

Operating Manual
Diode High Power Driver (Pulsed) DPD(P)

Document: 10101195OM

Revision: 00

Date:04.06.2019


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Warning!

**Risk of exposure of hazardous laser radiation
in combination with laser light emitting devices!**

Revision	00					
Created		Approved		Released		Form
04.06.2019	INe	04.06.2019	OWa	04.06.2019	KS	
Distribution:				File:		

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1. Safety Instructions

MESSTEC Power Converter GmbH cannot be held responsible for any damages resulting from wrong usage of this device.

Only trained or skilled personnel are allowed to use this device.

This manual should be read and followed carefully before use.

Caution:

Risk of fatal injury from electrical voltage!

The Laser system has to be proved under national safety regulations (e.g. EMC, safety interlock, etc.) by the user.

There is an Emergency-Off Switch at the front panel of the system.

It should be only used in case of emergency not for normal switching off.

This device series accepts wide range 3-phase AC input (3 ψ 4-wire / Y 340~530VAC) (see Fig.1).

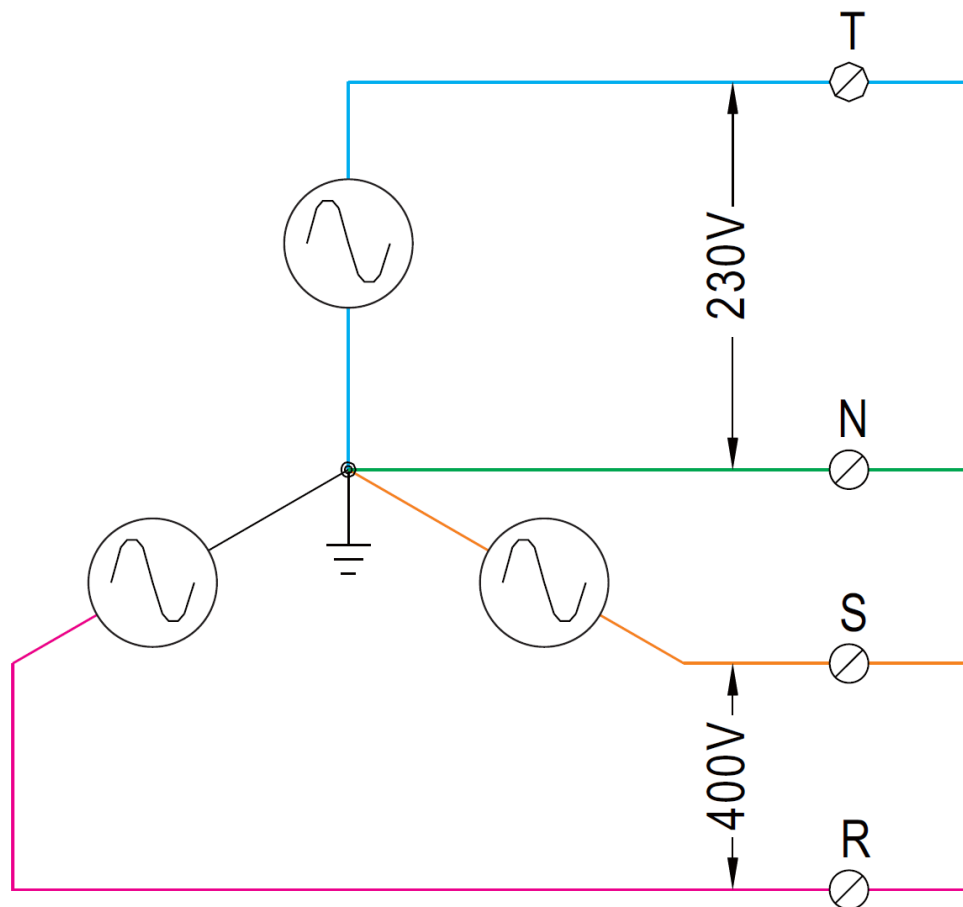



Fig.1

Note: The configuration with input 3-phase AC 3-wire (3 ψ 3-wire / Δ 196~305VAC) is on request.

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The maximum permitted output power is 4800 W.

Mains cable cross-section: >2,5 mm².

Output cable cross-section: >50 mm², use ring terminals.

Take care of correct wiring. Wrong polarity will damage the diodes. Never disconnect the output lines for the laser diodes during operation. This may generate a dangerous electric arc which can lead to skin burns or to fire.

Air-cooled version: Air is drawn in at the front side and is blown out at the rear side. In an environment with conductive dust, air filtering is required.

Important:

The external pulse unit must be cooled separately. For this purpose, the pulse unit has to be mounted on a heat sink.

Caution:

When mounting in the rack, ensure that it is securely installed. The device must not only be fixed to the front panel, but requires reinforcing elements (e.g. mounting rails etc.).



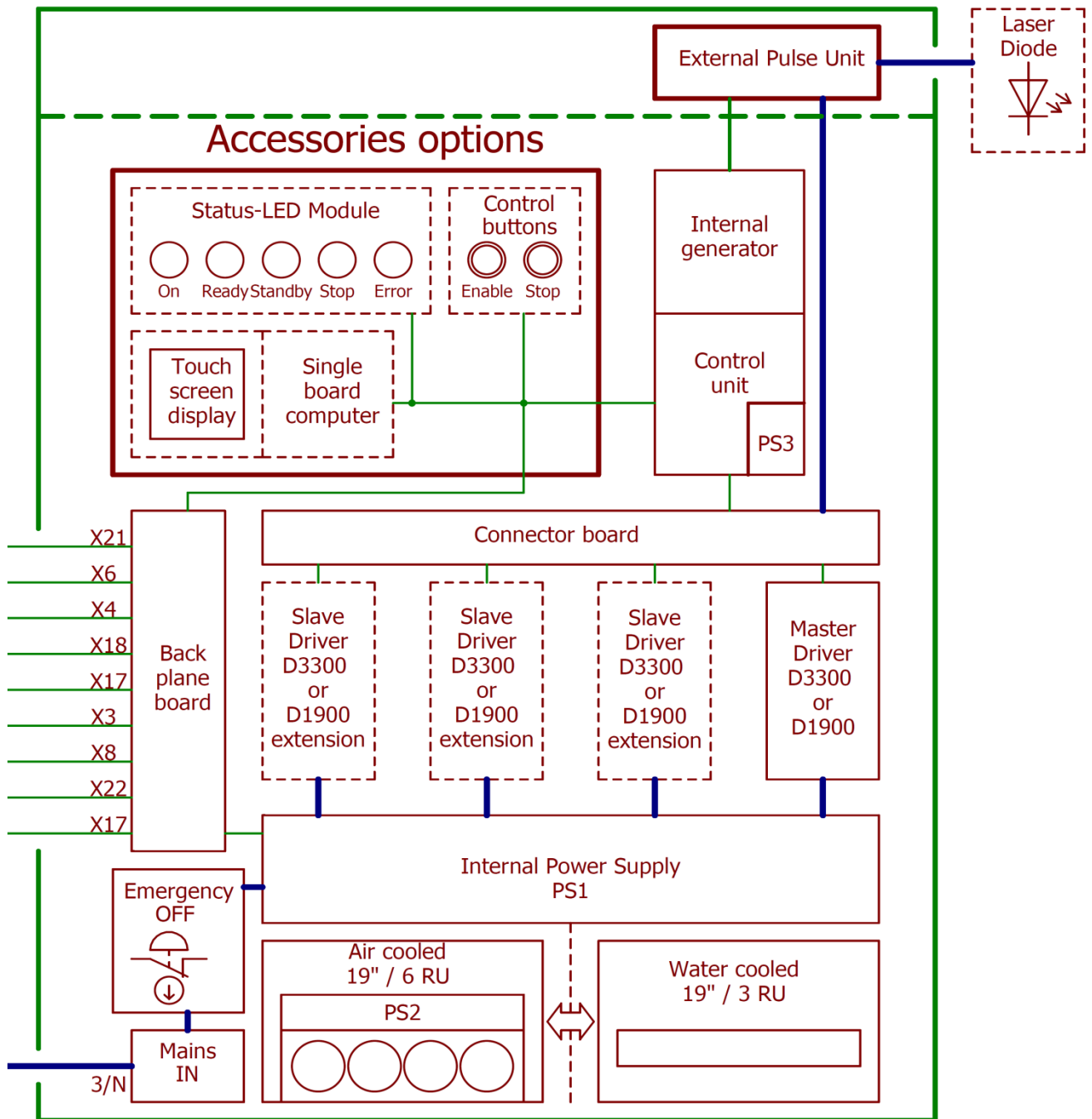
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2. Description

2.1. General information

The fully programmable system is designed to operate as pulsed, burst or CW current source for laser diodes and laser diode stacks.

The DPD (P) is a modular system and can be delivered in a variety of combinations (see Fig.2: DPDP and Fig.3: DPD).



DPDP

Fig. 2

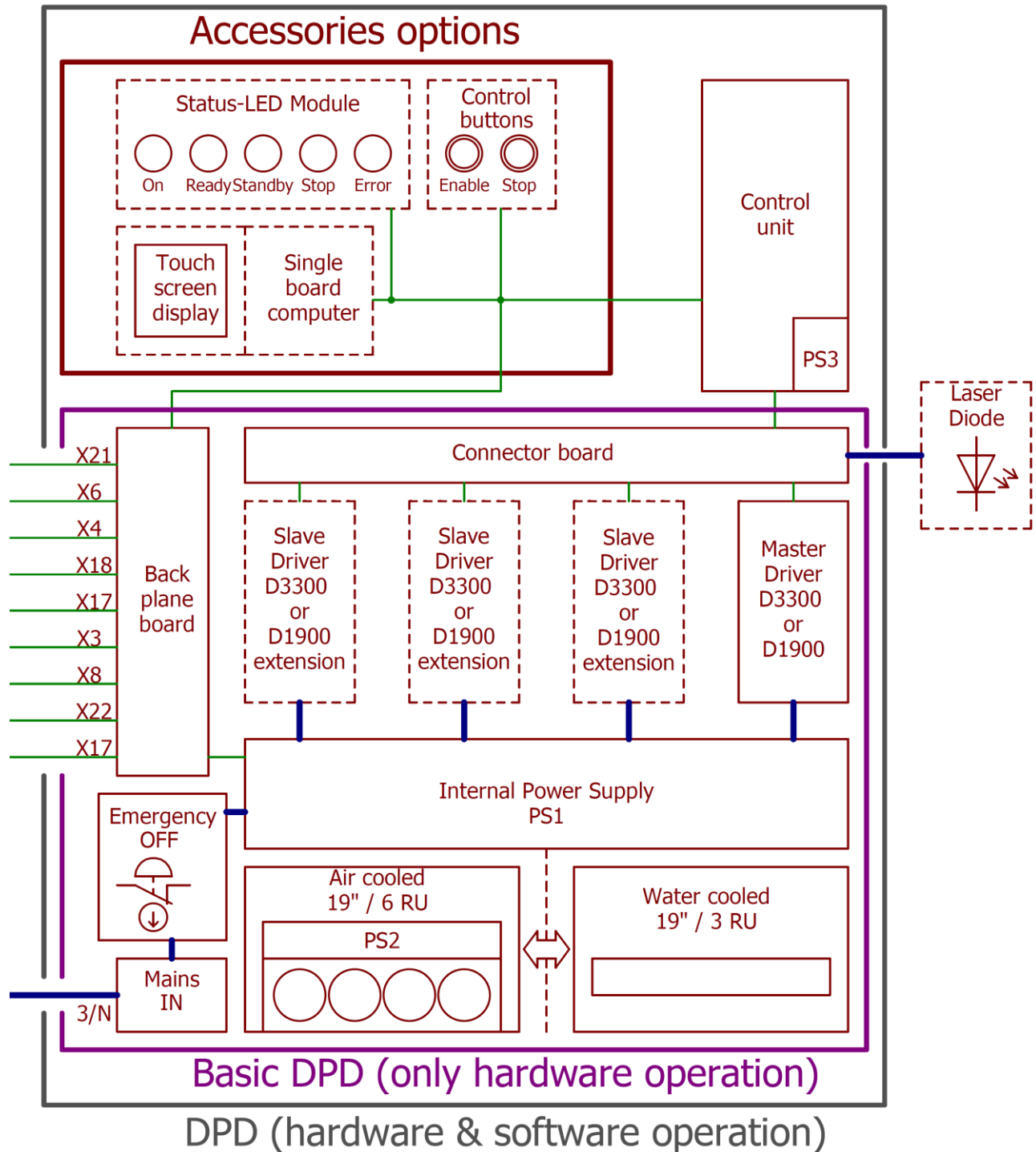


Fig. 3

Basic modules of the device are diode drivers: D3300-60 or D1900-80. It is possible to combine two to four diode drivers. Depending on the number and type of built-in drivers, the maximum output current and maximum diode voltage are defined (see Fig. 4).

Type of diode driver	Number of driver	Maximum output current	Maximum output voltage
D3300-60	2	120 A	55 V
D3300-60	3	180 A	55 V
D3300-60	4	240 A	55 V
D1900-80	2	160 A	26 V
D1900-80	3	240 A	26 V
D1900-80	4	320 A	26 V

Fig. 4

There are two different types of basic models: DPD and DPDP.

The DPD model is a high power laser diode driver exclusively for CW applications.

The DPDP model operates together with an external pulse unit and is a high power laser diode driver for CW and pulsed applications. The external pulse unit is a small and compact box. This unit is electrically connected with the DPD unit via two cables for the diode current and a control cable (see section 2.2.6). This model is suited for applications where it is not possible to mount the power supply near the diodes or where short rise and fall time as well as a high pulse frequency is required. In this case the DPDP unit can be mounted anywhere and the small external pulse unit has to be mounted near the laser diodes.

Dynamic performance

DPD (P) devices offer high accuracy, excellent pulse characteristics and stability, low temperature drift and an ideal current source characteristic with very high output impedance. No current overshoot or ringing arise when altering output current or load impedance changes abruptly.

Furthermore, a major feature is the dynamic output impedance which has significant effects to the diode current if load impedance alters abruptly.

For example if there is a loose contact at the output lines and the output circuit is open. The driver's output voltage will increase to its maximum value because of its characteristic to inject current.

If the contact will be closed again and you have a conventional laser driver with low dynamic output impedance, excessive overcurrent will damage the laser diode.

The same happens if you have stacked diodes and one of its emitters will get short circuit. The load impedance will alter abruptly at this moment and excessive overcurrent will damage the complete stack.

Different from a conventional laser driver, the DPD (P) responds absolutely reliable and no overcurrent occurs in this case.

Fig. 5 shows the response of a conventional laser diode driver at a nominal output current 100 %, if load impedance is changed abruptly to lower values.

Fig. 6 shows the response of the DPD (P) at the same conditions. The diode current stays constant.

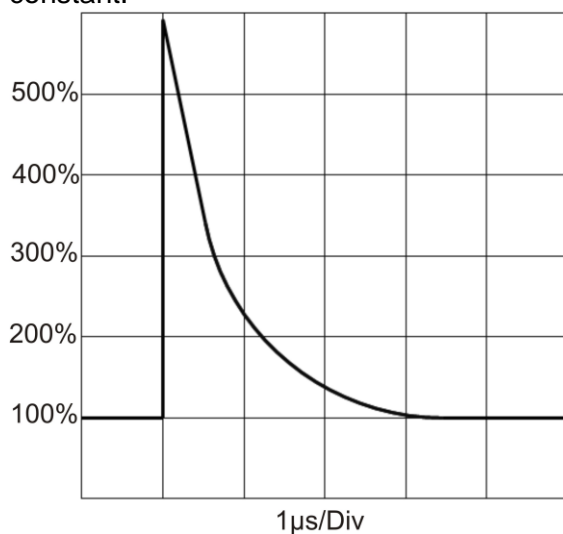


Fig.5

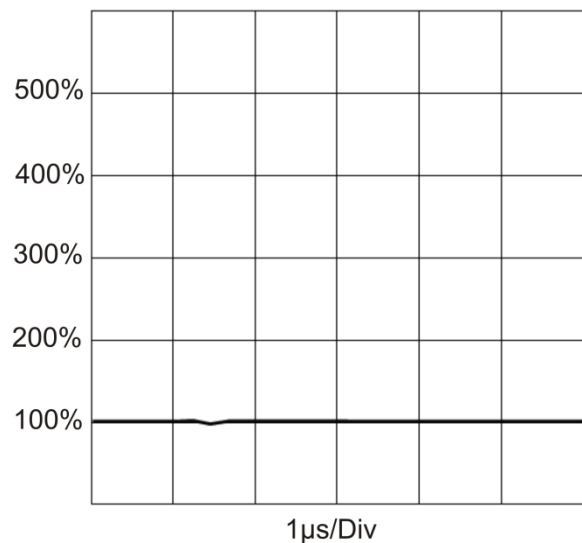


Fig. 6

Pulsing

The DPDP allows pulse width of 2 μ s minimum to CW. Rise and fall time depends on the inductance and the length of the output cables to the diodes. The shorter the cables, the shorter rise and fall time.

The maximum pulse frequency of the DPDP depends on the diode current, the inductance and the length of the output cables.

The lower the current and the shorter the lines, the higher is the possible pulse frequency. The maximum allowed pulse frequency is 20 KHz.

The DPDP is self-protected against higher pulse frequencies.

All models of DPDP are also available with an internal programmable pulse generator. The internal pulse generator is programmable in the range of 2 μ s to 512 s in steps of 125 ns. (separate pulse width, pulse pause). In addition to the internal pulse generator, an external pulse source can be used. Signals of the internal and external pulse sources can also be mixed.

Control options

DPD (P) devices can be equipped with the following control options:

- Operation via software (SW):

With PC software-, external PC or internal computer (Single Board Computer).
Software description see section 10.


Serial protocol (see document 10101195SI)

- Operation via hardware (HW) - control ports 1&2:

Stand-alone or in addition to an above-listed software operation.

- Operation exclusively hardware via control port 1:

Only available for DPD devices (CW application) without central control unit and accessories.

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Additionally, the device can have status LEDs and control buttons (see section 7).

The DPD (P) devices are available with the following cooling types: water cooled or air cooled. Air-cooled version is available in 6 RU 19" housing and water-cooled version in 3RU 19" housing. (see Fig.7)



Air-cooled version



Water-cooled version

Fig. 7

2.2. Connection elements of DPD (P).

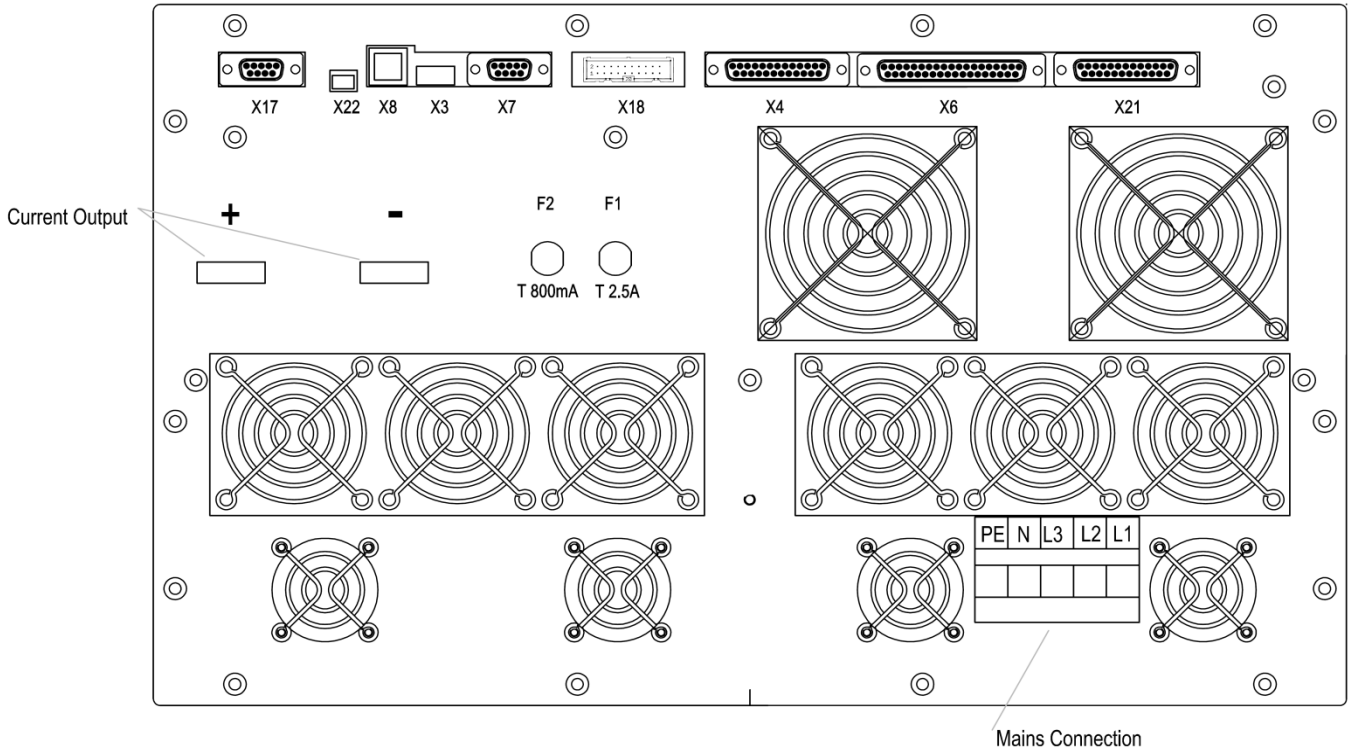


Fig.8: DPD (P) air cooled rear side

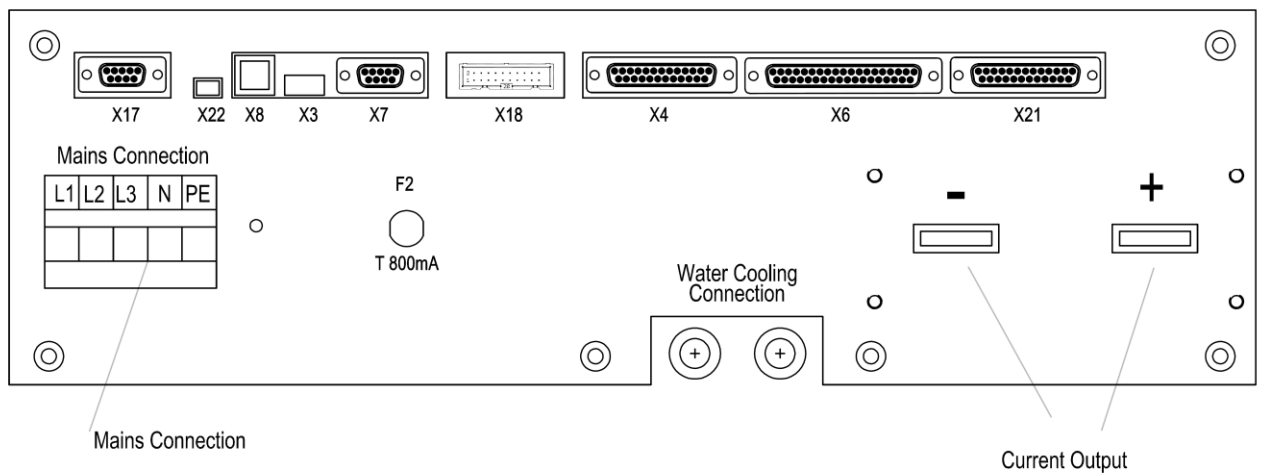



Fig.9: DPD (P) water cooled rear side

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2.2.1. Mains Connection

5-pole terminal strip, for cables with cross-section of 2,5 - 16 mm².

2.2.2. Current Output

2 output rails (width of coppers rails: 20mm) with 8mm holes, for ring cable lugs outer diameter up to 20mm. Recommended wire cross-section: min. 50mm².

2.2.3. X21 Control Port internal power supply

25-pin SUB-D male connector. Provided connector "Unlock PS" can be installed. Alternatively, the internal power supply can be operated via remote on/off (see section 9.1.3.).

2.2.4. X6 Control Port 2

37-pin SUB-D female connector. Provided connector "Enable DPDP" can be installed. Alternatively use according to the signal description (see section 9.3.1.).

2.2.5. X4 Control Port 1

25-pin SUB-D female connector, used for hardware operating mode (see section 9.2.1.).

2.2.6. X18 Pulse Unit Port

16-pole male connector to connect the external pulse unit (control cable external pulse unit 1 meter long is included in delivery; other lengths are available).

2.2.7. X7 pulse control port

9-pin SUB-D female connector (see section 8.4.1).

2.2.8. X3 USB-Port of Single Board Computer (optional)

USB 2.0 type A connector, 4 –pin.

2.2.9. X8 Ethernet-Port of Single Board Computer (optional)


RJ45 connector, 8-pin.

2.2.10. X22 Serial interface USB Port

MINI USB 2.0 type B connector, 5-pin serial port of DPD (P) (see section 9.5.1.).

2.2.11. X17 Serial interface RS 232 (optional RS 485) port

9-pin SUB-D female connector (see section 9.5.2.).

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2.2.12. F1 Fuse of fan unit (only for air-cooled devices)

T 2.5A 5x20mm time-lag surge withstand glass body cartridge fuse designed to IEC specification.

2.2.13. F2 Fuse of control unit

T 800mA 5x20mm time-lag surge withstand glass body cartridge fuse designed to IEC specification.

2.2.14. Water cooling connections (only for water-cooled devices)

Water connector PM010812E (for tube OD=8 mm).
Cooling water: pressure max. 6 bar; temperature 20°C.

Note: Sub-D connectors according to DIN 41652 and MIL-C-24308, UNC4-40.

2.3. Connection elements of external pulse unit

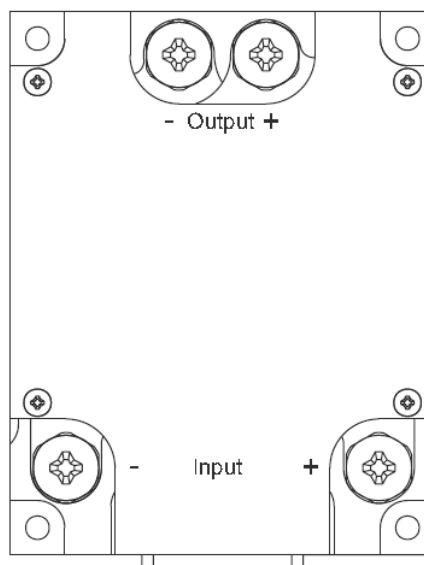
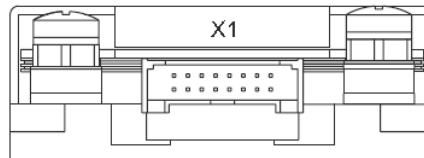


Fig. 10: External Pulse Unit

2.3.1. Pulse Unit Input

2 screw terminals M6, for ring cable-lugs with outer diameter up to 12 mm and recommended wire cross-section 50 mm², for connecting the current output of DPD (P) device with external pulse unit.

2.3.2. Pulse Unit Output - and Output +

2-pole screw terminal (M6), for ring cable-lugs with outer diameter up to 12 mm. The laser diode is connected here.

2.3.3. Pulse Unit X1

16-pole male connector for connecting the control port (X18 of DPD (P)).

3. Current block diagram

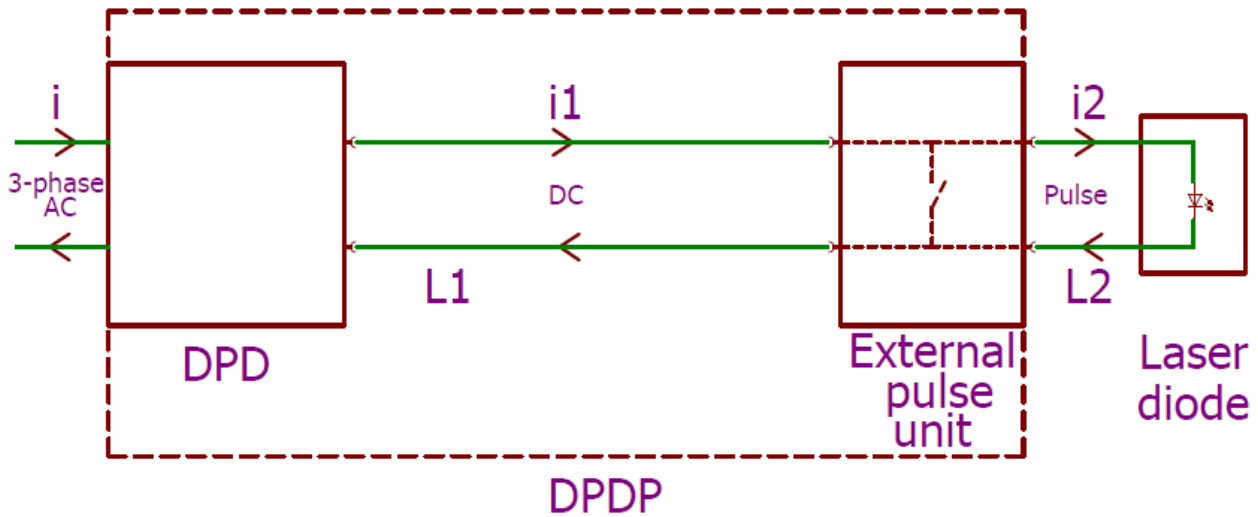


Fig. 11

Legend:

- i – input current, 3-phase AC
- i_1 - DPD output current to pulse unit, regardless of operating mode is always DC.
- i_2 - pulse unit output current to laser diode.
- L1 – current cable from DPD to pulse unit
- L2 – current cable from pulse unit to laser diode

Pulse unit has to be mounted near to the laser diode.

The shorter the pulse unit output cable (L2), the shorter the rise time and fall time.

The length of cable L1 should not be more than 10 meters (cable cross-section should be dimensioned according to the cable length).

4. Switching ON, Procedure

To activate the system, various enable signals must be issued (see Fig.12).

Enable chain

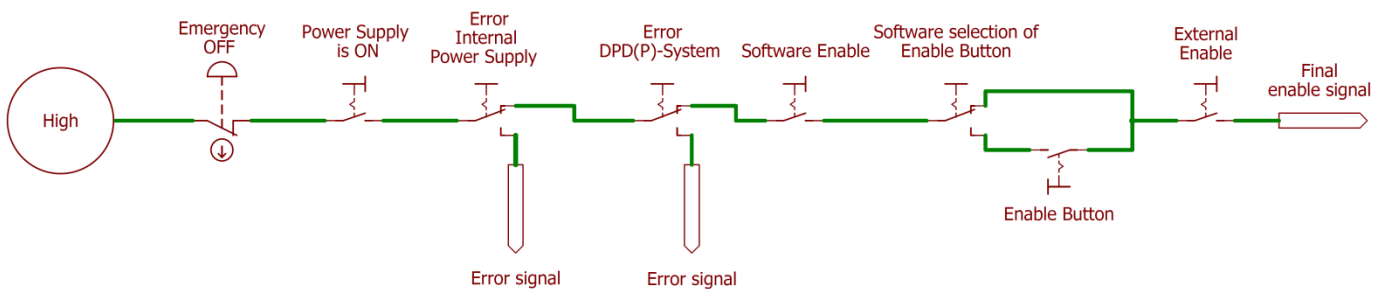


Fig. 12

- **Emergency OFF** switch is released.
- **Power supply is on:**
the provided connector "Unlock PS" must be installed or the power supply can be turned ON by using the "Remote on/off" function (see section 8.1.3.).
The provided connector "Unlock PS" (option) must be installed.
- **Error Internal Power Supply:**
Power supply is error free. Otherwise, the error messages come at X21 (see section 9.1.1.).
- **Error DPD (P)-System:**
System is error free. Otherwise, the error messages come at X6 (see section 9.3.1.).

Note: After switching on the system the device is running a self-test in the background looking for all interlock functions to be ready for operation. This may take up to 1 minute (fan test etc.).

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- **Software enable is active:**
Device settings (operation mode and configuration data) via serial interface (see document 10101195 SI section 4), via software (see section 10.) or via touch display of single board computer.
Operation via hardware: only the external enable is necessary (see section 5).
- **External enable button is selected (optional):**
Device must to be set via serial interface (see document 10101195 SI section 4), via software or via touch display of internal single board computer (see section 10.3.2.):
“Activate external enable button”
- **External enable is active:**
Set signal “external enable” (X6 Pin 32) to high (see section 8.3.2.).
The provided connector "Enable DPDP" (option) must be installed. Toggle switch to position „on“.

Now the system is enabled and ready to operate depending on operating mode (see section 5.).

5. Operating modes

The following operating modes at DPD (P) are possible (see Fig. 13.).

Operating modes		Hardware operation	Software operation without internal pulse generator	Software operation with internal pulse generator
CW mode	CW	✓	✓	✓
	CW with external Gate	-	✓	✓
Pulsed mode	External Pulse Source	✓	✓	✓
	External Pulse Source inverted	-	-	✓
	External Pulse Source with external Gate	-	-	✓
	Internal Pulse Source	-	-	✓
	Internal Pulse Source with external Gate	-	-	✓
	Internal Pulse Source with external Gate synchronized	-	-	✓
	Internal Burst Generator	-	-	✓
	Internal Burst Generator with external Gate	-	-	✓
	Internal Burst Generator with external Gate synchronized	-	-	✓

Fig. 13

The DPD (P) device has two set points for current adjustment. Set point 1 can be set via software optionally (depending on the device configuration) this can be switched to external hardware operation - CA-DCSP1; factory setting (see Fig. 14). The set point 2 (CA-DCSP2) can be set via the hardware operation (see section 8.2.1.).

Note: Both set-points are added internally.

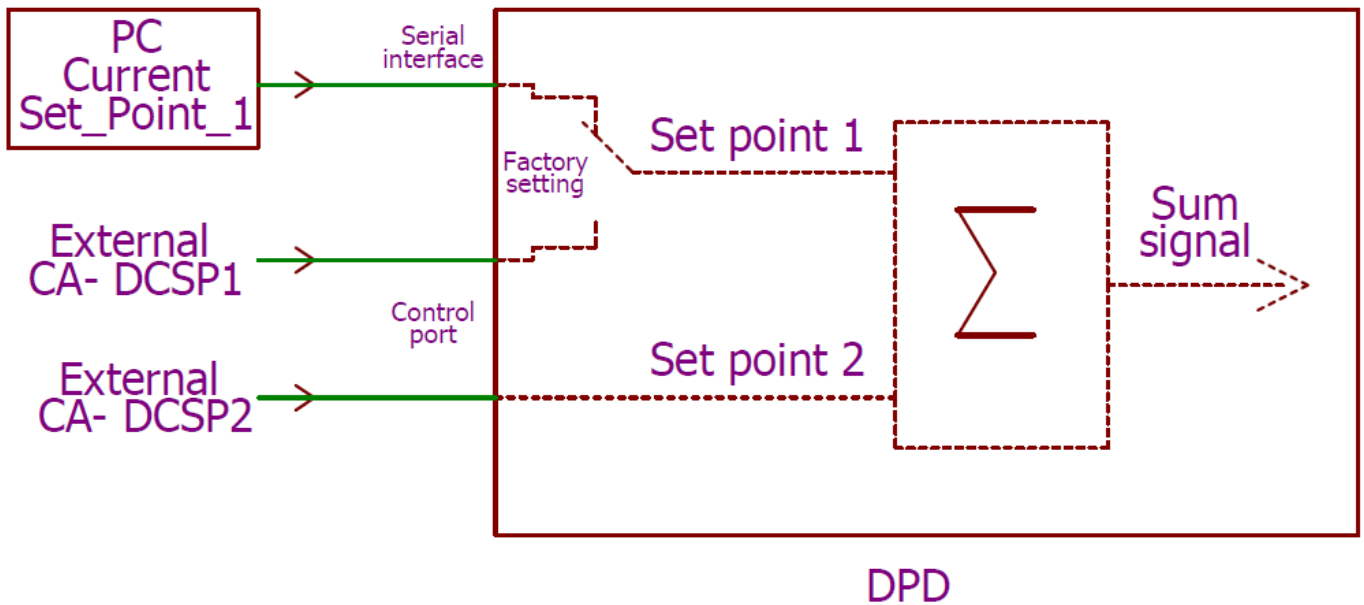


Fig. 14

5.1. CW mode

5.1.1. CW

After enabling (see section 4), the device supplies the DC current according to set point setting.

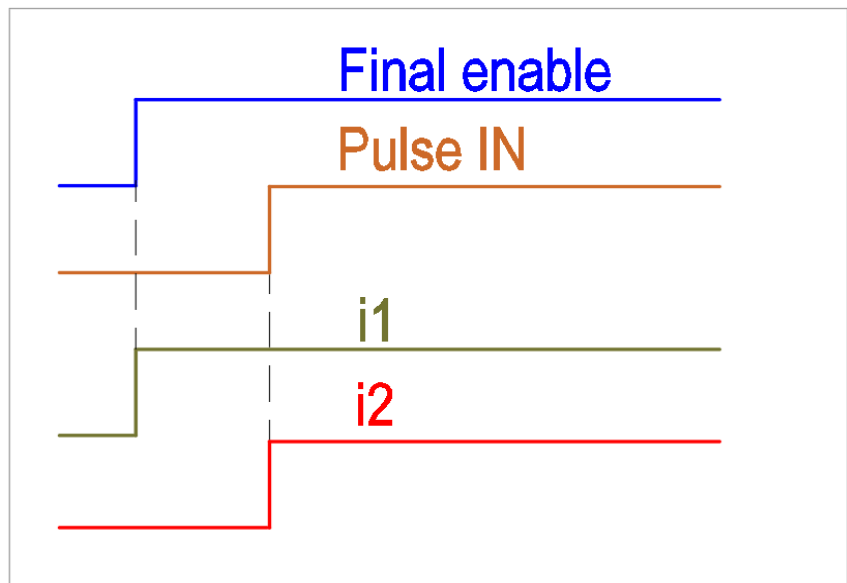



Fig. 15

Settings for HW operation:

- Set value for current level via CA-DCSP2 –Set Point 2 (X4 pin4) (see section 2.2.5.).
- Set signal “external enable” (X6 pin 32) to high.
DPD output is final enabled (see Fig.15).
i1 according CA-DCSP2 –Set Point 2
i2 is zero.
- Set signal “Pulse IN” (X7 pin 1) to high.
Pulse unit output is now enabled.
i1=i2.

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Settings for SW operation (serial protocol):

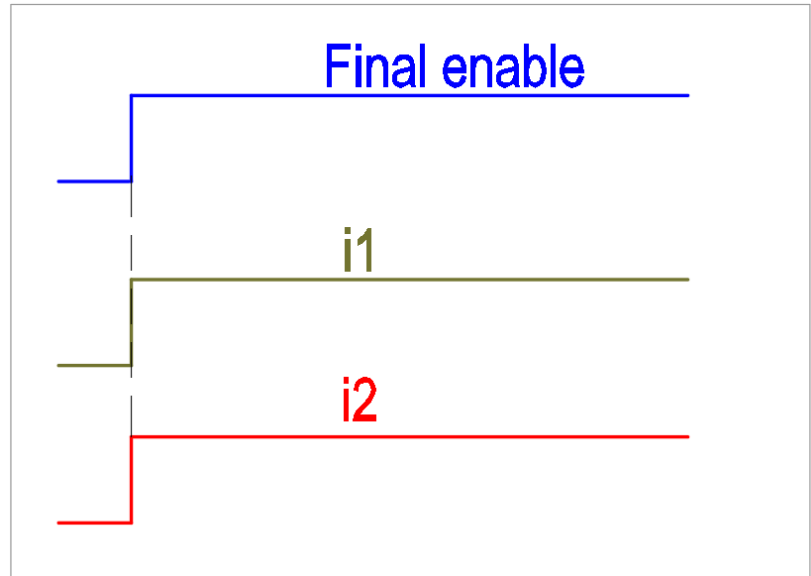


Fig. 16

- Connect a PC to the serial interface port (USB, RS 232 or RS 485)
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart Mode not active*
 - Set CW mode*
 - Set enable button is excluded*
 - Set software enable*
- Set signal “external enable” (X6 pin 32) to high.
DPD output and pulse unit output are final enabled (see Fig.16),
i1 according Current_Set_Point_1,
i2=i1.

***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.1.2. CW with external Gate (serial interface)

This mode is only possible for SW operation. After enabling (see section 4) and sending the external gate signal to "Gate IN" (X7 pin 1) the device supplies the i_2 current according to set point setting.

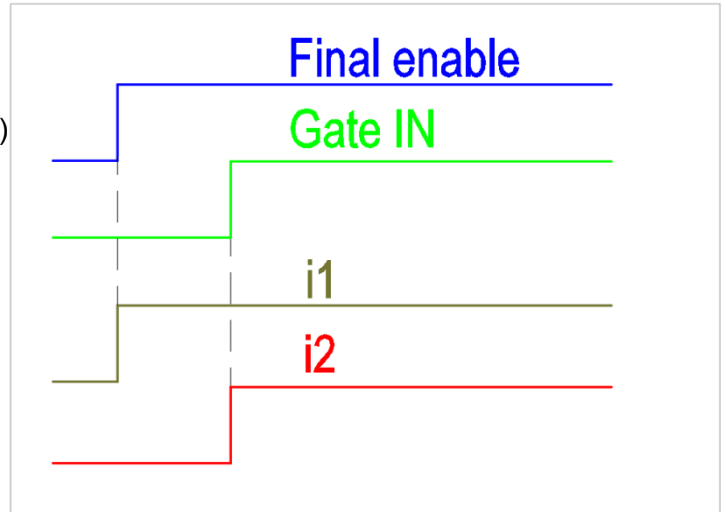


Fig. 17

- Connect a PC to the RS232 port.
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart mode not active*
 - Set CWmode*
 - Set external gate signal*
 - Set enable button is excluded*
 - Set software enable*
- Set signal "external enable" (X6 pin 32) to high. DPD output is final enabled (see Fig.17). i_1 according Current_Set_Point_1, i_2 is zero.
- Connect external gate signal to "Gate IN" (X7 pin 1). This signal enables the pulse unit output. i_2 amplitude= i_1 amplitude.

***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2. Pulsed mode

5.2.1. External Pulse Generator

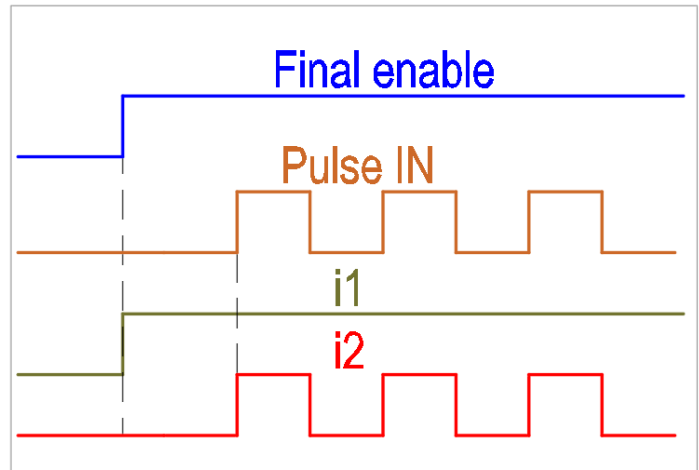



Fig. 18

Settings for HW operation

- Set value for current level via CA-DCSP2 (X4 pin4) (see section 2.2.5.).
- Set signal “external enable” (X6 pin 32) to high.
DPD output is final enabled (see Fig.18).
i1 according CA-DCSP2, i2 is zero.
- Connect external pulse generator to “Pulse IN” (X7 pin 1). This signal enables the pulse unit output. Speti
i2 amplitude=i1 amplitude.
Specification external signals: TTL-level.

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Settings for SW operation (serial interface)

- Connect a PC to the RS232 port.
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart mode not active*
 - Set pulsed mode*
 - Set don't invert pulse unit output*
 - Set pulse source: external pulse signal*
 - Set no external gate signal*
 - Set enable button is excluded*
 - Set software enable*
- Set signal “external enable” (X6 pin 32) to high.
DPD output is final enabled (see Fig.18).
i1 according Current_Set_Point_1, i2 is zero.
- Connect external pulse generator to “Pulse IN” (X7 pin 1). This signal enables the pulse unit output.
i2 amplitude=i1 amplitude.
Specification external signals: TTL-level.

***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2.2. External Pulse Generator inverted

This mode is only possible for SW operation with internal generator.

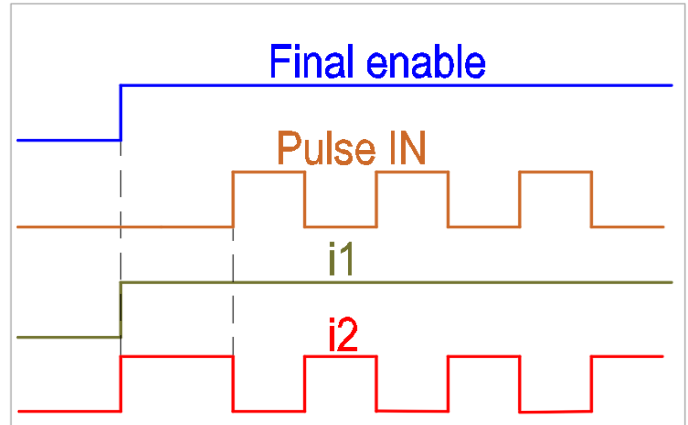


Fig. 19

Settings for SW operation (serial interface)

- Connect a PC to the RS232 port.
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart mode not active*
 - Set pulsed mode*
 - Set invert pulse unit output*
 - Set pulse source: external pulse signal*
 - Set no external gate signal*
 - Set enable button is excluded*
 - Set software enable*
- Set signal “external enable” (X6 pin 32) to high. DPDP output is final enabled (see Fig.19). $i1$ according Current_Set_Point_1, $i2=i1$.
- Connect external pulse generator to “Pulse IN” (X7 pin 1). This signal now inverts the pulse unit output.
- $i2$ amplitude= $i1$ amplitude.
Specification external signals: TTL-level.

***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2.3. External Pulse Generator with external Gate

This mode is only possible for SW operation with internal generator.

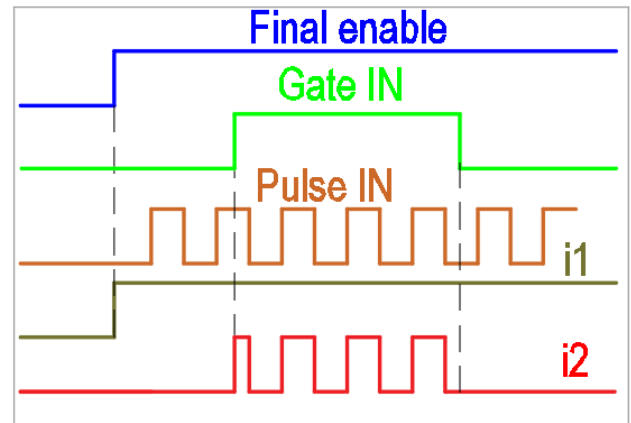


Fig. 20

Settings for SW operation (serial interface)

- Connect a PC to the RS232 port
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Operating mode:
Set initialization of DPDP
Set autostart mode not active
Set pulsed mode
Set don't invert pulse unit output
Set pulse source: external pulse signal
Set external gate signal
Set enable button is excluded
Set software enable
- Set signal "external enable" (X6 pin 32) to high.
 DPD output is final enabled (see Fig.20).
 i1 according Current_Set_Point_1, i2 is zero.
- Connect external pulse generator to "Pulse IN" (X7 pin 1).
- Connect external gate signal to "Gate IN" (X7 pin 1). This signal enables the pulse unit output.
 i2 amplitude=i1 amplitude.
 Specification external signals: TTL-level.

***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2.4. Internal Pulse Generator

This mode is only possible for SW operation with internal generator.
The pulses are generated by internal generator.

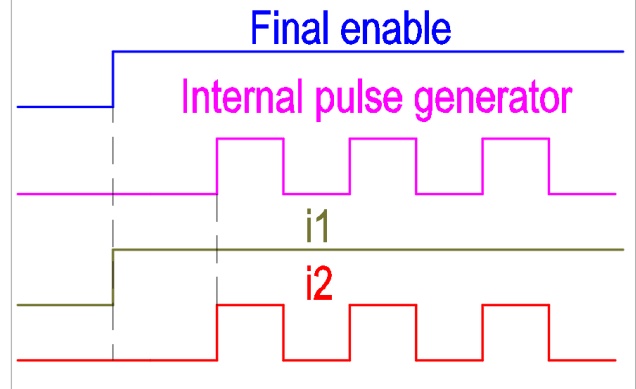


Fig. 21

Settings for SW operation (serial interface)

- Connect a PC to the RS232 port.
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Time_Base Factor.
 - Pulse_Time_Factor.
 - Pause_Time_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart mode not active*
 - Set pulsed mode*
 - Set don't invert pulse unit output*
 - Set pulse source: internal pulse signal*
 - Set no external gate signal*
 - Set enable button is excluded*
 - Set software enable*
- Set signal "external enable" (X6 pin 32) to high.
DPD output and pulse unit output are final enabled (see Fig. 21).
i1 according Current_Set_Point_1.
i2 amplitude=i1 amplitude.

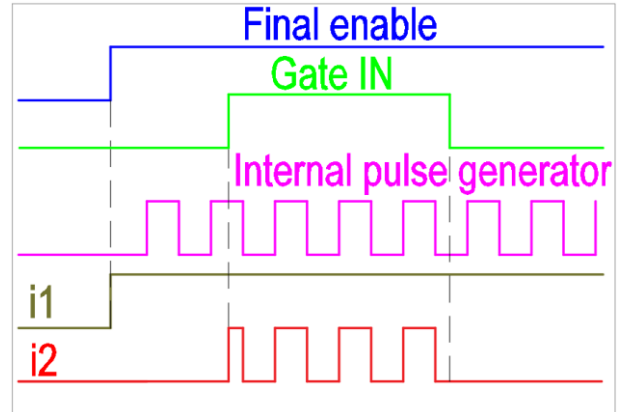
***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2.5. Internal Pulse Generator with external Gate

TTL level

This mode is only possible for SW operation with internal generator.



Settings for SW operation (serial interface)

- Connect a PC to the RS232 port.
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Time_Base Factor.
 - Pulse_Time_Factor.
 - Pause_Time_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart mode not active*
 - Set pulsed mode*
 - Set unsynchronized mode*
 - Set don't invert pulse unit output*
 - Set pulse source: internal pulse signal*
 - Set external gate signal*
 - Set enable button is excluded*
 - Set software enable*
- Set signal "external enable" (X6 pin 32) to high. DPD output is final enabled (see Fig.22). i1 according Current_Set_Point_1, i2 is zero.
- Connect external gate signal to "Gate IN" (X7 pin 1). This signal enables the pulse unit output. i2 amplitude=i1 amplitude. Specification external signals: TTL-level.

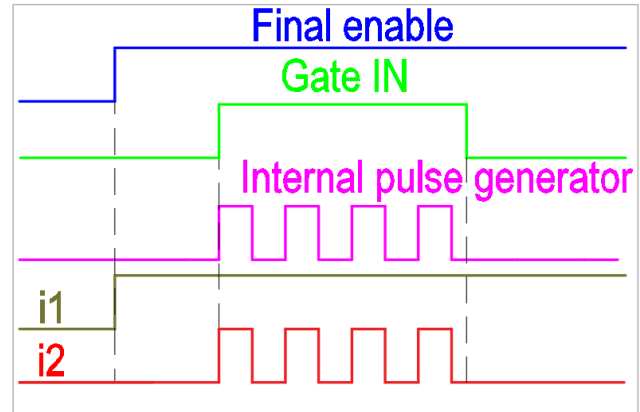
Fig. 22

***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2.6. Internal Pulse Generator with external Gate synchronized

This mode is only possible for SW operation with internal generator.
The rising slope of output pulse is synchronous with rising slope of gate signal.



Settings for SW operation (serial interface)

- Connect a PC to the RS232 port.
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Time_Base Factor.
 - Pulse_Time_Factor.
 - Pause_Time_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart mode not active*
 - Set pulsed mode*
 - Set synchronized mode*
 - Set don't invert pulse unit output*
 - Set pulse source: internal pulse signal*
 - Set external gate signal*
 - Set enable button is excluded*
 - Set software enable*
- Set signal "external enable" (X6 pin 32) to high. DPD output is final enabled (see Fig. 23). i1 according Current_Set_Point_1, i2 is zero.
- Connect external gate signal to "Gate IN" (X7 pin 1). This signal enables the pulse unit output. Output signal is synchronous with gate signal. i2 amplitude=i1 amplitude. Specification external signals: TTL-level.

Fig. 23

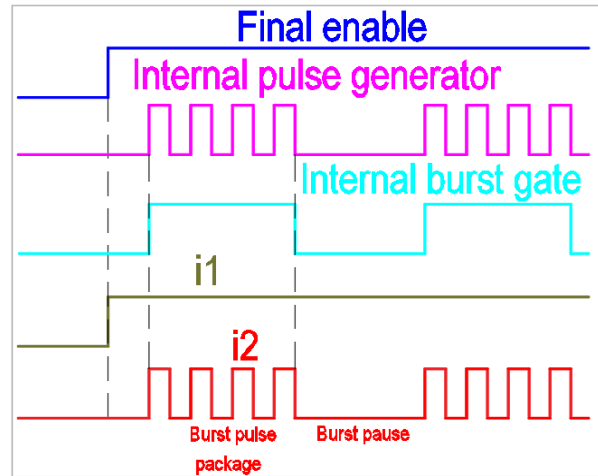
***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2.7. Internal Burst Generator

This mode is only possible for SW operation with internal generator.

The burst pulses are generated by internal generator.



Settings for SW operation (serial interface)

- Connect a PC to the RS232 port.
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Time_Base Factor.
 - Pulse_Time_Factor.
 - N-Cycles.
 - Burst_Pause_Factor .
 - Pause_Time_Factor.
 - Operating mode:
 Set initialization of DPDP
 Set autostart mode not active
 Set pulsed mode
 Set don't invert pulse unit output
 Set pulse source: internal pulse signal
 Set no external gate signal
 Set burst mode
 Set enable button is excluded
 Set software enable
 Set signal "external enable" (X6 pin 32) to high.
 DPD output and pulse unit output are final enabled (see Fig.24).
 i1 according Current_Set_Point_1.
 i2 amplitude=i1 amplitude.

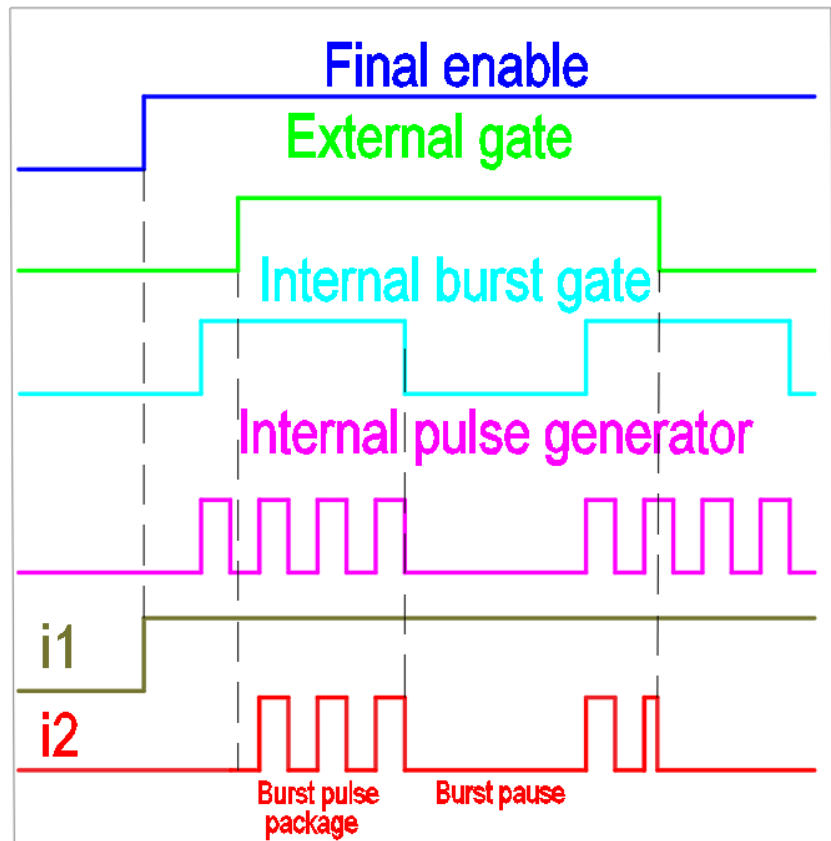
Fig. 24

***Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

***Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2.8. Internal Burst Generator with external Gate

This mode is only possible for SW operation with internal generator.



Settings SW operation (serial interface)

Fig. 25

- Connect a PC to the RS232 port
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Time_Base Factor.
 - Pulse_Time_Factor.
 - N-Cycles.
 - Burst_Pause_Factor .
 - Pause_Time_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart mode not active*
 - Set pulsed mode*
 - Set unsynchronized mode*
 - Set don't invert pulse unit output*
 - Set pulse source: internal pulse signal*
 - Set external gate signal*
 - Set burst mode*

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Set enable button is excluded

Set software enable

- Set signal “external enable” (X6 pin 32) to high.
DPD output is final enabled (see Fig.25).
i1 according Current_Set_Point_1,
i2 is zero.
- Connect external gate signal to “Gate IN” (X7 pin 1). This signal enables the pulse unit output.
i2 amplitude=i1 amplitude.
Specification external signals: TTL-level.

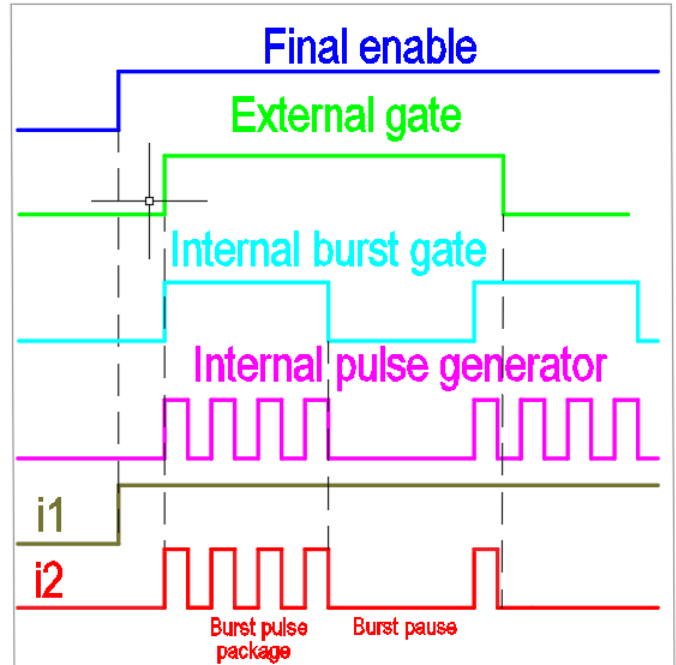
*** Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

*** Setting for SW operation via PC software or internal single board computer see section 10.3.**

5.2.9. Internal Burst Generator with external Gate synchronized

This mode is only possible for SW operation with internal generator.

The rising slope of output pulse is synchronous with rising slope of external gate.



Settings SW operation (serial interface)

- Connect a PC to the RS232 port.
- Setting of Configuration data (see document 10101195SI section 4.3):
 - Current_Set_Point_1.*
 - Current_Set_Point_Limit.
 - Current_Max_Factor.
 - Voltage_Max_Factor.
 - Time_Base Factor.
 - Pulse_Time_Factor.
 - N-Cycles.
 - Burst_Pause_Factor .
 - Pause_Time_Factor.
 - Operating mode:
 - Set initialization of DPDP*
 - Set autostart mode not active*
 - Set pulsed mode*
 - Set synchronized mode*
 - Set don't invert pulse unit output*
 - Set pulse source: internal pulse signal*
 - Set external gate signal*
 - Set burst mode*
 - Set enable button is excluded*
 - Set software enable*
- Set signal "external enable" (X6 pin 32) to high. DPD output is final enabled (see Fig.26).
i1 according Current_Set_Point_1,
i2 is zero.

Fig. 26

- Connect external gate signal to “Gate IN” (X7 pin 1). This signal enables the pulse unit output. Output signal is synchronous with gate signal.
i2 amplitude=i1 amplitude.
Specification external signals: TTL-level.

*** Please note: Level of Set Point 1 and Set Point 2 (CA-DCSP2) are added (see Fig. 14) and limited by Current_Set_Point_Limit level.**

*** Setting for SW operation via PC software or internal single board computer see section 10.3.**

6. Operating states


DPD (P) device has 5 operating states: stop-status, error-status, standby-status, ready-status and on-status.(see Fig. 27: Truth table). The actual operating status can be read out via control port 2 (see section 8.3.1.) or via serial interface.

- Status STOP:** External supply voltage is available, emergency stop switch is released, device is not initialized.
 Feedback: X6 Pin 7 is high (see section 8.3.1.), optional - LED "STOP" is active.
- Status ERROR:** Device is initialized. A failure in the system has occurred (see section 7).
 Feedback: X6 Pin 24 is high (see section 8.3.1.), LED "ERROR" is active (optional).
- Status STANDBY:** Device is initialized, system is error free, software enable is not active.
 Feedback: X6 Pin 27 is high (see section 8.3.1.), serial interface status 2 (see document 10101195SI section 4.1.2.), LED "STANDBY" is active (optional).
- Status READY:** Device is initialized, system is error free, software enable is active, enable button is active, external enable is not active
 Feedback: X6 Pin 8 is high (see section 8.3.1.), serial interface status 2 (see document 10101195SI section 4.1.2.), LED "READY" is active (optional).
- Status ON:** Device is initialized, system is error free, software enable is active, enable button is active, external enable is active, device is finally enabled
 Feedback: X6 Pin 26 is high (see section 8.3.1.), serial interface status 2 (see document 10101195SI section 4.1.2.), LED "ON" is active (optional).

Conditions					Operating states				
Device initialization	System fail	Software enable	Enable button is active	External enable is active	STOPP	ERROR	STANDBY	READY	ON
0	X	X	X	X	1	0	0	0	0
1	1	X	X	X	0	1	0	0	0
1	0	0	X	X	0	0	1	0	0
1	0	1	1	0	0	0	0	1	0
1	0	1	1	1	0	0	0	0	1

X- arbitrary

Fig. 27: Truth table

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7. Accessories

7.2. Internal single board computer (SBC) and touch screen display

This unit is suitable for applications in conjunction with external pulse unit and internal pulse generator. This can also be supplemented with status LED modules and control buttons. The DPD (P) devices with internal single board computer can either be controlled directly via touch screen display or controlled via Ethernet respectively USB interface.

Touch screen display:

- 17,8cm (7") Touch screen monitor
- Screen Dimensions: 194 mm x 110 mm
- Viewable screen size: 155 mm x 86 mm
- Screen resolution 800x480 pixels
- 10 finger capacitive touch.

The software description see section 10.

7.3. Status-LED Module

With this option the DPD (P) devices have the possibility to visualize the current operating status. The following status LEDs are available:

- LED "ON" – green.
- LED "READY" - green.
- LED "STANDBY" - yellow.
- LED "STOP" – red.
- LED "ERROR" - red.

States description see section 6.

7.4. Control buttons

There are two pushbuttons available:

- Button "ENABLE"
- Button "STOP / RESET"


The control buttons also allow the system to be operated manually.

Example 1:

The device can be set to a desired mode via an internal or external computer. Thereafter, the system is turned on, turned off or reset only via control buttons (section 10.4.6.).

Example 2:

Complementing the enable chain with an additional manual enable. The software enable and manual enable are connected in series (see section 4).

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8. Procedure in case of error

If an error occurs, the system status changes to the error status. The monitor signal for status error is high. Error type can be read out via serial interface (see document 10101195SI).

Possible error types:

- D-xxxx driver module error: internal error at one of the installed D-xxxx driver modules.
- Internal power supply DC voltage error.
- Overvoltage at current output. Overvoltage level is factory set (55 V or 26 V) and can be changed by the Voltage_Max_Factor (see document 101011950SI).
- Overcurrent at current output. Overcurrent level can be set via Current_Max_Factor (see document 101011950SI).
- Control unit error: internal error of control unit.
- Over temperature at pulse unit.
- Voltage error at pulse unit.
- Supply voltage error at pulse unit.
- Pulse error at pulse unit.
- Pulse frequency error: pulse frequency is too high.

In case of error:

- Check the system settings, system wiring, cooling system, especially the pulse unit.
- Reset the system with the reset command (see document 10101195SI), reset signal (see section 9.3.2) or button STOP/RESET (optional). The system reboots. Alternatively, the system can be turned off and after 30 sec. be restarted.


9. Interface and signal description

9.1.1. Control port of internal power supply (X21)

The internal AC/DC power supply can be remotely controlled and monitored via this interface. Alternatively, the remote control can be bridged by external plug "Unlock PS". In this case, the power supply starts automatically.

Pin	Name	Function
1	12V_AUX	Auxiliary voltage output
2	GND_AUX	Auxiliary voltage output GND
3	+V	Monitor Output +V signal
4	-V	Monitor Output -V signal
5	OTP2	Alarm signal overtemperature 2
6	GND_OTP2	Alarm signal overtemperature 2
7	OTP1	Alarm signal overtemperature 1
8	GND_OTP1	Alarm signal overtemperature 1
9	GND_AC_FAIL1	Alarm signal AC_FAIL 1
10	AC_FAIL1	Alarm signal AC_FAIL 1
11		Not connected
12	RC+	Remote ON/OFF Control
13		Not connected
14	GND_DC_OK2	Alarm signal of DC_OK2
15	DC_OK2	Alarm signal of DC_OK2
16	GND_AC_FAIL2	Alarm signal AC_FAIL 2
17	AC_FAIL2	Alarm signal AC_FAIL 2
18	FAN_FAIL2	Alarm signal of fan fail2
19	GND_FAN_FAIL2	Alarm signal of fan fail2
20	DC_OK1	Alarm signal of DC_OK1
21	GND_DC_OK1	Alarm signal of DC_OK1
22	GND_FAN_FAIL1	Alarm signal of fan fail1
23	FAN_FAIL1	Alarm signal of fan fail1
24		Not connected
25	RC-	Remote ON/OFF Control

Fig. 28

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9.1.2. Signal description control port of internal power supply

12V_AUX/GND_AUX

Auxiliary voltage output, 11,4~12,6 V, referenced to pin 2(GND_AUX).The maximum load current is 0.1 A. This output is not controlled by the "Remote ON/OFF" function.

+V/-V

Monitor output for DC link voltage. Factory setting is 59 VDC (+/- 500 mV) or 29 VDC (+/- 500 mV).

DC_OK1/ GND_DC_OK1

Alarm signal of DC link voltage fail. Normally open contact. "Short" when the power supply turns on. Relay contact rating (maximum) is 30 V and 1 A resistive.

DC_OK2/ GND_DC_OK2

Alarm signal of DC link voltage fail. Open collector signal. Low when the power supply turns on. The maximum sink current is 10mA and the maximum external voltage is 20 V.

OTP1/ GND_OTP1

Alarm signal of over temperature. Normally open contact. "Short" when the power supply over temperature protection occurs. Relay contact rating (maximum) is 30 V and 1 A resistive.

OTP2/ GND_OTP2

Alarm signal of over temperature. Open collector signal. Low when the power supply over temperature protection occurs. The maximum sink current is 10 mA and the maximum external voltage is 20 V.

AC_FAIL1/ GND_AC_FAIL1

Alarm signal of AC-fail. Normally open contact. "Short" when the power supply input voltage is too low. Relay contact rating (maximum) is 30 V and 1 A resistive.

AC_FAIL2/ GND_AC_FAIL2

Alarm signal of AC-fail. Open collector signal. Low when the power supply input voltage is too low. The maximum sink current is 10 mA and the maximum external voltage is 20 V.

DC_OK1/ GND_DC_OK1

Alarm signal of DC link voltage fail. Normally open contact. "Short" when the power supply turns on. Relay contact rating (maximum) is 30 V and 1 A resistive.

FAN_FAIL1/ GND_FAN_FAIL1

Alarm signal of fan failure. Normally open contact. "Short" when the internal fan of power supply fails. Relay contact rating (maximum) is 30 V and 1 A resistive.

FAN_FAIL2/ GND_FAN_FAIL2

Alarm signal of fan failure. Open collector signal. Low when the internal fan fails. The maximum sink current is 10mA and the maximum external voltage is 20 V.

RC+/RC-

The output of internal power supply can be turned ON/OFF by the electrical signal between RC+ and RC-.

9.1.3. Internal power supply Remote ON/OFF

Possible implementation of remote on/off SW = Switch

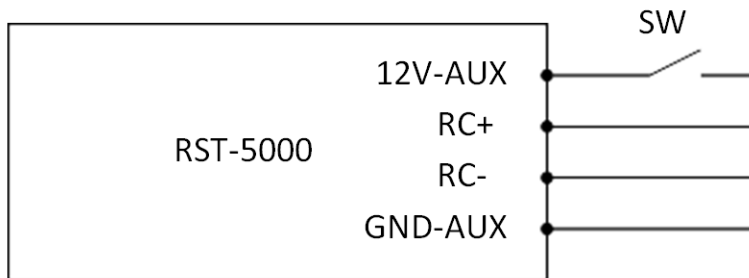


Fig. 29

ON/OFF switch between (pin12) and 12V_AUX (pin1)	ON/OFF Status
Switch close (Short)	Power supply turn ON
Switch open (Open)	Power supply turn OFF

Fig. 30

9.2.1. Control port 1 (X4)

CA = Control Data Analog


CD = Control Data Digital

SA = Status Data Analog

SD = Status Data Digital

Inputs		
Pin	Name	Function
15	CA_DCSP1	optional, for DPD (P) with exclusively HW operation
3	CA_DCSP2	Diode current set point 2
2	CA_DCL	optional, for DPD (P) with exclusively HW operation
5	CD_DCON	optional, for DPD (P) with exclusively HW operation
18	CD_DCOFF	optional, for DPD (P) with exclusively HW operation
6	CD_DCSD	optional, for DPD (P) with exclusively HW operation
1/14	GND	Signal ground
Outputs		
Pin	Name	Function
4	SA_DCACT	Diode current actual
16	SA_DCSPLIM	Diode current set point limit
17	SA_DVACT	Diode voltage actual
24	REF	Reference voltage
11	REFVAR	Reference voltage adjustable
12	AUX+5V	Auxiliary voltage +5V
25	AUX+15V	Auxiliary voltage +15V
13	AUX-15V	Auxiliary voltage -15V
23	SD_READY	Ready
19	SD_DCON	optional, for DPD (P) with exclusively HW operation
7	SD_DCSD	Current shut down
8		Not connected
9		Not connected
10		Not connected
20		Not connected
21		Not connected
22		Not connected

Fig. 31

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9.2.2. Signal description of control port 1

CA-DCSP1 (optional, for DPD (P) with exclusively HW operation)

Control Analog – Diode (Output) Current Set Point 2.

Analog input 0V... +5 V.

+5V corresponds to the maximum current of device.

Current Set Point 1 and Current Set Point 2 will be added internally for the effective current set point. A current set point with negative sign acts subtracting.

CA-DCSP2

Control Analog – Diode (Output) Current Set Point 2.

Analog input 0V... +5 V.

+5 V corresponds to the maximum current of device .

Current Set Point 1 and Current Set Point 2 will be added internally for the effective current set point.

A current set point with negative sign acts subtracting.

CA-DCL (optional, for DPD (P) with exclusively HW operation)

Control Analog – Diode (Output) Current Set Limit.

Analog input 0V... +5 V.

+5 V corresponds to the maximum current setpoint limit of device.

CD-DCON (optional, for DPD with exclusively HW operation)

Control Digital – Diode (Output) Current On.

TTL-compatible input. High if left open.

In operating mode On/Off the input acts in the following way:

If the input is pulled to GND momentary (> 1ms), the diode current will be switched on.

The diode current remains ON until a CD-DCOFF signal turns off.

CD-DCOFF (optional, for DPD with exclusively HW operation)

Control Digital – Diode (Output) Current Off.

TTL-compatible input. High if left open.

In operating mode On/Off the input acts in the following way: If diode current is ON and if the input is pulled to GND momentary (>1 ms), diode current will be turned off. The diode current remains in an off-status until a CD-DCON signal turns the output current on again. In both operating modes CD-DCOFF input also acts as a system reset if an error has occurred. In this case the system will be reset if the input is pulled to GND momentary (>1 ms).

CD-DCSD (optional, for DPD (P) with exclusively HW operation)

Control Digital - Diode (Output) Current Shut Down.

TTL-compatible input. Active high or active low.

Disables or enables diode (output) current.

SA-DCSPLIM

Status Analog – Diode (Output) Current Set Point Limited

Analog output 0V... +5 V, reflects the diode current set point, limited by Current_Set_Point_Limit value, setting via serial interface (see document 10101195SI).

SA-DCACT

Status Analog – Diode (Output) Current Actual at current output of DPD (P)

Analog output 0 V... +5 V

+5 V corresponds to maximum current (240 A / 320 A)

Please note: The signal refers to the DC link current. Regardless of pulse mode, DC link has current continues shape!

SA-DVACT

Status Analog – Diode (Output) Voltage Actual

Analog output 0 V... +5 V

+5 V corresponds to 55 V / 26 V output voltage

Reflects the actual voltage at current output of DPD (P).

REF

Analog output +5,00 V.

Maximum current: 2 mA.

REFVAR

Analog output 0.0V... +5,0 V, adjustable by the reference voltage potentiometer.

Maximum current: 2 mA.

AUX+5V

Output +5,1V, for supplying external components.

Maximum current: 100 mA.

AUX+15V

Output +15V, for supplying external components.

Maximum current: 100 mA.

AUX-15V

Output -15V, for supplying external components.

Maximum current: 100 mA.

SD-READY

Status Digital – Ready: driver are initialized, no error at System.

TTL-compatible output; open emitter. High if there are no errors.

SD-DCON

Status Digital – Diode (Output) Current On: current output of DPD (P) is on.

TTL-compatible output; open emitter. High, if DPD (P) is on.

SD-DCSD

Status Digital – Diode (Output) Current Shut Down: current output of DPD (P) is disabled.


TTL-compatible output; open emitter. High, if current shut down is active.

9.3.1. Control port 2 (X6)

Inputs		
Pin	Name	Function
12	IN_1	optional*
13	IN_3	optional*
14	ITERLOCK_1	optional*
15	DC_OK	optional*
16	AC_OK	optional*
31	IN_2	optional*
32	EXT_ENABLE	External Enable Signal
33	DIODE_INTERLOCK	optional*
34	DC_ON_IN	optional*
35	DC_OFF_IN	Diode Current OFF (RESET)
Outputs		
Pin	Name	Function
1	OUT_1_HA	optional*
2	OUT_2_HA	optional*
3	OUT_3_HA	optional*
4	OUT_4_HA	optional*
5	ERROR_PU	Error at Pulse Unit
6	CD_DCON	optional*
7	MONITOR_STATUS_STOP	Monitor signal for status "STOP"
8	MONITOR_STATUS_READY	Monitor signal for status "READY"
9	EN_POW	optional*
10	CD_DCSD2_LA	optional*
11	CD_DCSD2_HA	optional*
20	OUT_1_LA	optional*
21	OUT_2_LA	optional*
22	OUT_3_LA	optional*
23	OUT_4_LA	optional*
24	MONITOR_STATUS_ERROR	Monitor signal for status "ERROR"
25	SAVETY_RELAIS	optional*
26	MONITOR_STATUS_ON	Monitor signal for status "ON"
27	MONITOR_STATUS_STANDBY	Monitor signal for status "STANDBY"
28	ENABLE_AIMING	optional*
29	CD_PSD_LA	optional*
30	CD_DCOFF	optional*
18/19	GND	Signal ground
36/37	+5VDC	Output +5 V
17		Not connected

Fig. 32

* - These inputs and outputs can be configured on request according to customer requirements

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9.3.2. Signal description of control port 2

EXT_ENABLE

External Enable is a digital TTL-input, active-high +5 V.

Enables or disables current output of DPD (P).

A switch can be used between pin 32 and pin 36 or 37 or the supplied external connector "Enable DPDP" or an external signal + 5 V can be connected to pin 32.

DC_OFF_IN (RESET)

Diode (Output) Current Off input is a digital TTL-input, active-high +5 V.

In hardware operating mode the input acts like a system reset, if an error has occurred. In this case the system will be reset if the input is pulled to +5 V momentary (>1 ms).

In software operating mode (not autostart mode): if output current is ON and if the input is pulled to +5 V momentary (>1 ms), output current will be turned off.

The system remains in a ready state until software enable turns the output current on again. At the same time resets the system.

ERROR_PU

Monitor signal for failure at pulse unit.

Digital TTL output, active low.

+5 V if not error at pulse unit.

MONITOR_STATUS_STOP

Monitor signal for status "STOP", digital TTL output.

Active-high (+5 V), output resistance 220 Ohm.

High if the system is not initialized or during implementation of the (OFF) RESET command.

MONITOR_STATUS_READY

Monitor signal for status "Ready", digital TTL output.

Active-high (+5 V), output resistance 220 Ohm.

MONITOR_STATUS_ERROR

Monitor signal for general status "ERROR" of system.

Digital TTL output: active high (+5 V); low if there are no errors. Output resistance 220 Ohm.

MONITOR_STATUS_ON

Monitor signal for status "ON".

Digital TTL output: active high (+5 V). Output resistance 220 Ohm.

MONITOR_STATUS_STANDBY

Monitor signal for status "Standby".

Digital TTL output: active high (+5 V). Output resistance 220 Ohm.

+5V


Output 5 V approximately, for supplying external components.

Maximum current: 10 mA.

9.4.1. Pulse control port (X7)

Inputs		
Pin	Name	Function
1	PULS_IN	External Pulse Input
4	GATE_IN	External Gate Input
6	U_GATE	(optional)
7	U_ENABLE	(optional)
Outputs		
Pin	Name	Function
2	MONITOR_PULS_OUT	Monitor signal for pulse output
3	MONITOR_PULS_OUT_INV	Monitor signal for pulse output inverted
5	MONITOR_BURST_GATE	Monitor signal for burst gate
8	GND	Signal ground
9	ERROR_PU	Error at Pulse Unit

Fig. 33

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9.4.2. Signal description of pulse control port

PULS_IN

External pulse input, TTL-level +5 V, active-high. Low corresponds to pause, high corresponds to pulse.

Active at hardware operation and in software operation in modes with external pulse source.

GATE_IN

External gate input External pulse input, TTL-level +5 V, active-high.

Active in software operation in modes with external gate.

MONITOR_PULS_OUT

Monitor signal for pulse output TTL-level +5 V.

This monitoring signal reflects the output signal of the pulse unit.

MONITOR_PULS_OUT_INV

Monitor signal for pulse output inverted TTL-level +5 V.


This monitoring signal reflects the output signal of the pulse unit in inverted logic.

MONITOR_BURST_GATE

Monitor signal for burst gate TTL-level +5 V.

This monitoring signal reflects the signal of internal burst generator.

ERROR_PU (see section 9.3.2.)

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9.5.1. Serial interface USB

The interface meets the USB2.0. Signaling rate of 480 Mbit/s


9.5.2. Serial interface RS 232 (optional RS 485) port (X17)

The interface meets the RS 232 standard. It is configured as data circuit-terminating equipment (DCE). The DPD (P) sends data on pin 2 (TX) and receives data on pin 3 (RX).

DPD (P) serial interface operates at 38400 kbit /s.

The DPD (P) can communicate via a 9-pole cable (1:1) directly with a PC.

The software protocol is described in document “10101195SI: Description of Serial Interface for DPD (P)”

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10. Software operation via external PC or internal single board computer

10.1. Introduction

The operating software for series DPD (P) has the task of enabling the operation of diode driver via a PC or internal single board computer.

For PC operation: after start of program “*dpdp.exe*” and connection to the PC via USB interface, the devices are selected and configured from it via corresponding platforms (see Fig 34).

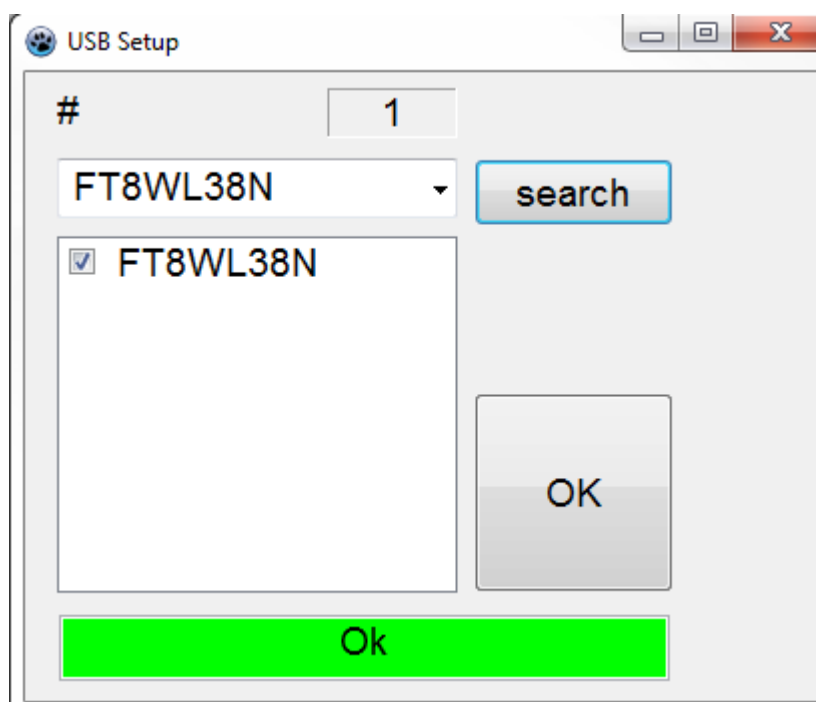



Fig. 34

Attention!

On some computer systems the FTDI driver is not installed yet.

In this case install the FTDI driver which is included on the CD (32- or 64-Bit Version).

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10.2. Operation Platform



Fig. 35

The program begins with a Welcome Screen (Fig. 35). The program is initialized during this time. The type, and also the article number of the selected device, is then displayed in the header. After this, the main screen opens (Fig.36).

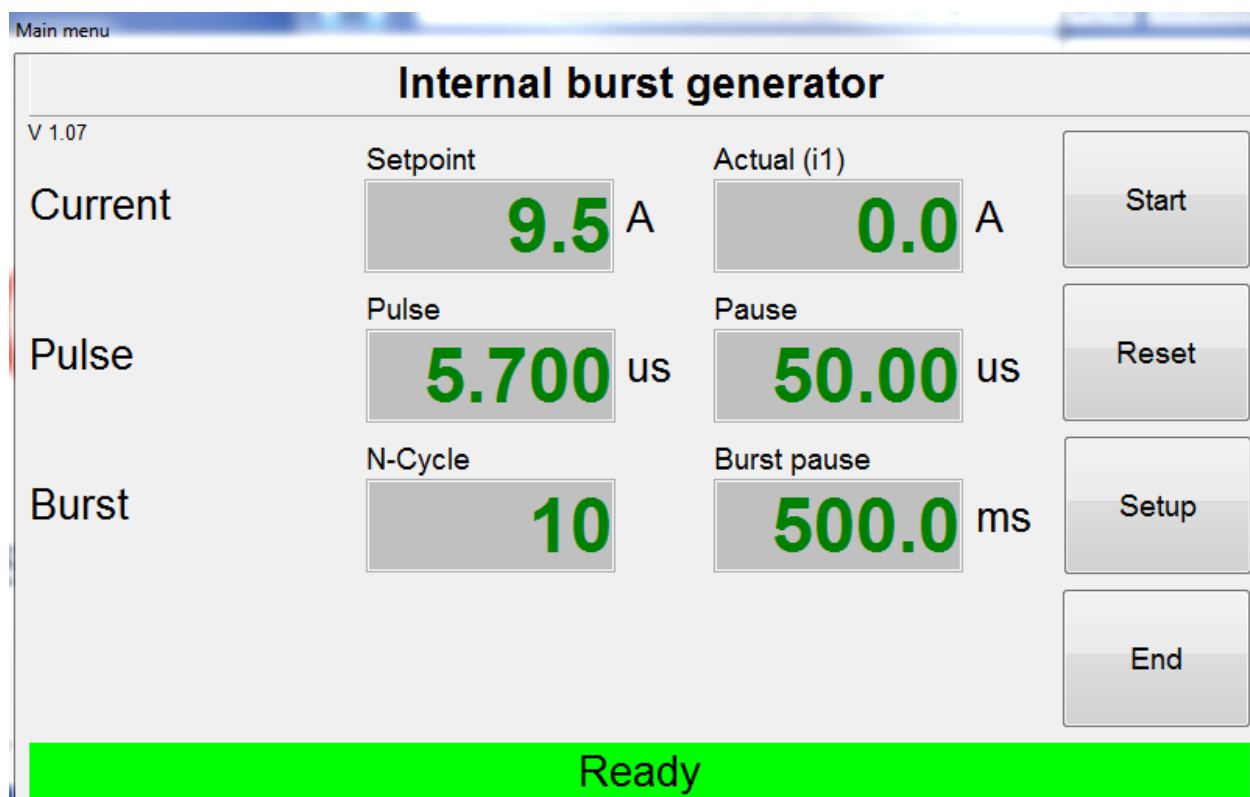


Fig. 36

The following information is displayed:

Top - set mode.

Center - set and actual current values; set time for pulses and burst mode.

Note: Displayed actual current always refers to i1-DPD output current to pulse unit (see current block diagram section 3).

Bottom –actual device status and additional information e.g. error type.

Right – control buttons:

“**Start**”- button - turn on of device.

“**Reset**”/ “**Stop**”- reset of device or turn off. As soon as the device is switched on (start button), the button label changes from “Reset” to “Stop”.

“**Setup**” – leads to further configuration menu

“**End**” - by clicking this button you exit the program

10.3. Setup

Clicking on the “Setup” button the setup menu (Fig. 37) is selected.

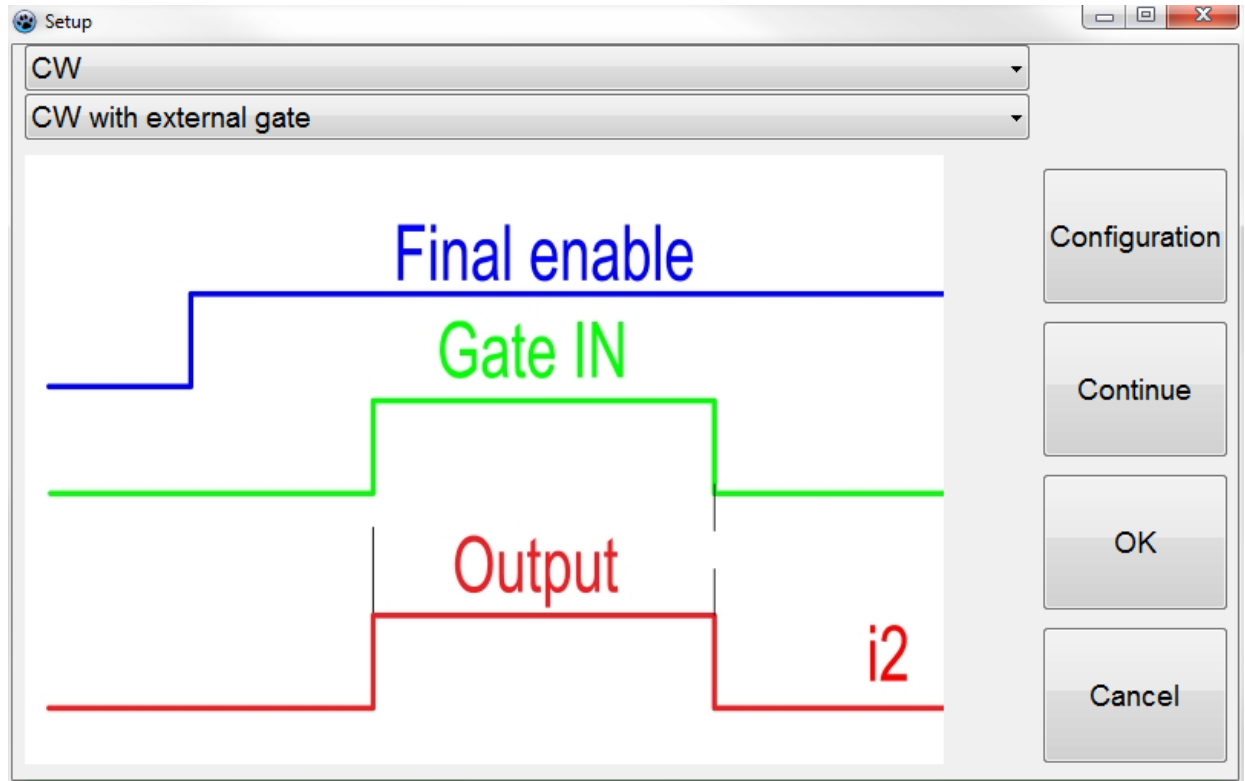


Fig. 37

10.3.1. Mode Selection

First, set the operating mode. There are two selection fields at the top.
In the first field you choose between **CW**, **Pulse** or **Burst** mode (see Fig. 38).

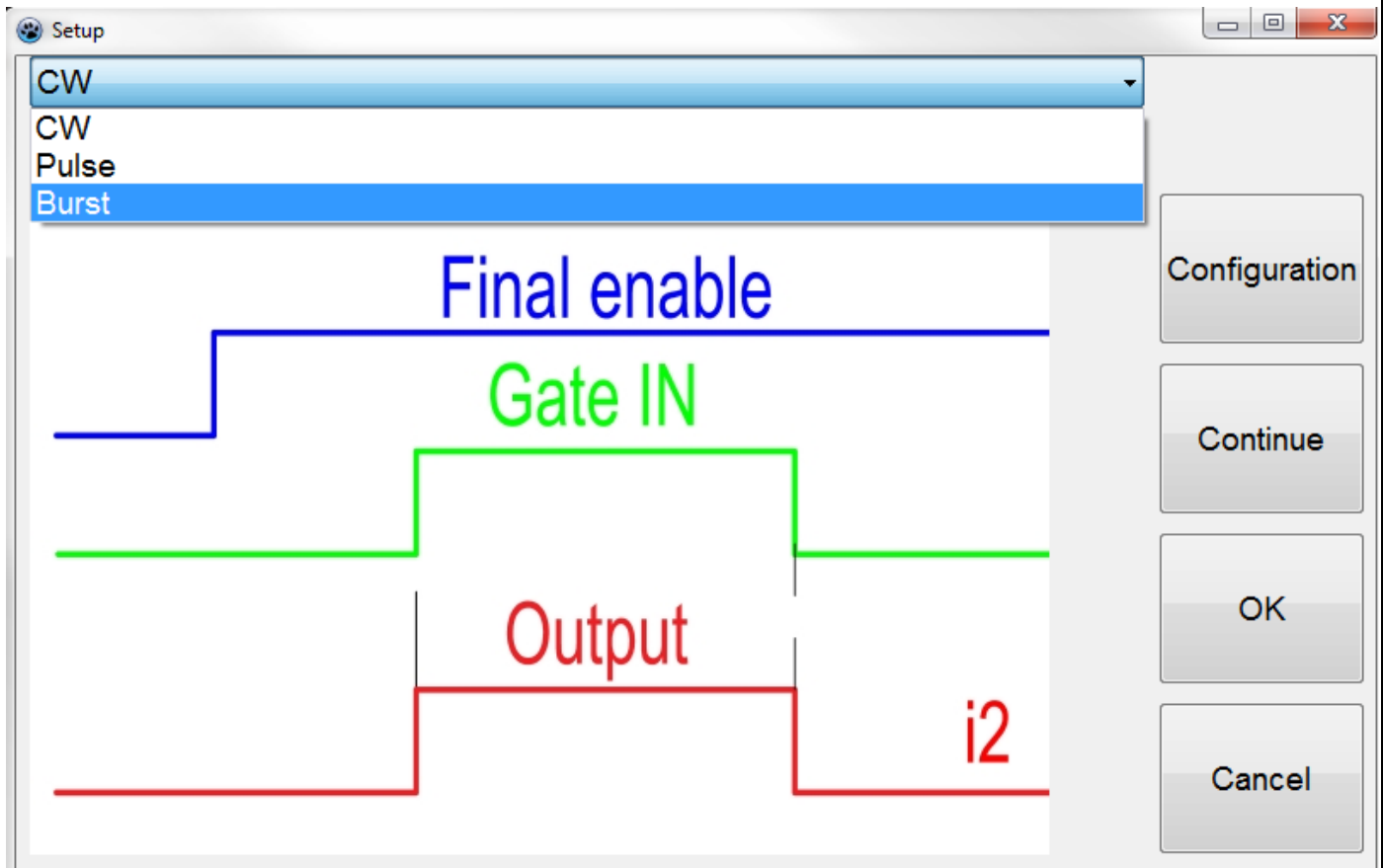


Fig.38

In the second field select the exact mode in the second field. For each mode a diagram is displayed.

For CW the following mode can be selected:

- CW.
- CW with external gate.

For Pulse the following mode can be selected:

- Internal pulse generator.
- External pulse generator
- External pulse generator inverted.
- Internal pulse generator with external gate.
- External pulse generator with external gate.
- Internal pulse generator with external gate synchronized.

For Burst the following mode can be selected:

- Internal burst generator
- Internal burst generator with external gate.
- Internal burst generator with external gate synchronized.

To confirm selection and to select current value and time setting, press the "Continue" button. If you want the values to remain the same, press the "OK" button: mode is saved and you return to the main menu. By clicking the "Cancel" button, you will return to the main menu without saving.

10.3.2. Values setting

- **Current setup**

As soon as the "Continue" button is pressed, the menu for current setup (see Fig.39) appears. This menu can also be accessed from the main menu by selecting "Setpoint" field.

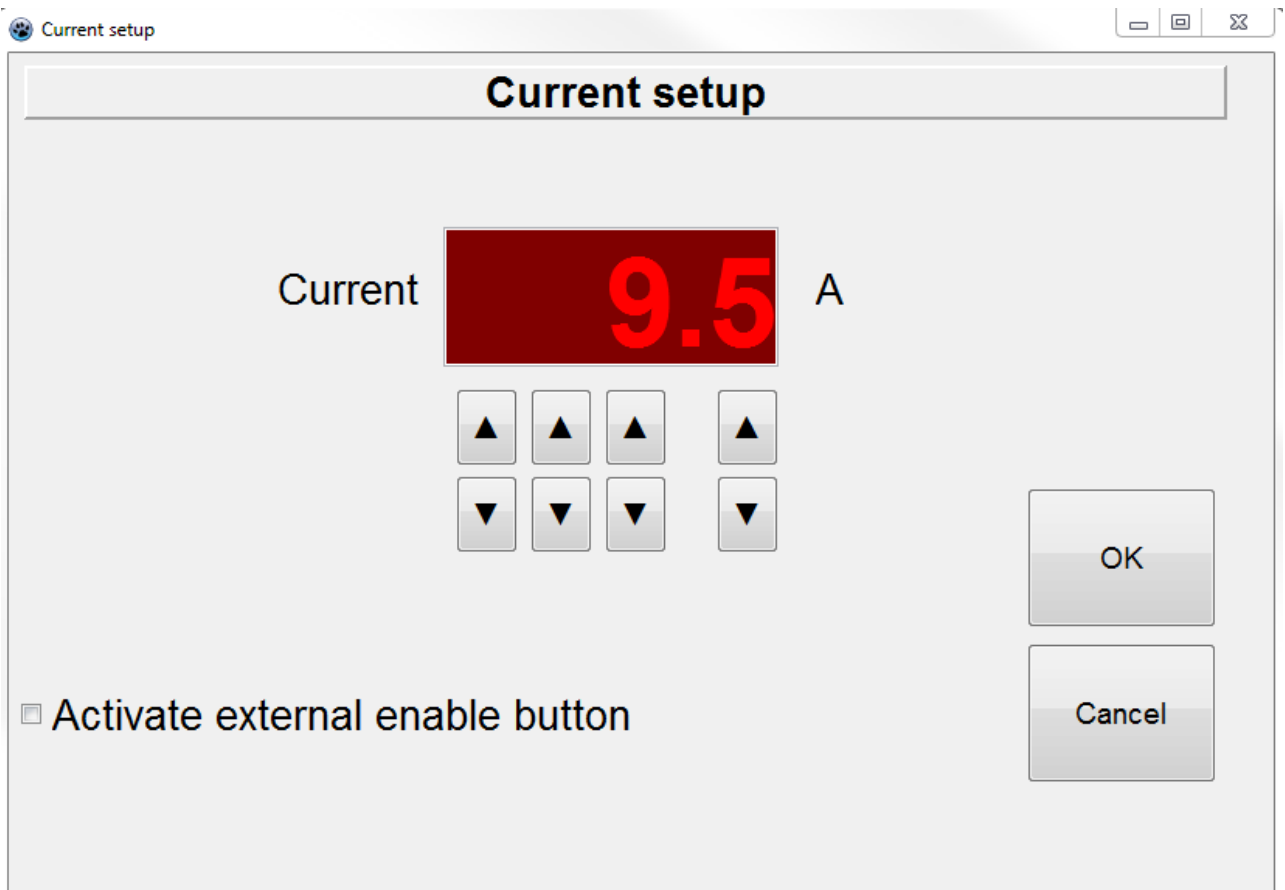


Fig. 39

You can set the current value to the desired value by pressing the arrow up or arrow down button.

The enable button can also be activated or deactivated in this menu. Then the external enable button (hardware option) is included in the power up procedure.

After this you have to confirm by pressing OK.

Depending on the operating mode selected, further settings menus will appear or return to setup menu (Fig. 38).

- **Pulse setup**

This menu is only active for operation modes with internal generator or burst generator.

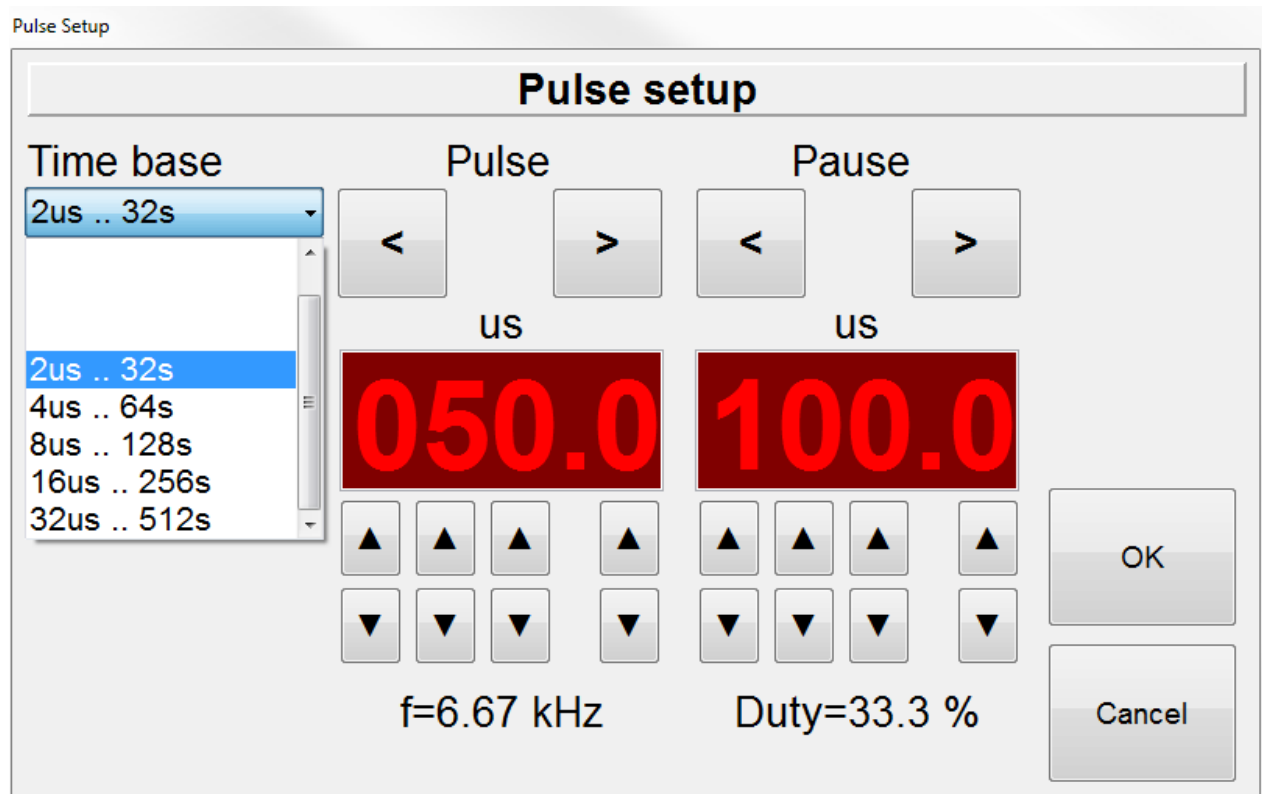


Fig.40

You can set pulse length and pause length to the desired value by pressing the arrow up or arrow down button (see Fig.40). The set values are automatically converted and displayed into frequency and duty cycle.

Note: The two values must be set so that the frequency does not rise above 20 kHz. From 37 kHz internal error occurs when switching on the device.

In the field "Time base" you can select several time bases.

Time base defines the resolution of the time setting. The following time base range is available:

- From 2 μ s to 32 s;
- From 4 μ s to 64 s;
- From 8 μ s to 128 s;
- From 16 μ s to 256 s;
- From 32 μ s to 512 s.

After this you have to confirm by pressing OK.

Depending on the operating mode selected, further settings menus will appear or return to setup menu (Fig. 38).

- **Burst setup**

This menu is only active for operation modes with burst generator.

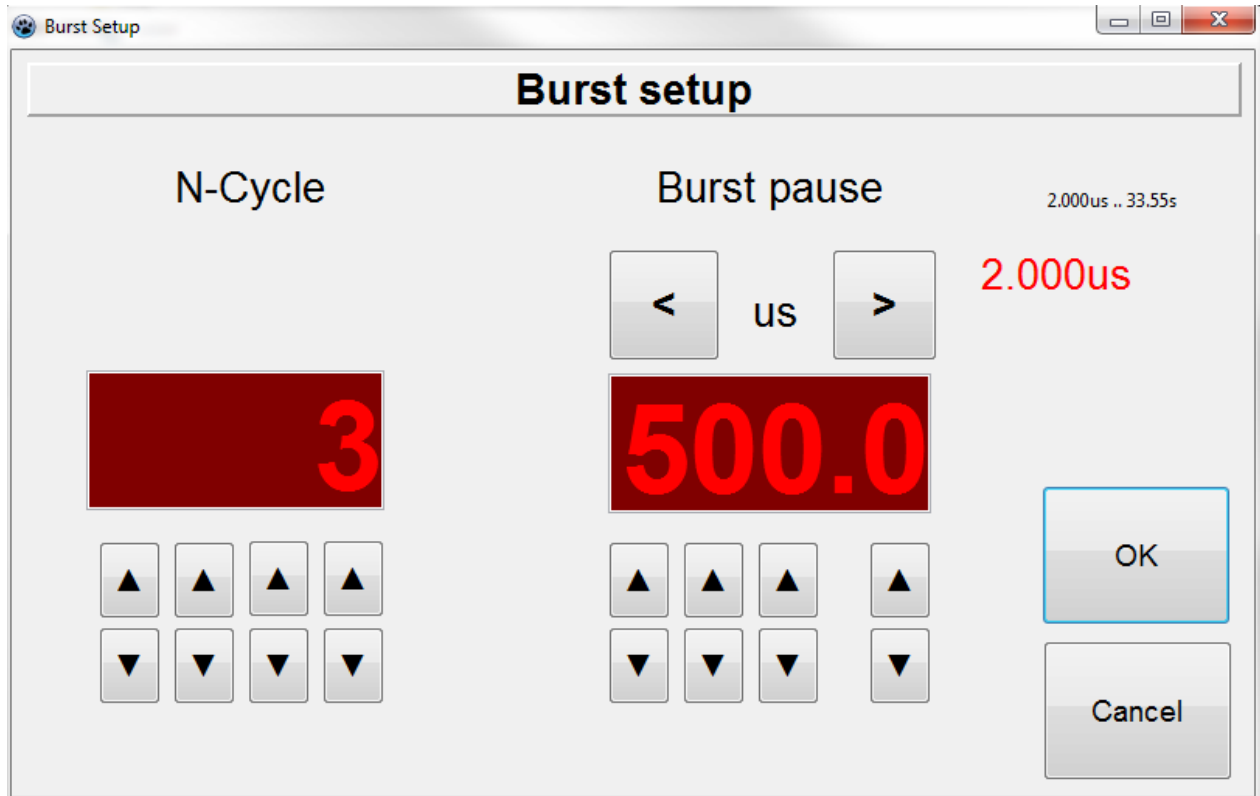


Fig. 41

You can set N-Cycle and Burst pause length to the desired value by pressing the arrow up or arrow down button (see Fig.41).

N-cycle is number of Burst pulses which are sending in one pulse package in Burst mode.

Note: Minimum input value for the N-cycle is "2".

Burst pause is time distance between two Burst pulse packages. Burst signal example see Fig. 42.

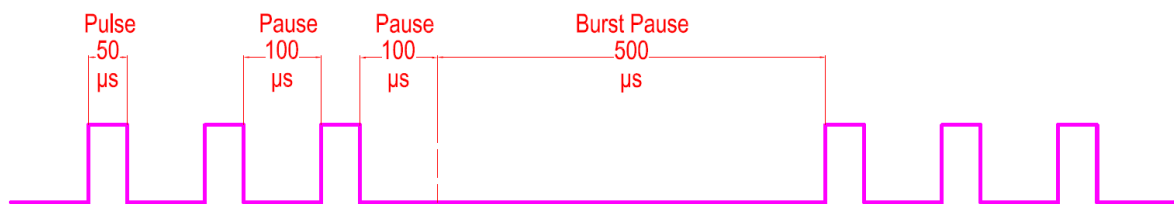



Fig. 42

After this you have to confirm by pressing OK.

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10.4. General configuration

By clicking on the "Configuration" field, the general configuration menu (Fig. 43) is selected.

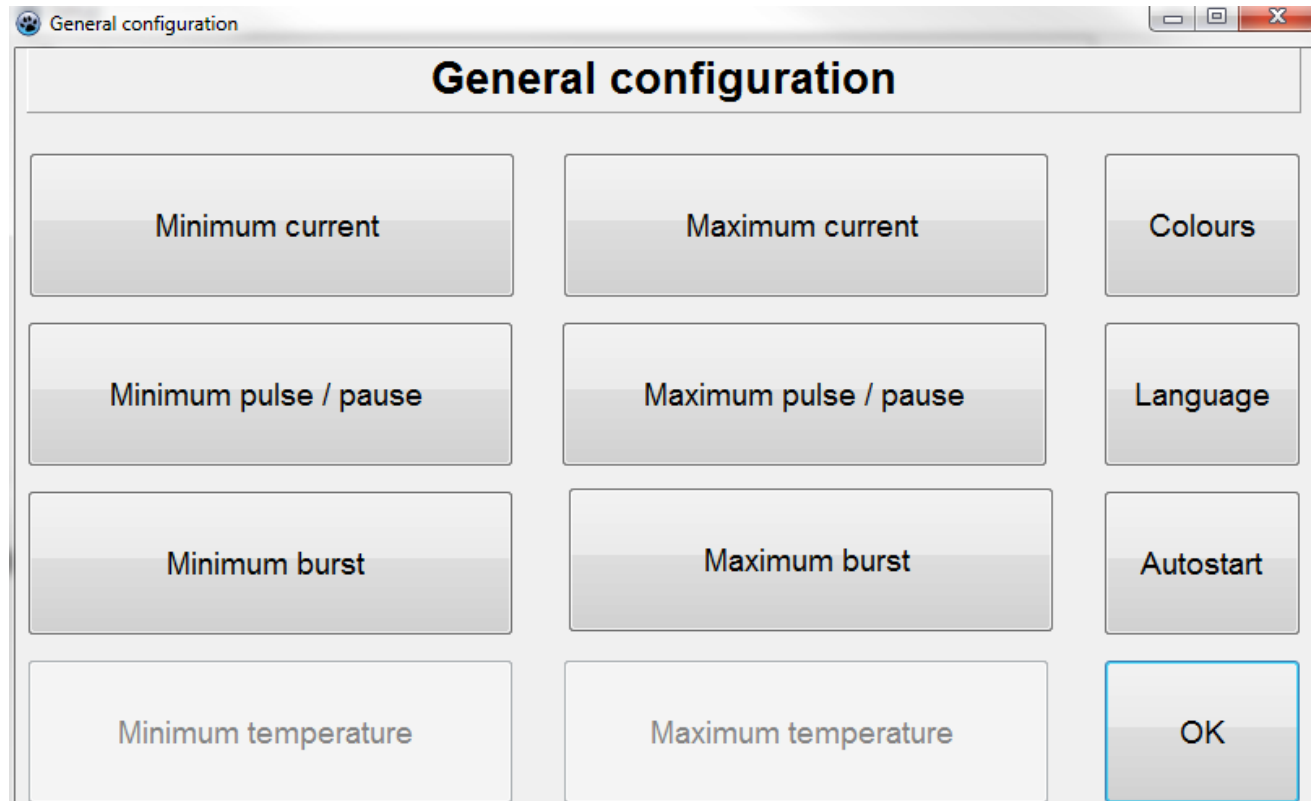


Fig. 43

The inactive buttons "Minimum (Maximum) temperature" refers to special version with TEC controller.

10.4.1. Current range

Normally, the current (in the range of 6 Ampere up to the maximum value of the device type which is specified by the manufacturer) can be adjusted by current setup (see section 10.3.2). However, if the user wants to limit over minimum and maximum values for application reasons, this can be done at this point.

By clicking on the “Minimum current” button, following screen appears (see Fig. 44):

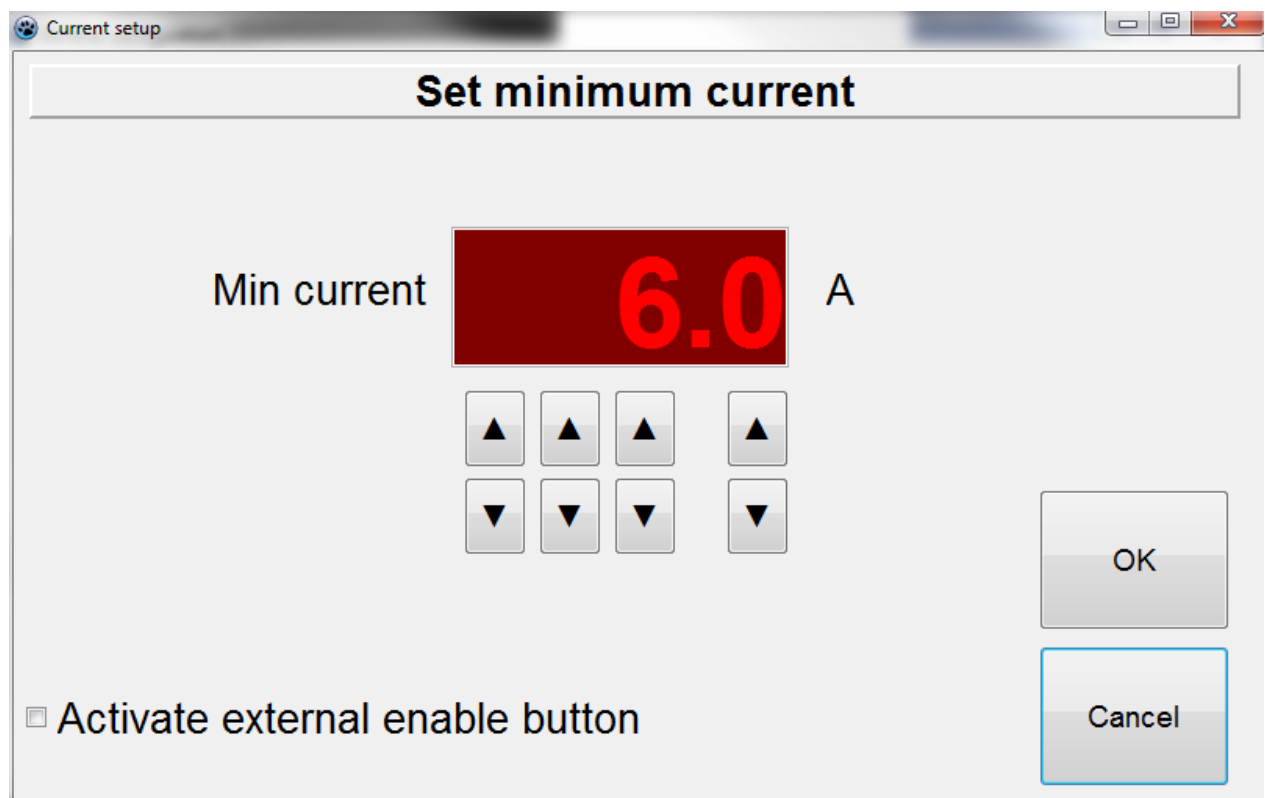



Fig. 44

You can set the minimum current value to the desired value by pressing the arrow up or arrow down button.

The enable button can also be activated or deactivated in this menu. Then the external enable button (hardware option) is included in the power up procedure.

After this you have to confirm by pressing OK.

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By clicking on the “Maximum current” button, following screen appears (see Fig. 46):

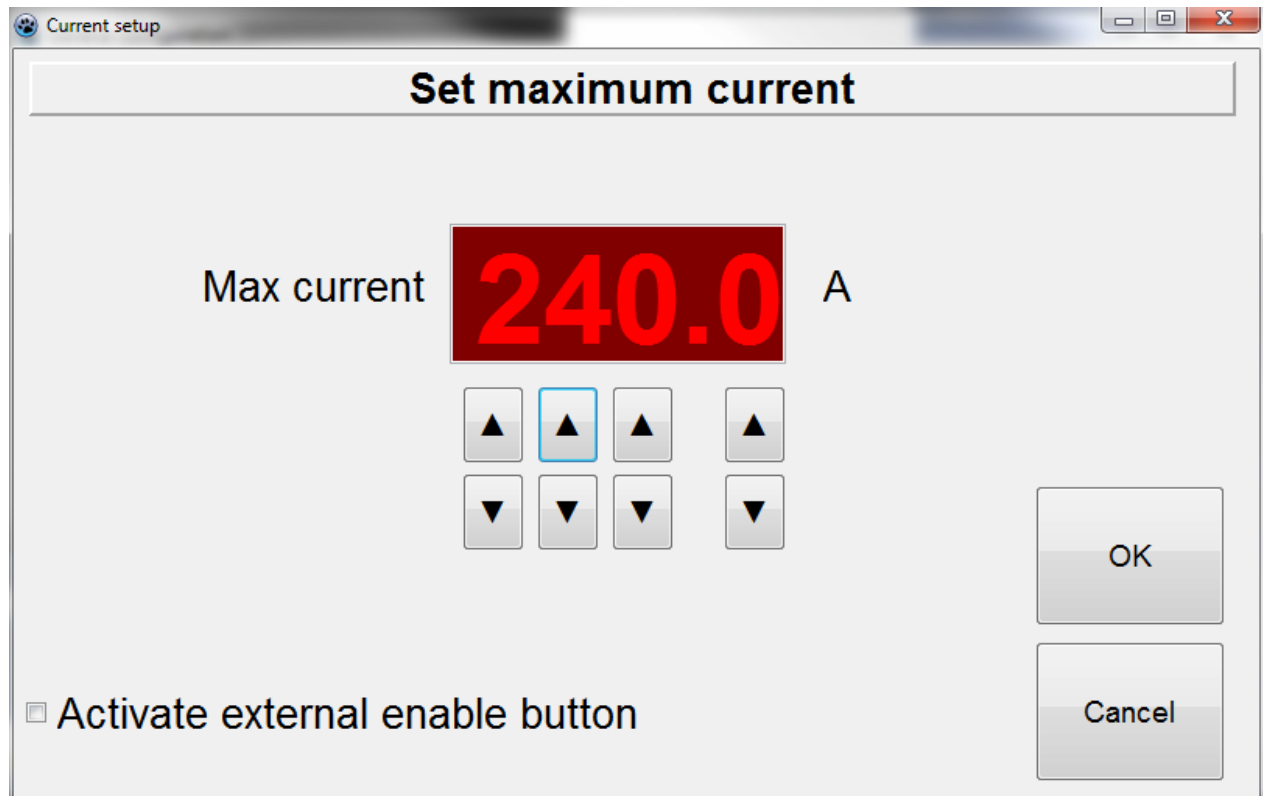


Fig. 46

You can set the maximum current value to the desired value by pressing the arrow up or arrow down button.

The enable button can also be activated or deactivated in this menu. Then the external enable button (hardware option) is included in the power up procedure.

After this you have to confirm by pressing OK.

10.4.2. Pulse / pause range

The configuration of pulse / pause range can only be performed if the pulse or burst mode is selected (see section 10.3.1). Otherwise the buttons "Minimum (Maximum) pulse / pause" are inactive.

By clicking on the "Minimum pulse" button, following screen appears (see Fig. 47):

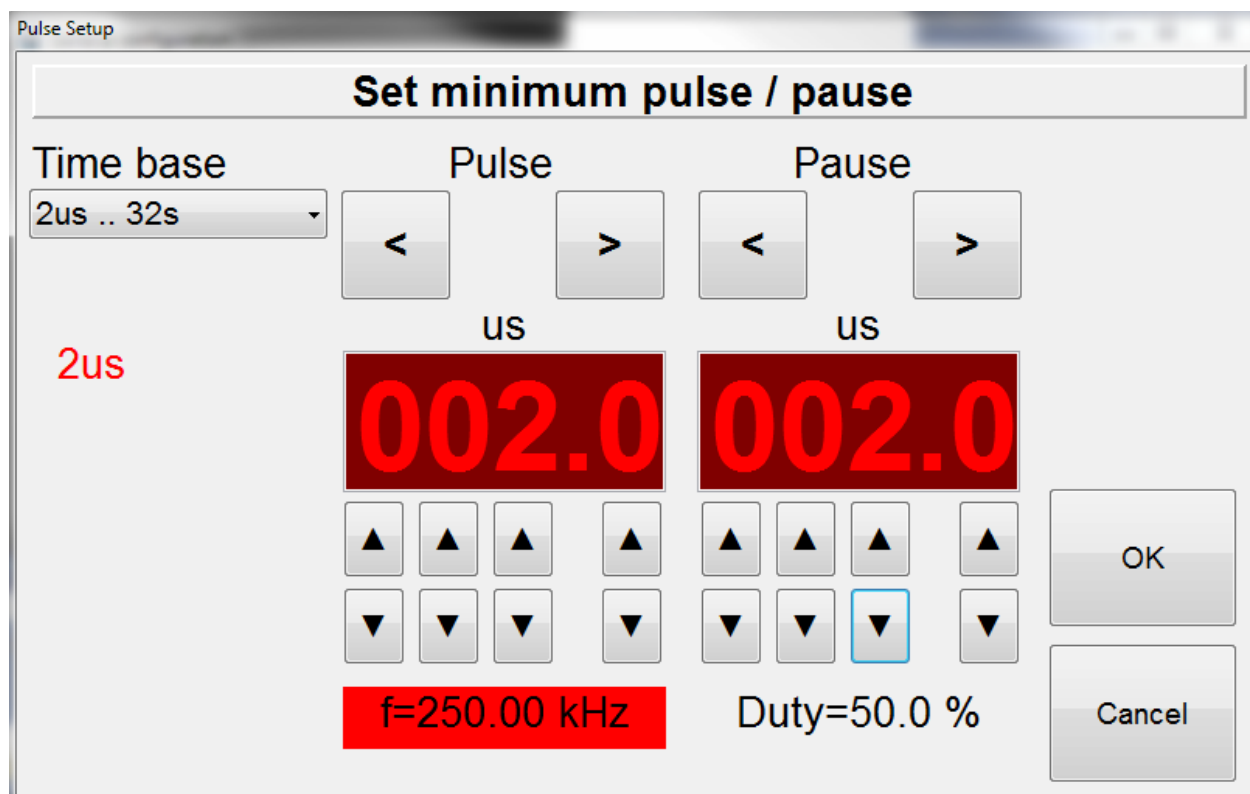


Fig. 47

You can set minimum pulse length and minimum pause length to the desired value by pressing the arrow up or arrow down button (see Fig. 47). The set values are automatically converted and displayed into frequency and duty cycle.

In the field "Time base" you can select several time bases.

Note: Minimum input value for the burst pause is 2 μ s.

After this you have to confirm by pressing OK.

By clicking on the “Maximum pulse / pause” button, following screen appears (see Fig. 48):

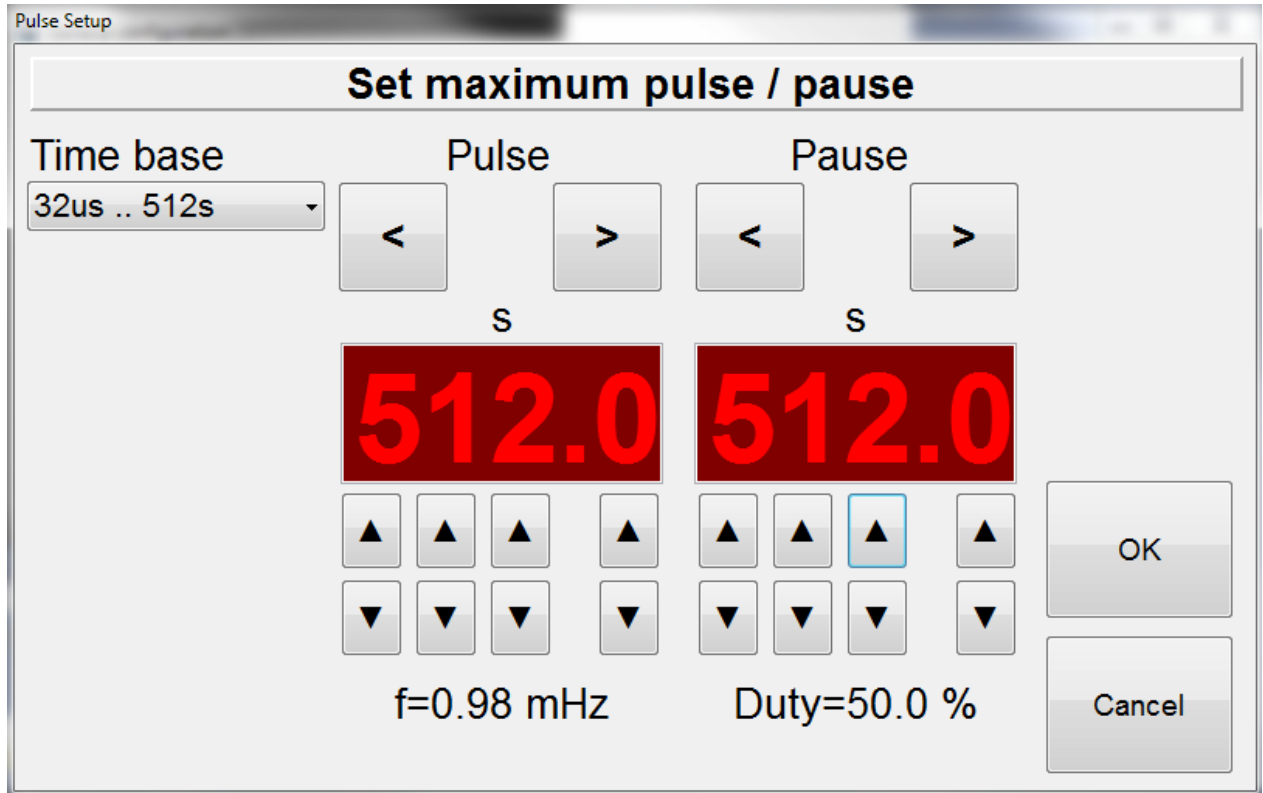


Fig. 48

You can set maximum pulse length and maximum pause length to the desired value by pressing the arrow up or down button (see Fig. 48). The set values are automatically converted and displayed as frequency and duty cycle.

In the field "Time base" you can select several time bases.

After this you have to confirm by pressing OK.

10.4.3. Burst range

The configuration of burst range can only be performed if the burst mode is selected (see section 10.3.1). Otherwise the buttons "Minimum (Maximum) burst" are inactive. By clicking on the "Minimum burst" button, following screen appears (see Fig. 49):

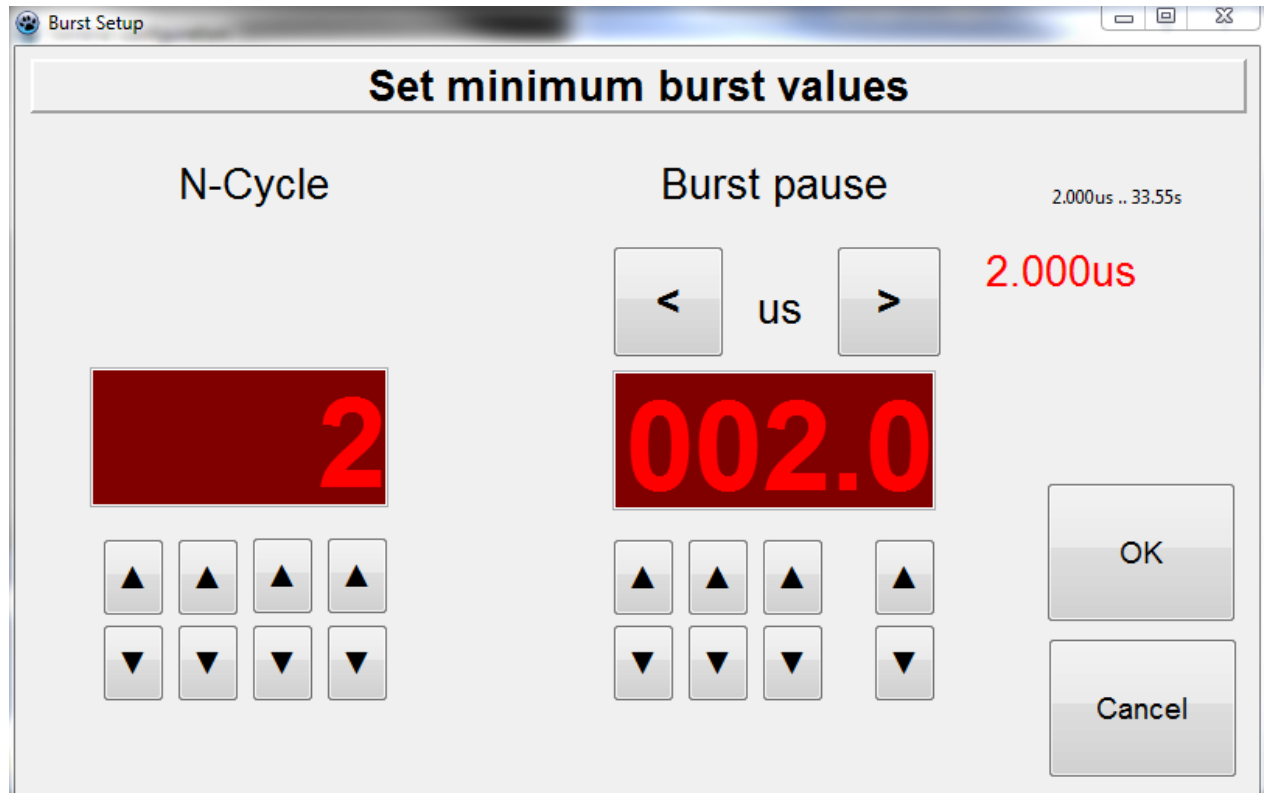


Fig. 49

You can set minimum of N-Cycle and minimum burst pause length to the desired value by pressing the arrow up or down button (see Fig.49).

N-cycle is number of burst pulses.

Burst pause is time distance between two burst pulse packages.

Note: Minimum input values for the N-cycle is "2" and for the Burst pause is 2 μ s.

After this you have to confirm by pressing OK.

By clicking on the “Maximum burs” button, following screen comes up (see Fig. 50):

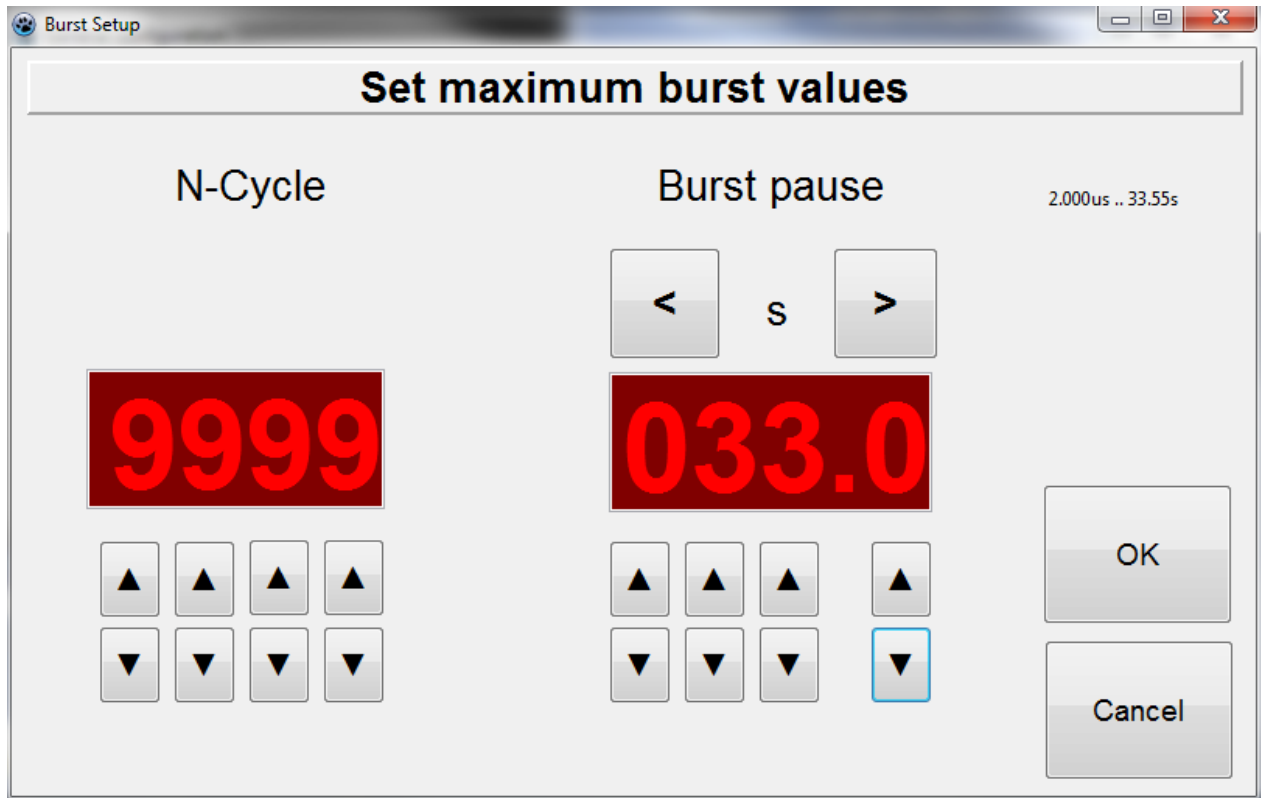


Fig. 50

You can set maximum of N-Cycle and maximum burst pause length to the desired value by pressing the arrow up or arrow down button (see Fig. 50).

N-cycle is number of burst pulses which are sending in one pulse package in burst mode.
Burst pause is time distance between two burst pulse packages.

After this you have to confirm by pressing OK.

10.4.4. Colours

By clicking on the “Colours” button, following screen comes up (see Fig. 51):

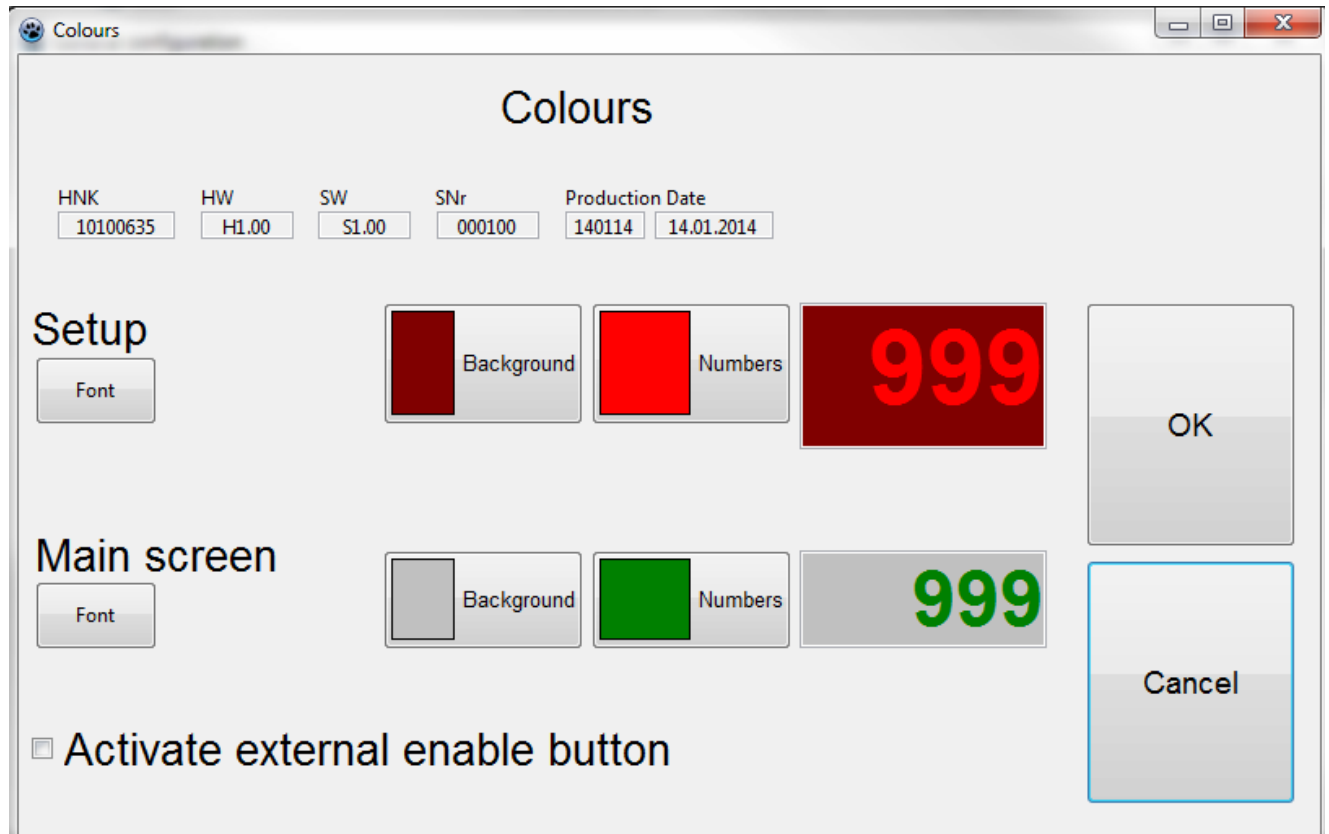



Fig. 51

Here you can define colours of background and indicator numbers, font. The enable button can also be activated or deactivated in this menu. Then the external enable button (hardware option) is included in the power up procedure.

Above you will find device information:

- **Field “HNK”**: Article number.
- **Field “HW”**: Hardware version - designates the processing status of the hardware and thus offers the option of differentiation of various revision statuses.
- **Field “SW”**: Software Version
- **Field “SNr”**: Serial number
- **Field “Production Date”**: Date of production.

After this you have to confirm by pressing OK.

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10.4.5. Language

By clicking on the “Language” button, following screen appears (see Fig. 52):

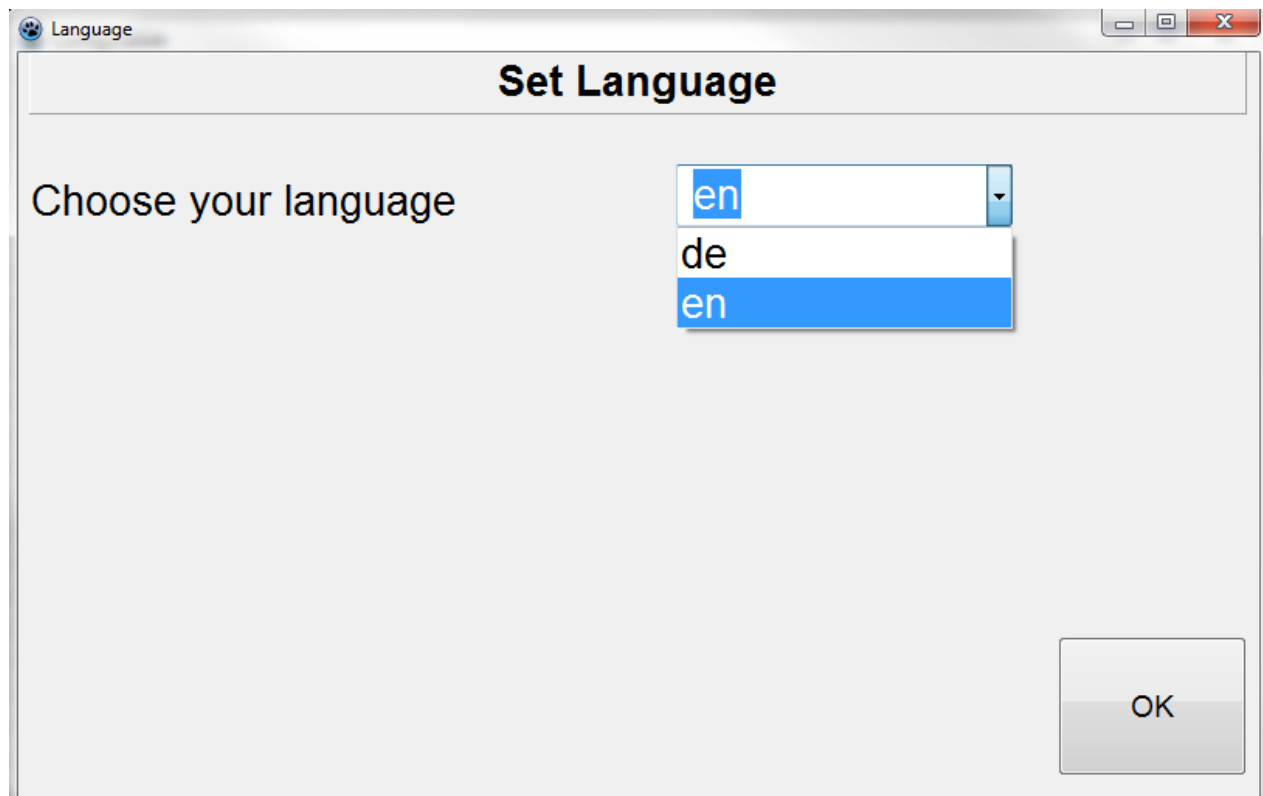



Fig. 52

Here you can set the language:

“en” - for english

“de” - for german.

After this you have to confirm by pressing OK.

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10.4.6. Autostart

By clicking on the “Autostart” button, following screen appears (see Fig. 53):

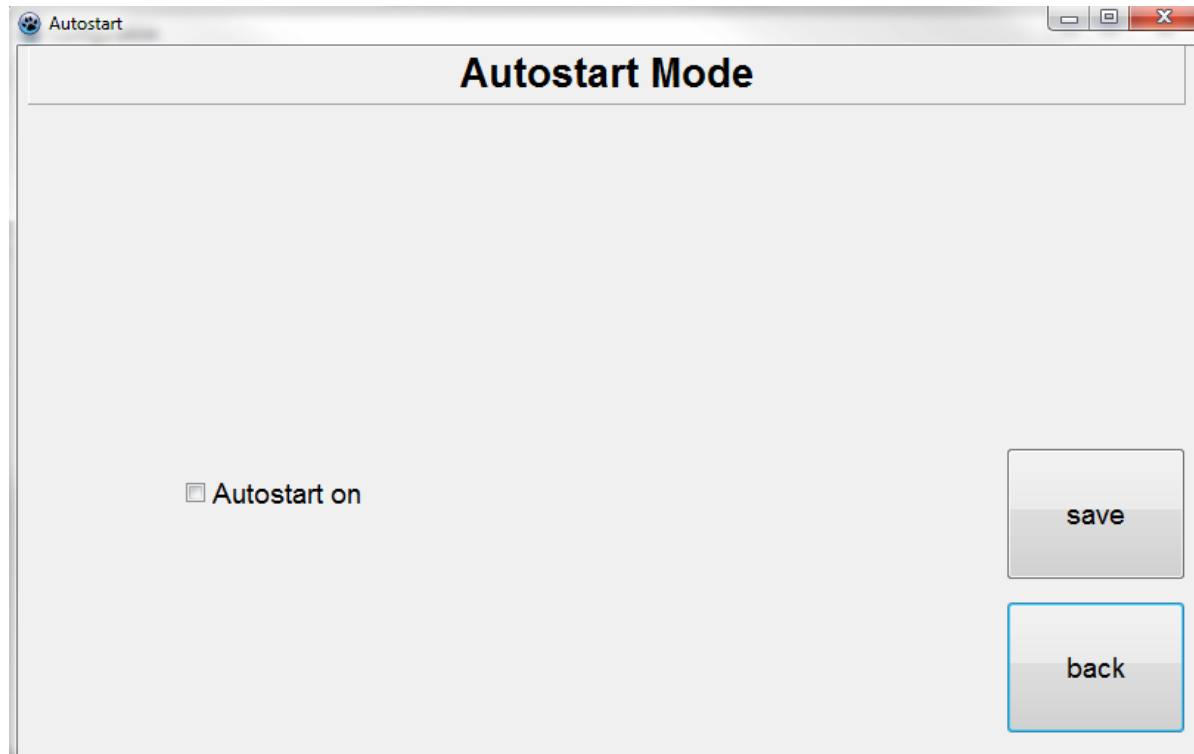
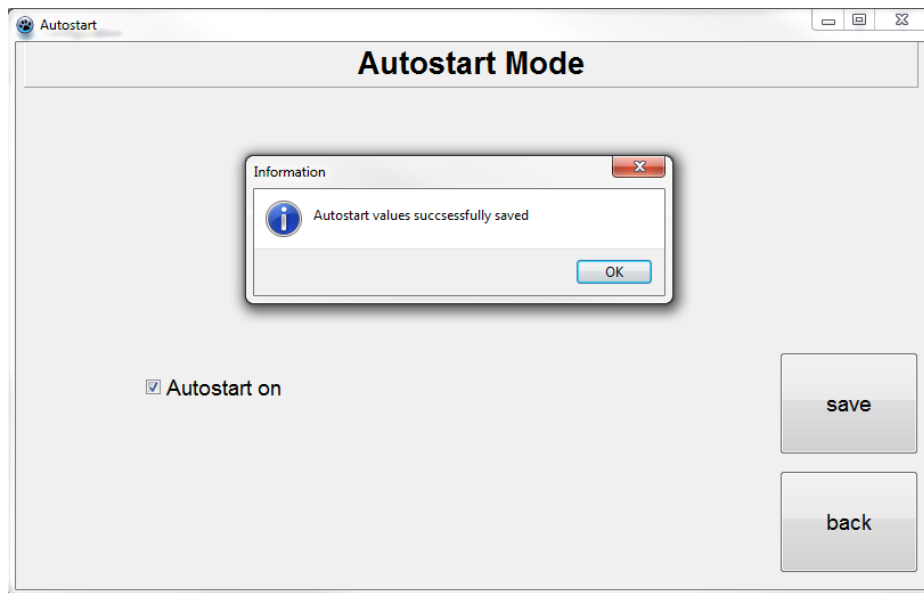


Fig. 53

The Autostart Mode is a possibility to operate the DPD (P) without serial communication. Device control is then only possible via the “Enable” and “Stop / Reset” buttons (hardware option). If the Autostart Mode becomes active, all configuration data will be stored to the EEPROM of the DPD (P).

Note: External enable button must be activated (see sections 10.3.2., 10.4.1. or 10.4.4.)

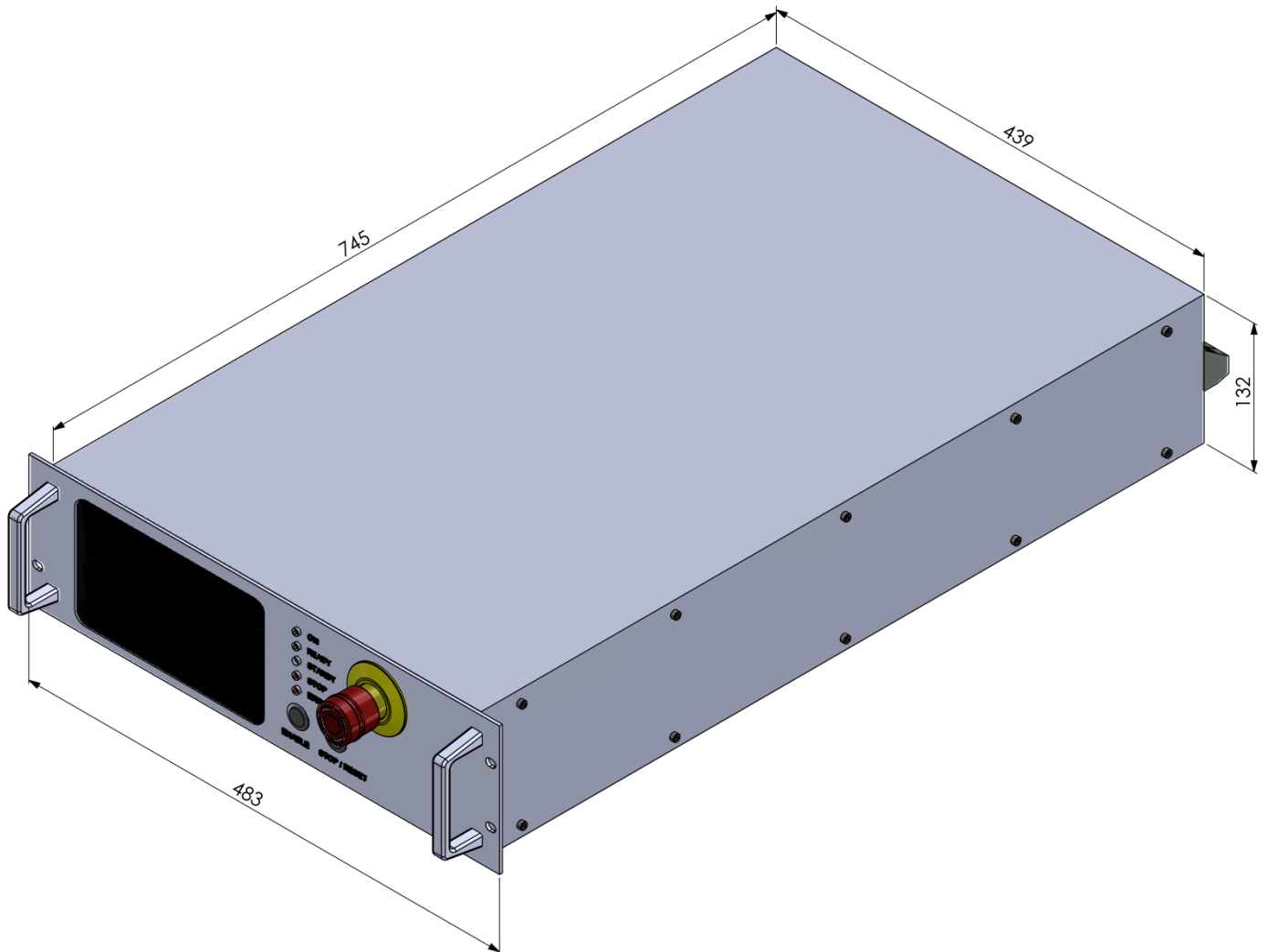
After this you have to confirm by pressing “save” and then confirm pop-up information window (see Fig. 54). Setting is saved.

**Fig. 54**

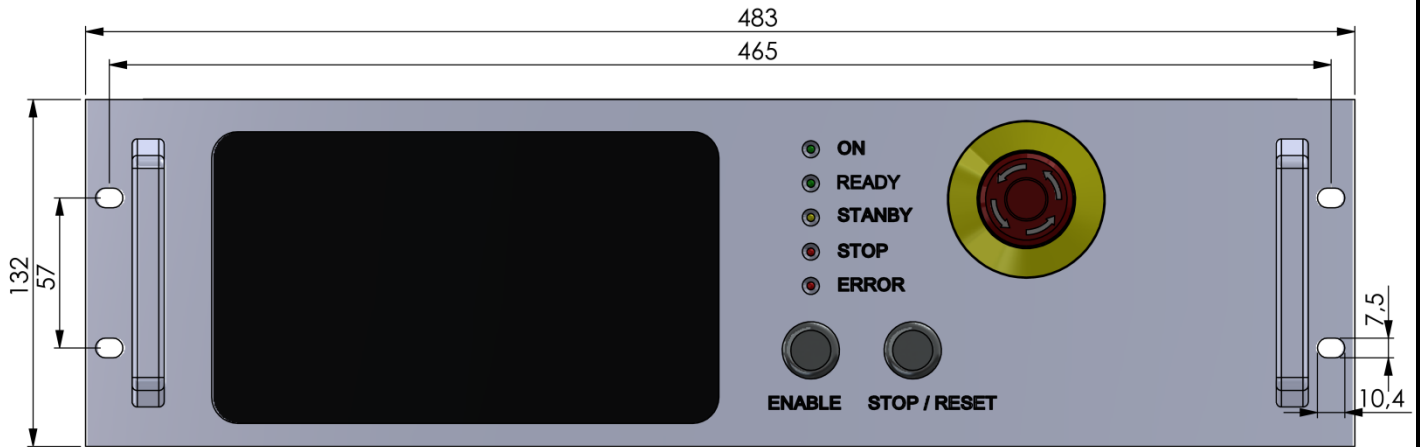
Press "Back" button to return to general configuration and then press "OK". Settings are saved, you return to Setup-menu.

11. Dimensions

11.1. Dimensions DPD (P) water-cooled

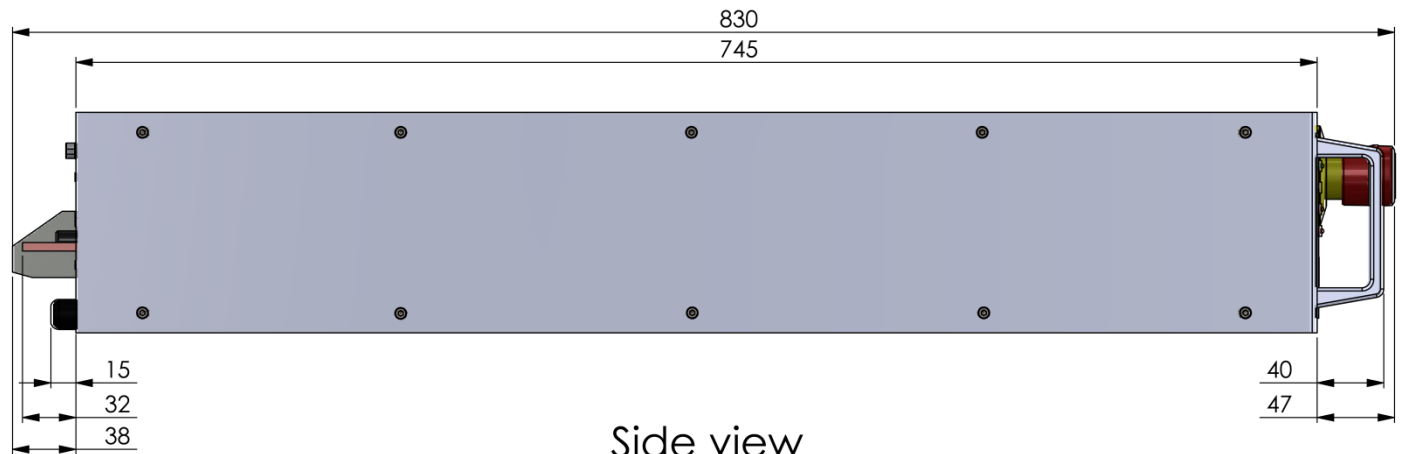


11.1.1. Front view



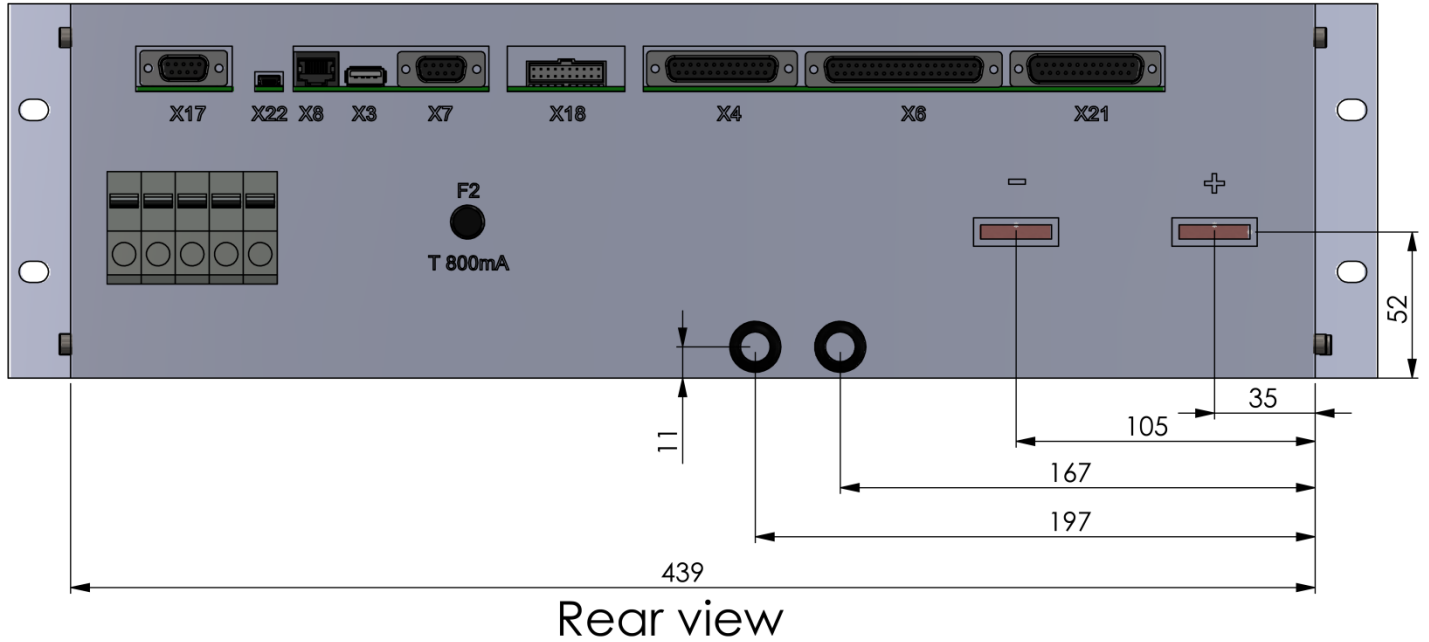
Front view

11.1.2. Side view

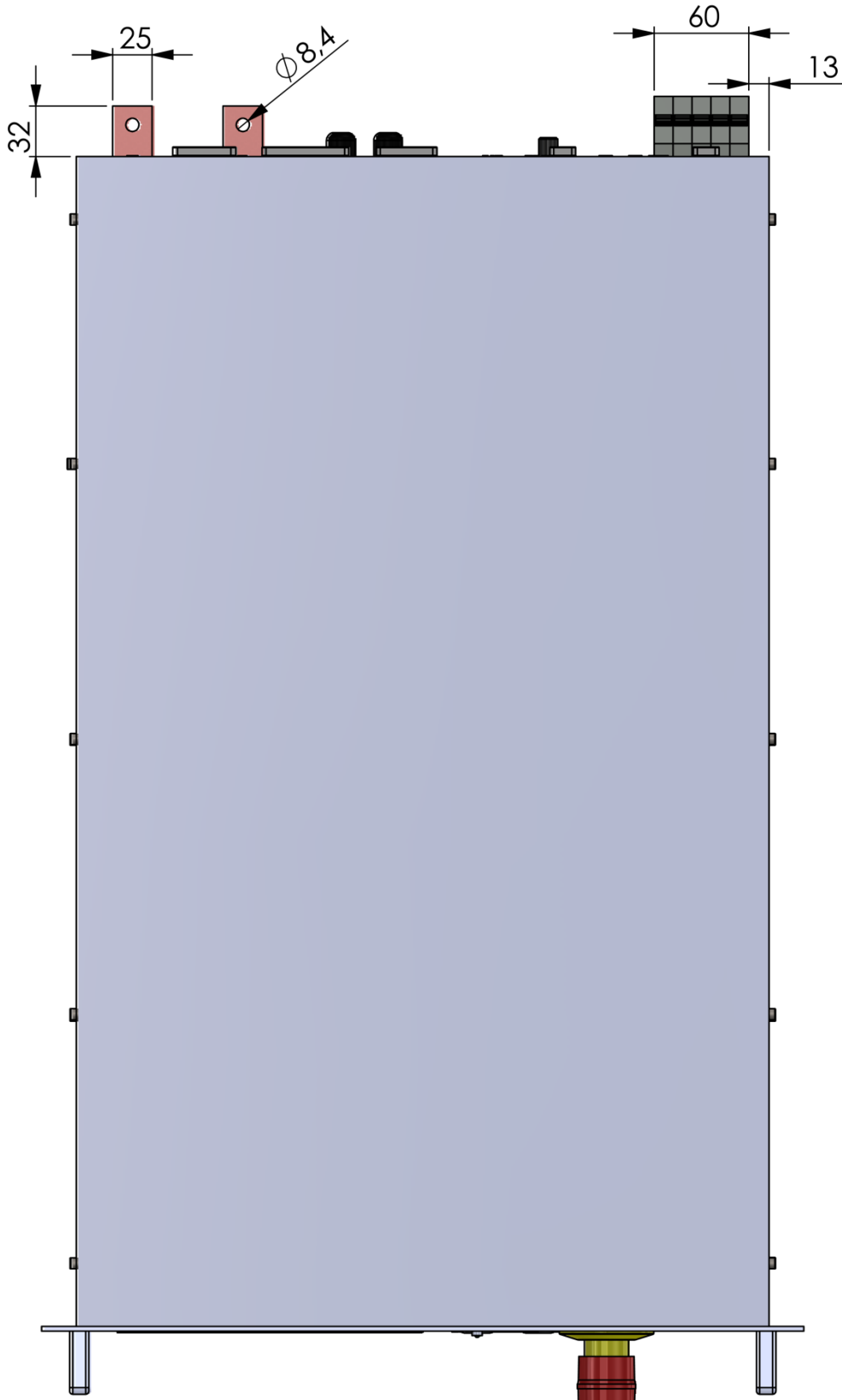


Side view

11.1.3. Rear view

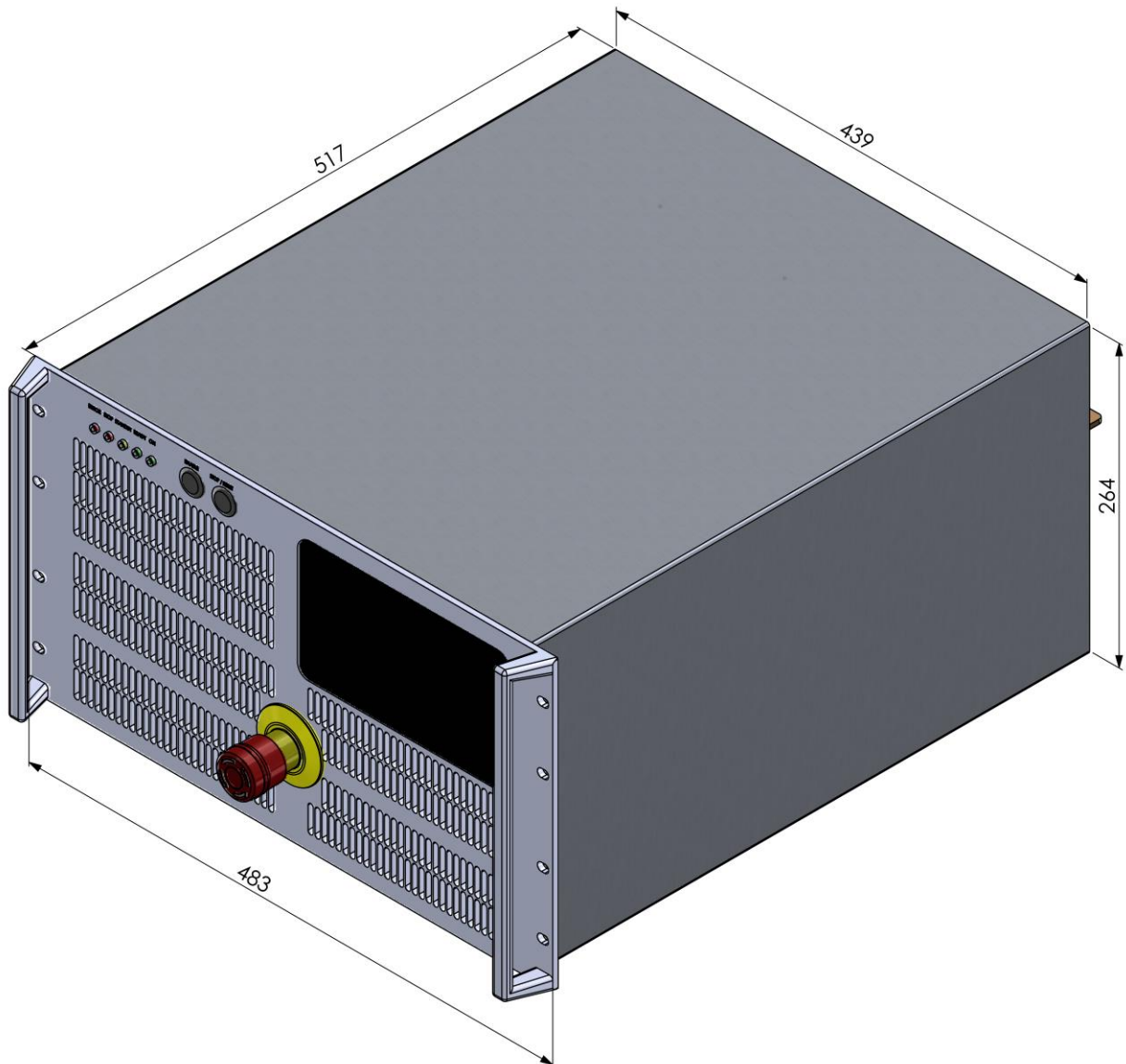


11.1.4. Top view

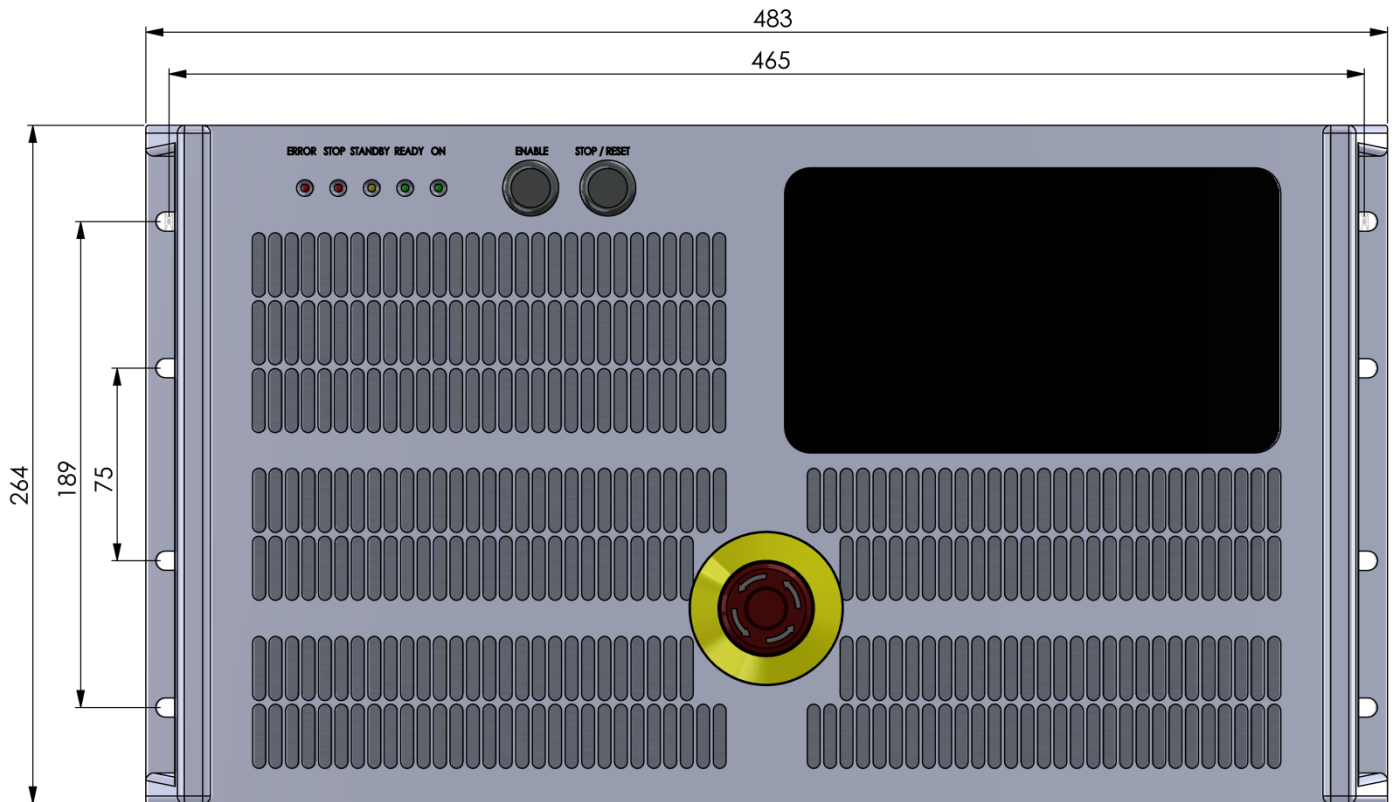


Top view

11.2. Dimensions DPD (P) air-cooled

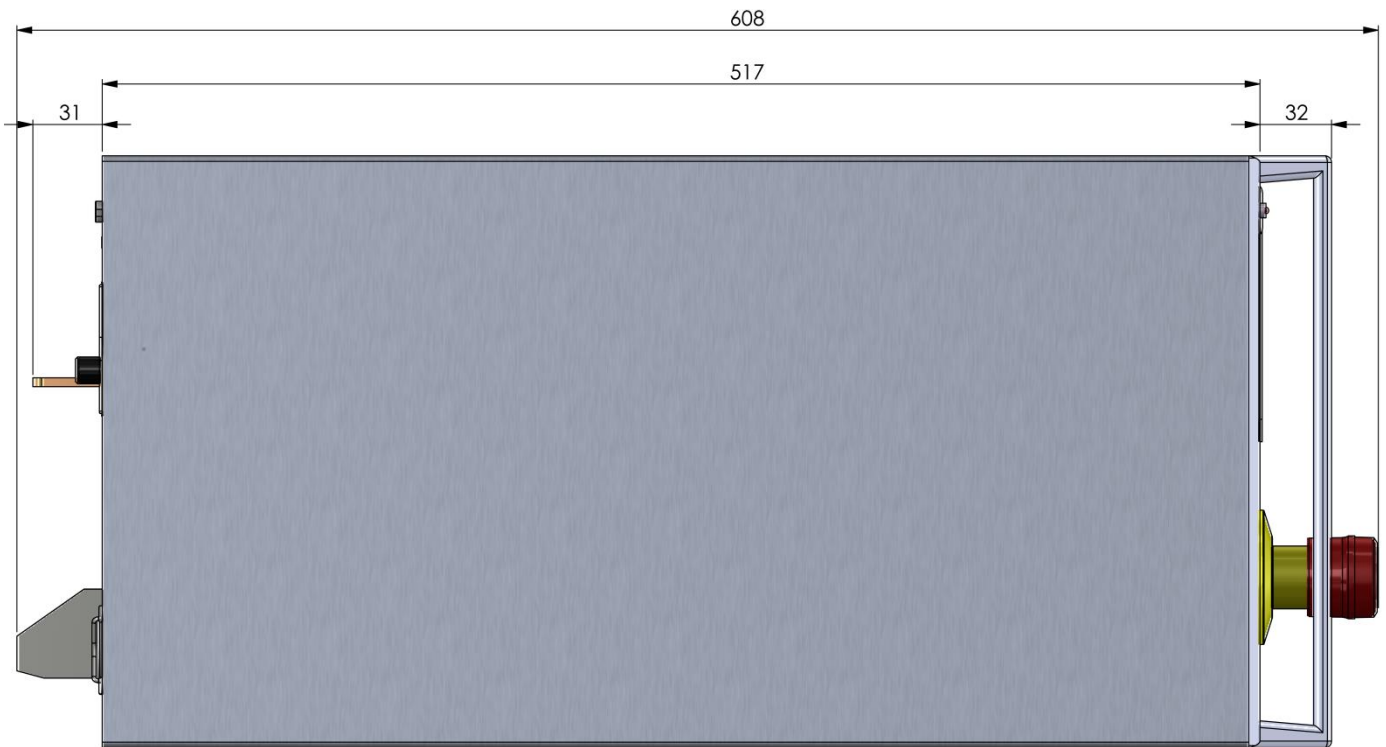


11.2.1. Front view



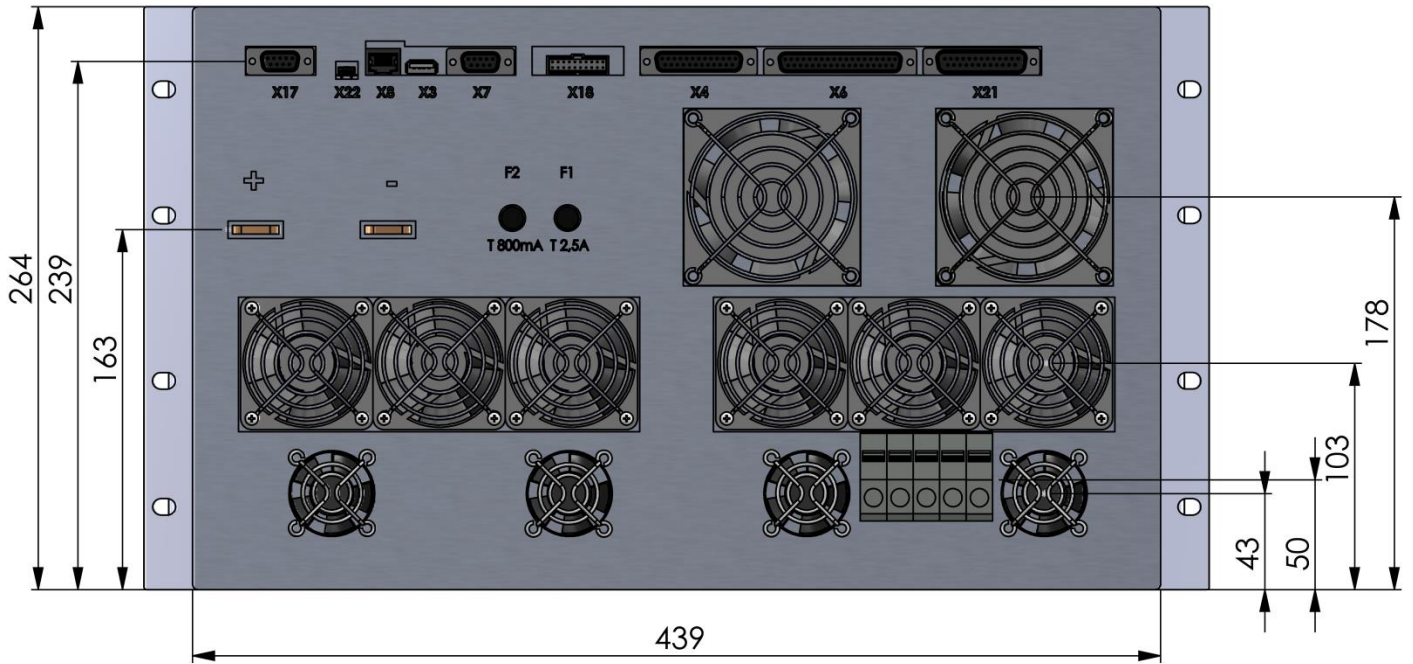
Front view

11.2.2. Side view



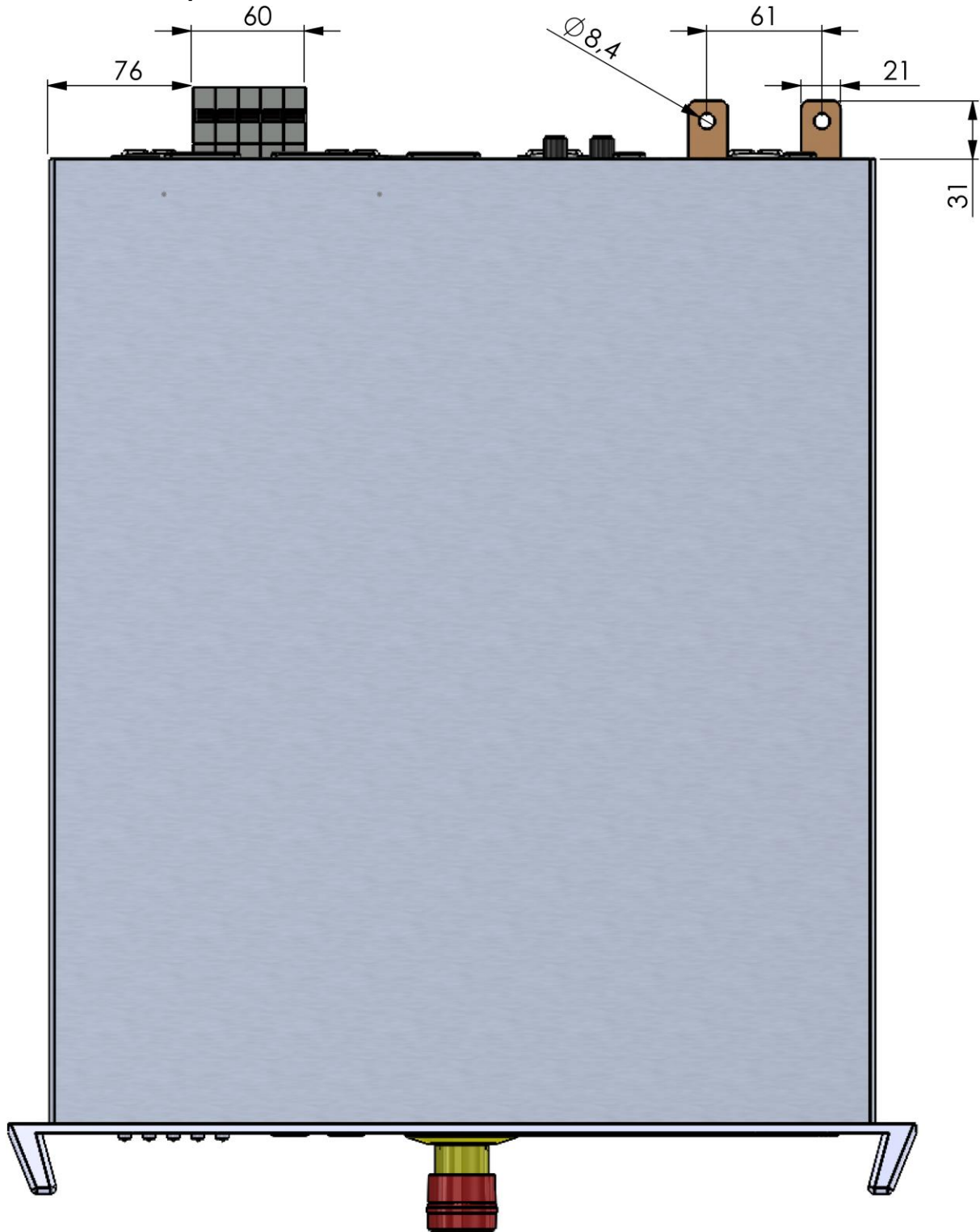
Side view

11.2.3. Rear view



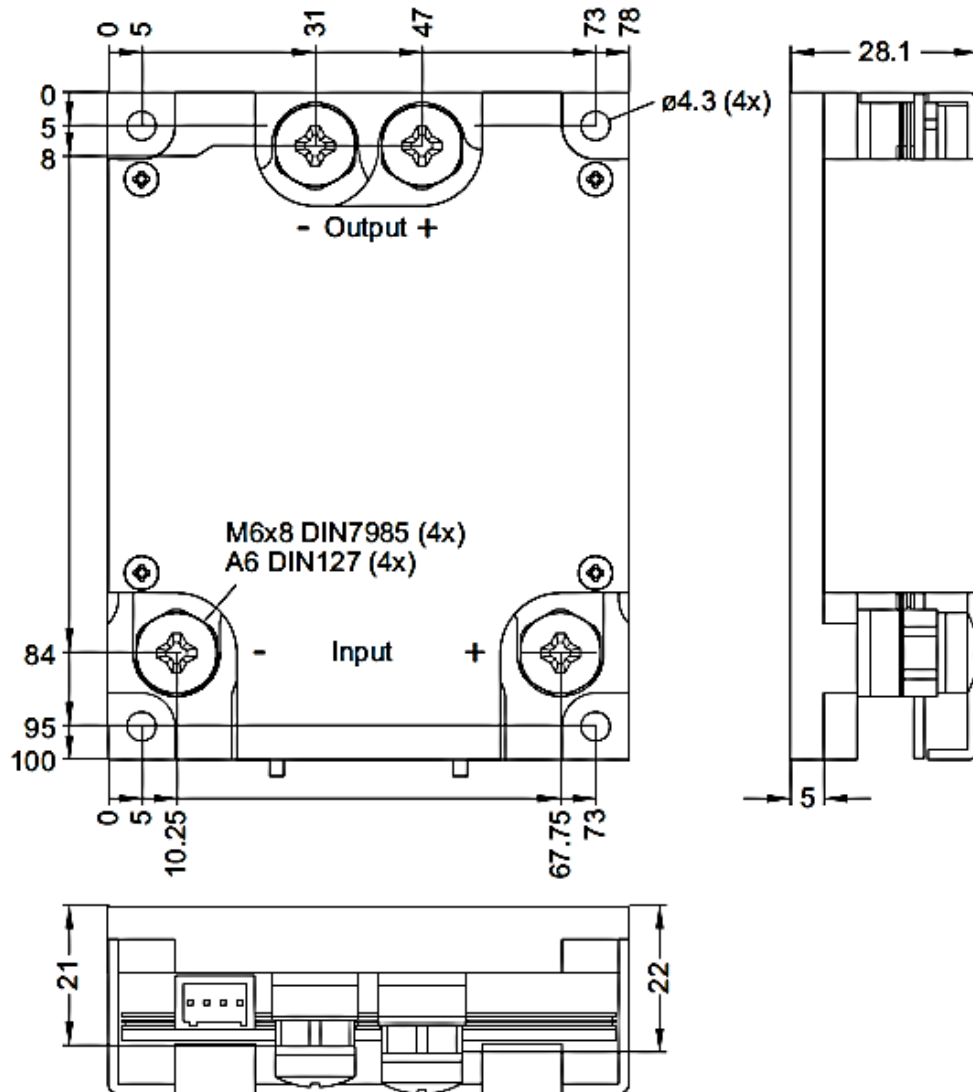
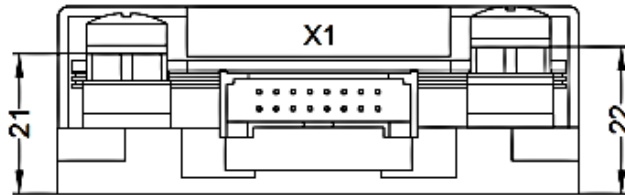
Rear view


11.2.4. Top view



Top view

11.3. Dimensions external pulse unit



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12. Ordering information

Single board computer incl. touch screen display	Part number 10300591
Status-LED Module	Part number 10300589
Control buttons	Part number 10300590
External pulse unit 200A	Part number 10204035
External pulse unit 320A	Part number 10204040
External plug "Unlock PS"	Part number 10300597
External plug "Enable DPDP"	Part number 10300598
Control cable external pulse unit, 2 meter	Part number 10385424
Control cable external pulse unit, 5 meter	Part number 10385425
Control cable external pulse unit, 10 meter	Part number 10385425

Contact Data

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Technical subjects to change without notice.