Laser Power Supply Family DPS X000

Operating Manual

mpc

English Edition

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Please read this instruction carefully, particularly observe the use as agreed and the safety labelings.
You will lose any warranty claim for damages caused by nonobservance of the instructions.
We don't accept liability for the resultant damages.

Use as agreed
The device serves for constant current operation of laser diodes.

The device is suitable for the constant current operation of ohmic, capacitive and inductive loads.

The device my not be used for the supply of loads producing an e.m.f. of more than 80 V.

The device may not be used for charging accumulators.

The device may not be installed into vehicles.

The maximum permitted output power of 3000 W, or a maximum input power of 3600 W, may not be exceeded.

Safety labeling
The safety rules of the federation of professional trade associations have to be paid attention for electrical plants in commercial facilities have to be followed.

The device isn't allowed for the use on people and animals.

The device may only be connected to a single-phase ac mains supply.
The supply lines must have a cross-section of at least 1.5 sqmm, better 2.5 sqmm. With the use of stranded wires multicore cable ends have to be applied.

The supply lines to the laser diodes must be designed for the intended diode current.
Dimensioning: ≥ 1 sqmm cross-section per 10 A diode current.
At the DPS X000 use closed annular cable lugs for the corresponding cross-section and for the fastening screws M6.
Use only the allowed and prescribed manufacturer crimping and squeezing tool for crimping or squeezing the ring tongues.
Not correct crimping or squeezing connections can show an inadmissibly high transfer resistance. This may lead to increased power dissipation at the crimp or squeezing point and can cause a cable fire.
In any case of uncertain crimping or squeezing points you should solder additionally. Pay particular attention that the ring tongue is free of soldering tin at the clamped area of the screws.

Safety labeling continuation

Pay attention to a firm screw joint of the ring tongues with the DPS X000.
Use galvanized screws M6 x 8 and galvanized spring washers M6.

Never disconnect the leads from the DPS X000 to the laser diodes during operation.
It could cause a dangerous arc because of the current source characteristics of the device which leads to skin burnings, to injury of the eyes or to a fire.

Particularly observe the correct polarity of the leads to the laser diodes. A mispolarization inevitably destroys the laser diodes.

Never put the device into operation when it was just taken from a cold to a warm room. The condensed water arising in this process can influence the function of the device or even destroy it.
Let the DPS X000 assimilate to room temperature before use.

Provide sufficient and unhindered ventilating during operation.
The integrated fan draws in the cooling air on the side of the fan and pours out in the range of the visible cooling rib.
The intaken and escaping cooling air may not be hindered.
If the device is assembled flush with a front or back plate on the fan side, an opening for the fan in the plate will be required. The measures for the opening are shown in the corresponding drawing.
A fan protective barrier has to be used to avoid injuries.

If the device is used in electrically conductive dust in commercial or industrial surroundings, then the intaken air must absolutely be filtered.

The fan may not be taken out of operation when an alternative water cooling is used.

If a safe mode of the DPS X000 cannot be guaranteed, set it out of operation and secure it against unintentional use.

In every case the DPS X000 has to be put out of operation if

the device has visible damages
the device doesn't work correctly
the device has been stored longer under unfavourable and inadmissible conditions
the device had a difficult and inadmissible transport use.

Difficulties of conventional current sources in operation with laser diodes

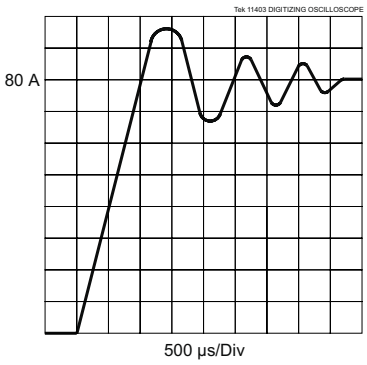
Laser diodes are sensitive to overcurrent and inverse voltage.
Most devices today used for the supply of laser diodes are systems which consist of a voltage source, a current measuring facility and a control loop.
The output voltage will be controlled, concerning the amount, by the current measuring facility and the control loop that the desired diode current flows.
The system works on principle, but there are serious disadvantages and dangers for the laser diodes.

At fast changes of the Current Set Point a dangerous current overshoot appears together with a long build-up time.
This causes instabilities of the visual performance and the wavelength of the laser and leads to the destruction of the diodes if the permissible current is exceeded. (Fig. 1)

Contact problems at the supply lines to the diodes bear another considerable danger.
If the supply line is interrupted during operation and restored again, at the first moment a multiple of the permitted current is flowing into the diodes and destroys them (Fig.2).

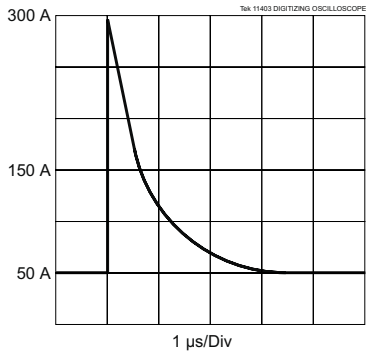
The operation of diode stacks is most dangerous when arranged in the described way.
During the life time of the stack single diodes alloy sporadically. This is a normal process and influences the optical performance of the stack merely insignificantly.
At the moment of the alloying, however, a abrupt reduction of the stack voltage occurs. The permitted diode current is exceeded and the complete stack will be destroyed (Fig 2).

Fig. 1



Diode current at a set point step function from 0 to 80 A.
The current overshoots 15 A.

Fig. 2



Diode current at the alloying of an individual diode in the stack.
The current reaches values of 300 A.

The current sources of the DPS X000 family

Laser diodes and diode stacks require mandatorily a classic current source for a secure and safe operation.
Classic current sources show an infinitely high output impedance. The adjusted current flows constantly and uninfluencedly by the level of the diode voltage and the type of the load resistance. This characteristic is existing as well statically, in the case of slow changes of current and diode voltage, as dynamically at abrupt changes.

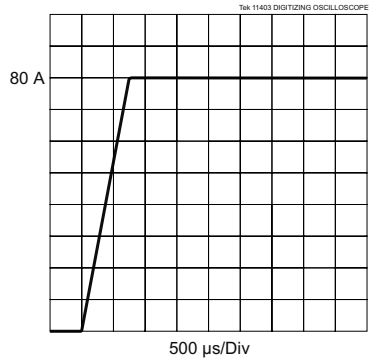
The current sources of the DPS X000 family meet these requirements to a considerable degree. They impress with outstanding static and dynamic qualities.

At fast changes of the Current Set Point, even at full stroke, no overshoot or undershoot of the diode current will occur.
The adjusted current is absolutely constant on all load impedances, from load voltage 0V (short circuit) up to the maximum possible voltage.
The adjusted current remains constant at any time also with abruptly changing diode voltage, with contact problems at the leads or with an alloying of diodes.

Fig. 3 shows the diode current at a set point step function from 0 to 80 A (DPS 2000-100).
No overshoot occurs.

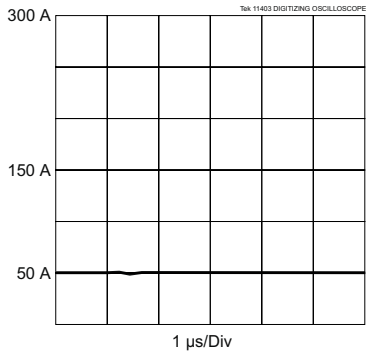
Fig. 4 shows the diode current in a stack during the alloying of a single diode.
The diode current remains absolutely constant.

Fig. 3



Diode current at a set point step function from 0 to 80 A.
The current doesn't overshoot.

Fig. 4



Diode current at the alloying of an individual diode in the stack.
The current remains constant.

Characteristics

The DPS X000 family consists of altogether 9 devices of equal dimensions and in power classes of 1000 W, 2000 W and 3000 W.
There are three current classes with 50 A, 70 A and 100 A for each power class.

- Single-phase wide range input with active Power Factor Correction
- High electromagnetic compatibility for operation in residential areas (EN 55014)
- No external mains filter required
- Low leakage current
- Ideal current source characteristic
- Outstanding static and dynamic characteristics
- Extremely low ripple current
- High Accuracy
- Low temperature drift
- Precise current limit
- Hybrid cooler for air and water cooling
- Small dimensions
- CE sign
- Integrated test value recording system with an open interface
- Limit value programming by configuration software
- Five different modes of operation

Interfaces in the basic device

- **RS 232 Port** for full programmability and test value recording
- **Control Port** for simple control and feedback
  Analog Input for Current Set Point
  Analog Output for Diode Current
  Analog Output for Diode Voltage
  Analog Output for Diode Power
- **Coaxial Port**
  Analog Input for Current Set Point
- **DC Port**
  DC Output to supply peripheral devices

Interfaces and accessories

- **Parallel Port** 12 bits with extensive control options
- **CAN Port** for full programmability and test value recording

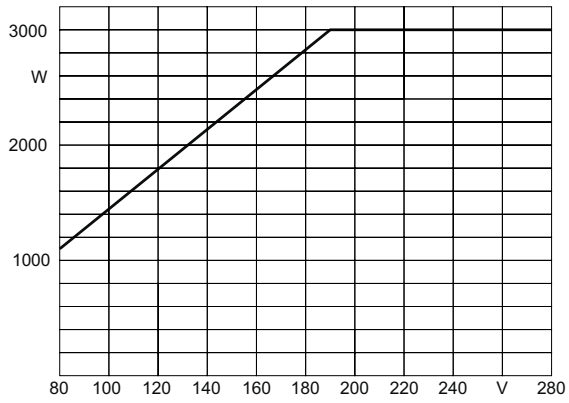
Type summary

Type	Output Power max	Diode Current	Diode Voltage max
DPS 1000-050	1000 W	0 - 50 A	20 V
DPS 1000-070	1000 W	0 - 70 A	14.3 V
DPS 1000-100	1000 W	0 - 100 A	10 V
DPS 2000-050	2000 W	0 - 50 A	40 V
DPS 2000-070	2000 W	0 - 70 A	28.6 V
DPS 2000-100	2000 W	0 - 100 A	20 V
DPS 3000-050	3000 W	0 - 50 A	60 V
DPS 3000-070	3000 W	0 - 70 A	42.9 V
DPS 3000-100	3000 W	0 - 100 A	30 V

Available power
The maximum available power depends on the mains voltage.
It is 3000 W in a 230 V single-phase mains supply, 1800 W in the 120 V single-phase mains supply of the USA and 3000 W in the 120 V (208 V, operation between the phases) three-phase mains supply of the USA.

Fig. 5 shows the coherence between the mains voltage and the maximum available output power.

Fig. 5



Description

The devices of the DPS X000 family provide a secure and safe operation of laser diodes and laser diode stacks.

The devices show an excellent static and dynamic characteristic.
An exceptional low ripple current as well as low noise make a high laser stability and allow even most difficult working tasks.

The single-phase long range input with active Power Factor Correction allows the operation at almost any arbitrary mains.
The low leakage current enables the use of a mains plug connection. A permanent connection of the laser system to the mains supply is no longer required.

A completely new circuit technology ensures high electromagnetic compatibility. An additional mains filter isn't required, also not for operation in residential areas.

A great number of interfaces, several modes of operation, the configuration of device parameters by software and an extensive test value recording system offer high flexibility for the adaption to the laser control.
Already in the basic version all important control signals and measurements are available with high precision both analoguely and digitally. They can be used mixed too.

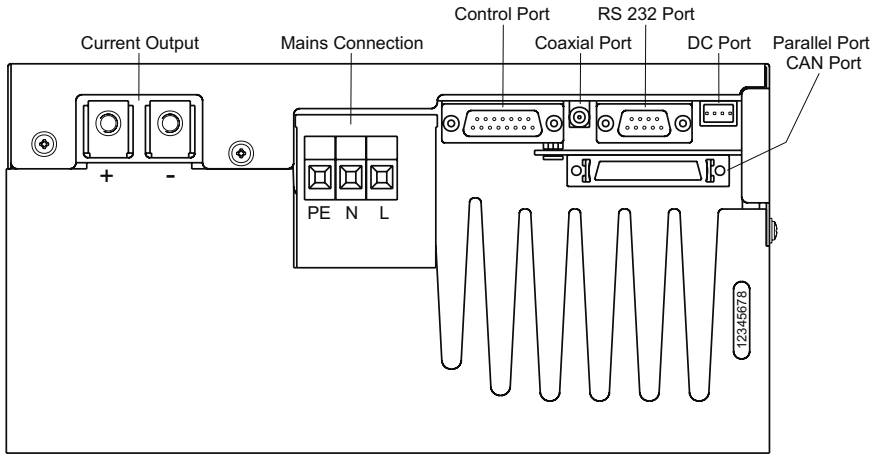
Structure

The power module is designed two-stage.
The first stage contains an active Power Factor Correction component, an active starting circuit and a preconnected mains filter.
In the Power Factor Correction component the received mains current is adapted to the wave form of the mains voltage in order to get both a high power factor and by that a low reactive current absorption and the compliance of the EN 61000 for permitted harmonic reactive current at the mains.
The active starting circuit causes a quick switching with low residual current, idependent of the mains voltage's height.

The second stage contains the laser current source with extensive controlling, measuring and regulating facilities.

Control signals and readings are edited and processed by a microcontroller, which also manages the interfaces.

The mechanical construction is extremely compact and space-saving.
All heat producing components are integrated in an extensive aluminium casting cooler which ensures an efficient removal of the dissipation power, both with air and water cooling.
The device can be assembled horizontally or vertically. Just as the assembly of a water cooler.
For a space-saving mounting all electric connection elements are on one equipment side.



Control options

DPS X000 can be controlled in various ways.
Two interfaces are integrated already in the standard finish. A Control Port and a RS 232 Port.
As accessories a Parallel Port and a CAN Port are available. Both are designed as plug-in card and can be installed subsequently.
The software recognizes automatically the corresponding interface and uses it.

The DPS X000 can be controlled analoguely by the **Control Port** with minimal effort.
All important control- and feedback functions are already available with the Control Port, status data and analog measurements with high precision for diode current, diode voltage and diode power are additionally provided independent of the chosen interface.

The **RS 232 Port** allows the operation and supervision of the DPS X000 with access to all implemented functions and measurements.
The DPS X000 can be controlled directly by a PC and a mouse with help of the control- and configuration software included in the extent of supply. Important equipment parameters and limit values can be fix-programmed by it.
No matter which interface is chosen or activated, the DPS X000 permanently sends the current measurements and settings at the RS 232 Port.

The DPS X000 can be controlled with wide performance range digitally as well as analoguely by the **Parallel Port**.

Just like the RS 232 Port the **CAN Port** allows the operation and the supervision of the DPS X000 with access to all implemented functions and measurements.

The interfaces can also be used mixed without any difficulty.
It is for example possible to control the DPS X000 at the same time digitally by the Parallel Port, to add or subtract (modulation) additionally a second current by the Coaxial Port, the Control Port or the Parallel Port, to record the analog measurements at the Control Port and to select the current measurements and settings in digital mode from the RS 232 Port.

The simultaneous use of the RS 232, the Parallel Port or the CAN Port to control the DPS X000 is not possible.
If the DPS X000 receives control data at the RS232 Port, it is automatically switched into the RS 232 operation mode. An attached Parallel Port or CAN Port, but not the ON-signal of the Control Port, is ignored. This works independently of the active interface.

The analog input at the Control Port and the Parallel Port, to control the Output Current, is also available at the **Coaxial Port**.
It makes the failsafe supply of the analog signal possible by a coaxial line in electrically problematic surroundings.

At the **DC Port** three direct voltages with +5 V, +15 V, and -15 V are available. They can be used to supply peripheral control equipment.

Modes of operation
Five modes of operation are possible. The mode to configure equipment parameters, operation at the Control Port, at the RS 232 Port and at the CAN Port.

Mode to configure device parameters
Different parameters of the DPS X000 can be programmed with the configuration software included to the extent of supply.
The programming is done at the RS 232 Port by means of a PC with Windows™ or a higher operating system.
The programmed parameters are saved and preserved in the device, even after turning off the mains supply.
The following parameters can be programmed:

Time RS 232 CF-TOUT
Configuration - Time Out
The time, after whose exceeding the communication between the DPS X000 and a RS 232 control is recognized as disturbed.
When this time is expired the current distribution at the power output will be interrupted and the DPS X000 checks permanently whether a control connection is possible again.
If the communication is channelled again, the current output will continue.

Current Limit CF-CLD
Configuration - Current Limit Digital
Value for the maximum permitted Output Current.
Permitted values are between zero and the specified maximum current of the device. The resolution is 12 bits (4096 digits)
The Current Limit will become effective at a value which is exactly 1 % higher than the programmed value. If for example 60.0 A are programmed as Current Limit the Current Limit will become effective at 60.6 A.
The programmed Current Limit is only effective for the exclusive operation of the DPS X000 at the Control Port. For operation with the RS 232 Port, the Parallel Port or the CAN Port a separate Current Limit has to be defined.

Current Set Point CF-CSPD
Configuration - Current Set Point Digital
Value for an initial Output Current.
Permitted values are between zero and the specified maximum current of the device. The resolution is 12 bits (4096 digits)
The possibility of presetting an initial Output Current extends and simplifies the control option for operation at the Control Port.
A programmed Output Current can be preset. This current can be modulated by the analog input of the Control Port.
The programmed Current Set Point is only effective for the exclusive operation of the DPS X000 at the Control Port. For the operation with the RS 232 Port, the Parallel Port or the CAN Port the value is ignored.

Current Set Point Stand By CF-CSPSD
Configuration - Current Set Point Stand By Digital
Value for a Stand By Output Current
Permitted values are between zero and the specified maximum current of the device. The resolution is 12 bits (4096 digits).
The possibility to preset a Stand By Output Current extends and simplifies the control options for operation at the Parallel Port.

The programmed Stand By Output Current is only effective when operating the DPS X000 at the Parallel Port. The value is ignored with operation at the Control Port.
For the operation with the RS 232 Port or the CAN Port a separate Stand By Output Current has to be defined.

Voltage Supervision Value CF-VL (Configuration - Voltage Limit)
Value to supervise the Output Voltage.
Permitted values are between zero and the specified Maximum Voltage of the device. The resolution is 10 bit (1024 digits)
If the Output Voltage of the DPS X000 exceeds or remains under the level of the Voltage Supervision Value, it will immediately be indicated at the Control Port and at the Parallel Port.
Problems at the leads to the laser diodes, such as bad contact, loose screw connections or an interruption within the stack of diodes can this way be detected.

The Voltage Supervision Value has no influence on the Output Voltage of the DPS X000.
The programmed Supervision Voltage Value is only effective for operating the DPS X000 at the Control Port or the Parallel Port.
For operation with the RS 232 Port or the CAN Port a separate Voltage Supervision Value has to be defined.

A survey of the signals and data available in the different operation modes is found on the following pages.

Signals and data at the interfaces

CA = Control Data Analog
CD = Control Data Digital
SA = Status Data Analog
SD = Status Data Digital
CF = Configuration Data

Other	Config. Data	Status Data	Control Data	Function	Name	Coaxial Port	Control Port	RS 232 Port	Parallel Port	CAN Port
			CA	Current Set Point Analog	CSPA	•	•		•	
			CD	Current Set Point 12 Bit	CSPD			•	•	•
			CD	Current Set Point Stand By 12 Bit	CSPSD			•		•
			CD	Current Limit 12 Bit	CLD			•	•	•
			CD	Voltage Supervision 10 Bit	VLD			•		•
			CD	Power Supply On	ON		•	•	•	•
			CD	Current Set Point 12 Bit Disable	CSPDD			•	•	•
			CD	Current Set Point Stand By 12 Bit Enable	CSPSDE			•	•	•
		SA		Output Current	COUT		•		•	
		SA		Output Voltage	VOUT		•		•	
		SA		Output Power	POUT		•		•	
		SD		Current Set Point Analog	CSPA			•		•
		SD		Current Set Point 12 Bit	CSPD			•		•
		SD		Current Limit 12 Bit	CLD			•		•
		SD		Voltage Supervision 10 Bit	VLD			•		•
		SD		Output Current	COUT			•		•
		SD		Output Voltage	VOUT			•		•
		SD		Output Power	POUT			•		•
		SD		Mains Voltage	MV			•		•
		SD		Mains Current	MC			•		•

Signals and data at the interfaces (continuation)

CA = Control Data Analog
CD = Control Data Digital
SA = Status Data Analog
SD = Status Data Digital
CF = Configuration Data

Other	Config. Data	Status Data	Control Data	Function	Name	Coaxial Port	Control Port	RS 232 Port	Parallel Port	CAN Port
		SD		PFC-Voltage	VPFC			•		•
		SD		Temperature	TMP			•		•
		SD		Operating Time	WH			•		•
		SD		Device Type	TYPE			•		•
		SD		Serial Number	SN			•		•
		SD		Power Supply is Ready	PSR		•	•	•	•
		SD		Power Supply is On	PSON			•	•	•
		SD		Power Limit Reached	PL			•	•	•
		SD		Current Limit Reached	CL			•	•	•
		SD		Current Fault	CFAIL		•	•	•	•
		SD		Voltage Supervision Exceeded	VFAIL		•	•	•	•
		SD		Temperature Limit Reached	TL			•	•	•
		SD		Temperature Warning Limit Reached	TW			•		•
		SD		Hardware Fault	HFAIL			•	•	•
		SD		System Fault	SFAIL			•		
		SD		RS 232 Frame Fault	DFAIL			•		
		SD		RS 232 Time Out	TOUT			•		
		SD		RS 232 Illegal Character	WS			•		

Signals and data at the interfaces (continuation)

CA = Control Data Analog
CD = Control Data Digital
SA = Status Data Analog
SD = Status Data Digital
CF = Configuration Data

Other	Config. Data	Status Data	Control Data	Function	Name	Coaxial Port	Control Port	RS 232 Port	Parallel Port	CAN Port
	CF			Current Set Point 12 Bit	CSPD			•		
	CF			Current Set Point Stand By 12 Bit	CSPSD			•		
	CF			Current Limit 12 Bit	CLD			•		
	CF			Voltage Supervision 10 Bit	VLD			•		
	CF			Time Out RS 232	TOUT			•		
•				Interlock Input	ILIN		•		•	
•				Interlock Output	ILOUT		•		•	
•				Reference Voltage + 10 V	VREF		•			
•				Auxiliary Voltage +15 V 100 mA	AUX+		•		•	
•				Auxiliary Voltage -15 V 100 mA	AUX-		•		•	

DC Port

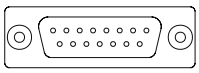
Interface description
DC Port
Three DC voltages of +5 V, +15 V, and -15 V to supply peripheral control devices or to supply additional fans are available.

4-pole female connector MC0.5/4-G2.5 Phoenix.

Outputs			
Pin	Name	Function	
1	-15V	- 15 V	300 mA max
2	+15V	+ 15 V	300 mA max
3	GND	Ground	
4	+5V	+ 5 V	300 mA max

Interface description

Control Port



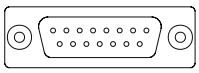
Control Port

Its possible to operate the DPS X000 via the Control Port with minimal effort. The Current Set Point will be preset analoguely.
All important control and feedback functions are existent in addition Status Data and highly precise analog measurements of the Diode Current, Diode Voltage and Diode Power are available independent of another chosen interface.

15-pole female plug connector according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40.

Inputs		
Pin	Name	Function
10	CA-CSPA	Current Set Point Analog
2	CD-ON	Power Supply On
8	ILIN	Interlock Input
9	NC	not used
1	GND	Signal Ground
Outputs		
Pin	Name	Function
5	SD-PSR	Power Supply is Ready
13	SD-CFAIL	Current Fault
6	SD-VFAIL	Voltage Supervision Exceeded
3	SA-COUT	Output Current Analog Value
11	SA-VOUT	Output Voltage Analog Value
4	SA-POUT	Output Power Analog Value
15	ILOUT	Interlock Output
12	VREF	Reference Voltage +10 V
14	AUX+	Auxiliary Voltage +15 V
7	AUX-	Auxiliary Voltage -15 V
1	GND	Signal Ground

Control Port



Signal Description

Current Set Point Analog CA-CSPA
Control Analog - Current Set Point Analog
Active in all operation modes.
Analog input with 0 ... ± 10.000 V for the Current Set Point.
+ 10.000 V correspond to the Maximum Current of the DPS X000.
The Current Set Point Analog will be internally added with correct sign to an Digital Current Set Point CD-CSPD possibly provided at the RS 232 Port, the Parallel Port or the CAN Port.
The sum forms the effective Current Set Point.
An analog Current Set Point with negative sign acts subtracting.
With this addition it is for example possible to preset a Digital Current Set Point as CW-value and to modulate it by the analog input.

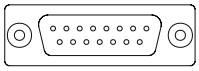
Power Supply Switch On CD-ON
Control Digital - Power Supply On
Active in all operation modes.
Digital input, active-high.
The DPS X000 is switched on, Output Current flows.
The level of the Output Current is determined by the sum of the Current Set Point CA-CSPA at the Analog Input and the Current Set Point 12 Bit whose value CF-CSPD is stored in the configuration of the DPS X000.
The Current Limit is determined by the value CF-CLD stored in the configuration of the DPS X000.
The Voltage Supervision Value CD-VLD is determined by the value CF-VLD stored in the configuration of the DPS X000.

Interlock Input ILIN
Active in all operation modes.
Interlock line, looped-through on pin 15 (ILOUT).
Does not influence the function of the DPS X000.

Power Supply is Ready SD-PSR
Status Digital - Power Supply Ready
Active in all operation modes.
Digital output, active-low, open collector.
Low, if the DPS X000 is operated at correct mains voltage and no faults are known.

Current Fault SD-CFAIL
Status Digital - Current Fail
Active in all operation modes.
Digital output, active-low, open collector.
Low, if the Output Current differs more than 0.5 % from the provided value.
Will be signaled at every fast change of current for the duration of the deviation.
The DPS X000 will switch off if the Output Current differs more than one second from the provided value.

Control Port



Voltage Supervision Value Exceeded SD-VFAIL
Status Digital - Voltage Fail
Active in all operation modes.
Digital output, active-low, open collector.
Low, if the Output Voltage is higher than the Voltage Supervision Value CF-VL which is programmed in the device configuration.
Problems at the leads to the laser diodes, such as bad contact, loose screw connections or an interruption within the stack of diodes can be detected this way.
The response time is less than 1 µs.
The Voltage Supervision Value doesn't influence the Output Voltage of the DPS X000.

The Voltage Supervision Value programmed in the device configuration is only relevant to the operation of the DPS X000 at the Control Port or the Parallel Port.
For the operation at the RS 232 Port or the CAN Port a separate Voltage Supervision Value has to be defined.

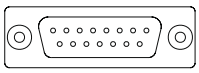
Output Current SA COUT
Status Analog - Current Out
Active in all operation modes.
Analog output with 0 ... +10.000 V, image of the Output Current.
Accuracy ± 0.1 %.
+ 10.000 V correspond to the Maximum Current of the DPS X000.

Output Voltage SA VOUT
Status Analog - Voltage Out
Active in all operation modes.
Analog output with 0 ... +10.000 V, image of the Output Voltage.
Accuracy ± 0.2 %.
+ 10.000 V correspond to the 100 V Output Voltage.

Output Power SA POUT
Status Analog - Power Out
Active in all operation modes.
Analog Output with 0 ... +10.000 V, image of the Output Power.
Accuracy ± 1 %.
+ 10.000 V correspond to the Maximum Power of the DPS X000.
The signal helps if a test system is available in a laser system to measure the optical output.
From comparing with the electrical power you can draw conclusions on the efficiency and the state of the laser diodes.

Interlock Output ILOUT
Active in all operation modes.
Interlock line, looped-through on pin 8 (ILIN).
Has no influence on the function of the DPS X000.

Control Port

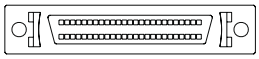


Reference Voltage +10 V VREF
Active in all operation modes.
Analog Output with +10.000 V.
Accuracy ± 0.05 %.
The output can be used to supply an external D/A-converter for the Current Set Point if no precise Reference Voltage is available.
In a simple operation mode like manual operation or operation with fixed Output Current the Reference Voltage can be used to supply a potentiometer to adjust the Current Set Point.

Auxiliary Voltage +15 V AUX+
Active in all operation modes.
Auxiliary voltage with approximately +15 V and an output resistance of 10 Ω to supply small external consumers.
The output may be loaded with 100 mA. It isn't short-circuit proof.

Auxiliary Voltage -15 V AUX-
Active in all operation modes.
Auxiliary voltage with approximately -15 V and an output resistance of 10 Ω to supply external small consumers.
The output may be loaded with 100 mA. It isn't short-circuit proof.

Parallel Port



Interface description

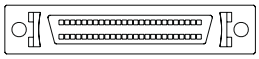
Parallel Port
The Parallel Port available as accessory is conceived as plug-in card and can be installed subsequently.
The software of the DPS X000 recognizes automatically the Parallel Port and uses it.

The DPS X000 can be controlled as well digitally as analoguely with a wide performance range by the Parallel Port.
Almost all implemented control and feedback functions of the DPS X000 are available, and additionally analog measurements of high precision for Diode Current, Diode Voltage and Diode Power.

50-pole female plug connector SCSI miniature.

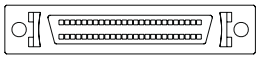
Pin	Name	Function Inputs	
49	CA-CSPA	Current Set Point	Analog
1	CD-CSPD	Current Set Point	Data Bit 0
2	CD-CSPD	Current Set Point	Data Bit 1
3	CD-CSPD	Current Set Point	Data Bit 2
4	CD-CSPD	Current Set Point	Data Bit 3
5	CD-CSPD	Current Set Point	Data Bit 4
6	CD-CSPD	Current Set Point	Data Bit 5
31	CD-CSPD	Current Set Point	Data Bit 6
30	CD-CSPD	Current Set Point	Data Bit 7
29	CD-CSPD	Current Set Point	Data Bit 8
28	CD-CSPD	Current Set Point	Data Bit 9
27	CD-CSPD	Current Set Point	Data Bit 10
26	CD-CSPD	Current Set Point	Data Bit 11
7	CD-CLD	Current Limit	Data Bit 0
8	CD-CLD	Current Limit	Data Bit 1
9	CD-CLD	Current Limit	Data Bit 2
10	CD-CLD	Current Limit	Data Bit 3
11	CD-CLD	Current Limit	Data Bit 4
12	CD-CLD	Current Limit	Data Bit 5
37	CD-CLD	Current Limit	Data Bit 6
36	CD-CLD	Current Limit	Data Bit 7
35	CD-CLD	Current Limit	Data Bit 8
34	CD-CLD	Current Limit	Data Bit 9
33	CD-CLD	Current Limit	Data Bit 10
32	CD-CLD	Current Limit	Data Bit 11
13	CD-ON	Power Supply On	
14	CD-CSPSDE	Current Set Point Stand By 12 Bit Enable	
38	CD-CSPDD	Current Set Point 12 Bit Disable	
20	ILIN	Interlock Input	

Parallel Port



Pin	Name	Function Outputs
42	SD-PSR	Power Supply is Ready
17	SD-PSON	Power Supply is On
43	SD-CFAIL	Current Fault
40	SD-CL	Current Limit Reached
39	SD-PL	Power Limit Reached
19	SD-VFAIL	Voltage Supervision Exceeded
41	SD-TL	Temperature Limit Reached
16	SD-HFAIL	Hardware Fault
45	ILOUT	Interlock Output
24	SA-COUT	Output Current Analog Value
50	SA-VOUT	Output Voltage Analog Value
25	SA-POUT	Output Power Analog Value
21	GND	Signal Ground
46	GND	Signal Ground
23	AUX+	Auxiliary Voltage +15 V
48	AUX-	Auxiliary Voltage -15 V
18	NC	not used
22	NC	not used
44	NC	not used
47	NC	not used

Parallel Port



Signal Description

Current Set Point Analog CA-CSPA
Control Analog - Current Set Point Analog
Active in all operation modes.
Analog input with 0 ... ± 10.000 V for the Current Set Point.
Accuracy ± 0.1 %.
+ 10.000 V correspond to the Maximum Current of the DPS X000.
The Current Set Point Analog is internally added with correct sign to a Digital Current Set Point (CD-CSP).
The sum is the effective Current Set Point.
An Analog Current Set Point with negative sign acts subtracting.
This addition makes it for example possible to preset a Digital Current Set Point as CW-value and to modulate it by the Analog Input.

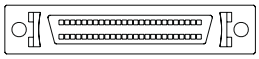
Current Set Point CD-CSPD
Control Digital - Current Set Point Digital
Digital inputs, 12 bit, active-high, with data bits 0 to 11 for the Current Set Point.
The resolution is 4096 digits, full scale (data bits 0 to 11 = High) corresponds to the Maximum Current of the DPS X000.
An Analog Current Set Point CA-CSP preset at the Analog Input will be added or subtracted to the Digital Current Set Point.

Current Limit CD-CLD
Control Digital - Current Limit Digital
Digital inputs, 12 bit, active-high, with data bits 0 to 11 for the Current Limit.
The resolution is 4096 digits, full scale (data bits 0 to 11 = High) corresponds to the Maximum Current of the DPS X000.
The Current Limit will become effective with a value which is exactly 1 % higher than the programmed value. If for example 60.0 A are programmed as Current Limit the Current Limit will become effective at 60.6 A.

Power Supply Switch On CD-ON
Control Digital - On
Operation with Current Set Point Analog and Current Set Point 12 Bit
Digital input, active-high.
The DPS X000 is switched on, Output Current flows.
The level of the Output Current is determined by the sum of the Current Set Point CA-CSPA at the Analog Input and the Current Set Point 12 Bit CD-CSPD.
The Current Limit is determined by the value Current Limit CD CLD.
The Voltage Supervision Value CD-VLD is determined by the value CF-VLD stored in the configuration of the DPS X000.

Current Set Point 12 Bit Disable CD-CSPDD
Control Digital - Current Set Point Digital Disable
Operation with Current Set Point Analog
Digital input, active-high.
The Current Set Point 12 Bit CD-CSPD is deactivated.
The level of the Output Current is determined by the Current Set Point CA-CSPA at the Analog Input.

Parallel Port



Current Set Point Stand By 12 Bit Enable CD-CSPSDE
Control Digital - Current Set Point Stand By Digital Enable
Operation with Current Set Point Analog and Current Set Point Stand By 12 Bit
Digital input, active-high.
The level of the Output Current is determined by the Current Set Point CA-CSPA at the Analog Input and the Current Set Point Stand By 12 Bit, its value is stored in the configuration of the DPS X000.

With the signals CD-ON, CD-CSPDD and CD-CSPSDE it is possible to switch between two till five different current values without effort in changing the control to preset the Current Set Point.
In the case of low requirements on the possibility to vary the Diode Current preseting a constant Digital Current Set Point 12 Bit CD-CSPD hardwired or with a DIP-switch and preseting an additional Current Set Point Analog CA-CSPA is possible. You can switch with these signals between the set points or combinations of it.

Interlock Input ILIN
Interlock line, looped-through on pin 15 (ILOUT).
No influence on the function of the DPS X000.

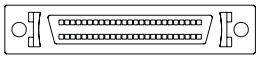
Power Supply is Ready SD-PSR
Status Digital - Power Supply Ready
Digital output, active-low, open collector.
Low, if the DPS X000 is operated at correct mains voltage and no faults are known.

Current Fault SD-CFAIL
Status Digital - Current Fail
Digital output, active-low, open collector.
Low, if the Output Current differs more than 0.5 % from the preset value.
Is signalled at every fast current change for the time of deviation.
The DPS X000 will switch off if the Output Current differs more than one second from the provided value.

Current Limit Reached SD-CL
Status Digital - Current Limit
Digital output, active-low, open collector.
Low, if the Output Current has reached the provided Current Limit CD-CL.

Power Limit Reached SD-PL
Status Digital - Power Limit
Digital output, active-low, open collector.
Low, if the Output Power exceeds the specified Maximum Power of the DPS X000.
When exceeding for more than one second the DPS X000 will switch off and restart again.
The DPS X000 will switch off if the Output Current differs more than one second from the preset value.
The DPS X000 switches off permanently after exceeding the specified Maximum Power five times.
To start it again it has to be disconnected from the mains supply and connected again.

Parallel Port



Voltage Supervision Value Exceeded SD-VFAIL
Status Digital - Voltage Fail
Digital output, active-low, open collector.
Low, if the Output Voltage is higher than the Voltage Supervision Value CF-VL stored in the configuration of the DPS X000.
Thus problems at the leads to the laser diodes, like bad contact, loose screw connections or an interruption within the stack of diodes can be detected.
The response time is less than 1 µs.
The Voltage Supervision Value doesn't influence on the Output Voltage of the DPS X000.

Temperature Limit Reached SD-TL
Status Digital - Temperature Limit
Digital output, active-low, open collector.
Low, if the temperature has reached the specified Maximum Temperature of the DPS X000.
The DPS X000 switches off and automatically restarts again after cooling down.

Hardware Fault SD-HFAIL
Status Digital - Hardware Fail
Digital output, active-low, open collector.
Low, if a Hardware Fault occurs.
The DPS X000 switches off and tries a restart.
After trying 5 times in vain the DPS X000 switches off lastingly. To start it again it has to be disconnected from the mains supply and connected again.

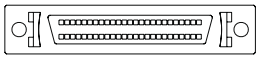
Interlock Output ILOUT
Interlock line, looped-through on pin 20 (ILIN).
No influence on the function of the DPS X000.

Output Current SA-COUT
Status Analog - Current Out
Analog output with 0 … +10.000 V, image of the Output Current.
Accuracy ± 0.1 %.
+ 10.000 V correspond to the Maximum Current of the DPS X000.

Output Voltage SA-VOUT
Status Analog - Voltage Out
Analog Output with 0 ... +10.000 V, image of the Output Voltage.
Accuracy ± 0.2 %.
+ 10.000 V correspond to 100 V Output Current.

Output Power SA-POUT
Status Analog - Power Out
Analog Output with 0 ... +10.000 V, image of the Output Power.
Accuracy ± 1 %.
+ 10.000 V correspond to the Maximum Power of the DPS X000.
The signal helps if a test system is available in a laser system to measure the optical output.
From comparing with the electrical power you can draw conclusions on the efficiency and the state of the laser diodes.

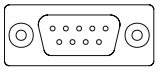
Parallel Port



Auxiliary Voltage +15 V AUX+
Auxiliary Voltage with approximately +15 V and an output resistance of 10 Ω to supply small external consumers.
The output may be loaded with 100 mA. It is not short-circuit proof.

Auxiliary Voltage -15 V AUX-
Auxiliary voltage with approximately -15 V and an output resistance of 10 Ω to supply small external consumers.
The output may be loaded with 100 mA. It isn't short-circuit proof.

RS 232 Port



Interface Description

RS 232 Port

The Serial Interface meets the RS232C standard.
It is configured as data terminal equipment (DEE).
The DPS X000 sends data on pin 2 (TX) and receives data on pin 3 (RX).
A hardware handshake isn't used. The RTS/CTS signal can be looped through or a fixed state (0 or 1) can be assigned to the RTS signal by an internal jumper.
The logic states of the interface correspond to the CCITT recommendation V.28.

Connection: 9-pole female plug connector according to DIN 41652 and MIL-C-24308 with internal thread UNC 4-40.

Permitted baud rates are 1200, 2400, 4800, 9600,19200, 38400, 57600 and 115200.

The data format is 8 data bits, no parity, one stop bit.
No software hand shake (XON, XOFF) is used.
The interface is full duplex capable.

The DPS X000 can communicate via a 9-pole conductor directly with a PC. The full function and diagnosis extent is available.

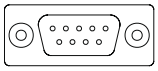
The DPS X000 can receive Control Data and send Status Data.
The DPS X000 can be controlled and configured on its full performance range by the Control Data.

Status data are always sent by the DPS X000 even if the control is made by the Control Port, the Parallel Port or the CAN Port and not by the RS 232 Port.
Status Data inform about the current operating state, configuration settings, as well as faults and measurements of the DPS X000.

A large part of the sent Status Data is insignificant for the practical operation and can be ignored regarding evaluation.

A listing and a description of the most important Status Data for the practical operation, a complete listing of the Status Data as well as the listing and description of the Control Data are found on the following pages.

RS 232 Port



Important Status Data

Power Supply is Ready SD-PSR
Status Digital - Power Supply Ready
Status Byte 31, bit 3
The DPS X000 is ready. No faults are notified.

Power Supply is Switched On SD-PSON
Status Digital - Power Supply On
Status Byte 31, bit 4
The DPS X000 is switched on. Output Current flows.

Power Limit Reached SD-PL
Status Digital - Power Limit
Status Byte 3, bit 2
The maximum permitted Output Power of the DPS X000 is reached.
A disconnection and a following automatic restart is made after 1 second.

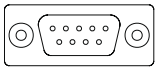
Current Limit Reached SD-CL
Status Digital - Current Limit
Status Byte 3, bit 4
The Output Current has reached the Current Limit (CD-CL) set with the Control Bytes 10 and 11.
No disconnection.

Current Fault SD-CFAIL
Status Digital - Current Fail
Status Byte 3, bit 3
The Output Current differs more than 0.5 % from the Current Set Point.
Disconnection and a following restart after 100 ms.

Voltage Supervision Value Exceeded SD-VFAIL
Status Digital - Voltage Fail
Status Byte 4, bit 4
The Output Voltage has exceeded the Voltage Supervision Value (CD-VL) set with the Control Bytes 14 and 15.
No disabling.
Problems at the leads to the laser diodes, such as bad contact, loose screw connections or an interruption within the stack of diodes can be detected with this Status Byte.
The SD-VFAIL signal at the Control Port can be used, if a very fast and contemporary detection is necessary. Its response time is less than 1 µs.

Temperature Limit Reached SD-TL
Status Digital - Temperature Limit
Status Byte 4, bit 6
The temperature of the DPS X000 has reached the permitted limit.
Disabling and a new attempt after cooling.
Disconnection and restart after cooling.

RS 232 Port



Temperature Warning Limit Reached SD-TW
Status Digital - Temperature Warning
Status Byte 31, bit 7
The temperature of the DPS X000 has reached the specified Warning Limit.
The signal helps to activate for example an additional external air or water cooler.

Hardware Fault SD-HFAIL
Status Digital - Hardware Fail
Status Byte 4, bit 7
Fault in the power modules. The DPS X000 switches off and tries a restart.
After trying five times in vain the DPS X000 switches off lastingly. To start it again it has to be disconnected from the mains supply and connected again.

System Fault SD-SFAIL
Status Digital - System Fail
Status Byte 4, bit 0
Fault in the microcontroller. The DPS X000 switches off and tries a restart.
After trying five times in vain the DPS X000 switches off lastingly. To start it again it has to be disconnected from the mains supply and connected again.

RS 232 Frame Fault SD-DFAIL
Status Digital - Data Fail
Status Byte 4, bit 1
Fault at the RS 232 Port data transmission.

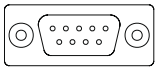
RS 232 Time Out SD-TOUT
Status Digital - Time Out
Status Byte 4, bit 2
The time till Time Out, set with the Control Bytes 6 and 7, is exceeded.
A communication interruption is carried out and the Output Current is switched off.
The DPS X000 tries to restore the communication.
The Output Current is switched on again if the connection is effective again.

RS 232 Illegal Character Received RS-W
Status Digital - Wrong Sign
Status Byte 4, bit 3
An illegal character was received at the RS 232 Port.

Current Set Point at the Analog Input SD-CSPA
Status Digital - Current Set Point Analog
Status Bytes 38 and 39
Shows the currently preset Analog Current Set Point of the Analog Inputs (Coaxial Port, Control Port and Parallel Port).

Current Set Point 12 Bit SD-CSPD
Status Digital - Current Set Point Digital
Status Bytes 11 and 12
Shows the currently preset Current Set Point 12 Bit (Control Port with stored Current Set Point 12 Bit, RS 232 Port, Parallel Port and CAN Port with directly preset Current Set Point 12 Bit).

RS 232 Port



Current Limit 12 Bit SD-CLD
Status Digital - Current Limit Digital
Status Bytes 13 and 14
Shows the currently preset Current Limit 12 Bit (Control Port with stored Current Limit 12 Bit, RS 232 Port, Parallel Port and CAN Port with directly preset Current Limit 12 Bit).

Voltage Supervision Value 10 Bit SD-VLD
Status Digital - Voltage Limit Digital
Status Bytes 17 and 18
Shows the currently preset Voltage Supervision Value 10 Bit (Control Port and Parallel Port with stored Voltage Supervision Value 10 Bit, RS 232 Port and CAN Port with directly preset Voltage Supervision Value 10 Bit).

Output Current SD-COUT
Status Digital - Current Out
Status Bytes 32 and 33
Shows the current Output Current.

Output Voltage SD-VOUT
Status Digital - Voltage Out
Status Bytes 34 and 35
Shows the current Output Voltage.

Output Power SD-POUT
Status Digital - Power Out
Status Bytes 36 and 37
Shows the current Output Power.

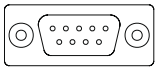
Mains Voltage SD-MV
Status Digital - Mains Voltage
Status Bytes 42 and 43
Shows the current value of the Mains Voltage.

Mains Current SD-MC
Status Digital - Mains Current
Status Bytes 40 and 41
Shows the current value of the Mains Current.

PFC Voltage SD-VPFC
Status Digital - Voltage PFC
Status Bytes 44 and 45
Shows the current value of the Output Voltage of the PFC module.

Temperature SD-TMP
Status Digital - Temperature
Status Bytes 46 and 47
The current temperature of the DPS X000.

RS 232 Port

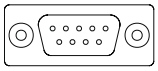


Operating Time SD-WH
Status Digital - Working Hours
Status Bytes 61, 62, 63 and 64
Shows the Operating Time of the DPS X000.

Device Type SD-TYPE
Status Digital - Type
Status Byte 48
Shows the Device Type.

Serial Number SD-SN
Status Digital - Serial Number
Status Bytes 49 and 50
Shows the Serial Number of the DPS X000.

RS 232 Port



Sent Data and their Meaning
(Complete listing)
Independent of the used interface, a data set of 88 consecutive bytes is cyclically sent at the RS 232 Port.
The data set consists of:

Data set beginning	2 bytes
Status information	84 bytes
Data set end	2 bytes

Status Byte 1 **Beginning of the Data Set**
Status Byte 2
To open the sequence twice a start byte is sent.
The value is hex 0A.

Status Byte 3 **Fault Bits**
8 bit word, binary output.

Bit 0 = 1	Maximum permitted Mains Current reached
Bit 1	unused
Bit 2 = 1	Power Limit reached (SD-PL)
Bit 3 = 1	Current Fault (SD-CFAIL)
Bit 4 = 1	Current Limit reached (SD-CL)

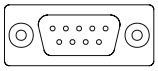
Status Byte 4 **Fault Flags**
8 bit word, binary output.
Fault flags are immediately set with the appearance of the fault.

Bit 0 = 1	System Fault (SD-SFAIL)
Bit 1 = 1	RS 232 Frame Fault (SD-DFAIL)
Bit 2 = 1	RS 232 Time Out (SD-TOUT)
Bit 3 = 1	RS 232 Illegal Character received (SD-WS)
Bit 4 = 1	Voltage Supervision Value exceeded (SD-VL)
Bit 5 = 1	Current Fault (SD-CFAIL)
Bit 6 = 1	Temperature Limit reached (SD-TL)
Bit 7 = 1	Hardware Fault (SD-HFAIL)

Status Byte 5 **Time Out Flags**
8 bit word, binary output, shows the transgression of set time limits.

Bit 0 = 1	RS 232 Reception
Bit 1 = 1	Check PFC Voltage
Bit 2 = 1	Check Mains Voltage to PFC Voltage
Bit 3 = 1	Check permitted Mains Current
Bit 4 = 1	Check Output Voltage
Bit 5 = 1	Check Mains Voltage
Bit 6 = 1	Check Temperature
Bit 7 = 1	Check Current Fault

RS 232 Port



Status Byte 6 **Operation Mode**
8 bit value, binary output, shows the Operation Mode.

Output	Operation Mode
0000 0000	Current Set Point 12 Bit and Analog
0000 0001	Mode without control
0000 0010	Current Set Point 12 Bit deactivated (SD-CSPDD)
0000 0100	Default value active (SD-PSON)
0000 0110	Only Current Set Point Analog active
0000 1000	Current Set Point Stand By 12 Bit activated (SD-CSPSDE)
0000 1010	Only Current Set Point Analog active
0000 1100	Current Set Point Stand By 12 Bit and Analog
0000 1110	Only Current Set Point Analog active
0001 0000	Saving of the values for the Parallel Interface
0010 0000	Restart to switch over from Operation Mode to Service Mode was made
0100 0000	Operation without control is programmed
1000 0000	Power Supply is switched off by the Control Port
1000 0100	Power Supply is switched on by the Control Port

Status Byte 7 **Configuration Register**
8 bit word, binary output, shows the control type and the mode.

Bit 0 = 1	Control by the Parallel Port
Bit 1 = 1	Control by the RS 232 Port
Bit 2 = 1	Control by the CAN Port
Bit 3 = 1	Control by the Control Port
Bit 4 = 1	Operation in Service Mode
Bit 5 = 1	Service2 flag
Bit 6 = 1	Received string flag

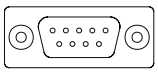
If all bits are zero no decision has been made for a control or operation mode.

Status Byte 8 **Service Register**
8 bit word, ASCII output, shows the mode.

‘B’	for operation mode

Status Byte 9 **Actual Value for the Time Out at the RS 232 Port**
Status Byte 10
16 bit value, binary output, shows the time which may pass until receiving the next word.
An exceeding leads to interruption of communication and disabling of the Output Current.
Range of values 0 to 655350 ms with increment 10.

RS 232 Port



Status Byte 11 Current Current Set Point 12 Bit SD-CSPD
Status Byte 12
Current Set Point (resolution 12 bit), binary output, left justified in the 16 bit word, shows the current Current Set Point 12 Bit.
The Maximum Current of the DPS X000 corresponds to a value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Set Point, then the binary value has to be converted into a decimal and multiplied with a factor.

Current Set $Point_{dec}$ = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

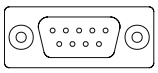
Status Byte 13 Current Current Limit 12 Bit SD-CLD
Status Byte 14
16 bit value (resolution 12 bit), binary output, left justified in the 16 bit word, shows the current Current Limit 12 Bit.
The Maximum Current Limit of the DPS X000 corresponds to a value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Limit, then the binary value has to be converted into a decimal and multiplied with a factor.

Current $Limit_{dec}$ = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

RS 232 Port



Status Byte 15 Current Current Set Point Stand By 12 Bit
Status Byte 16 SD-CSPSD
16 bit value (resolution 12 bit), binary output, left justified in the 16 bit word, shows the current Current Set Point Stand By 12 Bit.
The Maximum Current of the DPS X000 corresponds to a value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Set Point Stand By, then the binary value has to be converted into a decimal and multiplied with a factor.

Current Set Point Stand By_{dec} = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

Status Byte 17 Current Voltage Supervision Value 10 Bit SD-VLD
Status Byte 18
Voltage Supervision Value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current Voltage Supervision Value 10 Bit. The DPS X000 maximum Voltage Supervision Value of 60 V corresponds to a distributed value of 61312_{dec}.
If the distributed binary value shall be converted into the decimal Voltage Supervision Value, then the binary value has to be converted into a decimal and multiplied with the factor 0.0009786.

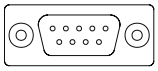
Voltage Supervision $Value_{dec}$ = Distributed $value_{dec}$ * 0.0009786

Example:
Distributed value = 1110111110000000 (61312)
Voltage Supervision $Value_{dec}$ = 61312 * 0.0009786 (60 V)

Status Byte 19 Fault Bits
8 bit word, binary output, shows the type of the faults.

Bit 0 = 1	Voltage Supervision Value is exceeded
Bit 1 = 1	Minimal Output Voltage is fallen below
Bit 2 = 1	Maximum permitted Mains Voltage is exceeded
Bit 3 = 1	Minimal permitted Mains Voltage is fallen below
Bit 4 = 1	Minimal permitted PFC Voltage is fallen below
Bit 5 = 1	Maximal permitted PFC Voltage is exceeded
Bit 6 = 1	Time to build up the PFC Voltage is exceeded
Bit 7 = 1	Maximum permitted Power is exceeded

RS 232 Port



Status Byte 20 Delay Time after Test of the PFC Voltage
8 bit value, binary output, shows the time which will be waited after the minimum required PFC Voltage is reached.
Range of values 0 to 2550 ms with increment 10.
Ex-works setting: 2000 ms

Status Byte 21 Delay Time after Test for Mains Voltage and PFC Voltage
8 bit value, binary output, shows the time which will be waited after the condition, PFC Voltage = Peak Value of the Mains Voltage, is reached.
Range of values 0 to 2550 ms with increment 10.
Ex-works setting: 1000 ms

Status Byte 22 Delay Time after Reaching the Maximum Permitted Mains Current
8 bit value, binary output, shows the time which will be waited after the maximum permitted Mains Voltage is reached.
Range of values 0 to 2550 ms with increment 10.
Ex-works setting: 200 ms

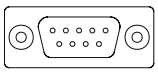
Status Byte 23 Delay Time after Exceeding the Voltage Supervision Value
8 bit value, binary output, shows the time which will be waited after exceeding the Voltage Supervision Value.
Range of values 0 to 2550 ms with increment 10.
Ex-works setting: 20 ms

Status Byte 24 Delay Time after Exceeding the Maximum Permitted Mains Voltage
8 bit value, binary output, shows the time which will be waited after exceeding the maximum permitted Mains Voltage.
Range of values 0 to 2550 ms with increment 10.
Ex-works setting: 200 ms

Status Byte 25 Delay Time after Exceeding the Maximum Permitted Temperature
8 bit value, binary output, shows the time which will be waited after exceeding the maximum permitted Temperature.
Range of values 0 to 2550 ms with increment 10.
Ex-works setting: 500 ms

Status Byte 26 Delay Time after a Current Fault Occurs
8 bit value, binary output, shows the time which will be waited after a Current Fault occurs.
Range of values 0 to 2550 ms with increment 10.
Ex-works setting: 100 ms

RS 232 Port



Status Byte 27 Time till Time Out at the RS 232 Port SD-TOUT
Status Byte 28
16 bit value, binary output, time which may pass until receiving the next word. An exceeding leads to a communication interruption and to disconnection of the Output Current.
Range of values 0 to 655350 ms with increment 10.
Ex-works setting: 1000 ms

Status Byte 29 Counter for Faults which Trigger a Restart of the DPS X000
8 bit value, starts with the value 250, number of the occurred faults which have triggered a restart. If another restart will be triggered by a fault after 5 restarts (distributed value 255), the DPS X000 switches off lastingly. To restart the DPS X000 again it has to be disconnected from the mains supply and connected again.

Status Byte 30 Component Fault Bits
8 bit word, binary output, shows the occured component faults.

Bit 0	not used
Bit 1 = 1	Fault in the power modules
Bit 2 = 1	Fault in the EEprom
Bit 3	not used
Bit 4	not used
Bit 5	not used
Bit 6	not used
Bit 7 = 1	Device was locked due to a certain number of faults.

Status Byte 31 Operating State
8 bit word, binary output, shows the operating state.

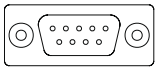
Bit 0 = 1	Waiting for a stable Mains Voltage
Bit 1 = 1	Waiting for PFC Voltage
Bit 2 = 1	PFC Voltage has reached the correct value
Bit 3 = 1	Power Supply is ready (SD-PSR)
Bit 4 = 1	Power Supply is switched on, current flows (SD-PSON)
Bit 5 = 1	Power Supply is in Service Mode
Bit 6	not used
Bit 7 = 1	Temperature Warning Limit is reached

Status Byte 32 Current Value of the Output Current SD-COUT
Status Byte 33
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current value of the Output Current. The maximum Output Current of the DPS X000 corresponds to a distributed value of 64192_{dec}.
If the distributed binary value shall be converted into the decimal Output Current, then the binary value has to be converted into a decimal and multiplied with a factor.

$\text{Output Current}_{dec} = \text{Distributed value}_{dec} * \text{factor}$

The factor depends on the Device Type.

RS 232 Port



Device	Factor
DPS 1000-050	0.00077892
DPS 2000-050	0.00077892
DPS 3000-050	0.00077892
DPS 1000-070	0.00109049
DPS 2000-070	0.00109049
DPS 3000-070	0.00109049
DPS 1000-100	0.00155783
DPS 2000-100	0.00155783
DPS 3000-100	0.00155783

Status Byte 34 Current Value of the Output Voltage SD-VOUT
Status Byte 35
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current value of the Output Voltage. A Output Voltage of 60 V corresponds to a distributed value of 61312_{dec}.
If the distributed binary value shall be converted into the decimal Output Voltage, then the binary value has to be converted into a decimal and multiplied with the factor 0.0009786.

$Output\ Voltage_{dec} = Distributed\ value_{dec} * 0.0009786$

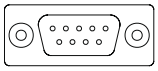
Status Byte 36 Current Value of the Output Power SD-POUT
Status Byte 37
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current value of the Output Power.
The maximum Output Power of the DPS X000 corresponds to a distributed value of 58560_{dec}.
If the distributed binary value shall be converted into the decimal Output Power, then the binary value has to be to converted into a decimal and multiplied with a factor.

$Output\ Power_{dec} = Distributed\ value_{dec} * factor$

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.0170765
DPS 2000-050	0.0341530
DPS 3000-050	0.0512295
DPS 1000-070	0.0170765
DPS 2000-070	0.0341530
DPS 3000-070	0.0512295
DPS 1000-100	0.0170765
DPS 2000-100	0.0341530
DPS 3000-100	0.0512295

RS 232 Port



Status Byte 38 **Current Current Set Point at the Analog Input**
Status Byte 39 **SD-CSPA**

16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current Current Set Point at the Analog Input. The maximum possible Current Set Point (10 V) at the Analog Input corresponds to a distributed value of 58304_{dec}.
If the distributed binary value shall be converted into the decimal Current Set Point, then the binary value has to be converted into decimal and multiplied with a factor.

$Current\ Set\ Point_{dec} = Distributed\ value_{dec} * Factor$

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.000857575
DPS 2000-050	0.000857575
DPS 3000-050	0.000857575
DPS 1000-070	0.001200604
DPS 2000-070	0.001200604
DPS 3000-070	0.001200604
DPS 1000-100	0.001715149
DPS 2000-100	0.001715149
DPS 3000-100	0.001715149

Status Byte 40 **Current Value of the Mains Current SD-MC**
Status Byte 41

16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current value of the Mains Current. A Mains Current of 10 A corresponds to a distributed value of 12608_{dec}.
If the distributed binary value shall be converted into the decimal value of the Mains Current, then the binary value has to be converted into decimal and multiplied with the factor 0.0007938.

$Mains\ Current_{dec} = Distributed\ value_{dec} * 0.0007938$

Status Byte 42 **Current Value of the Mains Voltage SD-MV**
Status Byte 43

16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current value of the Mains Voltage. A Mains Voltage of 230 V corresponds to a distributed value of 38592_{dec}.
If the distributed binary value shall be converted into the decimal value of the Mains Voltage, then the binary value has to be converted into decimal and multiplied with the factor 0.0059598.

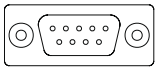
$Mains\ Voltage_{dec} = Distributed\ value_{dec} * 0.0059598$

Status Byte 44 **Current Value of the PFC Voltage SD-VPFC**
Status Byte 45

16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current value of the PFC Voltage. A PFC Voltage of 400 V corresponds to a distributed value of 51328_{dec}.
If the distributed binary value shall be converted into the decimal value of the PFC Voltage, then the binary value has to be converted into decimal and multiplied with the factor 0.007793.

$PFC\text{-}Spannung_{dec} = Distributed\ value_{dec} * 0.007793$

RS 232 Port



Status Byte 46 Current Temperature of the DPS X000 SD-TMP
Status Byte 47
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the current Temperature of the DPS X000. The coherence between the Temperature and the distributed value is non-linear.
If the distributed binary value shall be converted into the decimal value of the Temperature, then the binary value has to be converted into decimal and multiplied with a factor.

Temperature $°C_{dec}$ = Distributed $value_{dec}$ x factor

Temperature in $°C_{dec}$	**Distributed $Value_{dec}$**	**Factor**
0	11776	0
10	12544	0.0007972
25	14656	0.0017058
40	18880	0.0021186
45	20416	0.0022042
50	22784	0.0021945
55	25344	0.0021701
60	27904	0.0021502
65	31360	0.0020727
70	38272	0.0018290
75	42496	0.0017649

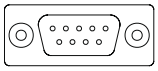
Status Byte 48 Device Type SD-TYPE
8 bit word, binary output, shows the Device Type.

Output	**Device type**
0000 0001	DPS 1000 - 050
0000 0010	DPS 2000 - 050
0000 0011	DPS 3000 - 050
0000 0100	DPS 1000 - 070
0000 0101	DPS 2000 - 070
0000 0110	DPS 3000 - 070
0000 0111	DPS 1000 - 100
0000 1000	DPS 2000 - 100
0000 1001	DPS 3000 - 100

Status Byte 49 Serial Number SD-SN
Status Byte 50
16 bit value, binary output, shows the Serial Number.

Status Byte 51 Counter for Occurred Current Limit Reached Faults
8 bit value, binary output, shows the occured number of Current Limit Reached Faults.
Maximum documentable number of occurred faults: 255

RS 232 Port



Status Byte 52 Counter for Occurred System Faults
8 bit value, binary output, shows the number of occurred System Faults.
Maximum documentable number of occurred faults: 255

Status Byte 53 Counter for Transgression of the Voltage Supervision Value
8 bit value, binary output, shows the number of transgressions of the Voltage Supervision Value.
Maximum documentable number of occurred faults: 255

Status Byte 54 Counter for Occurred PFC Voltage Faults
8 bit value, binary output, shows the number of occurred PFC Voltage Faults.
Maximum documentable number of occurred faults: 255

Status Byte 55 Counter for Occurred Mains Voltage Faults
8 bit value, binary output, shows the number of occurred Mains Voltage Faults.
Maximum documentable number of occurred faults: 255

Status Byte 56 Counter for Occurred Current Faults
8 bit value, binary output, shows the number of occurred Output Current Faults.
Maximum documentable number of occurred faults: 255

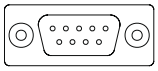
Status Byte 57 Counter for Temperature Sensor Faults
8 bit value, binary output, shows the number of Temperature Sensor Faults.
Maximum documentable number of occurred faults: 255

Status Byte 58 Counter for Exceeding the Power Limit
8 bit value, binary output, shows the number of transgressions of the Power Limit.
Maximum documentable number of occurred faults: 255

Status Byte 59 Flag for Last Occured Fault
8 bit value, binary output, shows the last occured fault.

Binary	Decimal	Fault Type
0000 0001	1	Voltage Supervision Value exceeded
0000 0010	2	Minimum required Output Voltage is fallen below
0000 0011	3	Maximum permitted Mains Voltage exceeded
0000 0100	4	Minimum required Mains Voltage is fallen below
0000 0101	5	Minimum required PFC Voltage is fallen below
0000 0110	6	Maximum permitted PFC Voltage exceeded
0000 0111	7	Time out PFC Voltage
0000 1000	8	PFC Voltage is lower than the peak value of the Mains Voltage
0000 1001	9	Internal Supply Voltage faulty
0000 1010	10	Maximum permitted Mains Current exceeded
0000 1011	11	Current Limit reached
0000 1100	12	Power Limit reached
0000 1101	13	Hardware Fault
0000 1110	14	not used
0000 1111	15	Fault in the EEprom

RS 232 Port



Binary	Decimal	Fault type
0001 0000	16	not used
0001 0001	17	RS 232 Frame Fault
0001 0010	18	RS 232 Time Out
0001 0011	19	RS 232 Illegal character
0001 0100	20	Temperature Limit reached
0001 0101	21	Temperature sensor faulty

Status Byte 60 Temperature Warning Limit
8 bit value, binary output, shows the value of the programmed Temperature Warning Limit.
Ex-works setting: 55 °C.
Statusbyte 31, bit 7 will be set to 1 if the Temperature Warning Limit is reached.
80 °C correspond to a distributed value of 255.

Status Byte 61 Operating Time SD-WH
Status Byte 62
Status Byte 63
Status Byte 64
8 bit value, binary output, shows the number of operating minutes.
To convert the distributed binary values into a decimal value for operating minutes the following equation has to be used:

Operating time in minutes = $SB61_{dec} * 256^3 + SB62_{dec} * 256^2 + SB63_{dec} * 256 + SB64_{dec}$

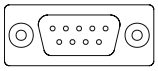
Status Byte 65 Counter for Occured Mains Current Faults
8 bit value, binary output, shows the number of occured Mains Current Faults.
Maximum documentable number of occurred faults: 255

Status Byte 66 Setting of the Baud Rate
8 bit value, binary output, shows the setting of the Baud Rate for the RS 232 Port.

Binary Value	Decimal	Baud Rate
0000 0001	1	1200
0000 0010	2	2400
0000 0011	3	4800
0000 0100	4	9600
0000 0101	5	19200
0000 0110	6	38400
0000 0111	7	57600
0000 1000	8	115200

Status Byte 67 Version Number of the Internal Control Program
Status Byte 68
Shows the Version Number of the internal control program.
The two Status Bytes are divided into two half bytes. Each representing one BCD-coded number.
The Version Number consists of:
Upper half byte of Status Byte 67, lower half byte of Status Byte 67, upper half byte of Status Byte 68, lower half byte of Status Byte 68.

RS 232 Port



Example for an output with the Version Number 01.45:

Status Byte 67	Status Byte 68
0000 0001	0100 0101
0 1	4 5

Status Byte 69 Minimum Required Mains Current
8 bit value, binary output, shows the ex-works set limit for the minimum required Mains Power. 51.929 A correspond to a distributed value of 255_{dec}. 1 digit corresponds to 0.2036 A.
If the distributed binary value shall be converted into the decimal value for the Mains Current, then the binary value has to be converted into decimal and multiplied with the factor 0.2036442.

Minimum required Mains $Voltage_{dec}$ = Distributed $value_{dec}$ * 0.2036442

Status Byte 70 Not Used
8 bit value, binary output, shows zero.

Status Byte 71 Maximum Permitted Output Power
8 bit value, binary output, shows the ex-works set limit for the maximum permitted Output Power. The maximum permitted Output Power corresponds to a distributed value of 227_{dec}.
If the distributed binary value shall be converted into the decimal value for the maximum permitted Output Power, then the binary value has to be converted into decimal and multiplied with a factor.

Maximum permitted Output $Power_{dec}$ = Distributed $value_{dec}$ * factor

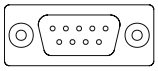
The factor depends on the Device Type.

Device	Factor
DPS 1000-050	4.4052863
DPS 1000-070	4.4052863
DPS 1000-100	4.4052863
DPS 2000-050	8.8105726
DPS 2000-070	8.8105726
DPS 2000-100	8.8105726
DPS 3000-050	13.215859
DPS 3000-070	13.215859
DPS 3000-100	13.215859

Status Byte 72 Maximum Permitted Mains Current
8 bit value, binary output, shows the ex-works set limit for the maximum permitted Mains Current. 51.929 A correspond to a distributed value of 255_{dec}. 1 digit corresponds to 0.2036 A.
If the distributed binary value shall be converted into the decimal Mains Current, then the binary value has to be converted into decimal and multiplied with the factor 0.2036442.

Maximum permitted Mains $Current_{dec}$ = Distributed $value_{dec}$ * 0.2036442

RS 232 Port



Status Byte 73 Maximum Possible Current Set Point Stand By 12 Bit
Status Byte 74
16 bit value (resolution 12 bit), binary output, left justified in the 16 bit word, shows the ex-works set limit for the maximum possible Current Set Point Stand By 12 Bit.
The ex-works setting corresponds to the maximum possible Output Current of the Device Type.
The maximum possible Current Set Point Stand By 12 Bit corresponds to the distributed value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Set Point Stand By, then the binary value has to be converted into decimal and multiplied with a factor.

Current Set Point Stand By_{dec} = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

Status Byte 75 Minimum Required Output Voltage
8 bit value, binary output, shows the ex-works set limit for the minimum required Output Voltage (as a rule 0 V).
64.15 V correspond to a distributed value of 255_{dec}. 1 digit corresponds to 0.2515723 V.
If the distributed binary value shall be converted into the decimal value for the Output Voltage, then the binary value has to be converted into decimal and multiplied with the factor 0.2515723.

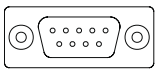
Minimum required Output $Voltage_{dec}$ = Distributed $value_{dec}$ * 0.2515723

Status Byte 76 Maximum Possible Voltage Supervision Value
Status Byte 77
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the ex-works set limit of 60 V for the maximum possible Voltage Supervision Value.
The maximum possible Voltage Supervision Value of 60 V corresponds to a distributed value of 61312_{dec}.
If the distributed binary value shall be converted into the decimal Voltage Supervision Current, then the binary value has to be converted into decimal and multiplied with the factor 0.0009786.

Voltage Supervision $Value_{dec}$ = Distributed $value_{dec}$ * 0.0009786

Example:
Distributed Value = 1110111110000000 (61312)
Voltage Supervision $Value_{dec}$ = 61312 * 0.0009786 (60 V)

RS 232 Port



Status Byte 78 Minimum Required Mains Voltage
8 bit value, binary output, shows the ex-works set limit of 87 V for the minimum required Mains Voltage.
389.9 V correspond to a distributed value of 255_{dec}. 1 digit corresponds to 1.529 V.
If the distributed binary value shall be converted into the decimal Mains Voltage, then the binary value has to be converted into decimal and multiplied with the factor 1.529.

Minimum required Mains $Voltage_{dec}$ = Distributed $value_{dec}$ * 1.529

Status Byte 79 Maximum Permitted Mains Voltage
8 bit value, binary output, shows the ex-works set limit of 276 V for the maximum permitted Mains Voltage.
389.9 V correspond to a distributed value of 255_{dec}. 1 digit corresponds to 1.529 V.
If the distributed binary value shall be converted into the decimal Mains Voltage, then the binary value has to be converted into decimal and multiplied with the factor 1.529.

Maximum permitted Mains $Voltage_{dec}$ = Distributed $value_{dec}$ * 1.529

Status Byte 80 Counter for Hardware Faults in the Power Modules
8 bit value, binary output, shows the number of occured Hardware Faults in the Power Modules.
Maximum documentable number of occurred faults: 255

Status Byte 81 Counter for Transgression of the Temperature Limit
8 bit value, binary output, shows the number of transgressions of the Temperature Limit.
Maximum documentable number of occurred faults: 255

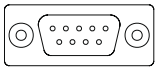
Status Byte 82 Maximum Possible Current Limit 12 Bit
Status Byte 83
16 bit value (resolution 12 bit), binary output, left justified in the 16 bit word, shows the ex-works set limit for the maximum possible Current Limit 12 Bit.
The ex-works setting corresponds to the maximum possible Output Current of the Device Type.
The maximum possible Current Limit corresponds to a distributed value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Limit, then the binary value has to be converted into decimal and multiplied with a factor.

Current $Limit_{dec}$ = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

RS 232 Port



Status Byte 84 Minimum Required PFC Voltage
8 bit value, binary output, shows the ex-works set limit for the minimum required PFC Voltage.
510 V correspond to a distributed value of 255_{dec}.
If the distributed binary value shall be converted into the decimal PFC Voltage Value, then the binary value has to be converted into decimal and multiplied with the factor 2.

PFC Voltage $value_{dec}$ = Distributed $value_{dec}$ * 2

Status Byte 85 Maximum Permitted PFC Voltage
8 bit value, binary output, shows the ex-works set limit for the maximum permitted PFC Voltage.
510 V correspond to a distributed value of 255_{dec}.
If the distributed binary value shall be converted into the decimal PFC Voltage Value, then the binary value has to be converted into decimal and multiplied with the factor 2.

PFC Voltage $value_{dec}$ = Distributed $value_{dec}$ * 2

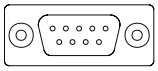
Status Byte 86 Temperature Limit
8 bit value, binary output, shows the ex-works set limit for the maximum permitted Temperature of the DPS X000.
The coherence of the Temperature and the distributed value is non linear.
If the distributed binary value shall be converted into the decimal Temperature Limit, then the binary value has to be converted into decimal and multiplied with a factor.

Temperature Limit $°C_{dec}$ = Distributed $value_{dec}$ * factor

Temperature in $°C_{dec}$	**Distributed $Value_{dec}$**	**Factor**
0	46	0
10	49	0.204082
25	57	0.438596
40	73	0.547945
45	79	0.569620
50	89	0.561798
55	99	0.555556
60	109	0.550459
65	122	0.532787
70	149	0.469799
75	166	0.451807

Status Byte 87 End of the Data Set
Status Byte 88
Twice a stop byte is sent at the end of the sequence.
The value is hex 0B.

RS 232 Port



Received Control Data and their Meaning
The DPS X000 is controlled with a data set of 17 consecutive bytes. The data set consists of:

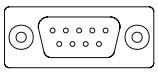
Data set beginning	2 bytes
Control informations	13 bytes
Data set end	2 bytes

Control Byte 1 Beginning of the Data Set
Control Byte 2
To open the sequence twice a start byte is expected.
The value is hex 0A.

Control Byte 3 Commands
8 bit word, obeys commands.

Binary	Decimal	Command
00000000	0	**Disconnection** DPS X000 is switched off. No Output Current flows.
00000100	4	**CD-ON** Control Digital - On **Operation with Current Set Point Analog and Current Set Point 12 Bit** DPS X000 is switched on, Output Current flows. The height of the Output Current is determined by the sum of the Current Set Point (CA-CSPA) at the Analog Input and the Current Set Point 12 Bit (CD-CSPD) of the Control Bytes 8 and 9. The Current Limit (CD-CLD) is determined by the Control Bytes 10 and 11. The Voltage Supervision Value (CD-VLD) is determined by the Control Bytes 14 and 15.
00000010	2	**CD-CSPDD** Control Digital - Current Set Point Digital Disable **Operation with Current Set Point Analog** The Current Set Point 12 Bit (CD-CSPD) of the Control Bytes 8 and 9 will be deactivated. The level of the Output Current is determined by the Current Set Point (CA-CSPA) at the Analog Input.
00001000	8	**CD-CSPSDE** Control digital - Current Set Point Stand By Digital Enable **Operation with Current Set Point Analog and Current Set Point Stand By 12 Bit** The Current Set Point Stand By 12 Bit (CD-CSPSD) of the Control Bytes 12 and 13 will be activated. The level of the Output Current is determined by the sum of the Current Set Point (CA-CSPA) at the Analog Input and the Current Set Point Stand By 12 Bit (CD-CSPSD) of the Control Bytes 12 and 13.

RS 232 Port



Control Byte 3 **Commands** (continuation)

Binary	Decimal	Command
00010000	16	**CD-SPP** Control Digital - Save Parallel Port **Storing of parameters for the operation at the Parallel Port** The DPS X000 is turned off. No Output Current flows. The Current Set Point Stand By 12 Bit (CD-CSPSD) of the Control Bytes 12 and 13 is stored nonvolatilely in the DPS X000 (CF-CSPSD). The Voltage Supervision Value (CD-VLD) of the Control Bytes 14 and 15 is stored nonvolatilely in the DPS X000 (CF-VLD).
01010001	81	**CD-SCP** Control Digital - Save Control Port **Saving of parameters for the operation at the Control Port** The DPS X000 is turned off. No Output Current flows. The Current Set Point 12 Bit (CD-CSPD) of the Control Bytes 8 and 9 is stored nonvolatilely in the DPS X000 (CF-CSPD). The Current Limit 12 Bit (CD-CLD) of the Control Bytes 10 and 11 is stored nonvolatilely in the DPS X000 (CF-CLD). The Voltage Supervision Value (CD-VLD) of the Control Bytes 14 and 15 is stored nonvolatilely in the DPS X000 (CF-VLD).

Control Byte 4 **Configuration Register**
8 bit word, binary input.
Must have the value zero.

Control Byte 5 **Operation Mode**
8 bit word, binary input.
Must have the value 66_{dec} (ASCII 'B ' for Operation Mode).

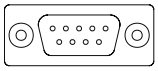
Control Byte 6 **Time till Time Out at the RS 232 Port CD-TOUT**
Control Byte 7 Control Digital - Time Out
16 bit value, binary input.
Defines the time which may maximal pass between the byte sequences without triggering a Time Out Fault.
The possible range of values from 0 to 65535_{dec} corresponds to a Time Out time from 0 to 655350 ms.

Control Byte 8 **Current Set Point 12 Bit CD-CSPD**
Control Byte 9 Control Digital - Current Set Point Digital
16 bit value (resolution 12 bit), binary input, left justified in the 16 bit word.
Sets the Current Set Point.
After executing Control Byte 3 (Bit 2 = 1 and Bit 3 = 0) the appropriate Output Current flows.
If a Current Set Point (CA-CSPA) is preset at one of the Analog Inputs, then this value will be added to the Output Current.

The Maximum Current of the DPS X000 corresponds to a value of 65520_{dec}.
If a decimal Current Set Point shall be converted into a binary value to put in, then the decimal Current Set Point has to be multiplied with a factor.

Current Set $Point_{bin}$ to put in = Current Set $Point_{dec}$ * factor

RS 232 Port



The factor depends on the Device Type.

Device	Factor
DPS 1000-050	1310.4
DPS 2000-050	1310.4
DPS 3000-050	1310.4
DPS 1000-070	936
DPS 2000-070	936
DPS 3000-070	936
DPS 1000-100	655.2
DPS 2000-100	655.2
DPS 3000-100	655.2

Example for a Current Set Point of 60 A to put it and the Device Type DPS 2000-070:
Current Set $Point_{bin}$ to put in = Current Set $Point_{dec}$ * factor
Current Set $Point_{bin}$ to put in = 60_{dec} * 936
Current Set $Point_{bin}$ to put in = 56160_{dec} = 11011011 01100000_{bin}

Control Byte 10 **Current Limit 12 Bit CD-CLD**
Control Byte 11 Control Digital - Current Limit Digital
16 bit value (resolution 12 bit), binary input, left justified in the 16 bit word.
Sets the Current Limit, the Output Current is limited to the set value.

The maximum Current Limit of the DPS X000 corresponds to a value of 65520_{dec}.
If a decimal Current Limit shall be converted into a binary value to put in, then the decimal Current Limit has to be multiplied with a factor.

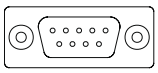
Current $Limit_{dec}$ to put in = Current $Limit_{dec}$ * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	1310.4
DPS 2000-050	1310.4
DPS 3000-050	1310.4
DPS 1000-070	936
DPS 2000-070	936
DPS 3000-070	936
DPS 1000-100	655.2
DPS 2000-100	655.2
DPS 3000-100	655.2

Example for a Current Limit of 60 A to put in and the Device Type DPS 2000-070:
Current $Limit_{bin}$ to put in = Current $Limit_{dec}$ * factor
Current $Limit_{bin}$ to put in = 60_{dec} * 936
Current $Limit_{bin}$ to put in = 56160_{dec} = 11011011 01100000_{bin}

RS 232 Port



Control Byte 12 **Current Set Point Stand By 12 Bit CD-CSPSD**
Control Byte 13 Control Digital - Current Set Point Stand By Digital
16 bit value (resolution 12 bit), binary input, left justified in the 16 bit word.
Sets the Current Set Point Stand By.
After executing Control Byte 3 (Bit 2 = 1 and Bit 3 = 1) the appropriate Output Current Stand By flows.
If a Current Set Point (CA-CSPA) is preset at one of the Analog Inputs, then this value will be added to the Output Current.
The maximum Current Set Point Stand By 12 Bit of the DPS X000 corresponds to a value of 65520_{dec}.
If a decimal Current Set Point Stand By shall be converted into a binary value to put in, then the decimal Current Set Point Stand By has to be multiplied with a factor.

Current Set Point Stand By_{bin} to put in = Current Set Point Stand By_{dec} * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	1310.4
DPS 2000-050	1310.4
DPS 3000-050	1310.4
DPS 1000-070	936
DPS 2000-070	936
DPS 3000-070	936
DPS 1000-100	655.2
DPS 2000-100	655.2
DPS 3000-100	655.2

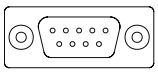
Control Byte 14 **Voltage Supervision Value 10 Bit CD-VLD**
Control Byte 15 Control Digital - Voltage Limit Digital
16 bit value (resolution 10 bit), binary input, left justified in the 16 bit word.
Sets the Voltage Supervision Value.
If the output voltage of the DPS X000 exceeds the set value, then the Status Byte 4, bit 4 (SD-VFAIL) will be set.
Problems at the leads to the laser diodes, such as bad contact, loose screw connections or an interruption within the stack of diodes can this way be detected.
The Voltage Supervision Value doesn't influence the Output Voltage of the DPS X000.

The maximum Voltage Supervision Value of the DPS X000 of 60 V corresponds to a value of 61312_{dec}.
If a decimal Voltage Supervision Value shall be converted into a binary value to put in, then the decimal Voltage Supervision Voltage has to be multiplied with the factor 1021.87.

Voltage Supervision $Value_{bin}$ to put in = Voltage Supervision $Value_{dec}$ * 1021.87

Control Byte 16 **End of the Data Set**
Control Byte 17
A stop byte is twice sent at the end of the sequence.
The value is hex 0B.

CAN Port



Interface Description

Data transfer rate	1 MBit/sec
Maximum bus line length	40 metres
Bus coupling	9-pole pin plug connector according to DIN 41652 and MIL-C-24308 with screw locking UNC 4-40
Connection cable	Conduction with a characteristic impedance of 120 Ω according to ISO 11898
Bus terminating resistors	have to be assigned in the CAN network
Assignment of the pin plug connector	according to CiA DS-102, version 2.0
	Pin 2 CANL
	Pin 7 CANH
	Pin 3, 6 GND
	Pin 1, 4, 5, 8, 9 not used

Data Protocol

The processing of the data follows the CAN 2.0B protocol. Extended Identifiers with 29 bits per message are used.
The filtration is made according to the Full-CAN principle. In this case the validity of a message will already be examined in the CAN controller by masks and filters.

The Identifier contains 29 bits (binary) and is divided up into three elements.

Group code DPS X000	5 bit	Identifier Bit 28 - 24
Serial Number	16 bit	Identifier Bit 23 - 8
Type of the message	8 bit	Identifier Bit 7 - 0

The bits 28 -18 are Identifier, the bits 17 to 0 are Extended Identifier Bits.

The Identifier Bit 28 is the highest-order bit, the Identifier Bit 0 the lowest-order bit.

The group code is a binary number remaining the same for all devices of the DPS X000 family: 11101

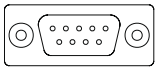
The identification of the DPS X000 is made by Serial Number.
The Serial Number is right justified in the Identifier as 16 bit binary value.
The Identifier Bit 23 is the highest-order bit, the Identifier Bit 8 the lowest-order bit of the Serial Number.

Example: The Serial Number 42 (decimal) appears in the Identifier Bits 23 - 8 as 00000000 00101010

The ‘Type of the Message’ serves to distinguish the different CAN messages.

The CAN messages will be distinguished between reception and sending. The definitions reception and sending have to be seen from the view of the DPS X000.

CAN Port



Reception

Control Data
Status Request
Global Request

Control Data for example the setting of the Current Set Point, will be sent to the DPS X000 in form of two control messages with 13 Bytes.

The data of the DPS X000, such as the current temperature, aren't distributed cyclically by the DPS X000 but sent on request. For the request a Status or Global Request has to be sent to the DPS X000.

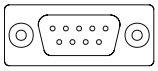
Sending

Status Data
Global Data
Faults

In the Status Sending the DPS X000 distributes the most important operating parameters and error messages with 6 CAN messages.
Less important values, like error counters, configuration data and limit values, are summarized in the 5 messages of the Global Sending.

If a fault occurs, then the device sends all error messages summarized in a message with 6 bytes. The 5 bytes signalizing Power Supply faults are also included in the Status Data. The sixth byte shows CAN communication faults.

CAN Port



Received messages
Three kinds of received messages are distinguished:

Control Data
Status Request
Global Request

2 CAN messages for the Control Data and one CAN message for each of the Status and the Global Request are necessary for the transmission.

Control Data
The control of the DPS X000 is made by 13 bytes in two CAN messages.

Message 1 with Control Bytes 1 to 8:

8 bytes with Identifier	ID 28 - ID 24	11101_{bin}
	ID 23 - ID 8	Serial Number
	ID 7 - ID 0	00_{hex}

Message 2 with Control Bytes 9 to 13:

5 bytes with Identifier	ID 28 - ID 24	11101_{bin}
	ID 23 - ID 8	Serial Number
	ID 7 - ID 0	01_{hex}

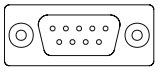
After receiving the Control Data the DPS X000 distributes the Status and Global Data once without previous request.

The Control Data have to be sent subsequently to the Identifier in the following order:

Message 1
Control Byte 1 **Commands**
8 bit word, binary input
Executes commands.

Binary	Decimal	Command
00000000	0	**Disconnection** The DPS X000 is switched off. No Output Current flows.
00000100	4	**CD-ON** Control Digital - On **Operation with Current Set Point Analog and Current Set Point 12 Bit** The DPS X000 is switched on, Output Current flows. The level of the Output Current is determined by the sum of the Current Set Point (CA-CSPA) at the Analog Input and the Current Set Point 12 Bit (CD-CSPD) of the Control Bytes 6 and 7. The Current Limit (CD-CLD) is determined by the Control Bytes 8 and 9. The Voltage Supervision Value (CD-VLD) is determined by the Control Bytes 12 and 13.

CAN Port

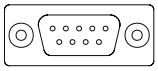


Binary	Decimal	Command
00000010	2	**CD-CSPDD** Control Digital - Current Set Point Digital Disable **Operation with Current Set Point Analog** The Current Set Point 12 Bit (CD-CSPD) of the Control Bytes 6 and 7 is deactivated. The level of the Output Current is determined by the Current Set Point (CA-CSPA) at the Analog Input.
00001000	8	**CD-CSPSDE** Control Digital - Current Set Point Stand By Digital Enable **Operation with Current Set Point Analog and Current Set Point Stand By 12 Bit** The Current Set Point Stand By 12 Bit (CD-CSPSD) of the Control Bytes 10 and 11 is activated. The level of the Output Current is determined by the sum of the Current Set Point (CA-CSPA) at the Analog Input and the Current Set Point Stand By 12 Bit (CD-CSPSD) of the Control Bytes 10 and 11.
00010000	16	**CD-SPP** Control Digital - Save Parallel Port **Saving of parameters for the operation at the Parallel Port** The DPS X000 is turned off. No Output Current flows. The Current Set Point Stand By 12 Bit (CD-CSPSD) of the Control Bytes 10 and 11 is stored nonvolatilely in the DPS X000 (CF-CSPSD). The Voltage Supervision Value (CD-VLD) of the Control Bytes 12 and 13 is stored nonvolatilely in the DPS X000 (CF-VLD).
01010001	81	**CD-SCP** Control Digital - Save Control Port **Storing of parameters for the operation at the Control Port** The DPS X000 is turned off. No Output Current flows. The Current Set Point 12 Bit (CD-CSPD) of the Control Bytes 6 and 7 is saved nonvolatilely in the DPS X000 (CF-CSPD). The Current Limit 12 Bit (CD-CLD) of the Control Bytes 8 and 9 is stored nonvolatilely in the DPS X000 (CF-CLD). The Voltage Supervision Value (CD-VLD) of the Control Bytes 12 and 13 is stored nonvolatilely in the DPS X000 (CF-VLD).

Control Byte 2 **Configuration Register**
8 bit word, binary input.
Must have the value zero.

Control Byte 3 **Operation Mode**
8 bit word, binary input.
Must have the value 66_{dec} (ASCII ‘B ‘ for operation mode).

CAN Port



Control Bytes 4 and 5 Time till Time Out at the RS 232 Port CD-TOUT
Control Digital - Time Out
16 bit value, binary input.
Defines the time which may maximal pass between the byte sequences without triggering a Time Out Fault.
The possible range of values from 0 to 65535 corresponds to a Time Out time from 0 to 655350 ms.

Control Bytes 6 and 7 Current Set Point 12 Bit CD-CSPD
Control Digital - Current Set Point Digital
Control Byte 6 is Highbyte, Control Byte 7 is Lowbyte
16 bit value (resolution 12 bit), binary input, 12 bits left justified in the 16 bit word.
Sets the Current Set Point.
After executing Control Byte 1 (Bit 2 = 1 and Bit 3 = 0) the appropriate Output Current flows.
If a Current Set Point (CA-CSPA) is preset at one of the Analog Inputs, then this value will be added to the Output Current.

The maximum current of the DPS X000 corresponds to a value of 65520_{dec}.
If a decimal Current Set Point shall be converted into a binary value to be put in, then the decimal Current Set Point has to be multiplied with a factor.

$\text{Current Set Point}_{bin}$ to put in = $\text{Current Set Point}_{dec} * \text{factor}$

The factor depends on the Device Type.

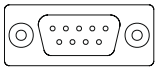
Device	Factor
DPS 1000-050	1310.4
DPS 2000-050	1310.4
DPS 3000-050	1310.4
DPS 1000-070	936
DPS 2000-070	936
DPS 3000-070	936
DPS 1000-100	655.2
DPS 2000-100	655.2
DPS 3000-100	655.2

Example for a Current Set Point of 60 A to be put in and the Device Type DPS 2000-070:
$\text{Current Set Point}_{bin}$ to put in = $\text{Current Set Point}_{dec}$ * factor
$\text{Current Set Point}_{bin}$ to put in = 60_{dec} * 936
$\text{Current Set Point}_{bin}$ to put in = $56160_{dec} = 11011011\ 01100000_{bin}$

Control Bytes 8 and 9 **Current Limit 12 Bit CD-CLD**
Control Digital - Current Limit Digital
Control Byte 8 is Highbyte, Control Byte 9 is Lowbyte
16 bit value (resolution 12 bit), binary input, 12 bits left justified in the 16 bit word.
The maximum Current Limit of the DPS X000 corresponds to a value of 65520_{dec}.
If a decimal Current Limit shall be converted into a binary value to be put in, then the decimal Current Limit has to be multiplied with a factor.

$\text{Current Limit}_{bin}$ to put in = $\text{Current Limit}_{dec} * \text{factor}$

CAN Port



The factor depends on the Device Type.

Device	Factor
DPS 1000-050	1310.4
DPS 2000-050	1310.4
DPS 3000-050	1310.4
DPS 1000-070	936
DPS 2000-070	936
DPS 3000-070	936
DPS 1000-100	655.2
DPS 2000-100	655.2
DPS 3000-100	655.2

Example for a Current Limit of 60 A to be put in and the Device Type DPS 2000-070:
Current $Limit_{bin}$ to put in = Current $Limit_{dec}$ * factor
Current $Limit_{bin}$ to put in = 60_{dec} * 936
Current $Limit_{bin}$ to put in = 56160_{dec} = 11011011 01100000_{bin}

The Control Bytes 8 and 9 are a connected value.
The Control Byte 8 is sent with message 1, the Control Byte 9, however, with message 2.

Message 2
Control Bytes 8 and **9** **Current Limit 12 Bit CD-CLD**
Description see message 1, Current Limit 12 Bit (CD-CLD)

Control Bytes 10, 11 **Current Set Point Stand By 12 Bit CD-CSPSD**
Control Digital - Current Set Point Stand By Digital
Control Byte 10 is Highbyte, Control Byte 11 is Lowbyte
16 bit value (resolution 12 bit), binary input, 12 bits left justified in the 16 bit word.
Sets the Current Set Point Stand By.
After executing Control Byte 1 (Bit 2 = 1 and Bit 3 = 1) the corresponding Output Current Stand By flows. If a Current Set Point (CA-CSPA) is preset at one of the Analog Inputs, then this value will be added to the Output Current.

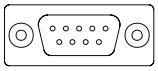
The maximum Current Set Point Stand By of the DPS X000 corresponds to a value of 65520_{dec}.
If a decimal Current Set Point Stand By shall be converted into a binary value to be put in, then the decimal Current Set Point Stand By has to be multiplied with a factor.

Current Set Point Stand By_{bin} to put in = Current Set Point Stand By_{dec} * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	1310.4
DPS 2000-050	1310.4
DPS 3000-050	1310.4
DPS 1000-070	936
DPS 2000-070	936
DPS 3000-070	936
DPS 1000-100	655.2
DPS 2000-100	655.2
DPS 3000-100	655.2

CAN Port



Control Bytes 12, 13 **Voltage Supervision Value 10 Bit CD-VLD**
Control Digital - Voltage Limit Digital

Control Byte 12 is Highbyte, Control Byte 13 is Lowbyte
16 bit value (resolution 10 bit), binary input, 10 bits left justified in the 16 bit word.
Sets the Voltage Supervision Value.
If the Output Voltage of the DPS X000 exceeds the set value, then the Status Byte 2, bit 4 (SD-VFAIL) will be set.
Problems at the leads to the laser diodes, such as bad contact, loose screw connections or an interruption within the stack of diodes can this way be detected this way.
The Voltage Supervision Value doesn't influence the Output Voltage of the DPS X000.

The maximum Voltage Supervision Value of the DPS X000 of 60 V corresponds to a value of 62208_{dec}.
If a decimal Voltage Supervision Value shall be converted into a binary value to be put in, then the decimal Voltage Supervision Voltage has to be multiplied with the factor 1036.8.

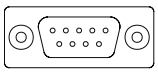
Voltage Supervision $Value_{bin}$ to put in = Voltage Supervision $Value_{dec}$ * 1036.8

Status Request
The distribution of the DPS X000 Status Data is triggered with the following CAN message. The message includes no data.

Message for Status Request:

0 bytes with Identifier	ID 28 - ID 24	11101_{bin}
	ID 23 - ID 8	Serial Number
	ID 7 - ID 0	02_{hex}

CAN Port



Global Request
The distribution of the DPS X000 Global Data is triggered by the following CAN message. The message doesn't include data.

Message for Global Request:

0 bytes with Identifier	ID 28 - ID 24	11101_{bin}
	ID 23 - ID 8	Serial Number
	ID 7 - ID 0	03_{hex}

Sending
It will be distinguished between three types of messages.

Status Data
Global Data
Faults

6 CAN messages for Status Data, 5 CAN messages for Global Data und 1 CAN message for Faults and Warnings are required.

A large part of the sent Status and Global Data is insignificant for the practical operation and can be ignored regarding evaluation.

A listing and description of the most important Status and Global Data for the practical mode is found on the following pages. After these the complete listing of all data is found.

Important Status and Global Data

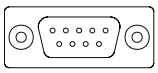
Power Supply is Ready SD-PSR
Status Digital - Power Supply Ready
Status Byte 29, bit 3
The DPS X000 is ready. No faults are notified.

Power Supply is Switched On SD-PSON
Status Digital - Power Supply On
Status Byte 29, bit 4
The DPS X000 is switched on. Output Current flows.

Power Limit Reached SD-PL
Status Digital - Power Limit
Status Byte 1, bit 2
The maximum permitted Output Power of the DPS X000 is reached.
If this state lasts for more than one second the DPS X000 will switch off and restart again.
After 1 second it is disconnected and subsequently restarted automatically.

Current Limit Reached SD-CL
Status Digital - Current Limit
Status Byte 1, bit 4
The Output Current has reached the Current Limit (CD-CL) set with the Control Bytes 10 and 11.
No disconnection.

CAN Port



Current Fault SD-CFAIL
Status Digital - Current Fail
Status Byte 1, bit 3
The Output Current differs more than 0.5 % from the Current Set Point.
Disconnection and a following restart after 100 ms.

Voltage Supervision Voltage Exceeded SD-VFAIL
Status Digital - Voltage Fail
Status Byte 2, bit 4
The Output Voltage has exceeded the Voltage Supervision Value (CD-VL) set with the Control Bytes 14 and 15.
No disconnection.
Problems at the leads to the laser diodes, such as bad contact, loose screw connections or an interruption within the stack of diodes can this way be detected.
The SD-VFAIL signal at the Control Port can be used, if a very fast and contemporary detection is necessary. Its response time is less than 1 µs.

Temperature Limit Reached SD-TL
Status Digital - Temperature Limit
Status Byte 2, bit 6
The temperature of the DPS X000 has reached the permitted limit.
Disconnection and a restart after cooling.

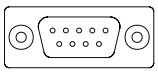
Temperature Warning Limit reached SD-TW
Status Digital - Temperature Warning
Status Byte 29, bit 7
The temperature of the DPS X000 has reached the specified Warning Limit.
The signal helps activating for example an additional external air or water cooler.

Hardware Fault SD-HFAIL
Status Digital - Hardware Fail
Status Byte 2, bit 7
Fault in the power module. The DPS X000 switches off and tries a restart.
After trying 5 times in vain the DPS X000 switches off lastingly. To start it again it has to be disconnected from the mains supply and connected again.

System Fault SD-SFAIL
Status Digital - System Fail
Status Byte 2, bit 0
Fault in the microcontroller. The DPS X000 switches off and tries a restart.
After trying 5 times in vain the DPS X000 switches off lastingly. To start it again it has to be disconnected from the mains supply and connected again.

RS 232 Frame Fault SD-DFAIL
Status Digital - Data Fail
Status Byte 2, bit 1
Fault at the RS 232 Port data transmission.

CAN Port



RS 232 Time Out SD-TOUT
Status Digital - Time Out
Status Byte 2, bit 2
The time till Time Out set with the Control Bytes 6 and 7 is exceeded.
The communication will be interrupted and the Output Current is switched off.
The DPS X000 tries to restore the communication.
The Output Current is switched on again if the connection is channelled again.

RS 232 Illegal Character received SD-WS
Status Digital - Wrong Sign
Status byte 2, bit 3
An Illegal Character was received at the RS 232 Port.

Current Set Point at the Analog Input SD-CSPA
Status Digital - Current Set Point Analog
Status Bytes 36 and 37
Shows the current preset analog Current Set Point of the Analog Inputs (Coaxial Port, Control Port and Parallel Port)

Current Set Point 12 Bit SD-CSPD
Status Digital - Current Set Point Digital
Status Bytes 9 and 10
Shows the current preset Current Set Point 12 Bit (Control Port with stored Current Set Point 12 Bit, RS 232 Port, Parallel Port and CAN Port with directly preset Current Set Point 12 Bit).

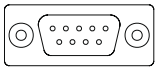
Current Limit 12 Bit SD-CLD
Status Digital - Current Limit Digital
Status Bytes 11 and 12
Shows the current preset Current Limit 12 Bit (Control Port with stored Current Limit 12 Bit, RS 232 Port, Parallel Port and CAN Port with directly preset Current Limit 12 Bit).

Voltage Supervision Value 10 Bit SD-VLD
Status Digital - Voltage Limit Digital
Status Bytes 15 and 16
Shows the current Voltage Supervision Value 10 Bit (Control Port and Parallel Port with stored Voltage Supervision Value 10 Bit, RS 232 Port and CAN Port with directly preset Voltage Supervision Value 10 Bit).

Output Current SD-COUT
Status Digital - Current Out
Status Bytes 30 and 31
Shows the current Output Current.

Output Voltage SD-VOUT
Status Digital - Voltage Out
Status Bytes 32 and 33
Shows the current Output Voltage.

CAN Port



Output Power SD-POUT
Status Digital - Power Out
Status Bytes 34 and 35
Shows the current Output Power.

Mains Voltage SD-MV
Status Digital - Mains Voltage
Status Bytes 42 and 43
Shows the current value of the Mains Voltage.

Mains Current SD-MC
Status Digital - Mains Current
Status Bytes 38 and 39
Shows the current value of the Mains Current.

PFC Voltage SD-VPFC
Status Digital - Voltage PFC
Status Bytes 42 and 43
Shows the current value of the Output Voltage of the PFC module.

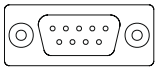
Temperature SD-TMP
Status Digital - Temperature
Status Bytes 44 and 45
Shows the current Temperature of the DPS X000.

Operating Time SD-WH
Status Digital - Working Hours
Global Bytes 14, 15, 16 and 17
Shows the Operating Time of the DPS X000.

Device Type SD-TYPE
Status Digital - Type
Global Byte 1
Shows the Device Type.

Serial Number SD-SN
Status Digital - Serial Number
Global Bytes 2 and 3
Shows the Serial Number of the DPS X000.

CAN Port



Detailed Description of the Status and Global Data

Status Data
The Status Output of the DPS X000 consists of 45 bytes in 6 CAN messages.

Message 1 to 6:

8 bytes (5 bytes) with Identifier each	ID 28 - ID 24	11101_{bin}
	ID 23 - ID 8	Serial Number
	ID 7 - ID 0	10_{hex} - 15_{hex}

The Status Data will be subsequently sent to the Identifier in the following order:

Message 1
Status Byte 1 **Fault Bits**
8 bit word, binary output

Bit 0 = 1	Maximum permitted Mains Current reached
Bit 1 = 1	unused
Bit 2 = 1	Power Limit reached (SD-PL)
Bit 3 = 1	Current Fault (SD-CFAIL)
Bit 4 = 1	Current Limit reached (SD-CL)

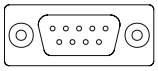
Status Byte 2 **Fault Flags**
8 bit word, binary output.
Fault flags are set immediately when the fault appears.

Bit 0 = 1	System Fault (SD-SFAIL)
Bit 1 = 1	RS 232 Frame Fault (SD-DFAIL)
Bit 2 = 1	RS 232 Time Out (SD-TOUT)
Bit 3 = 1	RS 232 Illegal Character received (SD-WS)
Bit 4 = 1	Voltage Supervision Value exceeded (SD-VL)
Bit 5 = 1	Current Fault (SD-CFAIL)
Bit 6 = 1	Temperature Limit reached (SD-TL)
Bit 7 = 1	Hardware Fault (SD-HFAIL)

Status Byte 3 **Time Out Flags**
8 bit word, binary output
Shows the transgression of set time limits.

Bit 0 = 1	RS 232 reception
Bit 1 = 1	Check PFC Voltage
Bit 2 = 1	Check Mains Voltage to PFC Voltage
Bit 3 = 1	Check permitted Mains Current
Bit 4 = 1	Check Output Voltage
Bit 5 = 1	Check Mains Voltage
Bit 6 = 1	Check Temperature
Bit 7 = 1	Check Current Fault

CAN Port



Status Byte 4 Operation mode
8 bit word, binary output, shows the Operation Mode.

Output	Operation Mode
0000 0000	Current Set Point 12 Bit and Analog
0000 0001	Mode without control
0000 0010	Current Set Point 12 Bit deactivated (SD-CSPDD)
0000 0100	Default value active (SD-PSON)
0000 0110	Only Current Set Point Analog active
0000 1000	Current Set Point Stand By 12 Bit activated (SD-CSPSDE)
0000 1010	Only Current Set Point Analog active
0000 1100	Current Set Point Stand By 12 Bit and Analog
0000 1110	Only Current Set Point Analog active
0001 0000	Saving of the values for the Parallel Interface
0010 0000	Restart to switch over from Operation Mode to Service Mode was made
0100 0000	Operation without control is programmed
1000 0000	Power Supply is switched off by the Control Port
1000 0100	Power Supply is switched on by the Control Port

Status Byte 5 Configuration Register
8 bit word, binary output
Shows the control type and the mode.

Bit 0 = 1	Control by the Parallel Port
Bit 1 = 1	Control by the RS 232 Port
Bit 2 = 1	Control by the CAN Port
Bit 3 = 1	Operation by the Control Port
Bit 4 = 1	Operation in Service Mode
Bit 5 = 1	Service2 flag
Bit 6 = 1	Received String flag

No decision has been made for a Control or Operation Mode if all bits are zero.

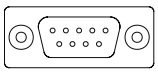
Status Byte 6 Service Register
8 bit word, ASCII output
Shows the mode.

'B'	for Operation Mode

Status Bytes 7 and 8 Actual Value for the Time Out at the RS 232 Port
Status Byte 7: Highbyte, Status Byte 8: Lowbyte
16 bit value, binary output
Shows the time which may pass until the reception of the next word.
An exceeding leads to an interruption of communication and a disabling of the Output Current.
Range of values 0 to 655350 ms with increment 10 ms.

Message 2
Status Bytes 9 and 10 Actual Current Set Point 12 Bit CD-CSP
Status Byte 9: Highbyte, Status Byte 10: Lowbyte
16 bit value (resolution 12 bit), binary output, left justified in the 16 bit word.
Shows the current Current Set Point 12 Bit.

CAN Port



The Maximum Current of the DPS X000 corresponds to a value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Set Point, then the binary value has to be converted into a decimal and multiplied with a factor.

Current Set $Point_{dec}$ = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

Status Bytes 11 and 12 Actual Current Limit 12 Bit SD-CLD
Status Byte 11: Highbyte, Status Byte 12: Lowbyte
16 bit value (resolution 12 bit), binary output, left justified in a 16 bit word.
Shows the actual Current Limit 12 Bit.
The maximum Current Limit of the DPS X000 corresponds to a value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Limit, then the binary value has to be converted into a decimal and multiplied with a factor.

Current Limitdec = Distributed valuedec * factor

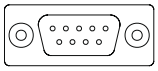
The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

Status Bytes 13 and 14 Current Set Point Stand By 12 Bit CD-CSPSD
Status Byte 13: Highbyte, Status Byte 14: Lowbyte
16 bit value (resolution 12 bit), binary output, left justified in the 16 bit word.
The maximum Stand By Current of the DPS X000 corresponds to a value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Limit Stand By, then the binary value has to be converted into a decimal and multiplied with a factor.

Current Set Point Stand By_{dec} = Distributed $value_{dec}$ * factor

CAN Port



The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

Status Bytes 15 and 16 Actual Voltage Supervision Value 12 Bit SD-VLD
Status Byte 15: Highbyte, Status Byte 16: Lowbyte
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word.
Shows the Current Voltage Supervision Value 10 Bit.
The maximum Voltage Supervision Voltage of the DPS X000 of 60 V corresponds to a distributed value of 61312_{dec}.
If the distributed binary value shall be converted into the decimal Voltage Supervision Value, then the binary value has to be converted into a decimal and multiplied with the factor 0.0009786.

$\text{Voltage Supervision Value}_{dec} = \text{Distributed value}_{dec} * 0.0009786$

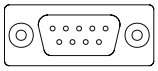
Example:
Distributed Value = 1110111110000000 (61312_{dec})
$\text{Voltage Supervision Value}_{dec} = 61312 * 0.0009786$ (60 V)

Message 3
Status Byte 17 Fault Bits
8 bit word, binary output
Shows the type of faults.

Bit 0 = 1	Voltage Supervision Value is exceeded
Bit 1 = 1	Minimal Output Voltage is undercut
Bit 2 = 1	Maximum permitted Mains Voltage is exceeded
Bit 3 = 1	Minimal permitted Mains Voltage is undercut
Bit 4 = 1	Minimal permitted PFC Voltage is undercut
Bit 5 = 1	Maximum permitted PFC Voltage is exceeded
Bit 6 = 1	Time to build up the PFC Voltage is exceeded
Bit 7 = 1	Maximum permitted Power is exceeded

Status Byte 18 Delay Time after Test of the PFC Voltage
8 bit value, binary output
Shows the time which will be waited after the minimum required PFC Voltage is reached.
Range of values from 0 to 2550 ms with increment 10 ms.
Ex-works setting: 2000 ms

CAN Port



Status Byte 19 **Delay Time after Test of Mains Voltage and PFC Voltage**

8 bit value, binary output
Shows the time which will be waited after the condition, PFC Voltage = Peak Value of the Mains Voltage, is reached.
Range of values from 0 to 2550 ms with increment 10 ms.
Ex-works setting: 1000 ms

Status Byte 20 **Delay Time after Reaching the Maximum Permitted Mains Current**

8 bit value, binary output
Shows the time which will be waited after the maximum permitted Mains Current is reached.
Range of values from 0 to 2550 ms with increment 10 ms.
Ex-works setting: 200 ms

Status Byte 21 **Delay Time after Exceeding the Voltage Supervision Value**

8 bit value, binary output
Shows the time which will be waited after the Voltage Supervision Value is reached.
Range of values from 0 to 2550 ms with increment 10 ms.
Ex-works setting: 20 ms

Status Byte 22 **Delay Time after Exceeding the Maximum Permitted Mains Voltage**

8 bit value, binary output
Shows the time which will be waited after the maximum permitted Mains Voltage is reached.
Range of values from 0 to 2550 ms with increment 10 ms.
Ex-works setting: 200 ms

Status Byte 23 **Delay Time after Exceeding the Maximum Permitted Temperature**

8 bit value, binary output
Shows the time which will be waited after the maximum permitted Temperature is reached.
Range of values from 0 to 2550 ms with increment 10 ms.
Ex-works setting: 500 ms

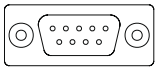
Status Byte 24 **Delay Time after a Current Fault Occures**

8 bit value, binary output
Shows the time which will be waited after a Current Fault occurs.
Range of values from 0 to 2550 ms with increment 10 ms.
Ex-works setting: 100 ms

Message 4
Status Bytes 25 and 26 Time till Time Out at the RS 232 Port (SD-TOUT)

Status Byte 25: Highbyte, Status Byte 26: Lowbyte
16 bit value, binary output
Shows the time which may pass until the reception of the next word.
An exceeding leads to a interruption of communication and a disabling of the Output Current.
Range of values 0 to 655350 ms with increment 10 ms.
Ex-works setting: 1000 ms

CAN Port



Status Byte 27 **Counter for Faults which Trigger a Restart of the DPS X000**

8 bit value, binary output
Shows the number of occurred faults which trigger a restart, beginning with the value 250.
If another restart will be triggered by a fault after 5 restarts (distributed value 255), the DPS X000 switches off lastingly. To restart the DPS X000 again it has to be disconnected from the mains supply and connected again.

Status Byte 28 **Component Fault Bits**

8 bit word, binary output
Shows the occurred Component Faults.

Bit 0	not used
Bit 1 = 1	Fault in the Power Modules
Bit 2 = 1	Fault in the EEprom
Bit 3	not used
Bit 4	not used
Bit 5	not used
Bit 6	not used
Bit 7 = 1	Device was locked because of a certain number of faults.

Status Byte 29 **Power Supply Operating State**

8 bit word, binary output
Shows the operating state.

Bit 0 = 1	Waiting for a stable Mains Voltage
Bit 1 = 1	Waiting for PFC Voltage
Bit 2 = 1	PFC voltage has reached the correct value
Bit 3 = 1	Power Supply is ready (SD-PSR)
Bit 4 = 1	Power Supply is switched on, current flows (SD-PSON)
Bit 5 = 1	Power Supply is in Service Mode
Bit 6	not used
Bit 7 = 1	Temperature Warning Limit reached

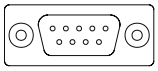
Status Bytes 30 and 31 Current Value of the Output Current SD-COUT

Status Byte 30: Highbyte, Status Byte 31: Lowbyte
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word.
Shows the current value of the Output Current.
The maximum Output Current of the DPS X000 corresponds to a distributed value of 64192_{dec}.
If the distributed binary value shall be converted into the decimal Output Current, then the binary value has to be converted into a decimal and multiplied with a factor.

$Output\ Current_{dec} = Distributed\ value_{dec} * factor$

The factor depends on the Device Type.

CAN Port



Device	Factor
DPS 1000-050	0.00077892
DPS 2000-050	0.00077892
DPS 3000-050	0.00077892
DPS 1000-070	0.00109049
DPS 2000-070	0.00109049
DPS 3000-070	0.00109049
DPS 1000-100	0.00155783
DPS 2000-100	0.00155783
DPS 3000-100	0.00155783

Status Bytes 32 and 33 **Current Value of the Output Voltage SD-VOUT**
Status Byte 32: Highbyte, Status Byte 33: Lowbyte
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word.
Shows the current value of the Output Voltage.
An Output Voltage of 60 V corresponds to a distributed value of 61312_{dec}.
If the distributed binary value shall be converted into the decimal Output Voltage, then the binary value has to be converted into a decimal and multiplied with the factor 0.0009786.

$Output\ Voltage_{dec} = Distributed\ value_{dec} * 0.0009786$

The Status Bytes 32 and 33 are a connected value.
The Status Byte 32 is sent with message 4, the Status Byte 33, however, with message 5.

Message 5
Status Bytes 32 and **33 Current Value of the Output Voltage SD-VOUT**
Description see message 4, Current Value of the Output Voltage SD-VOUT

Status Bytes 34 and 35 Current Value of the Output Power SD-POUT
Status Byte 34: Highbyte, Status Byte 35: Lowbyte
16 bit value (resolution 10 bit), binary value, left justified in the 16 bit word.
Shows the current value of the Output Power.
The maximum Output Power of the DPS X000 corresponds to a distributed value of 58560_{dec}.

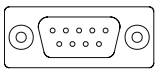
If the distributed binary value shall be converted into the decimal Output Voltage, then the binary value has to be converted into a decimal and multiplied with the a factor.

$Output\ Power_{dec} = Distributed\ value_{dec} * factor$

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.0170765
DPS 2000-050	0.0341530
DPS 3000-050	0.0512295
DPS 1000-070	0.0170765
DPS 2000-070	0.0341530
DPS 3000-070	0.0512295
DPS 1000-100	0.0170765
DPS 2000-100	0.0341530
DPS 3000-100	0.0512295

CAN Port



Status Bytes 36 and 37 Current Current Set Point at the Analog Input SD-CSPA

Status Byte 36: Highbyte, Status Byte 37: Lowbyte
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word.
Shows the current Current Set Point at the Analog Input.
The maximum permitted Current Set Point of 10 V at the Analog Input corresponds to a distributed value of 58304_{dec}.
If the distributed binary value shall be converted into the decimal Current Set Point, then the binary value has to be converted into a decimal and multiplied with the a factor.

$Current\ Set\ Point_{dec} = Distributed\ value_{dec} * factor$

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	0.000857575
DPS 2000-050	0.000857575
DPS 3000-050	0.000857575
DPS 1000-070	0.001200604
DPS 2000-070	0.001200604
DPS 3000-070	0.001200604
DPS 1000-100	0.001715149
DPS 2000-100	0.001715149
DPS 3000-100	0.001715149

Status Bytes 38 and 39 Current Value of the Mains Current SD-MC

Status Byte 38: Highbyte, Status Byte 39: Lowbyte
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word.
Shows the current value of the Mains Current.
A Mains Current of 10 A corresponds to a distributed value of 12608_{dec}.
If the distributed binary value shall be converted into the decimal Mains Current, then the binary value has to be converted into a decimal and multiplied with the the factor 0.0007938.

$Mains\ Current_{dec} = Distributed\ value_{dec} * 0.0007938$

Status Bytes 40 and 41 **Current Value of the Mains Voltage SD-MV**

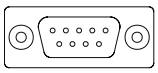
Status Byte 40: Highbyte, Status Byte 41: Lowbyte
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word.
Shows the current value of the Mains Voltage.
A Mains Voltage of 230 V corresponds to a distributed value of 38592_{dec}.

If the distributed binary value shall be converted into the decimal Mains Voltage, then the binary value has to be converted into a decimal and multiplied with the the factor 0.0059598.

$Mains\ Voltage_{dec} = Distributed\ value_{dec} * 0.0059598$

The Status Bytes 40 and 41 are a connected value.
The Status Byte 40 is sent with message 5, the Status Byte 41, however, with message 6.

CAN Port



Message 6
Status Bytes 40 and **41 Current Value of the Mains Voltage SD-MV**
Description see message 5, Current Value of the Mains Voltage SD-MV

Status Bytes 42 and 43 Current Value of the PFC Voltage SD-VPFC
Status Byte 42: Highbyte, Status Byte 43: Lowbyte
16 bit word (resolution 10 bit), binary output, left justified in the 16 bit word.
Shows the current value of the PFC Voltage.
A PFC Voltage of 400 V corresponds to a distributed value of 51328_{dec}.
If the distributed binary value shall be converted into the decimal PFC Voltage, then the binary value has to be converted into a decimal and multiplied with the factor 0.007793.

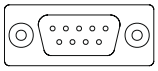
$PFC\ Voltage_{dec} = Distributed\ value_{dec} * 0.007793$

Status Bytes 44 and 45 Current Temperature of the DPS X000 SD-TMP
Status Byte 44: Highbyte, Status Byte 45: Lowbyte
16 bit word (resolution 10 bit), binary output, left justified in the 16 bit word.
Shows the current Temperature of the DPS X000.
The coherence of the Temperature and the distributed value is nonlinear.

If the distributed binary value shall be converted into the decimal Temperature, then the binary value has to be converted into a decimal and multiplied with the a factor.
$Temperature\ °C_{dec} = Distributed\ value_{dec} * factor$

Temperature in $°C_{dec}$	**Distributed $Value_{dec}$**	**Factor**
0	11776	0
10	12544	0.0007972
25	14656	0.0017058
40	18880	0.0021186
45	20416	0.0022042
50	22784	0.0021945
55	25344	0.0021701
60	27904	0.0021502
65	31360	0.0020727
70	38272	0.0018290
75	42496	0.0017649

CAN Port



Global
The Global Output of the DPS X000 consists of 40 bytes in 5 CAN messages.

Message 1 to 5:
8 bytes with Identifier each

ID 28 - ID 24	11101_{bin}
ID 23 - ID 8	Serial Number
ID 7 - 0	30_{hex} - 34_{hex}

The Global Data is subsequently sent to the Identifier in the following order:

Message 1
Global Byte 1 **Device Type**
8 bit word, binary output
Shows the Device Type.

Output	**Device Type**
0000 0001	DPS 1000 - 050
0000 0010	DPS 2000 - 050
0000 0011	DPS 3000 - 050
0000 0100	DPS 1000 - 070
0000 0101	DPS 2000 - 070
0000 0110	DPS 3000 - 070
0000 0111	DPS 1000 - 100
0000 1000	DPS 2000 - 100
0000 1001	DPS 3000 - 100

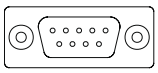
Global Bytes 2, 3 **Serial Number**
Status Byte 2: Highbyte, Status Byte 3: Lowbyte
16 bit value, binary output
Shows the Serial Number.

Global Byte 4 **Counter for Occurred Current Limit Reached Faults**
8 bit value, binary output
Shows the number of occurred Current Limit Reached Faults.
Maximum documentable number of occurred faults: 255

Global Byte 5 **Counter for occurred System Faults**
8 bit value, binary output
Shows the number of occurred System Faults.
Maximum documentable number of occurred faults: 255

Global Byte 6 **Counter for transgression of the Voltage Supervision Value**
8 bit value, binary output
Shows the number of transgressions of the Voltage Supervision Value.
Maximum documentable number of occurred faults: 255

CAN Port



Global Byte 7 **Counter for Occurred PFC Voltage Faults**
8 bit value, binary output
Shows the number of occured PFC Voltage Faults.
Maximum documentable number of occurred faults: 255

Global Byte 8 **Counter for Occurred Mains Voltage Faults**
8 bit value, binary output
Shows the number of the occurred Mains Voltage Faults.
Maximum documentable number of occurred faults: 255

Message 2
Global Byte 9 **Counter for Occurred Current Faults**
8 bit value, binary output
Shows the number of the occurred Output Current Faults.
Maximum documentable number of occurred faults: 255

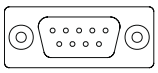
Global Byte 10 **Counter for Temperature Sensor Faults**
8 bit value, binary output
Shows the number of occurred Temperature Sensor Faults.
Maximum documentable number of occurred faults: 255

Global Byte 11 **Counter for Exceeding the Power Limit**
8 bit value, binary output
Shows the number of the occurred transgressions of the Power Limit.
Maximum documentable number of occurred faults: 255

Global Byte 12 **Flag for the Last Occurred Fault**
8 bit word, binary output
Shows the fault which occured latest.

Binary	Decimal	Fault Type
0000 0001	1	Voltage Supervision Value exceeded
0000 0010	2	Minimal required Output Voltage is undercut
0000 0011	3	Maximum permitted Mains Voltage exceeded
0000 0100	4	Minimal required Mains Voltage is undercut
0000 0101	5	Minimal required PFC Voltage is undercut
0000 0110	6	Maximum permitted PFC Voltage exceeded
0000 0111	7	Time out PFC Voltage
0000 1000	8	PFC Voltage is lower than the peak value of the Mains Voltage
0000 1001	9	Internal Supply Voltage Fault
0000 1010	10	Maximum permitted Mains Current exceeded
0000 1011	11	Current Limit reached
0000 1100	12	Power Limit reached
0000 1101	13	Hardware Fault
0000 1110	14	not used
0000 1111	15	Fault in the EEprom
0001 0000	16	not used
0001 0001	17	RS232 Frame Fault
0001 0010	18	RS232 Time Out
0001 0011	19	RS232 Illegal character
0001 0100	20	Temperature Limit reached
0001 0101	21	Temperature Sensor faulty

CAN Port



Global Byte 13 **Temperature Warning Limit**
8 bit value, binary output
Shows the value of the programmed Temperature Warning Limit.
Ex-works setting: 55 °C
If the Temperature Warning Limit is reached, then the Status Byte 29, bit 7 is set on 1.
80 °C correspond to a distributed value of 255.

Global Bytes 14, 15, 16, 17 **Operating time SD-WH**
Global Byte 14 is highest-order byte, Global Byte 17 is the lowest-order byte
32 bit value, binary output
Shows the number of operating minutes.
If the distributed binary value shall be converted into the decimal value for the operating minutes, then the following equation has to be used.

Operating time in minutes = $SB61_{dec} * 256^3 + SB62_{dec} * 256^2 + SB63_{dec} * 256 + SB64_{dec}$

The Global Bytes 14 to 17 represent a connected value. The Global Bytes 14 to 16 are sent with the message 2, the Global Byte 17 is, however, sent with message 3.

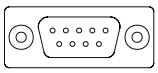
Message 3
Global Byte 17 **Operating Time SD-WH**
(Description see message 2, Global Bytes 14 15, 16, 17)

Global Byte 18 **Number of Occurred Mains Current Faults**
8 bit value, binary output
Shows the number of the occurred Mains Current Faults.
Maximum documentable number of occurred faults: 255

Global Byte 19 **Baud Rate Setting of the RS 232 Interface**
8 bit value, binary output
Shows the setting of the Baud Rate for the RS 232 Port.

Binary value	Decimal	Baud Rate
0000 0001	1	1200
0000 0010	2	2400
0000 0011	3	4800
0000 0100	4	9600
0000 0101	5	19200
0000 0110	6	38400
0000 0111	7	57600
0000 1000	8	115200

CAN Port



Global Bytes 20, 21 Version Number of the Internal Control Program

Shows the Version Number of the internal control program.
The two Global Bytes are divided up in two half bytes. Each of it represent one BCD-coded number.
The version number consists of:
Upper half byte of Global Byte 20, lower half byte of Global Byte 20, upper half byte of Global Byte 21, lower half byte of Global Byte 21.

Example for an output with the Version Number 01.45:

Global Byte 20	Global Byte 21
0000 0001	0100 0101
0 1	4 5

Global Byte 22 Minimum required Mains Current

8 bit value, binary output
Shows the ex-works set limit for the minimal required Mains Current.
51.929 A correspond to a distributed value of 255_{dec}. 1 Digit corresponds to 0.2036442 A.
If the distributed binary value shall be converted into the decimal Mains Current, then the binary value has to be converted into decimal and multiplied with the factor 0.2036442.

Minimum required Mains $Current_{dec}$ = Distributed $value_{dec}$ * 0.2036442

Global Byte 23 Not Used

8 bit value, binary output
Shows zero.

Global Byte 24 Maximum Permitted Output Power

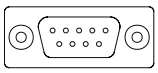
8 bit value, binary output
Shows the ex-works set limit for the maximum permitted Output Power.
The maximum permitted Output Power corresponds to a distributed value of 227_{dec}.
If the distributed binary value shall be converted into the decimal value for the maximum permitted Output Power, the binary value has to be converted into decimal and multiplied with a factor.

Maximum Permitted Output $Power_{dec}$ = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

Device	Factor
DPS 1000-050	4.4052863
DPS 1000-070	4.4052863
DPS 1000-100	4.4052863
DPS 2000-050	8.8105726
DPS 2000-070	8.8105726
DPS 2000-100	8.8105726
DPS 3000-050	13.215859
DPS 3000-070	13.215859
DPS 3000-100	13.215859

CAN Port



Message 4
Global Byte 25 Maximum Permitted Mains Current
8 bit value, binary output
Shows the ex-works set limit of the maximum permitted Mains Current.

51.929 A correspond to a distributed value of 255_{dec}. 1 digit corresponds to 0.2036442 A.
If the distributed binary value shall be converted into the decimal Mains Current, then the binary value has to be converted into decimal and multiplied with the factor 0.2036442.

Maximum Permitted Mains $Current_{dec}$ = Distributed $value_{dec}$ * 0.2036442

Global Bytes 26, 27 Maximum possible Current Set Point Stand By 12 Bit
16 bit value (resolution 12 bit), binary output, left justified in the 16 bit word, shows the ex-works set limit for the maximum possible Current Set Point Stand By 12 Bit. The ex-works setting correspond to the maximum possible Output Current of the Device Type.
The maximum permitted Current Set Point Stand By 12 Bit correspond to a distributed value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Set Point Stand By, then the binary value has to be converted into decimal and multiplied with a factor.

Current Set Point Stand By_{dec} = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

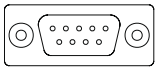
Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

Global Byte 28 Minimal required Output Voltage
8 bit value, binary output
Shows the ex-works set limit for the minimal required Output Voltage (as a rule 0 V)
64.15 V correspond to a distributed value of 255_{dec}. 1 Digit corresponds to 0.2515723 V.
If the distributed binary value shall be converted into the decimal value of the Output Voltage, then the binary value has to be converted into decimal and multiplied with the factor 0.2515723.

Minimal required Output $Voltage_{dec}$ = Distributed $value_{dec}$ * 0.2515723

Global Bytes 29 and 30 Maximum possible Voltage Supervision Value
16 bit value (resolution 10 bit), binary output, left justified in the 16 bit word, shows the ex-works set limit of 60 V for the maximum possible Voltage Supervision Value.
The maximum possible Voltage Supervision Value of 60 V corresponds to a distributed value of 61312_{dec}.

CAN Port



If the distributed binary value shall be converted into the decimal Voltage Supervision Value, the binary value has to be converted into decimal and multiplied with the factor 0.0009786.

Voltage Supervision $Value_{dec}$ = Distributed $value_{dec}$ * 0.0009786

Example:
Distributed value = 1110111110000000 (61312)
Voltage Supervision $Value_{dec}$ = 61312 * 0.0009786 (60 V)

Global Byte 31 Minimal required Mains Voltage
8 bit value, binary output
Shows the ex-works set limit of 87 V for the minimal required Mains Voltage.
389.9 V correspond to a distributed value of 255_{dec}. 1 Digit corresponds to 1.529 V.
If the distributed binary value shall be converted into the decimal value of the Mains Voltage, then the binary value has to be converted into decimal and multiplied with the factor 1.529.

Minimal required Mains $Voltage_{dec}$ = Distributed $value_{dec}$ * 1.529

Global Byte 32 Maximum permitted Mains Voltage
8 bit value, binary output
Shows the ex-works set limit of 276 V for the maximum permitted Mains Voltage.
389.9 V correspond to a distributed value of 255_{dec}. 1 Digit corresponds to 1.529 V.
If the distributed binary value shall be converted into the decimal Mains Voltage, then the binary value has to be converted into decimal and multiplied with the factor 1.529.

Message 5
Global Byte 33 Counter for Hardware Faults in the Power Modules
8 bit value, binary output
Shows the number of occured Hardware Faults in the Power Modules.
Maximum documentable number of occurred faults: 255

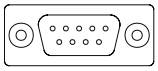
Global Byte 34 Counter for transgression of the Temperature Limit
8 bit value, binary output
Shows the number of transgressions of the Temperature Limit.
Maximum documentable number of occurred faults: 255

Global Bytes 35, 36 Maximum possible Current Limit 12 Bit
16 bit value (resolution 12 bit), binary output, left justified in the 16 bit word.
Shows the ex-works set limit of 276 V for the maximum possible Current Limit 12 Bit.
The ex-works set corresponds to the maximum possible Output Current of the Device Type. The maximum possible Current Limit corresponds to a distributed value of 65520_{dec}.
If the distributed binary value shall be converted into the decimal Current Set Point, then the binary value has to be converted into decimal and multiplied with a factor.

Current Set $Point_{dec}$ = Distributed $value_{dec}$ * factor

The factor depends on the Device Type.

CAN Port



Device	Factor
DPS 1000-050	0.00076313
DPS 2000-050	0.00076313
DPS 3000-050	0.00076313
DPS 1000-070	0.001068376
DPS 2000-070	0.001068376
DPS 3000-070	0.001068376
DPS 1000-100	0.001526251
DPS 2000-100	0.001526251
DPS 3000-100	0.001526251

Global Byte 37 Minimal required PFC Voltage
8 bit value, binary output
Shows the ex-works set limit for the minimal required PFC Voltage.
510 V correspond to a distributed value of 255_{dec}.
If the distributed binary value shall be converted into the decimal value of the PFC Voltage, the binary value has to be converted into decimal and multiplied with the factor 2.

$PFC\ Voltage_{dec} = Distributed\ value_{dec} * 2$

Global Byte 38 Maximum permitted PFC voltage
8 bit value, binary output
Shows the ex-works set limit for the maximum permitted PFC Voltage.
510 V correspond to a distributed value of 255_{dec}.
If the distributed binary value shall be converted into the decimal value of the PFC Voltage, the binary value has to be converted into decimal and multiplied with the factor 2.

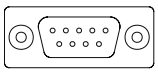
$PFC\ Voltage_{dec} = Distributed\ value_{dec} * 2$

Global Byte 39 Temperature Limit
8 bit value, binary output
Shows the ex-works set limit for the maximum permitted Temperature of the DPS X000. The coherence of the Temperature and the distributed value is nonlinear.
If the distributed binary value shall be converted into the decimal value of the Temperature Limit, then the binary value has to be converted into decimal and multiplied with a factor.

$Temperature\ Limit_{dec} = Distributed\ value_{dec} * factor$

Temperature in $°C_{dec}$	Distributed $Value_{dec}$	Factor
0	46	0
10	49	0.204082
25	57	0.438596
40	73	0.547945
45	79	0.569620
50	89	0.561798
55	99	0.555556
60	109	0.550459
65	122	0.532787
70	149	0.469799
75	166	0.451807

CAN Port



Global Byte 40 **Not Used**
8 bit word
not used

Faults
The error messages are sent in a message with 2 bytes.
The bytes Time Out Fault is also included in the Status Data. The second byte CAN Faults shows CAN communication faults.

The message consists of:

2 bytes with Identifier	ID 28 - ID 24	11101_{bin}
	ID 23 - ID 8	Serial Number
	ID 7 - ID 0	20_{hex}

The Fault Data will be subsequently sent to the identifier in the following order:

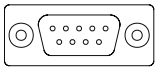
Message
Fault Byte 1 **Time Out Fault**
8 bit word, binary output, shows the transgression of time limits in the CAN system.

Bit 0 = 1	internal use
Bit 1 = 1	unused
Bit 2 = 1	CAN transmit buffer for fault transmission is busy
Bit 3 = 1	CAN transmit buffer for status transmission is busy
Bit 4 = 1	CAN bus is broken down
Bit 5 = 1	CAN bus line interrupted
Bit 6 = 1	CAN receive buffer 0 busy
Bit 7 = 1	CAN receive buffer 1 busy

Fault Byte 2 **CAN Faults**
8 bit value, binary output, shows faults of the CAN-communication

Bit 0 = 1	96 faults or more occured in the reception or sending
Bit 1 = 1	96 faults or more occured in the reception
Bit 2 = 1	96 faults or more occured in the sending
Bit 3 = 1	128 faults or more occured in the reception, CAN-suscriber is in error-passive mode
Bit 4 = 1	128 faults or more occured in the sending, CAN-suscriber is in error-passive mode
Bit 5 = 1	255 faults occured in the sending, CAN-suscriber is in bus-off mode
Bit 6 = 1	A message was received on receive buffer 1, although the buffer was not empty
Bit 7 = 1	A message was received on receive buffer 2, although the buffer was not empty

CAN Port



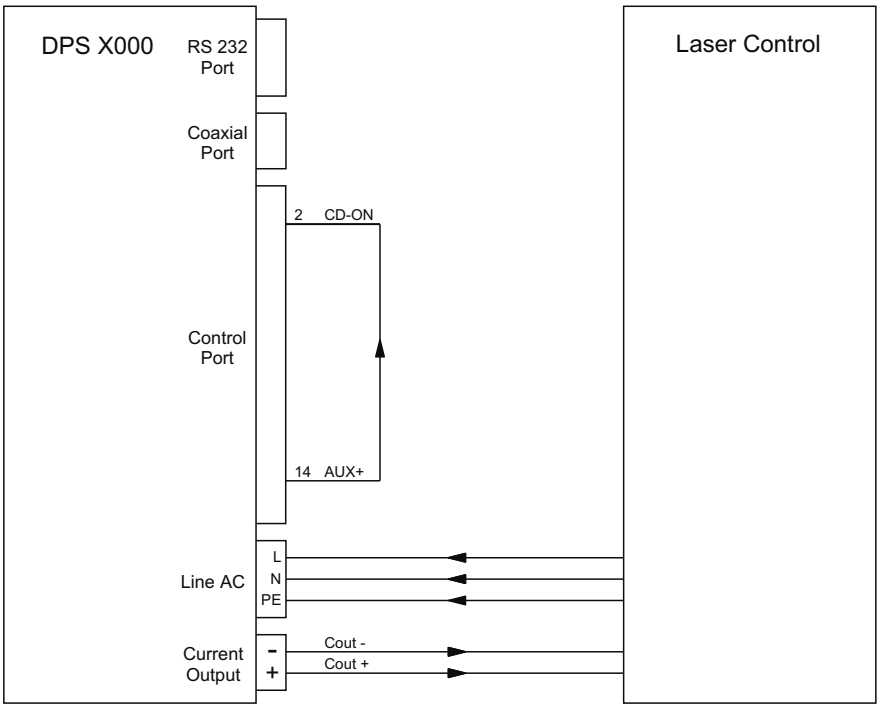
Informations concerning the CAN topic
Internet addresses concerning the CAN topic can be found on our home page.

Application 1
Operation without control.

The desired Output Current and the Current Limit is once programmed to the DPS X000 by the RS 232 Port by means of a PC and the configuration software.

The input CD-ON is connected with the Auxiliary Voltage Output AUX+ and generates the required switch-on signal. This can be, for example, carried out with a dummy plug put on the Control Port which contains the required connection.
The DPS X000 is mains-sided supplied by a contactor to switch the Output Current on and off.

After switching on the mains the DPS X000 delivers the programmed Output Current.
It is possible to change the Output Current at any time by means of the RS 232 Port, a PC and the configuration software.

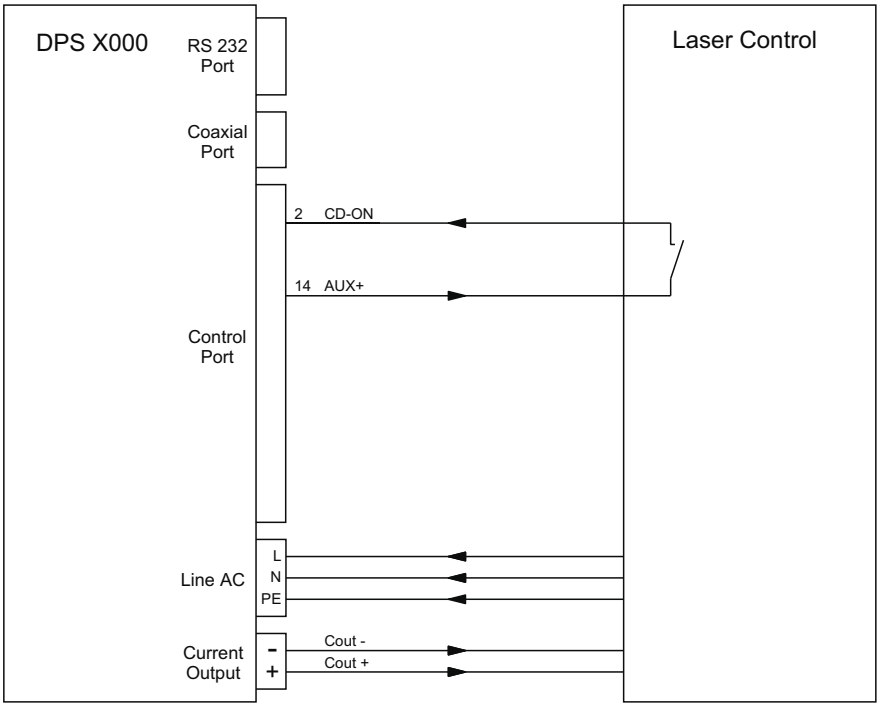


Application 2
Operation on the Control Port with simple control and fixed Output Current.

No control voltage or reference voltage is control sided required.

The desired Output Current and the Current Limit will be once programmed to the DPS X000 by means of a PC and the configuration software by the RS 232 Port.
The input CD-ON is connected in the laser control via a switching component, a relay, an optical coupling device or a switch to the Auxiliary Voltage Output AUX+ and generates the required switch-on signal.

The DPS X000 delivers the programmed Output Current after switching on the mains and activating the switching component.
Changing the Output Current is at any time possible by a PC and the configuration software via the RS 232 Port.



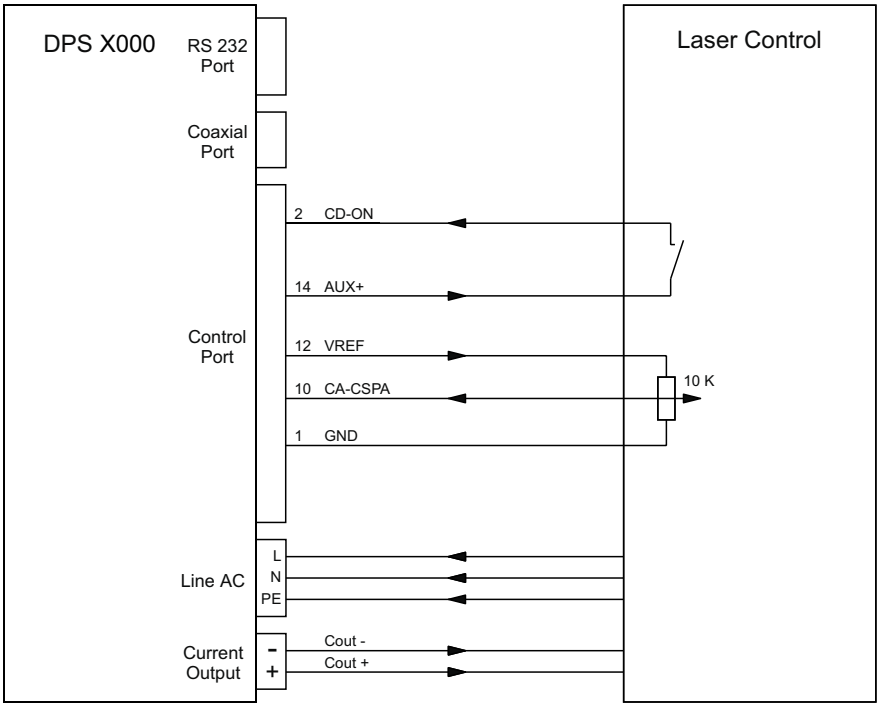
Application 3
Operation at the Control Port with simple control and variable Output Current.

The Current Limit is once programmed by means of a PC and the configuration software by the RS 232 Port.

No control voltage or reference voltage is control sided required.
The Output Current of the DPS X000 is controlled by the Analog Input at the Control Port. The current setting is manually made by a potentiometer.
The potentiometer is supplied by the high precision Reference Voltage of the DPS X000.

The input CD-ON of the DPS X000 is connected in the laser control via a switching component, a relay, an optical coupling device or a switch to the Auxiliary Voltage Output AUX+ and generates the required switch-on signal.

The DPS X000 delivers the programmed Output Current after switching on the mains and activating the switching component.

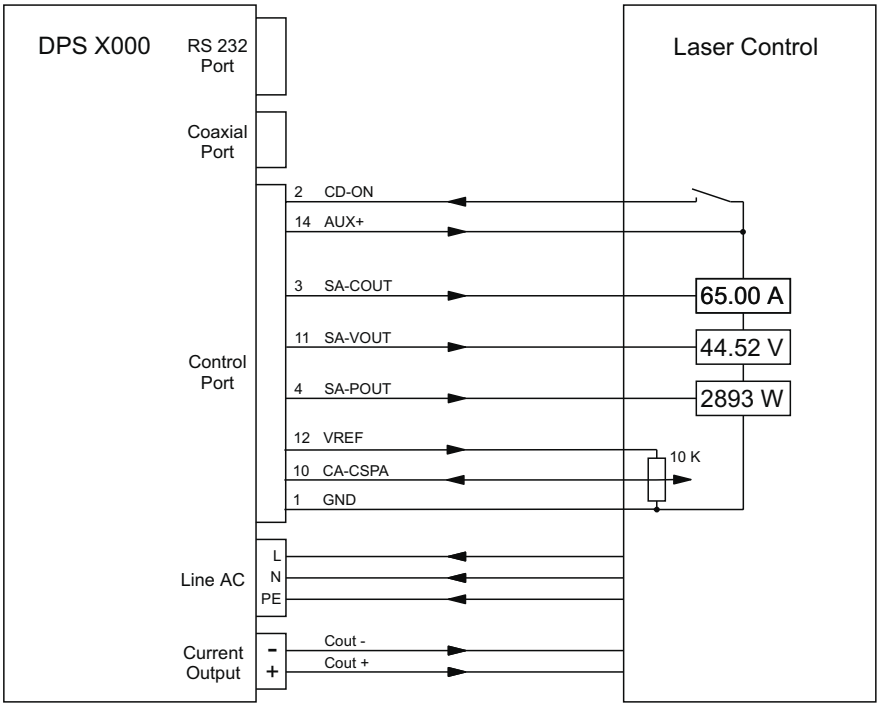


Application 4
Operation at the Control Port with simple control, with variable Output Current and three digital displays for Output Current, Output Voltage and Output Power.

The Current Limit is once programmed by means of a PC and the configuration software by the RS 232 Port.

Control sided no control voltage, reference voltage or supply voltage is necessary.
The Output Current of the DPS X000 is controlled by the Analog Input at the Control Port. The current setting is manually made by a potentiometer.
The potentiometer is supplied by the high precision Reference Voltage of the DPS X000.
The input CD-ON of the DPS X000 is connected in the laser control via a switching component, a relay, an optical coupling device or a switch to the Auxiliary Voltage Output AUX+ and generates the required switch-on signal.
The three digital displays are supplied by the Auxiliary Voltage Output AUX+.

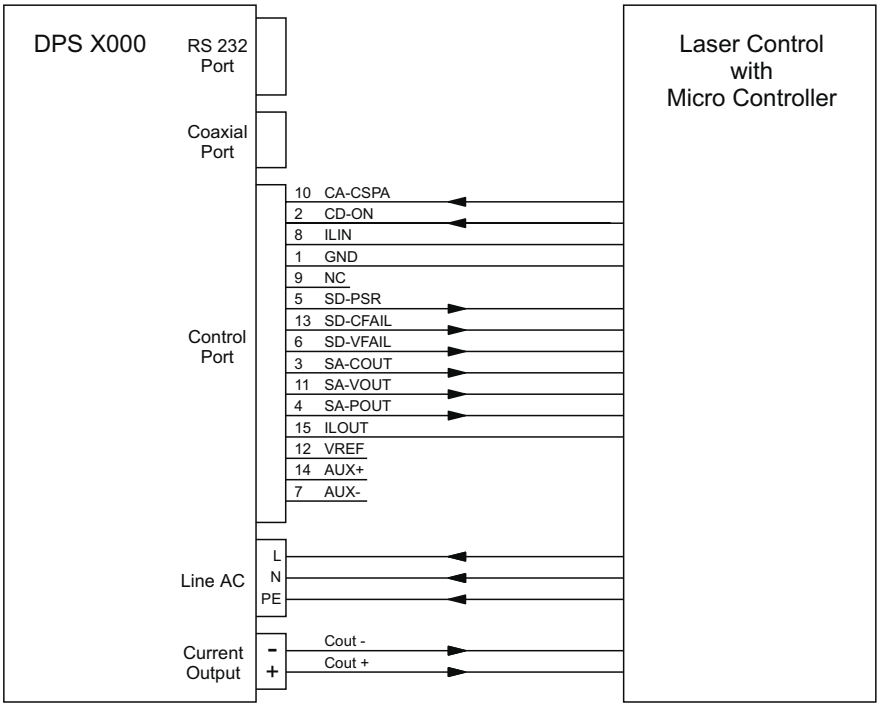
The DPS X000 delivers the programmed Output Current after switching on the mains and activating the switching component.



Application 5
Operation at the Control Port by a microcontroller with a D/A converter output and three A/D converter inputs.

The Current Limit and the Voltage Supervision Value is once programmed by means of a PC and the configuration software by the RS 232 Port.

The microcontroller delivers the analog signal for the Current Set Point CA-CSPA and the digital signal CD-ON to switch on the DPS X000.
The feed back digital Status Signals, Power Supply is Ready SD-PSR, Current Fault SD-CFAIL and Voltage Supervision Value Exceeded CD-VFAIL as well as the analog Status Signals Output Current SA-COUT, Output Voltage SA-VOUT and the Output Power SA-POUT, are processed by the microcontroller.

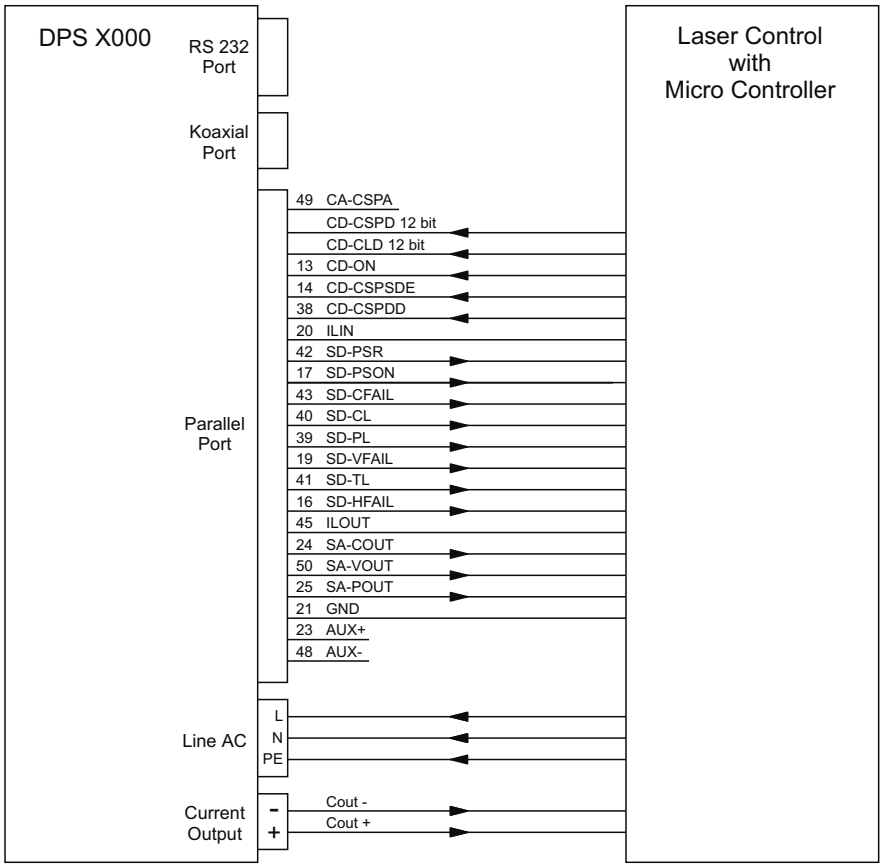


Application 6
Operation at the Parallel Port by a microcontroller.

The Current Set Point Stand By and the Voltage Supervision Value are once programmed by means of a PC and the configuration software by the RS 232 Port.

The microcontroller delivers a 12 bits wide digital signal for the Current Set Point CD-CSPD, a 12 bits wide digital signal CD-CLD for the Current Limit and three further digital signals with different conditions for switching on the DPS X000.
The Current Limit can be preset hardwired or by DIP switches too.

The feed back digital and analog Status Signals are processed by the microcontroller.

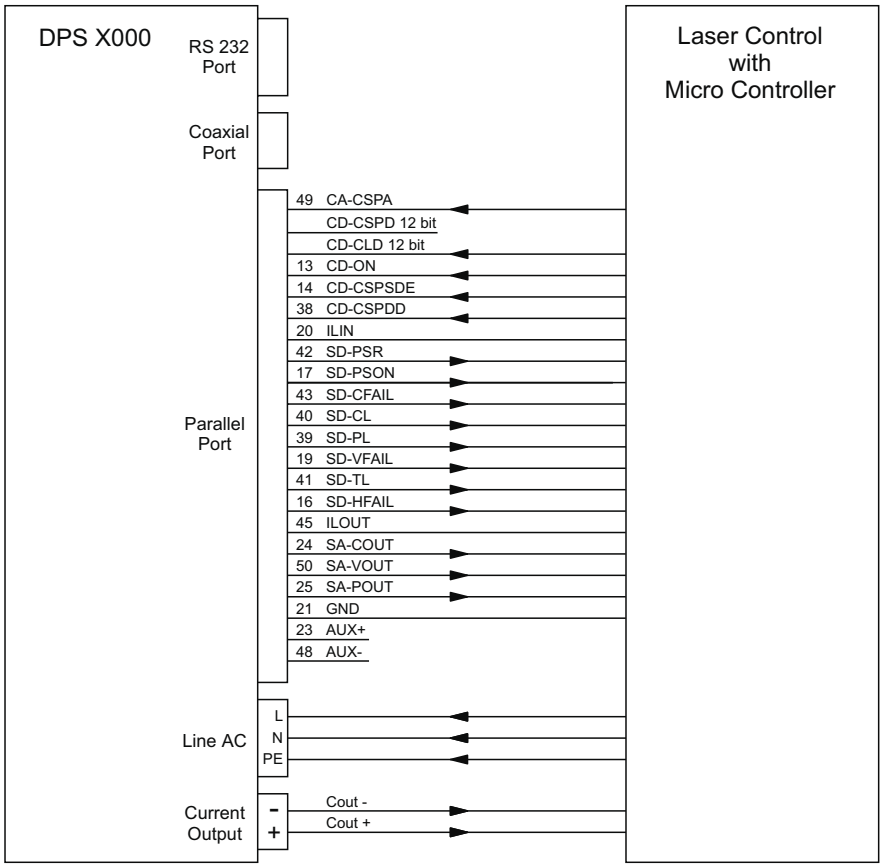


Application 7
Operation at the Parallel Port by a microcontroller.

The Current Set Point Stand By and the Voltage Supervision Value are once programmed by means of a PC and the configuration software by the RS 232 Port.

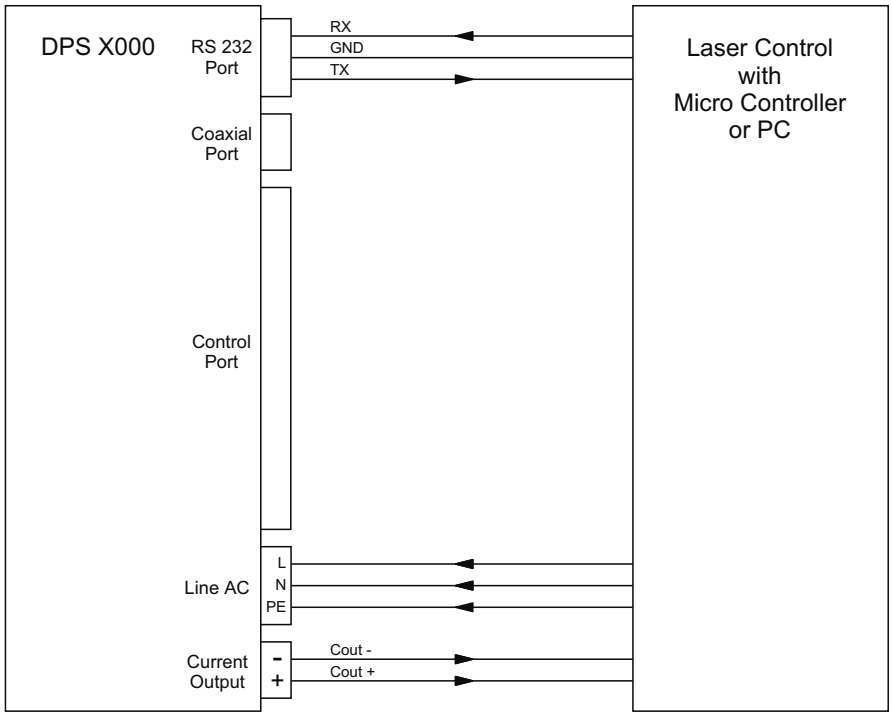
The microcontroller delivers an analog signal for the Current Set Point CA-CDPA, a 12 bits wide digital signal for the Current Limit CD-CLD and three further digital signals with different conditions for switching on the DPS X000.
The Current Limit can be preset hardwired or by DIP switches too.

The feed back digital and analog Status Signals are processed by the microcontroller.



Application 8
Operation at the RS 232 Port by a microcontroller or a PC.

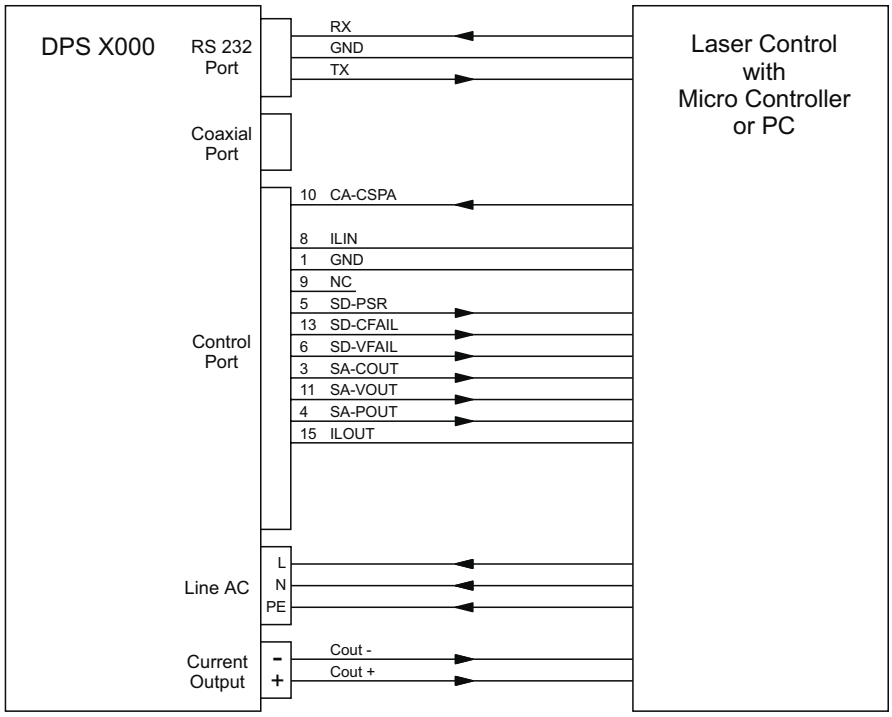
Access to all implemented functions and measurements.



Application 9
Operation at the RS 232 Port by a microcontroller or a PC.

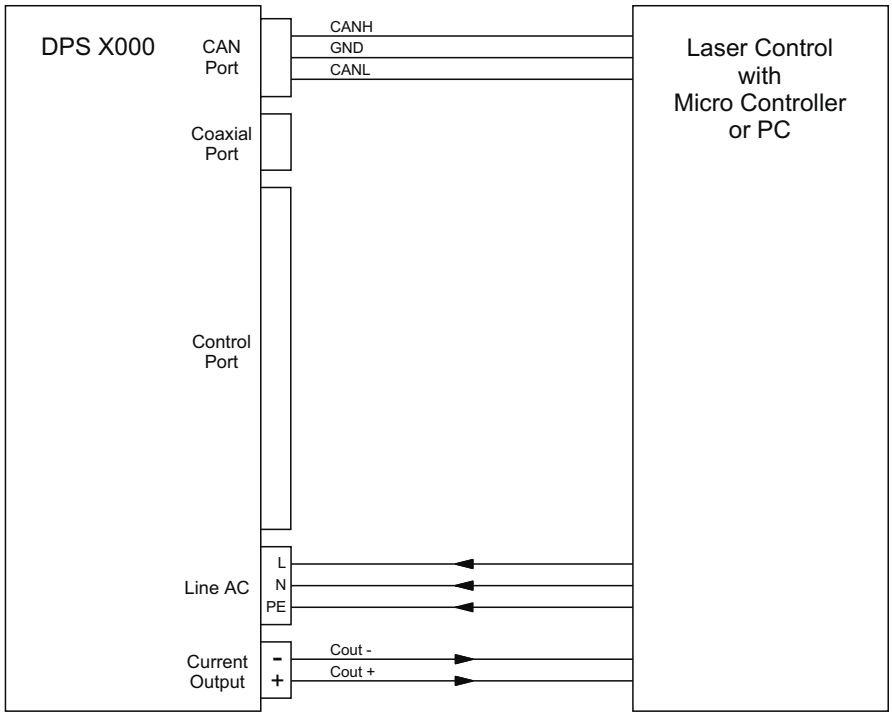
Access to all implemented functions and measurements.

Signals of the Control Port are additionally used.
The output current is modulated by the Analog Input. The feed back analog and digital Status Signals are topically supplied to the control.



Application 10
Operation at the CAN Port by a microcontroller or a PC.

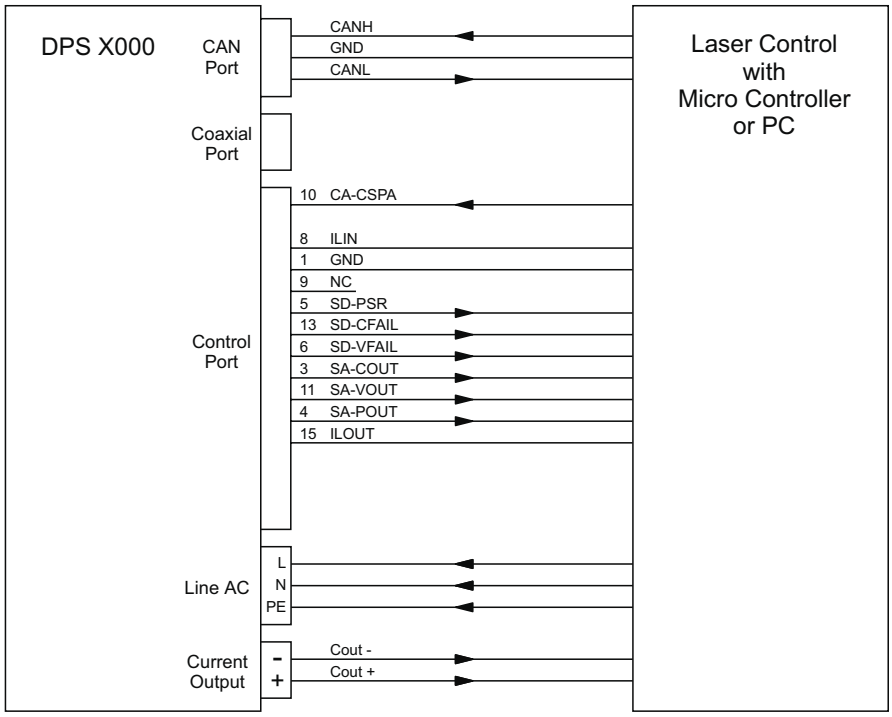
Access to all implemented functions and measurements.



Application 11
Operation at the CAN Port by a microcontroller or a PC.

Access to all implemented functions and measurements.

Signals of the Control Port are additionally used.
The Output Current is modulated by the Analog Input. The feed back analog and digital Status Signals are topically supplied to the control.



Specification		DPS 1000 - 050
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	External mains isolating
Connected load	1400 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	16 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole internal thread M6
Power max	1000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 50 A	cross-section up to 25 sqmm
Diode voltage	0 ... 20 V max	
Efficiency	80 %	
Diode Current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 13 mApp	
Broadband hissing	0.006 %eff 3 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 12.2 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 50.5 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 12.3 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 5 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 1000 - 050
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 5 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1V = 100 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
-15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 1000 - 050
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 1000 - 050
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 1000 - 050
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped-through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Level logical 0	> + 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC1000-4-2	
Air gap discharge	± 15 kV	IEC1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652 and MIL-C-24308 Internal thread UNC 4-40
Suitable bus levels	12 and 24 V		
Lead length maximum	40 m		
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... + 80 °C		
Dewfall	not allowed		
Protection Type	IP20		
Cooling type			
Air cooling	filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Specification		DPS 1000 - 070
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	External mains isolating
Connected load	1400 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	16 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole internal thread M6
Power max	1000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 70 A	cross-section up to 25 sqmm
Diode voltage	0 ... 14.3 V max	
Efficiency	78 %	
Diode Current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 22 mApp	
Broadband hissing	0,006 %eff 4 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 17.09 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 70.7 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 17.26 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 7 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 1000 - 070
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 7 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1 V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1 V = 100 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
- 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 1000 - 070
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 1000 - 070
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub-miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	Internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 1000 - 070
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 Internal thread UNC 4-40
Level logical 0	>+ 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC1000-4-2	
Air gap discharge	± 15 kV	IEC1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652 and MIL-C-24308 Internal thread UNC 4-40
Suitable bus levels	12 and 24 V		
Lead length maximum	40 m		
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... + 80 °C		
Dewfall	not allowed		
Protection type	IP20		
Cooling type			
Air cooling	filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Specification		DPS 1000 - 100
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	External mains isolating
Connected load	1400 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	16 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole internal thread M6
Power max	1000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 100 A	cross-section up to 25 sqmm
Diode voltage	0 ... 10 V max	
Efficiency	76 %	
Diode Current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 30 mApp	
Broadband hissing	0.006%eff 6 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 24.42 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 101 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 24.66 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 10 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 1000 - 100
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 10 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1 V = 100 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
-15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 1000 - 100
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 1000 - 100
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 1000 - 100
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped-through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Level logical 0	> + 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC 1000-4-2	
Air gap discharge	± 15 kV	IEC 1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652
Suitable bus levels	12 and 24 V		and MIL-C-24308
Lead length maximum	40 m		internal thread UNC 4-40
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... + 80 °C		
Dewfall	not allowed		
Protection type	IP20		
Cooling type			
Air cooling	Filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Specification		DPS 2000 - 050
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	External mains isolating
Connected load	2500 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	20 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole internal thread M6
Power max	2000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 50 A	cross-section up to 25 sqmm
Diode voltage	0 ... 40 V max	
Efficiency	86 %	
Diode Current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 13 mApp	
Broadband hissing	0.006%eff 3 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 12.2 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 50.5 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 12.3 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 5 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 2000 - 050
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 5 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1 V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1V = 200 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
-15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 2000 - 050
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 2000 - 050
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 2000 - 050
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Level logical 0	> + 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC1000-4-2	
Air gap discharge	± 15 kV	IEC1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652
Suitable bus levels	12 and 24 V		and MIL-C-24308
Lead length maximum	40 m		Internal thread UNC 4-40
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... + 80 °C		
Dewfall	not allowed		
Protection Type	IP20		
Cooling type			
Air cooling	filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Specification		DPS 2000 - 070
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	External mains isolating
Connected load	2500 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	20 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole, internal thread M6
Power max	2000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 70 A	cross-section up to 25 sqmm
Diode voltage	0 ... 28.6 V max	
Efficiency	84 %	
Diode current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 22 mApp	
Broadband hissing	0,006 %eff 4 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 17.09 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 70.7 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 17.26 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 7 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 2000 - 070
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 7 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1 V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1 V = 200 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
-15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 2000 - 070
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 2000 - 070
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	Internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 2000 - 070
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped-through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Level logical 0	> + 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC1000-4-2	
Air gap discharge	± 15 kV	IEC1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652 and MIL-C-24308 Internal thread UNC 4-40
Suitable bus levels	12 and 24 V		
Lead length maximum	40 m		
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... + 80 °C		
Dewfall	not allowed		
Protection type	IP20		
Cooling type			
Air cooling	filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Specification		DPS 2000 - 100
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	External mains isolating
Connected load	2500 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	20 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole internal thread M6
Power max	2000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 100 A	cross-section up to 25 sqmm
Diode voltage	0 ... 20 V max	
Efficiency	82 %	
Diode Current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 30 mApp	
Broadband hissing	0.006 %eff 6 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 24.42 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 101 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 24.66 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 10 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 2000 - 100
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 10 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1 V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1 V = 200 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
-15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 2000 - 100
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 2000 - 100
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 2000 - 100
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Level logical 0	> + 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC1000-4-2	
Air gap discharge	± 15 kV	IEC1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652
Suitable bus levels	12 and 24 V		and MIL-C-24308
Lead length maximum	40 m		Internal thread UNC 4-40
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... + 80 °C		
Dewfall	not allowed		
Protection type	IP20		
Cooling type			
Air cooling	filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Specification		DPS 3000 - 050
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	external mains isolating
Connected load	3600 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	20 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole internal thread M6
Power max	3000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 50 A	cross-section up to 25 sqmm
Diode voltage	0 ... 60 V max	
Efficiency	88 %	
Diode Current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 13 mApp	
Broadband hissing	0.006 %eff 3 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 12.2 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 50.5 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 12.3 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 5 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 3000 - 050
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 5 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1 V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1V = 300 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
-15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 3000 - 050
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 3000 - 050
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 3000 - 050
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Level logical 0	> + 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC1000-4-2	
Air gap discharge	± 15 kV	IEC1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652
Suitable bus levels	12 and 24 V		and MIL-C-24308
Lead length maximum	40 m		internal thread UNC 4-40
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... +80 °C		
Dewfall	not allowed		
Protection type	IP20		
Cooling type			
Air cooling	filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Specification		DPS 3000 - 070
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	External mains isolating
Connected load	3600 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	20 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole internal thread M6
Power max	3000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 70 A	cross-section up to 25 sqmm
Diode voltage	0 ... 42.9 V max	
Efficiency	86 %	
Diode Current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 22 mApp	
Broadband hissing	0.006 %eff 4 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 17.09 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 70.7 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 17.26 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 7 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 3000 - 070
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 7 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1 V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1 V = 300 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
-15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 3000 - 070
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 3000 - 070
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 3000 - 070
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped-through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Level logical 0	> + 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC1000-4-2	
Air gap discharge	± 15 kV	IEC1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652
Suitable bus levels	12 and 24 V		and MIL-C-24308
Lead length maximum	40 m		internal thread UNC 4-40
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... +80 °C		
Dewfall	not allowed		
Protection type	IP20		
Cooling type			
Air cooling	filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Specification		DPS 3000 - 100
Mains Connection		3-pole terminal strip
Voltage range	87 ... 276 V AC	1.5 sqmm - 4 sqmm
Frequency	47.5 ... 63 Hz	External mains isolating
Connected load	3600 W	device required
Power factor	0.99	
Leakage current	1.6 mA	
Required fuse	20 A	External fuse
Required wire cross-section	2 x 2.5 sqmm + PE	required
Safety class	1	
Degree of pollution	1	
Power Output		2-pole, internal thread M6
Power max	3000 W	for ring tongues up to ∅ 12 mm
Diode current	0 ... 100 A	cross-section up to 25 sqmm
Diode voltage	0 ... 30 V max	
Efficiency	84 %	
Diode Current		
Accuracy	± 0.1 %	
Linearity	± 0.1 %	
Temperature stability	± 50 ppm / °C	
Rate of change	0.1 A / µs depends on the diode voltage	
Ripple current	0.03 %pp 30 mApp	
Broadband hissing	0.006 %eff 6 mAeff	
Mains voltage dependency	0.00005 % / V~	
Diode voltage dependency	0.0005 % / V	
Resolution analog	∞	
Resolution digital	12 bit 24.42 mA / digit	
Current Limit		
Range programmable	0 ... 101 % 0 ... 101 A	Parallel Port
Accuracy	± 0.1 %	RS 232 Port
Linearity	± 0.1 %	CAN Port
Temperature stability	± 100 ppm / °C	
Resolution digital	12 bit 24.66 mA / digit	
Analog Input		
Current Set Point	0 ... 10 V (1 V = 10 A)	Coaxial Port
CA-CSPA		Control Port
Input resistance	25 kΩ	Parallel Port

Specification		DPS 3000 - 100
Analog Outputs		
Diode Current SA-COUT	0 ... 10 V (1 V = 10 A)	Control Port
Accuracy	± 0.1 %	Parallel Port
Output resistance	0 Ω	
Diode Voltage SA-VOUT	0 ... 10 V (1 V = 10 V)	Control Port
Accuracy	± 0.2 %	Parallel Port
Output resistance	0 Ω	
Diode Power SA-POUT	0 ... 10 V (1 V = 300 W)	Control Port
Accuracy	± 1 %	Parallel Port
Output resistance	0 Ω	
Reference Voltage VREF	+ 10 V	Control Port
Accuracy	± 0.05 %	Parallel Port
Output resistance	0 Ω	
+ 15 V AUX+	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
- 15 V AUX-	100 mA max	Control Port
Output resistance	10 Ω	Parallel Port
+ 5 V	300 mA max	DC-Port
Output resistance	0.2 Ω	
+ 15 V	300 mA max	DC-Port
Output resistance	0.2 Ω	
-15 V	300 mA max	DC Port
Output resistance	0.2 Ω	
Digital Inputs		
Power Supply On	active-high	Control Port
CD-ON	TTL level up to + 30 V	Parallel Port
Current Set Point 12 Bit Disable	active-high	Parallel Port
CD-CSPDD	TTL level up to + 30 V	
Current Set Point Stand By	active-high	Parallel Port
12 Bit Enable	TTL level up to + 30 V	
CD-CSPSDE		

Specification		DPS 3000 - 100
Digital Inputs continuation		
Current Set Point 12 Bit CD-CSPD	active-high TTL level up to + 30 V	Parallel Port
Current Limit 12 Bit CD-CL	active-high TTL level up to + 30 V	Parallel Port
Digital Outputs		
Power Supply is Ready SD-PSR	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Current Fault SD-CFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Voltage Supervision Value Exceeded SD-VFAIL	active-low, open collector 30 V max, 20 mA max	Control Port Parallel Port
Power Supply is ON SD-PSON	active-low, open collector 30 V max, 20 mA max	Parallel Port
Power Limit Reached SD-PL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Current Limit Reached SD-CL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Temperature Limit Reached SD-TL	active-low, open collector 30 V max, 20 mA max	Parallel Port
Hardware Fault SD-HFAIL	active-low, open collector 30 V max, 20 mA max	Parallel Port

Specification		DPS 3000 - 100
Interfaces		
Dielectric strength against PE	50 V DC	
DC Port	short-circuit proof via internal fuse	4-pole pin plug connector MC0.5/4-G2.5 Phoenix
Coaxial Port		Coaxial plug
Analog Input	0 ... 10 V	Sub miniature SMB
Control Port		15-pole female plug connector
Analog Input	0 ... 10 V	according to DIN 41652
Analog Outputs	0 ... 10 V	and MIL-C-24308
Digital Input	active-high	internal thread UNC 4-40
Level logical 0	0 V < 0.8 V	
Level logical 1	> 2 V < 30 V	
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	
Parallel Port (accessories)		Female plug connector
Analog Input	0 ... 10 V	50-pole SCSI miniature
Analog Outputs	0 ... 10 V	
Digital Input	active-high	
Level logical 0	0 V < 0.8 V	
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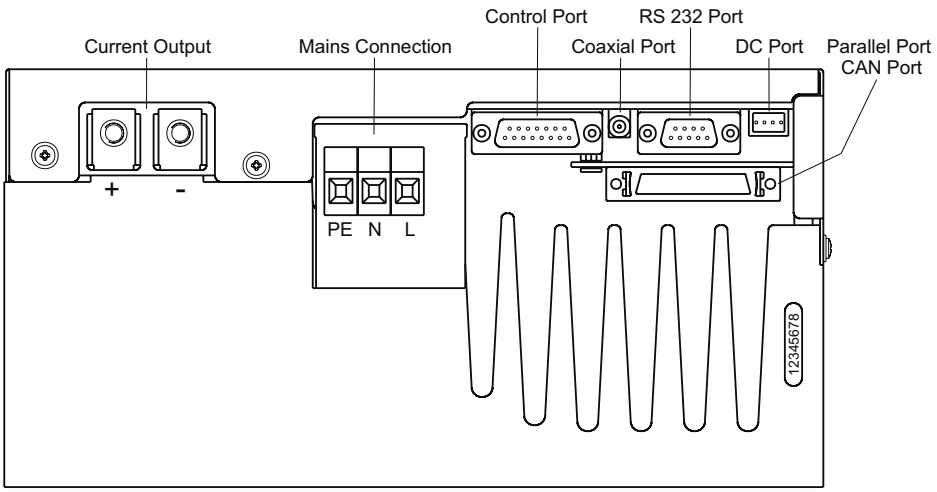
Minimal time for logical 0	> 128 µs	
Minimal time for logical 1	> 128 µs	
Digital Outputs	active-low, open collector pull up resistors required	
Maximum permitted voltage	30 V	
Maximum permitted current	20 mA	
Level logical 0	0 V < 0.4 V	
Level logical 1	> 0.4 V < 30 V	

Specification			DPS 3000 - 100
RS 232 Port	DEE CCITT V.28		9-pole female plug connector
Baud rate	2400 ... 115200 baud no hardware hand shake RTS/CTS looped-through by a jumper RTS configurable by a jumper logical 0 or 1		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Level logical 0	> + 3 V		
Level logical 1	< - 3 V		
Overvoltage protection			
Human body model	± 15 kV		
Contact discharge	± 8 kV	IEC1000-4-2	
Air Gap Discharge	± 15 kV	IEC1000-4-2	
CAN Port (accessories)			9-pole pin plug connector
Transmission rate	1 MBit/s		according to DIN 41652 and MIL-C-24308 internal thread UNC 4-40
Suitable bus levels	12 and 24 V		
Lead length maximum	40 m		
Connection cable impedance	120 Ω		
Temperature range			
Surrounding	0 ... 45 °C		
Storage	- 20 ... + 80 °C		
Dewfall	not allowed		
Protection type	IP20		
Cooling type			
Air cooling	filter required		
Water cooling (accessories)	de-ionized water		
Dimensions	312 x 247 x 126 mm		
Weight	17 kg		
Conformity			
Security	EN 61010		
EMV	EN 50081-1 EN 55014		
ESD air	EN 61000-4-2 8 KV		
Surge	EN 61000-4-5 3 KV		
Harmonic current at the mains	EN 61000-3-2 IEC 1000-3-2 VDE 0838		

Connection Elements



Power Supply
3-pole terminal strip, to hold supply lines in the range of 1.5 - 4 sqmm.

Current Output
2-pole screw type connection with internal thread M6, maximum depth of threaded hole 10 mm. For ring tongues with outside diameter up to 12 mm and wire cross-section up to 25 sqmm.

DC Port
4-pole pin plug connector MC0.5/4-2.5 Phoenix.

Coaxial Port
Coaxial pin plug connector 2-pole SMB.

Control Port
15-pole female plug connector according to DIN 41652 and MIL-C-24308, internal thread UNC 4-40.

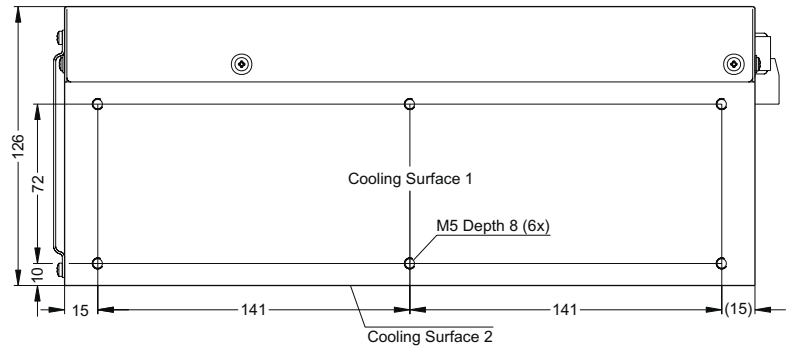
Parallel Port
50-pole female plug connector SCSI miniature.

RS 232 Port
9-pole female plug connector according to DIN 41652 and MIL-C-24308, internal thread UNC 4-40.

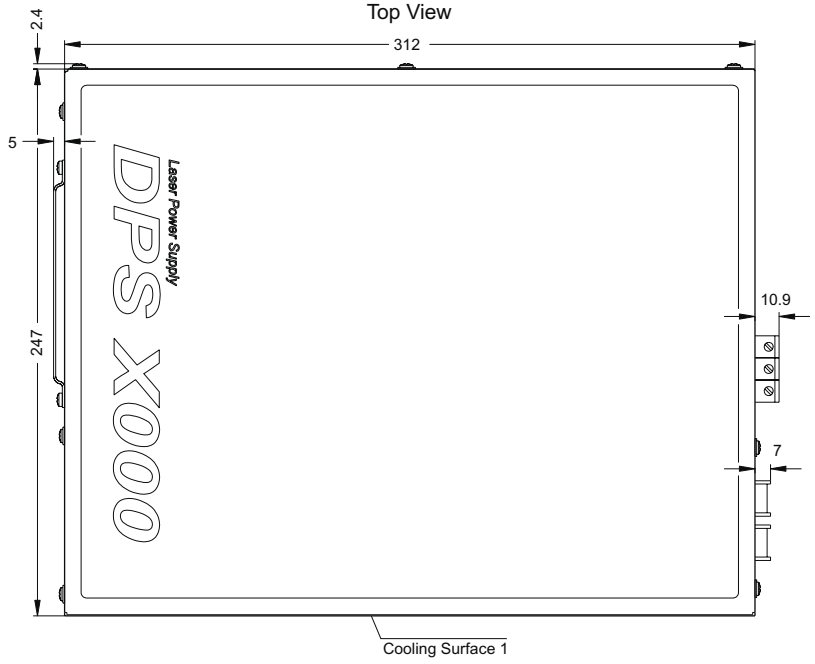
CAN Port
9-pole pin plug connector according to DIN 41652 and MIL-C-24308, internal thread UNC 4-40.

Dimensions

Side View

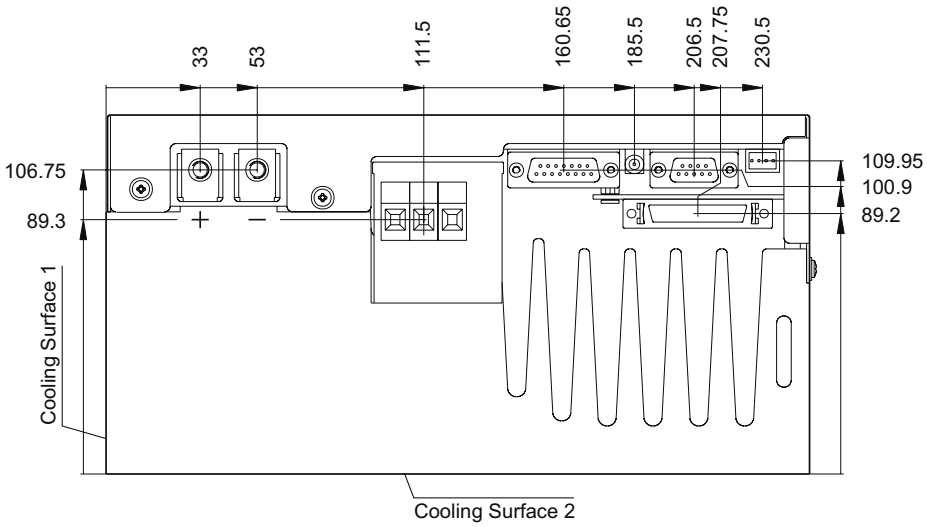


Top View

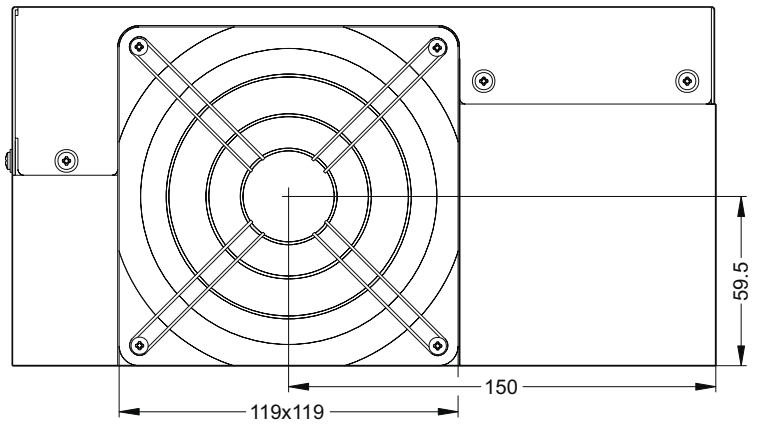


Dimensions

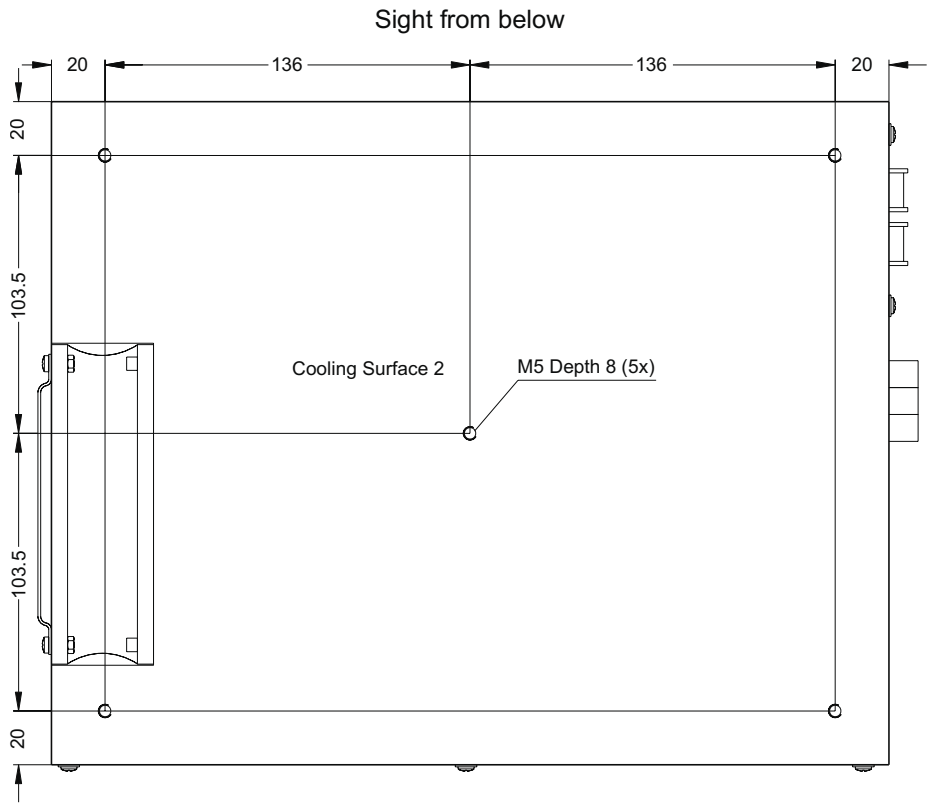
Front View



Rear View



Dimensions


Sight from below
20
136
136
20
20
103.5
103.5
20
Cooling Surface 2
M5 Depth 8 (5x)

Identity numbers and deliverable accessories

Type		Identity number
Laser Power Supply	DPS 1000-050	10100251
Laser Power Supply	DPS 1000-070	10100252
Laser Power Supply	DPS 1000-100	10100254
Laser Power Supply	DPS 2000-050	10100261
Laser Power Supply	DPS 2000-070	10100262
Laser Power Supply	DPS 2000-100	10100264
Laser Power Supply	DPS 3000-050	10100271
Laser Power Supply	DPS 3000-070	10100272
Laser Power Supply	DPS 3000-100	10100274
Parallel Port		10360260
CAN Port		10360263
Water cooler lateral, de-ionized water suitable		10300291
Mounting plate lateral		10500846
Mounting plate below		10500847

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