Dynapower Company

Hydrogen Power Supplies

DYNAPOWER
COMPANY
Trusted Worldwide Since 1963

OVERVIEW

- Founded in 1963
- Acquired the assets and product lines of Rapid Power Technologies in 2001
- 150,000 Sq. Ft. engineering and manufacturing facility in South Burlington, VT USA with service and R & D facilities in Union City, CA
- Full complement of Electrical, Mechanical & Software Engineers
- Transformers, rectifiers and electronics designed, manufactured and tested in our South Burlington, Vermont corporate headquarters.
- Service and support of our Dynapower equipment and a wide variety of legacy equipment.

CE
NEMA National Electrical Manufacturers Association
c UL us LISTED
Nadcap
ITAR Registered International Traffic in Arms Regulations
CERTIFIED ISO 9001:2015 COMPANY

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CHALLENGES

Challenging Characteristics of Electrolyzers

1. Large Scale Power Requirement
    I. Harmonics
    II. Power Factor Correction
2. Electrolyzer Sensitivity
    I. Ripple Current
    II. Ramp Rate
3. Renewable Integration
    I. Ramp Rate
    II. Control Response

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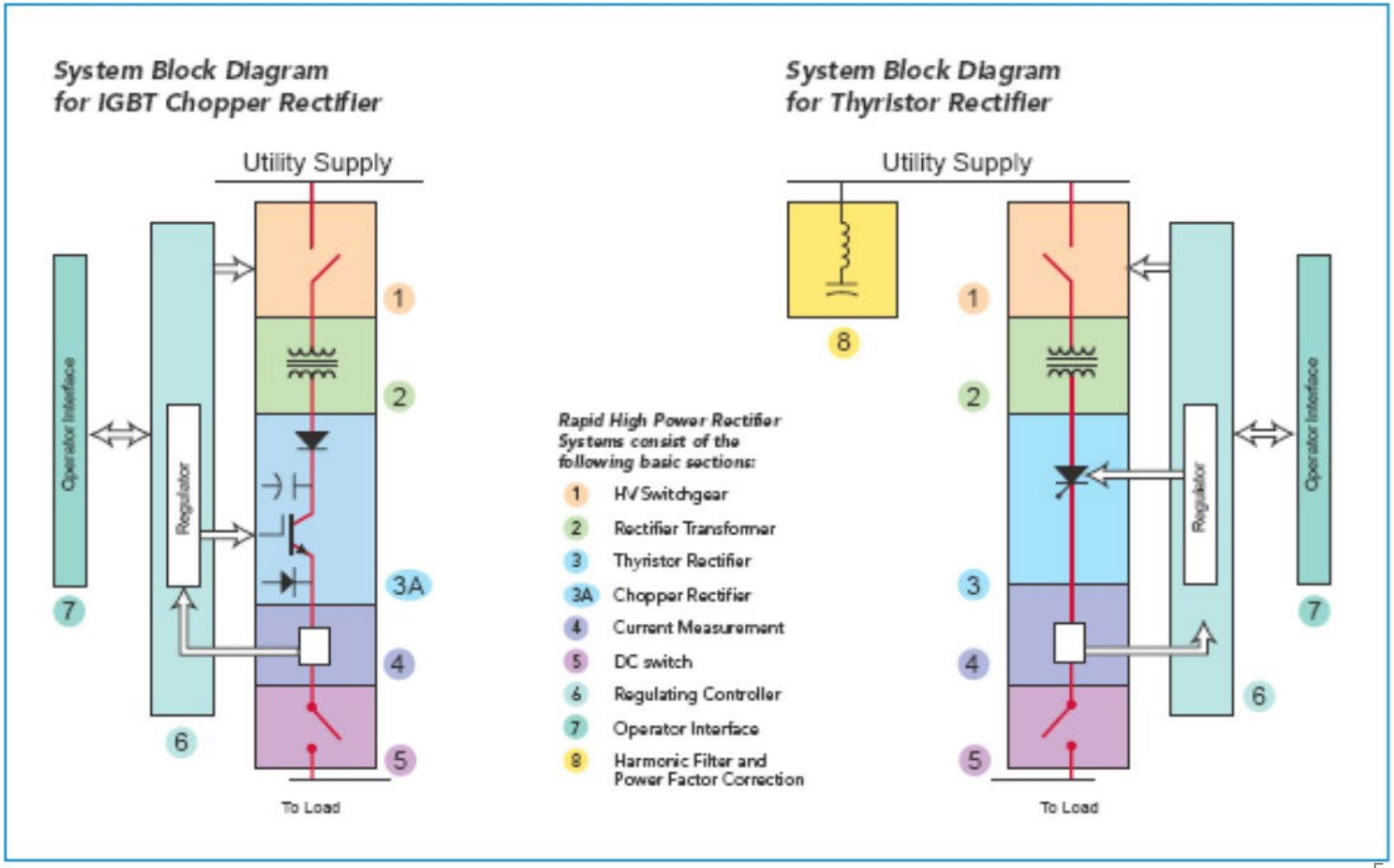
THYRISTOR & CHOPPER TECHNOLOGY COMPARISON

CHOPPER System

THYRISTOR Rectifier



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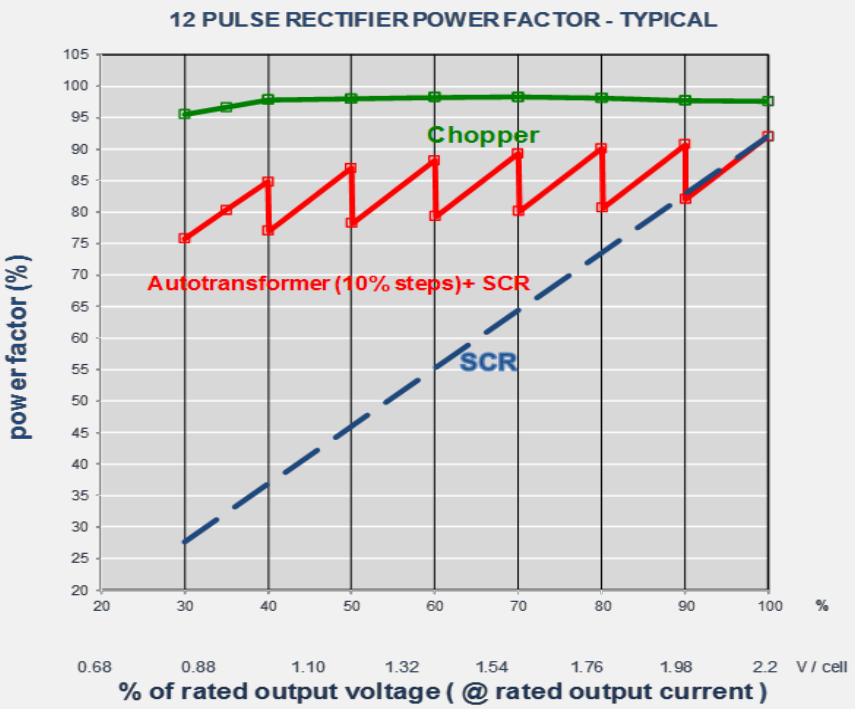
POWER FACTOR



Thyristor Power Supplies

A high power factor is accomplished with voltage and current being closely in phase with each other. Thyristor rectifiers can operate out of phase (with low power factor) resulting in a need for power factor correction equipment

Chopper Power Supplies

Chopper rectifiers use diode rectification which results in a high line power factor over the full operating range.

BENEFIT

A high power factor eliminates the need for power factor correction equipment such as:

- **Primary tap changers**
- **Regulating auto transformers**
- **Line capacitors**

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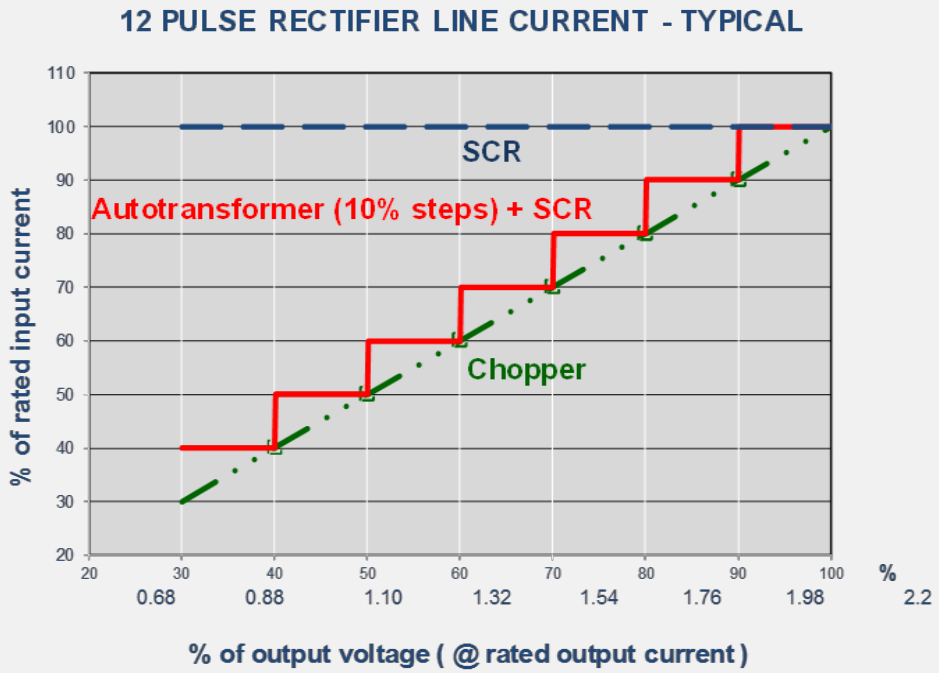
HARMONICS



Harmonics are distortions to the voltage and current running through a system due to non-linear loads and components.

Presence of harmonics can have adverse effects such as equipment heating and lowered efficiency.

BENEFIT

With Chopper Rectifiers Diode rectification results in reduced harmonic effects allowing for the elimination of harmonic line filters in unit design.

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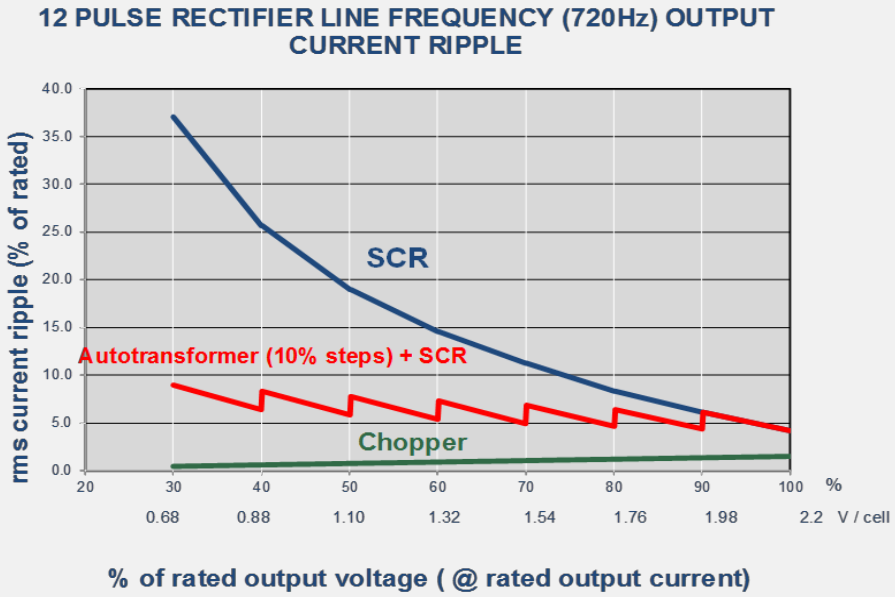
RIPPLE



Ripple is the variation of the output of a unit due to the leftover AC from converting from AC to DC. Ripple can cause varying issues for output sensitive processes.

Thyristor rectifier current ripple line frequency dependent and increases with reduced DC output voltage

Chopper rectifiers include IGBTs with high switching frequencies and output ripple reduces in proportion to the DC output voltage

BENEFITS

- **Lower Output Ripple**
- **Higher Frequency Output Ripple**
- **Constant Ripple Over Operating Range (<2%)**
- **Elimination of the need for ripple filters**