

DECKBLATT ZUM ORIGINAL-DOKUMENT DES HERSTELLERS

# DELTA | DATENBLATT OPTIONEN

**HERSTELLER**

Delta Elektronik BV

**PRODUKTSERIE**

High Speed Programming für SM800-, SM1500-,  
SM3300-, SM6000-Serie

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SM6000



SM3300



SM1500N



SM800



## HIGH SPEED PROGRAMMING OPTIONS

### For SM800, SM1500N, SM3300 and SM6000

- Programming speed about 10 - 20 times faster ( compared with standard versions)
- Low output capacitance

| SM800 Series (800W) | Order Code  | Voltage range   | Current range |
|---------------------|-------------|-----------------|---------------|
| SM 7.5-80           | Option P250 | 0 – 7.5 V       | 0 – 80 A      |
| SM 18-50            | Option P251 | 0 – 18 V        | 0 – 50 A      |
| SM 70-AR-24         | Option P252 | 0 – 35 / 70 V   | 0 – 24 / 12 A |
| SM 400-AR-4         | Option P253 | 0 – 200 / 400 V | 0 – 4 / 2 A   |

| SM1500N Series (1500W) | Order Code  | Voltage range   | Current range |
|------------------------|-------------|-----------------|---------------|
| SM 15-100              | Option P210 | 0 – 15 V        | 0 – 100 A     |
| SM 35-45               | Option P211 | 0 – 35 V        | 0 – 45 A      |
| SM 52-30               | Option P212 | 0 – 52 V        | 0 – 30 A      |
| SM 52-AR-60            | Option P213 | 0 – 26 / 52 V   | 0 – 60 / 30 A |
| SM 70-22               | Option P214 | 0 – 70 V        | 0 – 22 A      |
| SM 120-13              | Option P215 | 0 – 120 V       | 0 – 13 A      |
| SM 300-5               | Option P216 | 0 – 300 V       | 0 – 5 A       |
| SM 400-AR-8            | Option P217 | 0 – 200 / 400 V | 0 – 8 / 4 A   |

| SM3300 Series (3300W) | Order Code  | Voltage range   | Current range   |
|-----------------------|-------------|-----------------|-----------------|
| SM 18-220             | Option P300 | 0 – 18 V        | 0 – 220 A       |
| SM 66-AR-110          | Option P302 | 0 – 33 / 66 V   | 0 – 110 / 55 A  |
| SM 100-AR-75          | Option P303 | 0 – 50 / 100 V  | 0 – 75 / 33.5 A |
| SM 330-AR-22          | Option P304 | 0 – 165 / 330 V | 0 – 22 / 11 A   |
| SM 660-AR-11          | Option P305 | 0 – 330 / 660 V | 0 – 11 / 5.5 A  |

| SM6000 Series (6000W) | Order Code  | Voltage range | Current range |
|-----------------------|-------------|---------------|---------------|
| SM 15-400             | Option P166 | 0 – 15 V      | 0 – 400 A     |
| SM 30-200             | Option P167 | 0 – 30 V      | 0 – 200 A     |
| SM 45-140             | Option P168 | 0 – 45 V      | 0 – 140 A     |
| SM 60-100             | Option P169 | 0 – 60 V      | 0 – 100 A     |
| SM 70-90              | Option P170 | 0 – 70V       | 0 – 90 A      |
| SM 120-50             | Option P171 | 0 – 120 V     | 0 – 50 A      |
| SM 300-20             | Option P172 | 0 – 300 V     | 0 – 20 A      |
| SM 600-10             | Option P270 | 0 – 600 V     | 0 – 10 A      |

## Description

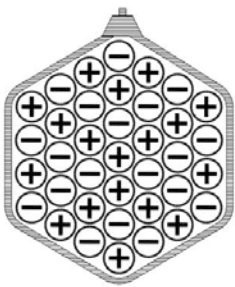
- The SM-Series with the High Speed Programming Options are optimized for maximum programming speed. The speed is about 10 -20 times higher compared to the standard version.
- To achieve the high speed, the output capacitance has been made much smaller. Because of the smaller capacitors, the output ripple voltage is higher, but this is generally no problem for applications requiring high speed.
- The low output capacitance and the fast control results in relatively low current overshoots (if any) in case of sudden voltage variations caused by the load, this is of great advantage for laser diode applications...

## Applications:

- Laser diode power supply, continuous or pulsed
- Test systems requirements a fast settings time to improve trough put of factory.
- A constant current source with a low parallel capacitance: plasma, load sensitive to current overshoots, etc.
- A constant current source on a load with fast voltage variations.

## Recommendations:

- Use low inductive cabling, especially for higher currents. The inductance of the connecting cables (between the power supply and the load) can cause overshoots and slowdown of the rise and fall times. A low inductive cable can be constructed by using multiple isolated strands for the plus and minus wires and by bundling the combination of the mixed plus and minus wires. Each plus wire should be close to a minus wire (see picture below), For lower currents it can be sufficient to tie the plus and minus wires very close to each other.
- Depending on the load impedance, the series inductance of the cables and the parallel capacitance of the power supply can make a resonant circuit, causing ringing and overshoots. Note that the voltage and current control of the power supply has little influence on this effect, because it is outside the control loop. To overcome this problem, connect an RC-filter to the head, to damp the circuit.
- When using analog programming, take care that the programming source is fully floating. In case of a non-floating source, the power supply should be equipped with a ISO AMP CARD. When the source is not sufficiently floating, it could result in distorted waveforms.
- Remote sensing is not recommended.



*Low inductance cable cross section.*



*An ISO AMP CARD should be used in case of a non-floating programming source.*



| SM800                                                 |                                                                                                                                                                                                                                                                 |                         |                            |                            |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------|----------------------------|
| Programming speed<br>High Speed Version               | SM 7.5-80<br>option P250                                                                                                                                                                                                                                        | SM 18-50<br>option P251 | SM 70-AR-24<br>option P252 | SM 400-AR-4<br>option P253 |
| <b>CV-mode, resistive load</b>                        |                                                                                                                                                                                                                                                                 |                         |                            |                            |
| <b>Rise time (10 - 90%)</b>                           |                                                                                                                                                                                                                                                                 |                         |                            |                            |
| output voltage step                                   | 0 → 7.5 V                                                                                                                                                                                                                                                       | 0 → 16 V                | 0 → 35 V                   | 0 → 200 V                  |
| time, (100 % load)                                    | 0.2 ms                                                                                                                                                                                                                                                          | 0.22 ms                 | 0.24 ms                    | 0.4 ms                     |
| time, (10 % load)                                     | 0.2 ms                                                                                                                                                                                                                                                          | 0.26 ms                 | 0.24 ms                    | 0.3 ms                     |
| output voltage step                                   | -                                                                                                                                                                                                                                                               | -                       | 0 → 70 V                   | 0 → 400 V                  |
| time, (100 % load)                                    | -                                                                                                                                                                                                                                                               | -                       | 0.24 ms                    | 0.82 ms                    |
| time, (10 % load)                                     | -                                                                                                                                                                                                                                                               | -                       | 0.24 ms                    | 0.55 ms                    |
| <b>Fall time (90 - 10%)</b>                           |                                                                                                                                                                                                                                                                 |                         |                            |                            |
| output voltage step                                   | 7.5 → 0 V                                                                                                                                                                                                                                                       | 16 → 0 V                | 35 → 0 V                   | 200 → 0 V                  |
| time, (100 % load)                                    | 0.2 ms                                                                                                                                                                                                                                                          | 0.24 ms                 | 0.27 ms                    | 0.42 ms                    |
| time, (10 % load)                                     | 1 ms                                                                                                                                                                                                                                                            | 1.95 ms                 | 3 ms                       | 4.6 ms                     |
| output voltage step                                   | -                                                                                                                                                                                                                                                               | -                       | 70 → 0 V                   | 400 → 0 V                  |
| time, (100 % load)                                    | -                                                                                                                                                                                                                                                               | -                       | 0.85 ms                    | 1.7 ms                     |
| time, (10 % load)                                     | -                                                                                                                                                                                                                                                               | -                       | 9.5 ms                     | 20 ms                      |
| <b>Ripple</b>                                         |                                                                                                                                                                                                                                                                 |                         |                            |                            |
| @ full load                                           |                                                                                                                                                                                                                                                                 |                         | 35 V / 24 A                | 200 V / 4 A                |
| typical (rms / pp)                                    | 20 / 80 mV                                                                                                                                                                                                                                                      | 40 / 120 mV             | 25 / 90 mV                 | 35 / 200 mV                |
| @ full load                                           |                                                                                                                                                                                                                                                                 |                         | 70 V / 12 A                | 400 V / 2 A                |
| typical (rms / pp)                                    | -                                                                                                                                                                                                                                                               | -                       | 30 / 110 mV                | 30 / 160 mV                |
| <b>Recovery time</b>                                  |                                                                                                                                                                                                                                                                 |                         |                            |                            |
| @ 50 - 100% load step, typical                        | 100 µs                                                                                                                                                                                                                                                          | 100 µs                  | 100 µs                     | 100 µs                     |
| <b>Output Capacitance (typical)</b>                   | 310 µF                                                                                                                                                                                                                                                          | 200 µF                  | 80 µF                      | 4 µF                       |
| <b>CC-mode, resistive load</b>                        | Similar result as with CV-mode and resistive load                                                                                                                                                                                                               |                         |                            |                            |
| <b>CC-mode, diode load</b><br>(constant voltage load) | Even higher speed possible. Generally 2 - 8 times, depending on unit and load.<br>Needs special attention on layout of cabling and damping networks because of the very high speed.<br>Special "low inductive cables" recommended, see section Recommendations. |                         |                            |                            |

| SM1500N                                               |                                                                                                                                                                                                                                                                 |                         |                         |                            |                         |                          |                         |                           |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|----------------------------|-------------------------|--------------------------|-------------------------|---------------------------|
| Programming speed<br>High Speed Version               | SM 15-100<br>option P210                                                                                                                                                                                                                                        | SM 35-45<br>option P211 | SM 52-30<br>option P212 | SM 52-AR-60<br>option P213 | SM 70-22<br>option P214 | SM 120-13<br>option P215 | SM 300-5<br>option P216 | SM400-AR-8<br>option P217 |
| <b>CV-mode, resistive load</b>                        |                                                                                                                                                                                                                                                                 |                         |                         |                            |                         |                          |                         |                           |
| <b>Rise time (10 - 90%)</b>                           |                                                                                                                                                                                                                                                                 |                         |                         |                            |                         |                          |                         |                           |
| output voltage step                                   | 0 → 15 V                                                                                                                                                                                                                                                        | 0 → 35 V                | 0 → 52 V                | 0 → 26 V                   | 0 → 70 V                | 0 → 120 V                | 0 → 300 V               | 0 → 200 V                 |
| time, (100 % load)                                    | 0.20 ms                                                                                                                                                                                                                                                         | 0.27 ms                 | 0.32 ms                 | 0.44 ms                    | 0.47 ms                 | 0.46 ms                  | 1.0 ms                  | 0.35 ms                   |
| time, (10 % load)                                     | 0.11 ms                                                                                                                                                                                                                                                         | 0.14 ms                 | 0.22 ms                 | 0.45 ms                    | 0.27 ms                 | 0.27 ms                  | 0.51 ms                 | 0.33 ms                   |
| output voltage step                                   | -                                                                                                                                                                                                                                                               | -                       | -                       | 0 → 52 V                   | -                       | -                        | -                       | 0 → 400 V                 |
| time, (100 % load)                                    | -                                                                                                                                                                                                                                                               | -                       | -                       | 0.42 ms                    | -                       | -                        | -                       | 0.98 ms                   |
| time, (10 % load)                                     | -                                                                                                                                                                                                                                                               | -                       | -                       | 0.34 ms                    | -                       | -                        | -                       | 0.59 ms                   |
| <b>Fall time (90 - 10%)</b>                           |                                                                                                                                                                                                                                                                 |                         |                         |                            |                         |                          |                         |                           |
| output voltage step                                   | 15 → 0 V                                                                                                                                                                                                                                                        | 35 → 0 V                | 52 → 0 V                | 26 → 0 V                   | 70 → 0 V                | 120 → 0 V                | 300 → 0 V               | 200 → 0 V                 |
| time, (100 % load)                                    | 0.21 ms                                                                                                                                                                                                                                                         | 0.33 ms                 | 0.39 ms                 | 0.48 ms                    | 0.67 ms                 | 0.51 ms                  | 1.40 ms                 | 0.35 ms                   |
| time, (10 % load)                                     | 1.6 ms                                                                                                                                                                                                                                                          | 3.5 ms                  | 3.6 ms                  | 1.9 ms                     | 6.4 ms                  | 4.5 ms                   | 13 ms                   | 3.8 ms                    |
| output voltage step                                   | -                                                                                                                                                                                                                                                               | -                       | -                       | 52 → 0 V                   | -                       | -                        | -                       | 400 → 0 V                 |
| time, (100 % load)                                    | -                                                                                                                                                                                                                                                               | -                       | -                       | 0.7 ms                     | -                       | -                        | -                       | 1.7 ms                    |
| time, (10 % load)                                     | -                                                                                                                                                                                                                                                               | -                       | -                       | 6.5 ms                     | -                       | -                        | -                       | 18 ms                     |
| <b>Ripple</b>                                         |                                                                                                                                                                                                                                                                 |                         |                         |                            |                         |                          |                         |                           |
| @ full load                                           |                                                                                                                                                                                                                                                                 |                         |                         | 26 V / 60 A                |                         |                          |                         | 200 V / 8 A               |
| typical (rms / pp)                                    | 20 / 80 mV                                                                                                                                                                                                                                                      | 50 / 115 mV             | 50 / 185 mV             | 20 / 90 mV                 | 30 / 125 mV             | 20 / 80 mV               | 25 / 115 mV             | 85 / 355 mV               |
| @ full load                                           |                                                                                                                                                                                                                                                                 |                         |                         | 52 V / 30 A                |                         |                          |                         | 400 V / 4 A               |
| typical (rms / pp)                                    | -                                                                                                                                                                                                                                                               | -                       | -                       | 20 / 90 mV                 | -                       | -                        | -                       | 60 / 245 mV               |
| <b>Recovery time</b>                                  |                                                                                                                                                                                                                                                                 |                         |                         |                            |                         |                          |                         |                           |
| @ 50 - 100% load step, typical                        | 100 µs                                                                                                                                                                                                                                                          | 100 µs                  | 100 µs                  | 100 µs                     | 100 µs                  | 100 µs                   | 100 µs                  | 100 µs                    |
| <b>Output Capacitance (typical)</b>                   | 390 µF                                                                                                                                                                                                                                                          | 190 µF                  | 135 µF                  | 228 µF                     | 135 µF                  | 21 µF                    | 10 µF                   | 7 µF                      |
| <b>CC-mode, resistive load</b>                        | Similar result as with CV-mode and resistive load                                                                                                                                                                                                               |                         |                         |                            |                         |                          |                         |                           |
| <b>CC-mode, diode load</b><br>(constant voltage load) | Even higher speed possible. Generally 2 - 8 times, depending on unit and load.<br>Needs special attention on layout of cabling and damping networks because of the very high speed.<br>Special "low inductive cables" recommended, see section Recommendations. |                         |                         |                            |                         |                          |                         |                           |



| SM3300                                                                                        |                                                                                                                                                                                                                                                                 |                                |                                 |                                 |                               |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------|---------------------------------|-------------------------------|
| Programming speed<br>High Speed Version                                                       | SM 18-220<br>option P300                                                                                                                                                                                                                                        | SM 66-AR-110<br>option P302    | SM 100-AR-75<br>option P303     | SM 330-AR-22<br>option P304     | SM660-AR-11<br>option P305    |
| <b>CV-mode, resistive load</b>                                                                |                                                                                                                                                                                                                                                                 |                                |                                 |                                 |                               |
| <b>Rise time (10 - 90%)</b><br>output voltage step<br>time, (100 % load)<br>time, (10 % load) | 0 → 15 / 18 V<br>0.17 / 0.24 ms<br>0.13 / 0.15 ms                                                                                                                                                                                                               | 0 → 33 V<br>0.34 ms<br>0.33 ms | 0 → 50 V<br>0.46 ms<br>0.46 ms  | 0 → 165 V<br>0.38 ms<br>0.35 ms | 0 → 330 V<br>0.8 ms<br>0.7 ms |
| output voltage step<br>time, (100 % load)<br>time, (10 % load)                                | -<br>-<br>-                                                                                                                                                                                                                                                     | 0 → 66 V<br>0.44 ms<br>0.35 ms | 0 → 100 V<br>0.53 ms<br>0.47 ms | 0 → 330 V<br>1.6 ms<br>0.8 ms   | 0 → 660 V<br>2.8 ms<br>2.0 ms |
| <b>Fall time (90 - 10%)</b><br>output voltage step<br>time, (100 % load)<br>time, (10 % load) | 15 / 18 → 0 V<br>0.19 / 0.27 ms<br>0.52 / 0.75 ms                                                                                                                                                                                                               | 33 → 0 V<br>0.34 ms<br>1.6 ms  | 50 → 0 V<br>0.42 ms<br>1.4 ms   | 165 → 0 V<br>0.45 ms<br>4.3 ms  | 330 → 0 V<br>0.82 ms<br>8 ms  |
| output voltage step<br>time, (100 % load)<br>time, (10 % load)                                | -<br>-<br>-                                                                                                                                                                                                                                                     | 66 → 0 V<br>0.58 ms<br>5.7 ms  | 100 → 0 V<br>0.53 ms<br>5 ms    | 330 → 0 V<br>2.1 ms<br>17 ms    | 660 → 0 V<br>3.4 ms<br>30 ms  |
| <b>Ripple</b> @ full load<br>typical (rms / pp)                                               | 15 / 50 mV                                                                                                                                                                                                                                                      | 25 / 70 mV                     | 35 / 120 mV                     | 50 / 120 mV                     | 60 / 250 mV                   |
| <b>Recovery time</b><br>@ 50 - 100% load step, typical                                        | 100 µs                                                                                                                                                                                                                                                          | 100 µs                         | 100 µs                          | 100 µs                          | 100 µs                        |
| <b>Output Capacitance</b> (typical)                                                           | 720 µF                                                                                                                                                                                                                                                          | 315 µF                         | 95 µF                           | 31 µF                           | 15 µF                         |
| <b>CC-mode, resistive load</b>                                                                | Similar result as with CV-mode and resistive load                                                                                                                                                                                                               |                                |                                 |                                 |                               |
| <b>CC-mode, diode load</b><br>(constant voltage load)                                         | Even higher speed possible. Generally 2 - 8 times, depending on unit and load.<br>Needs special attention on layout of cabling and damping networks because of the very high speed.<br>Special "low inductive cables" recommended, see section Recommendations. |                                |                                 |                                 |                               |

| SM6000                                                                                        |                                                                                                                                                                                                                                                                 |                                |                                |                                |                                |                                 |                                |                                |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|
| Programming speed<br>High Speed Version                                                       | SM 15-400<br>option P166                                                                                                                                                                                                                                        | SM 30-200<br>option P167       | SM 45-140<br>option P168       | SM 60-100<br>option P169       | SM 70-90<br>option P170        | SM 120-50<br>option P171        | SM 300-20<br>option P172       | SM 600-10<br>option P270       |
| <b>CV-mode, resistive load</b>                                                                |                                                                                                                                                                                                                                                                 |                                |                                |                                |                                |                                 |                                |                                |
| <b>Rise time (10 - 90%)</b><br>output voltage step<br>time, (100 % load)<br>time, (10 % load) | 0 → 15 V<br>0.40 ms<br>0.38 ms                                                                                                                                                                                                                                  | 0 → 30 V<br>0.41 ms<br>0.38 ms | 0 → 45 V<br>0.53 ms<br>0.16 ms | 0 → 60 V<br>0.44 ms<br>0.41 ms | 0 → 70 V<br>0.62 ms<br>0.40 ms | 0 → 120 V<br>0.57 ms<br>0.19 ms | 0 → 300 V<br>1.1 ms<br>0.44 ms | 0 @ 600 V<br>1.9 ms<br>0.80 ms |
| <b>Fall time (90 - 10%)</b><br>output voltage step<br>time, (100 % load)<br>time, (10 % load) | 15 → 0 V<br>0.39 ms<br>1.5 ms                                                                                                                                                                                                                                   | 30 → 0 V<br>0.41 ms<br>3.6 ms  | 45 → 0 V<br>0.26 ms<br>10 ms   | 60 → 0 V<br>0.57 ms<br>5.6 ms  | 70 → 0 V<br>0.50 ms<br>6.2 ms  | 120 → 0 V<br>0.38 ms<br>4.2 ms  | 300 → 0 V<br>1.0 ms<br>10 ms   | 600 @ 0 V<br>2.2 ms<br>20 ms   |
| <b>Ripple</b> @ full load<br>typical (rms / pp)                                               | 6 / 20 mV                                                                                                                                                                                                                                                       | 28 / 80 mV                     | 34 / 80 mV                     | 34 / 90 mV                     | 38 / 100 mV                    | 30 / 120 mV                     | 48 / 150 mV                    | 35 / 220 mV                    |
| <b>Recovery time</b><br>@ 50 - 100% load step, typical                                        | 100 µs                                                                                                                                                                                                                                                          | 100 µs                         | 100 µs                         | 100 µs                         | 100 µs                         | 100 µs                          | 100 µs                         | 100 µs                         |
| <b>Output Capacitance</b> (typical)                                                           | 1200 µF                                                                                                                                                                                                                                                         | 800 µF                         | 520 µF                         | 330 µF                         | 290 µF                         | 73 µF                           | 32 µF                          | 19 µF                          |
| <b>CC-mode, resistive load</b>                                                                | Similar result as with CV-mode and resistive load                                                                                                                                                                                                               |                                |                                |                                |                                |                                 |                                |                                |
| <b>CC-mode, diode load</b><br>(constant voltage load)                                         | Even higher speed possible. Generally 2 - 8 times, depending on unit and load.<br>Needs special attention on layout of cabling and damping networks because of the very high speed.<br>Special "low inductive cables" recommended, see section Recommendations. |                                |                                |                                |                                |                                 |                                |                                |