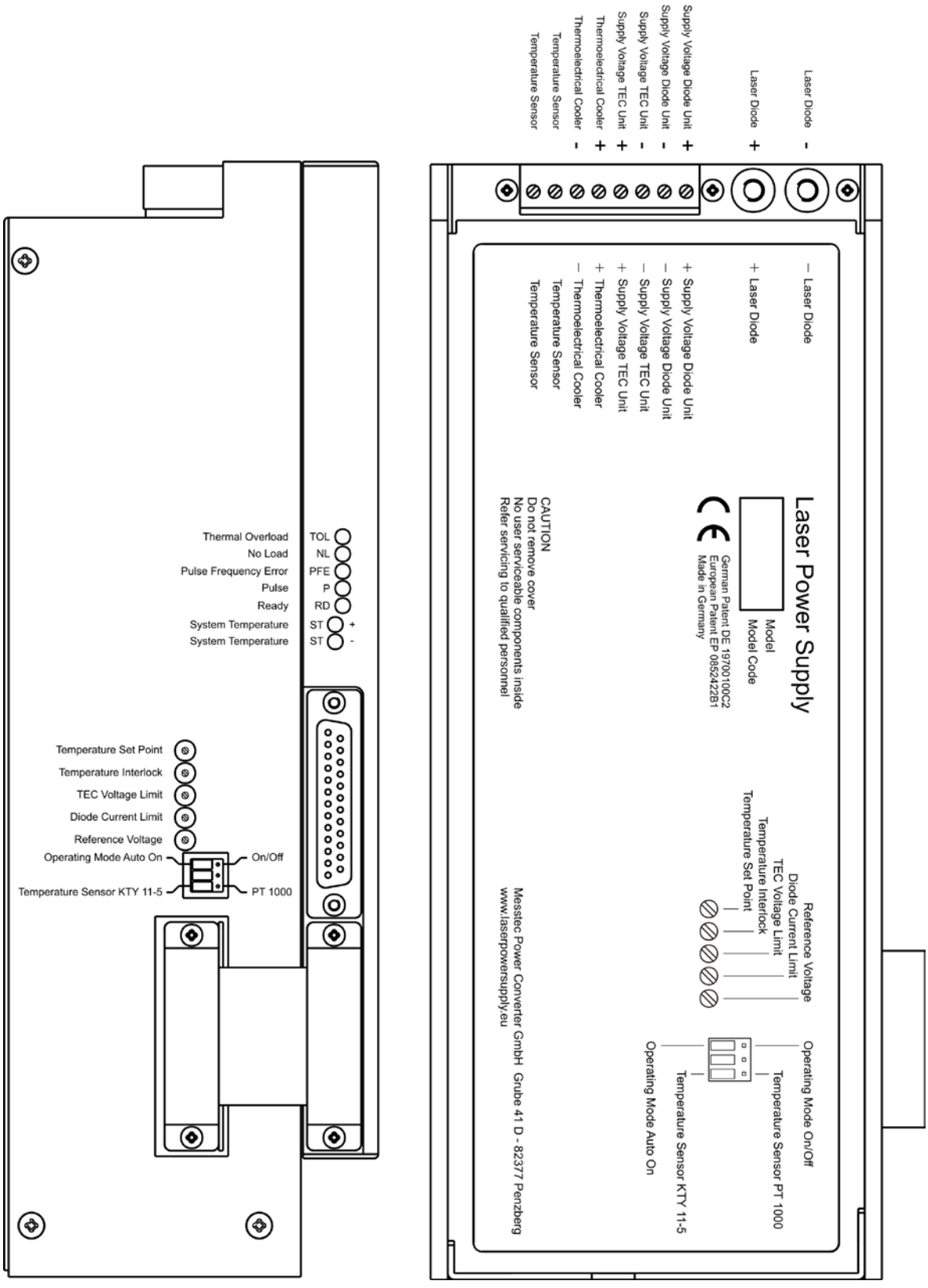

Laser Power Supply
DTP 400-60
10100521
Model
Model Code
CAUTION
Do not remove cover
No user serviceable components inside
Refer servicing to qualified personnel


Laser Diode -
Laser Diode +
Supply Voltage Diode Unit +
Supply Voltage Diode Unit -
Supply Voltage TEC Unit -
Supply Voltage TEC Unit +
Thermoelectrical Cooler +
Thermoelectrical Cooler -
Temperature Sensor
Temperature Sensor
Laser Power Supply
Model
Model Code
German Patent DE 19700100C2
European Patent EP 0852422B1
Made in Germany
CAUTION
Do not remove cover
No user serviceable components inside
Refer servicing to qualified personnel
Messtec Power Converter GmbH Grube 41 D - 82377 Penzberg
www.laserpowersupply.eu
Reference Voltage
Diode Current Limit
TEC Voltage Limit
Temperature Interlock
Temperature Set Point
Operating Mode On/Off
Temperature Sensor PT 1000
Temperature Sensor KTY 11-5
Operating Mode Auto On
Thermal Overload
No Load
Pulse Frequency Error
Pulse
Ready
System Temperature
System Temperature
TOL
NL
PFE
P
RD
ST +
ST -
Temperature Set Point
Temperature Interlock
TEC Voltage Limit
Diode Current Limit
Reference Voltage
Operating Mode Auto On
On/Off
Temperature Sensor KTY 11-5
PT 1000

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Safety Instructions

The DTP is suitable for supplying laser diodes with a constant pulsed or CW current and for supplying peltier elements with a constant voltage.
The device is not suitable for supplying loads which generate a electromotive force of more than 30 V.

The lines for the supply voltage must have a cross-section of 2.5 qmm, use sleeves.
The lines for the peltier elements must have a cross-section of 1.5 qmm, use sleeves.
The lines for the laser diodes must have a cross-section of 6 qmm, use ring terminals.
Do not use a crimping tool which does not fit. This increases transition resistance and may cause a cable fire.
In any case of doubtful crimping, additional soldering is required. Take care that the ring terminals are free of solder at the screws and at the connection bolts.
Use galvanized screws M5 x 8 and galvanized spring washers M5.

Take care of correct input wiring, the device has no inverse-polarity protection. Wrong polarity may damage the device.

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

The DTP is cooled by a fan. Air is drawn in at the front side near the terminals and is blown out at the rear side.

In an industrial environment with conductive dust, air filtering is required.

Put the device out of operation if it has visible damages or if it doesn't work properly.

Description

The DTP is a high-precision pulsed and CW laser diode driver and a full bridge TEC driver with temperature controller and control logic utilizing MPC's patented power switch technology. This technology has a lot of advantages and is particularly suited for driving laser diodes.
It offers high accuracy and current stability, an excellent dynamic performance, a high output impedance and low electromagnetic interference.
No current overshoot or ringing arise when altering output current or load impedance abruptly. Overshooting and ringing is very dangerous for laser diodes and it is the most dreaded thing in operating expensive laser diodes.

Fig. 1 shows the step response of a conventional laser driver at a current set point step of 0 ... 100 %. There is excessive overcurrent and ringing which may damage the laser diodes.

Fig. 2 shows the step response of the DTP at a current set point step of 0 ... 100 %, there is no overshoot or ringing, the characteristic is nearly perfect.

Fig. 1

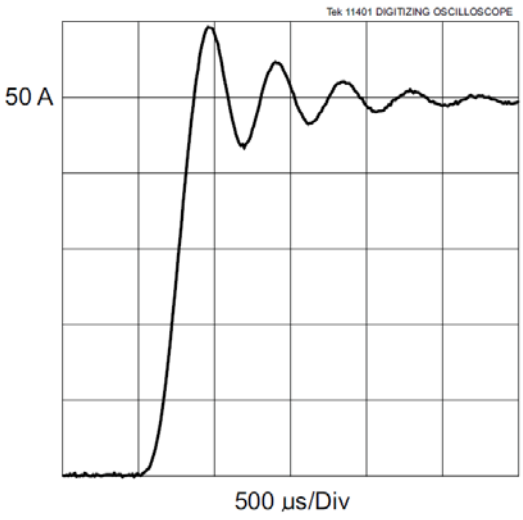
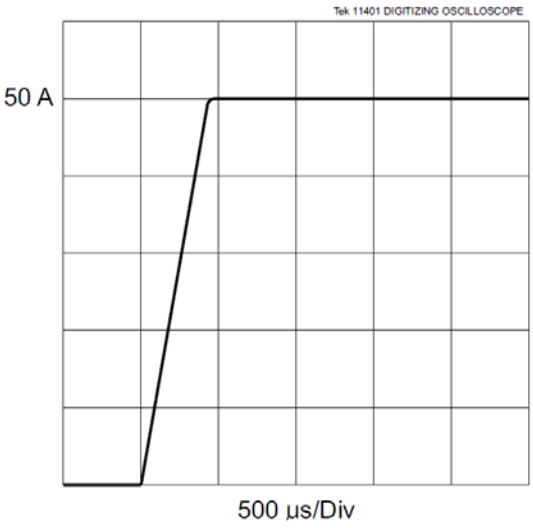


Fig. 2



A further major property 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 is open circuit, the drivers output voltage will increase to its maximum value because of its characteristic to inject current.
If the contact will be closed and you have a conventional laser driver with low dynamic output impedance, excessive overcurrent will damage the laser diodes.

The same happens, if you have stacked diodes and one of its emitters will getting 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 DTP responds in this case absolutely reliable and no overcurrent occurs
.
Fig. 3 shows the response of a conventional laser diode driver at a nominal output current of 50 A, if load impedance is changed abruptly to lower values.

Fig. 4 shows the response of the DTP at the same conditions, the diode current keeps constant

Fig. 3

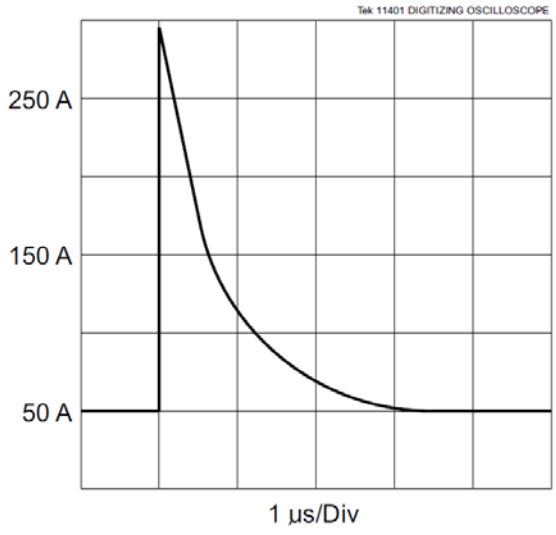
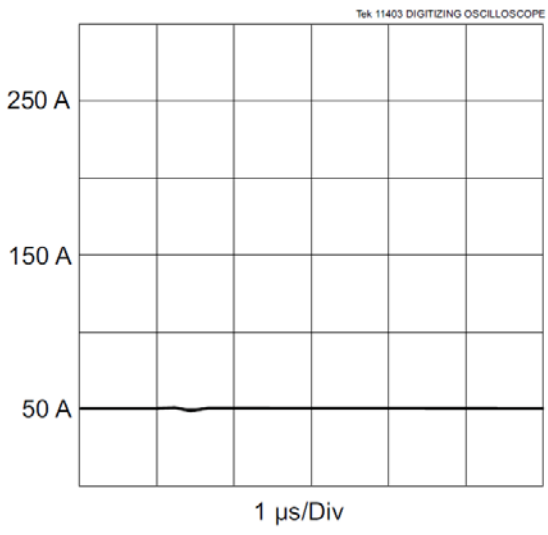


Fig. 4



Pulsing

The DTP allows pulsing with pulse lengths of 200 ns to CW.
Rise and fall time depend on the inductance and the length of the output lines for the diodes.
The shorter the lines, the shorter rise and fall time.
MPC developed a new method for the drastic reduction of the current fall times.
Compared to the state of the art, this method allows the reduction of the fall times by a factor of 120.

Fig. 5 shows a 1 ms / 60 A pulse of a conventional laser driver with an output line length of 150 mm. Rise time is 100 ns, fall time is 6.8 ms.

Fig. 6 and Fig. 7 show the same pulse with MPC's new method.
Rise time is 100 ns, fall time is only 57 ns.

Fig. 5

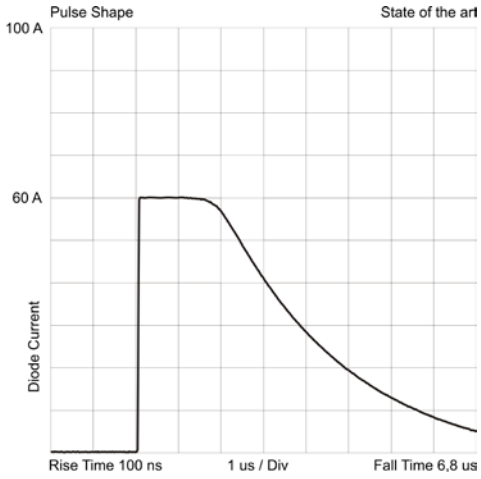


Fig.6

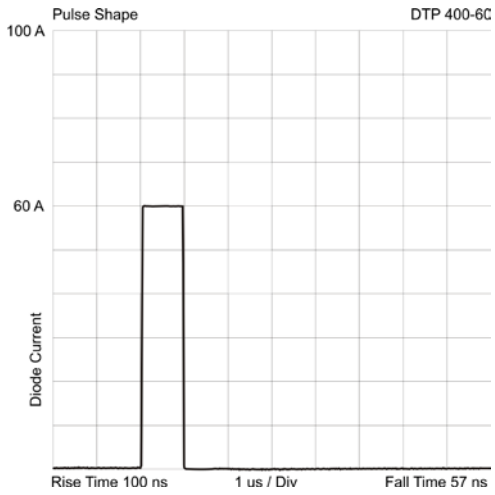
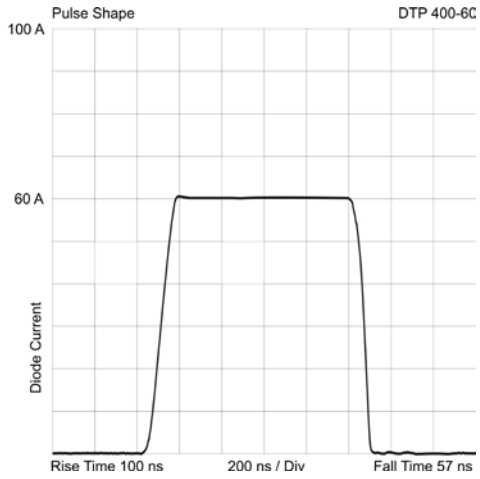


Fig. 7

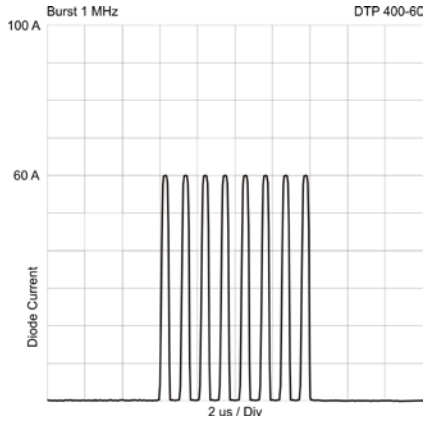


Pulse frequency

The maximum pulse frequency of the DTP depends on the diode current, the inductance and the length of the output lines for the diodes.
The lower the current and the shorter the lines, the higher the possible pulse frequency.
With a current of 60 A and a line length of 150 mm the maximum pulse frequency of the DTP is 200 KHz.
Higher frequencies can be run in a burst mode, provided that an average of 200 KHz is not exceeded.

Fig. 8 shows 1 MHz-pulses in a burst mode.

Fig. 8



Overload protection
The DTP is protected against too high pulse frequencies, against no load or too long output lines and against thermal overload.
In any case the DTP is switched off and remains in an off-state.

Errors:
Pulse frequency too high
The DTP detects that the maximum allowed pulse frequency is exceeded.
The DTP is switched off and remains in an off-state.
The LED PFE (Pulse Frequency Error) lits.
The LED RD (Ready) goes out.
The SD-READY signal goes Low.

No load or too long output lines
The DTP detects that there is no load at the output or that the line for the diodes is too long.
The DTP is switched off and remains in an off-state.
The LED NL (No Load) lits.
The LED RD (Ready) goes out.
The SD-READY signal goes Low.

Thermal overload
The DTP detects that its temperature is too high and has exceeded +80 °C.
Thermal overload may occur if the pulse frequency is too high in combination with high current, long output lines and high ambient temperature.
The DTP is switched off and remains in an off-state.
The LED TOL (Thermal Overload) lits.
The LED RD (Ready) goes out.
The SD-READY signal goes Low.

A good method for estimating an overload is to measure the systems temperature.
For this reason the DTP has a precise temperature measurement system inside whose measurement result can be readout at a 2-pole jack (connect a voltmeter).

SA-ST

System temperature (4 V corresponds to +80°C)	0 ... +5 V	for 0 ... 100 °C

The DTP can drive laser diodes, Peltier elements or both.
Two types of temperature sensors are supported, a KTY 11-5 and a PT 1000.
The DTP is available with an output current up to 50 A (DTP XXX-50) and with an output current up to 60 A (DTP XXX-60).
The DTP can be operated by a microcontroller, an external control logic or completely analog.
Two operating modes are possible, mode Laser On/Off and mode Auto On.
The mode can be selected by a jumper.

The device is well suited to build up simple laser systems with manual controlling, or complex laser systems with safety interlock, RS 232 interface and an industrial interface for controlling by a programmable logic controller.

For a simple laser system only a few external components are required:
Two buttons for Laser On and Laser Off
One potentiometer for the current set point
Six LEDs for indicating current states
No additional power supply is necessary.

For the DTP a comprehensive range of accessories is available, like eight different types of control panels, a safety interlock unit and a control interface unit with an industrial interface and a RS 232 interface, which allows fully controlling and configuring the system.

The DTP is forced-air-cooled but it can also be cooled by mounting it at a water cooler.

Set up elements
Jumper for operating mode On/Off or Auto On
Jumper for Shut Down mode active High or active Low
Jumper for temperature sensor KTY 11-5 or PT 1000

Adjustment elements
10 turn potentiometer for reference voltage
10 turn potentiometer for diode current limit
10 turn potentiometer for TEC voltage limit
10 turn potentiometer for TEC temperature interlock
10 turn potentiometer for TEC temperature set point

Indicating elements

LED RD	Ready, lits if the system is ready for operating
LED P	Pulse, lits if the pulse control signal CD-Pulse is High
LED PFE	Pulse frequency error, lits if the pulse frequency is too high
LED NL	No load, lits if there is no load at the output or if the line for the diodes is to long
LED TOL	Thermal overload, lits if the temperature of the system is too high

Connectors
8-pole terminal clamp for a 15 ... 30 V DC power supply, for the TEC ouput and for the temperature sensor
2 connection bolts Ø 10 mm with female thread M5 for the laser diodes
25-pole D-Sub female connector for control signals and status signals
2-pole connector for reading out system temperature

Analog Inputs

CA-DCSP1		
Diode current set point 1 for 0 ... 60 A DTP 400-60	0 ... +5 V	for 0 ... 50 A DTP 400-50
CA-DCSP2		
Diode current set point 2	0 ... +5 V	for 0 … 50 A DTP 400-50 for 0 … 60 A DTP 400-60
CA-DCL		
Diode current limit	0 … +5 V	for 0 … 50 A DTP 400-50 for 0 … 60 A DTP 400-60
CA-PTSP		
Peltier temperature set point	0 … +5 V	for 0 … +50 °C

Analog Outputs

SA-DCACT		
Diode current actual	0 … +5 V	for 0 … 50 A or for 0 … 60 A
SA-DCSPLIM		
Diode current set point limited	0 … +5 V	for 0 … 50 A or for 0 … 60 A
SA-DVACT		
Diode voltage	0 ... +5 V	for 0 … 25 V
SA-PTACT		
Peltier temperature actual	0 … +5 V	for 0 … +50 °C
REF		
Reference voltage	+5 V	2 mA max
REFVAR		
Reference voltage adjustable	0 … +5 V	Adjustable by potentiometer 2 mA max
AUX+5V		
Auxiliary voltage +5 V	+5.1 V	Current up to 200 mA
AUX+15V		
Auxiliary voltage +15 V	+15 V	Current up to 100 mA
AUX-15V		
Auxiliary voltage -15 V	-15 V	Current up to 100 mA

Digital Inputs

CD-DCON		
Diode Current On	+ 5 V	Connected to GND for 1 ms switches on (On/Off mode)
CD-DCOFF		
Diode Current Off	+ 5 V	Connected to GND for 1 ms turns off (On/Off mode)
CD-PULSE		
Pulse	TTL	Low corresponds to pulse pause High corresponds to pulse
CD-PSD		
Peltier Shut Down	TTL	High turns the TEC voltage off

Digital Outputs

SD-READY		
Ready	TTL	Open emitter, High if there are no errors
SD-DCON		
Diode Current On	TTL	Open emitter, High if the diode current is switched on
SD-DCSD		
Diode Current Shut Down	TTL	Open emitter, High if the diode current Shut Down is active
SD-PTL		
Peltier Temperature Low	TTL	Open emitter, High if the peltier temperature is low
SD-PTH		
Peltier Temperature High	TTL	Open emitter, High if the peltier temperature is high
SD-PTI		
Peltier Temperature Interlock	TTL	Open emitter, High if the peltier temperature exceeds the maximum allowed temperature. The system is turned off. The threshold value is adjustable by potentiometer.

Operating modes

There are two operating modes, mode On/Off and mode Auto on.
The mode is selectable by a jumper.

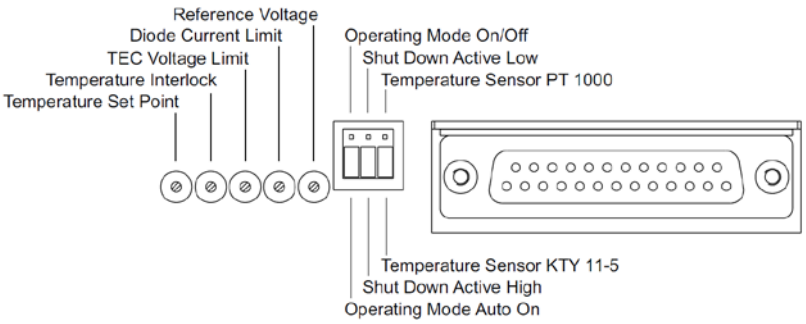
Mode On/Off

This mode is recommended for a manually operated or remote-controlled system with a control panel which has two buttons, one for Laser On and one for Laser Off.
No external logic or additional components or external power supply is required.

Mode Auto On

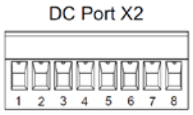
This mode is recommended for a system which is fully controlled by a microprocessor or by a programmable logic controller.
In this case, the device is permanently in an on-state.
On/Off controlling may be done using the shutdown input, or simply by feeding in a current set point or not.

Jumper Settings and Adjustment Elements



DC Port X2

8 pole terminal block, for connecting supply voltage, thermo-electrical cooler and temperature sensor.



Conductor cross section min. 0.14 qmm
Conductor cross section max. 2.5 qmm

Inputs		
Pin	Name	Function
1	+SVDU	+ Supply voltage diode unit
2	-SVDU	- Supply voltage diode unit
3	-SVTU	- Supply voltage TEC unit
4	+SVTU	+ Supply voltage TEC unit
5	+TEC	+ Thermoelectrical cooler
6	-TEC	- Thermoelectrical cooler
7	TS	Temperature sensor
8	TS	Temperature sensor

The supply voltage for the diode unit and the TEC unit are separated, with a common minus, pin 2 and pin 3 are connected internally.
The advantage over a single supply is that it is more flexible. For instance it is possible to supply the diode unit by a 15 V power supply and the TEC unit by a 24 V power supply. Additionally for building up a system with a safety interlock, separate supply lines are required because the diode unit must be electrically disconnected if an interlock occurs, whereas the TEC unit must operate and may not be disconnected.

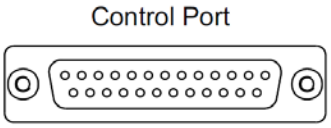
It is not necessary to use separate power supplies, it is also possible to supply the DT 400 by a single power supply. In this case pin 1 and pin 4 must be connected together.

If the DT 400 is only used for supplying laser diodes and the TEC unit is not used, supplying of the TEC unit is however mandatory because the internal circuit of the DT 400 is supplied by the TEC unit. In this case pin 1 and pin 4 must be connected together.

Important
The output for the laser diodes and the output for the TEC is not electrically isolated from the supply voltage. Never connect the outputs to the supply voltage. Never connect the diode outputs to the TEC outputs.

The signals and the GND of the Control Port are mostly isolated via instrumentation amplifiers, but not fully galvanically isolated from the diode output and from the TEC output .
It is possible to connect the GND of the Control Port to +SVDU or -SVDU of the supply voltage, or to +SVTU or -SVTU of the supply voltage, or to + or - of the diode output or to +TEC or -TEC of the TEC output.

Control Port X3



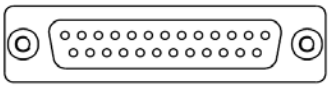
25-pole female plug connector according to
DIN 41652 and MIL-C-24308, female thread UNC 4-40

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

Inputs		
Pin	Name	Function
15	CA-DCSP1	Diode Current Set Point 1
3	CA-DCSP2	Diode Current Set Point 2
2	CA-DCL	Diode Current Limit
20	CA-PTSP	Peltier Temperature Set Point
5	CD-DCON	Diode Current On
18	CD-DCOFF	Diode Current Off
6	CD-DCSD	Pulse
21	CD-PSD	Peltier Voltage Shut Down
1	GND	Signal Ground
Outputs		
Pin	Name	Function
4	SA-DCACT	Diode Current Actual
16	SA-DCSPLIM	Diode Current Set Point Limited
17	SA-DVACT	Diode Voltage Actual
8	SA-PTACT	Peltier Temperature Actual
24	REF	Reference Voltage
11	REFVAR	Reference Voltage Adjustable
12	AUX+5V	Auxiliary Voltage +5 V
25	AUX+15V	Auxiliary Voltage +15 V
13	AUX-15V	Auxiliary Voltage -15 V
23	SD-READY	Ready
19	SD-DCON	Diode Current On
7	SD-DCSD	Diode Current Shut Down
9	SD-PTL	Peltier Temperature Low
22	SD-PTH	Peltier Temperature High
10	SD-PTI	Peltier Temperature Interlock
1	GND	Signal Ground

Signal description

Control Port



CA-DCSP1
Control Analog - Diode Current Set Point 1
Analog input 0 ... +5.000 V, corresponds to a diode current of 0 ... 50.00A.

CA-DCSP2
Control Analog - Diode Current Set Point 2
Analog input 0 ... +5.000 V, corresponds to a diode current of 0 ... 50.00A.

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

CA-DCL
Control Analog - Diode Current Limit
Analog input 0 ... +5.000 V, corresponds to a diode current limit of 0 ... 50.00 A.

There are four possibilities for diode current limiting, limiting by CA-DCL, by memory, by RS 232 or by the diode current limit potentiometer.
If limiting by CA-DCL or by memory or by RS 232 is selected, the current limit potentiometer has to be turned clockwise to its maximum value.
If limiting by the diode current limit potentiometer is selected, the CA-DCL input must be connected to the REF output (+5.000 V).

CA-PTSP
Control Analog - Peltier Temperature Set Point
Analog input 0 ... +5.000 V, corresponds to a peltier temperature of 0 ... + 50.00 °C.

There are four possibilities for a temperature set point, by CA-PTSP, by memory, by RS 232 or by the temperature set point potentiometer.
If a temperature set point by CA-PTSP or by memory or by RS 232 is selected, the temperature set point potentiometer has to be turned counterclockwise to its minimum value.
If a temperature set point by the temperature set point potentiometer is selected, the CA-PTSP input has to be left open.

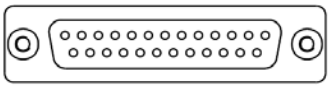
The value of the CA-PTSP signal and the value which comes from the temperature set point potentiometer will be added internally and generate the effective temperature set point.
It is also possible, to combine both values e.g. giving a temperature set point of 20 °C by the potentiometer and adding or subtracting 10 °C by a value of ±1 V at the CA-PTSP input.

SA-DCACT
Status Analog - Diode Current Actual
Analog output 0 ... 5.000 V, corresponds to a diode current of 0 ... 50 A.

SA-DCSPLIM
Status Analog - Diode Current Set Point Limited
Analog output 0 ... 5.000 V, reflects the diode current set point, limited by the diode current limit value of CA-DCL or by the value of the current limit potentiometer.

SA-DVACT
Status Analog - Diode Voltage Actual
Analog output 0 ... +5.000 V, corresponds to a diode voltage of 0 ... +25.00 V.
Reflects the actual diode voltage.

Control Port



SA-PTACT
Status Analog - Peltier Temperature Actual
Analog output 0 ... +5.000 V, corresponds to a peltier temperature of 0 ... +50,00 °C.
Reflects the actual peltier temperature.

REF
Analog output +5.000 V

REFVAR
Analog output 0 ... +5.000 V, adjustable by the reference voltage potentiometer.

AUX+5V
Output +5.1 V, for supplying external components.
Maximum allowable current: 200 mA.

AUX+15V
Output +15 V approximately, for supplying external components.
Maximum allowable current: 100 mA.

AUX-15V
Output -15 V approximately, for supplying external components.
Maximum allowable current: 100 mA.

CD-DCON
Control Digital - Diode Current On
Digital TTL input, High if left open.
In the operating mode On/Off the input acts in the following way:
If the input is pulled to GND for approximately 1 ms, the diode current will be switched on.
The diode current remains switched on until a CD-DCOFF signal turns off.
In the operating mode Auto On, the input is without effect.

CD-DCOFF
Control Digital - Diode Current Off
Digital TTL input, High if left open.
In the operating mode On/Off the input acts in the following way:

If diode current is switched on and if the input is pulled to GND for approximately 1 ms, the diode current will be turned off.
The diode current remains in an off-state until a CD-DCON signal turns on.
In both operating modes the CD-DCOFF input also acts as a system reset if an error has occurred.
In this case the system will be reseted if the input is pulled to GND for approximately 1 ms.

CD-PULSE
Control Digital - Pulse
Digital TTL input for pulse controlling.
Low corresponds to pulse pause, High corresponds to pulse.

General Instructions

Peltier element, cooling plate and heat sink

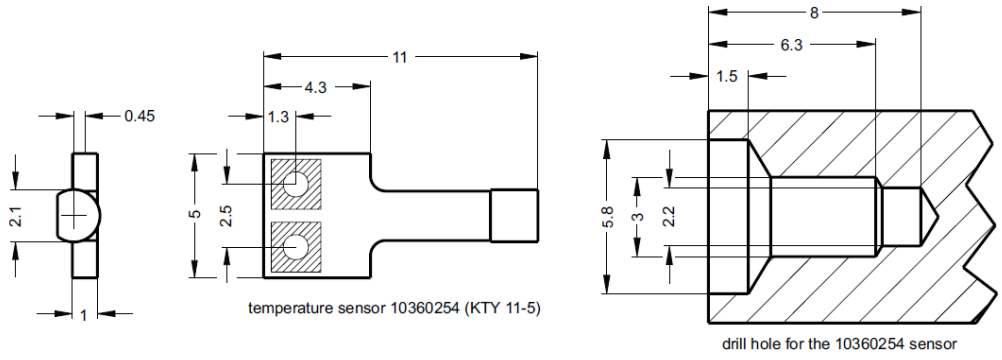
Do not operate a peltier element at its maximum limit or maximum cooling capacity, the electrical power loss will be very high and the efficiency will be very bad.
Operate the peltier element at a voltage of half of the maximum allowed voltage.
Select a peltier element whose cooling capacity is sufficient at a operating voltage of half of the maximum allowed operating voltage.

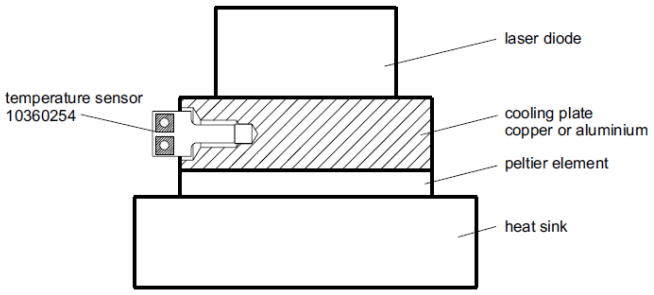
Try to spread the heat dissipation of the laser diodes by a extensive cooling plate, use extensive peltier elements ore multiple peltier elements instead of a single one.

Temperature sensor

Use small temperature sensors with a low thermal mass, the sensor must have a good thermal contact to the cooling plate. This is very important for the stability of the closed loop.
Use adhesives with high thermal conductivity for bonding the sensor. Do not use thick wires for connecting, this will draw away thermal energy and will degrade performance.
A good solution is Messtec's 10360254 sensor using a KTY 11-5. It has two soldering pads for connecting and it is easy to handle.

The figure shows an application with the 10360254 sensor.





General Instructions

TEC voltage limit

Adjust the TEC voltage limit before connecting a peltier element.
Connect a temperature sensor, either Messtec's 10360254 (KTY 11-5), a conventional KTY 11-5 or a PT 1000 to pin 7 and pin 8 of X2.
Pay attention to the proper jumper setting.
You can also take a 1000 Ω resistor instead of a temperature sensor, in this case set the jumper to PT 1000.
Connect a voltmeter to the TEC output and turn the DT 400 on.
Adjust TEC voltage to the maximum allowed value of your peltier element.

Temperature interlock

Do not adjust the trigger point very close to the operating temperature. Consider that in most cases a thermal overshoot will occur if the system is turned on.

Diode current and diode current limit

Do not connect laser diodes if it is the first time you put a DT 400 into operation.
Use a short circuit instead of laser diodes, connect the +laser diode output to the -laser diode output.
Connect a voltmeter to the SA-DCACT output (Diode Current Actual) and to GND of the control port. Turn on the DT 400 and feed in a current set point of 0 ... 5 V at the CA-DCSP1 input.
Watch the voltmeter, it reflects the diode current, in this case it reflects the current which flows through the short circuit. The reading value must be identical to the current set point. For instance if you have a DT 400-50 and the current set point is 5 V, the reading value must be 5 V, reflecting a current of 50 A through the short circuit.

Adjust the diode current limit potentiometer.
Example: You have a DT 400-60 and you would like to limit the diode current to a value of 55 A. Feed in a current set point of 5 V, voltmeter reading is now 5 V, reflecting 60 A current. Turn the diode current limit potentiometer counterclockwise to a reading value of 4.58 V, reflecting 55 A current.

Application 1

Simple laser system, only a switch for Laser On and a TTL-signal for pulse controlling is required.

Adjustments

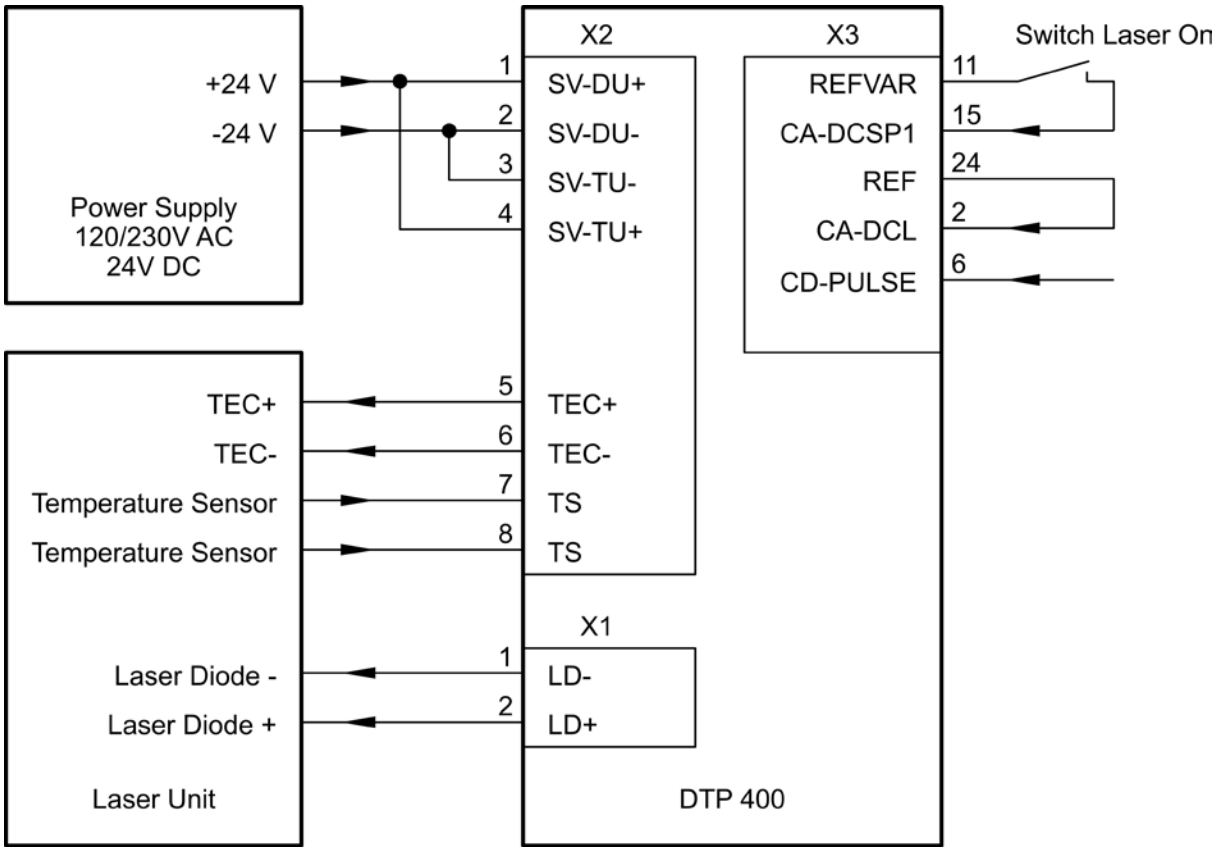
Diode current: reference voltage potentiometer at DTP 400.
Diode current limit: diode current limit potentiometer at DTP 400.
TEC temperature: temperature set point potentiometer at DTP 400.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings

Operating mode: Auto On

Pulse control

TTL-Signal



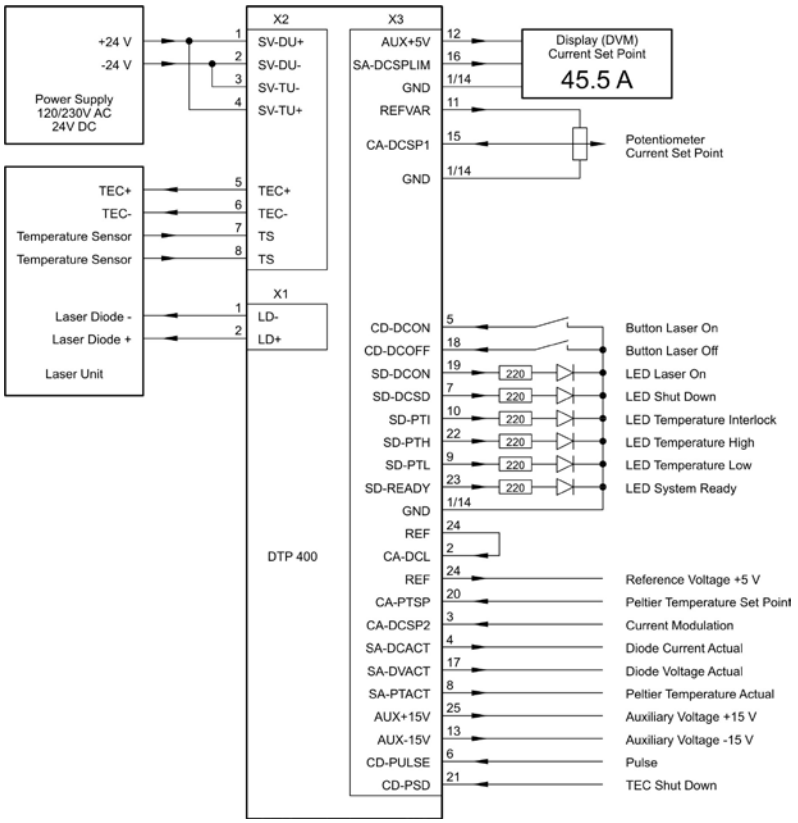
Application 2

Manually operated laser system, no additional power supply is required.
Required external components:
1 potentiometer 10K for the current set point
2 buttons for Laser On and Laser Off
1 DVM for indicating current set point
6 LEDs and 6 resistors for indicating states

Adjustments
Diode current: external potentiometer.
Diode current range, upper limit: reference voltage potentiometer at DTP 400.
Diode current limit: diode current limit potentiometer at DTP 400.
TEC temperature: temperature set point potentiometer at DTP 400.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings
Operating mode: On/Off

Pulse control
TTL-Signal



Application 3

Manually operated laser system, no additional power supply is required.
Required external components:
1 potentiometer 10K for the current set point
1 potentiometer 10K for the temperature set point
2 buttons for Laser On and Laser Off
1 DVM for indicating current set point
1 DVM for indicating temperature set point
6 LEDs and 6 resistors for indicating states

Adjustments

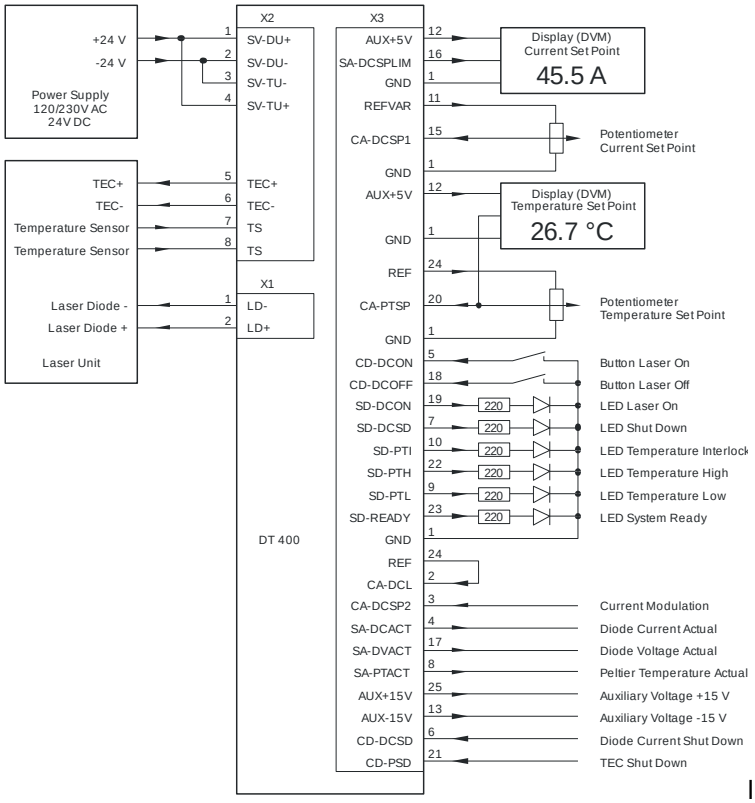
Diode current set point: external potentiometer.
TEC temperature set point: external potentiometer.
Diode current range, upper limit: reference voltage potentiometer at DTP 400.
Diode current limit: diode current limit potentiometer at DTP 400.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings

Operating mode: On/Off

Pulse control

TTL-Signal



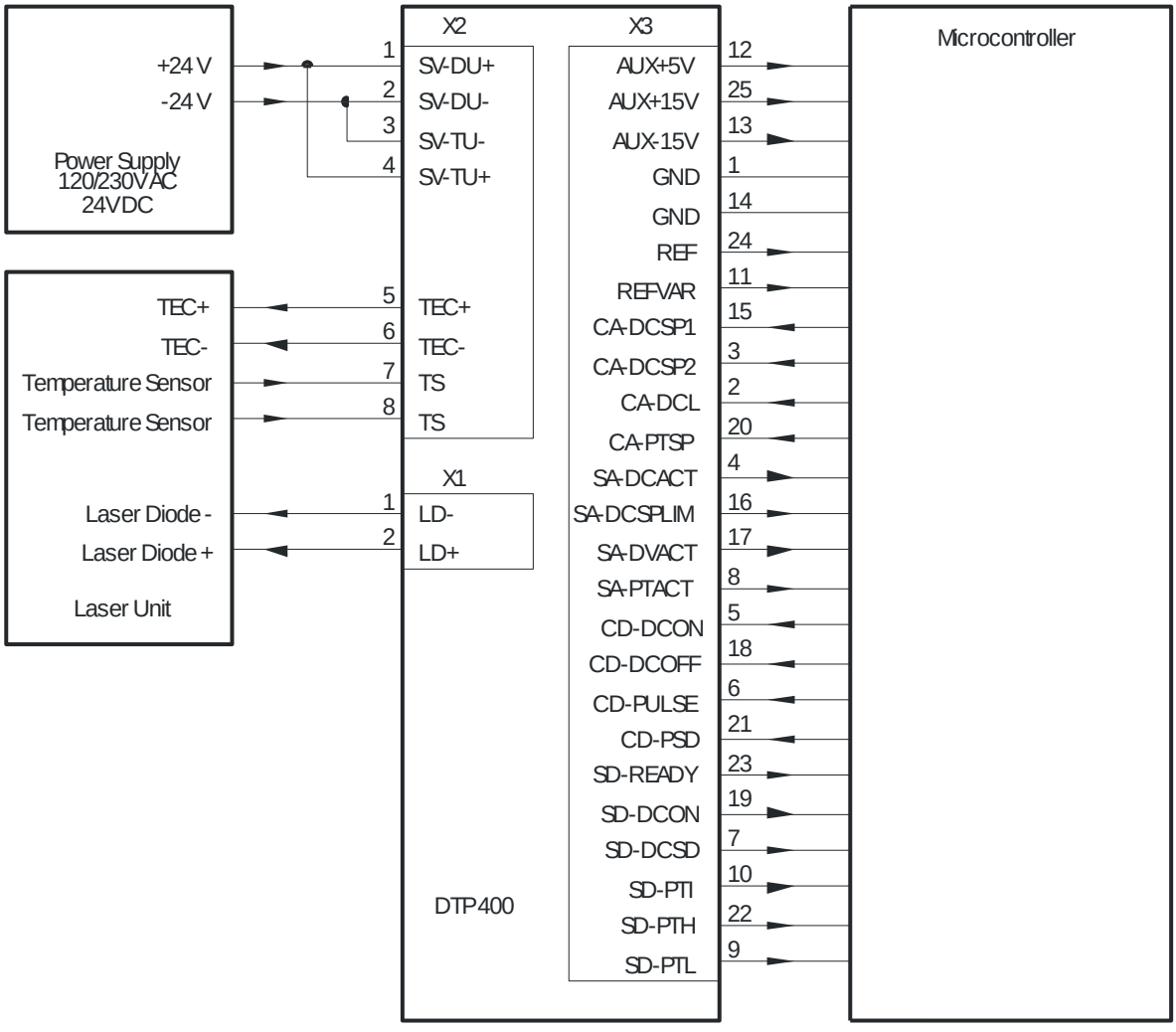
Application 4

Fully microprocessor controlled laser system, no additional power supply is required.

Adjustments
Adjust diode current limit potentiometer at DTP 400 clockwise to its maximum value.
Adjust temperature set point potentiometer at DTP 400 counterclockwise to its minimum value.
Adjust temperature interlock potentiometer at DTP 400 clockwise to its maximum value.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings
Operating mode: auto On or On/Off

Pulse control
TTL-Signal from microcontroller



Application 5

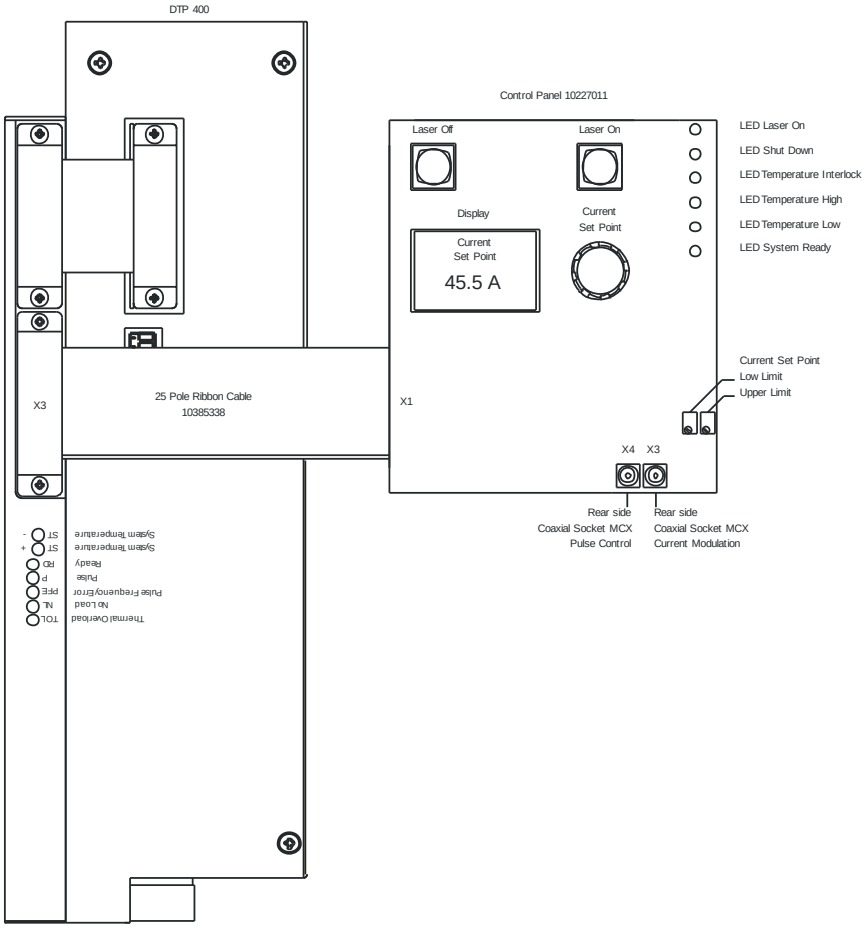
Manually operated laser system using control panel 10227011 with current set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point, six LEDs for indicating states, and two additional coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse modulation signal or TTL shut down signal.
No additional power supply is required.

Adjustments

Diode current set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Diode current limit: diode current limit potentiometer at DTP 400.
TEC temperature: temperature set point potentiometer at DTP 400.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings

Operating mode: On/Off



Application 6

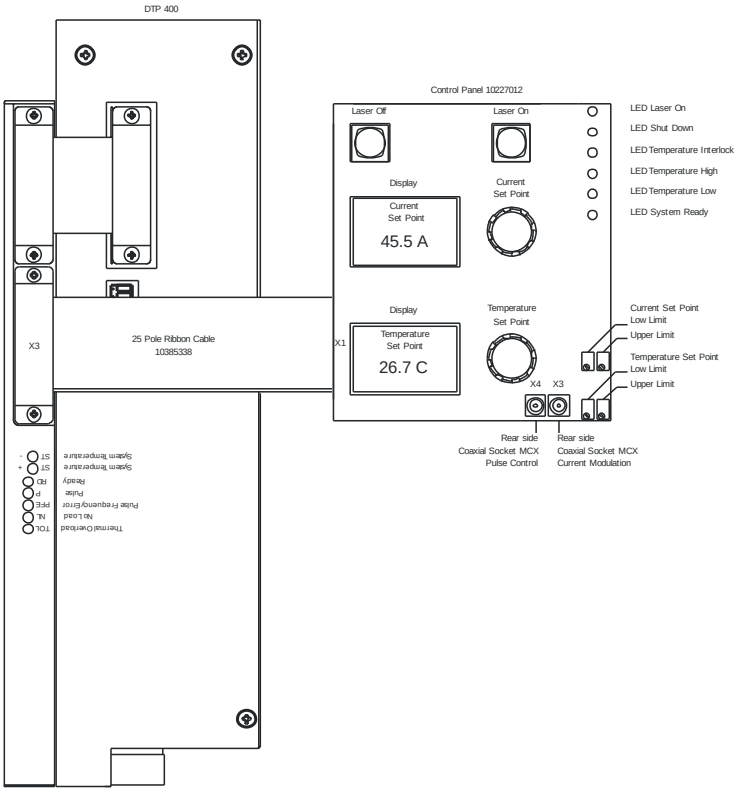
Manually operated laser system using control panel 10227012 with current set point potentiometer, temperature set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point, a digital display for the temperature set point, six LEDs for indicating states, and two additional coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse modulation signal or TTL shut down signal.
No additional power supply is required.

Adjustments

Diode current set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Diode current limit: diode current limit potentiometer at DTP 400.
TEC temperature set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 10.5 °C to 26.7 °C.
Adjust temperature set point potentiometer at DTP 400 counterclockwise to its minimum value.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings

Operating mode: On/Off



Application 7

Manually operated complete laser system utilizing accessories kits.
No additional power supply is required.

Front panel

Key-operated switch and emergency stop button for the mains voltage.
Current set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point and six LEDs for indicating states.

Rear panel

Connector for the mains voltage, BNC jack for analog current modulation, BNC jack for TTL pulse control signal.

Accessories

Power supply 10870022
120/230 V AC 24V/20 A DC

Control panel 10227011

with current set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point, six LEDs for indicating states and two coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse control signal.

Heat sink 10500882

for mounting printed circuit board 10360347, peltier elements and laser diodes.

Printed circuit board 10360347

with 6 pole terminal clamp and soldering pads for TEC, temperature sensor and pilot laser and 5 pole terminal with female thread M5 for the laser diodes.

25 pole ribbon cable 10385338

length 350 mm.

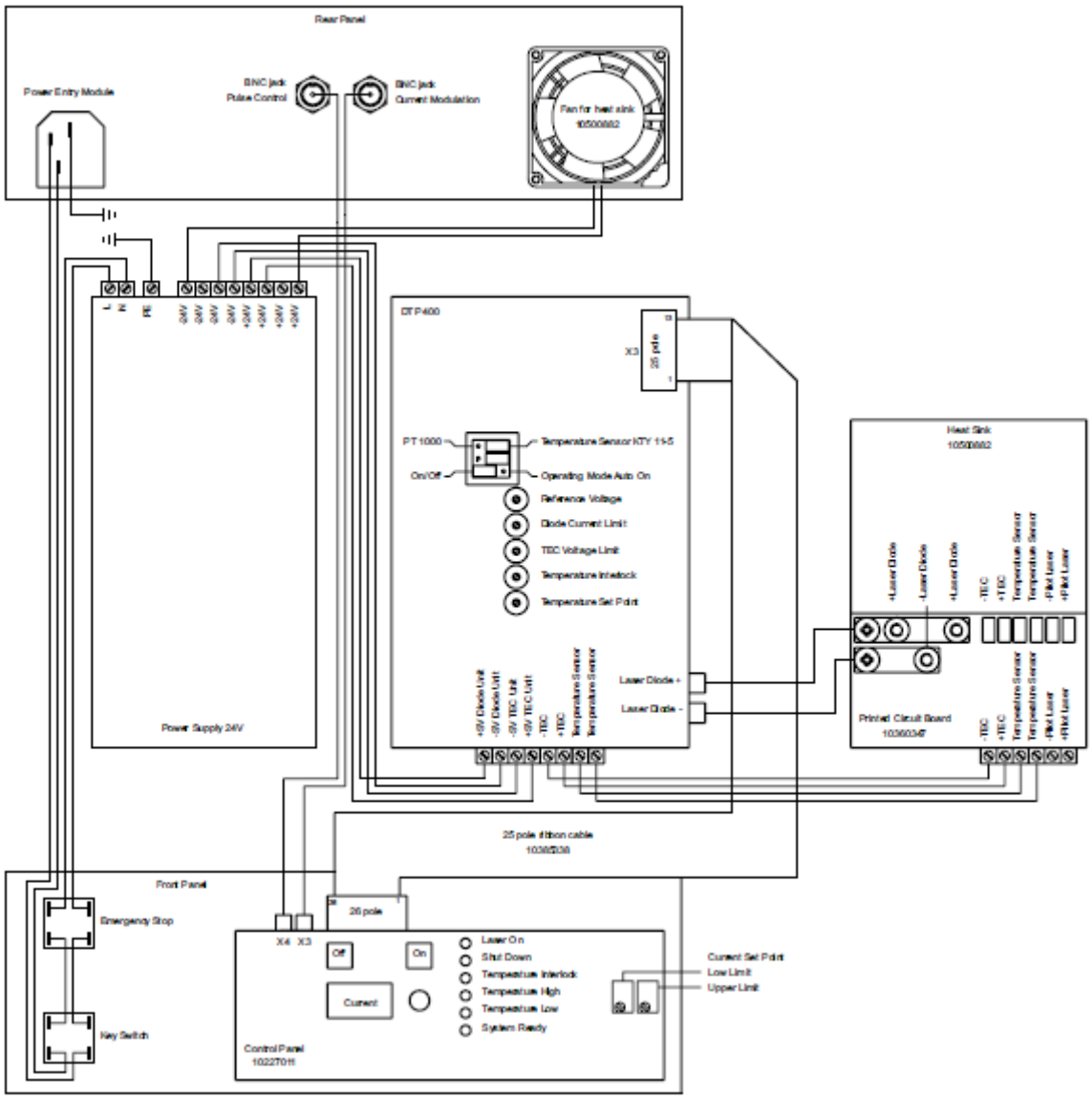
Adjustments

Diode current set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Diode current limit: diode current limit potentiometer at DTP 400.
TEC temperature set point: temperature set point potentiometer at DTP 400.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings

Operating mode: On/Off

Application 7



Application 8

Manually operated complete laser system utilizing accessories kits.
No additional power supply is required.

Front panel

Key-operated switch and emergency stop button for the mains voltage.
Current set point potentiometer, temperature set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point, a digital display for the temperature set point and six LEDs for indicating states.

Rear panel

Connector for the mains voltage, BNC jack for analog current modulation, BNC jack for TTL pulse control signal.

Accessories

Power supply 10870022
120/230 V AC 24V/20 A DC

Control panel 10227012

with current set point potentiometer, temperature set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point, a digital display for the temperature set point, six LEDs for indicating states and two coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse control signal.

Heat sink 10500882

for mounting printed circuit board 10360347, peltier elements and laser diodes.

Printed circuit board 10360347

with 6 pole terminal clamp and soldering pads for TEC, temperature sensor and pilot laser and 5 pole terminal with female thread M5 for the laser diodes.

25 pole ribbon cable 10385338

length 350 mm.

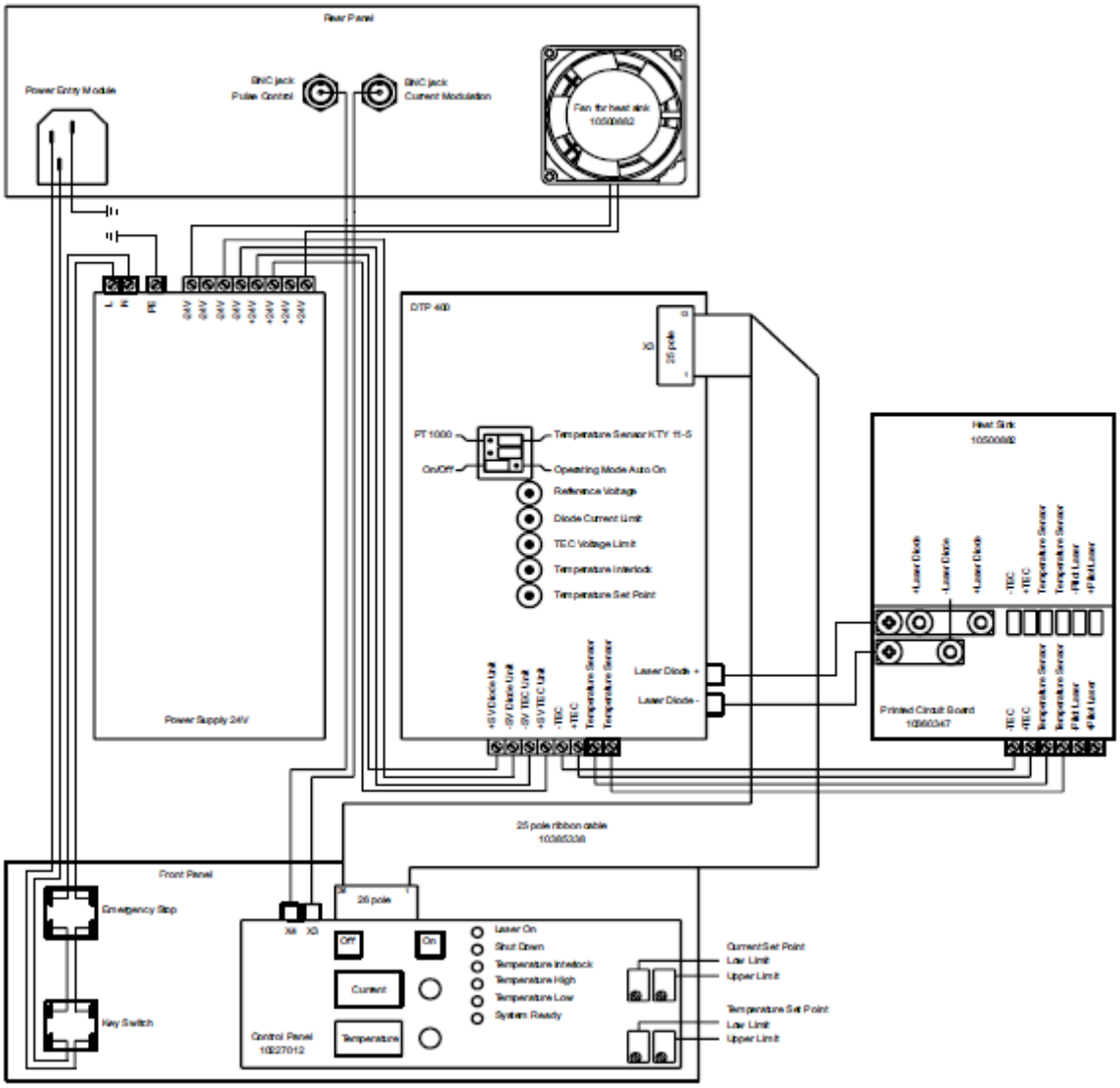
Adjustments

Diode current set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Diode current limit: diode current limit potentiometer at DTP 400.
TEC temperature set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 10.5 °C to 26.7 °C.
Adjust temperature set point potentiometer at DTP 400 counterclockwise to its minimum value.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings

Operating mode: On/Off

Application 8



Application 9

Manually operated and remote-controlled complete laser system utilizing accessories kits.
The system can be fully configured and controlled via the RS 232 port and fully controlled via the control port.
Signal levels at the control port meet the common industry standard for directly connecting a programmable controller (PLC) or any other controller.
The option of system configuring via the RS 232 port and set-up software (requires a PC with Windows_ operating system) makes the system exceptionally flexible. For example it is possible to define in both operating modes (local or remote), where the current set point shall come from, from internal nonvolatile memory, from control port or from control panel.
No additional power supply is required.

Front panel Key-operated switch and emergency stop button for the mains voltage, current set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point and seven LEDs for indicating current states.

Rear panel Connector for the mains voltage, BNC jack for analog current modulation, BNC jack for TTL pulse control signal, switch Local/Remote, 9 pole female plug connector of RS 232 port and 25 pole female plug connector of control port.

Accessories
Power supply 10870022 120/230 V AC 24V/20 A DC

Control panel 10227013 with current set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point, seven LEDs for indicating states and two coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse control signal.

Control interface 10227003 with RS 232 port, control port, set-up software and control software.

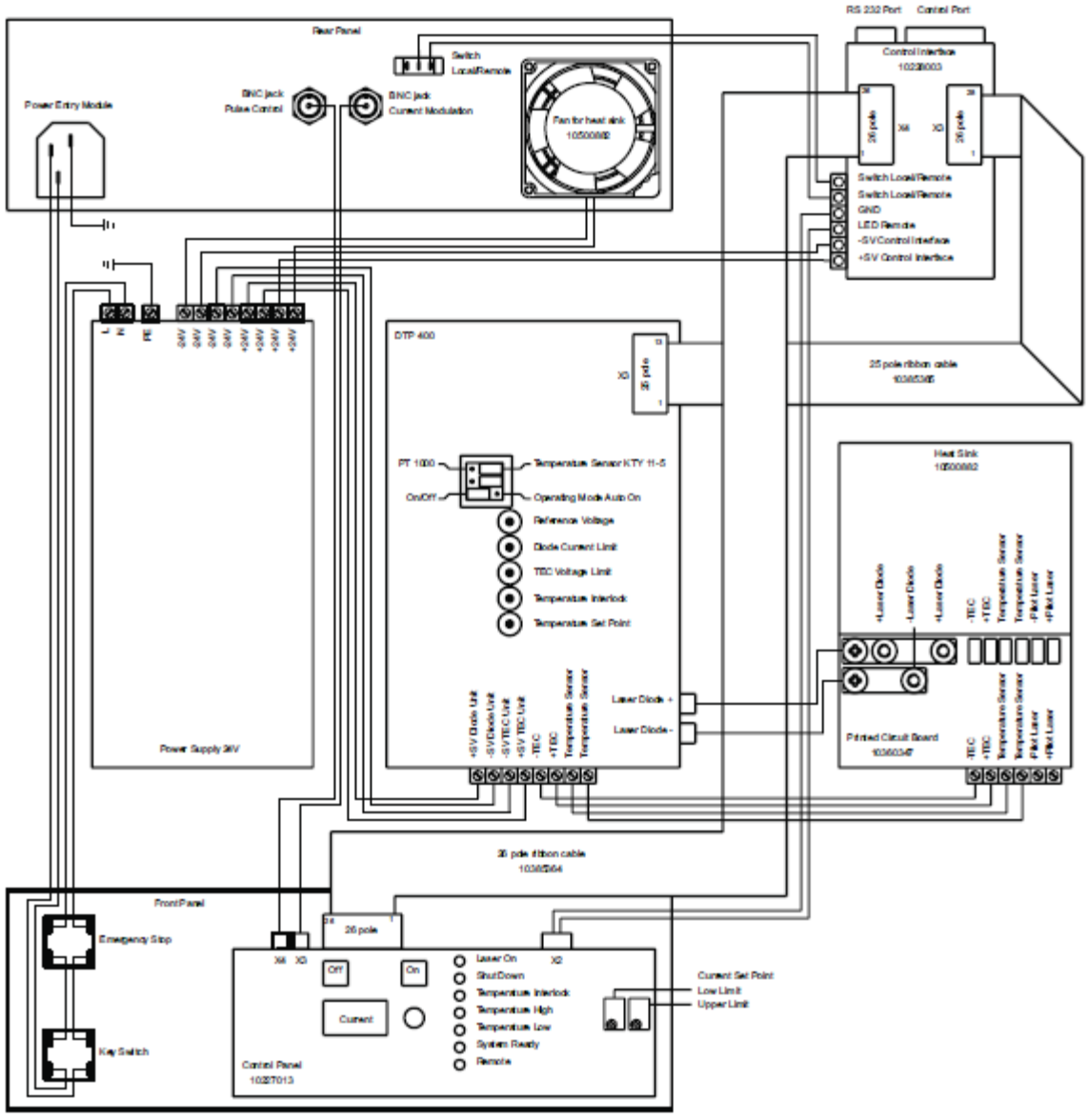
Heat sink 10500882 for mounting printed circuit board 10360347, peltier elements and laser diodes.
Printed circuit board 10360347 with 6 pole terminal clamp and soldering pads for TEC, temperature sensor and pilot laser and 5 pole terminal with female thread M5 for the laser diodes.
26 pole ribbon cable 10385364 length 480 mm.
25 pole ribbon cable 10385365 length 565 mm.

Adjustments
Diode current set point: by potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A, by analog signal at the control port, by internal memory or by RS 232 control.
Diode current limit: by analog signal at the control port, by internal memory or by RS 232 control.
TEC temperature set point: by analog signal at the control port, by internal memory or by RS 232 control.
TEC excess temperature: by internal memory or by RS 232 control.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.

Adjust diode current limit potentiometer at DTP 400 clockwise to its maximum value.
Adjust temperature interlock potentiometer at DTP 400 clockwise to its maximum value.
Adjust temperature set point potentiometer at DTP 400 counterclockwise to its minimum value.

Application 9

Jumper settings
Operating mode: On/Off



Application 10

Manually operated and remote-controlled complete laser system utilizing accessories kits.
The system can be fully configured and controlled via the RS 232 port and fully controlled via the control port.
Signal levels at the control port meet the common industry standard for directly connecting a programmable controller (PLC) or any other controller.
The option of system configuring via the RS 232 port and set-up software (requires a PC with Windows_ operating system) makes the system exceptionally flexible. For example it is possible to define in both operating modes (local or remote), where the current set point shall come from, from internal nonvolatile memory, from control port or from control panel.
No additional power supply is required.

Front panel Key-operated switch and emergency stop button for the mains voltage, current set point potentiometer, temperature set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point, a digital display for the temperature set point and seven LEDs for indicating current states.
Rear panel Connector for the mains voltage, BNC jack for analog current modulation, BNC jack for TTL pulse control signal, switch Local/Remote, 9 pole female plug connector of RS 232 port and 25 pole female plug connector of control port.

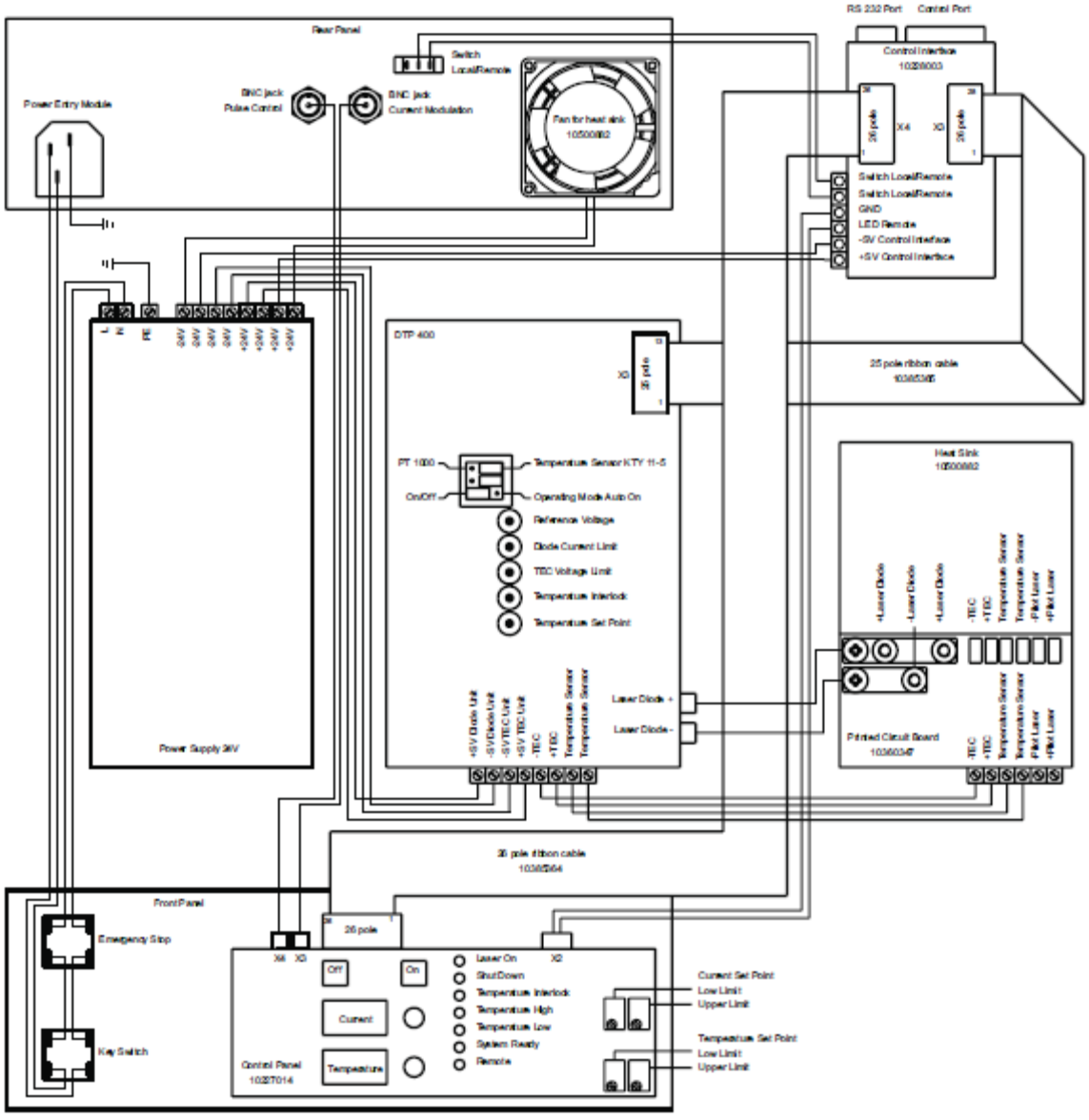
Accessories
Power supply 10870022 120/230 V AC 24V/20 A DC
Control panel 10227014 with current set point potentiometer, temperature set point potentiometer, two buttons for Laser On and Laser Off, a digital display for the current set point, a digital display for the temperature set point, seven LEDs for indicating states and two coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse control signal.
Control interface 10227003 with RS 232 port, control port, set-up software and control software.
Heat sink 10500882 for mounting printed circuit board 10360347, peltier elements and laser diodes.
Printed circuit board 10360347 with 6 pole terminal clamp and soldering pads for TEC, temperature sensor and pilot laser and 5 pole terminal with female thread M5 for the laser diodes.
26 pole ribbon cable 10385364 length 480 mm.
25 pole ribbon cable 10385365 length 565 mm.

Adjustments
Diode current set point: by potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A, by analog signal at the control port, by internal memory or by RS 232 control.
Diode current limit: by analog signal at the control port, by internal memory or by RS 232 control.
TEC temperature set point: by potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 10.5 °C to 26.7 °C, by analog signal at the control port, by internal memory or by RS 232 control.
TEC excess temperature: by internal memory or by RS 232 control.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Adjust diode current limit potentiometer at DTP 400 clockwise to its maximum value.

Adjust temperature interlock potentiometer at DTP 400 clockwise to its maximum value.
Adjust temperature set point potentiometer at DTP 400 counterclockwise to its minimum value.

Application 10

Jumper settings
Operating mode: On/Off



Application 11

Manually operated complete laser system with safety interlock utilizing accessories kits.
No additional power supply is required.
See chapter interlock unit 10228002 for further informations regarding to the functionality of the interlock unit.

Front panel Key-operated switch and emergency stop button for the mains voltage, a current set point potentiometer, three buttons for Interlock Validation, Laser On and Laser Off, a digital display for the current set point and seven LEDs for indicating states.
Rear panel Connector for the mains voltage, BNC jack for analog current modulation, BNC jack for TTL pulse control signal and a switch for a pilot laser.

Accessories
Power supply 10870022 120/230 V AC 24V/20 A DC

Control panel 10227015 with current set point potentiometer, three buttons for Interlock Validation, Laser On and Laser Off, a digital display for the current set point, seven LEDs for indicating states and two coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse control signal.
The validation button can be disabled by a jumper, this simplifies operating because the button must not be pressed every time an interlock occures. Check country-specific regulations before disabling the validation button.

Interlock unit 10228002 with a 5 V output for a pilot laser and a 12 V output for a fan or suchlike. The output voltage for the shutter is selectable by a jumper, either 12 V or the voltage of the mains power supply, in this application 24 V.
See chapter interlock unit 10228002 for further informations.

Heat sink 10500882 for mounting printed circuit board 10360347, peltier elements and laser diodes.

Printed circuit board 10360347 with 6 pole terminal clamp and soldering pads for TEC, temperature sensor and pilot laser and
5 pole terminal with female thread M5 for the laser diodes.

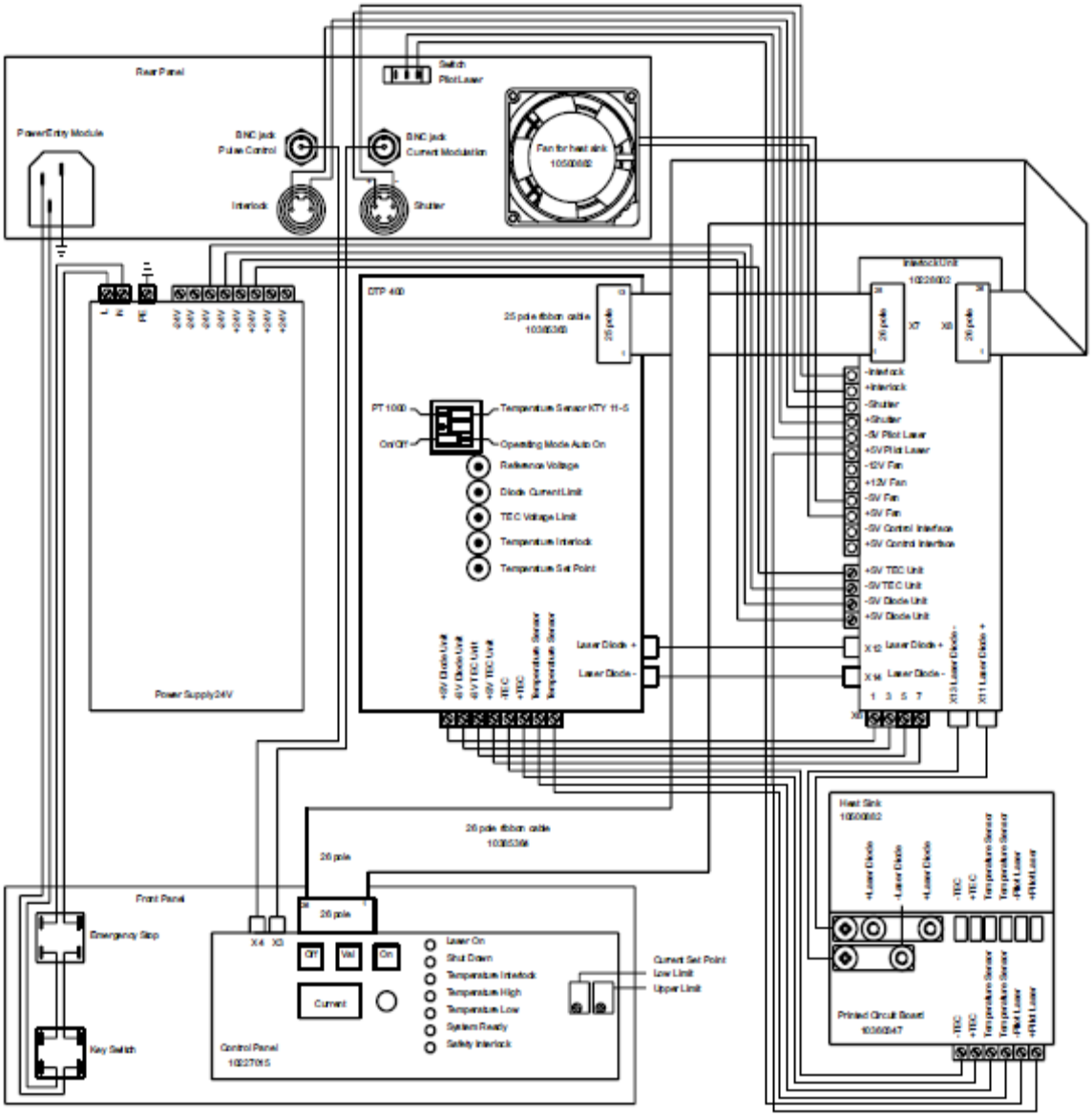
25 pole ribbon cable 10385363 length 150 mm.
26 pole ribbon cable 10385364 length 480 mm.
Mounting kit 10228009 including two connection bolts and four lines for connecting the output of the DTP 400 to the interlock unit.
Mounting kit 10228008 including two connecting plates for connecting the output of the interlock unit to the printed circuit board 10360347 at heatsink 10500882.
Only required if heatsink 10500882 with printed circuit board is used.

Adjustments
Diode current set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A.

Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Diode current limit: diode current limit potentiometer at DTP 400.
TEC temperature set point: temperature set point potentiometer at DTP 400.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Application 11

Jumper settings
Operating mode: On/Off



Application 12

Manually operated complete laser system with safety interlock utilizing accessories kits.
No additional power supply is required.
See chapter interlock unit 10228002 for further informations regarding to the functionality of the interlock unit.

Front panel Key-operated switch and emergency stop button for the mains voltage, a current set point potentiometer, a temperature set point potentiometer, three buttons for Interlock Validation, Laser On and Laser Off, a digital display for the current set point, a digital display for the temperature set point and seven LEDs for indicating states.
Rear panel Connector for the mains voltage, BNC jack for analog current modulation, BNC jack for TTL pulse control signal, an input for the interlock, an output for a shutter and a switch for a pilot laser.

Accessories
Power supply 10870022 120/230 V AC 24V/20 A DC

Control panel 10227016 with current set point potentiometer, temperature set point potentiometer, three buttons for Interlock Validation, Laser On and Laser Off, a digital display for the current set point, a digital display for the temperature set point, seven LEDs for indicating states and two coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse control signal.
The validation button can be disabled by a jumper, this simplifies operating because the button must not be pressed every time an interlock occures. Check country-specific regulations before disabling the validation button.

Interlock unit 10228002 with a 5 V output for a pilot laser and a 12 V output for a fan or suchlike. The output voltage for the shutter is selectable by a jumper, either 12 V or the voltage of the mains power supply, in this application 24 V.
See chapter interlock unit 10228002 for further informations.

Heat sink 10500882 for mounting printed circuit board 10360347, peltier elements and laser diodes.

Printed circuit board 10360347 with 6 pole terminal clamp and soldering pads for TEC, temperature sensor and pilot laser and 5 pole terminal with female thread M5 for the laser diodes.

25 pole ribbon cable 10385363 length 150 mm.
26 pole ribbon cable 10385364 length 480 mm.
Mounting kit 10228009 including two connection bolts and four lines for connecting the output of the DTP 400 to the interlock unit.
Mounting kit 10228008 including two connecting plates for connecting the output of the interlock unit to the printed circuit board 10360347 at heatsink 10500882.
Only required if heatsink 10500882 with printed circuit board is used.

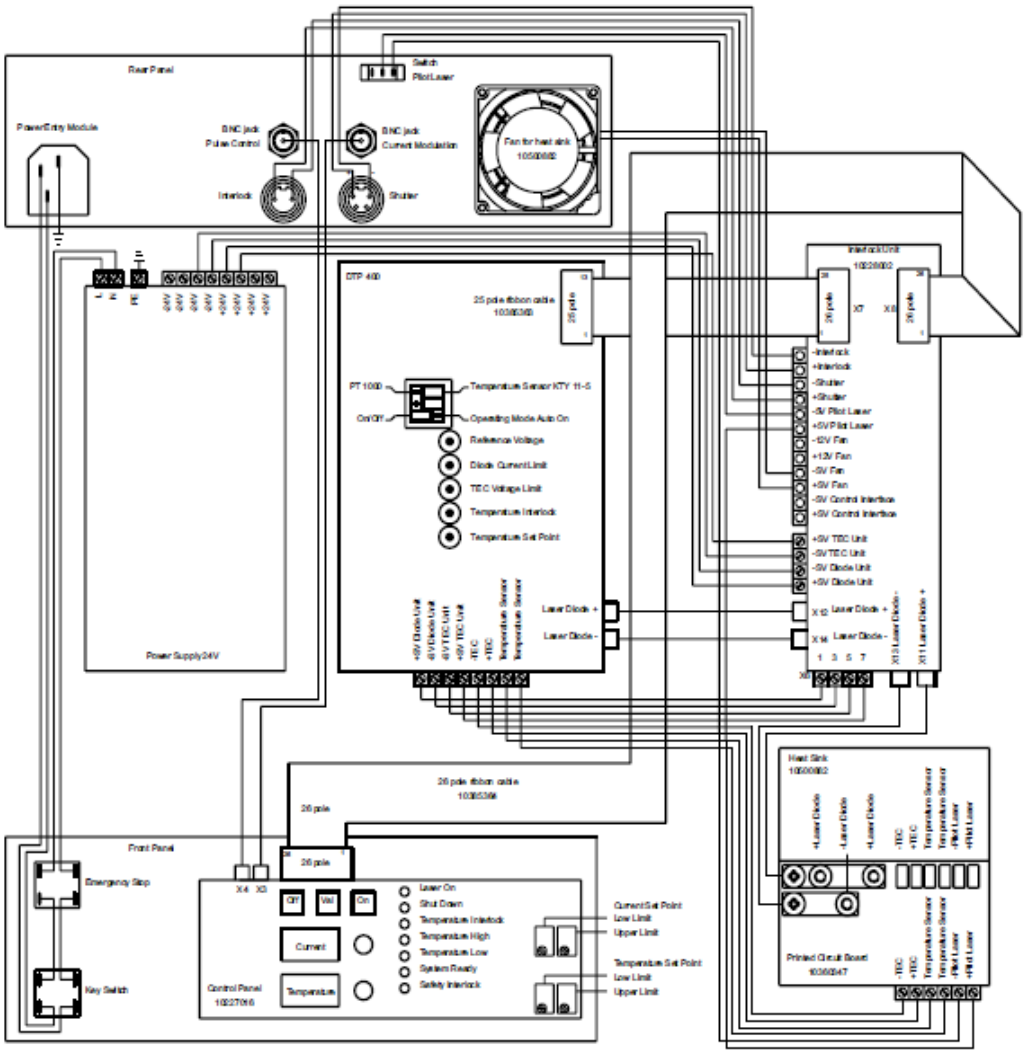
Adjustments

Diode current set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Diode current limit: diode current limit potentiometer at DTP 400.

Application 12

TEC temperature set point: potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 10.5 °C to 26.7 °C.
Adjust temperature set point potentiometer at DTP 400 counterclockwise to its minimum value.
TEC excess temperature: temperature interlock potentiometer at DTP 400.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.

Jumper settings
Operating mode: On/Off



Application 13

Manually operated and remote-controlled complete laser system with safety interlock utilizing accessories kits.
The system can be fully configured and controlled via the RS 232 port and fully controlled via the control port.
Signal levels at the control port meet the common industry standard for directly connecting a programmable controller (PLC) or any other controller.
The option of system configuring via the RS 232 port and set-up software (requires a PC with Windows_ operating system) makes the system exceptionally flexible. For instance it is possible to define in both operating modes (local or remote), where the current set point shall come from, from internal nonvolatile memory, from control port or from control panel.
No additional power supply is required.
See chapter interlock unit 10228002 for further informations regarding to the functionality of the interlock unit.

Front panel Key-operated switch and emergency stop button for the mains voltage,
a current set point potentiometer, three buttons for Interlock Validation, Laser On and Laser Off,
a digital display for the current set point and eight LEDs for indicating states.

Rear panel Connector for the mains voltage, BNC jack for analog current modulation, BNC jack for TTL pulse control signal, a 9 pole female plug connector of RS 232 port, a 25 pole female plug connector of control port, an input for the interlock, an output for a shutter, a switch for a pilot laser and a switch for Local/Remote.

Accessories
Power supply 10870022 120/230 V AC 24V/20 A DC

Control panel 10227017 with current set point potentiometer, three buttons for
Interlock Validation, Laser On and Laser Off, a digital display for the current set point, eight LEDs for indicating states and two coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse control.
The validation button can be disabled by a jumper, this simplifies operating because the button must not be pressed every time an interlock occures. Check country-specific regulations before disabling the validation button.

Control interface 10227003 with RS 232 port, control port, set-up software and control software.

Interlock unit 10228002 with a 5 V output for a pilot laser, a 12 V output for a fan or suchlike and an output for supplying the control interface.
The output voltage for the shutter is selectable by a jumper, either 12 V or the voltage of the mains power supply, in this application 24 V.
See chapter interlock unit 10228002 for further informations.

Heat sink 10500882 for mounting printed circuit board 10360347, peltier elements and laser diodes.

Printed circuit board 10360347 with 6 pole terminal clamp and soldering pads for TEC, temperature sensor and pilot laser and 5 pole terminal with female thread M5 for the laser diodes.

Application 13

5 pole ribbon cable 10385359 length 362 mm.

26 pole ribbon cable 10385360 length 260 mm.

26 pole ribbon cable 10385361 length 525 mm.

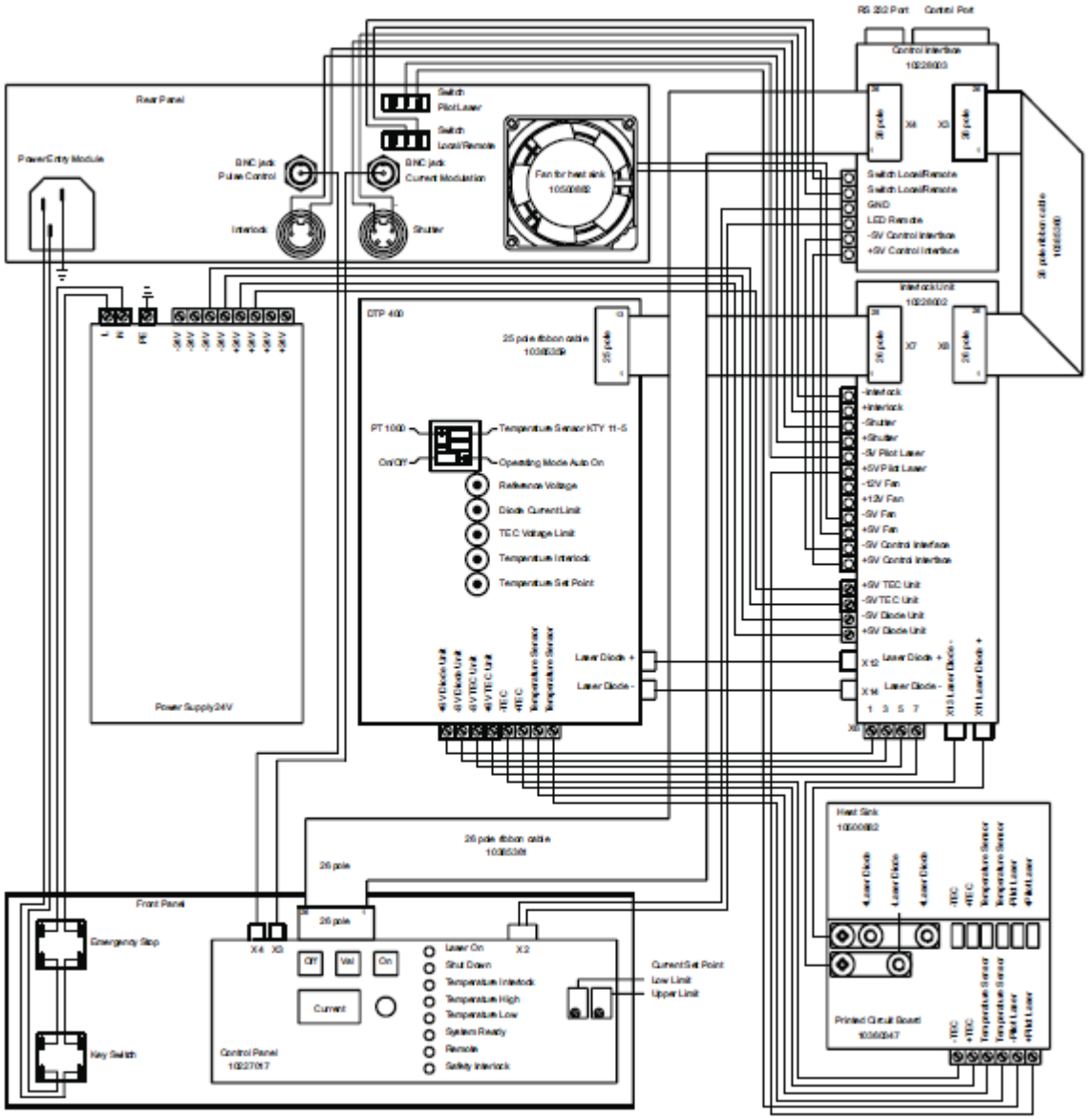
Mounting kit 10228009 including two connection bolts and four lines for connecting the output of the DTP 400 to the interlock unit.

Mounting kit 10228008 including two connecting plates for connecting the output of the interlock unit to the printed circuit board 10360347 at heatsink 10500882.
Only required if heatsink 10500882 with printed circuit board is used.

Adjustments
Diode current set point: by potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A, by analog signal at the control port, by internal memory or by RS 232 control.
Diode current limit: by analog signal at the control port, by internal memory or by RS 232 control.
TEC temperature set point: by analog signal at the control port, by internal memory or by RS 232 control.
TEC excess temperature: by internal memory or by RS 232 control.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Adjust diode current limit potentiometer at DTP 400 clockwise to its maximum value.
Adjust temperature interlock potentiometer at DTP 400 clockwise to its maximum value.
Adjust temperature set point potentiometer at DTP 400 counterclockwise to its minimum value.

Jumper settings
Operating mode: On/Off

Application 13



Application 14

Manually operated and remote-controlled complete laser system with safety interlock utilizing accessories kits.
The system can be fully configured and controlled via the RS 232 port and fully controlled via the control port.
Signal levels at the control port meet the common industry standard for directly connecting a programmable controller (PLC) or any other controller.
The option of system configuring via the RS 232 port and set-up software (requires a PC with Windows_ operating system) makes the system exceptionally flexible. For instance it is possible to define in both operating modes (local or remote), where the current set point shall come from, from internal nonvolatile memory, from control port or from control panel.
No additional power supply is required.
See chapter interlock unit 10228002 for further informations regarding to the functionality of the interlock unit.

Front panel Key-operated switch and emergency stop button for the mains voltage,
a current set point potentiometer, a temperature set point potentiometer, three buttons for Interlock Validation, Laser On and Laser Off, a digital display for the current set point, a digital display for the temperature set point and eight LEDs for indicating states.

Rear panel Connector for the mains voltage, BNC jack for analog current modulation, BNC jack for TTL pulse control signal or TTL shut down, a 9 pole female plug connector of RS 232 port, a 25 pole female plug connector of control port, an input for the interlock, an output for a shutter, a switch for a pilot laser and a switch for Local/Remote.

Accessories
Power supply 10870022 120/230 V AC 24V/20 A DC

Control panel 10227018 with current set point potentiometer, temperature set point potentiometer, three buttons for Interlock Validation, Laser On and Laser Off, a digital display for the current set point, digital display for the temperature set point, eight LEDs for indicating states and two coaxial sockets MCX for feeding in analog current modulation signal and TTL pulse control signal.
The validation button can be disabled by a jumper, this simplifies operating because the button must not be pressed every time an interlock occures. Check country-specific regulations before disabling the validation button.

Control interface 10227003 with RS 232 port, control port, set-up software and control software.

Interlock unit 10228002 with a 5 V output for a pilot laser, a 12 V output for a fan or suchlike and an output for supplying the control interface.
The output voltage for the shutter is selectable by a jumper, either 12 V or the voltage of the mains power supply, in this application 24 V.
See chapter interlock unit 10228002 for further informations.

Heat sink 10500882 for mounting printed circuit board 10360347, peltier elements and laser

diodes.

Printed circuit board 10360347 with 6 pole terminal clamp and soldering pads for TEC, temperature sensor and pilot laser and 5 pole terminal with female thread M5 for the laser diodes.

Application 14

5 pole ribbon cable 10385359 length 362 mm.

26 pole ribbon cable 10385360 length 260 mm.

26 pole ribbon cable 10385361 length 525 mm.

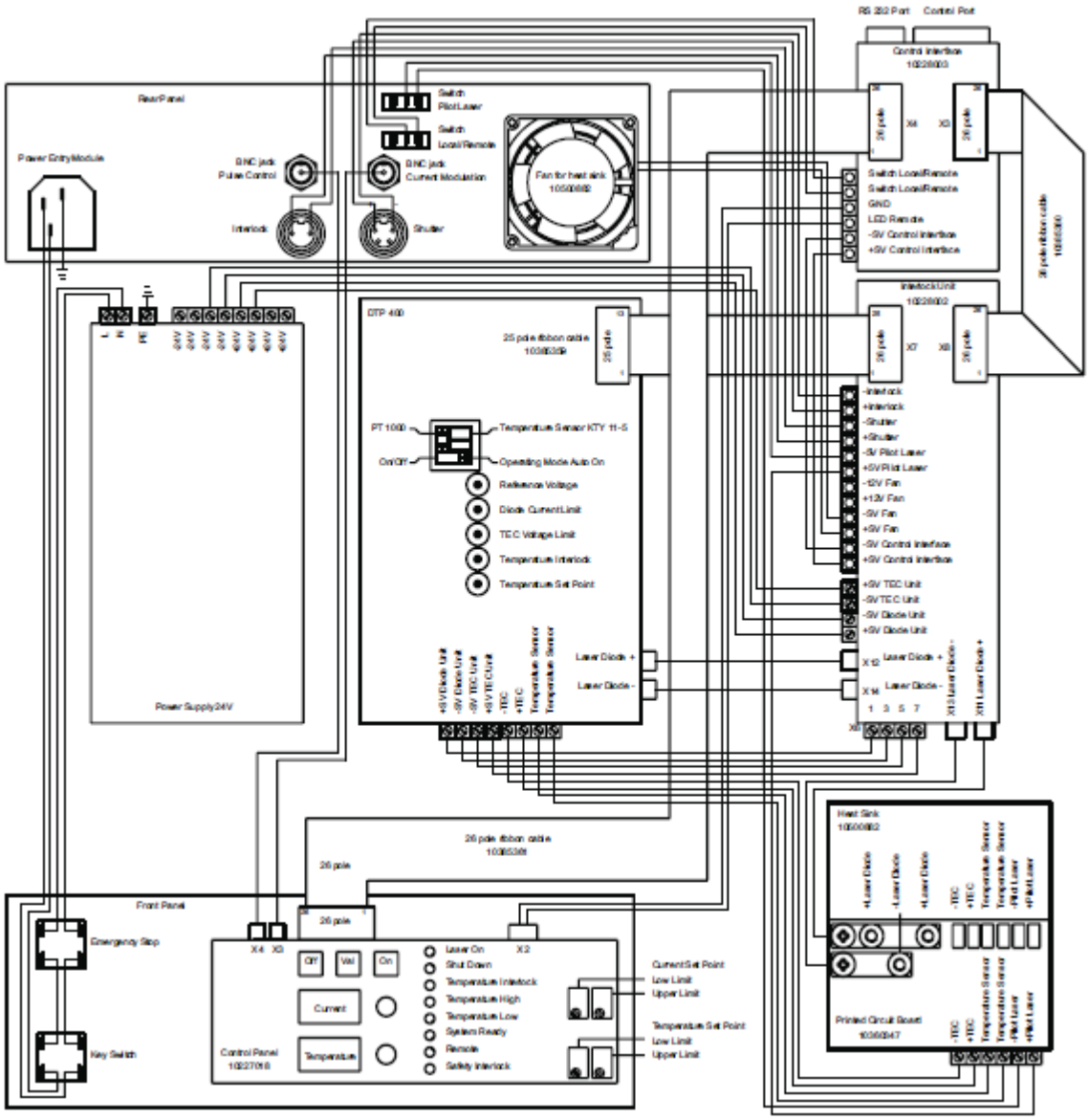
Mounting kit 10228009 including two connection bolts and four lines for connecting the output of the DTP 400 to the interlock unit.

Mounting kit 10228008 including two connecting plates for connecting the output of the interlock unit to the printed circuit board 10360347 at heatsink 10500882.
Only required if heatsink 10500882 with printed circuit board is used.

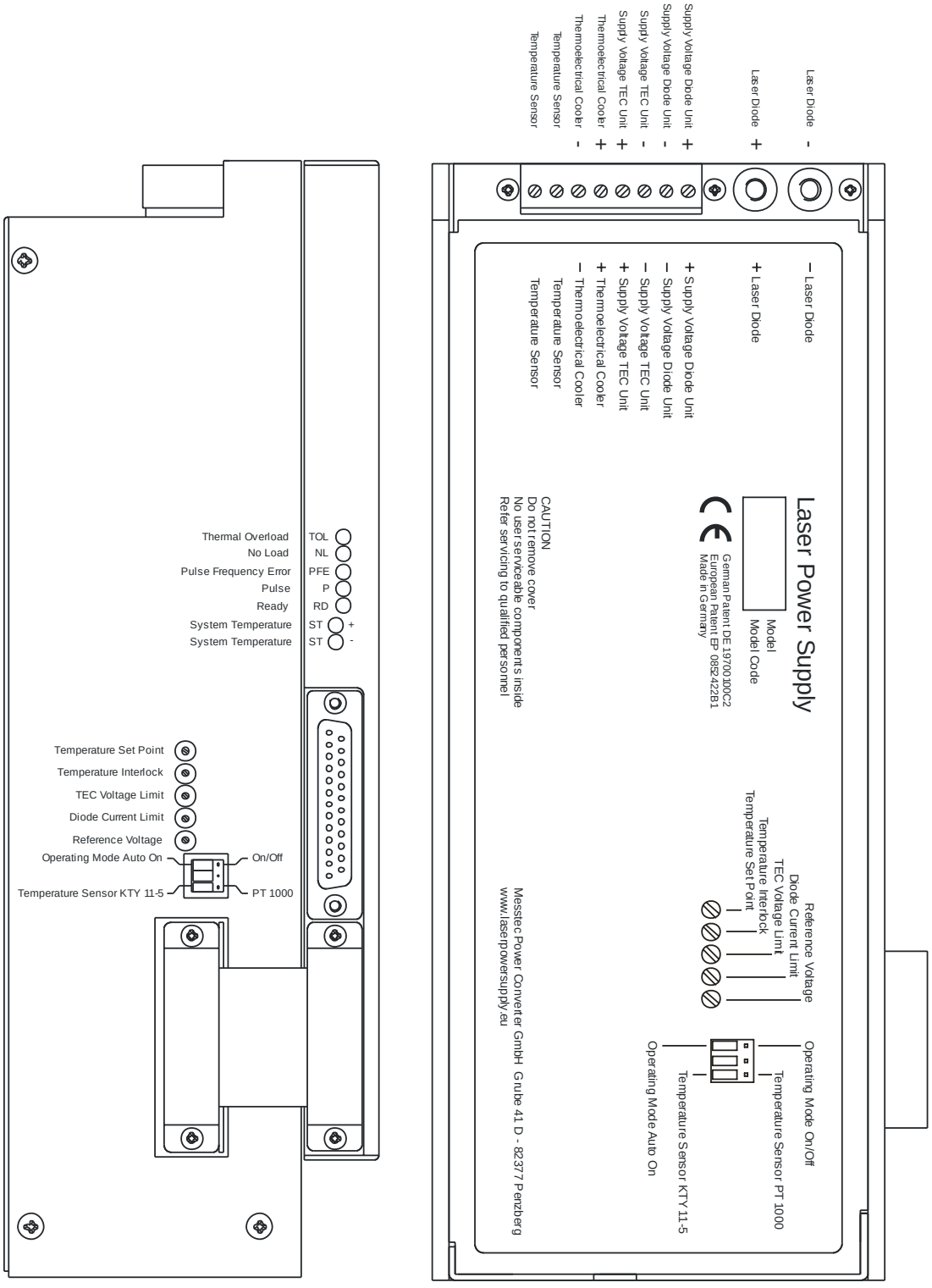
Adjustments
Diode current set point: by potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 35.6 A to 45.5 A, by analog signal at the control port, by internal memory or by RS 232 control.
Diode current limit: by analog signal at the control port, by internal memory or by RS 232 control.
TEC temperature set point: by potentiometer at control panel, low limit and upper limit can be adjusted by two potentiometers e.g. from 10.5 °C to 26.7 °C, by analog signal at the control port, by internal memory or by RS 232 control.
TEC excess temperature: by internal memory or by RS 232 control.
TEC voltage limit: TEC voltage limit potentiometer at DTP 400.
Adjust reference voltage potentiometer at DTP 400 clockwise to its maximum value.
Adjust diode current limit potentiometer at DTP 400 clockwise to its maximum value.
Adjust temperature interlock potentiometer at DTP 400 clockwise to its maximum value.
Adjust temperature set point potentiometer at DTP 400 counterclockwise to its minimum value.

Jumper settings
Operating mode: On/Off

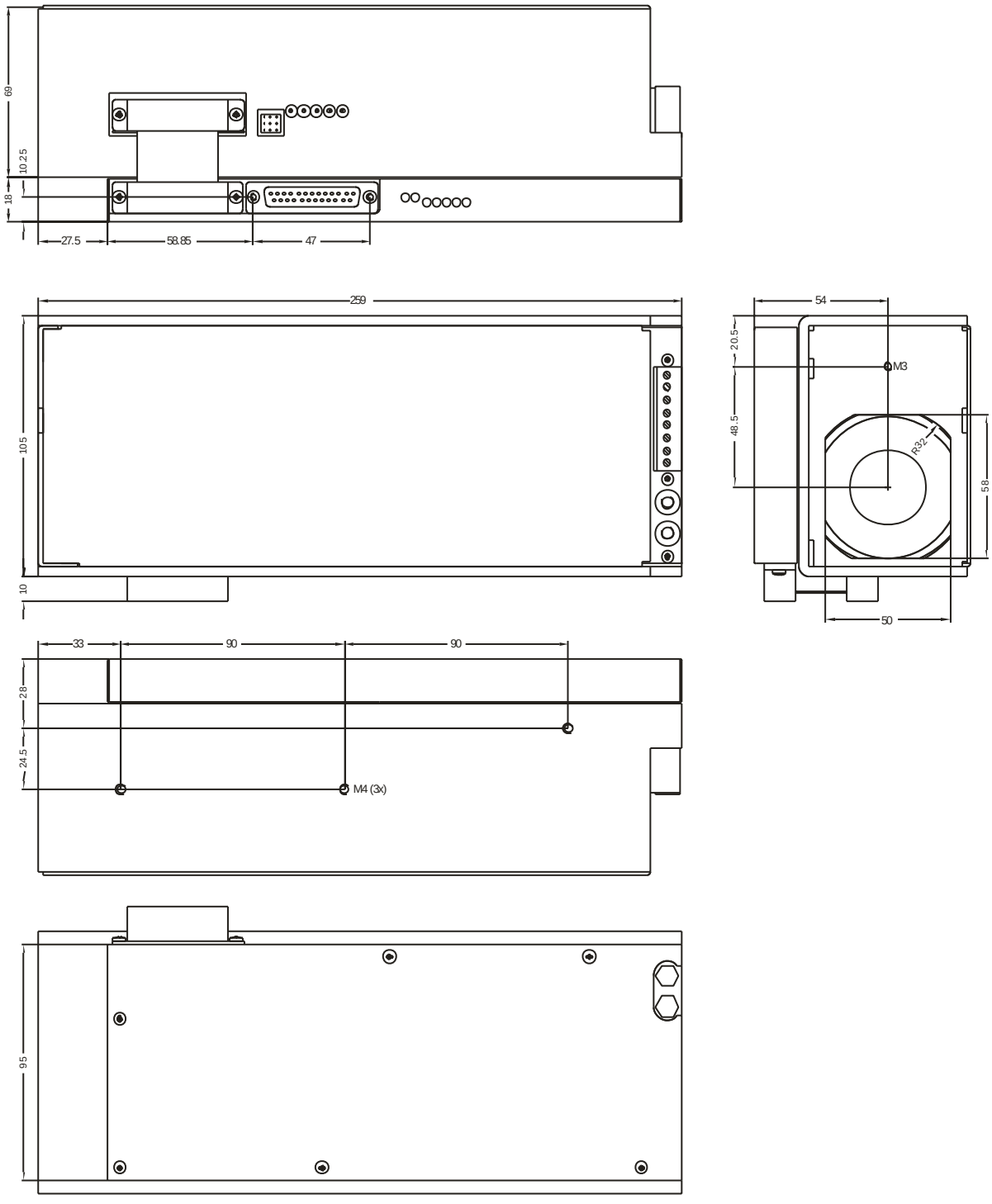
Application 14



Terminals


Laser Diode -
Laser Diode +
Supply Voltage Diode Unit +
Supply Voltage Diode Unit -
Supply Voltage TEC Unit -
Supply Voltage TEC Unit +
Thermoelectrical Cooler +
Thermoelectrical Cooler -
Temperature Sensor
Temperature Sensor
Laser Power Supply
Model
Model Code
German Patent DE 19700100C2
European Patent EP 0852422B1
Made in Germany
CAUTION
Do not remove cover.
No user serviceable components inside.
Refer servicing to qualified personnel
Reference Voltage
Diode Current Limit
TEC Voltage Limit
Temperature Interlock
Temperature Set Point
Operating Mode On/Off
Temperature Sensor PT 1000
Temperature Sensor KTY 11-5
Operating Mode Auto On
Messtec Power Converter GmbH Grube 41 D - 82377 Penzberg
www.laserpowersupply.eu
Thermal Overload
No Load
Pulse Frequency Error
Pulse
Ready
System Temperature
System Temperature
TOL
NL
PFE
P
RD
ST +
ST -
Temperature Set Point
Temperature Interlock
TEC Voltage Limit
Diode Current Limit
Reference Voltage
Operating Mode Auto On
On/Off
Temperature Sensor KTY 11-5
PT 1000

Dimensions


69
10.25
18
27.5
58.85
47
259
105
10
54
20.5
48.5
M3
R3.2
58
50
33
90
90
28
24.5
M4 (3x)
95

Accessories
Control Panel 10227011 and 10227012

This panels are suited for applications where a DTP 400 works without control interface and without interlock unit.

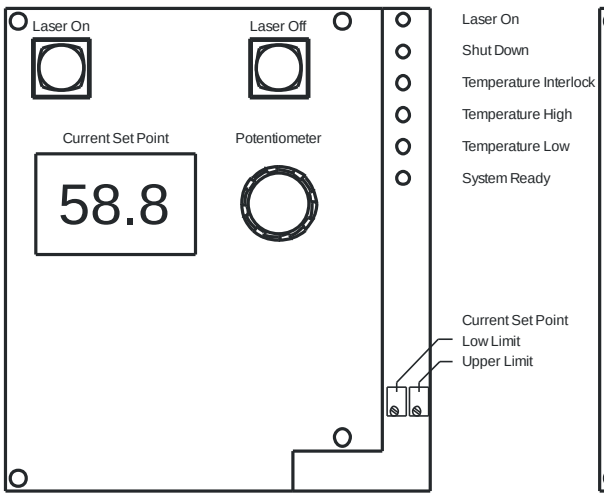
Both panels have buttons for Laser On and Laser Off and six LEDs for indicating states.
The 10227011 has a display and a potentiometer for the current set point, whereas the 10227012 additionally has a display and a potentiometer for the temperature set point.
Low limit and upper limit of the set point range can be adjusted by two potentiometers, e.g from 45.5 A to 59 A for the current set point, or from 18,5 °C to 32,2 °C for the temperature set point.

At the rear side there is X1, a 26 pole header (Tyco V23535A), and X2, a 4 pole header MC0,5/ 4-G-2,5 (Phoenix Contact) for supplying an optional pilot laser with 5 V.

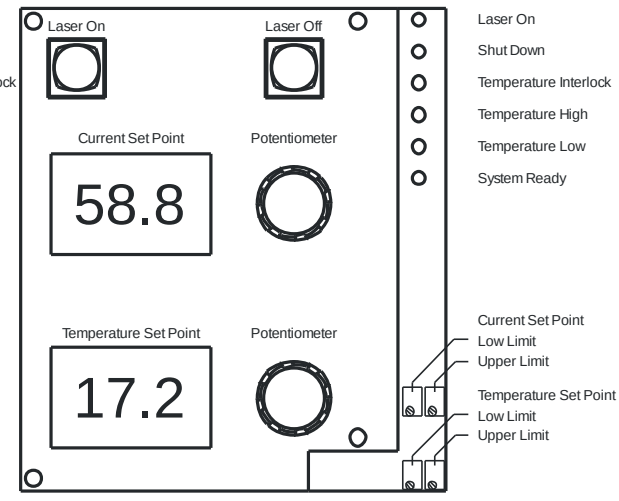
Also at the rear side there are two coaxial sockets MCX for feeding in an analog current modulation signal at X3 and a TTL pulse control signal at X4.

See application 7 and 8 for more information.

10227011



10227012



Accessories
Control Panel 10227013 and 10227014

This panels are suited for applications in conjunction with control interface 10228003.

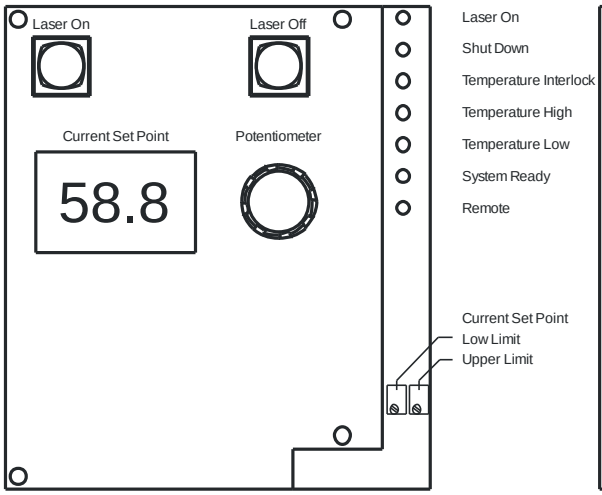
Both panels have buttons for Laser On and Laser Off and seven LEDs for indicating states.
The 10227013 has a display and a potentiometer for the current set point, whereas the 10227014 additionally has a display and a potentiometer for the temperature set point.
Low limit and upper limit of the set point range can be adjusted by two potentiometers, e.g from 45.5 A to 59 A for the current set point, or from 18,5 °C to 32,2 °C for the temperature set point.

At the rear side there is X1, a 26 pole header (Tyco V23535A), and X2, a 4 pole header MC0,5/ 4-G-2,5 (Phoenix Contact) for driving the Remote LED by the control interface and for supplying an optional pilot laser with 5 V.

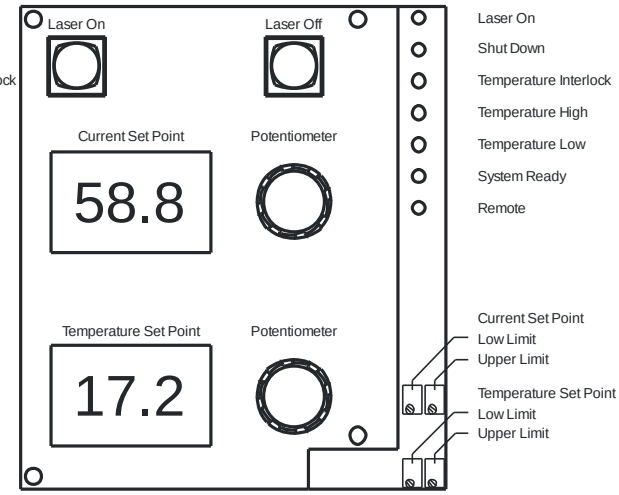
Also at the rear side there are two coaxial sockets MCX for feeding in an analog current modulation signal at X3 and a TTL pulse control signal at X4.

See application 9 and 10 for more information.

10227013



10227014



Accessories
Control Panel 10227015 and 10227016

This panels are suited for applications in conjunction with interlock unit 10228002.

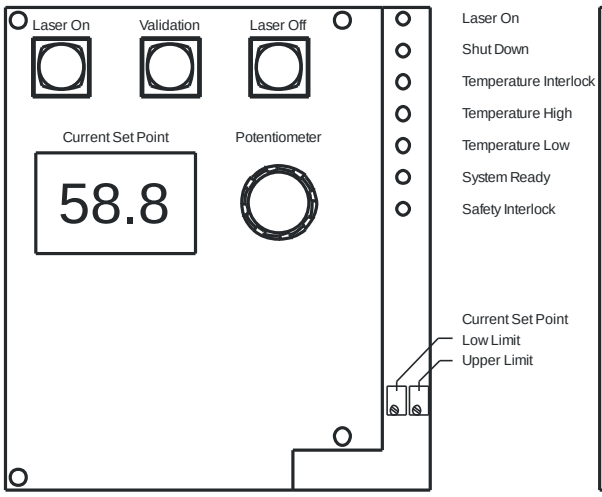
Both panels have buttons for Interlock Validation, Laser On and Laser Off and seven LEDs for indicating states.
The 10227015 has a display and a potentiometer for the current set point, whereas the 10227016 additionally has a display and a potentiometer for the temperature set point.
Low limit and upper limit of the set point range can be adjusted by two potentiometers, e.g from 45.5 A to 59 A for the current set point, or from 18,5 °C to 32,2 °C for the temperature set point.

At the rear side there is X1, a 26 pole header (Tyco V23535A), and X2, a 4 pole header MC0,5/ 4-G-2,5 (Phoenix Contact) for supplying an optional pilot laser with 5 V.
Also at the rear side there are two coaxial sockets MCX for feeding in an analog current modulation signal at X3 and a TTL pulse control signal at X4.

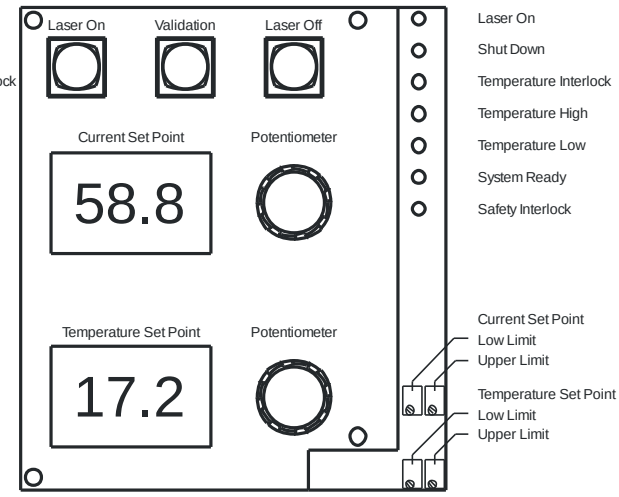
The validation button can be disabled by a jumper, this simplifies operating because the button must not be pressed every time an interlock occurs. Check country-specific regulations before disabling the validation button.

See application 11 and 12 for more information.

10227015



10227016



Accessories
Control Panel 10227017 and 10227018

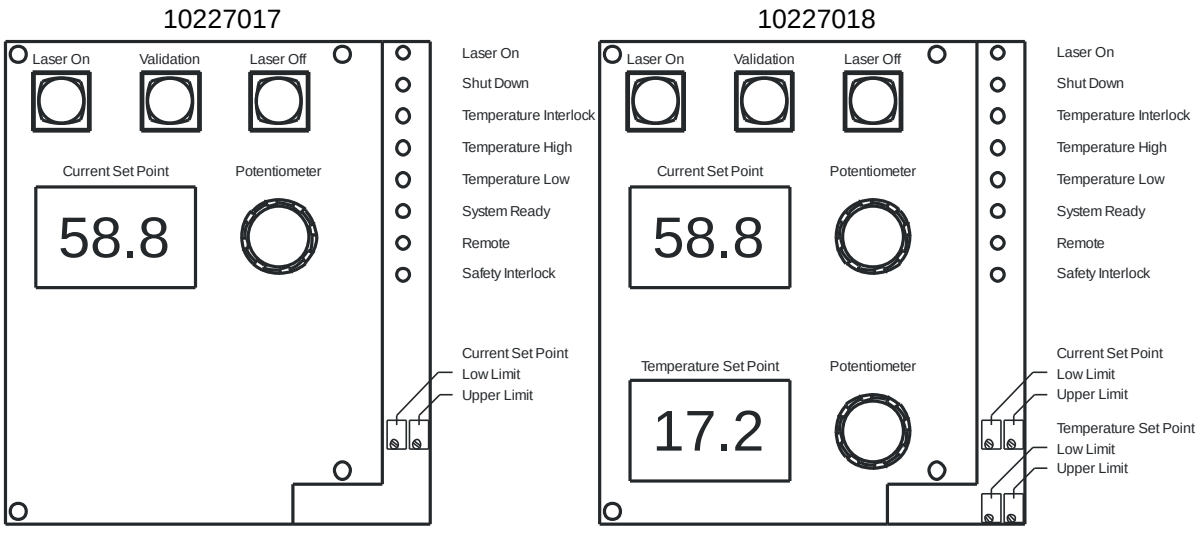
This panels are suited for applications in conjunction with interlock unit 10228002 and control interface 10228003.
Both panels have buttons for Interlock Validation, Laser On and Laser Off and eight LEDs for indicating states.

The 10227017 has a display and a potentiometer for the current set point, whereas the 10227018 additionally has a display and a potentiometer for the temperature set point.
Low limit and upper limit of the set point range can be adjusted by two potentiometers, e.g from 45.5 A to 59 A for the current set point, or from 18,5 °C to 32,2 °C for the temperature set point.
At the rear side there is X1, a 26 pole header (Tyco V23535A), and X2, a 4 pole header MC0,5/ 4-G-2,5 (Phoenix Contact) for driving the Remote LED by the control interface and for supplying an optional pilot laser with 5 V.

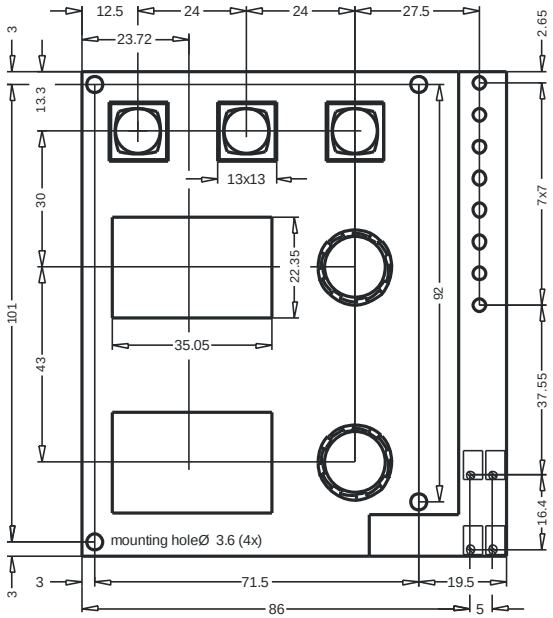
Also at the rear side there are two coaxial sockets MCX for feeding in an analog current modulation signal at X3 and a TTL pulse control signal at X4.

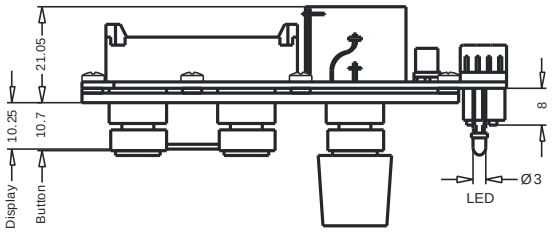
The validation button can be disabled by a jumper, this simplifies operating because the button must not be pressed every time an interlock occurs. Check country-specific regulations before disabling the validation button.

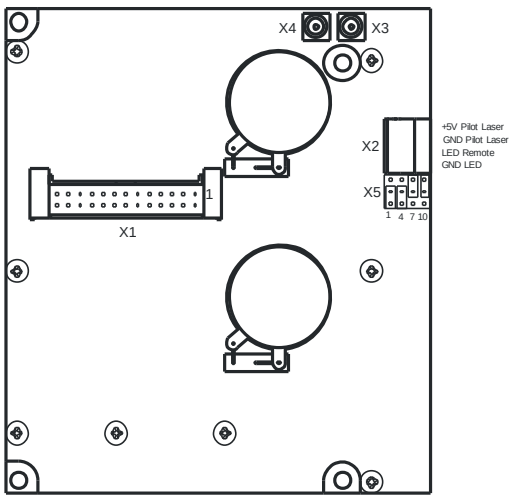
See application 13 and 14 for more information.



Dimensions of Control Panels







Accessories
Interlock Unit 10228002

A safety interlock is required, e.g. if a laser operates in a machine where parts will be inserted or removed manually. In this case laser radiation has to be interrupted immediately and the system must be keep in a safe off-state.
A safe off-state may be achieved by a safety beam shutter, but in most cases there is less space in the optical path.
A better and cost saving way is to switch off the laser power supply and keep it in a safe off-state.
Safe off-state means, that the laser power supply must be electrically disconnected, switching off by a digital signal like a shut down or a disable signal is forbidden for a safe operating.
It is regulation, that disconnection must be happen by a relay or a switch, the use of semiconductors or electronic switches for disconnecting is not allowed. The properly function of the relay must be supervised in a manner that malfunction does not lead to an unsafe state.

The interlock unit 10228002 complies with regulation and has a lot of additional features for achieving a safe off-state within a very short time.
There are two relays, connected in series, a working relay and an emergency relay. The emergency relay is always closed, the working relay acts if an interlock occures. The normally open contact and the normally closed contact of both relays are supervised.
If the working relays does not work properly or if there is a failure in the interlock unit, the emergency relays will be de-energized and turns the system in a steady off-state.
Every time the mains voltage is turned on, the function of the emergency relays is checked to ensure correct operation. If there is a failure, the system cannot be turned on.
Both relays are working currentless for achieving maximum life time.

If an interlock occures, the output for the laser diodes will be short circuited immediately by a semiconductor to ensure that laser radiation will be stopped within a few microseconds.
Simultaneously the DTP 400 will be turned off and the working relay will be de-energized. At the same time the input capacitors of the DTP 400 will be discharged to ensure that no stored energy will cause laser radiation if there is any malfunction.
Also the semiconductor and the circuit for discharging are supervised.
Additionally the interlock unit has an output for a beam shutter. The output is also supervised.

The interlock unit is a open frame component, which is generally mounted beside a vertically mounted DTP 400.
The DTP 400 to interlock unit connection will be done by mounting kit 10228009, including two connection bolts for mounting at X12 and X14 and four 2,5 qmm wires for connecting at terminal X6.
Laser diodes are connected at X11 and X13. If heatsink 10500882 with printed circuit board 10360347 is used, mounting kit 10228008 including two connecting plates is required.
The data connection to the DTP 400 will be done by a 25 pole ribbon cable 10385363 at X7.
A control panel can be connected at X8 via a 26 pole ribbon cable 10385364.
See application 11 and 12 for further information.

If the interlock unit is used in conjunction with control interface 10228003, then this can be

fastened directly at the interlock unit's metal plate. In this case take cable 10385359 instead of 10385363 and take cable 10385361instead of 10385364, this makes wiring easier.
For connecting the control interface to the interlock unit, a 26 pole ribbon cable 10385360 is required.

See application 13 and 14 for further information.

Accessories
Interlock Unit 10228002

Terminals X1 X2 X3 X4
Connection bolts with female thread M3 for connecting the supply voltage for the diode unit and the TEC unit of the DTP 400.
Use ring terminals and wires with a cross section of 2,5 qmm.

Termination block X5
Spring-cage 12 pole termination block.
Conductor cross section stranded minimum: 0.2 qmm, maximum: 1.5 qmm.

Inputs		
Pin	Name	Function
21	+Interlock	Interlock Input
23	-Interlock	Interlock Input
Outputs		
Pin	Name	Function
1	+SV Control Interface	+Supply Voltage for a control Interface
3	-SV Control Interface	- Supply Voltage for a control Interface
5	+SV Fan	+Supply voltage for a fan
7	-SV Fan	-Supply voltage for a fan
9	+12V Fan	+12V Supply voltage for a fan
11	-12V Fan	-12V Supply voltage for a fan
13	+5V Pilot Laser	+5V Supply voltage for a pilot laser
15	-5V Pilot Laser	-5V Supply voltage for a pilot laser
17	-Schutter	-Supply voltage for a shutter
19	+Shutter	+Supply voltage for a shutter

Signal description
Interlock pin 21, 23
Input for a positive opening contact. A interlock occures if pin 21 and pin 23 are not interconnected.
Interlock voltage (contact open): 12 V.
Interlock current (contact closed): approx. 1 mA.
For unlocking, a +5 V validation signal of at least a few milliseconds at pin 21 of X8 is required. Generally this will be done by the validation button of the control panels.

SV Control Interface pin 1, 3
Supply voltage for a control interface or suchlike. The voltage is the same like the SV TEC unit. For instance if you have a 24 V power supply, the SV Control Interface voltage will also be 24 V.

SV Fan pin 5, 7
Supply voltage for a fan or suchlike. The voltage is the same like the SV TEC unit. For instance if you have a 24 V power supply for supplying the TEC unit, the SV Fan voltage will also be 24 V.

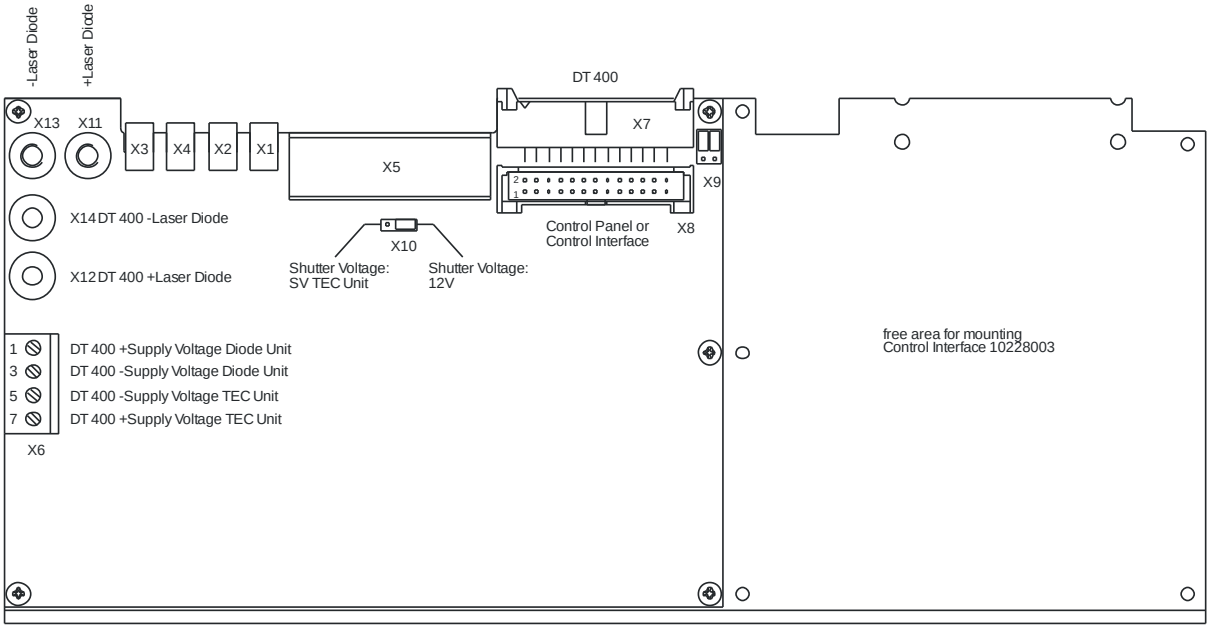
Accessories
Interlock Unit 10228002

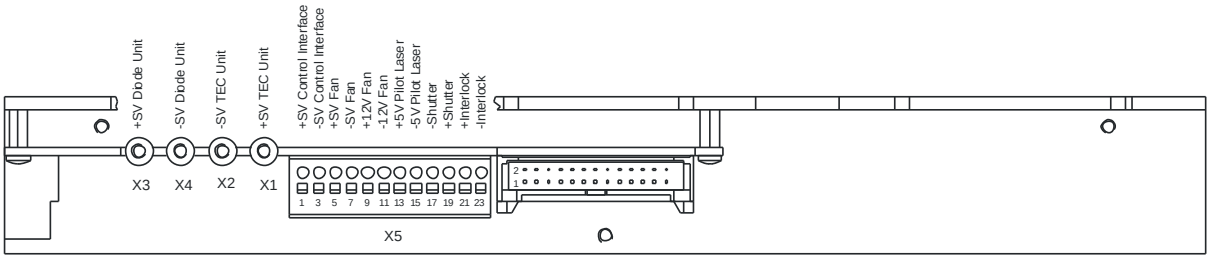
12V Fan pin 9, 11
12 V supply voltage for a fan or suchlike, the maximum allowed output current is 500 mA if the shutter output is not used or if it is switched to SV TEC Unit.
If the shutter output is switched to 12 V, fan current plus shutter current must not exceed 500 mA.

5V Pilot Laser pin 13, 15
5 V supply voltage for a pilot laser, maximum allowed output current is 200 mA.

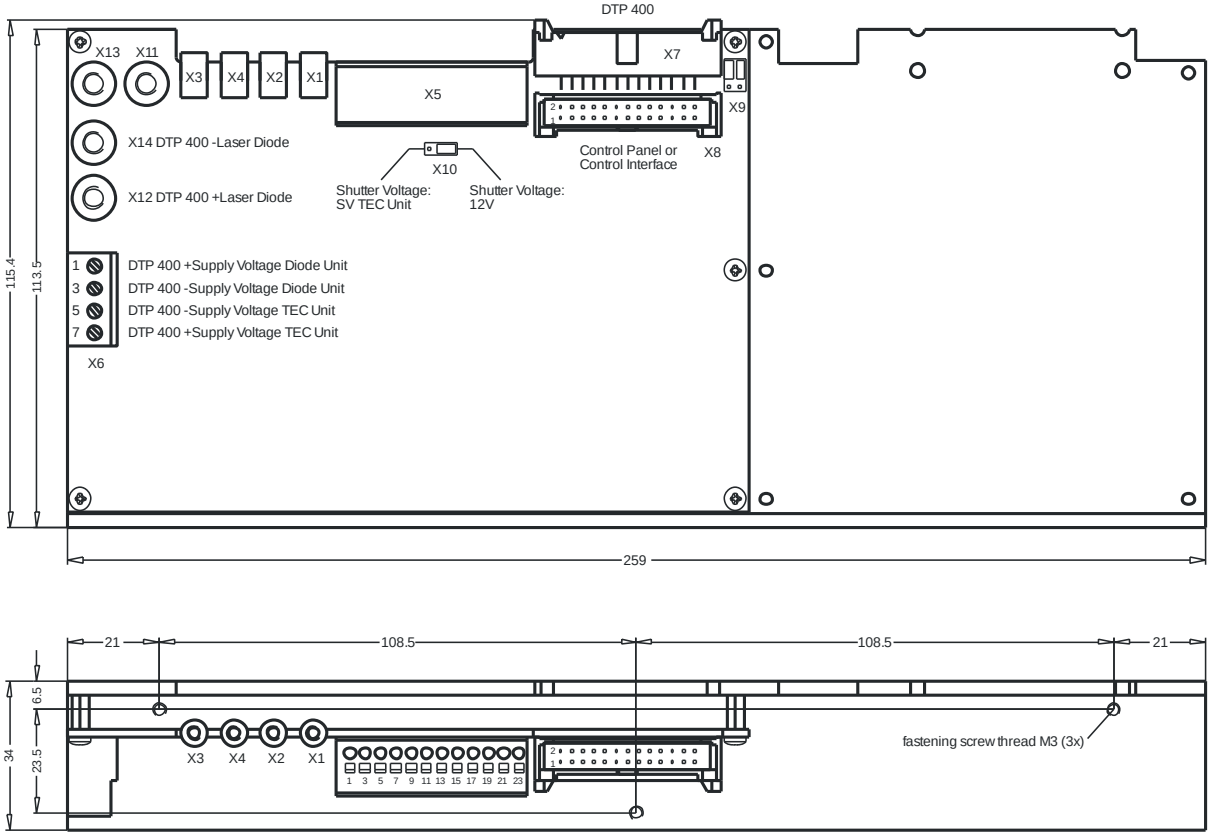
Shutter pin 17, 19
Supply voltage for a shutter. The voltage is selectable by jumper X10, either 12 V or the SV TEC Unit voltage. For instance if you have a 24 V power supply for supplying the TEC unit, the shutter voltage will also be 24 V.
If an interlock occures, the shutter output voltage is turned off.

The interlock unit is also available in a modified version, Interlock Unit FP 10228004, for faster pulsing via the pulse modulation or shut down input X4 at the control panel.
Rise time is approx. 500 ns and fall time is approx. 7 _s, the maximum allowed frequency is 5 kHz


-Laser Diode
+Laser Diode
DT 400
X13
X11
X3
X4
X2
X1
X5
X7
X9
X14 DT 400 -Laser Diode
X12 DT 400 +Laser Diode
X10
Shutter Voltage:
SV TEC Unit
Shutter Voltage:
12V
Control Panel or
Control Interface
X8
1 DT 400 +Supply Voltage Diode Unit
3 DT 400 -Supply Voltage Diode Unit
5 DT 400 -Supply Voltage TEC Unit
7 DT 400 +Supply Voltage TEC Unit
X6
free area for mounting
Control Interface 10228003


+5V Diode Unit
-5V Diode Unit
-5V TEC Unit
+5V TEC Unit
+5V Control Interface
-5V Control Interface
+5V Fan
-5V Fan
+12V Fan
-12V Fan
+5V Pilot Laser
-5V Pilot Laser
-Shutter
+Interlock
-Interlock
X3
X4
X2
X1
X5

Accessories
Interlock Unit 10228002
Dimensions



Accessories
Control Interface 10228003

The control interface 10228003 is a microprocessor controlled interface with a control port and a RS 232 port.
Signal levels at the control port meet the common industry standard such as analog levels of 0 ... 10 V for inputs and outputs and digital levels up to 30 V for directly connecting a programmable controller (PLC) or any other controller.

The system can be fully controlled via the control port and fully configured and controlled via the RS 232 port.
The option of system configuring via the RS 232 port and set-up software (requires a PC with Windows_ operating system) makes the system exceptionally flexible.
It is possible to define in both operating modes (local or remote), where the current set point and the temperature set point shall come from, from internal nonvolatile memory, from control port or from a control panel and it is possible to define where the current limit shall come from, from internal nonvolatile memory ore from control port.

Example 1
You can configure a remote controlled system in such a way that it is controlled by a PLC at the control port, but nevertheless the current set point can be adjusted manually at the control panel. The current limit value and the temperature set point is given via the control port or by the internal nonvolatile memory.
This allows remote operating with the possibility of manually correcting manufacturing results.

Example 2
You can configure a local controlled system in such a way that it is manually controlled by the buttons at the control panel, but the current set point or the temperature set point cannot be adjusted manually. This values are given by the internal nonvolatile memory.

The control interface 10228003 is a single printed circuit board with five mounting holes.
It can be mounted anywhere.
The mounting holes must be connected to protected earth (PE) for electromagnetic interference reasons.

There is also a mounting kit 10228005 available. In this case the printed circuit board is mounted on a metal plate, it's the same like the interlock unit's plate.
The advantage is that if you have a case with a rear panel which has an opening for the control port and the RS 232 port, the kit can be mounted vertically beside the DTP 400 in such a way that the port connectors can be used directly without additional connectors and cables.

The data connection to the DTP 400 is be done by a 25 pole ribbon cable 10385365 at X3.
A control panel can be connected at X4 via a 26 pole ribbon cable 10385364.
See application 9 and 10 for further information.

If the control interface is used in conjunction with the interlock unit 10228002, it can be fastened at

the metal plate of the interlock unit. Use mounting kit 10228006, containing 5 distance bolts and 10 screws.

Accessories
Control Interface 10228003

In this case, three ribbon cables are required.
A 26 pole ribbon cable 10385360 for connecting X3 of the control interface to X8 of the interlock unit,
a 25 pole ribbon cable for connecting X7 of the interlock unit to the DTP 400 and
a 26 pole ribbon cable 10385361 for connecting X4 of the control interface to a control panel.
See application 13 and 14 for further information.

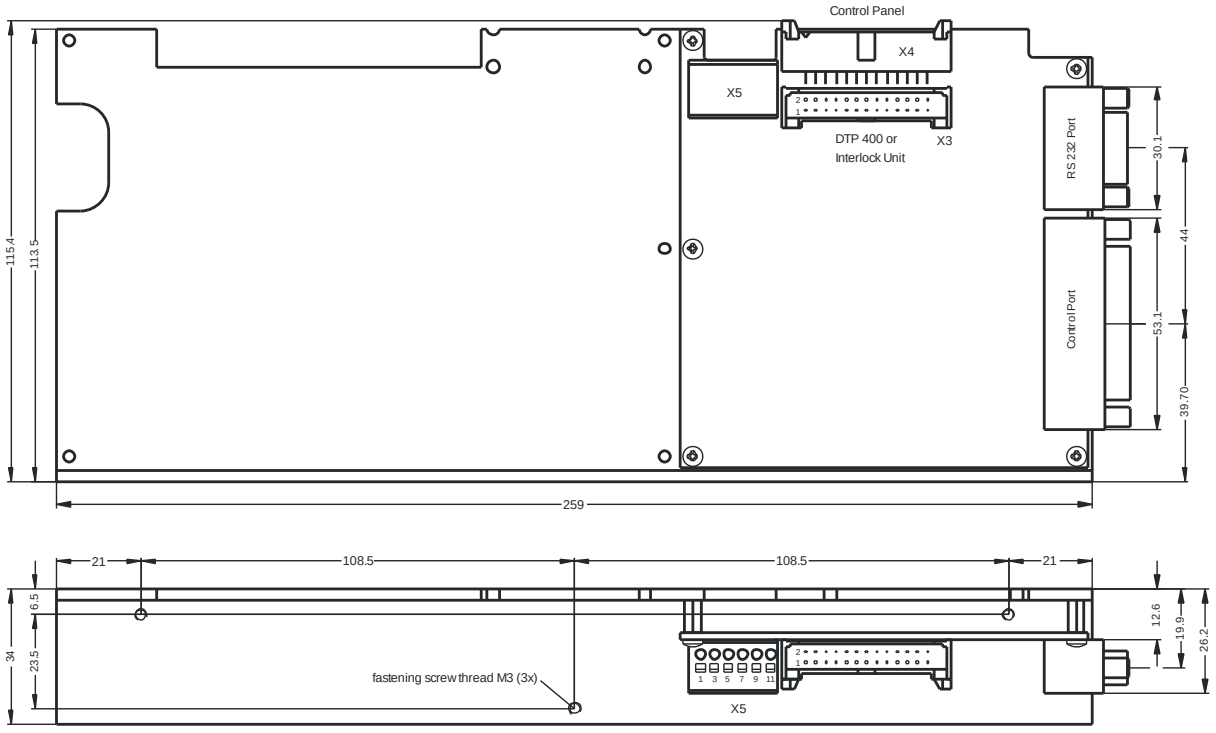
Dimensions

Accessories

Control Interface 10228003

with mounting kit 10228005

Dimensions



Accessories
Control Interface 10228003
in conjunction with Interlock Unit 10228002
and mounting kit 10228006

Accessories
Control Interface 10228003

Termination block X5
Spring-cage 6 pole termination block.
Conductor cross section stranded minimum: 0.2 qmm,
maximum: 1.5 qmm.

Inputs		
Pin	Name	Function
1	+SV Control Interface	+Supply voltage
3	-SV Control Interface	-Supply voltage
9	Switch Local/Remote	Switch Local/Remote
11	Switch Local/Remote	Switch Local Remote
Outputs		
Pin	Name	Function
5	RED Remote	LED Remote Anode
7	LED Remote	LED Remote Cathode

SV Control Interface pin 1, 3
Input for supply voltage. The control interface has an isolated voltage converter on board, this prevents from unwanted ground shifting.
Supply voltage range: 15 V ... 50 V.
If the control interface works in conjunction with the interlock unit, connect the supply voltage inputs to termination block X5 pin 1 and pin 3 at the interlock unit. Otherwise connect the supply voltage inputs to the power supply.
See application 13 and 14 for further information.

Switch Local/Remote pin 9, 11
Input for a local/remote switch, open contact means local, closed contact means remote.

LED Remote pin 5, 7
Open emitter output for a LED, indicating remote operating mode. A LED can directly be connected, use a resistor of 220 Ohm in series_
If the control interface works in conjunction with a control panel 10227013, 10227014, 10227017 or 10227018, the LED Remote and the LED GND must be connected to termination block X2 at the control panel for indicating remote status. In this case a resistor is not required.

Header X3 and X4
X3, 26 pole header for connecting to DTP 400 or to Interlock Unit 10228002.
X4, 26 pole header for connecting to a control panel.

Accessories
Control Interface 10228003
Control Port

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

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

Inputs		
Pin	Name	Function
15	CA-DCSP	Diode Current Set Point
2	CA-DCL	Diode Current Limit
3	CA-PTSP	Peltier Temperature Set Point
6	CD-DCON	Diode Current On
19	CD-PULSE	Pulse Control
7	CD-PSD	Peltier Voltage Shut Down
1	GND	Signal Ground
14	GND	Signal Ground
Outputs		
Pin	Name	Function
4	SA-DCACT	Diode current Actual
16	SA-DCSPLIM	Diode Current Set Point Limited
17	SA-DVACT	Diode Voltage Actual
5	SA-DPEACT	Diode Power Electrically Actual
18	SA-PTACT	Peltier temperature Actual
24	REF	Reference Voltage
12	AUX +5V	Auxiliary Voltage +5V
25	AUX+15V	Auxiliary Voltage +15V
13	AUX -15V	Auxiliary Voltage -15V
23	SD-Ready	Ready
8	SD-DCON	Diode Current On
20	SD-DCSD	Diode Current Shut Down
21	SD-PTL	Peltier Temperature Low
9	SD-PTH	Peltier Temperature High
22	SD-PTI	Peltier Temperature Interlock
10	SD-SIL	Safety Interlock
11	SD-REM	Remote
1	GND	Signal Ground
14	GND	Signal Ground

Accessories
Control Interface 10228003
Control Port

Signal Description

CA-DCSP
Control Analog - Diode Current Set Point
Analog input 0 ... +10.000 V for the current set point.
+10.000 V corresponds to the maximum output current of the DTP 400.

CA-DCL
Control Analog - Diode Current Limit
Analog input 0 .... +10.000 V for the diode current limit.
+10.000 V corresponds to the maximum output current of the DTP 400.
The diode current limit value is defined either by the value of the CA-DCL signal, the value of the nonvolatile memory (setup software), the value of the RS 232 software or by the setting of the diode current limit potentiometer at the DTP 400.
Turn current limit potentiometer at the DTP 400 clockwise to it's maximum value if you would like to define the current limit value by the CA-DCL signal, by memory or by RS 232.

CA-PTSP
Control Analog - Peltier Temperature Set Point
Analog input 0 .... +10.000 V for a peltier temperature of 0 ... +50 °C.
The peltier temperature set point is defined either by the value of the CA-PTSP signal, the value of the nonvolatile memory (setup software), the value of the RS 232 software or by the setting of the temperature set point potentiometer at the DTP 400.
Turn temperature set point potentiometer at the DTP 400 counterclockwise to it's minimum value if you would like to define the temperature set point by the CA-DCL signal, by memory or by RS 232.

CD-DCON
Control Digital - Diode Current On
Digital input, active high. High turns diode current on, low turns off.

CD-PULSE
Control Digital - Pulse
Digital input, active high. Controls pulse and pulse pause.
Low corresponds to pulse pause, High corresponds to pulse.

CD-PSD
Control Digital - Peltier Voltage Shut Down
Digital input, active high. High turns the peltier voltage off.

SA-DCACT

Status Analog - Diode Current Actual
Analog output 0 ... +10.000 V, reflects the actual diode current.

SA-DCSPLIM
Status Analog - Diode Current Set Point Limited
Analog output 0 ... +10.000 V, reflects the actual diode current set point, limited by the diode current limit value. The diode current limit value may be the CA-DCL signal, the value of the

Accessories

Control Interface 10228003

Control Port

nonvolatile memory (setup software), or the setting of
the diode current limit potentiometer at the DTP 400.

SA-DVACT
Status Analog - Diode Voltage Actual
Analog output 0 ... +10.000 V, reflects the actual diode voltage.
+10.000 V corresponds to a diode voltage of +25.000 V.

SA-DPEACT
Status Analog - Diode Power Electrically Actual
Analog output 0 ... +10.000 V, reflects the actual electrically diode power.
+10.000 V corresponds to a diode power of 500 W.

SA-PTACT
Status Analog - Peltier Temperature Actual
Analog output 0 ... +10.000 V, reflects the actual peltier temperature.
0 ...+10.000 V corresponds to a peltier temperature of 0 ... +50 °C.

REF
Analog output +5.000 V, _0.1 %, output impedance is 100 __

AUX+5V
Auxiliary voltage +5.1 V, maximum allowed current is 200 mA.

AUX+15V
Auxiliary voltage approx. +15 V, maximum allowed current is 100 mA.

AUX-15V
Auxiliary voltage approx. -15 V, maximum allowed current is 100 mA.

SD-READY
Status Digital - Ready
Digital output, open collector, active low. Low, if there are no errors and if the system is ready.

SD-DCON

Status Digital - Diode Current On
Digital output, open collector, active low. Low, if the diode current is turned on.

SD-DCSD

Status Digital - Diode Current Shut Down
Digital output, open collector, active low. Low, if the diode current shut down is active.

SD-PTL

Status Digital - Peltier Temperature Low
Digital output, open collector, active low. Low, if the peltier temperature is too low.

Accessories
Control Interface 10228003
Control Port

SD-PTH
Status Digital - Peltier Temperature High
Digital output, open collector, active low. Low, if the peltier temperature is too high.

SD-PTI
Status Digital - Peltier Temperature Interlock
Digital output, open collector, active low. Low, if there is a peltier temperature interlock.
A peltier temperature interlock means, that the peltier temperature has exceeded
the temperature supervision value due to excessive temperature.
The temperature supervision value is defined either by the value of the nonvolatile memory (setup software), or by the setting of the temperature interlock potentiometer at the DTP 400.
Turn temperature interlock potentiometer at the DTP 400 clockwise to it's maximum value, if you would like to define the supervision value by the setup software.

SD-SIL
Status Digital - Safety Interlock
Digital output, open collector, active low. Low, if an interlock occured.

SD-REM
Status Digital - Remote
Digital output, open collector, active low. Low, if the system works in the remote operating mode.

Digital signal levels
All digital inputs can be operated by TTL, CMOS or any other logic levels up to +30 V.
All digital outputs can drive up to 20 mA, the maximum permitted voltage is +30 V.

Accessories
Control Interface 10228003
RS 232 Port

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

The serial interface meets the requirement of the RS 232C standard.
It is configured as a data terminal equipmnet (DEE).
The port sends data at pin 2 (TX) and receives data at pin 3 (RX), signal ground is at pin 5.
A hardware handshake is not used. The RTS/CTS signal can be looped through by a jumper, or a fixed state (0 or 1) can be assigned to RTS.
The logic states correspond to the CCiTT recommendation V.28.

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 interface can interact directly with a PC via a 9 pole cable, it receives control data and sends status data and measurements of the complete system.
Status data and measurements will be permanently sent, independently of the operating mode (manually operated, operated by control port, operated by RS 232 port).

The option of system configuring and saving configuring data in the nonvolatile memory of the control interface, makes the system exceptionally flexible.
For example it is possible to define in both operating modes (local or remote), where the current set point shall come from, from internal memory, from control port or from control panel.

System configuring and controlling may be done by customer software or by the 10228003's system software which is included in delivery.
This software is very comfortable and easy to handle. It allows system configuring, system controlling and system monitoring.
Customer-specific modification of the 10228003's software is possible, for instance putting your logos at the screen or suchlike.

Ask our support for customer-specific software.

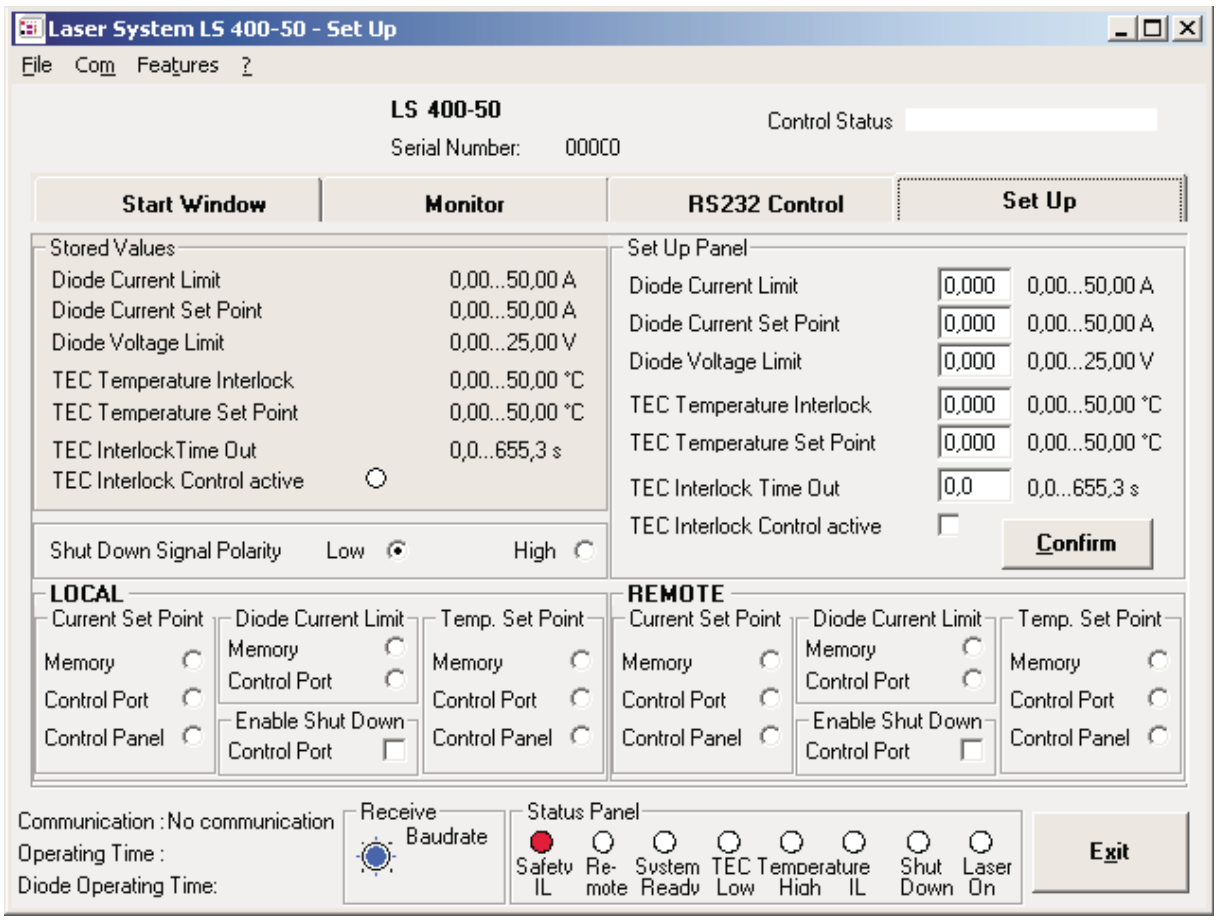
Accessories
Control Interface 10228003, RS 232 Port
System software 10228003, Set Up

Install the 10228003's software and connect a PC at the RS 232 port.
Turn on your system, start the program and select Set Up for configuring your system.
Enter the required values at the Set Up panel, this values will be stored in the nonvolatile memory of the control interface and will be relevant if memory is selected as a data source in the local or remote mode.
The Diode Voltage Limit value does not really affect the output voltage of the DTP 400, it is a supervision value which leads to a warning if exceeded. This is useful for detecting bad laser diodes or bad contacts at the output lines.

For the TEC Temperature Interlock and the TEC Interlock Time Out, do not select low values. Consider that in most cases a thermal overshoot will occur if the system is turned on.
Select whether the TEC Interlock Control shall be active or not. If you select active, the system will be turned off after the TEC interlock time if there is excessive TEC temperature.

Select Shut Down Signal Polarity Low or High. If you select High, the diode current will be shut down if the shut down signal is High.

Press the Confirm button, the values will be stored in the memory of the control interface.

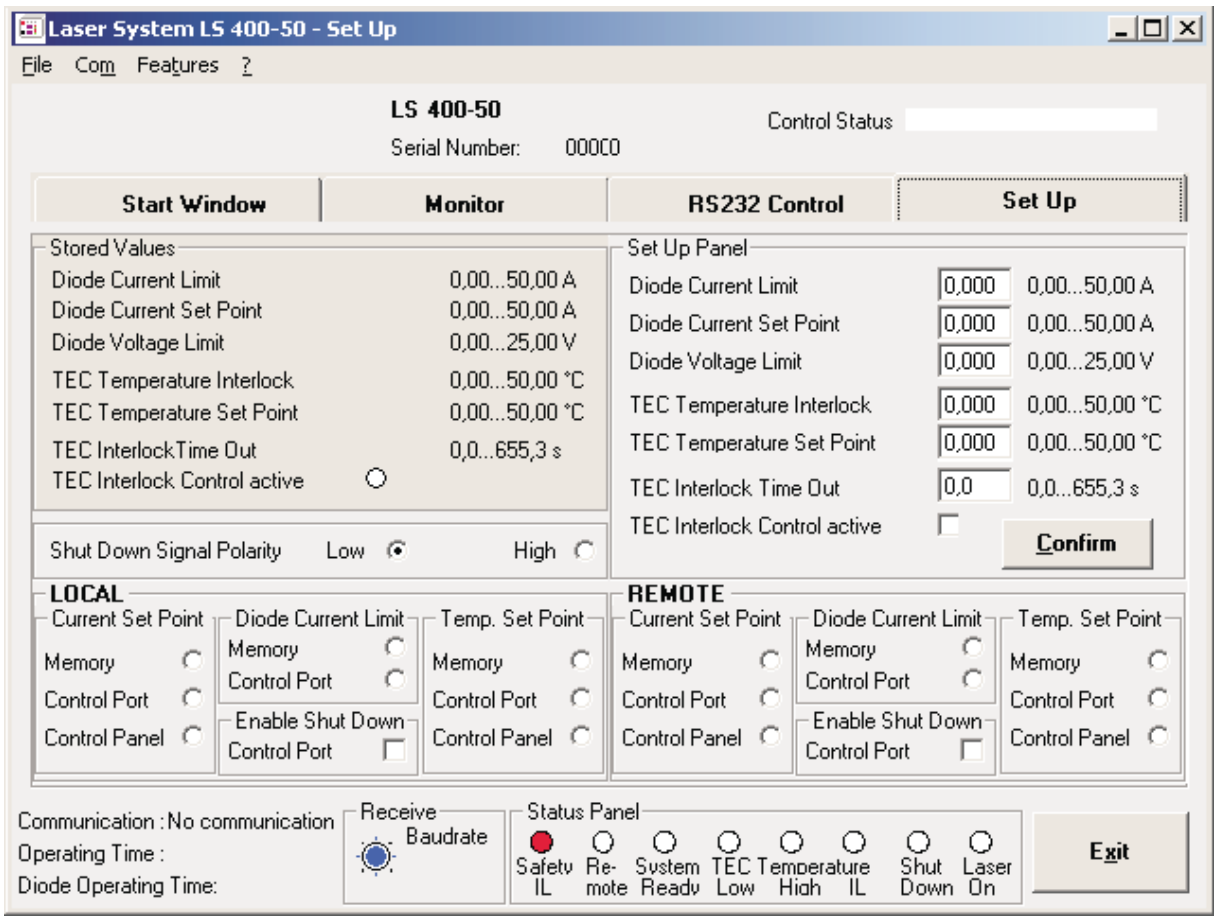


Accessories
Control Interface 10228003, RS 232 Port
System software 10228003, Set Up

Fill out the LOCAL form at the left side for the data sources in the
local operating mode.
Select the data source for current set point, diode current limit and temperature set point.
Select whether a shutdown signal at the control port shall be effective or not.

Fill out the REMOTE form at the right side for the data sources in the remote operating mode.
Select the data source for current set point, diode current limit and temperature set point.
Select whether a shutdown signal at the control port shall be effective or not.

Press the Confirm button, the settings will be stored in the memory of the control interface.


Laser System LS 400-50 - Set Up
File Com Features ?
LS 400-50
Serial Number: 00000
Control Status
Start Window
Monitor
RS232 Control
Set Up
Stored Values
Diode Current Limit 0,00...50,00 A
Diode Current Set Point 0,00...50,00 A
Diode Voltage Limit 0,00...25,00 V
TEC Temperature Interlock 0,00...50,00 °C
TEC Temperature Set Point 0,00...50,00 °C
TEC InterlockTime Out 0,0...655,3 s
TEC Interlock Control active
Set Up Panel
Diode Current Limit 0,000 0,00...50,00 A
Diode Current Set Point 0,000 0,00...50,00 A
Diode Voltage Limit 0,000 0,00...25,00 V
TEC Temperature Interlock 0,000 0,00...50,00 °C
TEC Temperature Set Point 0,000 0,00...50,00 °C
TEC Interlock Time Out 0,0 0,0...655,3 s
TEC Interlock Control active
Confirm
Shut Down Signal Polarity Low High
LOCAL
Current Set Point
Memory
Control Port
Control Panel
Diode Current Limit
Memory
Control Port
Enable Shut Down
Control Port
Temp. Set Point
Memory
Control Port
Control Panel
REMOTE
Current Set Point
Memory
Control Port
Control Panel
Diode Current Limit
Memory
Control Port
Enable Shut Down
Control Port
Temp. Set Point
Memory
Control Port
Control Panel
Communication : No communication
Operating Time :
Diode Operating Time:
Receive
Baudrate
Status Panel
Safety IL
Re-mote
System Ready
TEC Low
Temperature High
IL
Shut Down
Laser On
Exit

Accessories
Control Interface 10228003, RS 232 Port
System software 10228003, Set Up

Example for a Set Up:
You plan a laser system which shall be operated manually and remote controlled. For the remote operating mode there is a programmable logic controller (PLC) at the control port which does'nt have analog outputs. Your laser has one diode, the diode current shall be 45,00 A, diode current limit shall be 46,50 A and temperature set point shall be 24,30 °C.

In the local operating mode, the current set point and the temperature set point shall be adjusted manually for experimentation, a High shut down signal from the PLC shall be effective and shall turn off the diode current.

Turn on your system, start the program and select Set Up for configuring your system.
At the Set Up panel enter 46,50 A for the diode current limit,
enter 45,00 A for the diode current,
enter 2,50 V for the diode voltage limit.

Enter 30,00 °C for the TEC temperature interlock,
enter 24,30 °C for the temperature set point,
enter 10,0 s for the TEC interlock time out.
Select TEC interlock control active.

Select Shut Down Signal Polarity High at the left side.

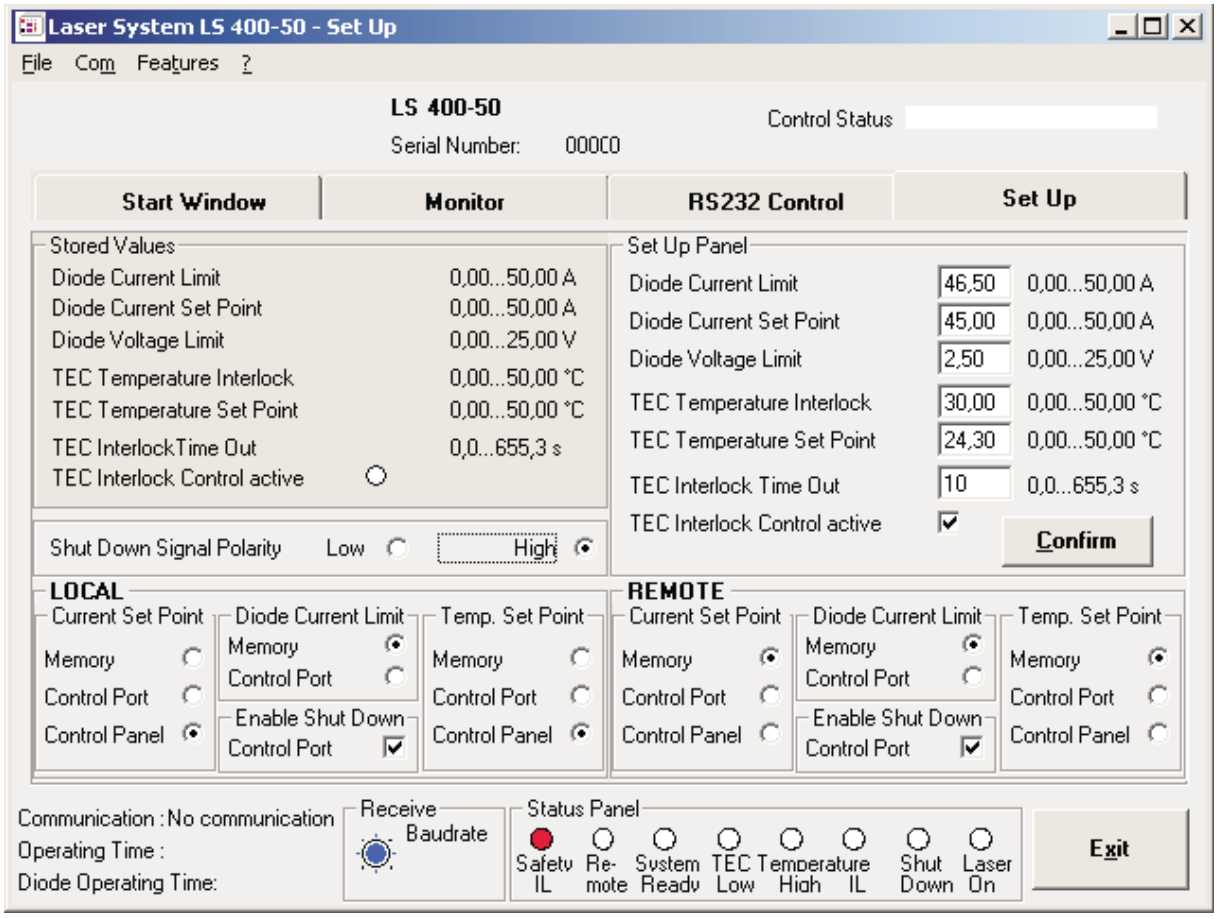
Fill out the LOCAL form at the left side for the data sources in the local operating mode.
Select Control Panel for the current set point,
select Memory for the diode current limit,
select Control Panel for the temperature set point.
Select Enable Shut Down Control Port.

Fill out the REMOTE form at the right side for the data sources in the remote operating mode.
Select Memory for the current set point,
select Memory for the diode current limit,
select Memory for the temperature set point.
Select Enable Shut Down Control Port.

Press the Confirm button, the settings will be stored in the memory of the control interface and the system is ready for operating.

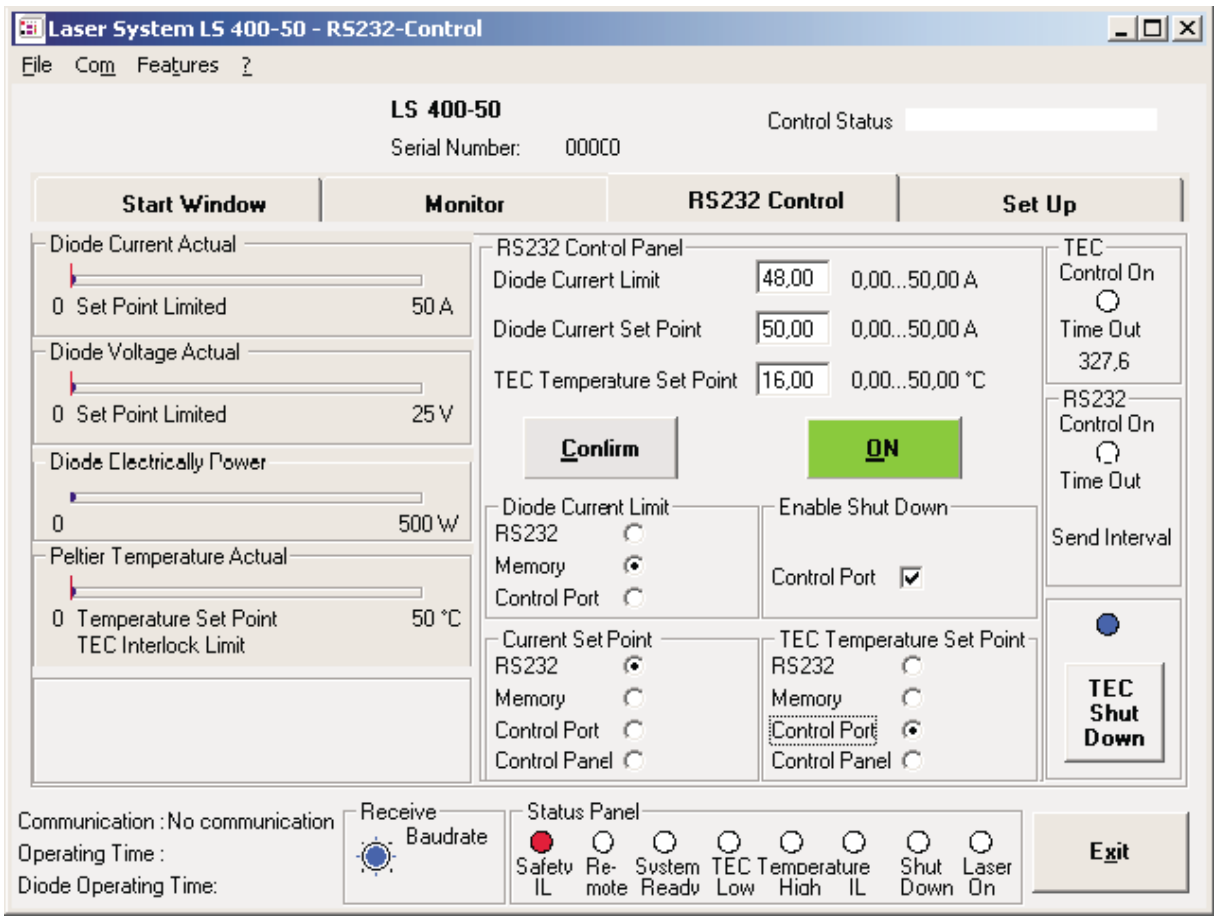
Accessories
Control Interface 10228003, RS 232 Port
System software 10228003, Set Up

Example for a Set Up



Accessories
Control Interface 10228003, RS 232 Port
System software 10228003, RS 232 Control

Select RS 232 Control for controlling the system by your PC.
Enter the required values for diode current limit, diode current set point and TEC temperature set point at the RS 232 Control Panel.
Select the data source for diode current limit, diode current set point and TEC temperature set point. Select whether a shut down signal at the control port shall be effective or not.
If you select RS 232 for diode current limit, diode current set point and TEC temperature set point, the registered values at the RS 232 Control Panel will be relevant at operating.
In other cases this values will be ignored.
If you select Memory as a data source, the value registered in the memory (set up) will be relevant at operating.
If you select Control Panel as a data source, the setting of the potentiometer at the control panel will be relevant at operating.
If you select Control Port as a data source, the analog set point signal fed in at the control port will be relevant at operating, e.g. the diode current set point signal CA-DCSP.
Every time you alter a value or a setting, you have to press the Confirm button.
There are three buttons for operating, button ON, button OFF and TEC Shut Down.
Button ON turns the laser on, button OFF turns the laser off.
The button TEC Shut Down turns the TEC voltage off, this is useful for equipment testing.



Accessories

Control Interface 10228003, RS 232 Port

Software Protocol

Status Data

Status data are splitted in three packets.

Packet P1 informs about measured values, current operating states and working hours.
Packet P2 informs about data from control port and control panel.
Packet P3 informs about stored data.
The short name of the data contains a data source number according to its origin.

Data source	data source number
DTP 400	1
Control Port	2
Control Panel	3
Memory	4
RS232 Port	5
Control Interface	6

Control Byte SD6CON

Status Digital 6 Control
Packet P1, Packet P2 and Packet P3, respectively Byte 3.
Reflects the current state of the control byte CD6CON.
Contains the following status bits:

Reset Diode Working Hours SB6RDWH

Status Bit 6 Reset Diode Working Hours
Byte 3, Bit 1
Reflects that the counter for the operating hours will be resetted. Reset will be done by control bit CB5RDWH with data source number 5.

Power Supply On SB6PSON

Status Bit 6 Power Supply On
Byte 3, Bit 2
Reflects that the DTP 400 is in an on-state. On will be done by control bit CB5PSON of the RS 232 port and /or by a CD-DCON signal at the control port or in the manual mode by a "ON" keystroke at the control panel.

TEC Shut Down SB6TSD

Status Bit 6 TEC Shut Down
Byte 3, Bit 4
Reflects that the TEC output is shut down. A TEC shut down will be done by control bit CB5TSD of RS 232 port or by a CD-PSD signal at the control port.

Reboot Firmware SB6REBOOT

Status Bit 6 Reboot
Byte 3, Bit 5
Reflects that a restart of the control interface was activated. A restart will be done by control bit CB5REBOOT of the RS 232 port.
A restart is required if the system will be new configured.

Accessories

Control Interface 10228003, RS 232 Port

Software Protocol

Data Store SB6STORE

Status Bit 6 Store
Byte 3, Bit 6
Reflects that the data will be saved. Control bit CB5STORE must be set in the configuration data set for saving data.

CD-DCON signal at the control port SB6CPPSON

Status Bit 6 Control Port Power Supply On
Byte 3, Bit 7
Reflects that the CD-DCON signal at the control port is High for turning on the DTP 400.

Operating mode SD6OM

Status Digital 6 Operating Mode
Packet P1, Packet P2 und Packet P3, respectively Byte 4.
Reflects the current state of control.

Operating Mode RS 232 SB6OMRS

Status Bit 6 Operating Mode RS 232
Byte 4, Bit 1
Reflects that the control interface is controlled by RS232.

Remote Mode Active SB6REM

Status Bit 6 Remote Mode
Byte 4, Bit 2
Reflects that the remote mode of the control interface is active.

TEC Shut Down Active SB6TSDA

Status Bit 6 TEC Shut Down Active
Byte 4, Bit 4
Reflects that the TEC shut down is active.

Receive RS 232 SB6RRS

Status Bit 6 Receive RS 232
Byte 4, Bit 6
Reflects that the control interface has received a byte from the RS 232 port.

Data Source Decoder SD6DEC

Status Digital 6 Data Source Decoder
Packet P1, Packet P2 und Packet P3, respectively Byte 5.
Reflects the current assignments of the data sources.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Data Source Decoder Local Mode SD4DECLOC

Status Digital 4 Data Source Decoder Local
Packet P3, Byte 23
Reflects the settings of the decoder, which were configured with configuration byte CF5DECLOC and were stored.
The settings of the decoder will be loaded from memory during local mode starting procedure.

Data Source Decoder Remote Mode SD4DECREM

Status Digital 4 Data Source Decoder Remote
Packet P2, Byte 23
Reflects the settings of the decoder, which were configured with configuration byte CF5DECREM and were stored.
The settings of the decoder will be loaded from memory during remote mode starting procedure.

In Out Control SD6IOC

Status Digital 6 In Out Control
Packet P1, Packet P2 und Packet P3, respectively Byte 6.
Reflects the settings of bits and contains the code of status data sets (transmit) and control data sets (receive). The code is mandatorily required.

Control Port Shut Down Enable SB6CPSDE

Status Bit 6 Control Port Shut Down Enable
Byte 6, Bit 0
Reflects whether the shutdown signal CD-DCSD at the control port is effective or not.

Shut Down Polarity Positive SB6SDPOLP

Status Bit 6 Shut Down Polarity Positive
Byte 6, Bit 2
Reflects whether a High shut down signal or a Low shut down signal results in a shutdown.
If bit 2 is 0, a Low signal results in a shutdown, if bit 2 is 1, a High signal results in a shutdown.
This bit is effective in all control modes.

Temperature Control On SB6TCON

Status Bit 6 Temperature Control On
Byte 6, Bit 3
Reflects whether a temperature interlock is effective or not. If temperature interlock is active and an excessive temperature occures, the diode current will be turned off and error bit EB6TF will be set. This bit is effective in all control modes.

Code of received data sets

Byte 6	Bit 5	Bit 4	Data set name

0	0	Control data set
0	1	Configuration data set
1	0	Unused
1	1	Short control data set

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Code of transmitted data sets

Byte 6	Bit 7	Bit 6	Data set name
	0	0	Status data set packet 1
	0	1	Status data set packet 2
	1	0	Status data set packet 3
	1	1	Unused

In Out Control Local SD4IOCLOC

Status Digital 4 In Out Control Local
Packet P3, Byte 24.
Reflects whether the shut down signal CD-DCSD at the control port is effective in the local mode or not. The setting is stored in SD4CPSDEL. The other bits aren't significant.

In Out Control Remote Mode SD4IOCREM

Status Digital 4 In Out Control Remote
Packet P2, Byte 24.
Reflects whether the shut down signal CD-DCSD at the control port is effective in the remote mode or not. The setting is stored in bit SD4CPSDER. The other bits aren't significant.

Error bits

Packet P1 in byte 8 and in byte10, respectively in the upper half byte.

Temperature Limit EB6TL

Error Bit 6 Temperature Limit
Packet P1, Byte 8, Bit 4
Bit 4 will be set if theTEC temperature interlock value will be exceeded. The diode current will be turned off.

RS 232 Data Fail EB6DFAIL

Error Bit 6 Data Fail
Packet P1, Byte 8, Bit 5
Bit 5 will be set if there is a data transfer error at the RS 232 port.

RS 232 Time Out EB6TOUT

Error Bit 6 Time Out
Packet P1, Byte 8, Bit 6
Bit 6 will be set if the RS 232 port doesn't receive data within the Time Out time. The diode current will be switched off. Bit 6 will be resetted if data will be received again, however the diode current remains in an off-state.

RS232 Wrong Sign EB6WS

Error Bit 6 Wrong Sign
Packet P1, Byte 8, Bit 7
Bit 7 will be set if a wrong character will be received. Bit 7 will be reseted if valid characters will be received again.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Hardware Fault EB6HFAIL

Error Bit 6 Hardware Fault
Packet P1, Byte 10, Bit 4
Bit 4 will be set if there is a hardware fault.

Voltage Limit EB6VL

Error Bit 6 Voltage Limit
Packet P1, Byte 10, Bit 6
Bit 6 will be set if the diode voltage exceeds the diode voltage supervision value.
Bit 6 will be resetted if the diode voltage is lower than the diode voltage supervision value.

Decoder Fail EB6DECF

Error Bit 6 Data Source Decoder Fail
Packet P1, Byte 10, Bit 7
Bit 7 will be set if the data source decoder gets an invalid value. In this case the diode current cannot be turned on.

Operating mode bits

Packet P1 in byte 8 and in byte10, respectively in the upper half byte.

TEC Temperature Low SB6PTL

Status Bit 6 Peltier Temperature Low
Packet P1, Byte 12, Bit 4
Bit 4 will be set if the current TEC temperature is lower than the temperature set point.

TEC Temperature High SB6PTH

Status Bit 6 Peltier Temperature High

Packet P1, Byte 12, Bit 5
Bit 5 will be set if the current TEC temperature is higher than the temperature set point.

Shut Down Active SB6SDA

Status Bit 6 Shut Down Active
Packet P1, Byte 12, Bit 6
Bit 6 will be set if a shut down is active.

Power Supply On SB6PSONA

Status Bit 6 Power Supply On
Packet P1, Byte 12, Bit 7
Bit 7 will be set if the DTP 400 is turned on.

Power Supply Ready SB6PSR

Status Bit 6 Power Supply Ready
Packet P1, Byte 14, Bit 4

Bit 4 will be set if the DTP 400 is ready for operating.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Interlock Active SB6ILA
Status Bit 6 Interlock Active
Packet P1, Byte 14, Bit 5
Bit 5 will be set if the safety interlock is active.

Local Mode SB6LOCAL
Status Bit 6 Local Mode
Packet P1, Byte 14, Bit 6
Bit 6 will be set if the system operates in the local mode.

Temperature Interlock Active SB6TILA
Status Bit 6 Temperature Interlock Active
Packet P1, Byte 14, Bit 7
Bit 7 will be set if a TEC temperature interlock is active.

Baud Rate SD6BR
Status Digital 6 Baud Rate
Packet P1, Byte 16, upper half byte
Reflects a numerical value, corresponding to the baud rate.

Numerical value	baud rate
1	1200
2	2400
3	4800
4	9600
5	19200
6	38400
7	57600
8	115200

Working Hours SD6WH
Status Digital 6 Working Hours
Packet P1, Byte 17, 18, 19 und 20
Reflects the operating hours of the control interface.

Diode working Hours SD6DWH
Status Digital 6 Diode Working Hours
Packet P1, Byte 21, 22, 23 und 24
Reflects the diode operating hours. The counter reading can be resetted by control bit CB5RDWH.

Revision Number SD6REV

Status Digital 6 Revision Number (of firmware)
Packet P2, Byte 8, upper half byte, first digit is SD6REV1
Packet P2, Byte 10, upper half byte, second digit is SD6REV2
Packet P2, Byte 12, upper half byte, third digit is SD6REV3
Packet P2, Byte 14, upper half byte, fourth digit is SD6REV4
For the half bytes, only values of 0 to 9 are permitted.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

The revision number of the firmware results of:
SD6REV = SD6REV4 + SD6REV3 + SD6REV2 + SD6REV1
Example for a revision number: 0109

Last Fault SD6LF

Status Digital 6 Last Fault
Packet P2, Byte 16, upper half byte
Reflects the error number of the last fault.

Error number	Error
1	Temperature interlock
2	Decoder error
3	Communication error
4	RS232 port data fail
5	RS232 port wrong sign
6	Hardware fail
7	Voltage supervision value exceeded

Serial number SD6SN

Status Digital 6 Serial Number
Packet P3, Byte 7 and 8
Reflects the serial number of the control interface.

Time Out RS 232 port SD4TOUT

Status Digital 4 Time Out RS232 Port
Packet P3, Byte 9 and 10
Reflects the Time Out value of the RS 232 port.
The Time Out value is determined by the configuration word CFT5TOUT, the value is stored in the memory of the control interface.

Time Out Temperature Control SD4TOTC

Status Digital 4 Time Out Temperature Control
Packet P3, Byte 21 and 22
Reflects the Time Out value of the temperature control.

The Time Out value is determined by the configuration word CFT5TOTC, the value is stored in the memory of the control interface.

Diode Current Set Point Limited SA1DCSPL

Status Analog 1 Diode Current Set Point Limited
Packet P1, Byte 7 and lower half byte of byte 8
Reflects the actual diode current set point, limited by the diode current limit value. The diode current limit value may be the CA-DCL signal of the control port, the value of the nonvolatile memory (setup software), or the setting of the diode current limit potentiometer at the DTP 400.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Diode Current Actual SA1DCACT
Status Analog 1 Diode Current Actual
Packet P1, Byte 9 and lower half byte of byte10
Reflects the actual diode current.

Diode Voltage Actual SA1DVACT
Status Analog 1 Diode Voltage Actual
Packet P1, Byte 11 and lower half byte of byte12
Reflects the actual diode voltage.

Diode Current Set Point 2 SA3DCSP2
Status Analog 3 Diode Current Set Point 2
Packet P1, Byte 13 and lower half byte of byte14
Reflects the diode current set point signal at X3 of a control panel.
Not implemented.

TEC Temperature Actual SA1PTACT
Status Analog 1 Peltier Temperature Actual
Packet P1, Byte 15 and lower half byte of byte16
Reflects the actual TEC temperature.

Diode Current Limit SA2DCL
Status Analog 2 Diode Current Limit
Packet P2, Byte 7 and lower half byte of byte 8
Reflects the diode current limit signal CA-DCL at the control port.

Diode Current Set Point SA2DCSP
Status Analog 2 Diode Current Set Point
Packet P2, Byte 11 and lower half byte of byte 12
Reflects the diode current set point signal CA-DCSP at the control port.

TEC Temperature Set Point SA2PTSP
Status Analog 2 Peltier Temperature Set Point
Packet P2, Byte 17 and lower half byte of byte 18
Reflects the Peltier temperature set point signal CA-PTSP at the control port.

Diode Current Set Point SA3DCSP
Status Analog 3 Diode Current Set Point Control Panel
Packet P2, Byte 13 and lower half byte of byte 14
Reflects the diode current set point of a control panel.

TEC Temperature Set Point SA3PTSP
Status Analog 3 Peltier Temperature Set Point Control Panel
Packet P2, Byte 19 and lower half byte of byte 20
Reflects the Peltier temperature set point of a control panel.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Diode Current Set Point SD4DCSP
Status Digital 4 Diode Current Set Point Memory
Packet P2, Byte 15 and lower half byte of byte 16
Packet P3, Byte 11 and lower half byte of byte 12
Reflects the diode current set point stored in the memory.

Diode Current Limit SD4DCL
Status Digital 4 Diode Current Limit Memory
Packet P2, Byte 9 and lower half byte of byte 10
Packet P3, Byte 13 and lower half byte of byte 14
Reflects the diode current limit stored in the memory.

TEC Temperature Set Point SD4PTSP
Status Digital 4 Peltier Temperature Set Point Memory
Packet P2, Byte 21 and lower half byte of byte 22
Packet P3, Byte 15 and lower half byte of byte 16
Reflects the Peltier temperature set point stored in the memory.

TEC Temperature Interlock CD4PTL
Control Digital 4 Peltier Temperature Interlock
Packet P3, Byte 17 and lower half byte of byte 18
Reflects the Peltier temperature interlock value stored in the memory.

Diode Voltage Limit CD4DVL
Control Digital 4 Diode Voltage Limit Memory
Packet P3, Byte 19 and lower half byte of byte 20
Reflects the diode voltage limit value stored in the memory.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Transmitted data

Independently of configuration, operating mode and interface, status data will be transmitted cyclically at the RS 232 port. For a better data management, the status data are packed into 3 data packets. Each of these packets consists of 26 bytes.
Packet P1 contains measurements, current operating states and operating hours.
Packet P2 contains data of the control port and data of the control panel.
Packet P3 contains data stored in the memory.
The separation of data packets offers the possibility for transmitting only packets whose contents have changed, resulting in a shorter cycle time.
The basic version however doesn't have this feature.
A packet consists of:
Start of data set 2 Byte
Status data bytes 22 Byte
End of data set 2 Byte

Status data packet overview

	Packet P1	**Packet P2**	**Packet P3**
Byte 1	Start byte	Start byte	Start byte
Byte 2	Start byte	Start byte	Start byte
Byte 3	SD6CON	SD6CON	SD6CON
Byte 4	SD6OM	SD6OM	SD6OM
Byte 5	SD6DEC	SD6DEC	SD6DEC
Byte 6	SD6IOC	SD6IOC	SD6IOC
Byte 7	SA1DCSPL	SA2DCL	SD6SN
Byte 8	Error Bits	SD6REV1	SD6SN
Byte 9	SA1DCACT	SD4DCL	SD4TOUT
Byte 10	Error Bits	SD6REV2	
Byte 11	SA1DVACT	SA2DCSP	SD4DCSP
Byte 12	Operating mode bits	SD6REV3	
Byte 13	SA3DCSP2	SA3DCSP	SD4DCL
Byte 14	Operating mode bits	SD6REV4	
Byte 15	SA1PTACT	SD4DCSP	SD4PTSP
Byte 16	SD6BR	SD6LF	
Byte 17	SD6WH	SA2PTSP	SD4PTL
Byte 18	SD6WH		
Byte 19	SD6WH	SA3PTSP	SD4DVL
Byte 20	SD6WH		
Byte 21	SD6DWH	SD4PTSP	SD4TOTC
Byte 22	SD6DWH		
Byte 23	SD6DWH	SD4DECREM	SD4DECLOC
Byte 24	SD6DWH	SD4IOCREM	SD4IOCLOC

Byte 25	Stop byte	Stop byte	Stop byte
Byte 26	Stop byte	Stop byte	Stop byte

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Description packet P1

Packet P1 contains measurements, current operating states and operating hours.

Packet P1 status byte 1 **start byte**
Packet P1 status byte 2 **start byte**
For starting the sequence a start byte will be send twice.
The start byte must have a hexadecimal value of “0A” or a binary value of “0000 1010”.

Packet P1 status byte 3 **control byte SD6CON**
8 bit word, binary output, reflects the current operating state.

Bit 0		Unused.
Bit 1 = 1	SB6RDWH	Counter for diode operating hours is reset.
Bit 2 = 1	SB6PSON	DTP 400 is in on-state.
Bit 3		Unused.
Bit 4 = 1	SB6TSD	TEC shut down is active.
Bit 5 = 1	SB6REBOOT	System reboot was triggered.
Bit 6 = 1	SB6STORE	Data are saved.
Bit 7 = 1	SB6CPPSON	DTP 400 is turned on by CD-DCON-signal at the control port.

Packet P1 status byte 4 operating state byte SD6OM
8 bit word, binary output, reflects the current operating mode.

Bit 0		Unused.
Bit 1 = 1	SB6OMRS	RS232 port is used for control.
Bit 2		Unused.
Bit 3 = 1	SB6REM	Remote mode is active.
Bit 4 = 1	SB6TSDA	TEC shut down is active.
Bit 5		Unused.
Bit 6 = 1	SB6RRS	Data were received of RS 232 port.
Bit 7		Unused.

Packet P1 status byte 5 data source decoder SD6DEC
8 bit word, binary output, reflects the data source assignments.

Bit 1	Bit 0	
0	0	The diode current limit value is given by RS 232 port.
0	1	The diode current limit value is given by memory.
1	0	The diode current limit value is given by control port.

Bit 4	Bit 3	Bit 2	
0	0	0	The diode current set point is given by RS 232 port.
0	0	1	The diode current set point is given by memory.

0	1	0	The diode current set point is given control port.
1	0	0	The diode current set point is given by control panel.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Bit 7	Bit 6	Bit 5	
0	0	0	The TEC temperature set point is given by RS 232 port.
0	0	1	The TEC temperature set point is given by memory.
0	1	0	The TEC temperature set point is given by control port.
1	0	0	The TEC temperature set point is given by control panel.

Other settings lead to a decoder fault, error bit EB6DECF will be set.

Packet P1 status byte 6 in out control SD6IOC
8 bit word, binary output, reflects the settings of the status bits and defines the packet assignments with bit 6 and bit 7.

Bit 0 = 1	SB6CPSDE	Shut down signal of control port approved.
Bit 1		Unused.
Bit 2 = 1	SB6SDPOLP	Shut down signal polarity is positive.
Bit 3 = 1	SB6TCON	Temperature interlock control is active.
Bit 4		Unused.
Bit 5		Unused.
Bit 6 = 0		Must be 0.
Bit 7 = 0		Must be 0.

Packet P1 status byte 7 diode current set point limited SA1DCSPL
Packet P1 status byte 8 Error bits
SA1DCSPL x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the actual diode current set point, limited by a diode current limit value. A diode current limit value may be the CA-DCL signal of the control port, the value of the nonvolatile memory (setup software), or the setting of the diode current limit potentiometer at the DTP 400.
The lower half byte of status byte 8 is the high-order part of the 12 bit value.

Error bits 1 1 1 1 x x x x x x x x x x x x
4 bit value, reflects faults.
The upper half byte of status byte 8 contains the following error bits.

Bit 4	EB6TL	Error bit temperature error.
Bit 5	EB6DFAIL	Error bit RS 232 port data fail.
Bit 6	EB6TOUT	Error bit RS 232 port time out.
Bit 7	EB6WS	Error bit RS 232 port wrong character received.

Packet P1 status byte 9 diode current actual SA1DCACT
Packet P1 status byte 10 Error bits

SA1DCACT x x x x 1 1 1 1 1 1 1 1 1 1 1 1

12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the actual diode current.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

The lower half byte of status byte 10 is the high-order part of the 12 bit value.

Error bits 1 1 1 1 x x x x x x x x x x x x

4 bit value, reflects faults.
The upper half byte of status byte 10 contains the following error bits.

Bit 4	EB6HFAIL	Error bit hardware.
Bit 5		Unused.
Bit 6	EB6VL	Error bit diode voltage limit exceeded.
Bit 7	EB6DECF	Error bit data source decoder error.

Packet P1 status byte 11 diode voltage SA1DVACT
Packet P1 status byte 12 operating state bits

SA1DVACT x x x x 1 1 1 1 1 1 1 1 1 1 1 1

12 bit value, resolution 4095 steps, range 0 to 25 V, increment 6,10501 mV.
Reflects the diode voltage.
The lower half byte of status byte 12 is the high-order part of the 12 bit value.

Operating state bits 1 1 1 1 x x x x x x x x x x x x

4 bit value, reflects operating states.
The upper half byte of status byte 12 contains the following operating state bits.

Bit 4	SB6PTL TEC	temperature is low.
Bit 5	SB6PTH TEC	temperature is high.
Bit 6	SB6SDA	Shut down is active.
Bit 7	SB6PSONA	DTP 400 is in on-state.

Packet P1 status byte 13 Current Set Point SA3DCSP2
Packet P1 status byte 14 Operating State bits

SA3DCSP2 x x x x 1 1 1 1 1 1 1 1 1 1 1 1

12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the diode current set point signal at X3 of a control panel.
The lower half byte of status byte 14 is the high-order part of the 12 bit value.
Not implemented.

Operating state bits 1 1 1 1 x x x x x x x x x x x x

4 bit value, reflects operating states.
The upper half byte of status byte 14 contains the following operating states bits.

Bit 4	SB6PSR	Control interface is ready.
Bit 5	SB6ILA	Safety interlock is active.
Bit 6	SB6LOCAL	Local mode is active.
Bit 7	SB6TILA	TEC temperature interlock is active.

Accessories
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Software Protocol

Packet P1 status byte 15 TEC Temperature Actual SA1PTACT
Packet P1 status byte 16 Baud rate SD6BR
SA1PTACT x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 °C, increment 0,01221 °C.
Reflect the actual TEC temperature.
The lower half byte of status byte 16 is the high-order part of the 12 bit value.

Baud rate 1 1 1 1 x x x x x x x x x x x x
4 bit value, binary output, range 0 bis 15, reflects the defined baud rate.
The upper half byte of status byte 16 contains the following baud rates.

Number	Baud rate
1	1200
2	2400
3	4800
4	9600
5	19200
6	38400
7	57600
8	115200

Packet P1 status byte 17 Counter Operating Hours SD6WH
Packet P1 status byte 18
Packet P1 status byte 19
Packet P1 status byte 20
32 bit value, resolution 4294967295 steps, increment 1 second.
Reflects the operating time of the system.
Operating time in seconds = P1SB20dez * 2563 + P1SB19dez* 2562 + P1SB18dez* 256 + P1SB17dez

Packet P1 status byte 21 Counter Operating Hours SD6DWH
Packet P1 status byte 22
Packet P1 status byte 23
Packet P1 status byte 24
32 bit value, resolution 4294967295 steps, increment 1 second.
Reflects the operating time of the diodes.
Operating time in seconds = P1SB24dez * 2563 + P1SB23dez* 2562 + P1SB22dez* 256 + P1SB21dez

Packet P1 status byte 25 Stop byte
Packet P1 status byte 26 Stop byte
For the end of the sequence a stop byte will be send twice.

The stop byte must have a hexadecimal value of “0B” or a binary value of “0000 1011”.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Description of Packet P2

Packet P2 reflects data from control port and from control panel.

Packet P2 status byte 1 **Start byte**
Packet P2 status byte 2 **Start byte**
For starting the sequence a start byte will be send twice.
The start byte must have a hexadecimal value of “0A” or a binary value of “0000 1010”.

Packet P2 status byte 3 **Control byte SD6CON**
8 bit word, binary output, reflects the current operating state.

Bit 0		Unused.
Bit 1 = 1	SB6RDWH	Counter for diode operating hours is reset.
Bit 2 = 1	SB6PSON	DTP 400 is in on-state.
Bit 3		Unused.
Bit 4 = 1	SB6TSD	TEC shut down is active.
Bit 5 = 1	SB6REBOOT	System reboot was triggered.
Bit 6 = 1	SB6STORE	Data are saved.
Bit 7 = 1	SB6CPPSON	DTP 400 is turned on by CD-DCON-signal at the control port.

Packet P2 status byte 4 operating state byte SD6OM
8 bit word, binary output, reflects the current operating mode.

Bit 0		Unused.
Bit 1 = 1	SB6OMRS	RS232 port is used for control.
Bit 2		Unused.
Bit 3 = 1	SB6REM	Remote mode is active.
Bit 4 = 1	SB6TSDA	TEC shut down is active.
Bit 5		Unused.
Bit 6 = 1	SB6RRS	Data were received at RS 232 port.
Bit 7		Unused.

Packet P2 status byte 5 data source decoder SD6DEC
8 bit word, binary output, reflects the data source assignments.

Bit 1	Bit 0	
0	0	The diode current limit value is given by RS 232 port.
0	1	The diode current limit value is given by memory.
1	0	The diode current limit value is given by control port.

Bit 4	Bit 3	Bit 2	
0	0	0	The diode current set point is given by RS 232 port.
0	0	1	The diode current set point is given by memory.

0	1	0	The diode current set point is given by control port.
1	0	0	The diode current set point is given by control panel.

Accessories
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Software Protocol

Bit 7	Bit 6	Bit 5	
0	0	0	The TEC temperature set point is given by RS 232 port.
0	0	1	The TEC temperature set point is given by memory.
0	1	0	The TEC temperature set point is given by control port.
1	0	0	The TEC temperature set point is given by control panel.

Different settings lead to a decoder fault, error bit EB6DECF will be set.

Packet P2 status byte 6 in out control SD6IOC
8 bit word, binary output, reflects the settings of the status bits and defines the packet assignments with bit 6 and bit 7.

Bit 0 = 1	SB6CPSDE	Shut down signal of control port approved.
Bit 1		Unused.
Bit 2 = 1	SB6SDPOLP	Shut down signal polarity is positive.
Bit 3 = 1	SB6TCON	Temperature interlock control is active.
Bit 4		Unused.
Bit 5		Unused.
Bit 6 = 1		Must be 1.
Bit 7 = 0		Must be 0.

Packet P2 status byte 7 Diode Current Limit SA2DCL
Packet P2 status byte 8 Revision number of firmware, first digit SD6REV1
SA2DCL x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the diode current limit value CA-DCL at the control port.
The lower half byte of status byte 8 is the high-order part of the 12 bit value.
SD6REV1 1 0 0 1 x x x x x x x x x x x x
4 bit value, range 0 to 9.
Reflects the first digit of the revision number of the control interface firmware.
The revision number of the firmware results of:
SD6REV = "SD6REV4" + "SD6REV3" + "SD6REV2" + "SD6REV1"
The upper half byte of status byte 8 is the least significant digit of the revision number.
Example for a revision number: 01.0**9**

Packet P2 status byte 9 Diode Current Limit SD4DCL
Packet P2 status byte 10 Revision number of firmware, second digit SD6REV2
SD4DCL x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the diode current limit value from the memory.

The lower half byte of status byte 10 is the high-order part of the 12 bit value.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

SD6REV2 0 0 0 0 x x x x x x x x x x x x

4 bit value, range 0 to 9.
Reflects the second digit of the revision number of the control interface firmware.
The revision number of the firmware results of:
SD6REV = "SD6REV4" + "SD6REV3" + "SD6REV2" + "SD6REV1"
The upper half byte of status byte 10 is the most significant digit after the dot.
Example for a revision number: 01.**0**9

Packet P2 status byte 11 **Diode Current Set Point SD2DCSP**
Packet P2 status byte 12 **Revision number of firmware, third digit SD6REV3**
SD2DCSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1

12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the diode current set point CA-DCSP at the control port.
The lower half byte of status byte 12 is the high-order part of the 12 bit value.
SD6REV3 0 0 0 1 x x x x x x x x x x x x

4 bit value, range 0 to 9.
Reflects the third digit of the revision number of the control interface firmware.
The revision number of the firmware results of:
SD6REV = "SD6REV4" + "SD6REV3" + "SD6REV2" + "SD6REV1"
The upper half byte of status byte 12 is the least significant digit left of the dot.
Example for a revision number: 0**1**.09

Packet P2 status byte 13 **Diode Current Set Point SA3DCSP**
Packet P2 status byte 14 **Revision number of firmware, fourth digit SD6REV4**
SA3DCSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1

12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the diode current set point at the control panel.
The lower half byte of status byte 14 is the high-order part of the 12 bit value.
SD6REV4 0 0 0 0 x x x x x x x x x x x x

4 bit value, range 0 to 9.
Reflects the fourth digit of the revision number of the control interface firmware.
The revision number of the firmware results of:
SD6REV = "SD6REV4" + "SD6REV3" + "SD6REV2" + "SD6REV1"
The upper half byte of status byte 14 is the most significant digit left of the dot.
Example for a revision number: **0**1.09

Packet P2 status byte 15 Diode Current Set Point in memory SD4DCSP
Packet P2 status byte 16 Number of last faults SD6LF
SD4DCSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1

12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA,
range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the diode current set point of the memory.
The lower half byte of status byte 16 is the high-order part of the 12 bit value.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

SD6LF 1 1 1 1 x x x x x x x x x x x x
4 bit value, range 0 to15.
The upper half byte of status byte 16 contains the number of the last faults.

Fault number	Fault name
1	TEC temperature fault.
2	Decoder error.
3	Communication error.
4	RS 232 port data fail.
5	RS 232 port wrong character received.
6	Hardware fail.
7	Diode voltage limit exceeded.

Packet P2 status byte 17 **TEC Temperature Set Point SA2PTSP**
Packet P2 status byte 18
SA2PTSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50°C, increment 0,01221°C.
Reflects the TEC temperature set point CA-PTSP at the control port.
The lower half byte of status byte 18 is the high-order part of the 12 bit value.
The high-order half byte of status byte 18 is unused.

Packet P2 status byte 19 **TEC Temperature Set Point SA3PTSP**
Packet P2 status byte 20
SA3PTSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 °C, increment 0,01221 °C.
Reflects the TEC temperature set point of the control panel.
The lower half byte of status byte 20 is the high-order part of the 12 bit value.
The high-order half byte of status byte 20 is unused.

Packet P2 status byte 21 **TEC Temperature Set Point SD4PTSP**
Packet P2 status byte 22
SD4PTSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 °C, increment 0,01221 °C.
Reflects the TEC temperature set point stored in the memory.
The lower half byte of status byte 22 is the high-order part of the 12 bit value.
The high-order half byte of status byte 22 is unused.

Packet P2 status byte 23 **Data Source Decoder Remote SD4DECREM**
8 bit word, binary output, reflects the data source assignments for the remote mode.

Bit 1	Bit 0	
0	0	The diode current limit value is given by RS 232 port.
0	1	The diode current limit value is given by memory.

1	0	The diode current limit value is given by control port.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Packet P2 status byte 23 Data Source Decoder Remote SD4DECREM

Bit 4	Bit 3	Bit 2	
0	0	0	The diode current set point is given by RS 232 port.
0	0	1	The diode current set point is given by memory.
0	1	0	The diode current set point is given by control port.
1	0	0	The diode current set point is given by control panel.

Bit 7	Bit 6	Bit 5	
0	0	0	The TEC temperature set point is given by RS 232 port.
0	0	1	The TEC temperature set point is given by memory.
0	1	0	The TEC temperature set point is given by control port.
1	0	0	The TEC temperature set point is given by control panel.

Different settings lead to a decoder fault, error bit EB6DECF will be set.

Packet P2 status byte 24 In Out Control Remote SD4IOCREM
8 bit value, binary output, reflects assignments for the remote mode.

Bit 0 = 1	SB4SDCPER	Shut Down signal of control port approved.
Bit 1		Unused
Bit 2 = X		Irrelevant.
Bit 3 = X		Irrelevant.
Bit 4 = X		Irrelevant.
Bit 5 = X		Irrelevant.
Bit 6 = X		Irrelevant.
Bit 7 = X		Irrelevant.

Packet P2 status byte 25 Stop byte
Packet P2 status byte 26 Stop byte
For the end of the sequence a stop byte will be send twice.
The stop byte must have a hexadecimal value of “0B” or a binary value of “0000 1011”.

Description of the packet P3
The packet P3 contains the data stored in the memory of the control interface.

Packet P3 status byte 1 Start byte
Packet P3 status byte 2 Start byte
For starting the sequence a start byte will be send twice.
The start byte must have a hexadecimal value of “0A” or a binary value of “0000 1010”.

Accessories
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Software Protocol

Packet P3 status byte 3 Control Byte SD6CON
8 bit word, binary output, reflects the operating state.

Bit 0		Unused.
Bit 1 = 1	SB6RDWH	Counter for diode operating hours is resetted.
Bit 2 = 1	SB6PSON	DTP 400 is in on-state.
Bit 3		Unused.
Bit 4 = 1	SB6TSD	TEC shut down is active.
Bit 5 = 1	SB6REBOOT	System reboot was triggered.
Bit 6 = 1	SB6STORE	Data are saved.
Bit 7 = 1	SB6CPPSON	DTP 400 is turned on by CD-DCON-signal at the control port.

Packet P4 status byte 4 Operating State Byte SD6OM
8 bit word, binary output, reflects the current operating mode.

Bit 0		Unused.
Bit 1 = 1	SB6OMRS	RS232 port is used for control.
Bit 2		Unused.
Bit 3 = 1	SB6REM	Remote mode is active.
Bit 4 = 1	SB6TSDA	TEC shut down is active.
Bit 5		Unused.
Bit 6 = 1	SB6RRS	Data were received at RS 232 port.
Bit 7		Unused.

Packet P3 status byte 5 Data Source Decoder SD6DEC
8 bit word, binary output, reflects the data source assignments.

Bit 1	Bit 0	
0	0	The diode current limit value is given by RS 232 port.
0	1	The diode current limit value is given by memory.
1	0	The diode current limit value is given by control port.

Bit 4	Bit 3	Bit 2	
0	0	0	The diode current set point is given by RS 232 port.
0	0	1	The diode current set point is given by memory.
0	1	0	The diode current set point is given by control port.
1	0	0	The diode current set point is given by control panel.

Bit 7	Bit 6	Bit 5	
0	0	0	The TEC temperature set point is given by RS 232 port.
0	0	1	The TEC temperature set point is given by memory.
0	1	0	The TEC temperature set point is given by control port.

1	0	0	The TEC temperature set point is given by control panel.

Different settings lead to a decoder fault, error bit EB6DECF will be set.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Packet P3 status byte 6 In Out Control SD6IOC

8 bit word, binary output, reflects the settings of the status bits and defines the packet assignments with bit 6 and bit 7.

Bit 0 = 1	SB6CPSDE	Shut down signal of control port approved.
Bit 1		Unused.
Bit 2 = 1	SB6SDPOLP	Shut down signal polarity is positive.
Bit 3 = 1	SB6TCON	Temperature interlock control is active.
Bit 4		Unused.
Bit 5		Unused.
Bit 6 = 0		Must be 0.
Bit 7 = 1		Must be 1.

Packet P3 status byte 7 Serial Number SD6SN
Packet P3 status byte 8

16 bit value, resolution 65535 steps, binary number.
Reflects the serial number of the control interface.
Status byte 8 is the high-order part of the 16 bit value.

Packet P3 status byte 9 Time Out RS 232 Port SD4TOUT
Packet P3 status byte 10

16 bit value, resolution 65535 steps, range 0 to 655,3 s, increment 100 ms.
Reflects the time which may pass till receiving the next data. An overrun leads to a time out error, error bit EB6TOUT will be set and the diode current will be turned off.
The time out control is only active if control by RS 232 port is active.
Status byte 10 is the high-order part of the 16 bit value.

Packet P3 status byte 11 Diode Current Set Point SD4DCSP
Packet P3 status byte 12

SD4DCSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1

12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the diode current set point stored in the memory.
The lower half byte of status byte 12 is the high-order part of 12 bit value.
The upper half byte of status byte 12 is unused.

Packet P3 status byte 13 Diode Current Limit SD4DCL
Packet P3 status byte 14

SD4DCL x x x x 1 1 1 1 1 1 1 1 1 1 1 1

12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Reflects the diode current limit value stored in the memory.

The lower half byte of status byte 14 is the high-order part of the 12 bit value.
The upper half byte of status byte 14 is unused.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Packet P3 status byte 15 TEC Temperature Set Point SD4PTSP
Packet P3 status byte 16
SD4PTSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 °C, increment 0,01221 °C.
Reflects the TEC temperature set point stored in the memory.
The lower half byte of status byte 16 is the high-order part of the 12 bit value.
The upper half byte of status byte 16 is unused.

Packet P3 status byte 17 TEC Temperature Interlock SD4PTL
Packet P3 status byte 18
SD4PTL x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 °C, increment 0,01221 °C.
Reflects the TEC temperature interlock value stored in the memory.
The lower half byte of status byte 18 is the high-order part of the 12 bit value.
The upper half byte of status byte 18 is unused.

Packet P3 status byte 19 Diode Voltage Limit SD4DVL
Packet P3 status byte 20
SD4DVL x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 25 V, increment 6,10501 mV.
Reflects the diode voltage limit value stored in the memory.
The lower half byte of status byte 20 is the high-order part of the 12 bit value.
The upper half byte of status byte 20 is unused.

Packet P3 status byte 21 Time Out Temperature Control SD4TOTC
Packet P3 Status byte 22
SD4TOTC 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
16 bit word, resolution 65535 steps, range 0 to 655,3 s, increment 100 ms.
Reflects the time which may pass till a temperature interlock event leads to an error. An overrun leads to a time out error, error bit EB6TOTC will be set and the diode current will be turned off.
Status byte 22 is the high-order part of the 16 bit word.

Packet P3 status byte 23 Data Source Decoder Local SD6DECLOC
8 bit word, binary output, reflects the data source assignments in the local mode.

Bit 1	Bit 0	
0	0	The diode current limit value is given by RS 232 port.
0	1	The diode current limit value is given by memory.
1	0	The diode current limit value is given by control port.

Bit 4	Bit 3	Bit 2	
0	0	0	The diode current set point is given by RS 232 port.

0	0	1	The diode current set point is given by memory.
0	1	0	The diode current set point is given by control port.
1	0	0	The diode current set point is given by control panel.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Packet P3 status byte 23 Data Source Decoder Local SD6DECLOC

Bit 7	Bit 6	Bit 5	
0	0	0	The TEC temperature set point is given by RS 232 port.
0	0	1	The TEC temperature set point is given by memory.
0	1	0	The TEC temperature set point is given by control port.
1	0	0	The TEC temperature set point is given by control panel.

Different settings lead to a decoder fault, error bit EB6DECF will be set.

Packet P2 status byte 24 In Out Control Remote SD4IOCLOC
8 bit value, binary output, reflects assignments for the local mode.

Bit 0 = 1	SB4SDCPER	Shut Down signal of control port approved.
Bit 1		Unused
Bit 2		Unused.
Bit 3		Unused.
Bit 4		Unused.
Bit 5		Unused.
Bit 6		Unused.
Bit 7		Unused.

Packet P3 status byte 25 Stop byte
Packet P3 status byte 26 Stop byte
For the end of the sequence a stop byte will be send twice.
The stop byte must have a hexadecimal value of “0B” or a binary value of “0000 1011”.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Received data

The system will be controlled by the control data set.
For safety reasons a connection supervision is implemented.
If the control interface doesn't receive data within a specific time, error bit EB6TOUT is set and the diode current is turned off.
For the connection supervision it is sufficient to generate the required data traffic by using a short control data set instead of the normal control data set. The short data set can be used if the fully functional range is not required.
For configuring the control interface, the configuration data set is used.

Overview

	Control data set	**Short control data set**	**Configuration data set**
Byte 1	Start byte	Start byte	Start byte
Byte 2	Start byte	Start byte	Start byte
Byte 3	CD5CON	CD5CON	CD5CON
Byte 4	SD6OM	SD6OM	SD6COM
Byte 5	CD5DEC	CD5DEC	CD5DEC
Byte 6	CD5IOC	CD5IOC	CD5IOC
Byte 7	CD5TOUT	Stop byte	CF5TOTC
Byte 8		Stop byte	
Byte 9	CD5DCL		CF5DCSP
Byte 10			
Byte 11	CD5DCSP		CF5DCL
Byte 12			
Byte 13	CD5PTSP		CF5PTSP
Byte 14			
Byte 15	Stop byte		CF5PTL
Byte 16	Stop byte		
Byte 17			CF5DVL
Byte 18			
Byte 19			CF5DECLOC
Byte 20			CF5IOCLOC
Byte 21			CF5DECREM
Byte 22			CF5IOCREM
Byte 23			Stop byte
Byte 24			Stop byte

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Control data set
A control data set consists of:
Start of data set 2 byte
Control data 12 byte
End of data set 2 byte

Byte 1 Start byte
Byte 2 Start byte
For starting the sequence a start byte must be send twice.
The start byte must have a hexadecimal value of “0A” or a binary value of “0000 1010”.

Byte 3 Control Byte CD5CON
8 bit word, binary input.

Bit 0		Unused.
Bit 1 = 1	CB5RDWH	Resets the counter for the diode operating hours.
Bit 2 = 1	CB5PSON	Turns the DTP 400 on.
Bit 3		Unused.
Bit 4 = 1	CB5TSD	Activates TEC shut down.
Bit 5 = 1	CB5REBOOT	Reboots system.
Bit 6 = 0	CB5STORE	Must be 0.
Bit 7 = 1	SB6CPPSON	Unused.

Byte 4 Operating State SD6OM
8 bit word, binary input, unused.

Byte 5 Data Source Decoder CD5DEC
8 bit word, binary input, defines the data source assignments for the RS 232 mode.

Bit 1	Bit 0	
0	0	The diode current limit value is given by RS 232 port.
0	1	The diode current limit value is given by memory.
1	0	The diode current limit value is given by control port.

Bit 4	Bit 3	Bit 2	
0	0	0	The diode current set point is given by RS 232 port.
0	0	1	The diode current set point is given by memory.
0	1	0	The diode current set point is given by control port.
1	0	0	The diode current set point is given by control panel.

Bit 7	Bit 6	Bit 5	
0	0	0	The TEC temperature set point is given by RS 232 port.

0	0	1	The TEC temperature set point is given by memory.
0	1	0	The TEC temperature set point is given by control port.
1	0	0	The TEC temperature set point is given by control panel.

Different settings lead to a decoder fault, error bit EB6DECF will be set.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Byte 6 In Out Control CD5IOC
8 bit word, binary input, defines settings.

Bit 0 = 1	CB5SDCPE	Enables CD-DCSD signal of Control Port for shut downing.
Bit 1		Unused.
Bit 2		Unused.
Bit 3		Unused.
Bit 4 = 0		Must be 0.
Bit 5 = 0		Must be 0.
Bit 6		Unused.
Bit 7		Unused.

Byte 7 Time Out RS 232 Port CD5TOUT
Byte 8
16 bit value, resolution 65535 steps, range 0 to 655,3 s, increment 100 ms.
Defines the time which may pass till receiving the next data. An overrun leads to a time out error, error bit EB6TOUT will be set and the diode current will be turned off.
The time out control is only active if control by RS 232 port is active.
Byte 8 is the high-order part of the 16 bit value.

Byte 9 Diode Current Limit CD5DCL
Byte 10
12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Defines the diode current limit value for the RS 232 control mode.
The value is valid if RS 232 is selected as a data source for the diode current limit value.

Byte 11 Diode Current Set Point CD5DCSP
Byte 12
12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Defines the diode current set point for the RS 232 control mode.
The value is valid if RS 232 is selected as a data source for the diode current set point.

Byte 13 TEC Temperature Set Point CD5PTSP
Byte 14
12 bit value, resolution 4095 steps, range 0 to 50 °C, increment 0,01221 °C.
Defines the TEC temperature set point for the RS 232 control mode.
The value is valid if RS 232 is selected as a data source for the TEC temperature set point.

Byte 15 Stop byte

Byte 16 Stop byte

For the end of the sequence a stop byte must be send twice.

The stop byte must have a hexadecimal value of “0B” or a binary value of “0000 1011”.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Short Control data set
A short control data set consists of:
Start of data set 2 byte
Control data 4 byte
End of data set 2 byte

Byte 1 Start byte
Byte 2 Start byte
For starting the sequence a start byte must be send twice.
The start byte must have a hexadecimal value of “0A” or a binary value of “0000 1010”.

Byte 3 Control Byte CD5CON
8 bit word, binary input.

Bit 0		Unused.
Bit 1 = 1	CB5RDWH	Resets the counter for the diode operating hours.
Bit 2 = 0	CB5PSON	Turns the DTP 400 on.
Bit 3		Unused.
Bit 4 = 1	CB5TSD	Activates TEC shut down.
Bit 5 = 1	CB5REBOOT	Reboots system.
Bit 6 = 0	CB5STORE	Must be 0.
Bit 7		Unused.

Byte 4 Operating State SD6OM
8 bit word, binary input, unused.

Byte 5 Data Source Decoder CD5DEC
8 bit word, binary input, unused.

Byte 6 In Out Control CD5IOC
8 bit word, binary input, defines settings.

Bit 0	Unused.
Bit 1	Unused.
Bit 2	Unused.
Bit 3	Unused.
Bit 4 = 1	Must be 1.
Bit 5 = 1	Must be 1.
Bit 6	Unused.
Bit 7	Unused.

Byte 7 Stop byte
Byte 8 Stop byte
For the end of the sequence a stop byte must be send twice.
The stop byte must have a hexadecimal value of “0B” or a binary value of “0000 1011”.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Configuration Data Set

A configuration data set consists of:
Start of data set 2 byte
Configuration data 20 byte
End of data set 2 byte

Byte 1 Start Byte
Byte 2 Start Byte
For the opening of the sequence a start byte must be send twice.
The start byte must have a hexadecimal value of “0A” or a binary value of “0000 1010”.

Byte 3 Control Byte CD5CON
8 bit word, binary input.

Bit 0		Unused.
Bit 1		Unused.
Bit 2 = 0	CB5PSON	Must be 0.
Bit 3		Unused.
Bit 4		Unused.
Bit 5		Unused.
Bit 6 = 1	CB5STORE	Must be 1.
Bit 7		Unused.

Byte 4 Operating State SD6OM
8 bit word, binary input, unused.

Byte 5 Data Source Decoder CD5DEC
8 bit word, binary input, unused.

Byte 6 In Out Control CD5IOC
8 bit word, binary input, defines settings.

Bit 0	Unused.
Bit 1	Unused.
Bit 2	Unused.
Bit 3	Unused.
Bit 4 = 1	Must be 1.
Bit 5 = 0	Must be 0.
Bit 6	Unused.
Bit 7	Unused.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Byte 7 **Time Out Temperature Control CF5TOTC**
Byte 8
CF5TOTC 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
16 bit word, resolution 65535 steps, range 0 to 655,3 s, increment 100 ms.
Defines the time which may pass till a temperature interlock event leads to an error. An overrun leads to a time out error, error bit EB6TOTC will be set and the diode current will be turned off.
Status byte 22 is the high-order part of the 16 bit word.

Byte 9 Diode **Current Set Point CF5DCSP**
Byte 10
CF5DCSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Defines the diode current set point which will be stored in the memory.
The value is valid if memory is selected as a data source for the diode current set point.
The lower half byte of byte 10 is the high-order part of the 12 bit value.
The upper half byte of byte 10 is unused.
Byte 11 **Diode Current Limit CF5DCL**
Byte 12
CF5DCL x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 A for DTP 400-50, increment 12,21 mA, range 0 to 60 A for DTP 400-60, increment 14,65 mA.
Defines the diode current limit value which will be stored in the memory.
The value is valid if memory is selected as a data source for the diode current limit value.
The lower half byte of byte 12 is the high-order part of the 12 bit value.
The upper half byte of byte 12 is unused.

Byte 13 **TEC Temperature Set Point CF5PTSP**
Byte 14
CF5PTSP x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 °C , increment 0,01221 °C.
Defines the TEC temperature set point which will be stored in the memory.
The value is valid if memory is selected as a data source for the TEC temperature set point.
The lower half byte of byte 14 is the high-order part of the 12 bit value.
The upper half byte of byte 14 is unused.
Byte 15 **TEC Temperature Interlock Limit CF5PTL**
Byte 16
CF5PTL x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 50 °C, increment 0,01221 °C .
Defines the TEC temperature interlock limit value which will be stored in the memory.
The lower half byte of byte 16 is the high-order part of the 12 bit value.
The upper half byte of byte 16 is unused.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Byte 17 **Diode Voltage Limit CF5DVL**
Byte 18
CF5DVL x x x x 1 1 1 1 1 1 1 1 1 1 1 1
12 bit value, resolution 4095 steps, range 0 to 25 V, increment 6,105 01 mV.
Defines the diode voltage limit value which will be stored in the memory.
The lower half byte of byte 18 is the high-order part of the 12 bit value.
The upper half byte of byte 18 is unused.

Byte 19 Data Source Decoder Local Mode CF5DECLOC
8 bit word, binary input, defines the data source assignments for the local mode.

Bit 1	Bit 0	
0	0	The diode current limit value is given by RS 232 port.
0	1	The diode current limit value is given by memory.
1	0	The diode current limit value is given by control port.

Bit 4	Bit 3	Bit 2	
0	0	0	The diode current set point is given by RS 232 port.
0	0	1	The diode current set point is given by memory.
0	1	0	The diode current set point is given by control port.
1	0	0	The diode current set point is given by control panel.

Bit 7	Bit 6	Bit 5	
0	0	0	The TEC temperature set point is given by RS 232 port.
0	0	1	The TEC temperature set point is given by memory.
0	1	0	The TEC temperature set point is given by control port.
1	0	0	The TEC temperature set point is given by control panel.

Different settings lead to a decoder fault, error bit EB6DECF will be set.

Byte 20 In Out Control Local Mode CF5IOCLOC
8 bit word, binary input, defines settings for the local mode.

Bit 0 = 1	CB6SDCPEL	Shut down signal of control port approved.
Bit 1		Unused.
Bit 2		Unused.
Bit 3		Unused.
Bit 4		Unused.
Bit 5		Unused.
Bit 6		Unused.
Bit 7		Unused.

Accessories
Control Interface 10228003, RS 232 Port
Software Protocol

Byte 21 Data Source Decoder Remote Mode CF5DECREM

8 bit word, binary input, defines the data source assignments for the remote mode.

Bit 1	Bit 0	
0	0	The diode current limit value is given by RS 232 port.
0	1	The diode current limit value is given by memory.
1	0	The diode current limit value is given by control port.

Bit 4	Bit 3	Bit 2	
0	0	0	The diode current set point is given by RS 232 port.
0	0	1	The diode current set point is given by memory.
0	1	0	The diode current set point is given by control port.
1	0	0	The diode current set point is given by control panel.

Bit 7	Bit 6	Bit 5	
0	0	0	The TEC temperature set point is given by RS 232 port.
0	0	1	The TEC temperature set point is given by memory.
0	1	0	The TEC temperature set point is given by control port.
1	0	0	The TEC temperature set point is given by control panel.

Different settings lead to a decoder fault, error bit EB6DECF will be set.

Byte 22 In Out Control Remote Mode CF5IOCREM

8 bit word, binary input, defines settings for the remote mode.

Bit 0 = 1	CB6SDCPER	Shut down signal of control port approved.
Bit 1		Unused.
Bit 2		Unused.
Bit 3		Unused.
Bit 4		Unused.
Bit 5		Unused.
Bit 6		Unused.
Bit 7		Unused.

Byte 23 Stop Byte

Byte 24 Stop Byte

For the end of the sequence a stop byte must be send twice.

The stop byte must have a hexadecimal value of “0B” or a binary value of “0000 1011”.

Ordering information

Device Identification number

DTP 400-50 10100520
DTP 400-60 10100521
Power Supply 24 V-500 W 10870022
Interlock Unit 10228002
Control Interface 10228003
Control Panel 10227011
Control Panel 10227012
Control Panel 10227013
Control Panel 10227014
Control Panel 10227015
Control Panel 10227016
Control Panel 10227017
Control Panel 10227018
Temperature Sensor 10360254
Heat Sink 10500882
Printed Circuit Board for Heat Sink 10500882 10360347
Mounting Kit 10228005
Mounting Kit 10228006
Mounting Kit 10228009
Mounting Kit 10228008
Ribbon Cable 10385338
Ribbon Cable 10385359
Ribbon Cable 10385360
Ribbon Cable 10385361
Ribbon Cable 10385363
Ribbon Cable 10385364
Ribbon Cable 10385365

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