DC/AC INVERTER

UNV-C

USER MANUAL

Notes to this manual

ATTENTION! Read this manual very carefully before installing and commissioning the specified module.
This manual is a part of the delivered module. Familiarity with the contents of this manual is required for installing and operating the specified module.
The rules for prevention of accidents for the specific country and the general safety rules in accordance with IEC 364 must be observed.

The function description in this manual corresponds to the date of publishing.
Technical changes and changes in form and content can be made at any time by the manufacturer without notice. There are no obligations to update the manual continually.

The module is manufactured in accordance with applicable DIN and VDE standards such as VDE 0106 (part 100) and VDE 0100 (part 410). The CE marking on the module confirms compliance with EU standards 2006-95-EG (low voltage) and 2004-108-EG (electromagnetic compatibility) if the installation and operation instructions are followed.

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Changes and errors excepted.

The current revision status of this manual is the following:

Revision: 3.0

Date: 2009-05-11

Revision	Description of change	Writer	Date
1.0	Basis is the former edition "BHB.UNV-C.D65-1000.HB102"; EVI layout inserted, new revision numbering (X.X) introduced.	RTH	2008-11-10
2.0	Section "Error indication on the displays" inserted.	RTH	2009-04-23
3.0	Sections 6.2.3 "Output" and 6.3.2 "Output Voltage Monitoring" corrected.	RTH	2009-05-11

Table of Contents

A. Safety Instructions

Warning!

Because several components of operating electrical modules are charged by dangerous voltage, the improper handling of electrical modules may cause accidents involving electrocution, injury, or material damages.

- Operation and maintenance of electrical devices must be performed by qualified skilled personnel such as electricians in accordance with EN 50110-1 or IEC 60950.
- Install the device only in areas with limited access to unskilled personnel.
- Before starting work, the device must be disconnected from mains. Make sure that the device is earthed.
- Do not touch connector pins as they can be charged with dangerous voltage up to 30 seconds after disconnection.
- Only spare parts approved by the manufacturer must be used.

B. Electronic Waste Disposal

The correct disposal of electronic waste is the responsibility to recycle discarded electronic equipment and is necessary to achieve the chosen level to protect human health and the environment.

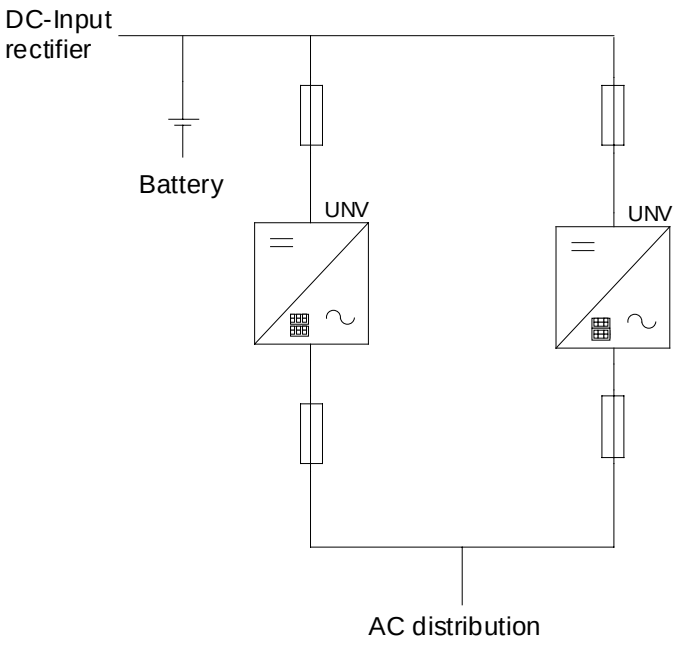
In the case of waste disposal of your discarded equipment we recommend to contact a professional waste management company.

1. General Information

Inverters of type UNV-C (named UNV on next pages) are available for delivery with an output power of 1.2 and 2.5kVA per module. To increase the system output power several units can be operated in parallel.

Typical applications are:

- AC power supply with input side battery buffering
- Industrial modular UPS with input side rectifier and battery



Picture 1.1: UNV in parallel operation

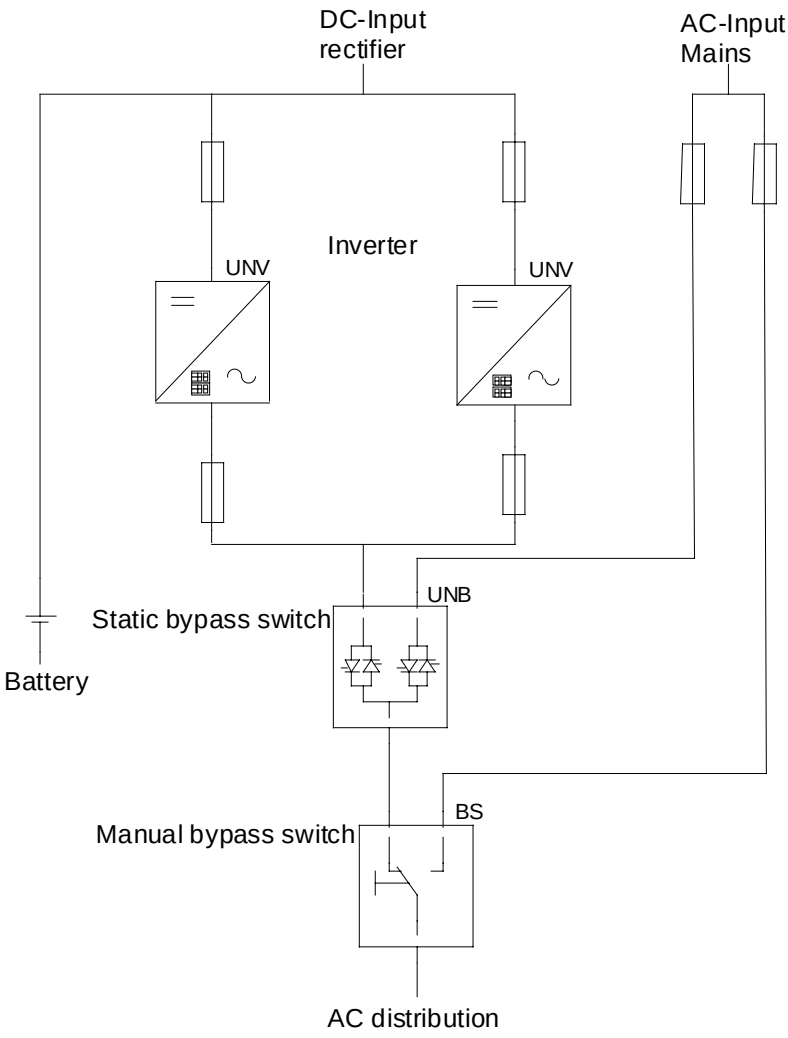
Inverter UNV-C converts input side DC voltage to stable sinewave output voltage.
Several output frequencies are available for delivery as option.

UNV-C are hot-pluggable modules with rear side connectors. Only the communication wire (CAN-Bus) is connected on the front. The inverter is controlled and monitored by internal microprocessor. All main functional parameters are adjustable with front side operating keys and are indicated with digital displays. Due to the excellent overall efficiency (see technical data) the unit has very compact dimensions (19”- cassette for mounting in 19” subracks), low weight and very high power density.

Due to the special input side regulation principle the ripple voltage limit fulfils the standard of CCITT-A-filtering without any additional filter elements.

To increase the reliability the inverter is designed to operate together with static bypass switch UNB. The static bypass switch monitores the connected bypass mains and synchronises the inverter output with mains frequency. In inverter preselection mode the UNB transfers the load supply to bypass mains in case of inverter faults, high overload, battery low voltage. The transfer is nearly without voltage interruption. After problem solving the unit switches back to inverter operation automatically. In case of mains preselection mode the inverter will take over the load if mains is not present, out of limits or heavy disturbed.

The primary source is programmable on static switch unit. For the UNB a separate manual is available for delivery.



Picture 1.2:
Inverter operation with static bypass switch UNB

2. Type Range (Standard)

Type Designation	Article Code	Input voltage in V_{DC}	Output voltage in V_{AC}	Output power (VA @ cosφ=0.8)	Dimensions W/H/D (mm)
UNV48-1.2C	500-012-510.00	48	230	1200	142/262/285
UNV48-2.5C	500-025-510.00	48	230	2500	142/262/405
UNV60-1.2C	500-012-610.00	60	230	1200	142/262/285
UNV60-2.5C	500-025-610.00	60	230	2500	142/262/405
UNV110-1.2C	500-012-710.00	108	230	1200	142/262/285
UNV110-2.5C	500-025-710.00	108	230	2500	142/262/405

Available options and accessory parts

- Additional connector
- 19”-subrack
- connector fastening

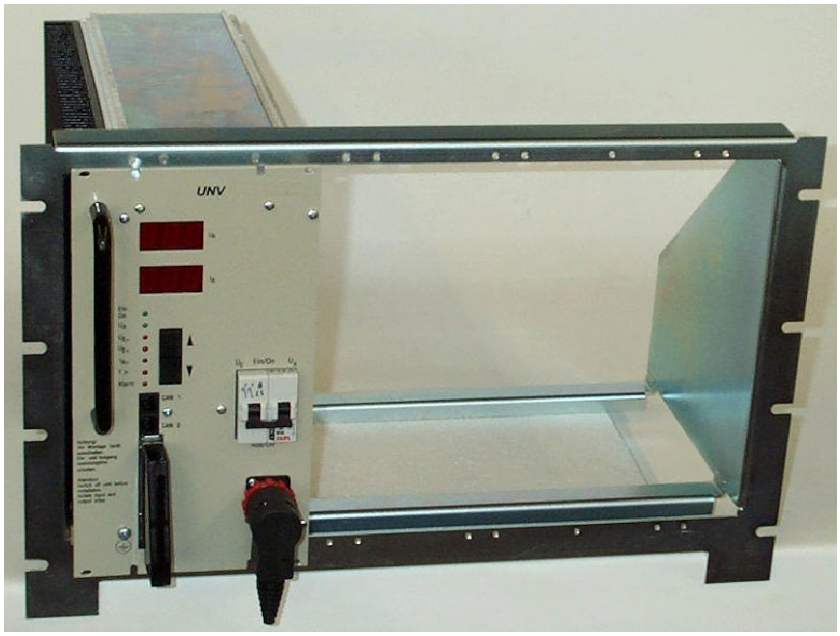
3. Storage

The modules must be stored in a dry, dust free environment in accordance with the specified storage temperature (see technical specifications; section 11).

4. Commissioning

After unpacking the module check for damages based on external influences. In case of mechanical deformation do not put the module in operation. The module is to be mounted into the subrack with four frontside screws.

Please check the input voltage level and compare it with the type lable value on the inverter module before connecting DC voltage.



Picture 4.1:
19"subrack with UNV-C Inverter

For mounting the units at operation site following instructions and rules have to be observed:

- mount in dry, dustfree rooms only
- observe the specifications about ambient conditions such as ambient temperature or relative humidity
- highly dusty or aggressive chemical atmosphere is not allowed; dew and dust in combination can cause short circuits on printed circuits
- sufficient air cooling is required, especially when mounting in cabinets with several 19" subrack levels

Check mains voltage before connecting the inverter (observe nominal values on type label).
For connection of DC input and AC output the front panel connectors (X1) and (X2) have to be used. The DC input is protected against wrong polarity (unit does not switch on). The UNV is equipped with input and output fusing (MCB`s on front panel).
The inverters operate with temperature controlled fan cooling. The ambient temperature must be lower than 40 °C.
Please check the load power before connecting the module.
A permanent overload is not allowed and decreases the inverters lifetime. Especially the inrush currents of loads have to be observed (for instance, a usual computer monitor can have an inrush current of more than 50A!).

The connection of the none-fused earthed conductor is required. The electrical connections have to be carried out acc. pin list in section 8. Please use wires acc. VDE 0100 or equal standard. To decrease voltage losses on cables usage of bigger sizes of wire as specified is recommended. For instance, a high voltage loss on battery wires can decrease the backup time.

Following installation rules should be observed:

Single inverter:

- check system wiring (polarity of DC- supply line)
- check that the inverter is switched off
- connect DC input with open DC busbar fuses
- connect AC loads
- close DC busbar fuses
- switch on the unit with front side MCB
- switch on load

Inverters in parallel:

- check system wiring (polarity of DC- supply line, synchronous bus)
- check that the inverters are switched off
- connect DC input with open DC busbar fuses
- check wiring between inverters (synchronization wires)
- connect AC loads
- close DC busbar fuses
- switch on the units with front side MCB's
- switch on load

One unit operates as master and synchronizes all other units.

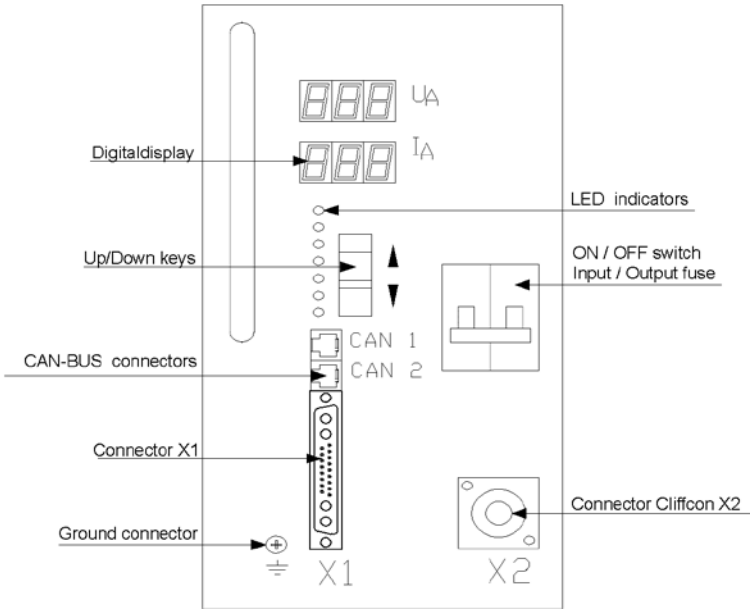
NOTE: The unit which transmits the synchonization signal to the synchronization bus at first will be the master. If this master unit is disturbed or switched off, another unit overtakes the master function. In systems with static bypass switch (SBS) the inverters are synchronized by the SBS unit.

5. Handling

All operating elements are located on the front of the module. The input and output side MCB's are used as ON/OFF-switch. The LED's indicate the operation state of inverter. All signals and monitorings are described in the following sections.

5.1 Front view

Picture 5.1:
Front view UNV-C



5.2 LED indication

The following table shows the LED status signals:

LED	Color	Meaning
OPERATION	green	Inverter is switched on and operates
Uo	green	Inverter output voltage o.k. (see section 6.3.5)
Ui>	red	Input voltage high; input voltage > Adjusted monitoring threshold; inverter switches off (see section 6.3.5)
Ui<	red	Input voltage low; input voltage < Adjusted monitoring threshold; inverter switches off (see section 6.3.5)
Io>	red	Output current high; short circuit or overload on output
T>	red	Continously light: overheating of inverter by overload Blinker light: poor cooling; Inverter switches off delayed
ALARM	red	Collective failure, delay time of relay alarm adjustable, relay contact on X1; all single errors are included

5.3 Adjustment keys

The adjustment takes place with up/down keys located at the front panel of the inverter while the displays indicate the actual values.

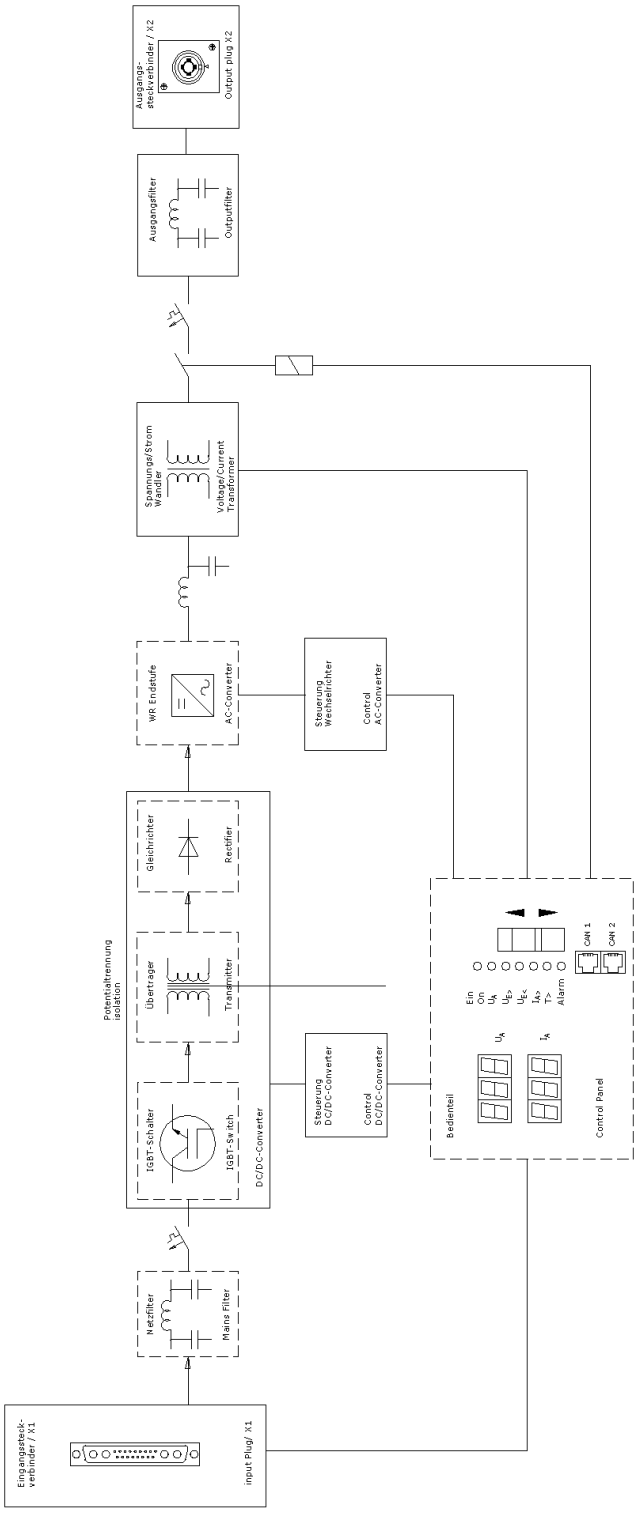
Front keys	Designation	Operation
	up	➢ during menu item selection: change to previous item (parameter) ➢ during adjustment mode: increase value
	down	➢ during menu item selection: change to next item (parameter) ➢ during adjustment mode: decrease value

For switching between the menues press both buttons for approx. 3 seconds.

6. Functions

6.1 Schematic Block Diagram

Picture 6.1:
Schematic Block Diagram
Inverter UNV (C type)



6.2 Functional Description

Inverters of the UNV-type are new switch mode inverters with an innovative operation principle. The inverter transforms the input side DC voltage into an AC voltage with high stability concerning frequency, amplitude and waveshape. The unit consists of following main parts:

1. Connector SUB-MIN-D 21 WA 4 / Cliffcon 4PC/S (1.2kVA-2.5kVA) to connect input, output voltage and signals
2. Passive filter to reduce RF interferences
3. Input circuit breaker (MCB); used as ON/OFF switch
4. Innovative DC/DC converter topology consisting of MOSFET/IGBT converter, isolation transformer, rectifier bridge to produce a voltage of approx. 380V_{DC}, capacitor block to store the DC voltage. The DC/DC-converter modulates the input current to suppress the input AC component.
5. Pulse width modulated inverter bridge (20kHz) with IGBT`s to convert the DC voltage to an AC voltage with high frequency and amplitude stability
6. Monitoring system for input, output and internal parameters
7. Output relay (necessary for parallel operation)
8. Output circuit breaker (MCB), mechanically coupled with DC circuit breaker
9. Output AC filter for RFI suppression
10. Control board for DC/DC converter
11. Control board for AC converter
12. Microprocessor based control unit performs controlling, monitoring, adjustments (value storage) and displaying of inverters parameter and serial communication via CAN-Bus

6.2.1 Safe Electrical Decoupling

The unit fulfills the standard EN60950.
Observance of air and creeping distances, the isolation transformer and the separate wiring guarantee a safe electrical decoupling between primary (input) and secondary (output) side.

6.2.2 Input

The DC input is protected by a magnetic circuit breaker (MCB).
The input is equipped with inrush current limitation to limit the inrush current to the level of nominal input current. The input voltage and current is visible at the front side digital displays.

6.2.3 Output

The unit is generally equipped with an output MCB.
The output is sustained short circuit proof and supplies a short circuit current of 2 to 3 x Inom for three seconds. After that, the unit automatically switches off and tries to switch on again (for a maximum of three times) after 15 seconds.
The inverter can be overcharged for a short time without switching off. The overload alarm is pre-set to 30% overload for 10 sec. After 10 seconds the unit automatically switches off. It must be manually restarted (manually switch off and switch on again). If the overload exceeds the preset overload value, the unit automatically switches off with delay of three seconds.

6.2.4 Dynamic Regulation of Output Voltage

For load steps between 10% and 100% Inom/100% and 10% Inom the dynamic voltage deviation is < 3 % and is regulatedwithin <1.5 ms to static accuracy.

6.2.5 RFI-Suppression

The UNV inverter UNV fulfills the standards EN 55011/55022 class „B“.

6.3 Monitoring

6.3.1 Input Voltage Monitoring

The input voltage is continuously monitored. The actual value is compared with the programmed monitoring thresholds. The thresholds can be adjusted with the front keys (see section 6.3.5).

The red LED "Ui<" signalizes inverter input voltage low (voltage is lower than adjusted threshold Ui<).
The inverter switches off with an adjustable delay time. It switches on again if the input voltage is within the correct range. The switch-on voltage is adjustable. The hysteresis and delay time protects the unit against an oscillation of the automatic switch off function, e.g. if a discharged battery is unloaded by inverter switch off.

The red LED "Ui>" signalizes inverter input voltage high (voltage is higher than adjusted threshold Ui>)
The inverter switches off without delay time (protection against overvoltage). The inverter switches on again if the input voltage is lower than adjusted switch off threshold.

6.3.2 Output Voltage Monitoring

The inverter output voltage is transmitted to the control unit by a voltage transformer and is compared to internally adjusted values.
If there is a correct output voltage the green LED "Uo" is on.
If the output voltage is lower than the adjusted threshold value (e.g. high overload or short circuit), the LED “ALARM” is on, whereas the LED “Uo” is off.
If the output voltage is higher than the adjusted threshold value “Uo>” the unit automatically switches off (selflocking), the LED “ALARM” is on. The unit must be manually switched on.

6.3.3 Monitoring of Overheating

If the internal temperature of the inverter is higher than the adjusted threshold value the LED "T>" is on. High ambient temperature, poor cooling, permanent overload (approx. 20-25%) or a defective fan can cause overheating of the unit. The inverter switches off with an adjustable delay time. The inverter switches on again if the temperature is lower than the adjusted switch on threshold. Additionally, the fan voltage and current characteristic is monitored to detect a defective fan. This is indicated by a blinking LED „T>".

6.3.4 Signals

All operation modes and error-states are indicated by LED's which are fitted on the front panel. The collective failure signal is available by an isolated relay contact on connector X1.

Max. contact load: 60V_{DC}/1A; 110V_{DC}/0.45A.

In case of failure the contacts "COM" and "NC" are closed.

6.3.5 Adjustment of Output Parameters and Monitoring Thresholds

The adjustment of output parameters and monitoring thresholds is easy. The values can be adjusted with the two frontkeys by displaying the actual value.

The inverter offers two adjustment menus:

- Basic menu PM1 is available for all users
- Service menu PM2 is for service personnel only. PM2 has a code protection to protect against unallowed parameter changes.

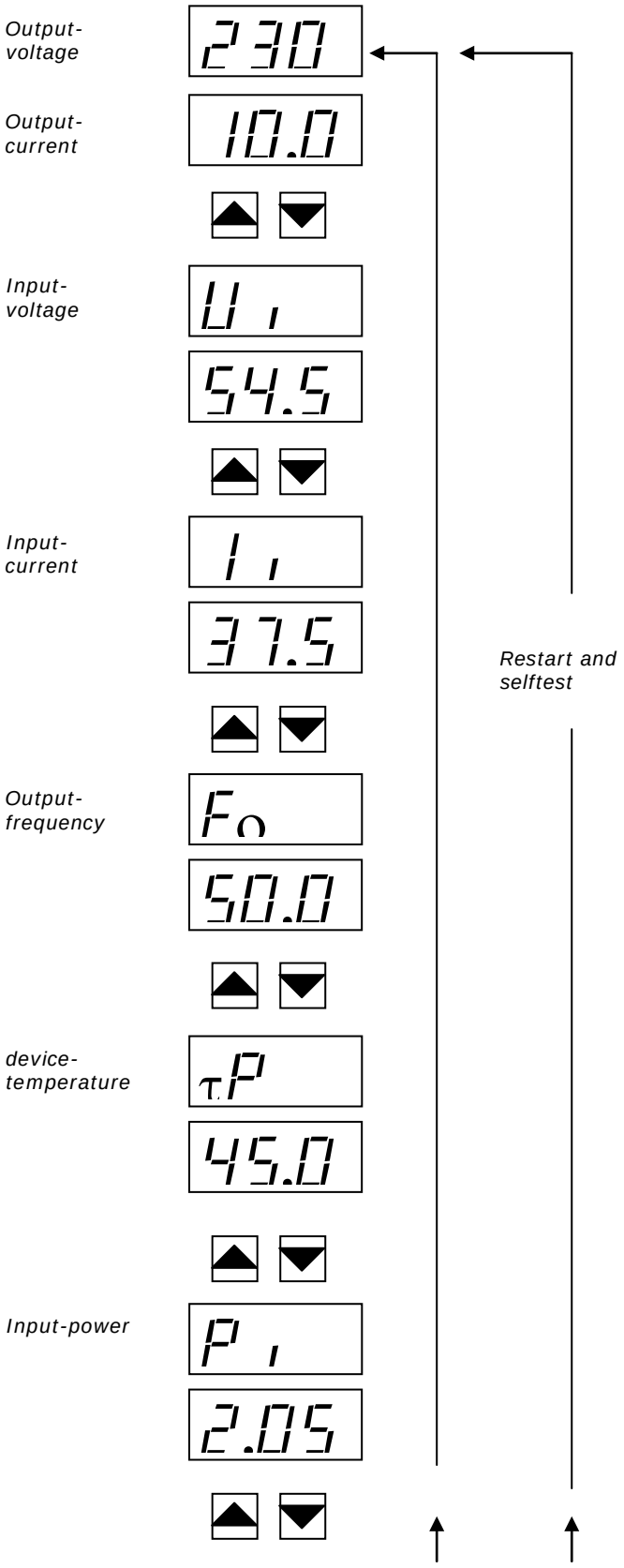
In the operation mode the top display shows the output voltage and the bottom display shows the output current.

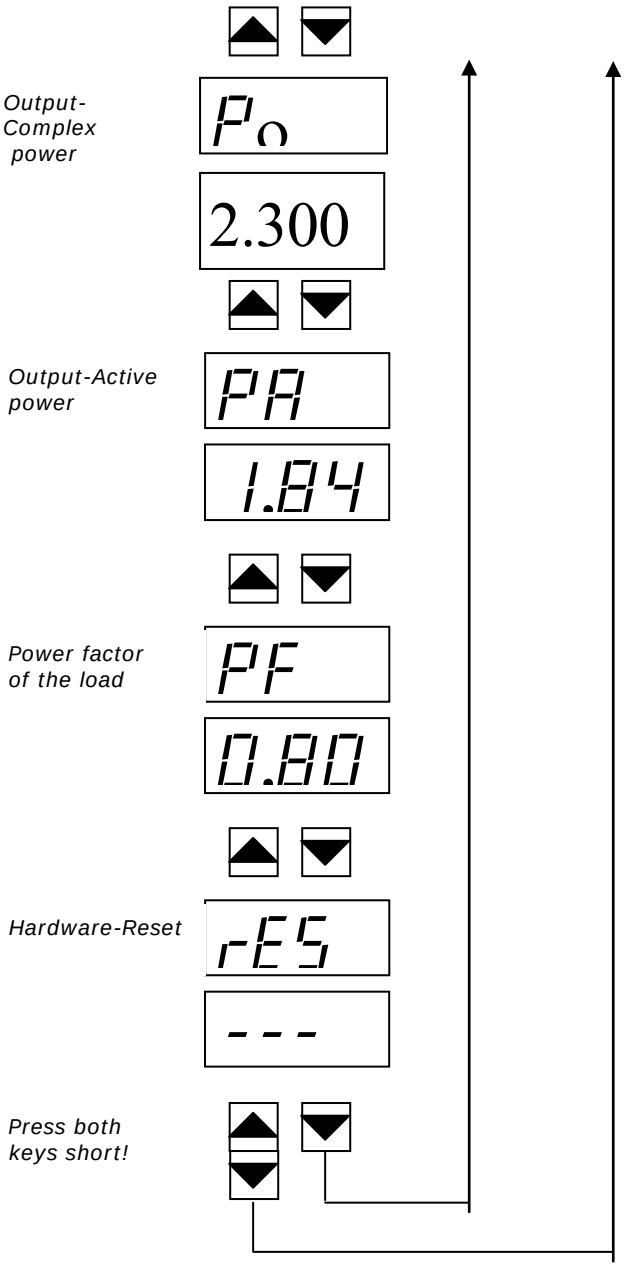
For adjustments of parameters in the basic menu PM1 the following procedure has to be used:

1. press both keys UP/DOWN (↑↓) together for short time; the inverter changes to the adjustment mode
2. press the key UP (↑) or DOWN (↓) to change the adjustment parameter (see the diagram on the next page)
3. press both keys UP/DOWN (↑↓) together for short time; the inverter changes to the value change mode
4. press the key UP (↑) or DOWN (↓) to change the adjustment value
5. press both keys UP/DOWN (↑↓) together for short time; the inverter changes back to the adjustment mode (the upper display shows a horizontal line, the changed value is stored at this moment)
6. press both keys UP/DOWN (↑↓) for approx. 3 sec. to change back to the operation mode

For details concerning the adjustable parameters in PM1: see the diagram a) on the next page.

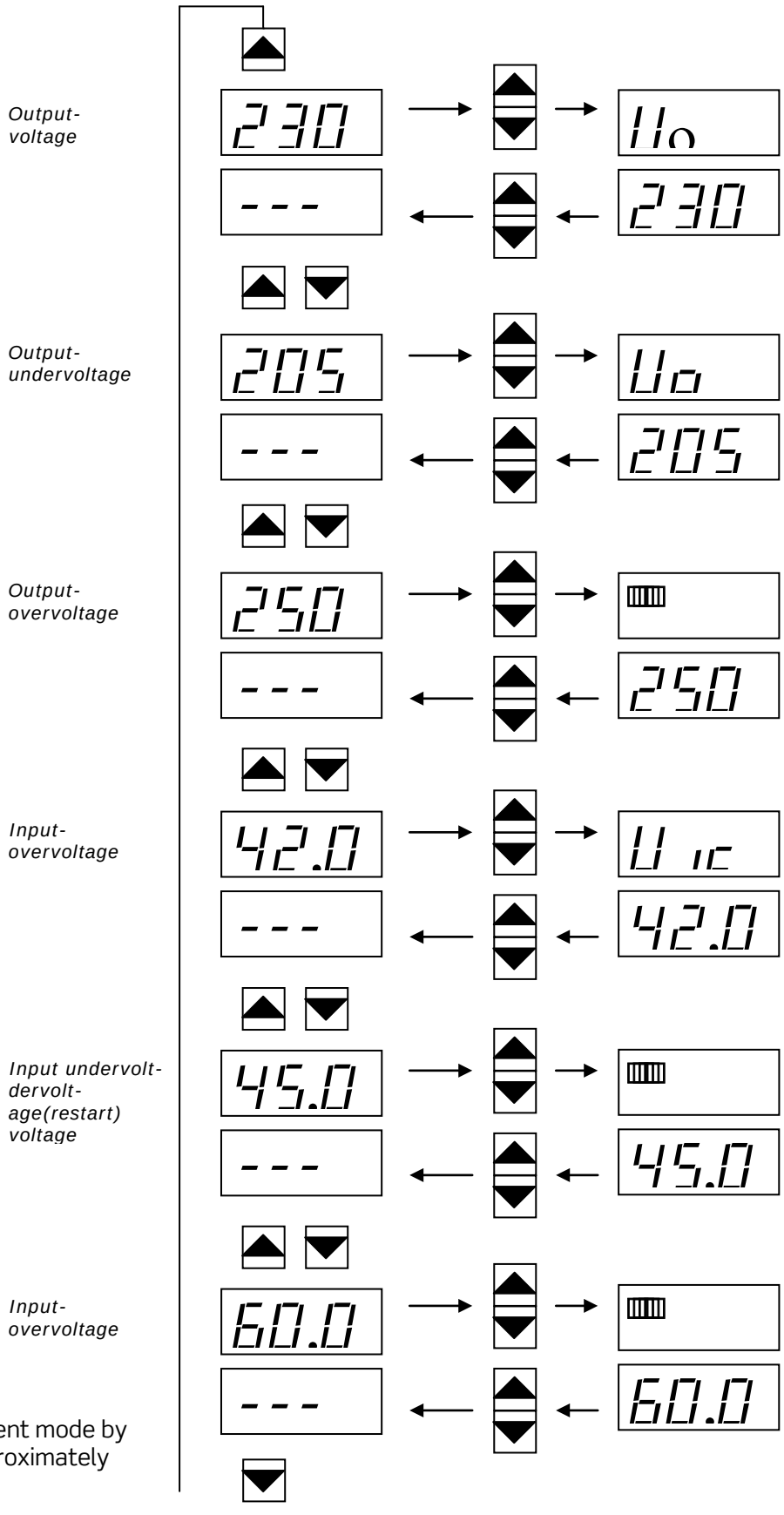
Standard display during operation/monitoring of in -/output parameters:





For switching to the adjustment menu press both buttons for approx. 3 sec (see next page).

Adjust the values and thresholds as follows



You can leave the adjustment mode by pressing both keys for approximately three seconds.

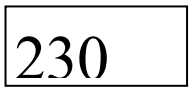
6.3.6 Table "Adjustable Parameters"

Following table shows the standard values (factory set), adjustment ranges and steps:

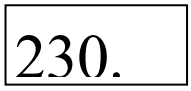
Display1	Designation	Factory set	Range	Step
Uo	nominal value of output voltage Uo*	230 [VAC]	200...255	0,25 [V]
Uo<	monitoring threshold of output voltage low Uo<*	207 [VAC]	180...230	1,0 [V]
Uo>	Monitoring threshold of output voltage high Uo>*	253 [VAC]	230...270	1,0 [V]
Ui>	switch off threshold input voltage high Ui>	48V: 75 [VDC] 108V: 130	0...80 0...135	0,1 [V] 0,25
Ui<	switch off threshold input voltage low Ui<	48V: 41 [VDC] 108V: 92	41...80 90...110	0,1 [V] 0,25
Ui^	switch on again threshold input voltage low Ui<	48V: 45 [VDC] 108V: 96	41...80 90...110	0,1 [V] 0,25

*While the thresholds values Uo, Uo> are set with up/down keys, the moving dot shows the actual value:

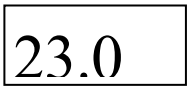
For example:



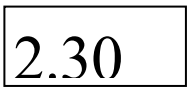
Corresponds to 230.0



Corresponds to 230.25



Corresponds to 230.5



Corresponds to 230.75

With each click at the UP/Down keys the dot moves. After four times clicking (4/4), the voltage value is increased (or decreased) for 1V.

6.3.6 CAN-Bus interface

The inverter is equipped with a serial data interface according to CAN (= Controlled Area Network) -specification.
Via CAN-Bus, several inverters in a system or parallel connection can be controlled and monitored by a central unit which is integrated into the static switch unit UNB.

Following parameters of a specific inverter unit can be controlled or read out:

- Remote ON/OFF
- Inverter status (OK/failure)
- Output voltage (measurement value)
- Output current (TRMS measurement value)
- Input voltage (measurement value)
- Input current (measurement value)
- Output frequency (measurement value)
- Internal temperature (measurement value)

The CAN-Bus connectors are located on the front panel. The wiring to the central unit shall be as shortes as possible. Cable length must not exceed 30m.

7. Parallel Operation

ATTENTION! Before starting several units in parallel it is important to check the output frequency and voltage on each unit without any connections between the units.
In the next step it has to be checked that the connections of the SYNC-BUS wires between the modules are correct.

NOTE! The unit which transmits the synchonization signal to the synchronization bus at first is the master. If this master unit is disturbed or switched off, another unit overtakes the master function. In systems with static bypass switch (SBS) the inverters are synchronized by SBS unit.

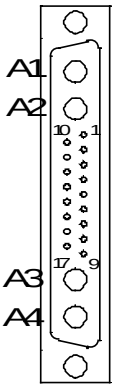
The inverter output relay switches the inverter output to AC busbar if the internal voltage is okay and the output voltage is within the correct range. On this way defective modules switch off themselves and are automatically disconnected from the AC bus.

8. Electrical Connectors

8.1 DC input voltage and signals

X1 (SUB-MIN-D 21WA4) socket outlet (DC input voltage and signals):

Picture 8.1:
Connector X1



X1/Pin	Designation
A1	DC input, plus pole
A2	DC input, plus pole (only 2.5kVA)
A3	DC input, minus pole (only 2.5kVA)
A4	DC input, minus pole
1	No connection
2	External switch ON/OFF (L+)[1)]
3	Collective failure COM[2)]
4	Collective failure NC
5	Collective failure NO
6	SYNC-STAT[3)] (synchronous bus state lines)
7	SYNC-SIG[4)] (synchronous bus 50Hz-signal)
8	SYNC-GND (synchronous bus ground)
9	No connection
10	No connection
11	External switch ON/OFF (L-)
12	No connection
13	No connection
14	No connection
15	No connection
16	No connection
17	No connection

[1)] External switch off by connecting of an external voltage of 12-24V_{DC} between pin 2 and 11; input is free of potential with 500V_{DC} – isolation to DC input

[2)] Relay contact with safe electrical decoupling to AC side and with 500V_{DC} to DC; COM and NC are closed at error. The maximum load for the relay contacts is:
U_{max} = 110V_{DC} I < 0.45A_{DC}
U_{max} ≤ 60V_{DC} I < 1A_{DC}

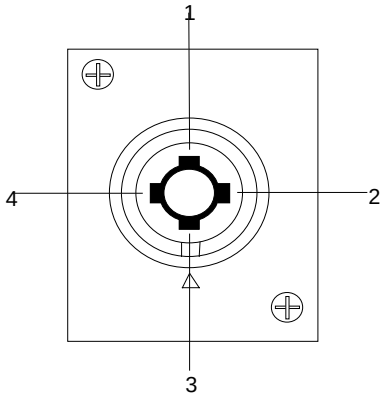
[3] Connection between all inverters and SBS for operation with static bypass switch SBS

[4] Connection between all inverters for parallel operation

8.2 AC output voltage

X2 (Cliffcon 4PC/S) socket outlet (AC output voltage):

Picture 8.2:
Connector X2

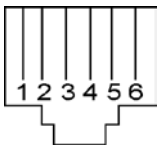


X2/Pin	Designation
1	AC output, L1
2	No connection
3	PE
4	AC output, N

8.3 CAN-Bus Connector

Connector (socket outlet RJ45, 6-pole):

Picture 8.3:
CAN-BUS-
Interface



Pin	Signal CAN1	Signal CAN2	Designation
1	CAN_V+		Voltage supply +8...15V
2	CAN_V+		Voltage supply +8...15V
3	CAN_H		Signal (high)
4	CAN_L		Signal (low)
5	CAN_V-		Voltage supply Ground
6	CAN_V-		Voltage supply Ground

9. Maintenance

In general, the inverter is maintenance-free.
A yearly inspection with following checks is recommended:

- Correct fan operation
- Optical/mechanical inspection
- Removal of dust and dirt, especially on radiator surfaces
- Check for internal dust or humidity

Attention! Dust together with dew or water can destroy the internal circuits by short circuit.
Dust inside the unit can be blown out with dry compressed air.
The intervals between this checks depends on ambient conditions of the installed module.

10. Trouble Shooting

All works have to be done by qualified personnel only.

10.1 No Output Voltage

- DC input voltage O.K.?
- mains switch (MCB) on?
- green LED„Operation“ on?
- Is the DC input voltage properly connected?
- DC input fuse (on DC busbar) O.K.?
- signalling LED's Ui> or Ui< on ?
- short circuit or overload on output?
- output fuse O.K.?

If the unit still does not work even though all checks are done, please contact your sales agent or the service department of Eltek Deutschland.

10.2 Distortion of Output Voltage

- overload on output? - check and reduce the load!
- big inrush current of the load?
- distortions by load steps or current peaks?
- adjustment of voltage value Uo not correct? Adjust to the correct value

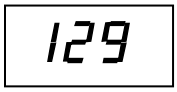
If the unit still does not work even though all checks are done, please contact your sales agent or the service department of Eltek Deutschland.

10.3 Error indication on the displays

Switch-off (shutdown of the module) caused by error is indicated on the displays.

Example:

Upper display:
SHd = Shutdown



Lower display:
Error number (example „129“)

Possible single error numbers are listed in the table below:

Error number (decimal number)	Meaning
1	Io> or Vi>
2	Vi< or fan error
4	Vo not ok (e.g. restart error)
8	T> or input DC/DC converter not ok
16	Internal error
32	Switch off via CAN-Bus (e.g. by static bypass switch UNB) alternatively via external switch off.
64	Vo>
128	Vo<

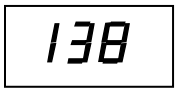
If more than one error appeared, the result (addition of the single error numbers) is shown at the lower display.

The example above (error number „129“) is the result of error number „1“ plus error number „128“.

For error numbers which include two possibilities (error number „1“, „2“ and „8“) please note the LED which additionally is “ON” for an identification of the error.

A further example to clarify:

Upper display:
SHd = Shutdown



Lower display:
Error number (example „138“)

Error number „138“ is the result of „128“ + „8“ + „2“.

„2“ means “input under voltage” (LED „Vi<“ is ON) or “fan error” (LED „T>“ is blinking).

„8“ means “over temperature” (LED „T>“ is ON) or “input DC/DC converter is not ok”.

„128“ means „output under voltage”. Because the module has switched OFF there is no output voltage. Due to this, the error „output under voltage“ also is included.

The following display indications are exceptions:

At shutdown due to **short circuit** or **overload** the displays indicate the following:

Upper display:
SHd = Shutdown

Lower display:
ovL = short circuit/overload

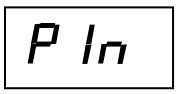
An **intended shutdown** via CAN-Bus by static bypass switch UNB is indicated as follows:

Upper display:
OFF (shutdown)

Lower display:
CAn (via CAN-Bus)

An **intended shutdown** via external switch off (connected pins 2 & 11 according to section 8.1) is indicated as follows:

Upper display:
OFF (shutdown)



Lower display:
PIn (via external switch off)

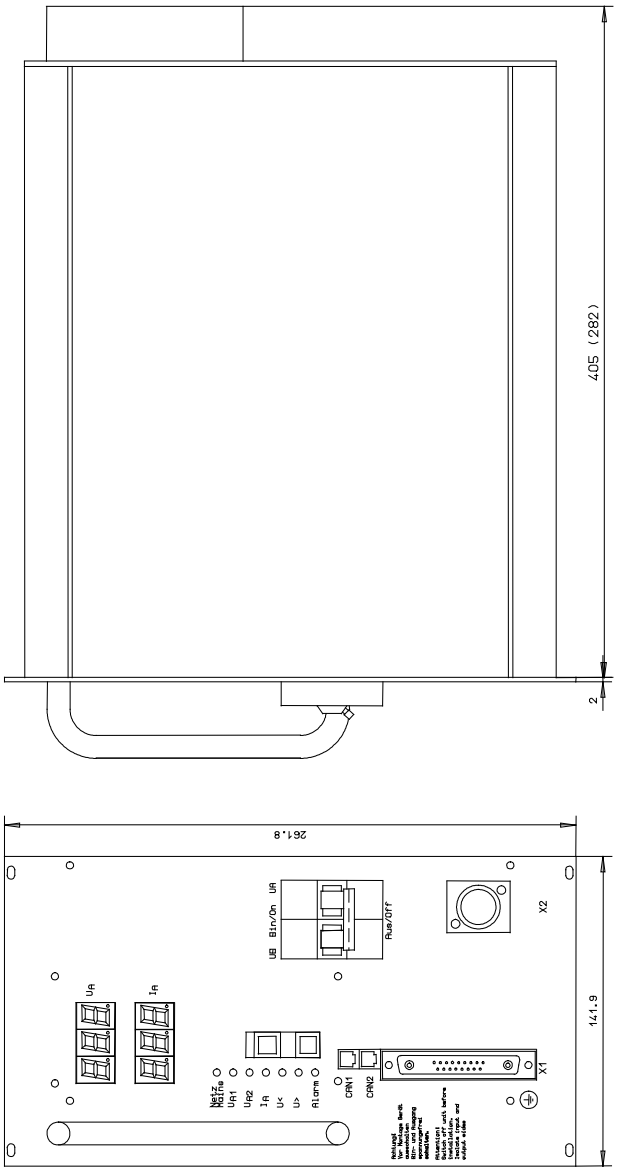
11. Technical Specifications

Nominal input voltage	See type list (section 2)
Input voltage range	48/60V types: 42-75V_{DC}; 108V types: 77-138V_{DC}
Inrush current	≤ nominal input current
Nominal output voltage	230V_{AC} ±0.5%
Adjustment range:	200...255V_{AC}
Output frequency	50Hz or 60Hz ±0.05%; synchronization range by external static switch unit 45-65Hz
Nominal output power	acc. to the type list (@ cos phi=0.8)
Output power factor range	0.5 ind. – 1 – 0.5 cap.
Total harmonic distortion	<2% for linear load
Overall efficiency	up to 92% for 50...100% load
Crest factor	≤ 3
RFI suppression / immunity	CE-label (EN50081-1, EN55011/55022 class „B“ EN50082-2, EN61000-4 part 2/3/4/5)
Isolation voltage	acc. to EN60950
Reflected input voltage ripple	≤ 1.8mV psophometric (CCITT-A-filter)
Dynamic bahavior	≤ 3 % for load transients between 10 % - 100 % - 10 % of nominal output current (transient time ≤ 0.3 ms)
Short circuit protection	sustained short circuit proof, short circuit current 2-2,5x I_{nom} for approx. 3sec. (with delayed restart)
Monitoring	DC-input voltage (U_{IN}<, U_{IN}>) with automatic switch ON/OFF function, AC-output voltage (U_{OUT}); overtemperature (T>) and overload with automatic switch off function; fan monitoring
Overload capability	130% for 10 sec.
LED-Signals	OPERATION, U_{OUT}, U_{IN}<, U_{IN}>, I_O>, T> and ALARM
Relay contacts	collective failure (max. contact load: 110V_{DC}/0.5A; 60V_{DC}/1A)
Parallel operation	max. seven units, load sharing approx. 5% I_{nom} by degressive output characteristic

Communication	CAN-Bus interface for communication with static bypass switch UNB
Noise emission	≤ 40dB(A) at 1m distance
Dimensions	acc. to the type list
Mechanical construction	acc. to VDE 0160 edition 5.88 section 7.2.2
Protection class	IP20
Cooling	speed controlled fan, monitored
Ambient temperature	operation: 0...+40°C; storage: -30...+65°C
Max. installation altitude	1000m
Surfaces	powder coating RAL 7035 (front panel only); constructive parts: anodized metal
Electrical connectors	DC-Input and signals: SUB-MIN-D 21WA4 (frontside) AC-Output: Cliffcon 4PC/S (frontside) CAN-BUS: RJ45-Connector (frontside)
Additional parts included in delivery	Input + output connector

11.1 Dimensional Drawings

Picture 11.1:
Dimensional drawings



12 Notes

Notes

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