CC7500L3B86TEZ/CC7500H3B86TEZ
High-Efficiency Water-Cooled Rectifier

3Ø, 3-Wire Input; 7500W Capable, Wide output range: 70-88V_{DC}
L3B version 200-240V_{AC}, H3B version 380-480V_{AC}

RoHS Complaint

The OmniOn Power™ CC7500x3B86TEZ [x=L (Low-line) or H (High-line)] is a high efficiency, true 3-phase, 3-wire (Delta) AC input, 70-88V_{DC} output, liquid or conduction cooled rectifier power supply. The true three phase input eliminates any neutral connection and ensures tight phase current balancing. The rectifier achieves very high efficiency, reducing the cooling demands and providing beneficial OpEx savings. The rectifier meets world-wide safety, environmental, and regulatory requirements. The physical package is designed to allow very flexible positioning into system cabinets, or racks. The rectifier can be mounted in both horizontal and vertical orientations, and its thin profile allows for minimal width when mounted vertically along cabinet's sides, or maximum stacking density when mounted horizontally in equipment racks.

Applications

- Laser
- Industrial systems

Features

- Efficiency
  - Low Line - 95% peak
  - High Line - ~96% peak
- Compact form factor with 23.6W/in^3 density
- Compact dimensions 218 x 54.3 x 448 mm (liquid cooled version)
- AC Input 3-wire, 3Ø, 7500W Rated Output
- Power factor correction (meets EN/IEC 61000-3-12 and EN 60555-2 requirements)
- Output voltage programmable from 70-88V_{DC}
- Redundant, parallel operation with active load sharing
- ModBus Communication Protocol
- Field remote upgrade
- Output overvoltage and overload protection
- IP65 Rated
- AC Input overvoltage and undervoltage protection
- Over-temperature warning and protection
- Redundant +5V_{DC} @ 0.75A Standby power
- Remote ON/OFF and redundancy interlock
- Integrated liquid-cooled cold plate (option)
- Conduction cooled (option)
- Three front panel LED indicators
- UL recognized (UL1012)
- CE mark (with EN62477-1/IEC61207-1)
- Meets FCC part 15 subpart A, EN55032 Class A standards
- Meets EN61000 immunity and transient standards
- Dripless Liquid Quick Connects Designed for

CC7500x3B86TEZ Technical Specifications

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Symbol	Min	Max	Unit
Input Low line unit High line unit No damage Continuous	V_{IN}	0	300 600	V_{AC}
Current into Enable or Intlock pin (internal circuit is 5.9kohm + 1.1V LED)	I_{EN}	0	7	mA
Voltage from Enable or Intlock pin to LGND	V_{EN}	-5	8	V
External voltage applied to pull up open-collector output signals	VCC_ext		30	V_{DC}
Storage Temperature (ensure that all liquid has been removed from cooling pipes for storage temperatures < 2°C)	T_{stg}	-40	85	°C
Isolation voltage, Input to GND (chassis), Output and all signals (100% factory Hi-Pot tested)			2121	V_{DC}

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. To meet measurement accuracy a warm up time of 1hr may be required.

INPUT Low Line Unit (200-240V_{AC})						
Parameter		**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Operating Voltage Range (3Φ delta with safety frame ground)		V_{IN}	176[1]	200/208 220/240	275	V_{AC}
Frequency		F_{IN}	47		63	Hz
Input current per phase (maximum at V_{IN} = 195$_{AC}$, W_{OUT} = 7500W)		I_{IN}			27	A_{rms}
Input low voltage Turn off Turn on Hysteresis		V_{IN}		 5	171 176	V_{AC}
Input high voltage Turn off Turn on Hysteresis		V_{IN}	280 275	 5		V_{AC}
Input current phase unbalance	[load > 50% of FL]				2	%
Inrush Transient (per Φ at 240V_{RMS} , 25°C, excluding X-Capacitor charging)		I_{IN}			10	A_{pk}
Leakage Current (per Φ, 240V_{AC}, 60Hz)		I_{IN}			5[2]	%
Input voltage unbalance		V_{IN}	-15	1	+10	%
Power Factor (50 – 100% load)		PF	0.98	0.995		
Total Harmonic Distortion (50 – 100% load)		THD			5[3]	%
Efficiency (200/208V_{AC} @ 25°C, 86V_{DC} output)	50% FL	η		95		%
Ride through (V_{IN} = 200V_{rms}, 100% FL)		T	10			ms
Isolation	Input – Output Input – Chassis (GND)/All Signals Output – Chassis (GND) LGND – Chassis (GND)	V	2000 2000 1500 100			V_{DC}

[1]Power derating at V_{IN}<195V_{AC}.
[2]Leakage current shall not exceed 5% of the nominal input current per phase under testing. Appropriate marking requirements of UL 1950, CSA 950, and IEC/EN 60950 should be applied.
[3]Total harmonic distortion <6.5% when $T_{water\text{-}inlet}$ <5°C.

CC7500x3B86TEZ Technical Specifications (continued)

Electrical Specifications (continued)

INPUT High Line Unit (380-480V_{AC})						
Parameter		**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Operating Voltage Range (3Φ delta with safety frame ground)		V_{IN}	320	380-480	530	V_{AC}
Frequency		F_{IN}	47		63	Hz
Input current per phase (maximum at V_{IN} = 320V_{AC}, W_{OUT} = 7500W)		I_{IN}			17	A_{rms}
Input low voltage Turn off Turn on Hysteresis		V_{IN}		 5	315 320	V_{AC}
Input high voltage Turn off Turn on Hysteresis		V_{IN}	535 530	 5		V_{AC}
Input current phase unbalance	[load > 50% of FL]				2	%
Inrush Transient (per Φ at 480V_{RMS}, 25°C, excluding X-Capacitor charging)		I_{IN}			30	A_{pk}
Leakage Current (per Φ, 530V_{AC}, 60Hz)		I_{IN}			13 <5	mArms %
Input voltage unbalance		V_{IN}	-15		+10	%
Power Factor (50 – 100% load)		PF	0.96	0.99		
Total Harmonic Distortion (50 – 100% load)		THD			5[3]	%
Efficiency (480V_{AC} @ 25°C, 86V_{DC} output)	50% Load 75% Load 100% Load	η		96.1 96.2 96.2		%
Holdup Time (V_{IN}= 480, V_{OUT} = 86V_{DC} 100% FL)		T	10			ms
Isolation	Input – Output Input – Chassis (GND)/All Signals Output – Chassis (GND) LGND – Chassis (GND)	V	2750 2750 1500 100			V_{DC}

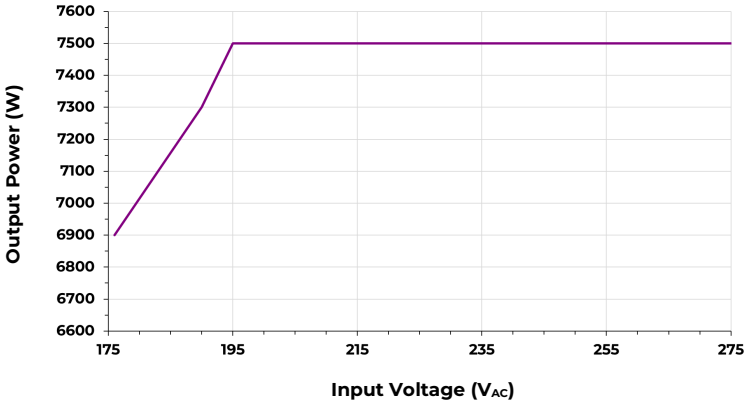
CC7500x3B86TEZ Technical Specifications (continued)

Electrical Specifications (continued)

MAIN OUTPUT (common)						
Parameter		**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Output Power ($T_{INLET/CASE}$ = 2-30°C , V_{IN}≥195V_{AC} , V_{OUT}≥80V_{DC}) 320V_{AC} ≤ $V_{IN\ (High-line)}$ ≤ 530V_{AC} 195V_{AC} ≤ $V_{IN\ (Low-line)}$ ≤ 275V_{AC}, power derating[4]		W_{OUT}			7500 7500	W W
Output Voltage Factory Setpoint		V_{OUT}		86		V_{DC}
Output Voltage Programming Range Low Line High Line			70		88	V_{DC}
Resolution				5		mV_{DC}
Overall Output Regulation (single and paralleling operation) Tinlet/case = 25°C Tinlet/case = 2-30°C			-0.5 -1%		+0.5 +1%	V
Output Current ($T_{INLET/case}$ = 2-30°C) $V_{IN(Low-line)}$ ≥195V_{AC}[4] V_{OUT} = 88V_{DC} V_{OUT} = 86V_{DC} V_{OUT} = 80V_{DC} $V_{OUT(High-line)}$ = 70V_{DC} $V_{OUT\ (Low-line)}$ = 70V_{DC}		I_{OUT}	 0 0 0 0 0		 85.2 87.2 93.8 75 93.8	A_{DC}
Output Ripple RMS (5Hz to 20MHz)(20MHz bandwidth) Peak-to-Peak (5Hz to 20MHz)		V_{OUT}	0		93.8 120 500	 mV_{rms} mV_{p-p}
Current share (>50% FL)			-5		+5	%FL
External Bulk Load Capacitance			0		22,750	µF
Turn-On (monotonic from 30-100% of V_{nom}) AC input turn on Delay Remote enable turn on delay Rise Time		T		5 50 100		S ms ms
Output Overshoot		V_{OUT}			3.5	%
Pulse load response, C_O=6720µF, 25°C, no shutdown/damage happen Load frequency Duty Load step		 F Duty I_{OUT}	 1 1 1		 10 100 100	 KHz % % FL
Power limit, V_o from 80-88V_{DC}		W_{OUT}	7500			W
Current limit, V_o from 70-88V_{DC}		I_{OUT}	105			%
Undervoltage Shutdown		V_{OUT}		67		V_{DC}
Behavior		One restart attempt, then latches OFF				
Short-circuit protection		No damage				
Overvoltage Shutdown (dynamic)	200ms delayed shutdown (default) Immediate shutdown Programmable range	V_{OUT}		$V_{o,set}$ +5		V_{DC}
	Latched shutdown	After 3 restart attempts within a 30 sec window, unit latches OFF				
	Restart delay		3.5	4	5	sec
Over-temperature Warning Over-temperature Shutdown Restart		$T_{COMPONENT}$		5°C below shut down 20 20		°C
Restart/Reset conditions		Loss of input > 1 sec or Output OFF followed by ON command				
Isolation voltage to Chassis/signals		1500 V_{DC}				

[4] See curve below of Output Power Derating vs. V_{IN}.

CC7500x3B86TEZ Technical Specifications (continued)



Output Power Derating vs V_{IN} (low-line module)

$5V_{DC}$ Auxiliary output					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Output Voltage Setpoint (return is LGND)	V_{OUT}		5		V_{DC}
Overall Regulation		-10		+10	%
Output Current		0		0.75	A
Over - voltage Clamp			5.5		V_{DC}
Over - current Limit			250		%FL
Isolation voltage to main output		1500			V_{DC}
Isolation voltage to grounding/chassis		100			V_{DC}

General Specifications

Parameter	Min	Typ	Max	Units	Notes
Unpacked Weight (conduction cooled)		7.68 (16.9)		Kgs (Lbs)	
Packed weight (conduction cooled)		9.14 (20.1)			
Unpacked Weight (liquid cooled)		7.91 (17.4)			
Packed weight (liquid cooled)		9.36 (20.6)			
Reliability Calculated		560,000		Hours	Full load, 25°C case; MTBF per Telecordia SR232 Reliability protection for electronic equipment, issue 3, method I, case III,
Service life		10		years	Case temperature, 25°C, 80% load

CC7500x3B86TEZ Technical Specifications (continued)

Signal Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. Signals are referenced to LGND unless noted otherwise. See the Signal Definitions table for additional information.

Parameter	Symbol	Min	Typ	Max	Unit
Remote ON/OFF (by Enable pin; return is LGND)					
main output OFF	V_{EN}	0	–	0.8	V
main output ON (current into pin)*	I_{EN}	3	–	6	mA
Vprog					V_{DC}
Voltage control range	$V_{control}$	0		3.3	V_{DC}
Programmed output voltage range	V_{OUT}	70		88	V_{DC}
Voltage adjustment resolution (12-bit A/D)	$V_{control}$		7.2		mV
Output configured to $86V_{DC}$[5]	$V_{control}$	3.1		3.3	V_{DC}
Output configured to $70V_{DC}$	$V_{control}$	0		0.1	V_{DC}
Fault (open collector output, pulled up with a 5kohm resistor inside, 24V need to be sourced externally)					
Logic HI (No fault is present)	V		–	30	V_{DC}
Sink current	I	–	–	6	mA
Logic LO (Fault is present)	V	0	–	0.4	V_{DC}
Power Good (Open collector output, pulled up with a 5kohm resistor inside, 24V need to be sourced externally)					
Logic HI (Vo in regulation – normal)	V			30	V_{DC}
Sink current	I			6	mA
Logic LO (Alert is set)	V	0		0.4	V_{DC}
EMG (Open collector output, pulled up with a 5kohm resistor inside to VCC_ext which needs to be sourced externally)					
Logic HI (either Interlock open = OFF)	V			30	V_{DC}
Sink current	I			6	mA
Logic LO (normal)	V	0		0.4	V_{DC}
Interlock 1 (Opto-coupler input, internal 5.9K ohm resistor + ~1.1V LED) Conduction current to turn on		3		6	mA
Interlock 2 (Opto-coupler input, internal 5.9K ohm resistor + ~1.1V LED) Conduction current to turn on		3		6	mA

[5]default setting can be changed through Modbus command by user, and stored into non-volatile memory.

*Interlocks must also be ON to turn the output ON. Internal circuit is 5.9K ohm in series with ~1.1V (used to calculate current).

Environmental Specifications

Parameter	Min	Typ	Max	Units	Notes
Coolant Water Inlet Temperature[6,7]	2		30	°C	
Operating Ambient Air Temperature	2		50	°C	
Cooling Flow Rate	0.2 0.76		0.66 2.5	GPM L/min	
Cold Plate Inlet Pressure	30		100	psi	
Cold Plate Pressure Drop		10		psi	at the minimum flow rate
Conduction cold-plate temperature	2		30	°C	
Operating Altitude			3000 / 10k	m / ft	
Non-operating Altitude			9000 / 30k	m / ft	
Relative Humidity	The product should be operated under controlled temperature and humidity conditions with ambient below 50°C and below 60% Relative Humidity.				
Shock Operational	IEC 60068-2-27				
Vibration Operational	IEC 60068-2-64				

[6]Coolant must remain free of algae and corrosion products. The use of suitable inhibitors in the coolant is recommended and compatible with copper tubing. Full-rated output power is available up to 30°C inlet water temperature (lower for coolants other than water).

[7]Water connections are indicated by color on faceplate (blue – cool inlet, red – warm exit). Water delivery method should include strain relief feature to mitigate the risk of water leak in the end product. Leak detection and protection mechanisms should be used to mitigate the effect of water leaks. Care must be taken to prevent water clogs that could reduce the water pressure or restrict flow.

CC7500x3B86TEZ Technical Specifications (continued)

EMC#

Parameter	Function	Standard	Level	Criteria	Test
AC input	Conducted emissions	EN55032, FCC part 15	A - 3dB margin		0.15 – 30MHz
	Radiated emissions[8]	EN55032/CISPR32, FCC part 15 Subpart A,			30 – 10000MHz
	Input Harmonics	IEC61000-3-12 THD	A 5%		
AC Input Immunity	Line DIP and Short interruptions	IEC61000-4-34 Dip	Class 3	B B	-30% (from nominal) for 25/30 cycles -100%, 1 cycle
		IEC61000-4-34 short interruption	Class 3	B	25% sag from nominal for 250/300 cycles
				A	1/2 cycle -100% interruption
	Lightning surge	EN61000-4-5, Level 4, 1.2/50µs – error free		A	4kV L-E
				A	2kV L-L
	Fast transients	EN61000-4-4	3	A	5/50ns, 2kV (common mode)
Enclosure immunity	Conducted RF fields	EN61000-4-6	3	A	140dBµV, 0.15-80MHz, 80%
	Radiated RF fields	EN61000-4-3	3	A	10V/m, 80-1000MHz, 80%
	ESD	EN61000-4-2	4	A	8kV contact, 15kV air
	Magnetic Field Immunity	EN61000-4-8	4	A	

Criteria	Performance
A	No performance degradation
B	Temporary loss of function or degradation not requiring manual intervention
C	Temporary loss of function or degradation that may require manual intervention
D	Loss of function with possible permanent damage

#Surges and sags applied one Ø at a time and all 3Ø's simultaneously; phase angles 0°, 90°, 270°.

[8]Test with system. OmniOn Power™ assumed a ferrite core is used in the AC input line. The core used by OmniOn Power™ is PN 2631626202 from Fair-Rite.

CC7500x3B86TEZ Technical Specifications (continued)

Control and Status

The Rectifier provides two methods for monitor and control, analog and the Modbus protocol.

Signal Reference

Unless otherwise noted, all signals, the standby output, and Modbus communications are referenced to Logic Ground (LGND). See the Signal Definitions Table at the end of this document for further description of all the signals.

LGND is capacitively coupled to the chassis which is connected inside the rectifier to the safety GND lead. The maximum voltage differential between LGND and Chassis (GND) should be less than $100V_{DC}$. It is assumed that the end user will connect LGND to the digital ground reference in the system.

LGND is isolated from the main output of the rectifier.

Control Signals

Interlock 1 & 2: These two pins provide redundant emergency stop function. Either interlock pin open (low) will turn off main output immediately. To turn ON the main output, each Interlock pin & the Enable pin must be driven high by injecting between 3mA (min) & 6mA (max) into each. The internal circuit for each pin is an opto-isolator diode (~1.1V) with 5.9kohm in series to LGND.

LED/analog signals/communication can report status correctly when interlock is open.

Interlock is top priority no matter Enable/Modbus command status.

Enable: Remote on/off for the main output with system control. Logic high to turn ON the main output and Logic low (open) to turn OFF in < 200ms. To drive the pin high, between 3mA (min) & 6mA (max) must be driven into the pin as described above for Interlock 1 & 2.

Refer the on/off logic table combined interlock and Enable.

Input	Interlock 1	Low/ Open	High	Low/ Open	High	High
	Interlock 2	Low/ Open	Low/ Open	High	High	High
	Enable	Low/ Open	Low/ Open	Low/ Open	High	Low/ Open

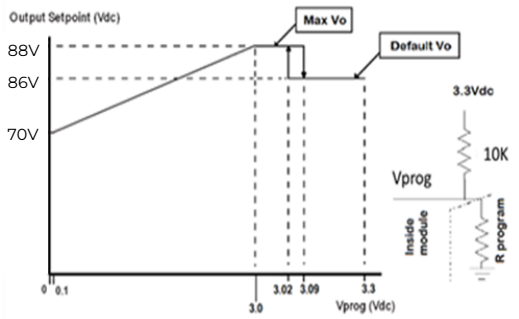
Output	EMG	High	High	High	Low	Low
	PG	Low	Low	Low	High	Low
	Output Voltage	Off	Off	Off	ON	Off

Voltage programming (V_{prog}): Hardware voltage programming controls the output voltage until a software command to change the output voltage is executed. Software voltage programming permanently overrides the hardware margin setting and the rectifier no longer listens to any hardware margin settings until power to the controller is interrupted, for example if input power or bias power is recycled.

When bias power is recycled to the controller the controller restarts into its default configuration, programmed to set the output as instructed by the V_{prog} pin. Again, subsequent software commanded settings permanently override the margin setting. As an example, applying a voltage between V_{prog} and LGND is an effective way of changing the factory set point of the rectifier to whatever voltage level is desired by the user during initial start-up.

The V_{prog} pin level should be set by a divider from $3.3V_{DC}$ to LGND external to the rectifier as shown in the graph. Programming can be accomplished either by a resistor divider or by a voltage source injecting a precision voltage level into the V_{prog} pin. Above $3V_{DC}$ the rectifier sets the output to its default state.

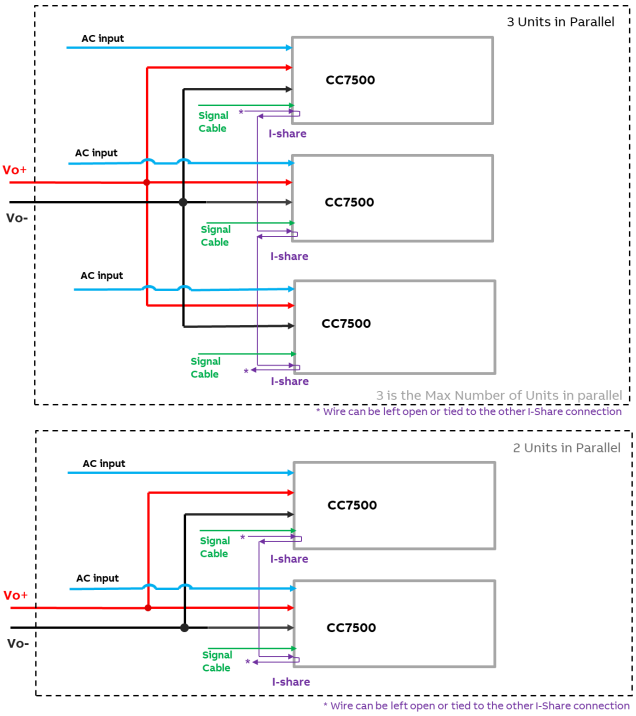
If V_{prog} feature is not used, keep this pin open. this signal is pulled up to 3.3V with a resistor inside, therefore output voltage is default factory setting.



CC7500x3B86TEZ Technical Specifications (continued)

I_share (after P0 stage)

Load share (Ishare): This is a single wire analog signal that is generated and acted upon automatically by rectifiers connected in parallel. Ishare pins should be connected to each other for rectifiers, if active current share among the rectifiers is desired. No resistors or capacitors should get connected to this pin. I_share refers Vo- as ground.



Status Signals

EMG: This signal represents the status of interlocks input. This signal is pulled up with a 5kohm resistor inside, VCC_ext needs to be sourced outside the rectifier. When either interlock input is open this signal will be HI.

PG: This signal is HI when the main output is delivered and goes LO if the main output is out of regulation. This signal is pulled up with a 5kohm resistor inside, 24V needs to be sourced outside the rectifier.

Fault Signals

Fault_1 (Pin 13): This signal representing whether a Fault occurred (see table p.11). This signal is pulled up with a 5kohm resistor to VCC_ext, where 24V needs to be sourced outside the rectifier. This signal goes LO when the unit needs attention.

Fault_0 (Pin 11): Indicates inability to provide power according to the table on p.11. These signals are pulled up with an internal 5 kohm resistor to VCC_ext, where 24V needs to be sourced outside the rectifier.

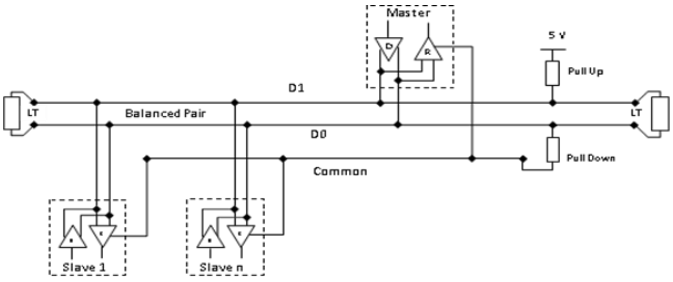
Communication

CC7500X3B86TEZ supports Modbus communication to control and monitor the device. It also supports firmware remote upgrade and black box.

Refer to the Modbus Communication Protocol Feature Document Issue 0.1 for details.

Modbus Physical layer:

Modbus over a serial line should implement an electrical interface in accordance with EIA/TIA-485 standard (also known as RS485 standard). This standard allows point to point and multipoint systems, in a “two-wire configuration”.



Hardware signal pin named “Modbus+” is presented as “D1” and “Modbus-” as “D0”.

Modbus mode

Supports RTU mode

The format (11 bits) for each byte in RTU mode is:

- Coding System: 8-bit binary
- Per Byte: 1 start bit, 8 data bits, 1 parity bit, 1 stop bit
- Parity: Default is even parity
- Baud: Default is 19200

Modbus Addressing

The Modbus addressing space comprises of 256 different addresses.

0	From 1 to 247	From 248 to 255
Broadcast address	Slave individual addresses	Reserved

The Address 0 is reserved as the broadcast address. All slave nodes must recognize the broadcast address. The Modbus Master node has no specific address, only the slave nodes must have an address. This address must be unique on a Modbus serial bus. As slave, CC7500X3B86TEZ supports 1-99 addresses setting through addr_0, addr_1.

Addr_0 to Addr_1

Treat the Addr_0 pin as a ones place and Addr_1 as a tens place to make up the unit's address. Each address pin is pulled up to an internal 3.3V through a 10K ohm resistor. The external resistor, Rs, connected to LGND changes the voltage level to configure the address according to the table below.

Addr_1 is to set tens place for the address, and Addr_0 is to set one place.

Tens or one place	Voltage level	R_S (± 0.1%)
1	3.30	open
2	2.67	45.3k
3	2.34	24.9k
4	2.01	15.4k
5	1.68	10.5k
6	1.35	7.15k
7	1.02	4.99k
8	0.69	2.49k
9	0.36	1.27k
0	0	0

For example, if address 0x10d required, the Addr_1 with 0ohm resistor for 0 and the Addr_0 pin open for 1. Unit will keep default address 0x11d when all address pins are open.

Black Box

Contents of the black box and more detailed information about the specifics of the feature are described in a separate document. The intent here is to provide a high-level summary. This feature includes the following.

1. A rolling event Recorder
2. Operational Use Statistics

Remote upgrade

CC7500X3B86TEZ supports to upgrade firmware on live through Modbus.

LEDs

Three LEDs are located on the front faceplate of the device. The AC_OK LED provides visual indication of the INPUT signal function. When the LED is ON and GREEN, the rectifier input is within normal design limits.

The second LED is the DC_OK LED. When it is GREEN, the DC output is present. When 'blinking', a power limit or overload condition exists. When it is OFF, the output is not present.

The third LED is the FAULT LED. A continous RED condition indicates that a fault exists and the rectifier has been shut down. A 'blinking' RED LED indicates an over-temperature warning.

Both FAULT LED and DC_OK LED 'blinking' indicates an interlock is OPEN.

A communication fail alert is enabled after communications is established. If during power up, communications is not sensed, then the communication fail alert can not be asserted. If at any time during operation there is communications established, then the communication fail alert can occur if communication is lost.

There is a communication fail alert timeout default of 30 seconds, where if communications has been established and the device does not communicate for 30 seconds, the communication fail alert will assert. This timeout can be changed via a Modbus register. The communication fail alert feature can also be enabled/disabled via a Modbus register, if you do not want a timeout/comm fail to be detected.

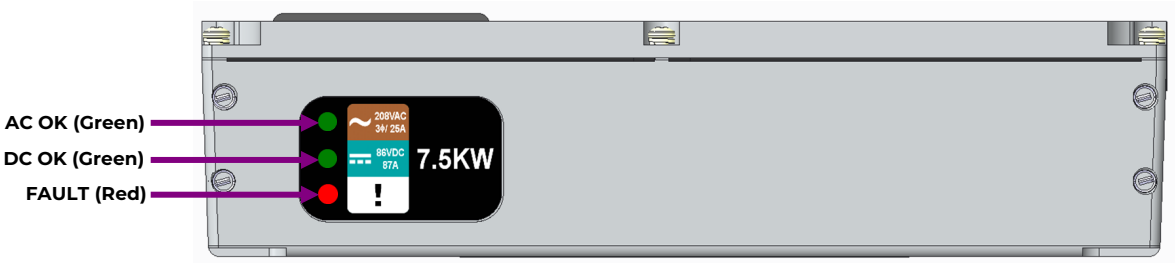
CC7500x3B86TEZ Technical Specifications (continued)

Alarm and LED state summary

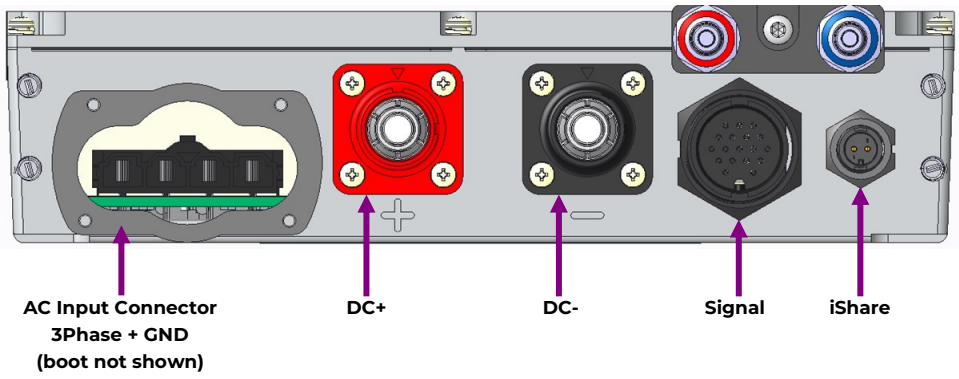
	Power Supply LED State			Signals State			
Condition	**AC OK Green**	**Fault Red**	**DC OK Green**	**Fault_1 (Pin 13)**	**Fault_0 (Pin 11)**	**PG**	**EMG**
OK	1	0	1	High	High	High	LOW
Over-Temperature Warning (OTW) 5°C before shutdown)	1	Blinks	1	LOW	High	High	LOW
Over temperature Shutdown	1	1	0	LOW	LOW	LOW	LOW
AC Present but not within limits	Blinks	0	0	High	LOW	LOW	LOW
Boost Stage Failure	1	1	0	LOW	LOW	LOW	LOW
Over Voltage Latched Shutdown	1	1	0	LOW	LOW	LOW	LOW
Over Current	1	0	Blinks	High	LOW	Pulse	LOW
Non-catastrophic Internal Failure	1	1	1	LOW	High	High	LOW
Standby (remote enable/ communication command)	1	0	0	High	High	LOW	LOW
Emergency stop (either interlock open)	1	Blinks	Blinks	High	High	LOW	High
Comm. Fail (loss of Comm.)	1	Blinks	1	High	High	High	LOW

CC7500x3B86TEZ Technical Specifications (continued)

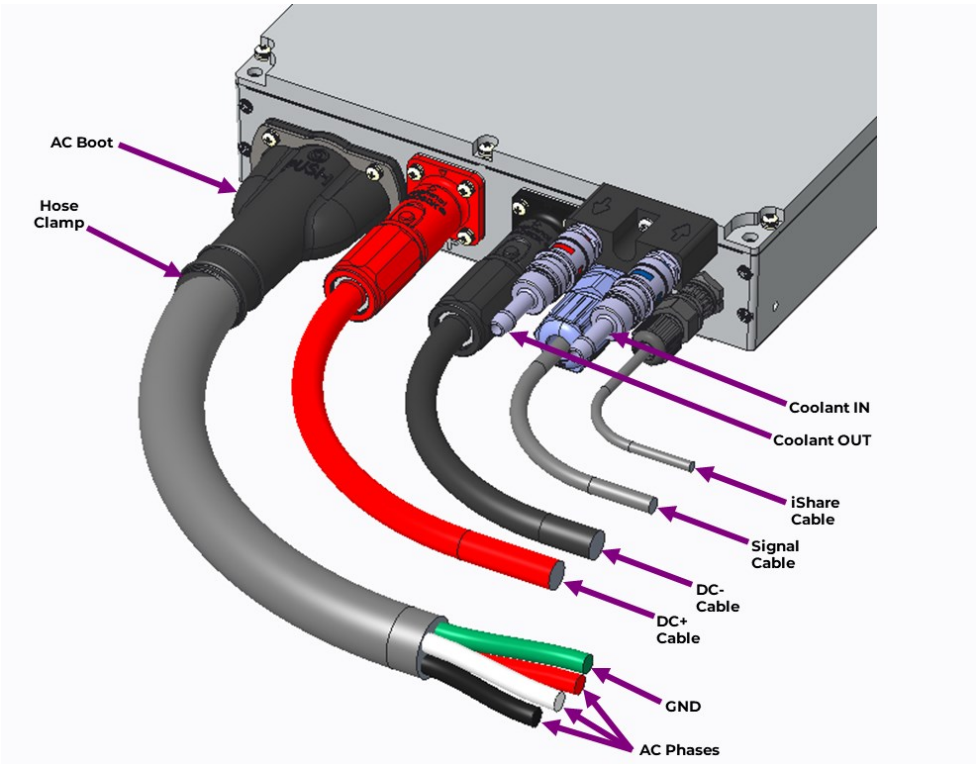
Front view



Rear view



Connectors without mated pairs, covers and cables

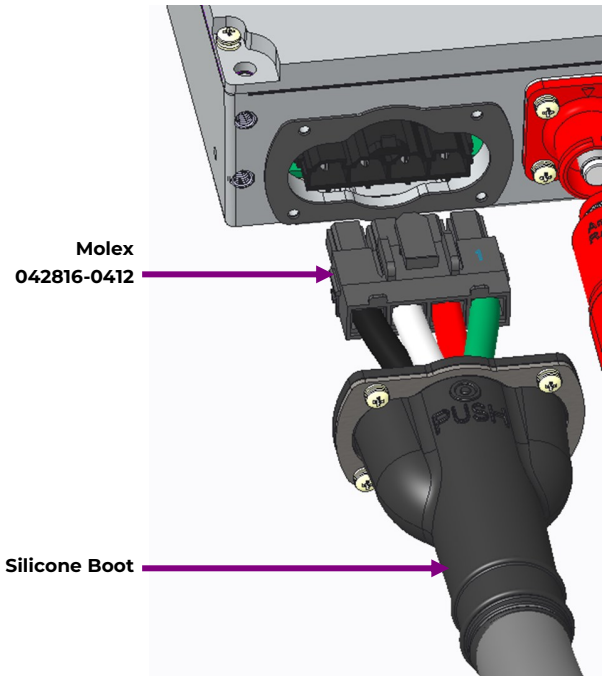


Connectors with mated pairs, AC boot and cables

CC7500x3B86TEZ Technical Specifications (continued)

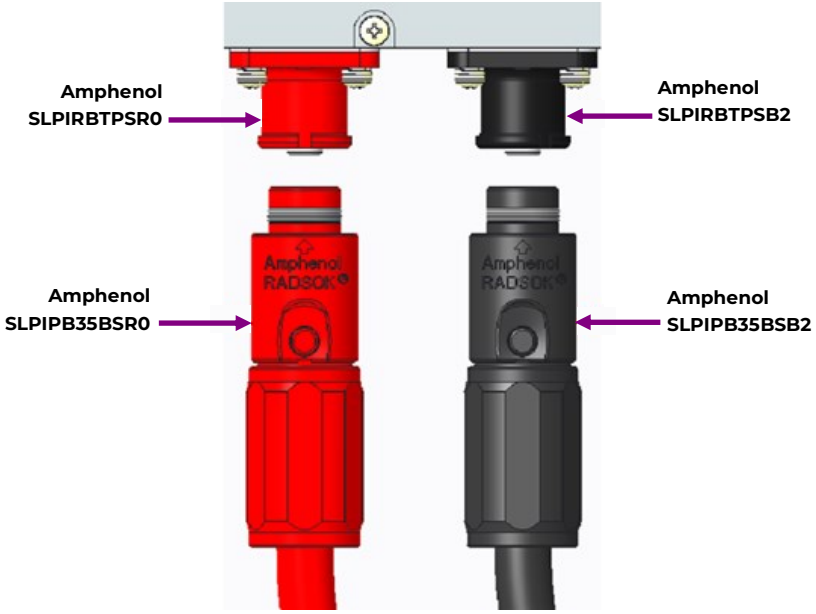
AC Input connector

Installed AC connector is Molex Mini-fit Sr, **Molex 042820-4224**, Rated for 8AWG and 50A.
Mating connector is **Molex 042816-0412**.
A plastic cover is provided to provide water protection.



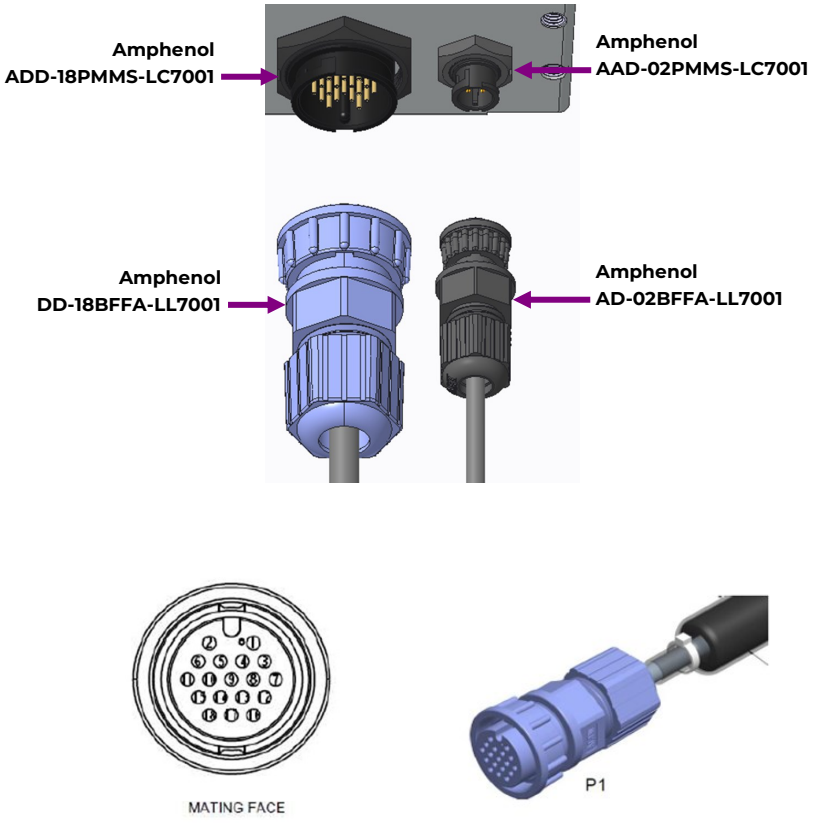
DC Output connector

DC connectors on rectifier are Amphenol Surlok waterproof connectors, SLPIRBTPSR0, Red, 90deg key, and SLPIRBTPSB2, Black, 60deg key.
Mating connectors are Amphenol SLPIPB35BSR0, Red, 90deg key, and SLPIPB35BSB2, Black, 60deg key. They support 2 AWG wire field termination using standard crimping tools.



CC7500x3B86TEZ Technical Specifications (continued)

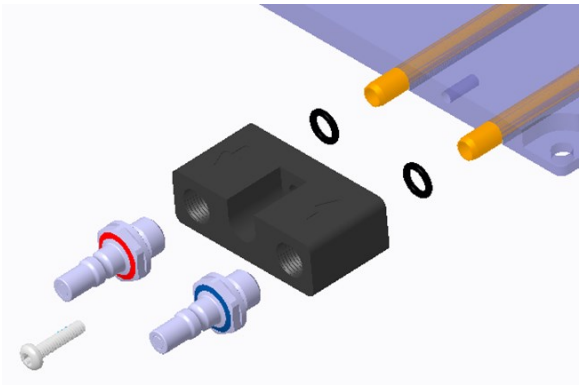
Signal & Current-Share Connectors

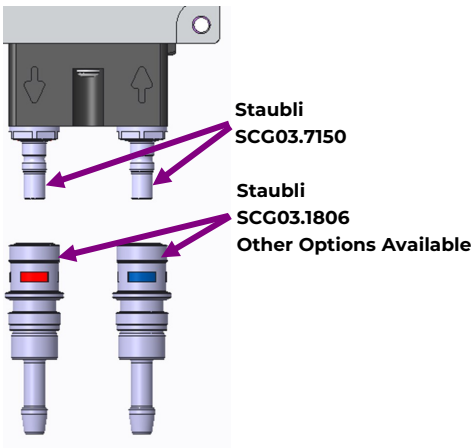


Signal cable (Ordering code: 1600447136A)

Water connections

The rectifier uses dripless liquid quick-connects for the cold plate connections. They are Staubli SCG03.7150 plugs (with G 1/8 threads) that will mate with any Staubli SCG03 socket.





CC7500x3B86TEZ Technical Specifications (continued)

Signal table

Connector	Pin	Label	Type	Description
Signal	1	Modbus+		Modbus communication wire D1, refer to LGND
	2	Modbus-		Modbus communication wire D0, refer to LGND
	3	LGND	Reference ground	Isolated from the main output & SEC_RTN.
	4	5Vstby	Output	5V @ 0.75A provided for external use; return is LGND. This output is always ON.
	5	Vprog	Input	Vo programing
	6	Addr_0	Input	Address setting
	7	Addr_1	Input	Address setting
	8	Intlock_1	Input	Emergency stop to turn OFF the main output within 50ms. Open (not connected) turns OFF; 3mA (min) to 6mA (max) into the pin turns ON. The internal circuit is an opto-isolator diode (~1.1V) with 5900 ohms in series to LGND, so supplying an external voltage of 24V turns ON.
	9	Intlock_2	Input	Emergency stop to turn OFF the main output within 50ms. Open (not connected) turns OFF; 3mA (min) to 6mA (max) into the pin turns ON. The internal circuit is an opto-isolator diode (~1.1V) with 5900 ohms in series to LGND, so supplying an external voltage of 24V turns ON.
	10	Enable	Input	Turns the main output ON/OFF. Open (not connected) turns OFF; 3mA (min) to 6mA (max) into the pin turns ON. The internal circuit is an opto-isolator diode (~1.1V) with 5900 ohms in series to LGND, so supplying an external voltage of 24V turns ON.
	11	Fault_0	Output	Indicates inability to provide power - see table p.11. Open-collector type, pulled up internally to VCC_ext. Sink current is 5mA max. Normal is logic High.
	12	PG	Output	V_O is in regulation Open-collector type, pulled up internally to VCC_ext. Sink current is 5mA max. max voltage is VCC_ext. Normal is logic Hi.
	13	Fault_1	Output	Internal fault - see table p.11. Open-collector type, pulled up internally to VCC_ext. Sink current is 5mA max, max voltage is VCC_ext. Normal is logic High; goes low when unit needs attention.
	14	EMG	Output	“Emergency” interlock status: Logic Low when both interlocks are satisfied (= ON = powered). Pulled up internally to VCC_ext.
	15	VCC_ext	Input	External pull-up voltage for output signals, referred to LGND and connected to internal 5K pull-up resistors. Set less than the maximum input voltage of connected devices, and < 30V abs max.
	16	–	–	
	17	–	–	
	18	–	–	
I-Share	1	ISHARE	–	A single wire active-current-share interconnect between rectifiers Ref: Vout (-)
	2	ISHARE	–	Same signal as above, for daisy-chaining.

Modbus Registers

All registers in this document are 0-based. Holding register 40001 is addressed as 0001 in a Modbus message.

Reg Address	Reg length	Register Name	R/W	Reg type	Note
1	18	SERIAL_NUMBER	R/W	STR18	
19	1	GROUP_ADDRESS	R/W	INT	
20	11	COMCODE	R/W	STR11	
31	20	STATION_TYPE_R	R	STR20	
51	7	SERIES	R/W	STR7	XX: YYZ, XX YY is 0-9, Z is A-Z
58	7	SEC_APPLICATION_VERSION	R	STR7	VERmaj, VERmin, Month, Day, Year, Hour, Minutes
65	7	PRI_APPLICATION_VERSION	R	STR7	VERmaj, VERmin, Month, Day, Year, Hour, Minutes
72	10	CLEI_NUMBER	R	STR10	
82	1	CAPACITY	R	INT	Current capacity of rectifier (A x 10)
84	2	ON_TIME	R	INT	In hours
301	1	RECT_STATUS	R		Device Status 0001h: 1 = oring FET failed 0002h: 1 = AC input failure 0004h: Not Used 0008h: 1 = Rectifier shutdown due to thermal alarm 0010h: 1 = Rectifier failure 0020h: Not Used 0040h: 1 = Load share imbalance 0080h: 1 = Participating in load share (Enabled) 0100h: Manual Off, 1 = Manually OFF 0200h:1 = Standby from controller requested 0400h: 1 = Rectifier shutdown due to high voltage 0800h: Rectifier Power Status, 1 = On and producing power 1000h: 1 = Ready to participate in load share 2000h: 1 = ID # has changed (cleared when read) 4000h: 1 = Fan failed 8000h: 1 = Rectifier is in current limit/ Power Limit
500	1	VIN_RMS_A	R	INT	Input voltage phase A in VIN_RSU
501	1	VIN_RMS_B	R	INT	Input voltage phase B in VIN_RSU
502	1	VIN_RMS_C	R	INT	Input voltage phase C in VIN_RSU
503	1	IIN_RMS_A	R	INT	Input current phase A in IIN_RSU
504	1	IIN_RMS_B	R	INT	Input current phase B in IIN_RSU
505	1	IIN_RMS_C	R	INT	Input current phase C in IIN_RSU
506	1	AC_POWER_ALL	R	INT	Input power all phases in PIN_RSU
523	1	VCATHODE (volts)	R	INT	Output voltage in VOUT_RSU
524	1	VANODE (volts)	R	INT	Output voltage in VOUT_RSU
527	1	OUTPUT CURRENT	R	INT	Output current in IOUT_RSU
529	1	OUTPUT POWER	R	INT	Output Power in Watts

CC7500x3B86TEZ Technical Specifications (continued)

Modbus Registers (continued)

Reg Address	Reg length (word)	Register Name	R/W	Reg type	Note
531	1	TEMP_INTERNAL (hottest)	R	INT	Hottest Temperature in TEMP_RSU (Celsius)
532	1	TEMP_DCDC	R	INT	Temperature in TEMP_RSU (Celsius)
533	1	TEMP_PFC	R	INT	Temperature in TEMP_RSU (Celsius)
534	1	TEMP_SYNC	R	INT	Temperature in TEMP_RSU (Celsius)
535	1	TEMP_ORFET	R	INT	Temperature in TEMP_RSU (Celsius)
536	1	TEMP_AMBIENT	R	INT	Temperature in TEMP_RSU (Celsius)
803	1	CMD_ALL	R/W		00 01h Standby 00 02h Unit On 00 04h HV Shutdown 00 08h Loadshare On 00 10h Loadshare Off 00 20h Restart 00 40h Lamp Test 00 80h 01 00h Fault LED On 02 00h Fault LED Off 04 00h Oring FET Test 08 00h 10 00h 20 00h 40 00h 80 00h
850	1	VIN_RSU_R	R		Readback scaling factor for input voltage
851	1	IIN_RSU_R	R		Readback scaling factor for input current
852	1	PIN_RSU_R	R		Readback scaling factor for input power
853	1	FIN_RSU_R	R		Readback scaling factor for input frequency
854	1	VBUS_RSU_R	R		Readback scaling factor for bus voltage
860	1	VOUT_RSU_R	R		Readback scaling factor for output voltage
861	1	IOUT_RSU_R	R		Readback scaling factor for output current
862	1	POUT_RSU_R	R		Readback scaling factor for output power
870	1	TEMP_RSU_R	R		Readback scaling factor for temperature
904	1	VSET	R/W	INT	Vout set-point (non-volatile memory) in VOUT_RSU
905	1	VCMD	R/W	INT	Vout set-point (volatile memory) in VOUT_RSU
920	1	CL_PERCENT	R/W	INT	Current limit set point in % of rectifier capacity. Configurable from 30 to 100.
922	1	ISHVSD	R/W	INT	Individual selective high voltage shutdown in VOUT_RSU
1100	1	COMM_LOSS TIMEOUT_VALUE	R/W	UINT	In seconds
1101	1	COMM_LOSS TIMEOUT_DISABLE	R/W	INT	Write 1 to disable, write 0 to enable (default is enabled)

Byte format

The format (11 bits) for each byte in RTU mode is:

Coding System: 8-bit binary

Bits per Byte: 1 start bit, 8 data bits, 1 parity bit, 1 stop bit

Parity: even

Baud: 19200

Supported Function Codes

0x03: Read Holding Registers

0x06: Write Single Holding Register

0x10: Write Multi Holding Register

References

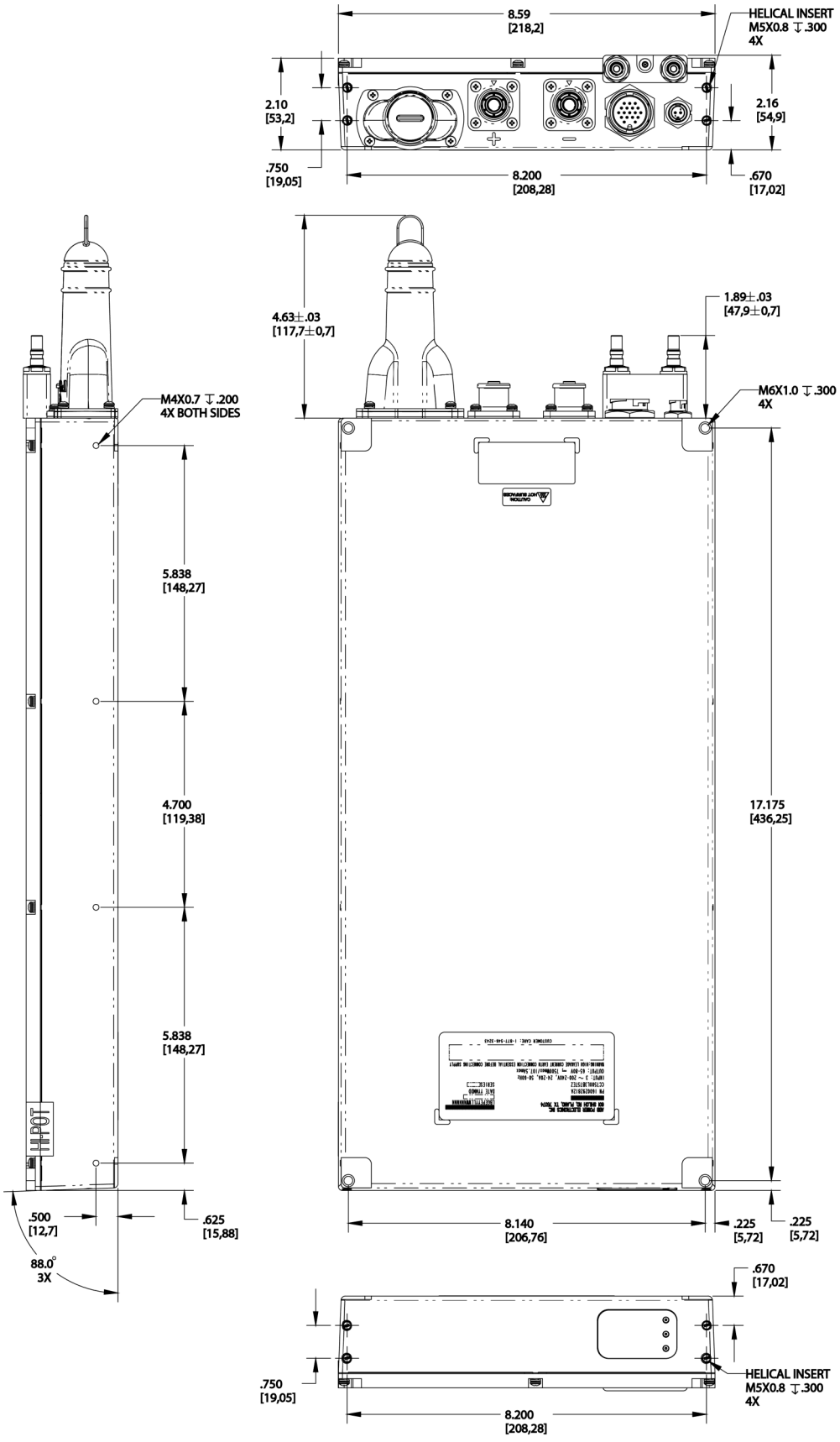
1. OmniOn “Galaxy Communication Protocol Feature Document”（99ESSS001）Ver 2.19 Team
2. Modbus application protocol V1.1b3
3. Modbus Serial Line Protocol and Implementation Guide V1.02
4. OmniOn ACS510 low voltage AC drivers User manual
5. OmniOn AC500 PLC user manual

Standard Modbus Exception Codes

Code	Name	Description
1	Illegal Function	The function code received in the query is not an allowable action for the slave. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.
2	Illegal Data Address	The data address received in the query is not an allowable address for the slave.
3	Illegal Data Value	A value contained in the query data field is not an allowable value for the slave.

CC7500x3B86TEZ Mechanical Specifications

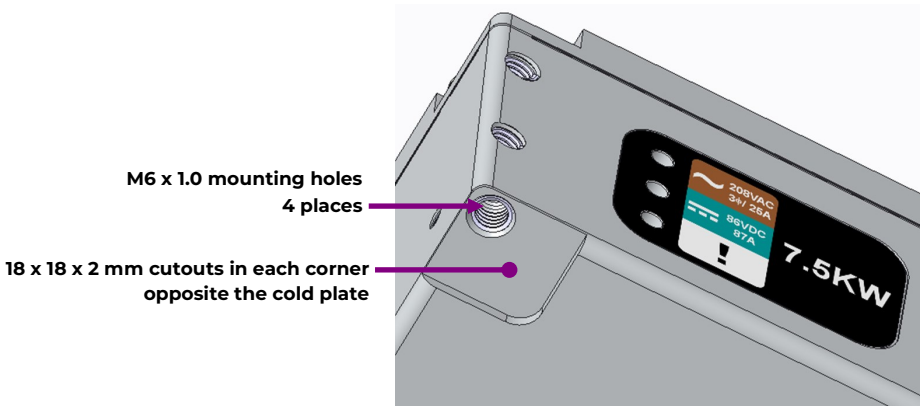
Mechanical Drawing

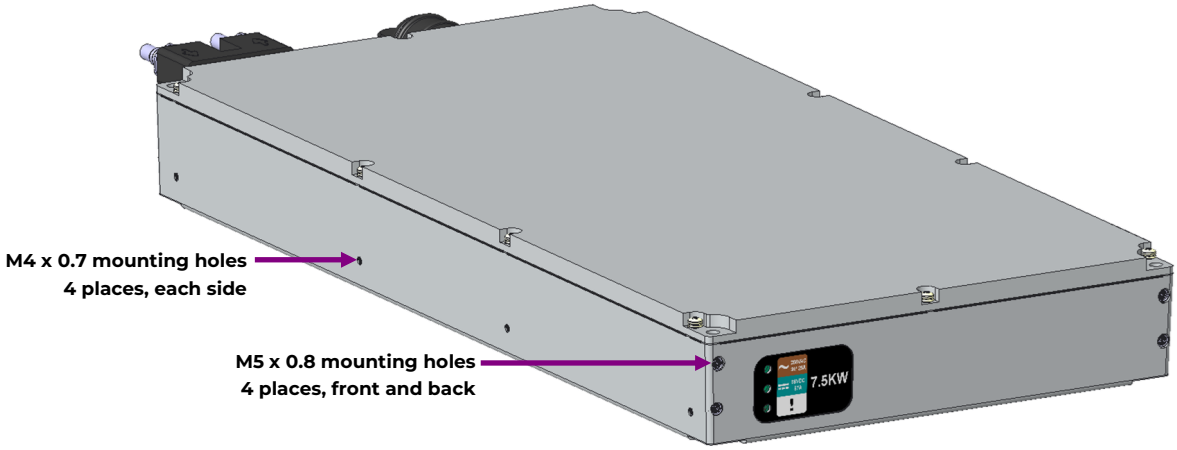


CC7500x3B86TEZ Technical Specifications (continued)

Mounting Instruction

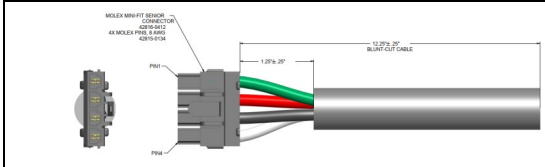
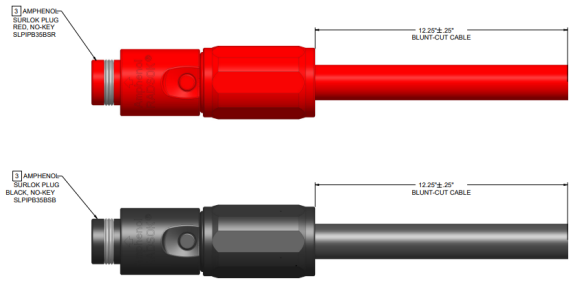
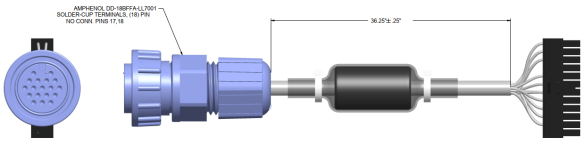
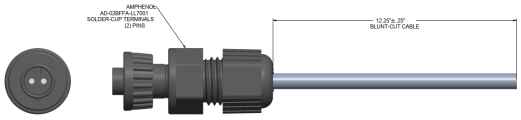
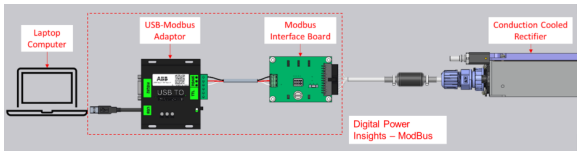
Bracket Landings





CC7500x3B86TEZ Ordering Information

Accessories

Picture	Item	Description	Ordering code
	AC Cable	3ph Delta with Ground, 8AWG, 311mm	1600447138A
	DC Cable	Surlok, Red/Black pair, 2AWG, 311mm	1600447137A
	Signal Cable	ModBus and Alarms, 412mm, 24AWG, with Integrated EMI filter	1600447136A
	Share Cable	Load Share, 311mm, 22AWG	1600447322A
	Digital Power Insights – ModBus Developers Toolkit	ModBus Adaptor, Interface Board, Downloadable GUI and Instructions (Requires Signal Cable 1600447136A Purchased separately)	1600464989A

Please contact your OmniOn Power™ Sales Representative for pricing, availability and optional features.

Item	Description	Ordering code
CC7500L3B86TEZ	7500W 200-240V_{AC} to 86V_{DC} Rectifier, water cooled	1600481550A
CC7500H3B86TEZ	7500W 380-480V_{AC} to 86V_{DC} Rectifier, water cooled	1600481752A

Change History (excludes grammar & clarifications)

Revision	Date	Description of the change
1.0	07-02-2025	Initial Release

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601 Shiloh Rd.
Plano, TX USA

omnionpower.com