

Quasar is a line of switch-mode rectifiers for surface treatment processes, electro-winning and water treatment, that adopts pulse width modulation (PWM) technique for the controlling of current amplitude.

### Electrical Features

- > High speed IGBT technology
- > Modular power platform
- > Microprocessor controlled
- > High speed polarity switching
- > Up to 40% power saving vs. Silicon Controlled Rectifier (SCR)
- >  $\text{Cos } \varnothing \geq 0.93$  at rated load
- > Low output current ripple
- > High precision voltage and current regulation (1000 steps)
- > Fast response time and high stability to load variation (~1ms)

### Hardware Features

- > 15 to 170cm height
- > 43 x 43cm base size
- > Light weight
- > Main switch and operator control panel in the front
- > All input/output connections in the back for easy access

### Software Features

- > Simple output parameters and waveform programming from the operator panel (current, voltage, cycle time and ramp time)
- > Customized software available
- > A/h and A/min meters for precise thickness and dosing pumps control

### Available Interfaces

- > RS485 \*
- > RS232 \*
- > Profibus-DP
- > DeviceNet
- > Analogue 0-10V
- > Analogue 4-20mA

\* Standard feature

### Operation Modes

- > Manual
- > Automatic (Via PC or PLC)

### Machine Types

#### PP - Pulse Plating (forward)

Rectifiers designed to handle forward pulsed output current with the possibility to create, via software, special mixed waveforms with DC & pulsed output current. These rectifiers are able to generate very fast and complex current and voltage patterns (repetitive sequence of pulses) where minimum pulse (phase) duration is 1ms.

Using these fast pulse patterns in combination with appropriate chemical products, remarkable improvements are obtained.

#### PPR - Pulse Plating Reverse (forward and reverse)

Rectifiers designed to handle forward and reverse pulsed output current, tailored for applications that require very fast polarity changes and pulse (phase) duration as low as 1ms.

In order to accomplish synchronized pulses, 2 machines can be networked in Master & Slave configuration, being able to perform in 2 different working modes: synchronous and asynchronous (pulses 180° out of phase). Nevertheless they can operate like normal DC machines.

These rectifiers, via software, are able to handle a current pattern of up to 6 phases (more phases on request).



— 2 Year Warranty —

**Technical Specifications**
**ELECTRICAL SPECIFICATIONS**

		Q100 model	Q300 model	Q500 model
<b>Output</b>	Current	PP 550/1375A	1700/4250A	5000/12500A
		PPR 250(750)A	-	2800(7000)A
	Voltage	5-50VDC		
	Max. pulsed current	Up to 2.5 times the max DC current value depending on the pattern required		
	Hardware control method	Current control		
	Current regulation range	2 - 100% of max current		
	Voltage regulation range	5 - 100% of max voltage		
	Current ripple (RMS)	< 2.0% of rated output current in current operation mode (< 1.0% on Request)		
	Efficiency	87% (typ.) @ rated load		
	Pulse width	Standard: 3ms (1.24ms on request)		
Secondary withstand voltage	500VAC 50Hz 1min. between Secondary to Earth			
<b>Main Supply</b>	Line voltage	3 x 230VAC ± 10%, 3 x 400VAC ± 10%, 3 x 440VAC ± 10%, 3 x 480VAC ± 10% or 3 x 550VAC ± 10%		
	Frequency	50 - 60Hz		
	Neutral	NOT USED		
	Power factor	> 93%		
	Primary current in max DC	Max 20A	Max 125A	Max 160A per tower
	Earth leakage current	See EMC filter input specifications		
	Primary withstand voltage	According to IEC 60204		

**GENERAL SPECIFICATIONS**

		Q100 model	Q300 model	Q500 model
<b>Technology</b>		Switching mode PWM, IGBT output transistors		
<b>Cooling Systems</b>		Air (CFM is provided)		
		Water (L/h and pressure drop is provided)		
<b>Operation Conditions</b>	Location	Indoor use only		
	Ambient temperature	0 - 40°C		
	Relative humidity	15 - 85% not condensing		
	Filter obstruction - air cooled	15% max		
	Water input temp. - water cooled	19 - 22°C		
	Altitude	<= 1000m		
<b>Degree of Protection</b>	Air cooled	IP31	IP21 (on request NEMA12)	IP32
	Water cooled	IP43		IP43 (on request IP65)
<b>Conformity of EU Directives</b>		2006/95/EC - Low Voltage Directive		
		2004/108/EC - Electromagnetic Compatibility		
		2006/42/EC - Machines Directive		

**SERIAL INTERFACE**
**Communication Ports**

RS232

RS485

**Communication Protocols**

CRS-ASCII	RS232 point-to-point and RS485 network
Modbus-RTU	RS232 point-to-point and RS485 network
Profibus-DP (On request)	Profibus-DP network
DeviceNet (On request)	CAN bus network

**PROTECTION**
**Surge**

According to directive | EN 61000-4-5

2kV between each input phase and PE. 1kV across each input phase combination.

**Output Short Circuit**

Type	Software
Programmed limit	25% of $I_{out\_max}$
Detection time	1ms

**Phase Loss**

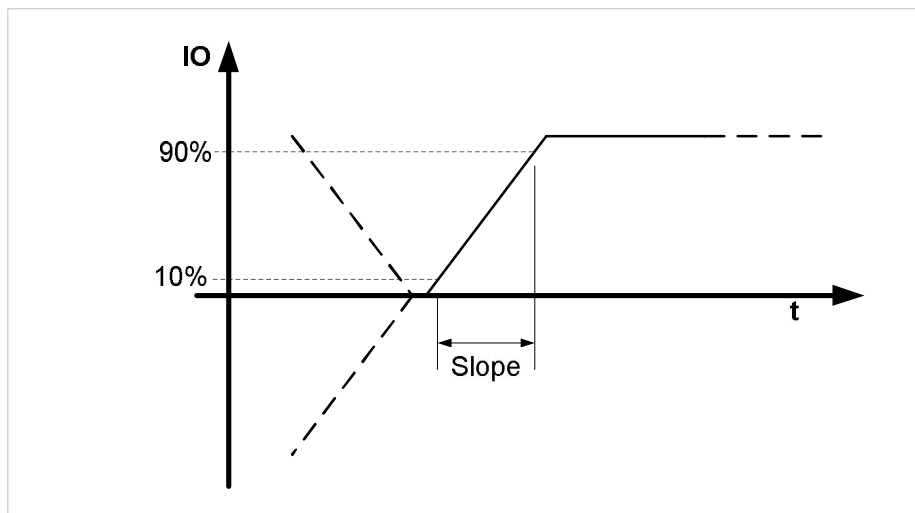
Type	Hardware	Software
Programmed limit	Half cycle	Adjustable via configuration parameter

**Thermal Protection**

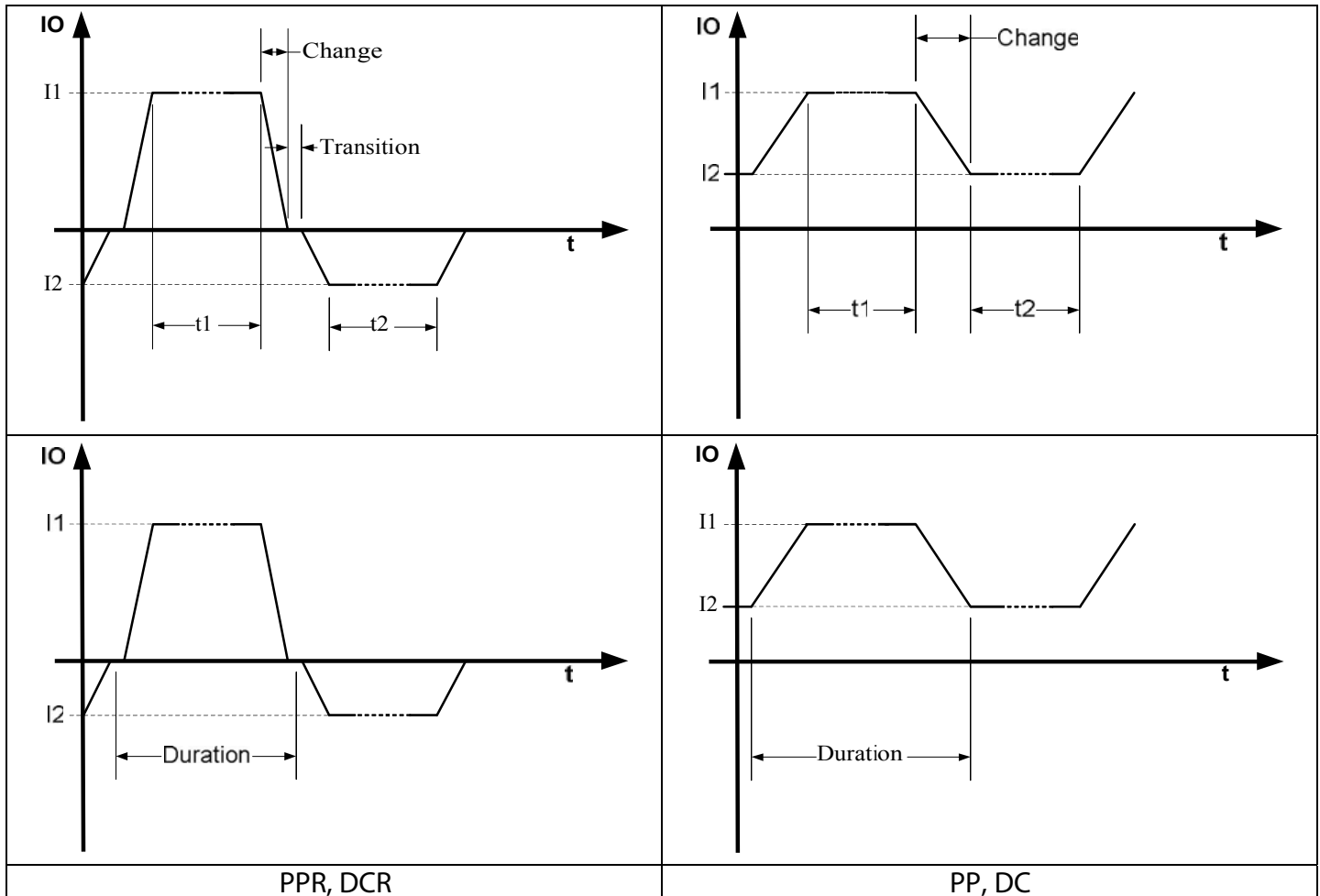
With PTC on each module

**FULL LOAD HARMONICS DISTORTION**

Harmonic	Freq. (Hz)	Absorbed Current Distortions
3	150	-
5	250	< 22.5%
7	350	< 12.5%
9	450	-
11	550	< 11.0%
13	650	< 7.6%
17	850	< 8.0%
19	950	< 4.8%
<b>THD</b>		<b>MAX 30%</b>

**Understand the pulsing**


The current can't increase (or fall) in null time. It needs time to charge inductive and capacitive components of power supply and output cables. The Slope is the time needed to increase the current from 10% to 90% of final maximum current. It is measurable by a common digital storage oscilloscope.

**Pulse definitions**


<b>I1, I2</b>	The currents flowing in load, in the flat segment of the waveforms. This coincides with the request of current, if the power supply operates in current control mode. These currents are the same as software parameters "PHAS1 A" and " PHAS2 A ". See "Patterns in Manual Operation Mode for PP & PPR Type Machines".
<b>Transition</b>	It is the duration of zeroing of output current to permit the correct reversing of output current.
<b>Change</b>	It is the duration of the changing of current. The changing time is roughly 1.25 times the Slope time.
<b>t1, t2</b>	The duration of the pulses. Note that this is the time of flat line of the shape of current. Ideally connect two Change. Please do not confuse the duration and the Change time. They are disconnected each other. t1 and t2 may be at least the minimum allowed by software and reported in the table of classification. These times are the same as software parameters "TIM1 msec" and "TIM2 msec". See "Patterns in Manual Operation Mode for PP & PPR Type Machines".
<b>Duration</b>	It is the total time of a pulse. In reverse it is zero-to-zero time; in direct it is the time to complete the emerging part of pulse. E.g. $D = t1 + 2 \times \text{Change} + \text{Transition}$

### Classification

We divide the direct current machine in three categories:

	Slope [ms]	Transition [ms]	Change [ms]	t1,t2 min. [ms]	Duration min. [ms]	PWR Dsn <sup>a)</sup>	CTRD	PWR voltage b)	Multi-tower c)
PP FAST	0.09	--	0.11	1	1.22	C	02	+20%	no
PP SLOW	0.8	--	1	1	3	Q	02	+0%	limited <sup>d)</sup>
DC	100	--	125	1000	1250	Q	01/02	+0%	yes

We divide the reverse current machine in three categories:

	Slope [ms]	Transition [ms]	Change [ms]	t1,t2 min. [ms]	Duration min. [ms]	PWR Dsn <sup>a)</sup>	CTRD	PWR voltage b)	Multi-tower c)
PPR FAST	0.09	0.01	0.11	1	1.23	C	02	+20% +RD	no
PPR SLOW	0.8	0.02	1	1	3	Q	02	+RD	limited <sup>d)</sup>
DCR	100	0.02	125	1000	1250	Q	01/02	+RD	no
	100	100	125	1000	1350	Q	01/02	+RD	yes

#### a) PWR Design

- **"C"** Custom, we mean that is needed a custom design of module and a special care in output cable setup. The custom design can be avoided only if there is a power supply designed with the same input voltage and output voltage and current.

- **"Q"** Quasar-spec, we mean that is NOT needed a custom design of module.

b) **PWR Voltage.** It is the nominal design output voltage of module. We must keep in account the dynamic and static voltage drop of machine. **+20%** mean that the module must have 20% more voltage than nominal output voltage. **+RD** means that the module must compensate the Reverse module voltage Drop.

c) **Multi-tower** it is needed if the input main current overcomes the 150Arms.

d) **limited** referred to multi-tower. Is permitted in case of two towers that works in synchronism each other, with output doesn't connected together.

### Hardware Differences of Quasar Models (Forward Configuration)

