

1600W 1U Front End Power Supplies

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Industrial



COTS



Test



COMM



Broadcast



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™ (I ² C) 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) (Vin>170Vac)	Max Power (W) (Vin>170Vac)	Max Current (A) (100<Vin<170Vac) ⁽²⁾	Max Power (W) (100<Vin<170Vac) ⁽²⁾
HFE1600-12	12	9.6 - 13.2	133	1596	100	1200
HFE1600-24	24	19.2 - 29	67	1608	50	1200
HFE1600-32	32	25.6 - 38.4	47	1500	37.5	1200
HFE1600-48	48	38.4 - 58	33	1584	25	1200

HFE1600-	12	/	S
	Output voltage 12, 24, 32, 48		blank No PMBus™ / I ² C S PMBus™ / I ² C 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	14.2 / 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	-	

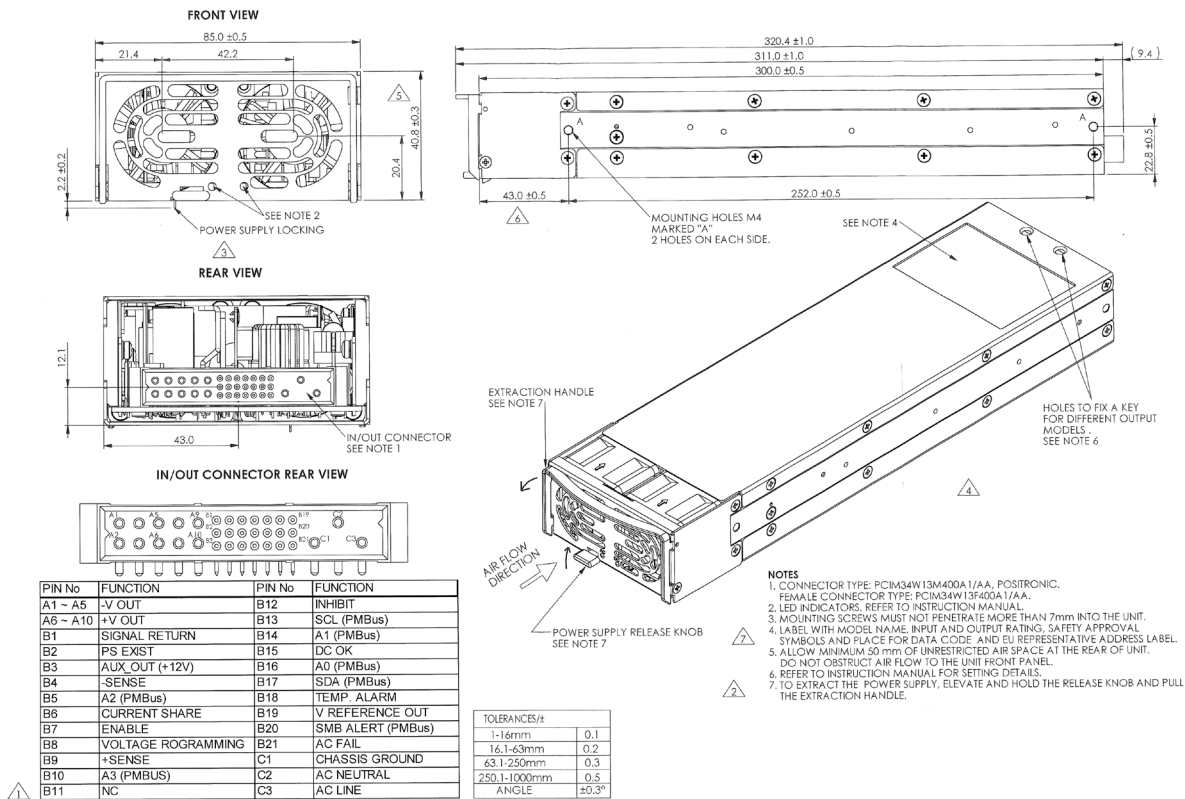
Specifications					
Model		HFE1600-12	HFE1600-24	HFE1600-32	HFE1600-48
Output					
Line Regulation	mV	30	60	80	120
Load Regulation	mV	60	120	160	240
External Load Capacitance	uF/A	1000			
Ripple & Noise (1)	mV	240	240	320	480
Temperature Coefficient	%/°C	<0.02			
Minimum Load	-	No minimum load required			
Overcurrent Protection	%	105-120			
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™ (I²C) 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
Environmental					
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 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			

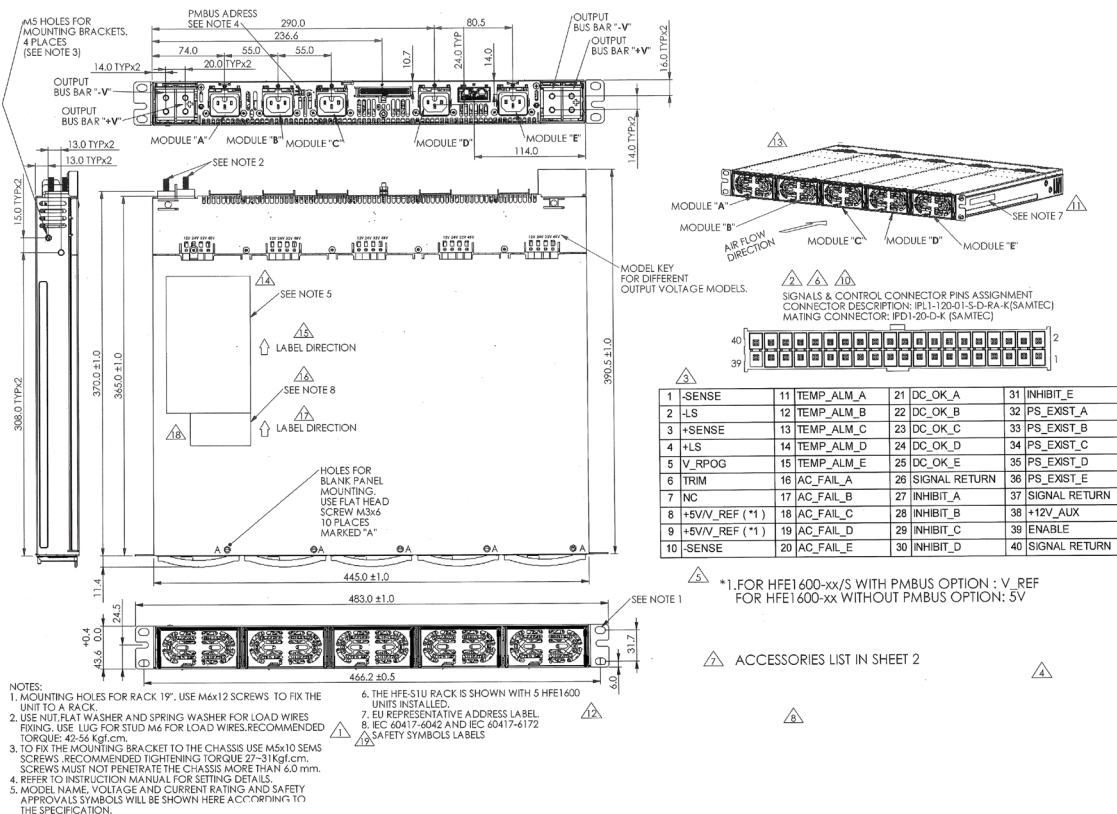
Notes

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

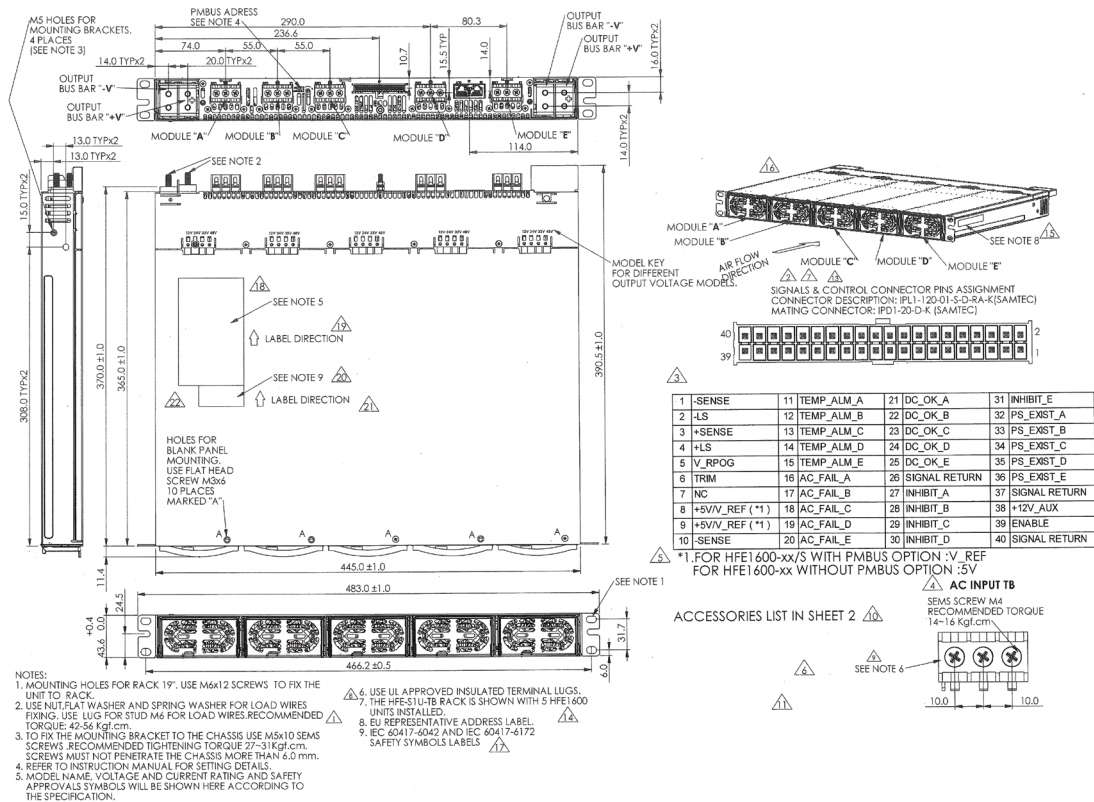
Outline Drawing HFE1600



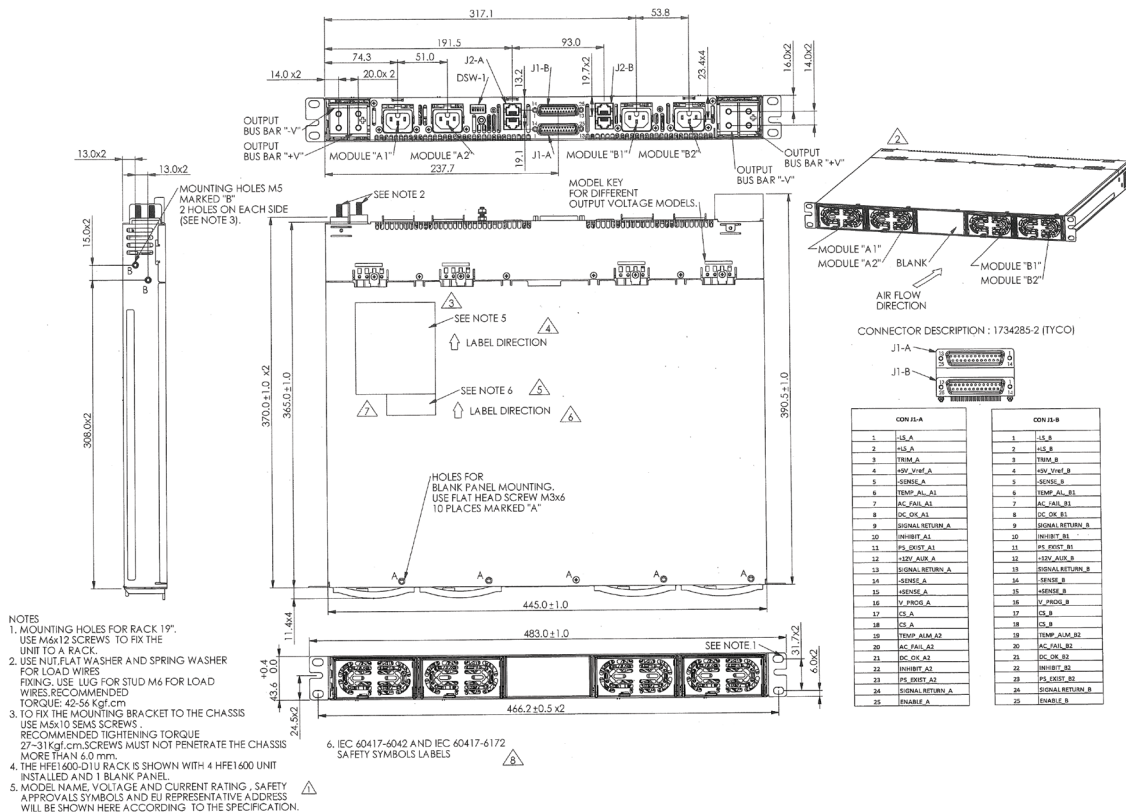
Outline Drawing HFE1600-S1U



Outline Drawing HFE1600-S1U-TB



Outline Drawing HFE1600-D1U



AC INPUT TB
 SEMS SCREW M4
 RECOMMENDED TORQUE
 1-1.6 kgf.cm

SEE NOTE 6

10.0

13.0x2

15.0x2

308.0x2

3700±1.0x2

3650±1.0

3905±1.0

445.0±1.0

483.0±1.0

466.2±0.5x2

317.3

54.0

74.3

51.0

191.5

93.0

15.3x4

16.0x2

14.0x2

20.0x2

14.0x2

OUTPUT BUS BAR "-V"

OUTPUT BUS BAR "+V"

MODULE "A1"

MODULE "A2"

237.7

DSW-1

J2-A

J1-B

J1-A

MODULE "B1"

MODULE "B2"

MODEL KEY
 FOR DIFFERENT
 OUTPUT VOLTAGE MODELS

OUTPUT BUS BAR "-V"

OUTPUT BUS BAR "+V"

7

MODULE "A1"

MODULE "A2"

BLANK

MODULE "B1"

MODULE "B2"

AIR FLOW
 DIRECTION

CONNECTOR DESCRIPTION: 1734285-2 (TYCO)

J1-A

J1-B

CON J1-A

1	-15 A
2	+15 A
3	TEMP_A
4	DSW_VINP_A
5	SIGNAL_A
6	TEMP_A_B1
7	AC_FAN_A1
8	DC_DC_A1
9	SIGNAL_RETURN_A
10	INHERIT_A1
11	PS_KEYT_A1
12	LVF_AINP_A
13	SIGNAL_RETURN_A
14	SIGNAL_A
15	INHERIT_A
16	V_FROD_A
17	CS_A
18	CS_A
19	TEMP_AINP_A2
20	AC_FAN_A2
21	DC_DC_A2
22	INHERIT_A2
23	PS_KEYT_A2
24	SIGNAL_RETURN_A
25	INHERIT_A

CON J1-B

1	-15 B
2	+15 B
3	TEMP_B
4	DSW_VINP_B
5	SIGNAL_B
6	TEMP_B_B1
7	AC_FAN_B1
8	DC_DC_B1
9	SIGNAL_RETURN_B
10	INHERIT_B1
11	PS_KEYT_B1
12	LVF_BINP_B
13	SIGNAL_RETURN_B
14	SIGNAL_B
15	INHERIT_B
16	V_FROD_B
17	CS_B
18	CS_B
19	TEMP_BINP_B2
20	AC_FAN_B2
21	DC_DC_B2
22	INHERIT_B2
23	PS_KEYT_B2
24	SIGNAL_RETURN_B
25	INHERIT_B

NOTES

1. MOUNTING HOLES FOR RACK 19".
 USE M6x12 SCREWS TO FIX THE UNIT TO A RACK.
2. USE NUT, FLAT WASHER AND SPRING WASHER FOR LOAD WIRES.
 FRYING: USE LUG FOR STUD M6 FOR LOAD WIRES. RECOMMENDED TORQUE: 42-56 kgf.cm.
3. TO FIX THE MOUNTING BRACKET TO THE CHASSIS
 USE M5x10 SEMS SCREWS.
 RECOMMENDED TIGHTENING TORQUE: 27-31 kgf.cm. SCREWS MUST NOT PENETRATE THE CHASSIS MORE THAN 6.0 mm.
4. THE HFE1600-DIU-1B RACK IS SHOWN WITH 4 HFE1600 UNIT INSTALLED AND 1 BLANK PANEL.
5. MODEL NAME, VOLTAGE AND CURRENT RATING, SAFETY APPROVALS SYMBOLS AND EU REPRESENTATIVE ADDRESS WILL BE SHOWN HERE ACCORDING TO THE SPECIFICATION.
6. USE UL APPROVED INSULATED TERMINAL LUGS.
 7. IEC 60417-6042 AND IEC 60417-6172 SAFETY SYMBOLS LABELS

FRONT VIEW

Dimensions: 320.4 ±1.0, 311.0 ±1.0, 300.0 ±0.5, 43.0 ±0.5, 252.0 ±0.5, 22.8 ±0.5, 9.4

Callouts: MOUNTING HOLES M4 MARKED "A" 2 HOLES ON EACH SIDE.

REAR VIEW

Dimensions: 85.0 ±0.5, 40.8 ±0.3, 2.2 ±0.2, 43.0

Callouts: SEE NOTE 2, MODULE LOCKING, IN/OUT CONNECTOR SEE NOTE 1

IN/OUT CONNECTOR REAR VIEW

Labels: A1, A2, A3, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100, C101, C102, C103, C104, C105, C106, C107, C108, C109, C110, C111, C112, C113, C114, C115, C116, C117, C118, C119, C120, C121, C122, C123, C124, C125, C126, C127, C128, C129, C130, C131, C132, C133, C134, C135, C136, C137, C138, C139, C140, C141, C142, C143, C144, C145, C146, C147, C148, C149, C150, C151, C152, C153, C154, C155, C156, C157, C158, C159, C160, C161, C162, C163, C164, C165, C166, C167, C168, C169, C170, C171, C172, C173, C174, C175, C176, C177, C178, C179, C180, C181, C182, C183, C184, C185, C186, C187, C188, C189, C190, C191, C192, C193, C194, C195, C196, C197, C198, C199, C200, C201, C202, C203, C204, C205, C206, C207, C208, C209, C210, C211, C212, C213, C214, C215, C216, C217, C218, C219, C220, C221, C222, C223, C224, C225, C226, C227, C228, C229, C230, C231, C232, C233, C234, C235, C236, C237, C238, C239, C240, C241, C242, C243, C244, C245, C246, C247, C248, C249, C250, C251, C252, C253, C254, C255, C256, C257, C258, C259, C260, C261, C262, C263, C264, C265, C266, C267, C268, C269, C270, C271, C272, C273, C274, C275, C276, C277, C278, C279, C280, C281, C282, C283, C284, C285, C286, C287, C288, C289, C290, C291, C292, C293, C294, C295, C296, C297, C298, C299, C300, C301, C302, C303, C304, C305, C306, C307, C308, C309, C310, C311, C312, C313, C314, C315, C316, C317, C318, C319, C320, C321, C322, C323, C324, C325, C326, C327, C328, C329, C330, C331, C332, C333, C334, C335, C336, C337, C338, C339, C340, C341, C342, C343, C344, C345, C346, C347, C348, C349, C350, C351, C352, C353, C354, C355, C356, C357, C358, C359, C360, C361, C362, C363, C364, C365, C366, C367, C368, C369, C370, C371, C372, C373, C374, C375, C376, C377, C378, C379, C380, C381, C382, C383, C384, C385, C386, C387, C388, C389, C390, C391, C392, C393, C394, C395, C396, C397, C398, C399, C400, C401, C402, C403, C404, C405, C406, C407, C408, C409, C410, C411, C412, C413, C414, C415, C416, C417, C418, C419, C420, C421, C422, C423, C424, C425, C426, C427, C428, C429, C430, C431, C432, C433, C434, C435, C436, C437, C438, C439, C440, C441, C442, C443, C444, C445, C446, C447, C448, C449, C450, C451, C452, C453, C454, C455, C456, C457, C458, C459, C460, C461, C462, C463, C464, C465, C466, C467, C468, C469, C470, C471, C472, C473, C474, C475, C476, C477, C478, C479, C480, C481, C482, C483, C484, C485, C486, C487, C488, C489, C490, C491, C492, C493, C494, C495, C496, C497, C498, C499, C500, C501, C502, C503, C504, C505, C506, C507, C508, C509, C510, C511, C512, C513, C514, C515, C516, C517, C518, C519, C520, C521, C522, C523, C524, C525, C526, C527, C528, C529, C530, C531, C532, C533, C534, C535, C536, C537, C538, C539, C540, C541, C542, C543, C544, C545, C546, C547, C548, C549, C550, C551, C552, C553, C554, C555, C556, C557, C558, C559, C560, C561, C562, C563, C564, C565, C566, C567, C568, C569, C570, C571, C572, C573, C574, C575, C576, C577, C578, C579, C580, C581, C582, C583, C584, C585, C586, C587, C588, C589, C590, C591, C592, C593, C594, C595, C596, C597, C598, C599, C600, C601, C602, C603, C604, C605, C606, C607, C608, C609, C610, C611, C612, C613, C614, C615, C616, C617, C618, C619, C620, C621, C622, C623, C624, C625, C626, C627, C628, C629, C630, C631, C632, C633, C634, C635, C636, C637, C638, C639, C640, C641, C642, C643, C644, C645, C646, C647, C648, C649, C650, C651, C652, C653, C654, C655, C656, C657, C658, C659, C660, C661, C662, C663, C664, C665, C666, C667, C668, C669, C670, C671, C672, C673, C674, C675, C676, C677, C678, C679, C680, C681, C682, C683, C684, C685, C686, C687, C688, C689, C690, C691, C692, C693, C694, C695, C696, C697, C698, C699, C700, C701, C702, C703, C704, C705, C706, C707, C708, C709, C710, C711, C712, C713, C714, C715, C716, C717, C718, C719, C720, C721, C722, C723, C724, C725, C726, C727, C728, C729, C730, C731, C732, C733, C734, C735, C736, C737, C738, C739, C740, C741, C742, C743, C744, C745, C746, C747, C748, C749, C750, C751, C752, C753, C754, C755, C756, C757, C758, C759, C760, C761, C762, C763, C764, C765, C766, C767, C768, C769, C770, C771, C772, C773, C774, C7



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