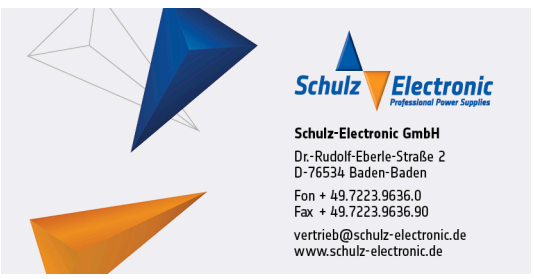
Options for SM 1500 - series

- SM 15 - 100
- SM 35 - 45
- SM 52 - 30
- SM 52 - AR - 60
- SM 70 - 22
- SM 120 - 13
- SM 300 - 5
- SM 400 - AR - 8

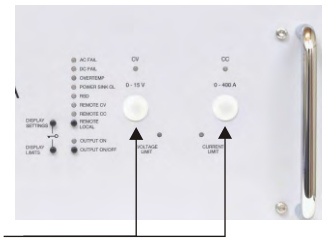


OPTION NUMBER : P001

UNIT : SM 1500 - series

DESCRIPTION : Screwdriver adjustment front panel.

The CV and CC knobs on the front panel are removed from the potmeters for a **fixed** setting of the output values.
The potmeters are moved backwards just behind the front panel and plastic caps are inserted to cover the holes, see picture.
This avoids accidental adjusting of the CV and CC settings.



screwdriver adjustment
behind the plastic caps

OPTION NUMBER : P069

UNIT : SM 1500 - series

DESCRIPTION : Increased max. output voltage/current.

The maximum output voltage or current can be increased by approximately 10%, normally resulting in a derating of the maximum ambient temperature or other parameters. For exact details consult the technical department, email 'support@delta-elektronika.nl'.
Always add increased value for voltage or current in ordercode, example **SM35-45 P069 output 38 V**.

OPTION NUMBER : P110

UNIT : SM 1500 - series

DESCRIPTION : Pull relief for power cord.

For this option a power cord lock is supplied with the unit.

OPTION NUMBER : P177

UNIT : SM 1500 - series

DESCRIPTION : Built-in PSC Ethernet

For this option the PSC Ethernet Controller has been built inside the unit.
With the PSC Ethernet the voltage and current can easily be programmed and read back. Also all the status outputs can be read by the computer.
See PSC-ETH manual for further details.

OPTION NUMBER : P183

UNIT : SM 1500 - series

DESCRIPTION : Built-in PSC-232

For this option the PSC-232 Controller has been built inside the unit.
With the PSC-232 the voltage and current can easily be programmed and read back. Also all the status outputs can be read by the computer.
See PSC-232 manual for further details.

OPTION NUMBER : P184

UNIT : SM 1500 - series

DESCRIPTION : Built-in PSC-488

For this option the PSC-488 Controller has been built inside the unit.
With the PSC-488 the voltage and current can easily be programmed and read back. Also all the status outputs can be read by the computer.
See PSC-488 manual for further details.

OPTION NUMBER : P197 - P201

UNIT : SM 52-30, SM 52-AR-60, SM 120-13, SM 300-5, SM 400-AR-8

DESCRIPTION : External diode set for battery charging.

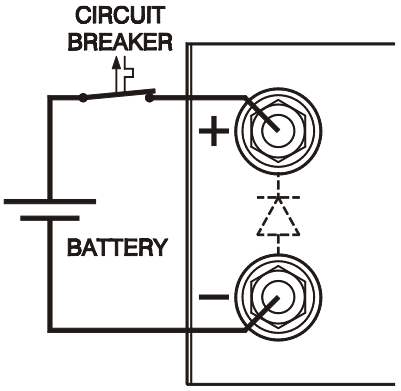
Warning: always use a circuit breaker in combination with the protective diodes !
See table below for circuit breakers.

Battery charging
The CV / CC regulated SM power supplies are ideal battery chargers. Once the output is set at the correct voltage, the battery will charge constantly without overcharging. This can also be useful for emergency power systems.

For battery charging with remote sensing contact factory.

Protective measures
Use a CIRCUIT BREAKER in series in order to protect the power supply from **accidental reverse connection**, see figure.
The circuit breaker should have a DC voltage rating twice the battery voltage. Use the very fast type (Z), a type meant for protecting semiconductors.

Internally the unit has a reverse diode in parallel with the output, this diode and the wiring cannot withstand the thousands of amperes supplied by a wrongly connected battery. Therefore several units need extra parallel diodes on the output, without these diodes the internal diode will still blow.



Circuit breaker protecting the power supply from accidental battery reversal

Ordering information and suggested circuit breakers for protection power supply:

Model	Type number circuit breaker	Brand	Remarks
SM52-30	S281 UC-Z 32	ABB	2 poles parallel **order unit with OPTION P197** (connect the 2 internal diodes of the BYV255V-200 in parallel)
SM52-AR-60	S281 UC-Z 63	ABB	2 poles parallel **order unit with OPTION P198** (connect the 2 internal diodes of the BYV255V-200 in parallel)
SM120-13	S281 UC-Z 16	ABB	- **order unit with OPTION P199** (connect the 2 internal diodes of the BYV255V-200 in parallel)
SM300-5	S282 UC-Z 6	ABB	2 poles in series **order unit with OPTION P200** (connect the 2 internal diodes of the BYT261 also in parallel = total 4 diodes)
SM400-AR-8	S282 UC-Z 10	ABB	2 poles in series **order unit with OPTION P201** (connect the 2 internal diodes of the BYT261 also in parallel = total 4 diodes)

OPTION NUMBER : P202 - 206

UNIT : up to 70 V

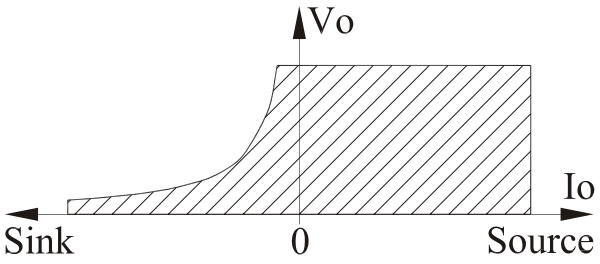
DESCRIPTION : Power Sink for 2 quadrant operation.

The Power Sink option permits the power supply to absorb bursts of power fed back to the unit.

An internal module senses the status of power supply and sinks current across the output terminals, thus maintaining a constant output voltage.

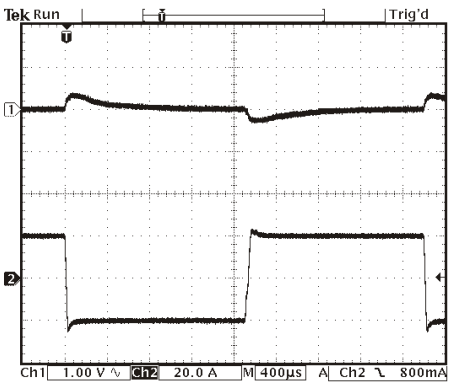
The Power Sink Option allows a faster response when the power supply is step programmed to a lower voltage at small load conditions.

- Can absorb **200 W peak power**
- Maintains output voltage setting regardless output power is positive or negative (source and sink)
- Ideal solution for supplying electric motors with PWM-speed control. These systems often return power to the power supply during a braking action
- Ideal solution for ATE systems requiring fast down programming at no load conditions
- See *www.DeltaPowerSupplies.com* for datasheet.



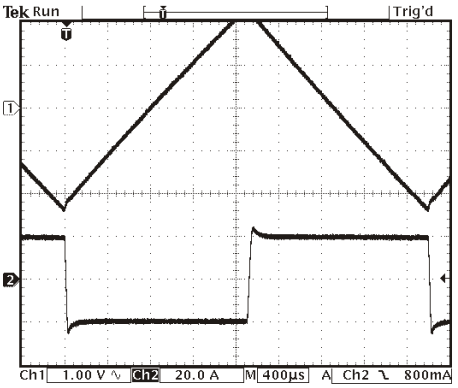
Ordering information for units with Power Sink:

SM15-100	option P202
SM35-45	option P203
SM52-30	option P204
SM52-AR-60	option P205
SM70-22	option P206



SM35-45 **with** Power Sink Option
Current – 20 A means the load delivers 20 A to the power supply (sink operation)

Upper trace: output voltage
Lower trace: output current
(current switching from +20 A to –20 A at Vo=6 V)



SM35-45 **without** Power Sink Option
*The output voltage is out of control when the output current is **negative***

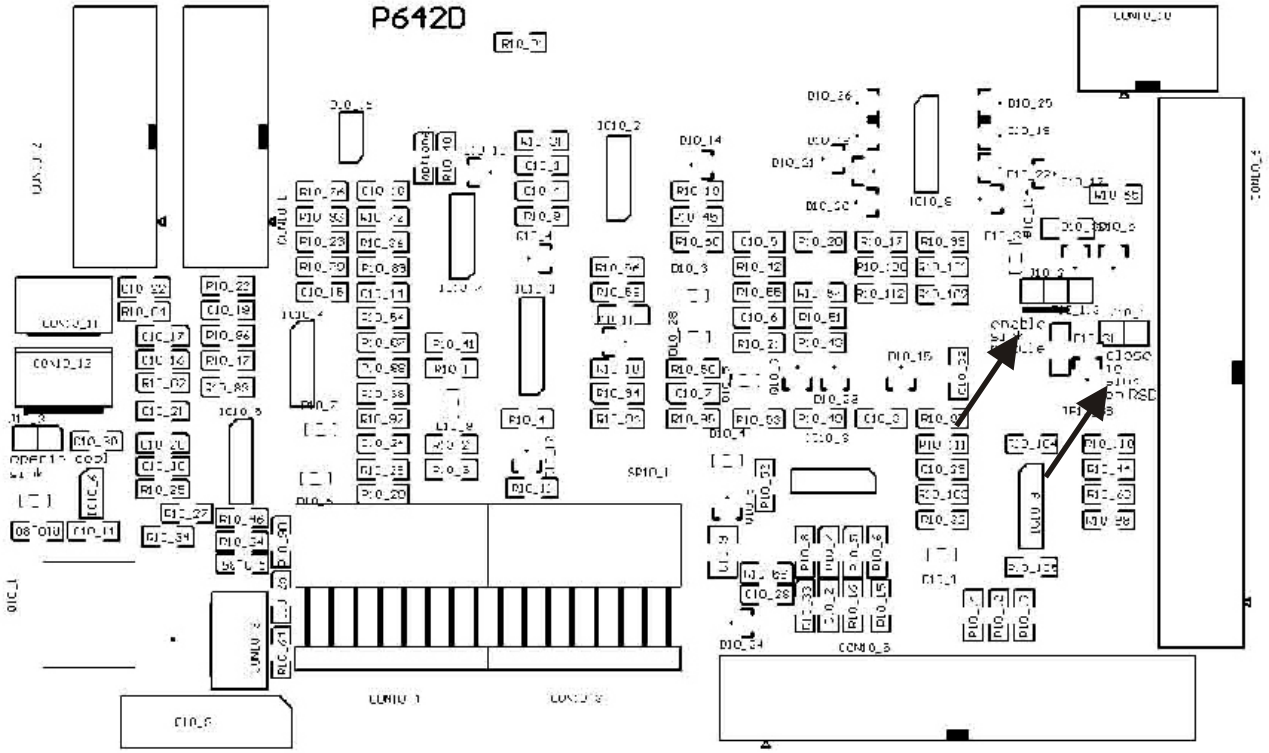
Upper trace: output voltage
Lower trace: output current
(current switching from +20 A to –20 A at Vo=6 V)

Setting up the Power Sink

On the pc board P642, two jumpers are located.
With these jumpers the Power Sink can be set up for different operation.
Inside the power supply, P642 can be found in the section behind the front panel.

Standard operation

On the front panel the button 'Output On/Off' can be used to switch off the output of the power supply.
If the output has been switched off, also the Power Sink has been switched off.
This means no current can be absorbed by the Power Sink.
The Power Sink will also switch off if the unit goes in OverTemperature (OT) or the Interlock connection has been interrupted.



Location of the jumpers J10_1 and J10_2 on P642.

Sink on Remote ShutDown

A voltage of +4 V...+12 V on the Remote ShutDown input on the programming connector CON E will switch off the output of the unit. In the standard configuration, Remote ShutDown will not switch off the Power Sink.
This enables high speed down programming of the output voltage, regardless of the load.
By removing the link from jumper J10_1, the Power Sink will switch off after Remote ShutDown.

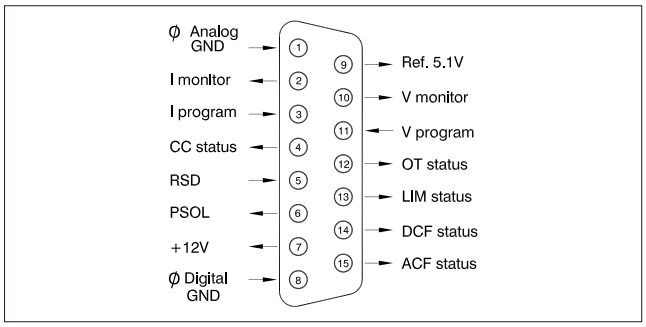
Disable the Power Sink

In the standard configuration, the Power Sink is ready for operation.
By changing the position of the jumper J10_2 (set jumper on pin 2 and 3 instead of pin 1 and 2),
the Power Sink can be disabled.

Power Sink Overload

If the maximum power has been reached, the Power Sink will go in overload and the sink current will be limited. In this situation the Sink cannot absorb more power and the output voltage of the supply will rise.

On the front panel the LED 'Power Sink OverLoad' will be on and the status output 'PSOL' will be high.
On the 15P programming connector 'CON E', the PSOL signal has been placed on pin 6, see figure below.
The PSOL signal can be 0 V (low) or 5 V (high). Output impedance is 500 Ohms.



Connections ANALOG PROGRAMMING CONNECTOR

Thermal Overload

If the Power Sink runs hot, the fan starts blowing to cool it down. If the Power Sink still runs hot, the LED 'Overtemp' starts blinking. This is a warning that soon the Power Sink will go in thermal overload.
Once the situation of thermal overload has been reached, the Power Sink shuts down completely until the internal heat sink has cooled down again. Also in this situation the PSOL signal will be high.

Series Operation of units with Power Sink

To enable power sinking in combination with series operation, **each unit** must have a Power Sink built inside. The total power that can be absorbed by the series system, is proportional to the number of units in series. For example three units in series can absorb 3 x 200 W = 600 W peak power.
If one or more units have no Power Sink, normal series operation is possible but no power can be absorbed !

For easier control, Master / Slave operation is recommended. Refer to the operation manual of the power supply for details about Master / Slave operation.

Parallel Operation of units with Power Sink

To enable power sinking in combination with parallel operation, **only one unit** can have a Power Sink built inside. The total power that can be absorbed by the parallel system, is equal to the power for one Power Sink (= 200 W peak power). If more than one unit would have a Power Sink inside, the other Power Sinks would be drawing power of the units in the parallel system !

For easier control, Master / Slave operation is recommended. Always set the **unit with Power Sink as master** ! If the unit with Power Sink would be set as slave, normal parallel operation is possible but the sink level will be as high as the maximum output voltage of that unit. For example if two SM35-45 would be set to 12 V, only above 35 V the system would start sinking power. Refer to the operation manual of the power supply for details about Master / Slave operation.

Parallel system with Fast Programming and Power Sink
In combination with Fast Programming, the Master / Slave operation is **not** recommended. In this situation where normal parallel operation is used, the unit with the Power Sink should be set to a fractional higher output voltage (advised +0.2% – +0.5%). A Power Sink that detects a higher output voltage than set on that unit, starts sinking. If one of the units in the parallel system would have a higher voltage, the Power Sink would be constantly sinking this power. The result is reduced output power of the whole system and an Overload condition for the Power Sink. If the Power Sink is in Overload, it cannot absorb power fed back to the unit, which will cause the output voltage to rise.

Parallel programming of a parallel system
For parallel programming of units connected in parallel, the isolation amplifier ISO AMP is recommended.
On the ISO AMP connected to the unit with Power Sink, the programming gain must set higher (+0.2% – +0.5%). This to make sure the unit with the Power Sink has a fractional higher output voltage. For example programming a 30 V unit with a 0.2% higher gain means that programmed with 5.000 V, the output voltage will be 30.060 V (60 mV = 0.2%).

OPTION NUMBER : P210

UNIT : SM 15-100

DESCRIPTION : Fast programming.

For the programming speed, check the datasheet of the unit on www.DeltaPowerSupplies.com.

P639 analog control board

Dip switches in position: 3
C9_24: REMOVED
C9_25: REMOVED
C9_32: CAP C2 S 10NF63
C9_33: CAP C2 S 10UF25
C9_43: CAP C2 S 10NF63
C9_48: CAP C2 S 10UF25
R9_45: RES.125 SMD 4.7K
R9_55: RES .125 SMD 4.7K
R9_59: RES .125 SMD 470
R9_66: RES .125 SMD 470

P647 analog protection board

R27_1: RES .125 SMD 1.2K
R27_2: RES .125 SMD 100

P650 voltage divider / shunt amplifier

C26_5: CAP C1 S 47PF63
R26_36: RES .125 SMD 1

P644 output filter low voltage

Replaced by pcb P648 with ceramic output capacitors.

OPTION NUMBER : P211

UNIT : SM 35-45

DESCRIPTION : Fast programming.

For the programming speed, check the datasheet of the unit on www.DeltaPowerSupplies.com.

P639 analog control board

Dip switches in position: 3
C9_25: REMOVED
C9_30: CAP C2 S 10NF63
C9_32: CAP C2 S 10NF63
C9_33: CAP C2 S 10UF25
C9_43: CAP C2 S 10NF63
C9_45: CAP C2 S 10NF63
C9_48: CAP C2 S 10UF25
R9_55: RES .125 SMD 1K
R9_59: RES .125 SMD 3.3K
R9_66: RES .125 SMD 1K

P647 analog protection board

R27_1: RES .125 SMD 100
R27_2: RES .125 SMD 100

P650 voltage divider / shunt amplifier

C26_5: CAP C1 S 47PF63
R26_36: RES .125 SMD 1

P644 output filter low voltage

Replaced by pcb P648 with ceramic output capacitors.

OPTION NUMBER : P212

UNIT : SM 52-30

DESCRIPTION : Fast programming.

For the programming speed, check the datasheet of the unit on www.DeltaPowerSupplies.com.

P639 analog control board

Dip switches in position: 3
C9_25: REMOVED
C9_33: CAP C2 S 10UF25
C9_41: CAP C2 S 22NF63
C9_43: CAP C2 S 10NF63
C9_45: CAP C2 S 10NF63
C9_48: CAP C2 S 10UF25
R9_45: RES .125 SMD 1K
R9_55: RES .125 SMD 1K
R9_59: RES .125 SMD 470
R9_66: RES .125 SMD 1K

P647 analog protection board

R27_1: RES .125 SMD 100
R27_2: RES .125 SMD 100

P650 voltage divider / shunt amplifier

C26_5: CAP C1 S 150PF63
R26_36: RES .125 SMD 150K

P644 output filter low voltage

Replaced by pcb P648 with ceramic output capacitors.

OPTION NUMBER : P213

UNIT : SM 52-AR-60

DESCRIPTION : Fast programming.

For the programming speed, check the datasheet of the unit on www.DeltaPowerSupplies.com.

P639 analog control board

Dip switches in position: 3
C9_25: REMOVED
C9_33: CAP C2 S 10UF25
C9_41: CAP C2 S 22NF63
C9_43: CAP C2 S 10NF63
C9_45: CAP C2 S 10NF63
C9_48: CAP C2 S 10UF25
R9_45: RES .125 SMD 1K
R9_55: RES .125 SMD 1K
R9_59: RES .125 SMD 470
R9_66: RES .125 SMD 1K

P647 analog protection board

R27_1: RES .125 SMD 100
R27_2: RES .125 SMD 100

P650 voltage divider / shunt amplifier

C26_5: CAP C1 S 150PF63
R26_36: RES .125 SMD 150K

P644 output filter low voltage

Replaced by pcb P648 with ceramic output capacitors.

OPTION NUMBER : P214

UNIT : SM 70-22

DESCRIPTION : Fast programming.

For the programming speed, check the datasheet of the unit on www.DeltaPowerSupplies.com.

P639 analog control board

Dip switches in position: 3
C9_25: REMOVED
C9_33: CAP C2 S 10UF25
C9_41: CAP C2 S 22NF63
C9_43: CAP C2 S 10NF63
C9_45: CAP C2 S 10NF63
C9_48: CAP C2 S 10UF25
R9_45: RES .125 SMD 1K
R9_55: RES .125 SMD 1K
R9_59: RES .125 SMD 470
R9_66: RES .125 SMD 1K

P647 analog protection board

R27_1: RES .125 SMD 100
R27_2: RES .125 SMD 100

P650 voltage divider / shunt amplifier

C26_5: CAP C1 S 150PF63
R26_36: RES .125 SMD 150K

P644 output filter low voltage

Replaced by pcb P648 with ceramic output capacitors.

OPTION NUMBER : P215

UNIT : SM 120-13

DESCRIPTION : Fast programming.

For the programming speed, check the datasheet of the unit on www.DeltaPowerSupplies.com.

P639 analog control board

Dip switches in position: 3
R9_45: RES .125 SMD 330
C9_33: CAP C2 S 10UF25
C9_43: CAP C2 S 10NF63
R9_55: RES .125 SMD 1K
C9_24: REMOVED
R9_66: RES .125 SMD 1.2K
C9_48: CAP C2 S 10UF25
C9_41: CAP C2 S 4.7NF63
R9_59: RES .125 SMD 1.8K
C9_25: REMOVED

P647 analog protection board

R27_1: RES .125 SMD 100
R27_2: RES .125 SMD 100

P650 voltage divider / shunt amplifier

C26_5: CAP C1 S 47PF63
R26_36: RES .125 SMD 1
C26_22: CAP C1 S 470PF500
C26_23: CAP C1 S 470PF500

P645 output filter high voltage

Removed electrolytic capacitors and series inductors.

OPTION NUMBER : P216

UNIT : SM 300-5

DESCRIPTION : Fast programming.

For the programming speed, check the datasheet of the unit on www.DeltaPowerSupplies.com.

P639 analog control board

Dip switches in position: 3
R9_45: RES .125 SMD 330
C9_33: CAP C2 S 10UF25
C9_43: CAP C2 S 10NF63
R9_55: RES .125 SMD 1K
C9_24: REMOVED
R9_66: RES .125 SMD 1.2K
C9_48: CAP C2 S 10UF25
C9_41: CAP C2 S 4.7NF63
C9_59: RES .125 SMD 1K
C9_25: REMOVED

P647 analog protection board

R27_1: RES .125 SMD 100
R27_2: RES .125 SMD 100

P650 voltage divider / shunt amplifier

C26_5: CAP C1 S 47PF63
R26_36: RES .125 SMD 1
C26_22: CAP C1 S 470PF500
C26_23: CAP C1 S 470PF500
C26_24: REMOVED
C26_25: REMOVED

P645 output filter high voltage

Removed electrolytic capacitors and series inductors.

OPTION NUMBER : P217

UNIT : SM 400-AR-8

DESCRIPTION : Fast programming.

For the programming speed, check the datasheet of the unit on www.DeltaPowerSupplies.com.

P639 analog control board

Dip switches in position: 3
R9_45: RES .125 SMD 330
C9_33: CAP C2 S 10UF25
C9_43: CAP C2 S 10NF63
R9_55: RES .125 SMD 1K
C9_24: REMOVED
R9_66: RES .125 SMD 1.2K
C9_48: CAP C2 S 10UF25
C9_41: CAP C2 S 4.7NF63
C9_59: RES .125 SMD 1K
C9_25: REMOVED

P647 analog protection board

R27_1: RES .125 SMD 100
R27_2: RES .125 SMD 100

P650 voltage divider / shunt amplifier

C26_5: CAP C1 S 47PF63
R26_36: RES .125 SMD 1
C26_22: CAP C1 S 470PF500
C26_23: CAP C1 S 470PF500
C26_24: REMOVED
C26_25: REMOVED

P645 output filter high voltage

Removed electrolytic capacitors and series inductors.

OPTION NUMBER : P218

UNIT : SM 1500 - series

DESCRIPTION : Built-in ISO AMP CARD

For this option the ISO AMP CARD has been built inside the unit.
The ISO AMP CARD can be used for isolated analog programming.
See ISO AMP manual for further details.

OPTION NUMBER : P220

UNIT : SM 1500 - series

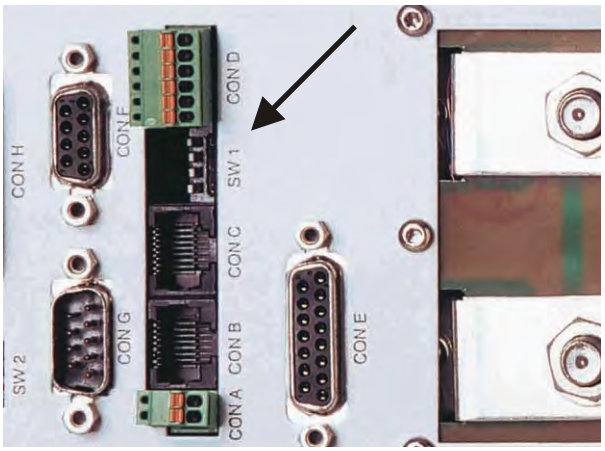
DESCRIPTION : Digital Encoders

Instead of the normal 10-turn resistive potentiometers, with this option the unit has two digital encoders to set the voltage and the current on the front panel. These encoders enable several intelligent functions and have a very long life time. For full specifications, check the datasheet on www.DeltaPowerSupplies.com.

Setting the Start-up mode

With this option it is possible to choose between starting up at 0 V - 0 A or starting up and remember the previous settings of the voltage and current.

On the rear side of the unit switch SW1 is located (see picture below).



Set dip switch 5 of switch SW1 in the position 'down'. After switching mains on, the unit will always start up with a voltage setting of 0 V and a current setting of 0 A. Once the unit is switched on, the voltage and current can be set to the preferred value.

Set dip switch 5 in the position 'up'. After switching mains on, the unit will start with the same settings for the voltage and the current as it had before switching mains off.

Setting the KEYLOCK-mode

Normally when a unit is set in KEYLOCK, the REMOTE/LOCAL and the OUTPUT ON/OFF button are disabled (see manual). With Option P220 also the digital encoders are disabled. This means the settings of the voltage and current do not change when the encoders are operated.

This prevents the unit from accidental ShutDown or accidental changing of the programming and output settings.

Activate Keylock:
Pressing the buttons DISPLAY SETTINGS and DISPLAY LIMITS at the same time for more than 3 seconds, activates the function KEYLOCK. The moment this function is activated, the LED's for REMOTE CV / CC and for OUTPUT ON will blink a few times.

De-activate Keylock:
Pressing the same buttons again for 3 seconds, disables the Keylock function. The LED's for REMOTE CV / CC and for OUTPUT ON will blink again to indicate the new setting.