

AXPERT - *i-Sine*

ACTIVE FRONT - END CONVERTER

Active Front-end Converter is an IGBT based AC to DC converter. It keeps supply side power factor to unity and supply current sinusoidal. AFC also regenerates the excessive power from DC link capacitor to grid side and so it is also popularly known as Regenerative Unit. A single unit of high capacity can also be used for multiple VFD (Variable Frequency Drive) of low capacity having common DC bus configuration.

Six pulse diode rectifier bridge is a basic building block of many products such as UPS, battery chargers, VFDs, DC drives etc., known as non-linear loads. They generate about 70...120 % current harmonic distortion at the input.

AFC reduces the current harmonic distortion level to $< 5\%$. It is a high quality product and meets the international power quality standards such as IEEE 519-2014.

AXPERT Benefits

- Feeds back the excess power to grid from regenerative loads, connected at the VFD output
- Reduces total harmonic distortion to draw sine wave current from the utility
- Stabilizes output DC voltage against mains and load fluctuations
- Improves power factor to unity
- Compatible with any VFD, useful in common DC applications

Target Applications

- Centrifuges
- Cranes and hoists
- Un-winders
- Paper machines
- Regenerative application
- Roller tables
- Test jigs for dynamometers, gears and motor test benches



“Feeds back excess power with improved quality”

Standard Specifications

| Electrical | | | | | | | | | | | | | | | | |
|--|--|---|---------|---------|---------|----------------------|---------|---------|---------|------------------|-----------------|-----|-----|----------------|--|--|
| Input Voltage/ Frequency | 380, 400, 415 , 440, 460, 480 VAC (-10 %, +5 %), 3-Phase, 3-Wire, 50 Hz (60 Hz optional) (±5 %) | | | | | | | | | | | | | | | |
| Output Voltage | 600, 610, 620 , 660, 690, 720 VDC (according to input voltage), (+2 %) | | | | | | | | | | | | | | | |
| AMT-AFC-XXX-4 | 045 | 055 | 075 | 090 | 110 | 132 | 160 | 200 | 250 | 315 | 355 | 400 | 450 | 500 | | |
| Converter capacity (kVA) | 50 | 61 | 83 | 101 | 122 | 144 | 176 | 219 | 273 | 341 | 388 | 438 | 492 | 546 | | |
| Max. Continuous Rated Current (A) | 70 | 85 | 115 | 140 | 170 | 200 | 245 | 305 | 380 | 475 | 540 | 610 | 685 | 760 | | |
| AFC Current for 60 Second (A) | 84 | 102 | 138 | 168 | 204 | 240 | 294 | 366 | 456 | 570 | 648 | 732 | 822 | 912 | | |
| Applicable VFD capacity (kW) | 45 | 55 | 75 | 90 | 110 | 132 | 160 | 200 | 250 | 315 | 355 | 400 | 450 | 500 | | |
| Frame size | A | | | | | B | | | | | Consult factory | | | | | |
| Weight (kg/lb) | 60/132 | 65/143 | 195/430 | 210/463 | 225/496 | 250/551 | 300/661 | 335/738 | 360/794 | 410/904 | Consult factory | | | | | |
| Control Functions * | | | | | | | | | | | | | | | | |
| Control mode & method | Constant Voltage & Hysteresis current control | | | | | | | | | | | | | | | |
| Input current distortion (% THD) | Less than 5 % (at 100 % load) | | | | | | | | | | | | | | | |
| Input power factor | 0.99 (at 100 % load & nominal voltage), better than 0.95 (at load of more than 30 %) | | | | | | | | | | | | | | | |
| Regeneration mode | Yes (Automatic) | | | | | | | | | | | | | | | |
| Max. Switching Frequency | 5 kHz | | | | | | | | | | | | | | | |
| Efficiency | Approx. 98 % | | | | | | | | | | | | | | | |
| Operation Specifications | | | | | | | | | | | | | | | | |
| Digital inputs | 5-Programmable sequence inputs, sink / source and Active Close / Active Open selectable | | | | | | | | | | | | | | | |
| Digital outputs | 4-Programmable sequence outputs, open collector type | | | | | | | | | | | | | | | |
| Potential free contacts | 3-programmable relays: | 1-NO, 1-NC for 5 A @ 240 Vac Programmable between 12 different options | | | | | | | | | | | | | | |
| Programmable analog outputs | 2-Programmable analog outputs AO1 & AO2: Voltage (0...10) V / Current (4...20) mA with settable Gain, Bias, Min. and Max. scaling | | | | | | | | | | | | | | | |
| Soft-charge | Through resistor within 5 sec. | | | | | | | | | | | | | | | |
| Auto start | Yes, AFC can start at power ON condition in local and serial mode. | | | | | | | | | | | | | | | |
| Auto restart | Adjustable up to ten times for fault like Over current fault, Timed over current fault, Adjustable over current fault, DC bus over voltage fault, DC bus under voltage fault, Earth fault, Temperature fault, External fault, R-Phase Temp Fault, Y-Phase Temp Fault, B-Phase Temp Fault. | | | | | | | | | | | | | | | |
| Display Indications | | | | | | | | | | | | | | | | |
| Display and Keypad module | Digital Operation Panel 128 x 64 Graphical LCD with white back light LED, 8-Key keypad, 3-Status indicating LED for Run, Stop and Fault; Real Time Clock. V _{LV} , THD _v , THD _i , Line Frequency, DC bus voltage, PF, DPF, kW, kWh import, kWh export, kWh net, kVA, kVAR, Source side current for each phase | | | | | | | | | | | | | | | |
| Communication | | | | | | | | | | | | | | | | |
| Network connectivity | RS-485 for PC interface with Modbus-RTU protocol and Wi-Fi connectivity as standard. (DeviceNet, Profibus DP (Slave), CANopen, Ethernet, ControlNet are optional) | | | | | | | | | | | | | | | |
| Protective Specifications | | | | | | | | | | | | | | | | |
| Protective Function | Over current | Adjustable over current | | | | DC bus under voltage | | | | Over temperature | | | | External fault | | |
| | | Timed over current | | | | Phase loss | | | | EEPROM fault | | | | | | |
| | | DC bus over voltage | | | | Ground fault | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Fault History | Last 20 faults with status at time fault occurred stored in memory | | | | | | | | | | | | | | | |
| Electronic Thermal Overload | 120 % Overload for 60 Seconds | | | | | | | | | | | | | | | |
| Environment | | | | | | | | | | | | | | | | |
| Installation location | Indoor | | | | | | | | | | | | | | | |
| Type of cooling | Forced Air Cooling | | | | | | | | | | | | | | | |
| Ambient temperature | -15...45 °C (5...113 °F) | | | | | | | | | | | | | | | |
| Storage temperature | -20...70 °C (-4...158 °F) | | | | | | | | | | | | | | | |
| Audible noise | ≤ 72 db @ 1.0 m (3 ft) | | | | | | | | | | | | | | | |
| Altitude (above sea level) | 1000 m (3300 ft) without derating, derate 1 % per 100 m (330 ft) above 1000 m (3300 ft) | | | | | | | | | | | | | | | |
| Model derating with temperature | Above 45 °C (113 °F), derate the output current by 3 % / 1 °C (1.8 °F) Maximum up to 55 °C (131 °F) temperature | | | | | | | | | | | | | | | |
| Relative humidity | 0...95 % max non condensing | | | | | | | | | | | | | | | |
| Mechanical Specifications | | | | | | | | | | | | | | | | |
| Color | RAL7035 | | | | | | | | | | | | | | | |
| Dimensions in mm [inch] (W X D X H) | A = 310 X 360 X 900 [12.2 X 14.2 X 35.4], IP 00, Wall mounting B = 600 X 600 X 1995 [23.6 X 23.6 X 78.6], IP 31, Floor mounting | | | | | | | | | | | | | | | |
| Reference standard | | | | | | | | | | | | | | | | |
| Harmonic | IEEE 519-2014, G5/4-1, GB/T 14549-93, IEC 61000-3-2, IEC 61000-3-4, IEC 61000-3-12 | | | | | | | | | | | | | | | |
| Safety | IEC 50178 | | | | | | | | | | | | | | | |

* All performance specifications are valid at nominal ratings. Consult AMTECH for high power rating and line supply voltages 575 V or 690 V.



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