 1,000 V |
| Minimum DC input voltage (V_{dcmin}) | 530 V |
| Maximum MPP voltage (V_{mppmax}) | 800 V |
| Minimum MPP voltage (V_{mppmin}) | 530 V |
| Maximum input current (I_{pcmax}) | 590 A (VC 300) / 400 A (VC 200) 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 tapings 2x +/-2,5% |
| Rated frequency (f_r) | 50 Hz |
| Frequency min. (f_{min}) / max. (f_{max}) | 45 Hz / 65 Hz |
| Power factor ($\cos \varphi$) | Adjustable 0.7 inductive to 0.7 capacitive |
| Distortion factor (at rated capacity) | $\leq 3\%$ |
| 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 transformer 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 m ² |
| Maximum counterpressure with additional station conversion | 50 Pa in total for feed and exhaust air |
| Environmental / ambient conditions | |
| Temperature range ¹ | -20 °C / +50 °C |
| Maximum temperature for permanent rated capacity ¹ | +50 °C |
| Relative humidity (non-condensing) | $\leq 95\%$ |
| Installation altitude above sea level | $\leq 2,000$ 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 II / III. 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 | |
| Construction | Oil transformer, hermetic design |
| Cooling | ONAN |
| Charging | Dry and vented mineral oil |
| Tappings | 21.0 kV / 20.5 kV / 20 kV / 19.5 kV / 19 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 temperature controlled

⁴ Values when an external auxiliary supply is used

⁵ Height specification without exhaust air hoods. Dimensions without any special equipment; height for transport 3.25 m

⁶ Typical values

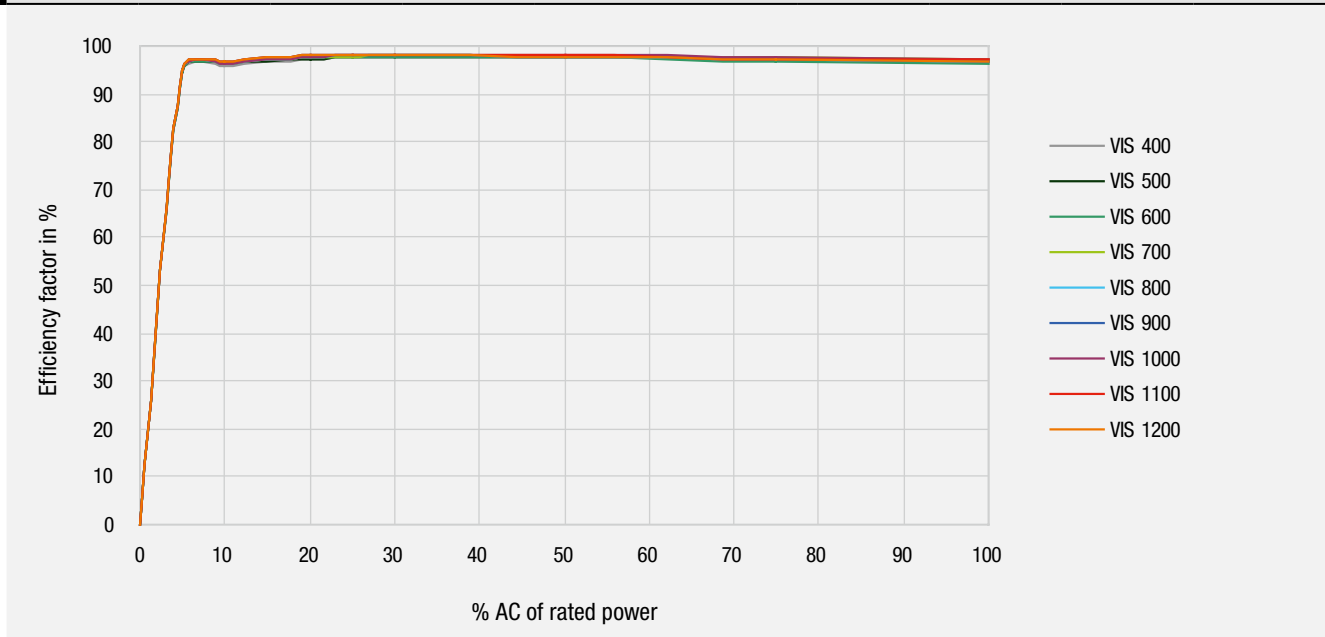
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| Inverter | |
|---|---|
| Transient emissions (EMC) | DIN EN 61000-6-4:2007-09 |
| Interference resistance (EMC) | DIN EN 61000-6-2:2006-03 |
| Equipment reliability | DIN EN 50178:1998-04 |
| Pre-configured standards for grid monitoring | VDE 0126-1-1, 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 (additional hardware may be necessary) |
| Conformity of Medium Voltage Directive (BDEW) of June 2008 | Yes (additional hardware may be necessary) |

| Type Item no. | VIS 400 V1-120-014 | VIS 500 V1-120-015 | VIS 600 V1-120-016 | VIS 700 V1-120-017 | VIS 800 V1-120-018 | VIS 900 V1-120-019 | VIS 1000 V1-120-020 | VIS 1100 V1-120-021 | VIS 1200 V1-120-022 |
|--|--------------------------|-----------------------|-----------------------|--------------------------|-----------------------|--------------------------|------------------------|------------------------|------------------------|
| AC Rated power (inverter) ($S_{ac,r}$) | 400 kVA | 500 kVA | 600 kVA | 700 kVA | 800 kVA | 900 kVA | 1000 kVA | 1100 kVA | 1200 kVA |
| Recommended DC output (kWp) | 440 | 550 | 660 | 770 | 880 | 990 | 1100 | 1210 | 1320 |
| Maximum DC Power (kWp) | 480 | 600 | 720 | 840 | 960 | 1080 | 1200 | 1320 | 1440 |
| AC rated current (A) | 11.55 | 14.43 | 17.32 | 20.20 | 23.10 | 25.98 | 28.87 | 31.75 | 34.64 |
| System efficiency factor ^{4,7} | | | | | | | | | |
| Maximum efficiency factor | 98.1 % | 98.1 % | 98.2 % | 98.1 % | 98.1 % | 98.2 % | 98.1 % | 98.1 % | 98.2 % |
| European efficiency factor | 97.6 % | 97.7 % | 97.8 % | 97.6 % | 97.7 % | 97.8 % | 97.7 % | 97.7 % | 97.8 % |
| Californian efficiency factor | 97.9 % | 98.0 % | 98.0 % | 97.9 % | 98.0 % | 98.0 % | 98.0 % | 98.0 % | 98.0 % |
| Auxiliary supply ² | | | | | | | | | |
| Stand-by / nighttime performance (P_{night}) | 220 W | | | 330 W | | 440 W | | | |
| Power consumption (P_{day}) ^{3,7} | 220 W to 4,400 W | | | 330 W to 6,500 W | | 440 W to 8,700 W | | | |
| Medium Voltage transformer | | | | | | | | | |
| Rated power | 600 kVA | | | 900 kVA | | 1250 kVA | | | |
| Vector group | Dyn5, optional Dyn5yn5 | | | Dyn5 | | Dyn5 | | | |
| Short circuit voltage ⁵ | 6 % | | | 6 % | | 6 % | | | |
| No-load losses ⁶ | 320 W | | | 400 W | | 580 W | | | |
| Dimensions / Weight | | | | | | | | | |
| Dimensions (W x H x D) ⁵ | 2,980 x 2,980 x 5,380 mm | | | 2,980 x 2,980 x 6,980 mm | | 2,980 x 2,980 x 6,980 mm | | | |
| Weight of entire station ^{6,7} | 28 t | | | 35 t | | 35 t | | | |

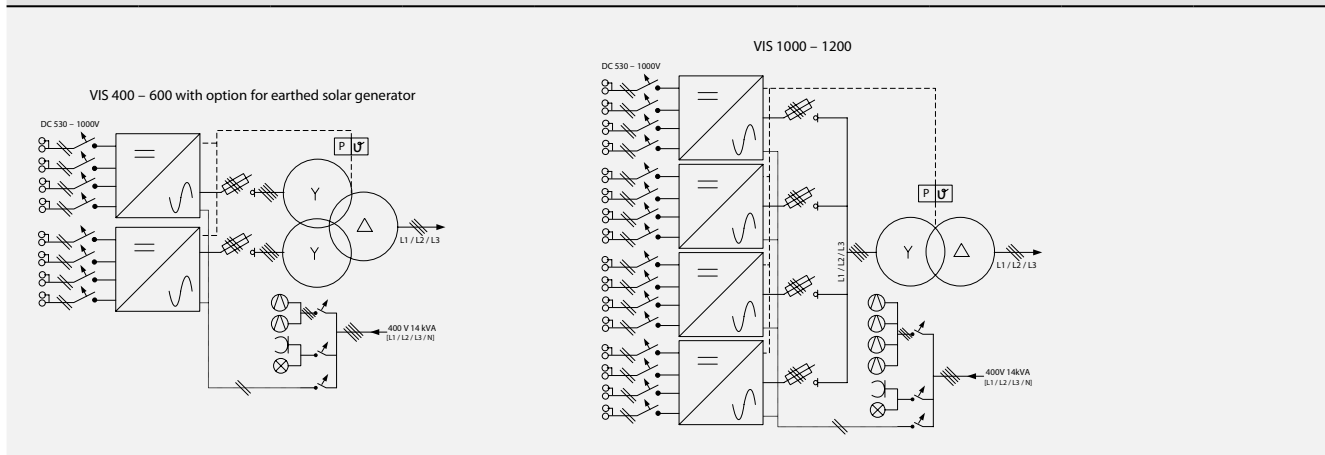
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Efficiency curves at 540 VDC⁷



| P _r | VIS 400 | VIS 500 | VIS 600 | VIS 700 | VIS 800 | VIS 900 | VIS 1000 | VIS 1100 | VIS 1200 |
|----------------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| 5 % | 93.1 % | 94.0 % | 95.0 % | 93.7 % | 94.4 % | 95.0 % | 94.0 % | 94.6 % | 95.0 % |
| 10 % | 96.0 % | 96.4 % | 96.8 % | 96.3 % | 96.6 % | 96.8 % | 96.4 % | 96.6 % | 96.8 % |
| 20 % | 96.8 % | 97.2 % | 97.5 % | 97.0 % | 97.3 % | 97.5 % | 97.2 % | 97.3 % | 97.5 % |
| 25 % | 97.4 % | 97.7 % | 98.0 % | 97.6 % | 97.8 % | 98.0 % | 97.7 % | 97.9 % | 98.0 % |
| 30 % | 97.9 % | 98.0 % | 98.0 % | 97.9 % | 98.0 % | 98.0 % | 98.0 % | 98.0 % | 98.0 % |
| 50 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % |
| 75 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % | 98.1 % |
| 100 % | 97.8 % | 97.8 % | 97.8 % | 97.8 % | 97.8 % | 97.8 % | 97.8 % | 97.8 % | 97.8 % |

Internal layout



⁷ With AC/DC rated voltage, Cos φ = 1 and external auxiliary supply

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Available at: