Rectification & DC Power Systems

Silicon, Industrial & AC-to-DC Rectifiers

Controlled DC supplies for process duties, typically 50–5,000 A.

Rating band: Typically 50–5,000 A DC

Document silicon-industrial-ac-dc-rectifiers / Revision 2.0 / 19 October 2026

An industrial rectifier combines a transformer with a silicon diode or thyristor bridge to deliver DC at the voltage and current a process needs. Invitrona manufactures air-cooled and oil-cooled rectifiers, typically from 50 to 5,000 A and 6 to 220 V DC, with constant-current or constant-voltage control. The output, ripple, control interfaces and cooling are agreed against the process duty rather than taken from a standard table.

Class summary

Typical values for the class

Rating range
Typically 50–5,000 A DC

DC output
Typically 6–220 V DC

Control
Constant current or constant voltage

Cooling
Air or oil cooled

Typical specification

Parameter	Value or range	Conditions and basis
Rating range	Typically 50–5,000 A DC	Higher currents by assessment
DC output voltage	Typically 6–220 V DC	Adjustable from near zero; higher voltages by assessment
Input supply	415 V AC, three phase, 50 Hz	Single phase 230 V AC for small ratings
Conversion	Silicon diode bridge with on-load voltage control, or thyristor phase control	Six-pulse typical; twelve-pulse by assessment
Control mode	Constant current (CC) or constant voltage (CV)	Selected at the panel
Regulation accuracy	Typically ±1% of set value	Closed-loop control, within the rated input range
Cooling	Natural air, forced air or oil cooled	Selected against rating, duty and room conditions
Duty	Continuous (100%) duty or a stated process cycle	Overload capacity stated per unit
Output ripple	Typically 3–5% RMS without filtering	Lower with filtering or twelve-pulse arrangements
Efficiency	Typically 85–97%	Lower at low DC voltage and high current
Controls and metering	Local panel with DC voltmeter and ammeter, setpoint adjustment, start and stop	Remote setpoint and ramping by assessment

Figures are typical values for the class and rating band; the quotation states the values for a specific unit.

Parameter	Value or range	Conditions and basis
Protection	Overload, short-circuit, over-temperature and phase-failure trips	Settings stated for each unit
Ambient temperature	0–45 °C	Air-cooled units; derating above 45 °C
Enclosure	Floor-standing sheet-steel cabinet, IP20 indoor	IP54 by assessment

Selection and application

Features

Feature	What it means in use
Constant current or voltage	The operator selects CC or CV control, so one rectifier can follow a plating current density or hold a bath voltage.
Step-free adjustment	Output is adjusted smoothly from near zero to full rating, either by on-load voltage control or by thyristor phase control.
Cooling matched to duty	Air cooling suits moderate duty in clean rooms; oil cooling suits continuous high-current duty in humid or corrosive process areas.
Process protection	Overload, short-circuit, over-temperature and phase-failure trips protect the rectifier and the work in the tank.
Panel and remote control	Local metering and controls come as standard; remote setpoint and ramping can be arranged for process integration.

Selection questions

Question	Answer
What information defines a rectifier?	The DC current and voltage at the operating point, the duty cycle, the process type and the incoming supply. Tank or load details help confirm the voltage needed at full current.
Constant current or constant voltage?	Plating and anodising are usually controlled on current density, so constant current is common. Constant voltage suits loads that need a steady DC level, such as some electrolysis or test duties.
Air cooled or oil cooled?	Air cooling suits moderate ratings in clean, dry rooms. Oil cooling suits higher currents, continuous duty and humid or corrosive process areas, where it also protects the windings and semiconductors.
How much ripple is acceptable?	It depends on the process. State any ripple limit in the enquiry; filtering or a twelve-pulse arrangement reduces ripple where the process needs it.

Figures are typical values for the class and rating band; the quotation states the values for a specific unit.

Typical applications

Application context
Electroplating and anodising
Electrolysis and electro-refining
Battery charging
DC motor and magnet supplies
Electrophoretic coating
Heating and DC test supplies

Where the class fits

	Duty or project context
01	Industrial DC power requirements
02	Process and equipment rectification duties
03	Application-specific AC-to-DC conversion

Documents for an agreed scope

	Document
01	Technical scope for the agreed duty
02	General arrangement and DC terminal layout
03	Operating and maintenance instructions
04	Inspection, test and handover records when included in scope

Information needed for selection

	Input
01	Incoming supply and the required DC voltage and current
02	Process type, load behaviour, duty cycle and operating conditions
03	Control, protection, indication and interface requirements
04	Cooling, enclosure, installation and maintenance constraints

How a requirement is handled

	Activity
01	Establish the conversion duty and load behaviour
02	Propose the rating, conversion method and cooling
03	Define control, protection, interfaces and assumptions
04	Agree inspection and documentation for the supplied scope

Document control

Field	Entry	Field	Entry
Document ID	silicon-industrial-ac-dc-rectifiers	Revision	2.0
Document type	Technical data sheet	Date	19 October 2026
Product class	Silicon, Industrial & AC-to-DC Rectifiers	Owner	Invitrona Engineering
Product family	Rectification & DC Power Systems	Change	Issued with typical values for the product class and rating band.
Issued by	INVITRONA ELECTRICALS LIMITED, A-56, Naraina Industrial Area, Phase 1, New Delhi 110028, India		

Figures are typical values for the class and rating band; the quotation states the values for a specific unit.