Automation Solutions

UPS-Battery Management Systems Power Excellent

Patented Battery Charging- and Diagnostic Procedure

LUTZE

Systematic Technology

Patented Battery Charging- an
Intelligent UPS-Battery Managem

Patent protected, adaptive procedure
real algorithms, no internal access to
any battery characteristics on a database

Thermal management
prevents the thermal
“run-away“ of the battery

Dynamic adaption
of the charging parameters in
relation to the temperature as
well as the charge (SOC) and
ageing status (SOH) of the battery

Charge factor[1] until 1,02
(customary values are typ. 1,10-1,20)

Reduction of the yearly energy consumption by typically a factor of 10
(compared with conventional procedures)

1) Charge factor κ :
* Describes the ratio between the energy used during charging and the actual charge absorbed by the battery
* Charge factor κ is the reciprocal of the charging efficiency η

Charge factor $\kappa = 1/\eta$

Automation Solutions

d Diagnostic Procedure
ment Systems **Power Excellent**

Patent protected, temperature compensated diagnostic procedure
for ageing determination (SOH = State-Of-Health) of lead-based UPS batteries

Regeneration
of aged (sulphated) cells

No serial effects
D-IPS ACS maintains the battery capacity (high cycle consistency)

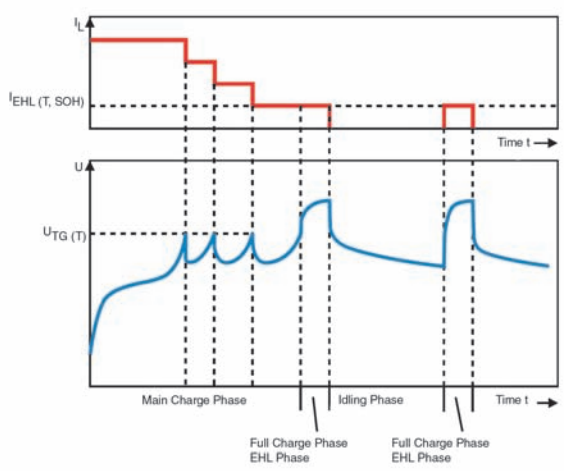
Fast charging capability
without detrimental consequences for the battery

No permanently connected charging voltage

ACS- Temperature Compensated Battery Charging and Di

Main Charging Phase:

- the *CONSTANT CURRENT CHARGING* enables an ideal quick charging of the battery with high charging current and relatively low temperature compensated charging voltage (far below the gassing voltage).
- *ADAPTIVE CURRENT STEP CHARGING PROCEDURE:* Immediately the algorithm detects the onset of secondary reactions in a relevant magnitude, the next constant current charging step is activated.
- according to the ascertained battery parameters the procedure is repeated until the lead-acid battery is nearly charged.

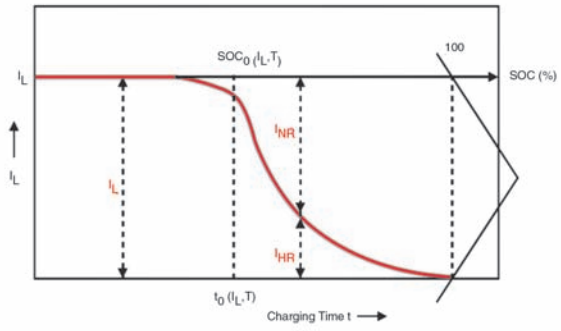


Full Charging Phase / No-Load Phase:

- at the end of the charging process there follows a short *FULL CHARGE / TRICKLE CHARGE PHASE (TCH),* after this is a change to the *NO-LOAD PHASE (OCV = OPEN CIRCUIT VOLTAGE).*

- During the no-load phase the lead-acid battery is *CONTINUALLY MONITORED.* Until recharging occurs, the charge status drops during the no-load phase by a max. 3-5% (charging takes place at the latest after 23 days). The duty factor of the recharging phases is below 1‰, which enables high *ENERGY SAVINGS* and

at the same time *REDUCED AGEING.*



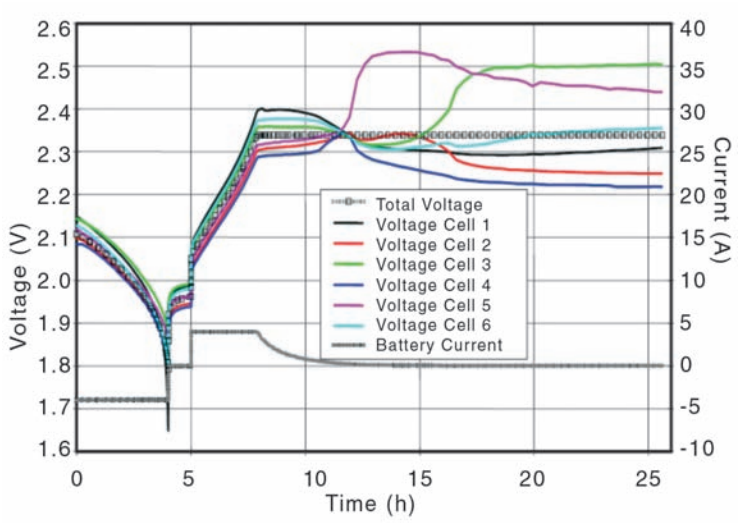
Technical Note **INFO**

With traditional, standard IU procedures nearly all the energy fed into the battery during the trickle charge phase is expended in side reactions (SR) and hence in the ageing of the battery - with simultaneous deficient charging of the battery (explanation - cf. the following description “serial effect”).

agnostic Procedure

Serial effect:

- the adjacent diagram shows the trend of the individual cell voltages in a 12V AGM UPS battery. To provide reproducible conditions for the sub-sequent charging procedure at the beginning of the recording the battery is *DISCHARGED.*
- After a short pause, charging is commenced with a *CONSTANT CURRENT PHASE* and then subsequently transferring into a *CONSTANT VOLTAGE PHASE*. The charging current is portrayed by the curve in the lower part of the diagram.



SOURCE: B. Fricke et. al., Lead accumulators for stationary power supplies, “Belecker Fachtage”, 2004

Technical Note **INFO**

During the CONSTANT CURRENT PHASE (cf. ACS procedure) the cells behave homogeneously. Internal parameter changes have no effect on the terminal voltage of the other individual cells, because the same current is continually flowing through all cells.

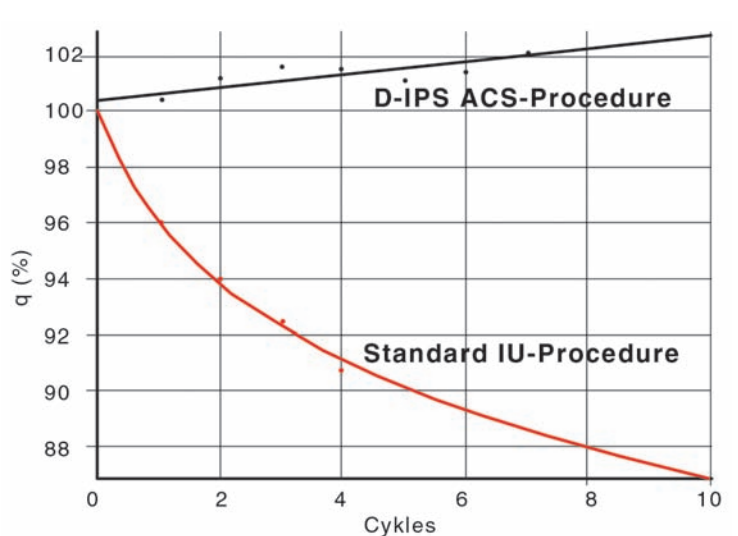
Serial Effect:
the *NEGATIVE RESULTS OF CONSTANT VOLTAGE CHARGING* become apparent through a considerable divergence of the individual cell voltages as the resulting cell-voltage behaviour shown in the diagram above. During a charging procedure to fully charge a lead-acid battery, the change of any single cell effects all other serially connected cells. During the course of the charging procedure with
constant voltage charging, some individual cells develop higher contact voltages, whereas other cells are increasingly less charged and even give-up their charge, so that the contact voltage decreases. The reason for this are inhomogeneities of the cell parameters within the battery (as for example differing internal resistances or *SOC= STATE-OF-CHARGE*).

Technical Note **INFO**

Consequence of CONSTANT VOLTAGE CHARGING is an excessive ageing of the battery because single cells are being overloaded during charging procedure while other cells in the battery receive insufficient charge!

Charging Cycles / Capacity Behaviour:

- The adjacent diagram shows the capacity behaviour of a UPS battery (type: gel, 12V/60Ah) over multiple charging and discharging cycles.
- *The D-IPS ACS PROCEDURE HOLDS THE BATTERY CAPACITY STABLE,* whereas after only a few charging/discharging cycles the capacity of UPS battery charged with the conventional IU charging procedure will be noticeably reduced due to deficient charging.



SOURCE: JD. Deutronic

DC UPS battery management system ECO · 250 W

Uninterruptible DC system voltage
DC UPS for lead-acid batteries (standard, AGM, gel, pure lead)
Input: wide range DC 22 V – 30 V, output: DC 10 A, Boost DC 15 A

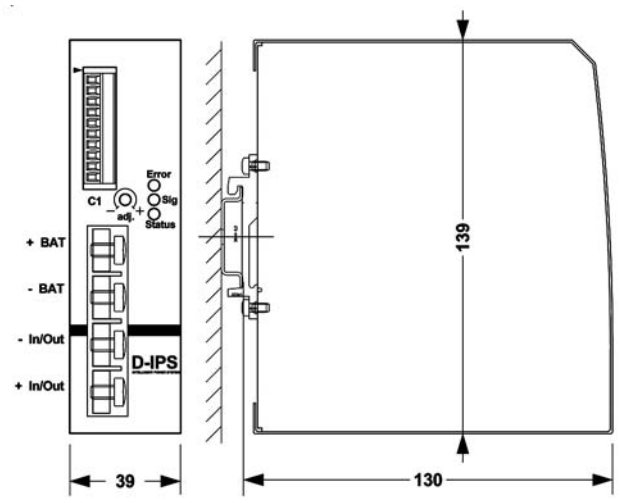
Battery test/monitoring is cyclic
I-U_0-U charge with car charge level
temperature compensated charging voltage
deep discharge protection (residual discharge current <300 uA)
electronic battery short-circuit protection
control by state-of-the-art digital technology
signalling via LEDs, relays
fault diagnosis (battery temperature, aging, cable break, etc.)
Option: fast charge by means of power supply bypass

Description		Part-No.	Type	PU
Screw terminal				
Output voltage/current	DC 24 V; 10 A	723001	L-COPS-B1-BME-250-24	1
General				
Supported load circuit voltage power supply operation			DC 22 V – DC 30 V	
Supported load circuit voltage battery operation			DC 18 V – DC 27 V	
Deep discharge protection early warning			DC 21.6 V type	
Deep discharge protection deactivation			Threshold DC 18 V type	
Overload protection mains operation			External (current limit by means of DC power supply)	
Overload protection buffer operation			locking electronic deactivation at Iout > Inom × 1.75	
Reverse battery protection			Electronic isolation switch	
Battery charge			Temperature is controlled (external sensor included) emergency operation if temperature sensor is not connected	
Battery charging current			max. DC 1.5 A option: fast charging by means of power supply bypass	
Buffer time limit			adjustable by potentiometer from 10 s to 600 s or infinite (deep discharge point)	
External battery			see accessories	
Battery types			all standard types of lead acid batteries	
Signalling		LED green	Mains operation / battery operation	
		LED yellow	Charging	
		LED red	Device or battery fault	
		Relay 1	DC 30 V, DC 1 A, 1 NO contact, mains operation monitoring	
		Relay 2	DC 30 V, DC 1 A, 1 NO contact, warning threshold monitoring	
		Relay 3	DC 30 V, DC 1 A, 1 NO contact, composite error monitoring	
Operation temperature range			-25 °C – 70 °C	
Cooling			Air convection	
Storage temperature range			-40 °C – 85 °C	
Humidity			100 %, condensation allowed (coated circuit boards)	
Own consumption			Buffer mode: 60 mA type	
Battery residual discharge current			<300 µA (deep discharge protection, battery disconnected from load)	
Electrical safety			EN 60950, SELV, protection class III	
Emitted interference			EN 55011 class B	
Interference immunity			EN 61000-6-2	
Protection class			IP 20	
Installation postition			Horizontal on all mounting rails acc. EN 60715	
Clearance above			–	
Clearance at the side			–	
Connection cross-sections		Mains supply	Faston flat terminal plugs 6.3 × 0.8 mm	
		Load, battery	Faston flat terminal plugs 6.3 × 0.8 mm	
		Signal	Plug-in screw terminals 10-pin, 0.5 – 2.5 mm^2, flexible, rigid, RM 3.81	
Dimensions (w × h × d) in mm			39.0 × 139.0 × 130.0	
Weight (kg/piece)			0.500	
Approvals				

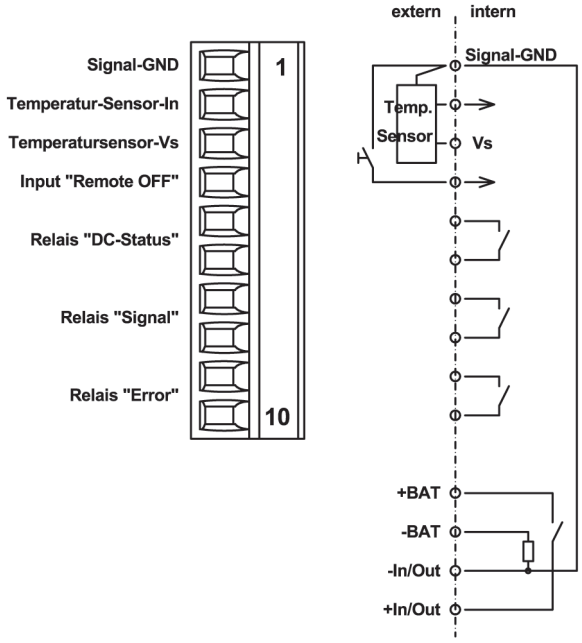
DC UPS battery management system ECO · 250 W

Uninterruptible DC system voltage
DC UPS for lead-acid batteries (standard, AGM, gel, pure lead)
Input: wide range DC 22 V – 30 V, output: DC 10 A, Boost DC 15 A

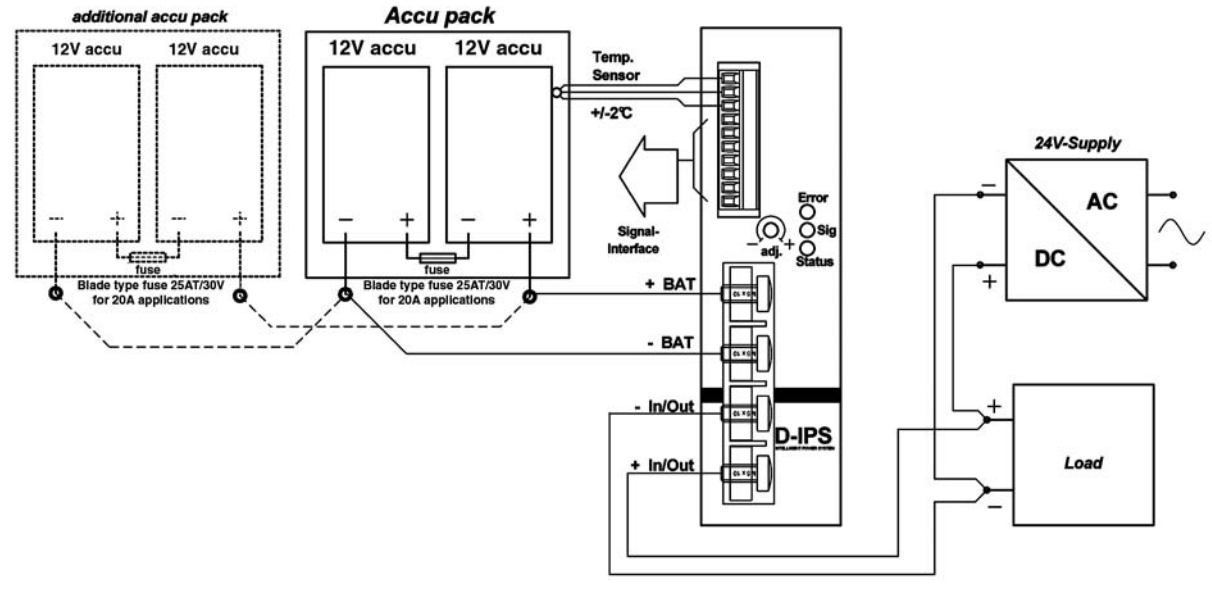
Dimensions



Signal connection



PIN assignment



DC UPS battery management system ECO · 500 W

Uninterruptible DC system voltage
DC UPS for lead-acid batteries (standard, AGM, gel, pure lead)
Input: wide range DC 22 V – 30 V, output: DC 20 A, Boost DC 30 A

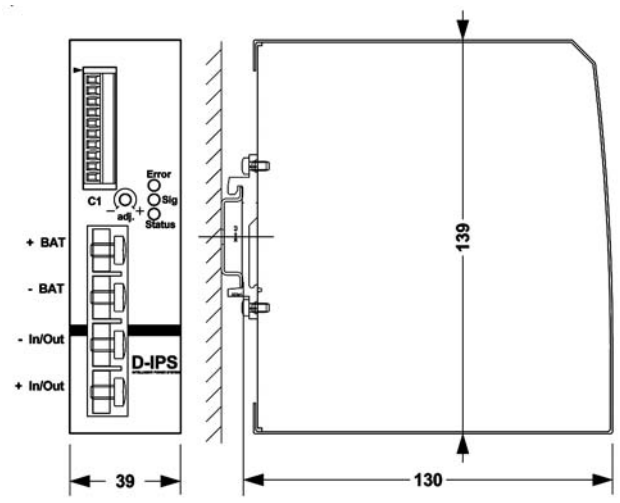
Battery test/monitoring is cyclic
I-U_0-U charge with car charge level
temperature compensated charging voltage
deep discharge protection (residual discharge current <300 uA)
electronic battery short-circuit protection
control by state-of-the-art digital technology
signalling via LEDs, relays
fault diagnosis (battery temperature, aging, cable break, etc.)
Option: fast charge by means of power supply bypass

Description		Part-No.	Type	PU
Screw terminal				
Output voltage/current	DC 24 V; 20 A	723002	L-COPS-B1-BME-500-24	1
General				
Supported load circuit voltage power supply operation			DC 22 V – DC 30 V	
Supported load circuit voltage battery operation			DC 18 V – DC 27 V	
Deep discharge protection early warning			DC 21.6 V type	
Deep discharge protection deactivation			Threshold DC 18 V type	
Overload protection mains operation			External (current limit by means of DC power supply)	
Overload protection buffer operation			locking electronic deactivation if Iout > Inom × 1.75	
Reverse battery protection			Electronic isolation switch	
Battery charge			Temperature is controlled (external sensor included) emergency operation if temperature sensor is not connected	
Battery charging current			max. DC 1.5 A option: fast charging by means of power supply bypass	
Buffer time limit			adjustable by potentiometer from 10 s to 600 s or infinite (deep discharge point)	
External battery			see accessories	
Battery types			all standard types of lead acid batteries	
Signalling		LED green	Mains operation / battery operation	
		LED yellow	Charging	
		LED red	Device or battery fault	
		Relay 1	DC 30 V, DC 1 A, 1 NO contact, mains operation monitoring	
		Relay 2	DC 30 V, DC 1 A, 1 NO contact, warning threshold monitoring	
		Relay 3	DC 30 V, DC 1 A, 1 NO contact, composite error monitoring	
Operation temperature range			-25 °C – 70 °C	
Cooling			Air convection	
Storage temperature range			-40 °C – 85 °C	
Humidity			100 %, condensation allowed (coated circuit boards)	
Own consumption			Buffer mode: 60 mA type	
Battery residual discharge current			<300 µA (deep discharge protection, battery disconnected from load)	
Electrical safety			EN 60950, SELV, protection class III	
Emitted interference			EN 55011 class B	
Interference immunity			EN 61000-6-2	
Protection class			IP 20	
Installation postition			Horizontal on all mounting rails acc. EN 60715	
Clearance above			–	
Clearance at the side			–	
Connection cross-sections		Mains supply	Faston flat terminal plugs 6.3 × 0.8 mm	
		Load, battery	Faston flat terminal plugs 6.3 × 0.8 mm	
		Signal	Plug-in screw terminals 10-pin, 0.5 – 2.5 mm^2, flexible, rigid, RM 3.81	
Dimensions (w × h × d) in mm			39.0 × 139.0 × 130.0	
Weight (kg/piece)			0.500	
Approvals				

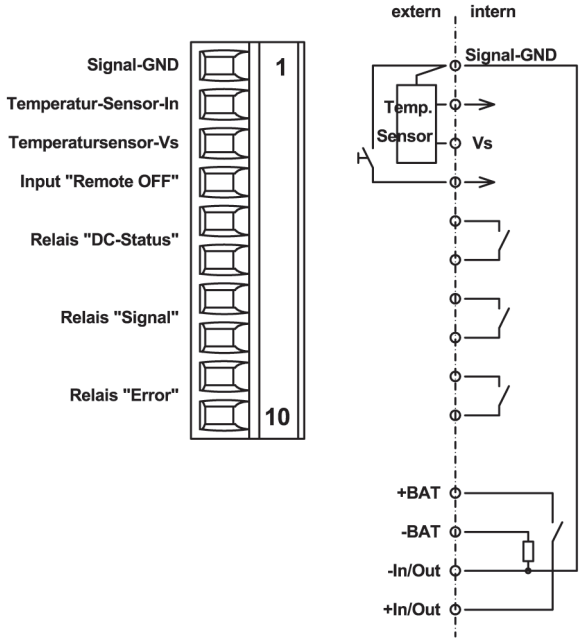
DC UPS battery management system ECO · 500 W

Uninterruptible DC system voltage
DC UPS for lead-acid batteries (standard, AGM, gel, pure lead)
Input: wide range DC 22 V – 30 V, output: DC 20 A, Boost DC 30 A

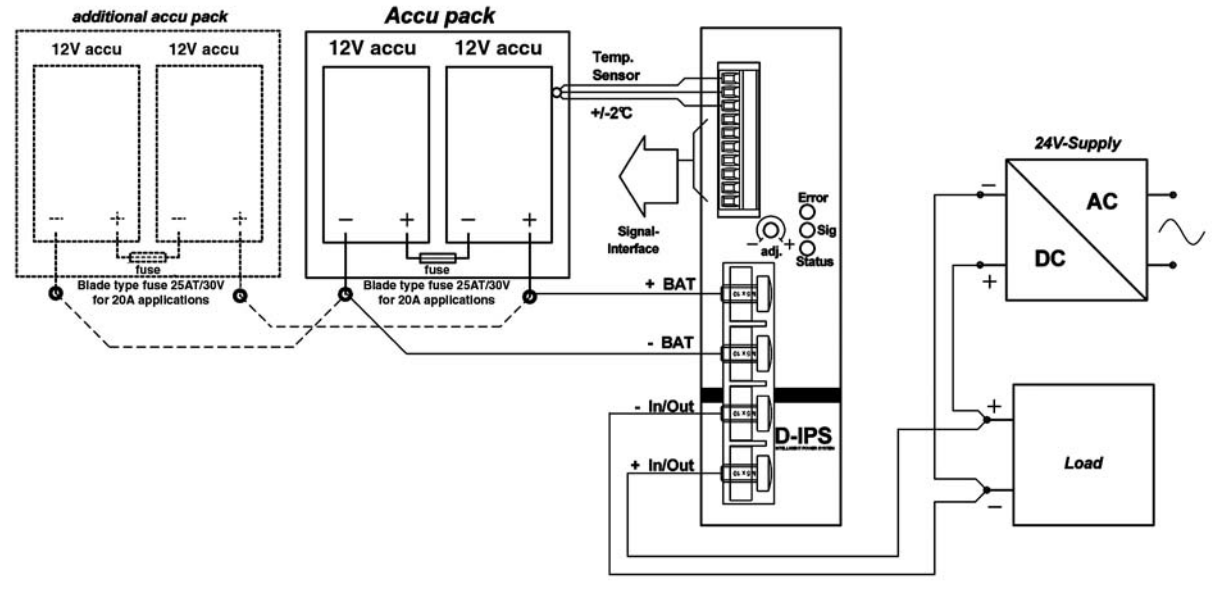
Dimensions



Signal connection



PIN assignment



DC UPS battery management system ECO · 1000 W

Uninterruptible DC system voltage
DC UPS for lead-acid batteries (standard, AGM, gel, pure lead)
Input: wide range DC 22 V – 30 V, output: DC 40 A, Boost DC 60 A

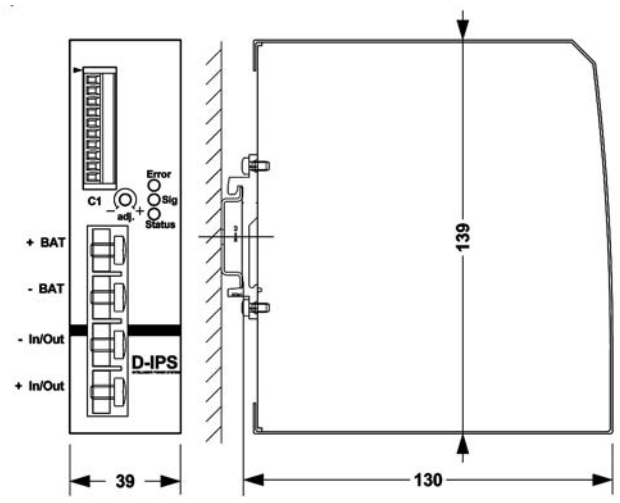
Battery test/monitoring is cyclic
I-U_0-U charge with car charge level
temperature compensated charging voltage
deep discharge protection (residual discharge current <300 uA)
electronic battery short-circuit protection
control by state-of-the-art digital technology
signalling via LEDs, relays
fault diagnosis (battery temperature, aging, cable break, etc.)
Option: fast charge by means of power supply bypass

Description		Part-No.	Type	PU
Screw terminal				
Output voltage/current	DC 24 V; 40 A	723004	L-COPS-B1-BME-1000-24	1
General				
Supported load circuit voltage power supply operation			DC 22 V – DC 30 V	
Supported load circuit voltage battery operation			DC 18 V – DC 27 V	
Deep discharge protection early warning			DC 21.6 V type	
Deep discharge protection deactivation			Threshold DC 18 V type	
Overload protection mains operation			External (current limit by means of DC power supply)	
Overload protection buffer operation			locking electronic deactivation if Iout > Inom × 1.75	
Reverse battery protection			Electronic isolation switch	
Battery charge			Temperature is controlled (external sensor included) emergency operation if temperature sensor is not connected	
Battery charging current			max. DC 1.5 A option: fast charging by means of power supply bypass	
Buffer time limit			adjustable by potentiometer from 10 s to 600 s or infinite (deep discharge point)	
External battery			see accessories	
Battery types			all standard types of lead acid batteries	
Signalling		LED green	Mains operation / battery operation	
		LED yellow	Charging	
		LED red	Device or battery fault	
		Relay 1	DC 30 V, DC 1 A, 1 NO contact, mains operation monitoring	
		Relay 2	DC 30 V, DC 1 A, 1 NO contact, warning threshold monitoring	
		Relay 3	DC 30 V, DC 1 A, 1 NO contact, composite error monitoring	
Operation temperature range			-25 °C – 70 °C	
Cooling			Air convection	
Storage temperature range			-40 °C – 85 °C	
Humidity			100 %, condensation allowed (coated circuit boards)	
Own consumption			Buffer mode: 60 mA type	
Battery residual discharge current			<300 µA (deep discharge protection, battery disconnected from load)	
Electrical safety			EN 60950, SELV, protection class III	
Emitted interference			EN 55011 class B	
Interference immunity			EN 61000-6-2	
Protection class			IP 20	
Installation postition			Horizontal on all mounting rails acc. EN 60715	
Clearance above			–	
Clearance at the side			–	
Connection cross-sections		Mains supply	Faston flat terminal plugs 6.3 × 0.8 mm	
		Load, battery	Faston flat terminal plugs 6.3 × 0.8 mm	
		Signal	Plug-in screw terminals 10-pin, 0.5 – 2.5 mm^2, flexible, rigid, RM 3.81	
Dimensions (w × h × d) in mm			39.0 × 139.0 × 130.0	
Weight (kg/piece)			0.500	
Approvals				

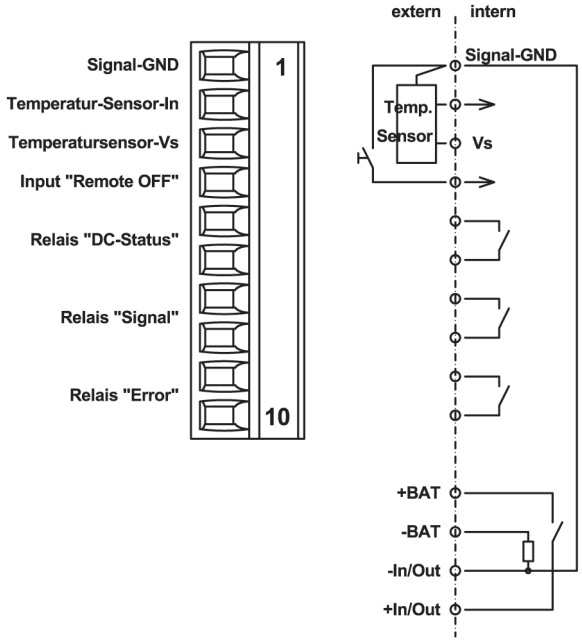
DC UPS battery management system ECO · 1000 W

Uninterruptible DC system voltage
DC UPS for lead-acid batteries (standard, AGM, gel, pure lead)
Input: wide range DC 22 V – 30 V, output: DC 40 A, Boost DC 60 A

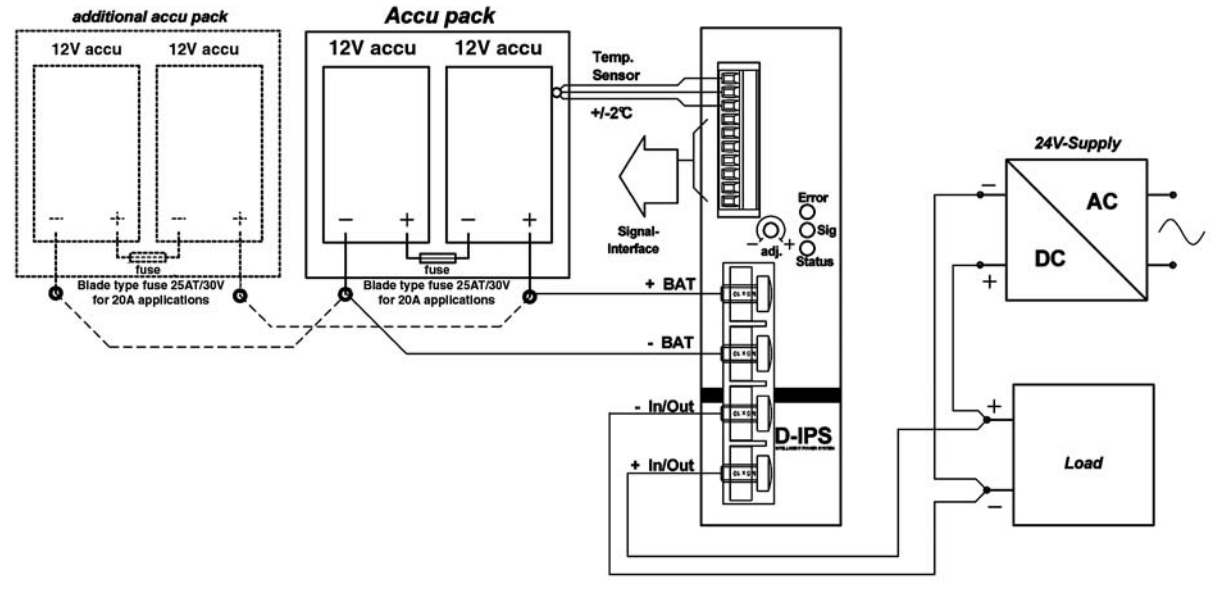
Dimensions



Signal connection



PIN assignment



DC UPS battery management system PRO · 250 W

Primary switchmode power supply, PFC, Single-phase
DC UPS for all battery types (standard, AGM, gel, pure lead)
Input: wide range AC 85 V – 276 V, output: DC 24 V – adjustable

Active PFC wide range
Extensive protective measures such as short circuit/no-load proof, overvoltage and overtemperature
Very low standby power and equally high effectiveness over the entire entrance area
no inrush current
Patent protected, highly efficient ACS battery charging and diagnostic method (ACS: Adaptive Current Step)
Thermal battery management incl. cyclic monitoring – prevents thermal runaway
Maximum battery charging current adjustable
Deep discharge protection (residual discharge current < 300 µA)
electronic battery short-circuit protection
Suitable for VDS applications
Absence of feedback on energy sources
Fault diagnosis (battery temperature, ageing, cable break, etc.)
Signalling via LEDs, relays

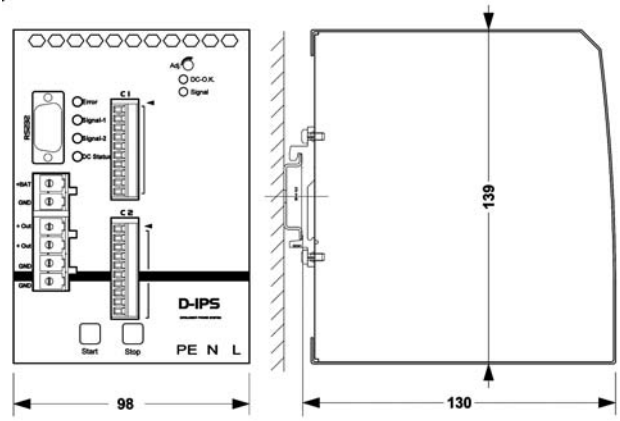
Description		Part-No.	Type	PU
Screw terminal				
Output voltage/current	DC 24 V; 10 A	723011	L-COPS-B1-BM-250-24	1
Input				
Nominal voltage	AC 120 V / 230 V			
Operation voltage range	AC 85 V – 276 V, short-time < 1 sec. AC 60 V – 300 V, DC 130 V – 350 V, (TN-S, TN-C, TT, IT networks)			
Line frequency	47 – 65 Hz			
Rated current	U_i = AC 230 V: 4 A / U_i = AC 120 V: 9 A			
Inrush current	no inrush current (active limit: start-up by means of ramp)			
Internal fuse	T10 A / AC 250 V			
External fuse	additional fuse not necessary			
Power Factor Correction P.F.C.	> 0.98 (active)			
Over voltage protection	Varistor 4.5 kA, 71 J			
Output				
Rated voltage output	DC 24 V			
Rated current output	DC 10 A			
Max. output current	–			
Peak output current	–			
Voltage trim range	22.5 V – 28.8 V			
Load control (static)	10 % – 90 %: < 0.05 % (type 0.05 %)			
Load control (dynamic)	10 % – 90 %: < 5 %			
Response time	< 1 ms			
Change of input	< 0.2 % (type 0.02 %)			
Temperature drift /K	-25 °C – 70 °C: < 1 %, (type 0.5 %), 0 °C – 60 °C: 0.4 %			
Rise time	10 % – 90 %: < 50 ms			
Ripple	< 50 mV pp			
Switching peaks (20 MHz)	< 100 mV pp			
Hold up time	UPS			
Current limit behaviour				
Rated over load protection	In the case of an overload, the buffer battery is switched to the power supply (I=const.)			
Short-circuit protection	Locking electronic deactivation of the battery path (if Iout > Inom × 2.05)			
Supported load circuit voltage (battery operation)				
Output voltage	Battery voltage (Attention – note configurable switch-off threshold)			
Deep discharge protection	Signal thresholds or threshold values are individually adjustable via interface Early warning: type DC 21.0 V, switch-off threshold type DC 19.2 V buffer time threshold: 10 s to infinity			
Reverse battery protection	Electronic isolation switch			
Battery charge	Temperature is controlled by means of an external sensor, emergency operation if sensor is not connected			
Battery charging current	see table			
Note	**Important note:** Apart from the output power for supplying the load, the power supply unit integrated in the battery management must also be provided for the charging power, which is needed by the battery. The L-COPS battery management system has been designed to be able to provide the nominal output power for supplying the load and as well as the nominal charging current for supplying the battery under normal operating conditions (s. table 1). If a higher charging current is configured than the nominal value, care must be taken to ensure that the power requirement of the load is reduced accordingly (in case of doubt, an L-COPS variant with a greater power supply unit should be chosen).			
Calculation of the charging capacity	$P_{change} = U_{out} * I_{change}$ P_{change} = 30 V * 2 A = 60 W P_{change} = 30 V * 4 A = 120 W			
EMC (electromagnetic compatibility)				
HF Emission	EN 55011, class B			
Primary side current harmonics	EN 61000-3-2			
Discharge of static capacity	EN 61000-4-2, 4/8 kV, criterion B			
Electromagnetic HF field	EN 61000-4-3, 10 V/m, criterion A			
Burst	EN 6100-4-4, 2 kV/1 kV, criterion B			
Surge	EN 61000-4-5, 1 kV sym/2 kV unsym., criterion B			

DC UPS battery management system PRO · 250 W

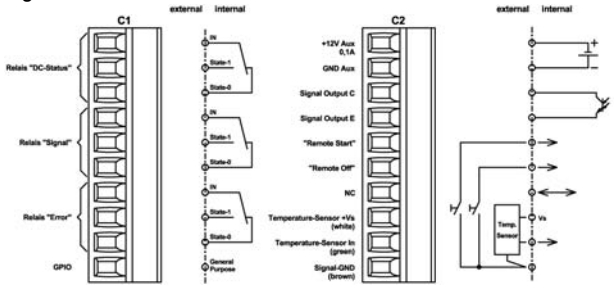
Primary switchmode power supply, PFC, Single-phase
DC UPS for all battery types (standard, AGM, gel, pure lead)
Input: wide range AC 85 V – 276 V, output: DC 24 V – adjustable

Conducted HF influence		EN 61000-4-6, 10 V
Voltage interruptions		EN 61000-4-11, mains buffering > 20 ms
General		
Operation temperature range		-25 °C – 50 °C, 70 °C: from 50 °C: derating 1.5 %/°C
Cooling		Air convection
Storage temperature range		-40 °C – 85 °C
Humidity		100 %, condensation allowed (coated circuit boards)
Vibration acc. IEC 68-2-6		10 Hz – 150 Hz, 0.15 mm or 2g, 90 min in resonance
Shock acc. IEC 68-2-27		30g for 18 ms in three spatial directions
Pollution degree		2 acc. EN 50178
Climate class		3K3 acc. EN 60721
Installation postition		Horizontal on all mounting rails acc. EN 60715
Clearance above		> 80 mm
Clearance at the side		> 3 mm
Connection cross-sections	Mains supply	Plug-in screw terminals, 0.2 – 2.5 mm^2, flexible, rigid
	Load, battery	Plug-in screw terminals, 0.25 – 4 mm^2, flexible, rigid
	Signal	Plug-in screw terminals, 0.5 – 2.5 mm^2, flexible, rigid
Dimensions (w × h × d) in mm		98.0 × 139.0 × 130.0
Weight (kg/piece)		1.600
Electrical safety		UL 508, EN 60950, UL 60950, EN 50178
Insulation voltage		Input/output: 3 kV, individually checked output/housing: 500 V
Protection class		IP 20
IP rating		Class 1, with PE connection
M.T.B.F.		>1000000 h, IEC 1709 (SN 29500)
Efficiency		approx. 91 %
No-load power		type 3.5 W
Own consumption		type 1.5 W
Battery residual discharge current		type 300 µA (deep discharge protection, battery disconnected from load)
Signalling	Mains supply	green: 90 % – 110 % from the set value, red: overload
	Battery MM	4 LEDs (green, 2 x yellow, red)
Signal outputs		3 potential free relays with one changeover each (DC 30 V, 1 A)
Remote Start/OFF		Battery support of the load can be activated/deactivated by means of control cable in the absence of mains supply
Temperature sensor		Connection of an analogue, active temperature sensor

Dimensions



Signal connection



DC UPS battery management system PRO · 500 W

Primary switchmode power supply, PFC, Single-phase
DC UPS for all battery types (standard, AGM, gel, pure lead)
Input: wide range AC 85 V – 276 V, output: DC 24 V – adjustable

Active PFC wide range
Extensive protective measures such as short circuit/no-load proof, overvoltage and overtemperature
Very low standby power and equally high effectiveness over the entire entrance area
no inrush current
Patent protected, highly efficient ACS battery charging and diagnostic method (ACS: Adaptive Current Step)
Thermal battery management incl. cyclic monitoring – prevents thermal runaway
Maximum battery charging current adjustable
Deep discharge protection (residual discharge current < 300 µA)
electronic battery short-circuit protection
Suitable for VDS applications
Absence of feedback on energy sources
Fault diagnosis (battery temperature, ageing, cable break, etc.)
Signalling via LEDs, relays

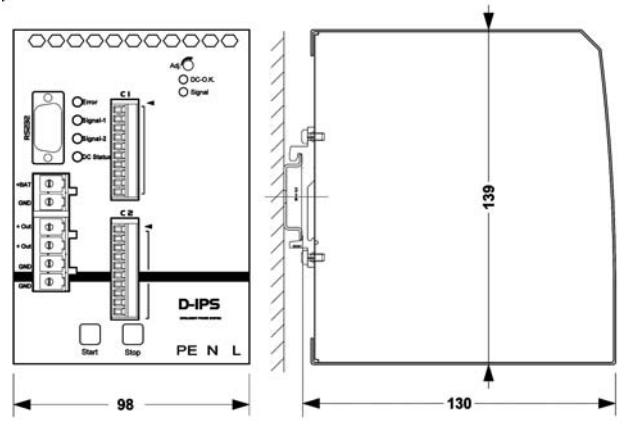
Description		Part-No.	Type	PU
Screw terminal				
Output voltage/current	DC 24 V; 20 A	723012	L-COPS-B1-BM-500-24	1
Input				
Nominal voltage	AC 120 V / 230 V			
Operation voltage range	AC 85 V – 276 V, short-time < 1 sec. AC 60 V – 300 V, DC 130 V – 350 V, (TN-S, TN-C, TT, IT networks)			
Line frequency	47 – 65 Hz			
Rated current	U_i = AC 230 V: 4 A / U_i = AC 120 V: 9 A			
Inrush current	no inrush current (active limit: start-up by means of ramp)			
Internal fuse	T10 A / AC 250 V			
External fuse	additional fuse not necessary			
Power Factor Correction P.F.C.	> 0.98 (active)			
Over voltage protection	Varistor 4.5 kA, 71 J			
Output				
Rated voltage output	DC 24 V			
Rated current output	DC 20 A			
Max. output current	–			
Peak output current	–			
Voltage trim range	22.5 V – 28.8 V			
Load control (static)	10 % – 90 %: < 0.05 % (type 0.05 %)			
Load control (dynamic)	10 % – 90 %: < 5 %			
Response time	< 1 ms			
Change of input	< 0.2 % (type 0.02 %)			
Temperature drift /K	-25 °C – 70 °C: < 1 %, (type 0.5 %), 0 °C – 60 °C: 0.4 %			
Rise time	10 % – 90 %: < 50 ms			
Ripple	< 50 mV pp			
Switching peaks (20 MHz)	< 100 mV pp			
Hold up time	UPS			
Current limit behaviour				
Rated over load protection	In the case of an overload, the buffer battery is switched to the power supply (I=const.)			
Short-circuit protection	Locking electronic deactivation of the battery path (if Iout > Inom × 2.05)			
Supported load circuit voltage (battery operation)				
Output voltage	Battery voltage (Attention – note configurable switch-off threshold)			
Deep discharge protection	Signal thresholds or threshold values are individually adjustable via interface Early warning: type DC 21.0 V, switch-off threshold type DC 19.2 V buffer time threshold: 10 s to infinity			
Reverse battery protection	Electronic isolation switch			
Battery charge	Temperature is controlled by means of an external sensor, emergency operation if sensor is not connected			
Battery charging current	see table			
Note	**Important note:** Apart from the output power for supplying the load, the power supply unit integrated in the battery management must also be provided for the charging power, which is needed by the battery. The L-COPS battery management system has been designed to be able to provide the nominal output power for supplying the load and as well as the nominal charging current for supplying the battery under normal operating conditions (s. table 1). If a higher charging current is configured than the nominal value, care must be taken to ensure that the power requirement of the load is reduced accordingly (in case of doubt, an L-COPS variant with a greater power supply unit should be chosen).			
Calculation of the charging capacity	$P_{change} = U_{out} * I_{change}$ P_{change} = 30 V * 2 A = 60 W P_{change} = 30 V * 4 A = 120 W			
EMC (electromagnetic compatibility)				
HF Emission	EN 55011, class B			
Primary side current harmonics	EN 61000-3-2			
Discharge of static capacity	EN 61000-4-2, 4/8 kV, criterion B			
Electromagnetic HF field	EN 61000-4-3, 10 V/m, criterion A			
Burst	EN 6100-4-4, 2 kV/1 kV, criterion B			
Surge	EN 61000-4-5, 1 kV sym/2 kV unsym., criterion B			

DC UPS battery management system PRO · 500 W

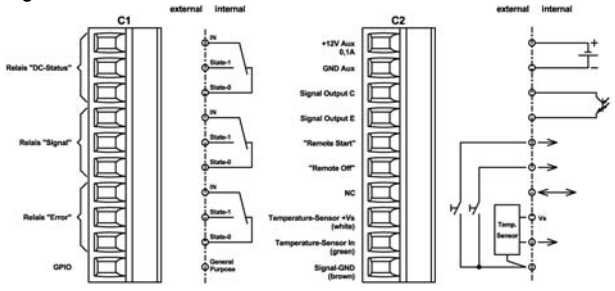
Primary switchmode power supply, PFC, Single-phase
DC UPS for all battery types (standard, AGM, gel, pure lead)
Input: wide range AC 85 V – 276 V, output: DC 24 V – adjustable

Conducted HF influence		EN 61000-4-6, 10 V
Voltage interruptions		EN 61000-4-11, mains buffering > 20 ms
General		
Operation temperature range		-25 °C – 50 °C, 70 °C: from 50 °C: derating 1.5 %/°C
Cooling		Air convection
Storage temperature range		-40 °C – 85 °C
Humidity		100 %, condensation allowed (coated circuit boards)
Vibration acc. IEC 68-2-6		10 Hz – 150 Hz, 0.15 mm or 2g, 90 min in resonance
Shock acc. IEC 68-2-27		30g for 18 ms in three spatial directions
Pollution degree		2 acc. EN 50178
Climate class		3K3 acc. EN 60721
Installation postition		Horizontal on all mounting rails acc. EN 60715
Clearance above		> 80 mm
Clearance at the side		> 3 mm
Connection cross-sections	Mains supply	Plug-in screw terminals, 0.2 – 2.5 mm^2, flexible, rigid
	Load, battery	Plug-in screw terminals, 0.25 – 4 mm^2, flexible, rigid
	Signal	Plug-in screw terminals, 0.5 – 2.5 mm^2, flexible, rigid
Dimensions (w × h × d) in mm		98.0 × 139.0 × 130.0
Weight (kg/piece)		1.900
Electrical safety		UL 508, EN 60950, UL 60950, EN 50178
Insulation voltage		Input/output: 3 kV, individually checked output/housing: 500 V
Protection class		IP 20
IP rating		Class 1, with PE connection
M.T.B.F.		>1000000 h, IEC 1709 (SN 29500)
Efficiency		approx. 91 %
No-load power		type 3.5 W
Own consumption		type 1.5 W
Battery residual discharge current		type 300 µA (deep discharge protection, battery disconnected from load)
Signalling	Mains supply	green: 90 % – 110 % from the set value, red: overload
	Battery MM	4 LEDs (green, 2 x yellow, red)
Signal outputs		3 potential free relays with one changeover each (DC 30 V, 1 A)
Remote Start/OFF		Battery support of the load can be activated/deactivated by means of control cable in the absence of mains supply
Temperature sensor		Connection of an analogue, active temperature sensor

Dimensions



Signal connection



DC UPS battery management system PRO · 1000 W

Primary switchmode power supply, PFC, Single-phase
DC UPS for all battery types (standard, AGM, gel, pure lead)
Input: wide range AC 85 V – 276 V, output: DC 24 V – adjustable

Active PFC wide range
Extensive protective measures such as short circuit/no-load proof, overvoltage and overtemperature
Very low standby power and equally high effectiveness over the entire entrance area
no inrush current
Patent protected, highly efficient ACS battery charging and diagnostic method (ACS: Adaptive Current Step)
Thermal battery management incl. cyclic monitoring – prevents thermal runaway
Maximum battery charging current adjustable
Deep discharge protection (residual discharge current < 300 µA)
electronic battery short-circuit protection
Suitable for VDS applications
Absence of feedback on energy sources
Fault diagnosis (battery temperature, ageing, cable break, etc.)
Signalling via LEDs, relays

Description		Part-No.	Type	PU
Screw terminal				
Output voltage/current	DC 24 V; 40 A	723014	L-COPS-B1-BM-1000-24	1
Input				
Nominal voltage	AC 120 V / 230 V			
Operation voltage range	AC 85 V – 276 V, short-time < 1 sec. AC 60 V – 300 V, DC 130 V – 350 V, (TN-S, TN-C, TT, IT networks)			
Line frequency	47 – 65 Hz			
Rated current	U_i = AC 230 V: 9 A / U_i = AC 120 V: 13 A			
Inrush current	no inrush current (active limit: start-up by means of ramp)			
Internal fuse	T16 A / AC 250 V			
External fuse	additional fuse not necessary			
Power Factor Correction P.F.C.	> 0.98 (active)			
Over voltage protection	Varistor 8 kA, 151 J			
Output				
Rated voltage output	DC 24 V			
Rated current output	DC 40 A			
Max. output current	–			
Peak output current	–			
Voltage trim range	22.5 V – 28.8 V			
Load control (static)	10 % – 90 %: < 0.05 % (type 0.05 %)			
Load control (dynamic)	10 % – 90 %: < 5 %			
Response time	< 1 ms			
Change of input	< 0.2 % (type 0.02 %)			
Temperature drift /K	-25 °C – 70 °C: < 1 %, (type 0.5 %), 0 °C – 60 °C: 0.4 %			
Rise time	10 % – 90 %: < 50 ms			
Ripple	< 50 mV pp			
Switching peaks (20 MHz)	< 100 mV pp			
Hold up time	UPS			
Current limit behaviour				
Rated over load protection	In the case of an overload, the buffer battery is switched to the power supply (I=const.)			
Short-circuit protection	Locking electronic deactivation of the battery path (if Iout > Inom × 2.05)			
Supported load circuit voltage (battery operation)				
Output voltage	Battery voltage (Attention – note configurable switch-off threshold)			
Deep discharge protection	Signal thresholds or threshold values are individually adjustable via interface Early warning: type DC 21.0 V, switch-off threshold type DC 19.2 V buffer time threshold: 10 s to infinity			
Reverse battery protection	Electronic isolation switch			
Battery charge	Temperature is controlled by means of an external sensor, emergency operation if sensor is not connected			
Battery charging current	see table			
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Conducted HF influence		EN 61000-4-6, 10 V
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Pollution degree		2 acc. EN 50178
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Installation postition		Horizontal on all mounting rails acc. EN 60715
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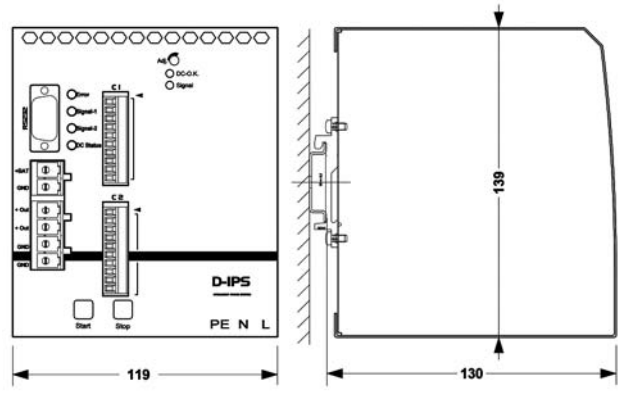
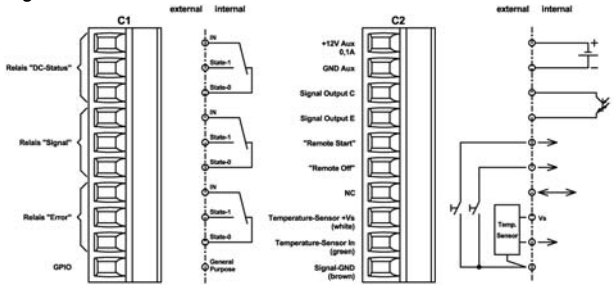
	Load, battery	Plug-in screw terminals, 0.25 – 4 mm^2, flexible, rigid
	Signal	Plug-in screw terminals, 0.5 – 2.5 mm^2, flexible, rigid
Dimensions (w × h × d) in mm		119.0 × 139.0 × 130.0
Weight (kg/piece)		4.200
Electrical safety		UL 508, EN 60950, UL 60950, EN 50178
Insulation voltage		Input/output: 3 kV, individually checked output/housing: 500 V
Protection class		IP 20
IP rating		Class 1, with PE connection
M.T.B.F.		>1000000 h, IEC 1709 (SN 29500)
Efficiency		approx. 91 %
No-load power		type 3.5 W
Own consumption		type 1.5 W
Battery residual discharge current		type 300 µA (deep discharge protection, battery disconnected from load)
Signalling	Mains supply	green: 90 % – 110 % from the set value, red: overload
	Battery MM	4 LEDs (green, 2 x yellow, red)
Signal outputs		3 potential free relays with one changeover each (DC 30 V, 1 A)
Remote Start/OFF		Battery support of the load can be activated/deactivated by means of control cable in the absence of mains supply
Temperature sensor		Connection of an analogue, active temperature sensor

Dimensions



Signal connection



Accu-Modules for DC UPS and accessories

VRLA lead Accumulators inclusive temperature sensor
7 Ah, 14 Ah

Description		Part-No.	Type	PU
VRLA Accu incl T-Sensor				
Nominal voltage	DC 24 V / 7 Ah	723020	L-BPT24-7AH	1
	DC 24 V / 14 Ah	723022	L-BPT24-14AH	1

General	L-BPT24-7AH	L-BPT24-14AH
Output fuse	1×25 A	2×25 A
Parallel-/series connection	yes	
Weight (kg/piece)	7	14
Dimensions (w × h × d)	185.4 × 124.5 × 170.0 mm	306.4 × 124.5 × 185.0 mm
Ambient-temperature range min./ max.	operation: 0 °C – 40 °C	
Life time (Eurobat)	3 - 5 years	
Latest installation	9 months @ 20 °C – 30 °C	

Accessories	Article number	Type	PU
Temperature sensor	723024	L-COPS-TS	1

Notes

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