

BENNING

World Class Power Solutions



TEBEVERT DSP

Inverters for telecommunication
and industrial applications



TEBEVERT DSP

reliable and comfortable

General Information

The Tebevert DSP inverter system featuring DSP- technology (Digital Signal Processing) can be used in a wide array of telecommunication and industrial applications. The introduction of enhanced DSP controls and higher semi-conductor switching frequencies improves power density, operating efficiency while dramatically reducing physical size and weight.

The Tebevert DSP inverters feature the latest in paralleling technology allowing multiple inverter modules to be reliably paralleled to support higher power levels or N+1 redundancy.

The regulation and monitoring is provided via digital signal processors (DSP) programmed with next generation regulation and control algorithms. The CAN (Control Area Network) bus communication interface provides high reliability communication between the system components while a built-in serial interface provides service access for system status and software update.



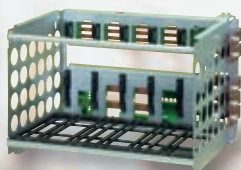
Tebevert 1,0 kVA



Tebevert 1,5 kVA



Tebevert 2,5 kVA



Sub rack



System configuration

The Tebevert DSP inverter incorporates a modular design providing easily configurable, expandable solutions. Systems can be quickly configured to suit most applications without any load interruption.

A maximum of 6 inverter modules can be installed in a single sub rack (picture 1), and parallel connection of two sub racks can be used for system redundancy or increased power capacity (picture 2). The Tebevert DSP inverters can be constructed to support a maximum output power of 12 kVA (1 kVA inverter), 18 kVA (1,5 kVA inverter) or 30 kVA (2,5 kVA inverter).

The DSP Inverter system features:

- DSP- Technology (Digital Signal Processing)
- Simple installation and maintenance via hot plug technology
- Compact design
- Adjustable voltage and frequency
- Display with extensive Monitoring



Inverter system with static bypass

Systems can also be configured with an optional static bypass (EUE) module. In this configuration, a maximum of 5 inverter modules plus a static bypass module can be installed in a single sub rack (picture 3), or 11 inverters and one static bypass are possible in a two sub rack configuration (picture 4).

TEBEVERT DSP with Static Bypass increased system reliability

Static bypass (EUE)



EUE 12 kVA

The optional static bypass module (EUE) increases system reliability by providing automatic switching between the inverter output and the AC mains source providing protection against load interruptions caused by severe overloads or the unlikely inverter system failure.

The Tebevert DSP no-break switching provides computer grade power capable of powering the most sensitive electronic loads. Front panel pushbuttons and a graphical digital display provide a wide range of supervisory functions, and enable easy monitoring and modification of system controls.

Included in the menu driven display screen is an easy to view system single line diagram plus detailed system operational information, status and alarms (picture 6). The user control pushbuttons provide local access to measurement values, component status, system adjustments and service options (picture 7).

The static bypass module can be configured to operate in an on-line (inverter priority) or off-line (mains priority) modes. The access to sensitive menu levels is controlled by multi-level passwords.



EUE 30 kVA

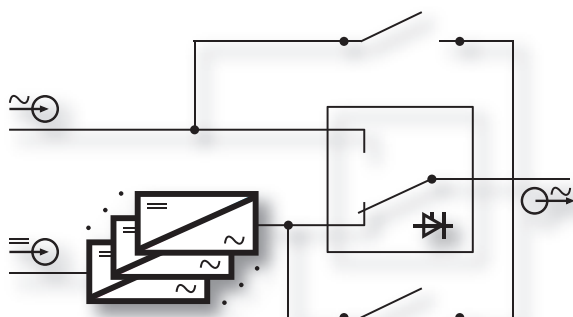
Static bypass

Nominal power rating	[kVA]	12	30
DC input	[V]	48 / 60	24 / 48 / 60
DC input range	[%]	+20, -15	
*Nominal mains (AC) input	[V]	120 / 220 / 230 / 240	
Mains (AC) input range	[%]	±15	
*Nominal mains (AC) frequency	[Hz]	50 / 60	
Mains (AC) frequency range		max. ±3 %; Synchronize area of the inverter	
*Inverter nominal voltage	[V]	120 / 220 / 230 / 240	
Nominal output power	[kVA]	12	30
Nominal output voltage	[V]	120 / 220 / 230 / 240	
Voltage range / static		max. ±15 % at mains priority, max. ±1% at inverter priority	
*Nominal output frequency	[Hz]	50 / 60	
Max. frequency deviation		±3 %; (±1 % crystal control)	
*Nominal output current	[A]	100 / 54,6 / 52,5 / 50,6	250 / 136,4 / 130,4 / 125
Power factor range		0,7 ind. to 0,8 cap.	
Overload rating		500 % for 100 ms	
Transfer time		2ms (DIN VDE 0558 part5; IEC 146-4)	
*Operation modes		Inverter priority / Mains priority	
Mechanical design		19" part rack	
Dimensions H x W x D	[mm] [in]	261 x 74 x 374 10,3 x 2,9 x 14,7	261 x 74 x 481 10,3 x 2,9 x 18,9
Protection class		IP 20 (without plug)	
Painting		RAL 7035 for front panel	
Indicators		Fault Operation Display for system status and measurement	
Connections		Plug	
Weight	[kg] [lbs]	5 11	7 15,4

*The settings for 220 / 230 / 240 V systems are software configurable.

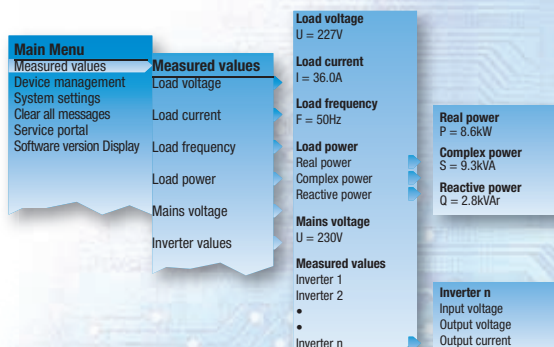


Display static bypass



Picture 6: Single line diagram

Menu levels



Picture 7: The access to sensitive menu levels is controlled by multi-level passwords.



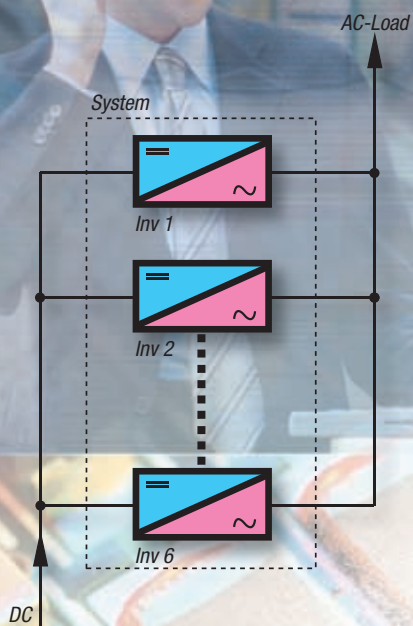
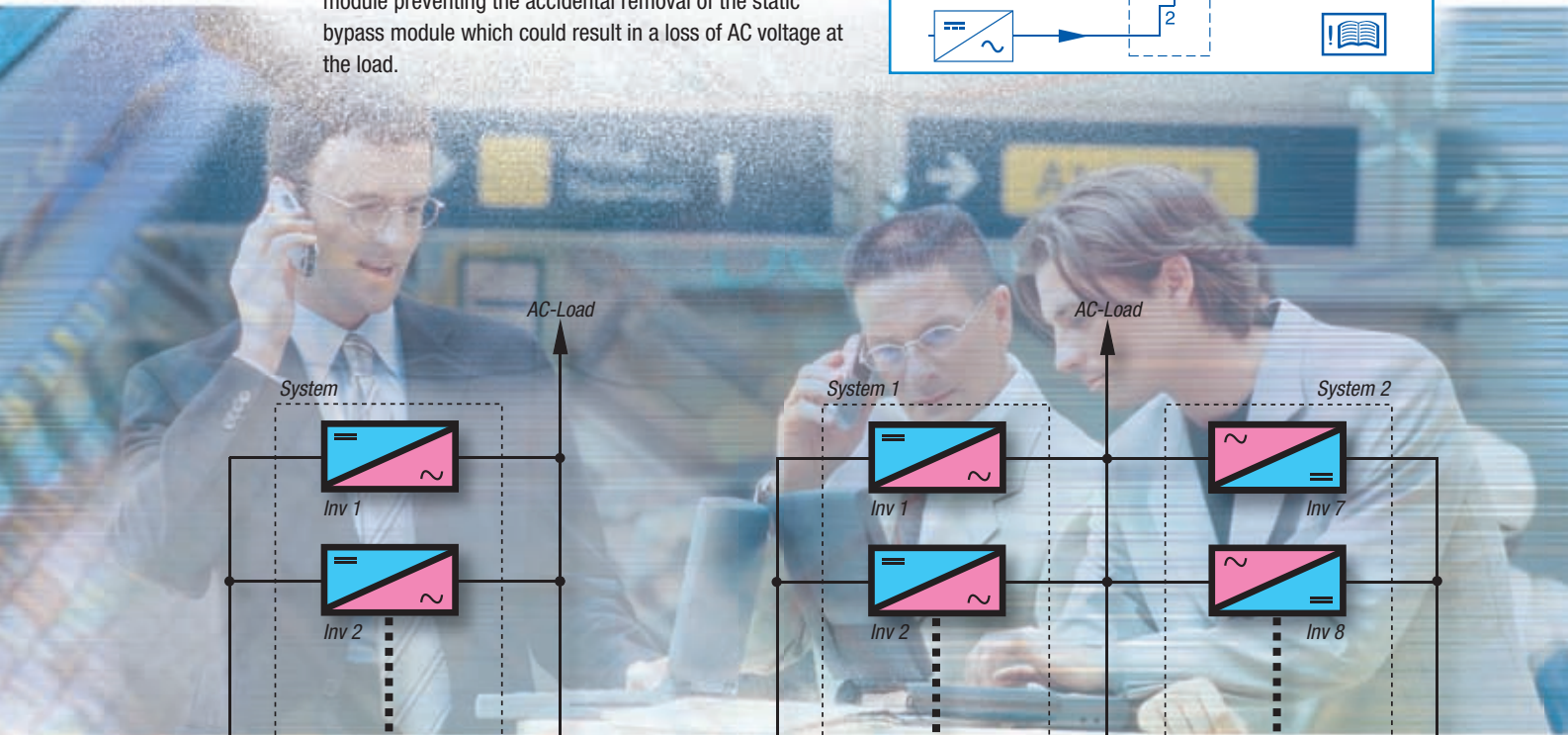
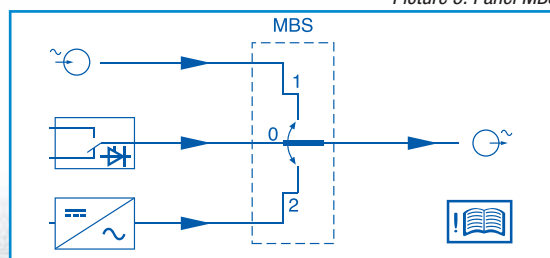
TEBEVERT DSP

multiple options

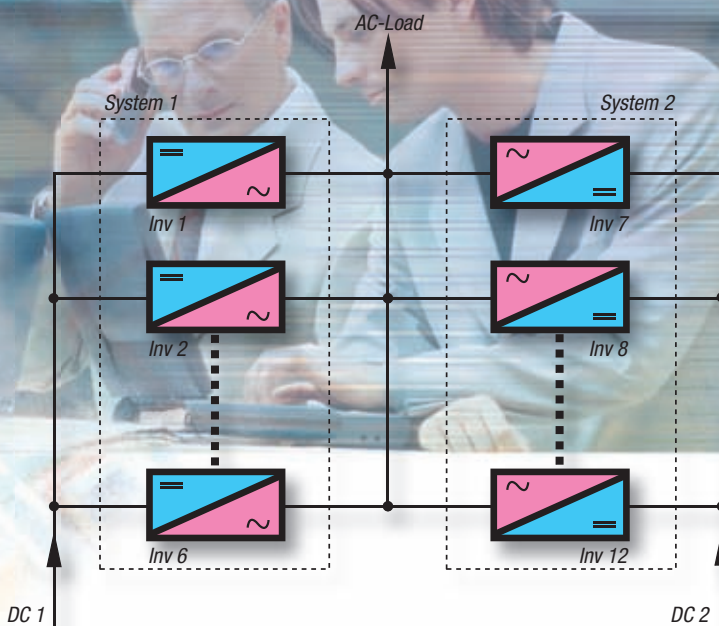
Mechanical bypass MBS

Systems with static bypass also include a mechanical maintenance bypass switch providing voltage free system maintenance or the safe removal of the static bypass module without load power interruptions (picture 5). The maintenance bypass is mechanically interlocked with the static bypass module preventing the accidental removal of the static bypass module which could result in a loss of AC voltage at the load.

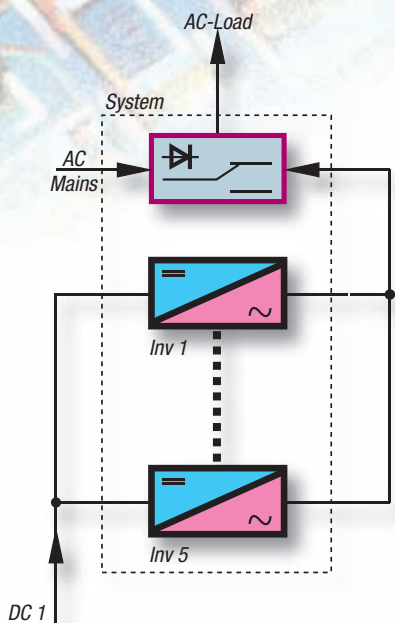
Picture 5: Panel MBS



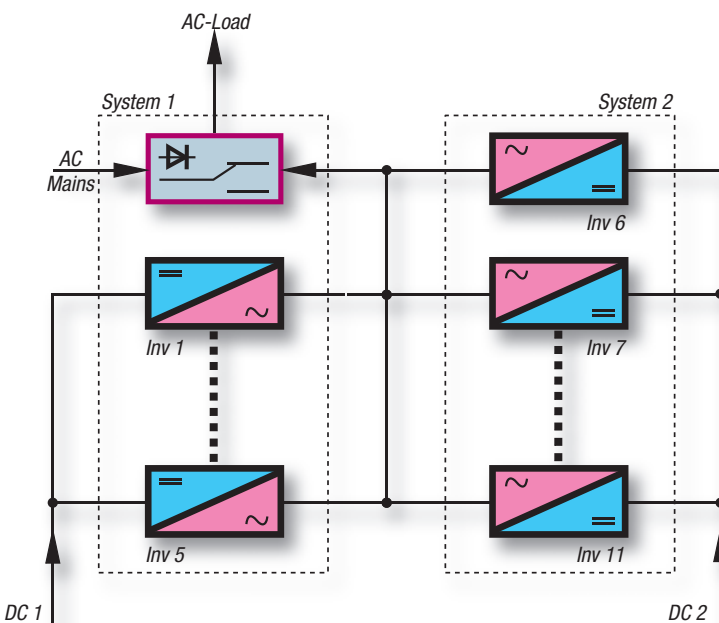
Picture 1: Parallel operations of 6 inverters



Picture 2: Parallel operation of 12 inverters in two sub racks



Picture 3: Parallel operation of 5 inverters and a static bypass



Picture 4: Parallel operation of 11 inverters and a static bypass

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technical opportunities

Inverter				
Nominal power rating	[kVA]	1	1,5	2,5
DC input voltage	[V]	48 / 60	24	48 / 60
DC input range	[%]	+20, -15		
*Disconnection value	[V]	40,8 / 51	20,4	40,8 / 51
*Connection value	[V]	49 / 61,3	24,5	49 / 61,3
Input current at nominal real power	[A]	18,7	57,5	46,7
Ripple of the input voltage		max. 5 % eff.		
Nominal real power (cos $\varphi = 0,8$)	[kVA]	1	1,5	2,5
Nominal real power	[kW]	0,8	1,2	2,0
*Output voltage	[V]	120 / 220 / 230 / 240		
Static regulation	[%]	± 1		
*Nominal current (cos $\varphi = 0,8$)	[A]	8,33 / 4,55 / 4,35 / 4,17	-, - / 6,5 / 6,8 / 6,2	20,83 / 11,36 / 10,87 / 10,42
*Output frequency	[Hz]	50 / 60		
Regulation frequency	[%]	$\pm 0,1$ with crystal control		
Mains control of frequency	[%]	± 3		
Power factor range		0,7 ind. to 0,8 cap.		
Efficiency at 100%	[%]	90	87	90
Voltage waveform	[%]	Sine-wave		
Output distortion factor	[%]	≤ 2 at linear load		
Short circuit behavior		10 A _{rms} for 4 sec, then cut-off	15 A _{rms} for 4 sec, then cut-off	25 A _{rms} for 4 sec, then cut-off
Overload capacity	[%]	200 for 4 sec, then reduction to 120 for 60 sec, then cut-off		
Continuous overload	[%]	110		
Crest factor load		2.8:1 (higher crest factor possible at reduced output current)		
Radio interference		Limiting class B to EN 55022		
Noise level		55 dB (A) at fan operation		
Ambient temperature	[°C]	0 to +40		
Installation height		Up to 1000m (3,300 ft) above sea level		
Climatic environment conditions		IEC 721-3-3 (3k3)		
Humidity class		F (0-95% non-condensing)		
Cooling		Temperature controlled forced ventilation		
Protection class		1 to EN 60950		
Mechanical design		19" subrack (rack or cabinet mount.) 23" relay rack mounting		
Dimensions H x W x D	[mm]	261 x 74 x 353	261 x 74 x 463	261 x 74 x 463
	[in]	10,3 x 2,9 x 13,9	10,3 x 2,9 x 18,2	10,3 x 2,9 x 18,2
Protection class		IP 20 (without plug)		
Painting		RAL 7035 for front panel		
Indicators		Fault Output voltage present Parallel operation DC input within limits Bargraph for output power		
Connections		plug		
Weight	[kg]	5	8	8
	[lbs]	11	17,6	17,6
Option		48 V (1 kVA and 2,5 kVA) also available with output voltage of 110 V / 115 V / 120 V		

*The settings for 220 / 230 / 240 V units are software configurable.



www.benning.de

BENNING worldwide

Austria

Benning GmbH Elektrotechnik und Elektronik
Eduard-Klinger-Str. 9
A-3423 St. Andrä-Wördern
Tel. 0 22 42 / 3 24 16-0
Fax 0 22 42 / 3 24 23
E-Mail: info@benning.at

Belarus

IOOO BENNING Belarus
ul. Derzinskogo, 50
BY-224030, Brest
Tel. 0162 / 22 07 21
Fax 0162 / 22 07 21
E-Mail: info@benning.brest.by

Belgium

Benning Belgium
Power Electronics
Z. 2 Essenestraat 16
B-1740 Ternat
Tel. 02 / 58 287 85
Fax 02 / 58 287 69
E-Mail: info@benning.be

Croatia

Benning Zagreb d.o.o.
Trnjanska 61
HR-10000 Zagreb
Tel. 1 / 63 12 280
Fax 1 / 63 12 289
E-Mail: info@benning.hr

Czech Republic

Benning CR s.r.o.
Zahradní ul. 894
CZ-293 06 Kosmonosy
(Mladá Boleslav)
Tel. 3 26 72 10 03
Fax 3 26 72 25 33
E-Mail: benning@benning.cz

France

Benning Conversion d'énergie
43, avenue Winston Churchill
B.P. 418
F-27404 Louviers Cedex
Tél. 0 / 2.32.25.23.94
Fax 0 / 2.32.25.08.64
E-Mail: info@benning.fr

Germany

Benning Elektrotechnik und Elektronik
GmbH & Co.KG
Factory I: Münsterstr. 135-137
Factory II: Robert-Bosch-Str. 20
D-46397 Bocholt
Tel. 0 28 71/ 93-0
Fax 0 28 71/ 9 32 97
E-Mail: info@benning.de

Great-Britain

Benning Power Electronics (UK) Ltd.
Oakley House
Hogwood Lane
Finchampstead
GB-Berkshire
RG 40 4QW
Tel. 0118 9731506
Fax 0118 9731508
E-Mail: info@benninguk.com

Hungary

Benning Kft.
Power Electronics
Rákóczi út 145
H-2541 Lábattlan
Tel. 033 / 50 76 00
Fax 033 / 50 76 01
E-Mail: benning@vnet.hu

Italy

Benning Conversione di Energia S.r.L.
Via 2 Giugno 1946, 8/B
I-40033 Casalecchio di Reno (BO)
Tel. 0 51 / 75 88 00
Fax 0 51 / 61 67 655
E-Mail: info@benningitalia.com

Netherlands

Benning NL
Power Electronics
Peppelkade 42
NL-3992 AK Houten
Tel. 0 30 / 6 34 60 10
Fax 0 30 / 6 34 60 20
E-Mail: info@benning.nl

Poland

Benning Power Electronics Sp. z o.o.
Korczyńska 30
PL-05-503 Głusków
Tel. 0 22 / 7 57 84 53
Fax 0 22 / 7 57 84 52
E-Mail: biuro@benning.biz

P. R. China

Benning Power Electronics (Beijing) Co., Ltd.
Tongzhou Industrial Development Zone
1-B BeiEr Street
CN-101113 Beijing
Tel. 010 61568588
Fax 010 61506200
E-Mail: info@benning.cn

Russian Federation

OOO Benning Power Electronics
Moscow region,
Domodedovskiy district,
Domodedovo, Severny zone,
Tel. (495) 967 68 50
Fax (495) 967 68 51
E-Mail: benning@benning.ru

Slovakia

Benning Slovensko, s.r.o.
Kukuríčná 17
SK-83103 Bratislava
Tel. 02 / 44459942
Fax 02 / 44455005
E-Mail: benning@benning.sk

South America

Benning Office South America
Lavalle 637
AR-1876 Bernal, Buenos Aires
Argentina
Tel. 54/ 911 5498 2515
E-Mail: info-argentina@benning.es

South East Asia

Benning Power Electronics Pte Ltd
85, Defu Lane 10
#05-00
SGP-Singapore 539218
Tel. (65) 6844 3133
Fax (65) 6844 3279
E-Mail: sales@benning.com.sg

Sweden

Benning Sweden AB
Box 990, Hovslagarev. 3B
S-19129 Sollentuna
Tel. 08 / 6239500
Fax 08 / 969772
E-Mail: power@benning.se

Switzerland

Benning Power Electronics GmbH
Industriestrasse 6
CH-8305 Dietlikon
Tel. 044 / 8057575
Fax 044 / 8057580
E-Mail: info@benning.ch

Spain

Benning Conversión de Energía S.A.
C/Pico de Santa Catalina 2
Pol. Ind. Los Linares
E-28970 Humanes, Madrid
Tel. 91 / 6048110
Fax 91 / 6048402
E-Mail: benning@benning.es

Ukraine

Benning Power Electronics
3 Sim'yi Sosnykh str.
UA-03148 Kyiv
Tel. 044 / 501 40 45
Fax 044 / 273 57 49
E-Mail: info@benning.ua

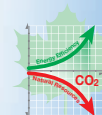
U.S.A.

Benning Power Electronics, Inc.
11120 Grader Street
USA-Dallas, TX 75238
Tel. 214 5531444
Fax 214 5531355
E-Mail: sales@benning.us

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