1600W 1U Front End Power Supplies

https://product.tdk.com/en/power/hfe
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Industrial COTS Test COMM Broadcast

PMBus

The HFE1600 AC-DC industrial power supplies can be operated in a hot-swap redundant configuration, or used to provide up to 7,600W of bulk power. Up to five power supplies can be fitted in a variety of 19" 1U high racks, for configuration as a single or dual output. The HFE supplies have internal ORing MOSFETs and current share for automatic parallel operation. Communication is possible with the power supplies using the optional isolated PMBus™ (I²C) interface or a plug-in LAN module. AC fail, DC good, remote output adjust, remote on/off and a 12V auxiliary output are fitted as standard.

Features	Benefits
• Internal ORing MOSFET and Current Share	• Suitable For N+1 Redundancy
• Up to 7600W in 1U Rack	• Utilizes Less System Space
• Full Array of Signals Available	• Easy Remote Monitoring
• PMBus™ (I²C) and LAN options	• Industry Standard Communication Interfaces
• Analog Output Adjustment	• Simple External Resistance or Voltage Connection

Model Selector

Model	Output Voltage (V)	Adjustment Range (V)(1)	Max Current (A) (100≤Vin≤132Vac)(2)	Max Power (W) (100≤Vin≤132Vac)(2)	Max Current (A) (Vin≥170Vac)(2)	Max Power (W) (Vin≥170Vac)(2)
HFE1600-12	12	9.6 - 13.2	100	1200	133	1596
HFE1600-24	24	19.2 - 29	50	1200	67	1608
HFE1600-32	32	25.6 - 38.4	37.5	1200	47	1504
HFE1600-48	48	38.4 - 58	25	1200	33	1584

HFE1600-	12	/	S

Output voltage 12, 24, 32, 48

blank	No PMBus™ / I²C
S	PMBus™ / I²C interface

Model Selector (Racks and LAN)

Model	Description	Maximum Rack Current
HFE1600-S1U	Five slot 19" rack, IEC320-C16 input connectors (5)	266A each side (532A total)
HFE1600-S1U-TB	Five slot 19" rack, terminal block input connectors (5)	266A each side (532A total)
HFE1600/BP	One slot blanking panel, four provided with each rack	-
HFE/C15U	AC Power cord, 2.0m long, one per power supply required	-
HFE1600-D1U	Four slot (two isolated pairs), dual output 19" rack, IEC320 input	266A each side (532A total)
HFE1600-D1U-TB	Four slot (two isolated pairs), dual output 19" rack, terminal block input	266A each side (532A total)
HFE1600-LAN	Plug in LAN module. Takes up one rack slot. For use with /S power supplies only.	-

Specifications

Model		HFE1600-12	HFE1600-24	HFE1600-32	HFE1600-48
Input					
Input Voltage range (2)	Vac	85 - 265			
Input Frequency	Hz	47 - 63			
Input Current (Max) 115/230Vac	A	12.4 / 8.1			
Inrush Current	A	<35			
Leakage Current	mA	Less than 0.75/1.5mA at 100/230Vac, 60Hz			
Power Factor Correction	-	EN61000-3-2, PF >0.98 at full load			
Harmonic Compliance	-	Meets IEC61000-3-2			
Hold up time	ms	>10ms, 100/230Vac input, 80% loading			
Efficiency (4)	%	87 / 90	88 / 90	88 / 90	89 / 92
Conducted & Radiated EMI	-	EN55022 & FCC part 15; Conducted class B, Radiated class A			
Line Dip	-	Complies with SEMI F47 (200Vac line only)			
Immunity	-	See immunity section			
Safety Certifications and Markings	-	IEC/UL/CSA/EN62368-1, 60950-1, CE Mark and UKCA Mark			

Immunity

Test	Standard	Test Level	Criteria	Notes
ESD	EN61000-4-2	2,3	B	-
Radiated Susceptibility	EN61000-4-3	2	A	-
Electrical Fast Transient Burst	EN61000-4-4	2	B	-
Surge	EN61000-4-5	3,4	B	-
Conducted Susceptibility	EN61000-4-6	2	A	-
Magnetic Fields	EN61000-4-8	4	A	-
Voltage Dips and Input Interruptions	EN61000-4-11	>95% for 0.5 cycles	B	-
		30% for 25/30 cycles	C	-
		>95% for 250/300 cycles	C	-

Specifications

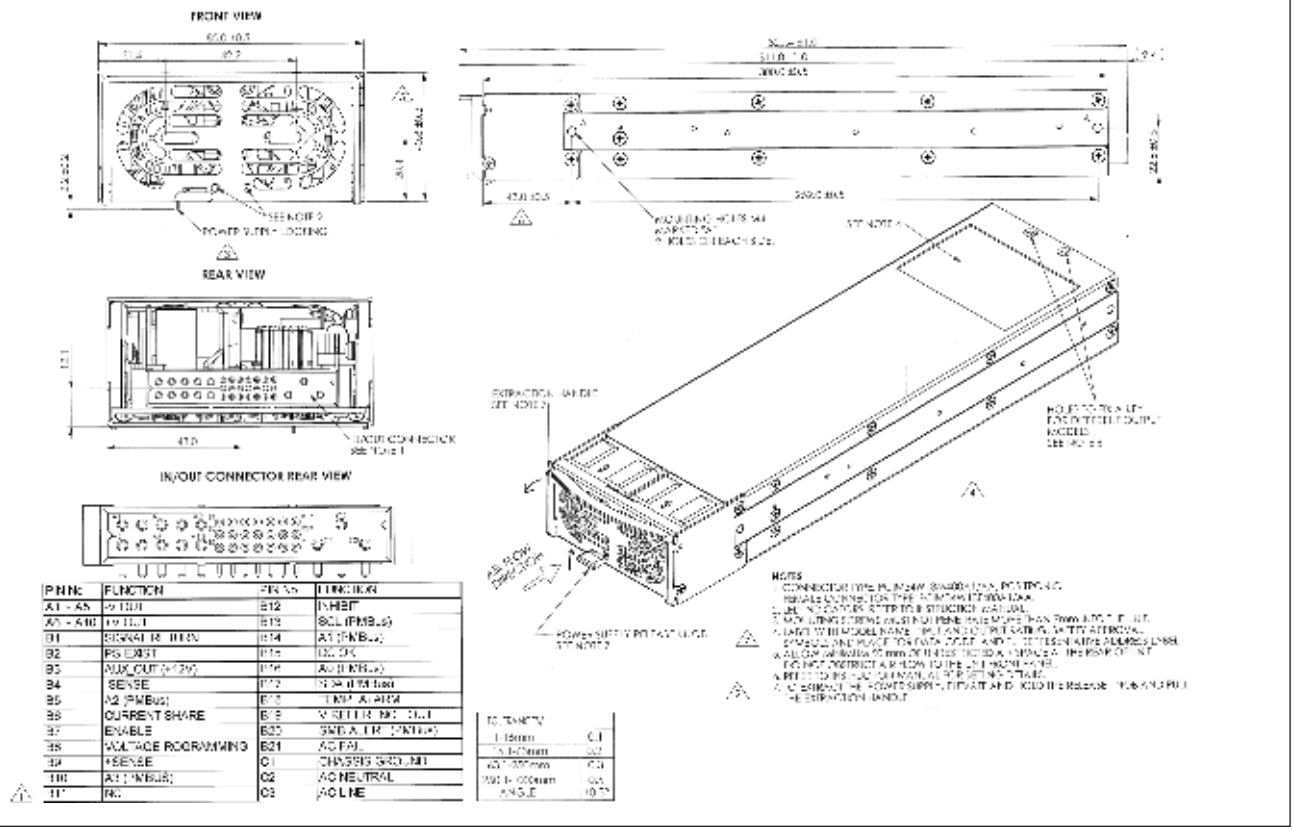
Model		HFE1600-12	HFE1600-24	HFE1600-32	HFE1600-48
Output					
Line Regulation	mV	30	60	80	120
Load Regulation	mV	60	120	160	240
External Load Capacitance	uF/A	1000			
Ripple & Noise (1)	mV	240	240	320	480
Temperature Coefficient	%/°C	<0.02			
Minimum Load	-	No minimum load required			
Overcurrent Protection	%	85V ≤ Vin < 132Vac: Minimum 105% of rated output current 170V ≤ Vin < 265Vac: 105~120% of rated output current.			
Overvoltage Protection (1)	%	110% (Tracking). Cycle AC to reset or utilize Remote On/Off			
Overtemperature Protection (1)	-	Shutdown with automatic reset. Warning signal provided.			
Remote Sense Compensation	V/wire	0.25	0.5	0.75	1.0
Remote On/Off	-	Unit ON: 0-0.6V or short, OFF: 2-15V or open circuit			
Remote Adjust	-	By either external 0-5V signal or 1k ohm potentiometer			
AC Fail Signal	-	Open Collector, ON when AC is within 85-270Vac			
DC Good Signal	-	Open Collector, ON when output is above 85 to 95% of setpoint (tracking)			
Auxiliary Output	-	11.2 - 12.5V, 0.5A, 240mV ripple and noise			
Communication	-	Optional isolated PMBus™ (I^2C) interface (/S suffix) or plug-in LAN module. See model selectors			
Indicators	-	DC OK - Green- >90% ±5% of set output voltage; AC OK - Green - 85 to 270Vac ; Green / Red LED			
Parallel Operation (1)	-	Yes, single wire current share, up to 90% accuracy (load dependant), up to 10 units			

Specifications

Model		HFE1600-12	HFE1600-24	HFE1600-32	HFE1600-48
Environnmental					
Operating Temperature	°C	-10 to +50: 100% load; +50 to +60 derate: 2%/°C of load; +60 to +70 derate: 2.5%/°C of load. For models with reverse air contact factory.			
Storage Temperature	°C	-30 to +85			
Humidity (non condensing)	%RH	Operating: 10 - 90, Storage: 10 - 95			
Cooling	-	Internal variable speed fans. Airflow enters from the front. Contact factory for reverse airflow option.			
Altitude	m	3000 max. Derate output current 2%/100m above 2000m.			
Withstand Voltage	-	I/P to O/P 3kVac, I/P to GND 2kVac. O/P to GND: HFE1600-12, -24V, -32V 500Vac, HFE1600-48 2250Vdc 1 min, (POE)			
Isolation Resistance	MΩ	>100 at 25°C, 70%RH & Output to Ground 500Vdc			
Vibration (Non-operating)	-	Meets IEC60068-2-64 (Basic Transportation)			
Shock (Non-operating)	-	Meets IEC60068-2-27 (Basic Transportation)			
Other					
Weight (Typ)	g	Power Supply: 1550, Rack: 4800			
Size (LxWxH)	mm	Power Supply: 300 x 85 x 41; Rack: 365 x 445 x 43.6			
Size (LxWxH)	Inches	Power Supply: 11.8 x 3.35 x 1.61; Rack: 14.4 x 17.5 x 1.72			
PMBus™ / I²C Interface (1)	-	Isolated from output, Add suffix /S, PMBus™ compatible			
MTBF - Telcordia	Hours	210,143			
Warranty	Years	Three			

Notes
(1) See installation manual for detailed specifications and test methods
(2) Derate output power linearly1%/V from 100Vac to 85Vac input
(3) Reverse air - contact factory
(4) At 75% load, 115 / 230Vac input

Outline Drawing HFE1600

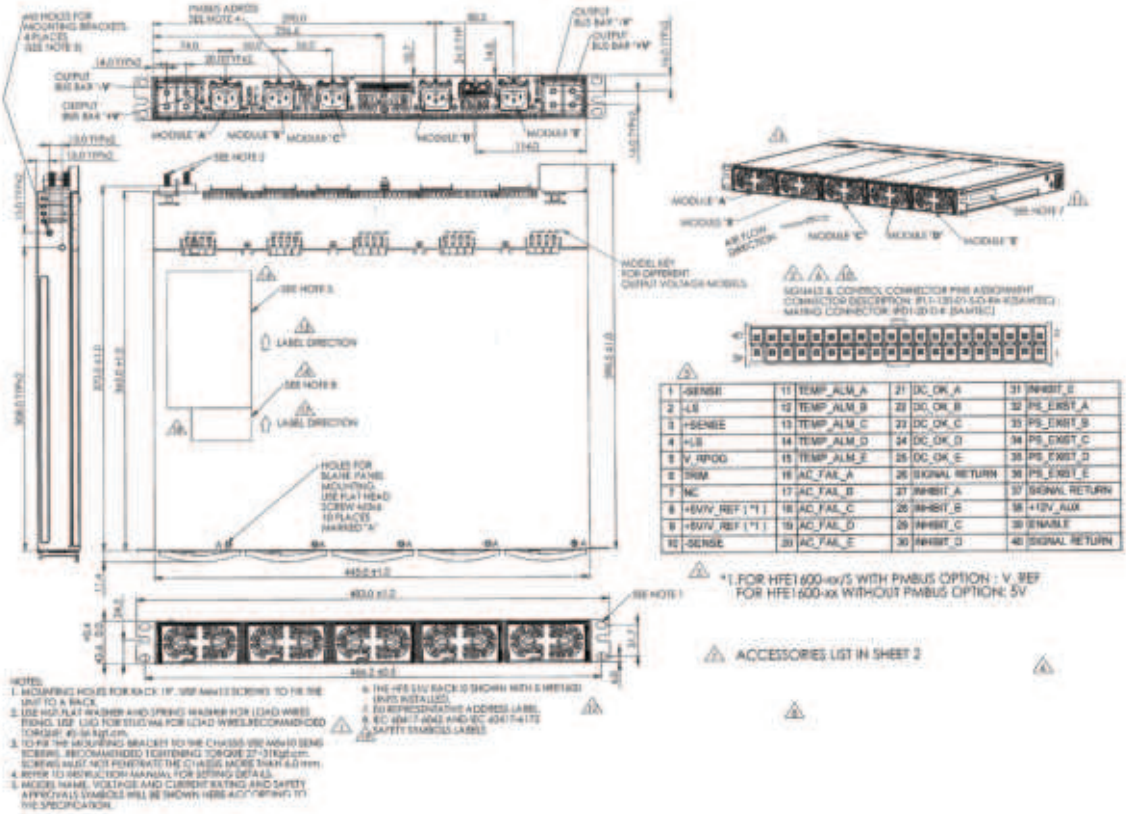


PIN No.	FUNCTION	PIN No.	FUNCTION
A1 ~ A5	-V OUT	B12	INHIBIT
A6 ~ A10	+V OUT	B13	SCL (PMBus)
B1	SIGNAL RETURN	B14	A1 (PMBus)
B2	PS EXIST	B15	DC OK
B3	AUX_OUT (+12V)	B16	A0 (PMBus)
B4	-SENSE	B17	+5V SET POINT ADJ
B5	A2 (PMBus)	B18	TEMP ALARM
B6	CURRENT SHARE	B19	V SETTER (NC) *1
B7	ENABLE	B20	SMB ALERT (PMBus)
B8	VOLTAGE PROGRAMMING	B21	AC FAIL
B9	+SENSE	C1	CHASSIS GROUND
B10	A3 (PMBus)	C2	AC NEUTRAL
B11	NC	C3	AC LINE

TOLERANCE	
1.5mm	±0.1
1.5~20mm	±0.2
20~200mm	±0.3
200.1~500mm	±0.5
ANGLE	±0.5°

NOTES
1. CONNECTOR TYPE: PLUG HAW 32A/DIN 41612, R/A, POLARIZED.
RECEPTACLE CONNECTOR: EITHER DIN 41612 OR EQUIVALENT.
2. SEE MOUNTING SCREWS AND SCREW PENETRATION DEPTH LIMITATIONS.
3. REFER TO THE MODEL NAME, INPUT AND OUTPUT RATINGS, SAFETY APPROVALS AND MARKINGS LABEL.
4. ALL DIMENSIONS IN mm. ALL UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY.
DO NOT OBSTRUCT AIR FLOW TO THE UNIT FRONT COVER.
5. REFER TO INSTRUCTION MANUAL FOR SETTING DETAILS.
6. TO ENSURE THE POWER SUPPLY OUTPUT AND VOLTAGE BALANCE, MAKE SURE THE EXTRACTION HANDLE

Outline Drawing HFE1600-S1U

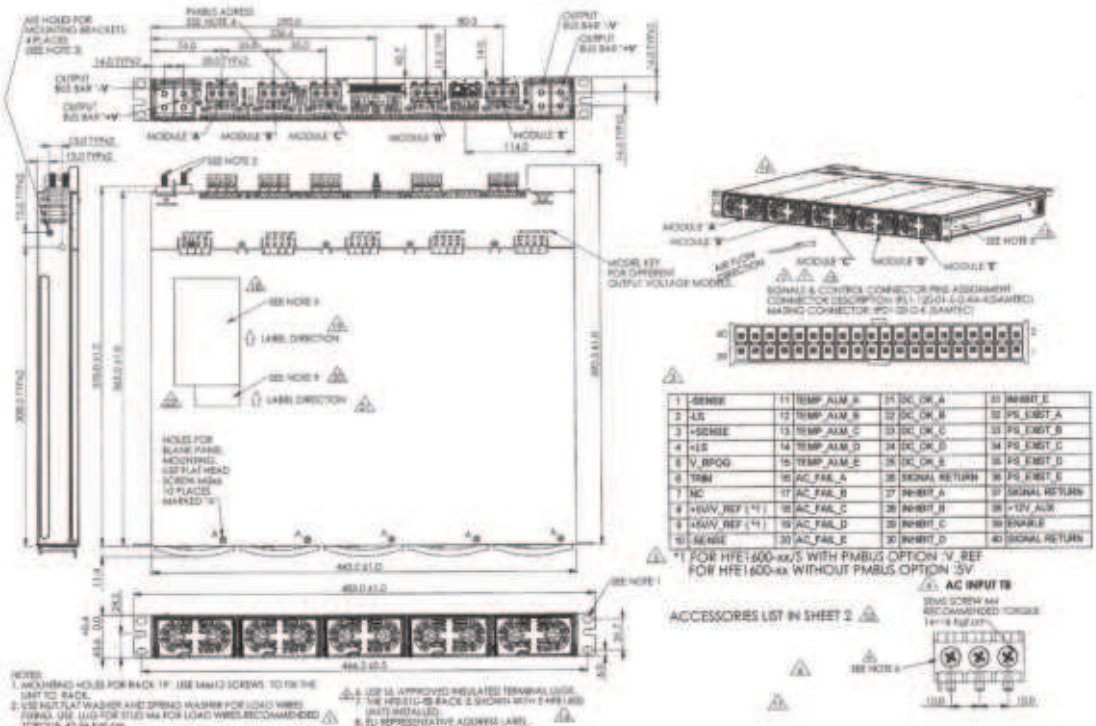


1	-SENSE	11	TEMP_ALM_A	21	DC_OK_A	31	INHIBIT_B
2	+S	12	TEMP_ALM_B	22	DC_OK_B	32	PS_EXIST_A
3	+SENSE	13	TEMP_ALM_C	23	DC_OK_C	33	PS_EXIST_B
4	+S	14	TEMP_ALM_D	24	DC_OK_D	34	PS_EXIST_C
5	V_RPOD	15	TEMP_ALM_E	25	DC_OK_E	35	PS_EXIST_D
6	TRIM	16	AC_FAIL_A	26	SIGNAL RETURN	36	PS_EXIST_E
7	NC	17	AC_FAIL_B	27	INHIBIT_A	37	SIGNAL RETURN
8	+5V/V_REF (*1)	18	AC_FAIL_C	28	INHIBIT_B	38	+12V_AUX
9	+5V/V_REF (*1)	19	AC_FAIL_D	29	INHIBIT_C	39	ENABLE
10	-SENSE	20	AC_FAIL_E	30	INHIBIT_D	40	SIGNAL RETURN

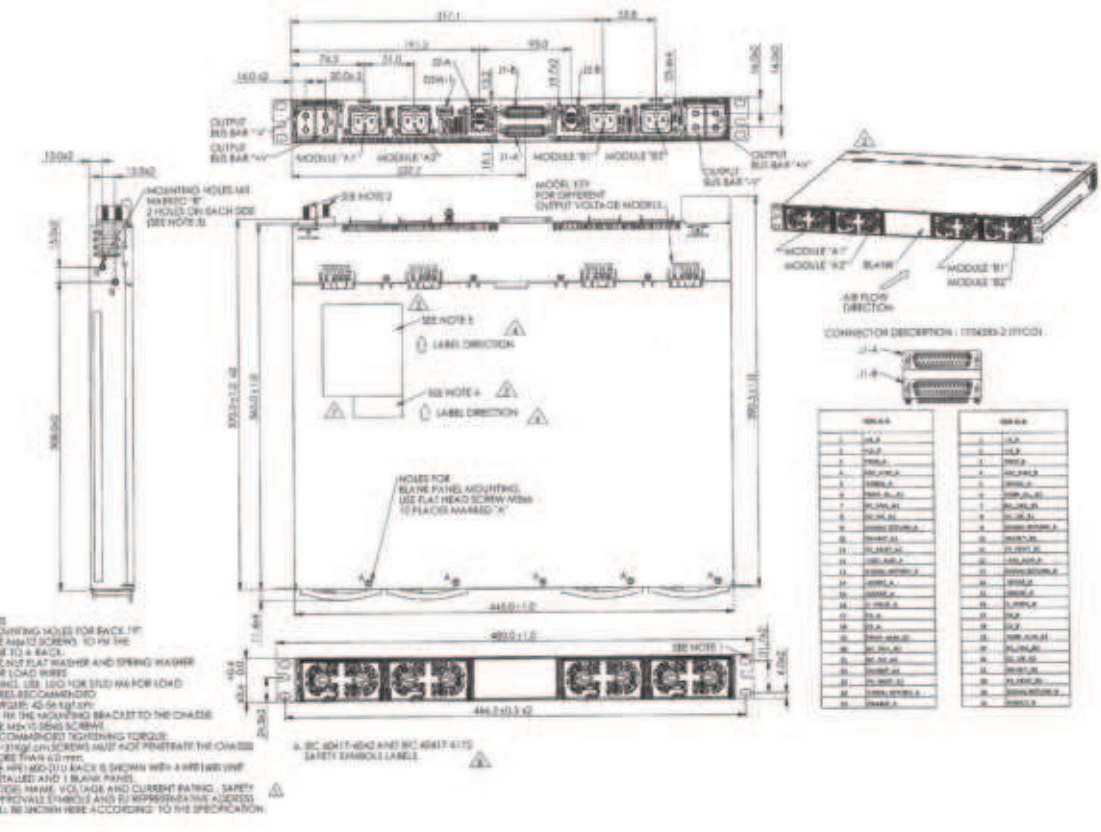
*1 FOR HFE1600-xx/S WITH PMBUS OPTION : V_REF
FOR HFE1600-xx WITHOUT PMBUS OPTION: 5V

ACCESSORIES LIST IN SHEET 2

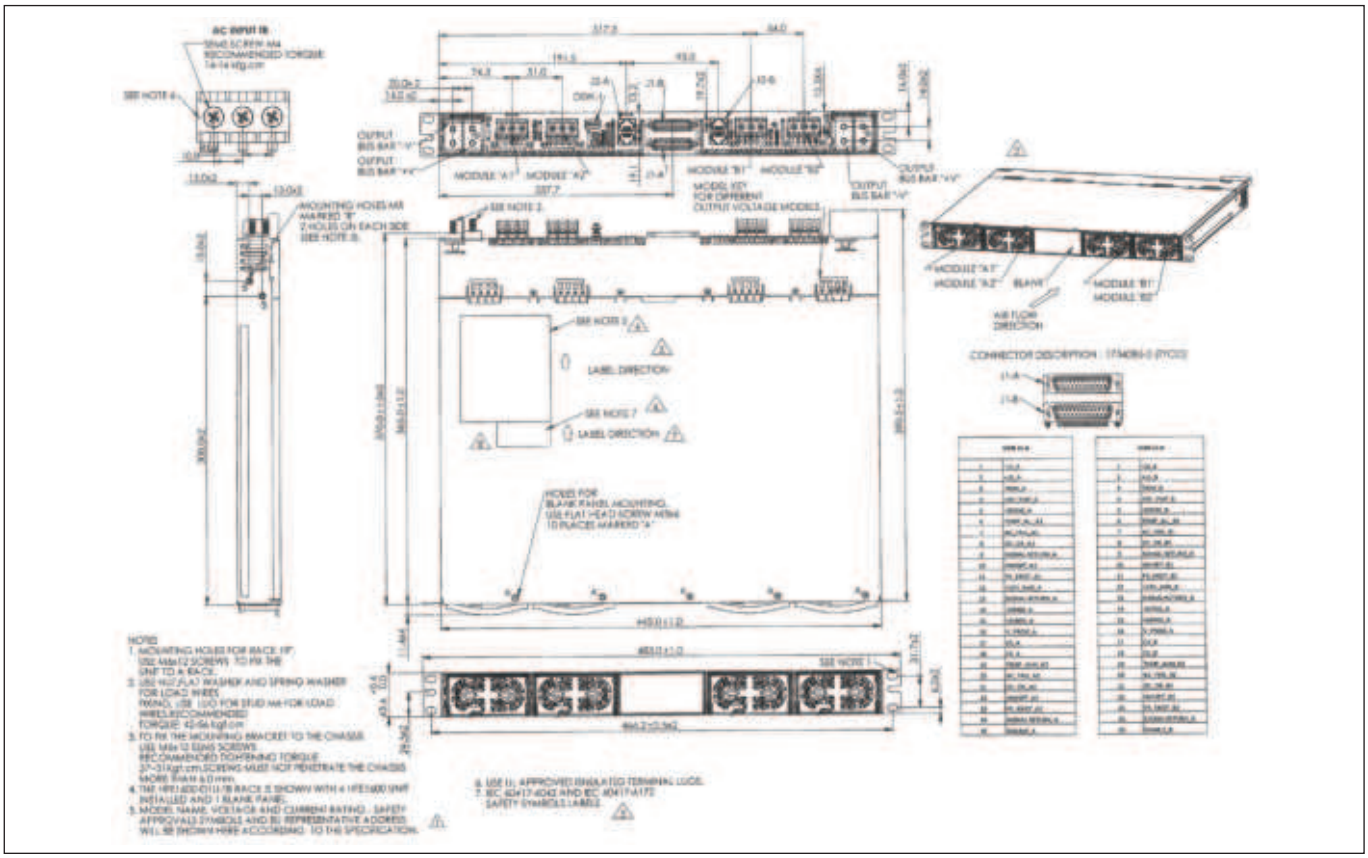
Outline Drawing HFE1600-S1U-TB



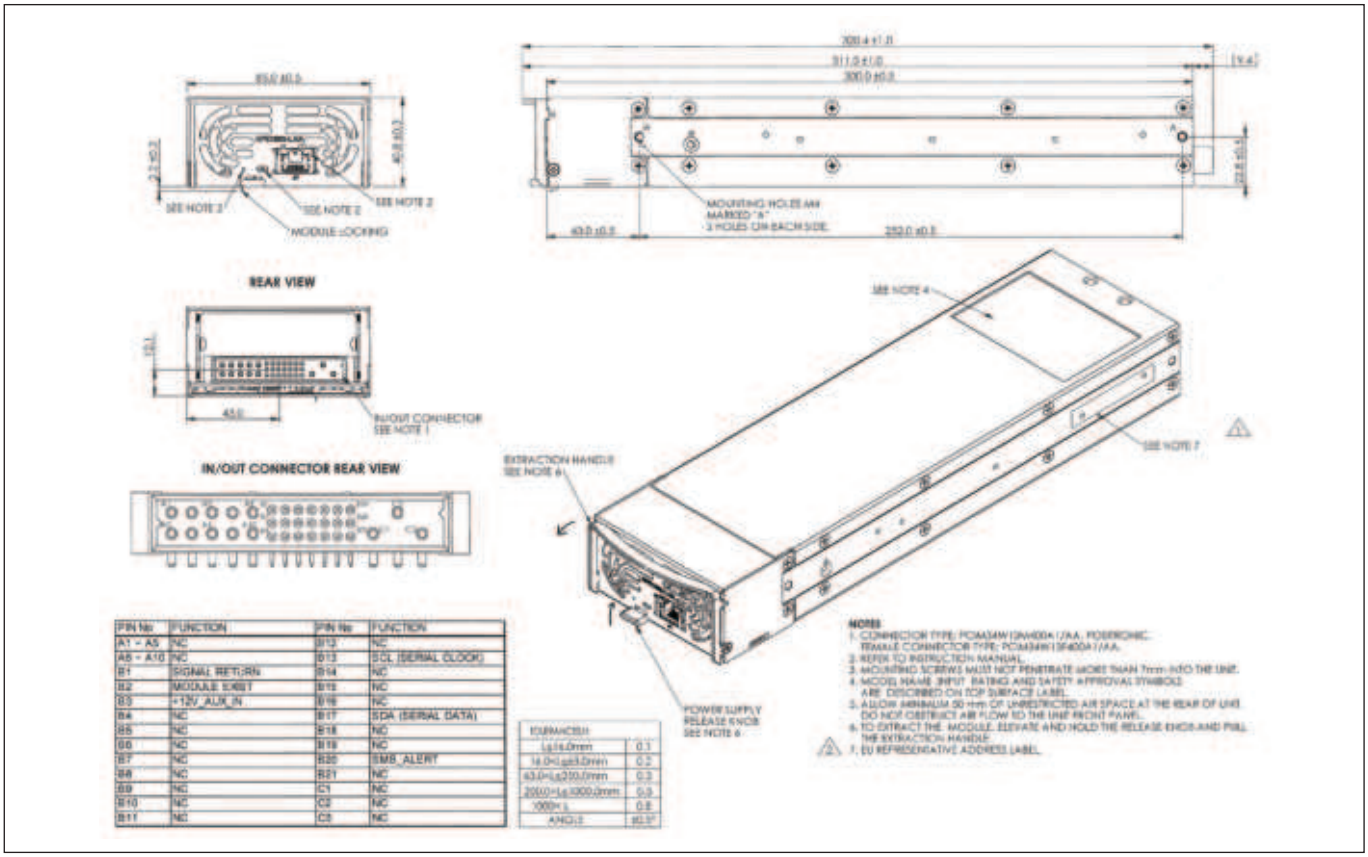
Outline Drawing HFE1600-D1U



Outline Drawing HFE1600-D1U-TB



Outline Drawing HFE1600-LAN



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