



Absolute maximum ratings ¹⁾			
Symbol	Conditions	Values	Unit
$I_{OUT\ MAX}$	Maximum permanent output current	1 000	A _{RMS}
$I_{IN\ MAX}$	Maximum permanent input current	1 800	A _{DC}
$V_{OUT\ MAX}$	Maximum output voltage	760	V _{AC}
$V_{BUS\ MAX}$	Maximum DC Bus voltage	1 200	V _{DC}
$F_{OUT\ MAX}$	Inverter output frequency	100	Hz
$F_{SW\ MAX}$	Maximum switching frequency	5	kHz

Electrical characteristics: application example				T _{AMBIENT} =40°C unless otherwise specified		
Symbol	Conditions	min	typ	max	Unit	
AC phase						
V_{BUS}	DC bus rated voltage	1 100			V _{DC}	
$I_{OUT\ RATED}$	Rated output current	1 000			A _{RMS}	
$I_{OUT\ OVL}$	Overload output current	1 100			A _{RMS}	
t_{OVL}	Overload duration	60			s	
T_{OVL}	Time between 2 overloads	10			min	
V_{OUT}	Output voltage	620	690	760	V _{AC}	
P_{OUT}	Rated output power	1 200			kW	
F_{SW}	Inverter switching frequency	2			kHz	
F_{OUT}	Output frequency	50			Hz	
PF	Power factor	-1			1	
$P_{LOSS\ INV}^{2)}$	Losses at rated current	11 200			W	
$\eta^{2)}$	Efficiency at rated current	99			%	

$T_{INLET}=45^{\circ}C$, 50% glycol, Flowrate = 16 L/min
 $T_J < 150^{\circ}C$, ambient air temperature = 40°C, air extraction according to thermal data page 2

DC Bus			
V_{BUS}	Rated DC voltage applied to the capacitor bank	1 100	V _{DC}
$V_{BUS\ MAX}$	Max DC voltage applied to the caps bank (max 30% of LTE)	1 200	V _{DC}
$\tau_{d5\%}$	Discharge time of the capacitors (V _{DC} < 60 V)	5	min
C_{DC}	Capacitor bank capacity	8,4	mF
LTE	Calculated LTE of the caps with forced air cooling	100	kh

Stack Insulation			
Crđ	Minimum creepage distance	11	mm
Cld	Minimum clearance distance	9,4	mm
Visol	Chassis / power stage AC/DC (insulation test voltage DC, 5s)	-4 200	4 200
dv/dt	SKiiP driver only, secondary to primary side	75	kV/ μ s

SEMISTACK® Renewable Energy - Size W2

Two Quadrant 3-phase IGBT inverter

Ordering No. 08800565

Description SKS B2 100 GD 69/11 - MA PB

Features

- Designed in regard to EN50178 and UL508C recommendations
- Designed for a 600 x 600 x 2000 mm cabinet
- Embedded SKiiP® Technology 3
- SKiiP 2013GB172-4DW, Trench 3 1700V IGBT, CAL3 diode
- Integrated current and temperature sensors
- Water cooling

Typical Applications

- Wind generators (SG and DFIG)
- Solar Inverters

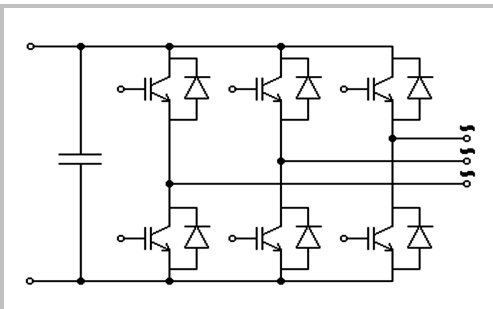
Footnotes

¹⁾ Absolute maximum ratings are values not to be exceeded in any case and do not imply that the stack can operate in all these conditions taken together.

²⁾ fan consumption and losses in air included

REMARKS

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee, expressed or implied is made regarding delivery, performance or suitability.



B6CI



SKiiP stack

Environmental conditions		T _{AMBIENT} =40°C unless otherwise specified			
Characteristics	Conditions	min	typ	max	Unit
Climatic					
Ambient temperature ³⁾	Storage: IEC 60721-3-1, class 1K2 Transportation: IEC 60721-3-2, class 2K2	-25		60	°C
	Operation: IEC 60721-3-3, class 3K3 extended	-20		55	°C
Humidity	IEC 60721-3-3, class 3K3 no condensation no icing	5		85	%
Mechanical					
Installation altitude	without derating			1 000	m
Max installation altitude	with derating			4 000	m
Ingress protection	IEC 60529		IP00		-
Vibrations & Shocks	IEC 60721-3-2, Storage & transportation		2M1		-
	IEC 60721-3-3, in operation		3M3		-
Pollution degree	EN 50178		2		-
Mass	3-phase inverter, with cable plate terminal and no DC bus connection		98		kg
Thermal data					
$\Delta V/\Delta t_{\text{WATER}}$	Water flow of the 3-phase inverter	8	16	35	L/min
ΔP_{WATER}	Water pressure drop of the inverter, with male and female connectors, 50% glycol, 16 L/min		580		mbar
Water pressure	Rated water pressure per inverter		3		bar
Coolant type	Recommended coolant		50% glycol / 50% water		-
T _{INLET}	Cooling water inlet temperature	-20	45	60	°C
Required cooling airflow	Airflow direction bottom to top on snubbers ³⁾		1		m.s ⁻¹
V _{SUPPLY}	Fan DC voltage supply	16	24	30	V _{DC}
P _{FAN}	Fan power consumption at typical voltage supply		90		W
LTE	Capacitor DC fan lifetime expectancy (L10 method)		57		kh

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Typical Applications

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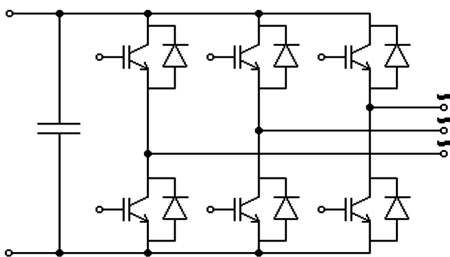
Footnotes

³⁾ the user shall ensure that the ambient air is sufficiently ventilated to avoid hot spots.

REMARKS

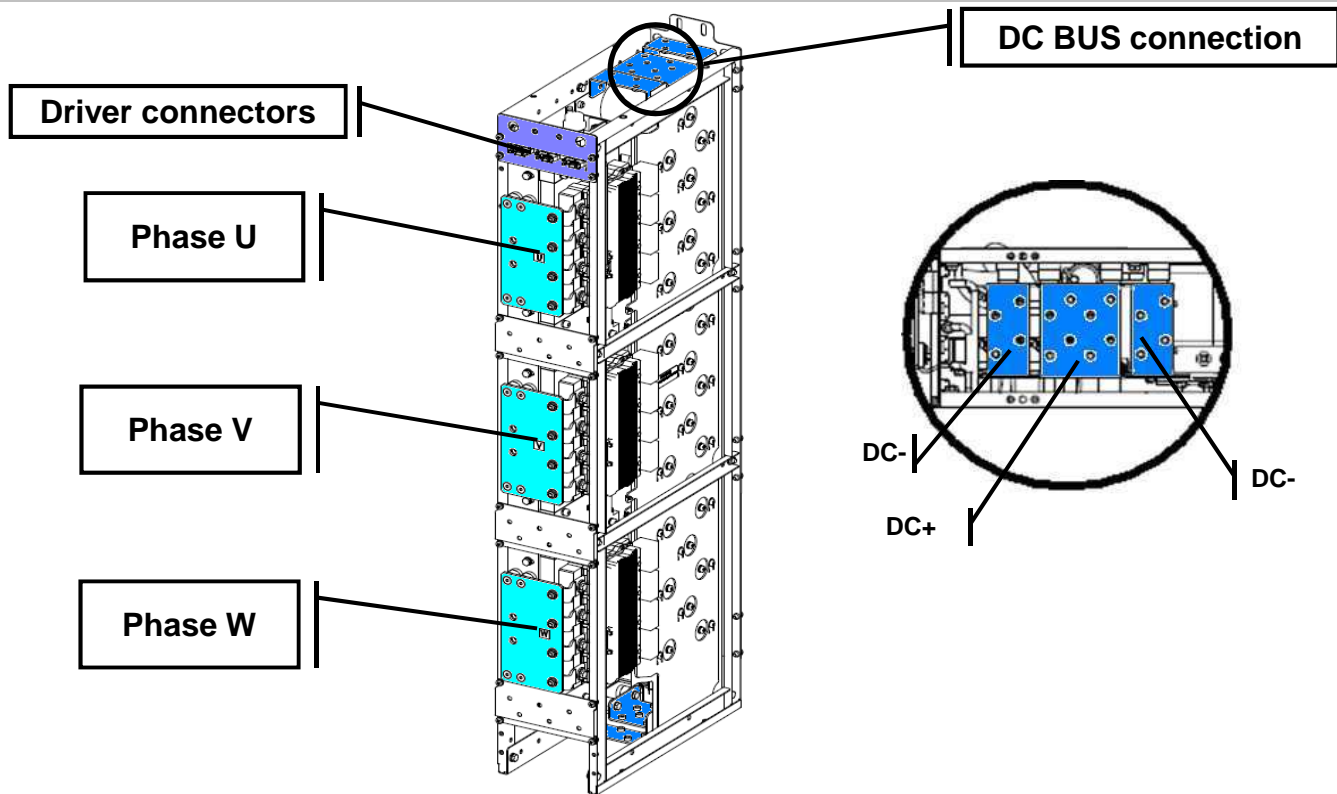
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Gate Driver Characteristics		T _{AMBIENT} =25°C unless otherwise specified				
Symbol	Conditions	min	typ	max	Unit	
Gate Driver / controller data						
V _S	supply voltage non stabilized	13	24	30	V	
I _S	V _{S2} = 24 V, F _{SW} in kHz, I _{RMS} in A	330 + 55×F _{sw} + 0.00035×I _{RMS} ²			mA	
V _{IT+}	input threshold voltage HIGH	12.3			V	
V _{IT-}	input threshold voltage LOW				4.6	V
R _{IN}	Input resistance	10			kΩ	
C _{IN}	Input capacitance	1			nF	
Measurement & protection						
HB_I	Analogue current signal HB_I	245	250	255	A.V ⁻¹	
I _{TRIP-SC}	Over current trip level (I _{analogue} OUT=10V)	2 450	2 500	2 550	A _{PEAK}	
CMN_TMP	Analogue temperature signal Th < 80°C	min	17 + 10.3×CMN_TMP		°C	
		typ	19 + 10.5×CMN_TMP		°C	
		max	20 + 10.5×CMN_TMP		°C	
CMN_TMP	Analogue temperature signal Th > 80°C	min	26 + 8.8×CMN_TMP		°C	
		typ	28 + 8.8×CMN_TMP		°C	
		max	30 + 8.9×CMN_TMP		°C	
T _{TRIP}	Over temperature protection	110	115	120	°C	

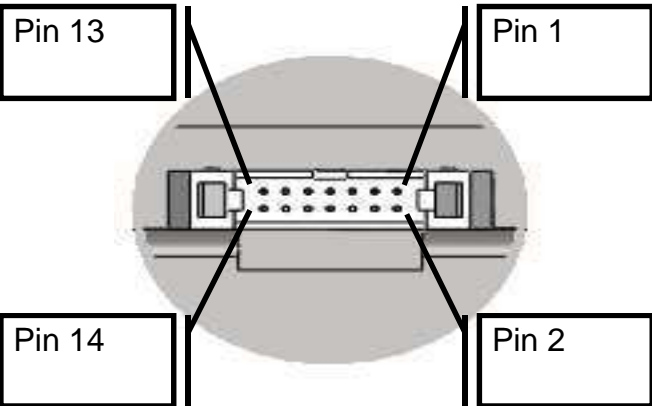
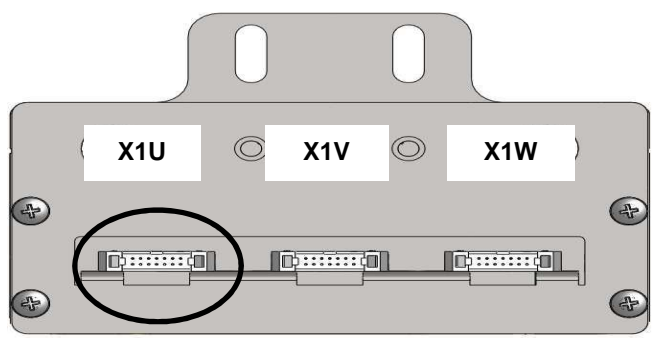


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Electrical connection



Drive connector assignment



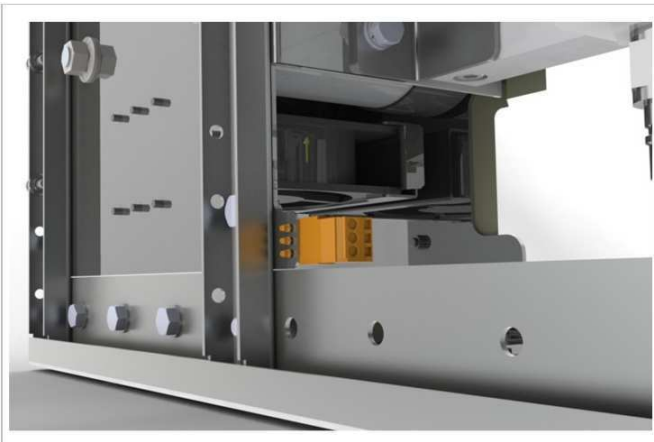
HE10-14 male connector

X1U, X1V, X1W

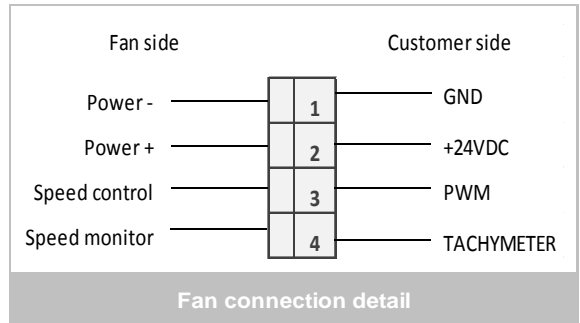
Pin	Signal	Remark
1	Shield	
2	BOT IN (2)	positive 15V CMOS logic; 10 kΩ impedance, don't connect when using fiber optic
3	ERROR OUT (1)	LOW = NO ERROR; open Collector Output; max. 30 V / 15 mA don't connect when using fiber optic, propagation delay 1 μs min. pulsewidth error-memory-reset 9 μs
4	TOP IN (2)	positive 15V CMOS logic; 10 kΩ impedance don't connect when using fiber optic
5	Overtemp. OUT (1)	LOW = NO ERROR = ̸DCB < 115 + 5°C open collector Output; max. 30 V / 15 mA „low“ output voltage < 0,6 V „high“ output voltage max. 30 V
6	+ 24 VDC IN	24 VDC (SKiiP 2: 20 - 30 V, SKiiP 3: 13 - 30 V)
7	+ 24 VDC IN	don't supply with 24V, when using +15 VDCIN supply voltage monitoring threshold 19,5 V
8	+15 Vdc OUT	max. 50 mA auxiliary power supply when
9	+15 Vdc OUT	SKiiP system is supplied via pin 6/7
10	GND	GND for power supply and
11	GND	GND for digital signals
12	Temp. analog OUT	max output current 5mA
13	GND aux	reference for analog output signals
14	I analog OUT	SKiiP 3 with Al2O3 ceramic substrate current actual value 8,0 V ⇔ 100 % IC @ 25 °C overcurrent trip level 10 V ⇔ 125 % IC @ 25 °C current value > 0 ⇔ SKiiP system is source current value < 0 ⇔ SKiiP system is sink SKiiP 3 with AlN ceramic substrate: refer to corresponding datasheet

1) Open collector output, external pull up resistor necessary
2) „high“ (max) 12,3 V, „low“ (min) 4,6 V; SKiiP 3: 1 nF capacitance added signal to GND

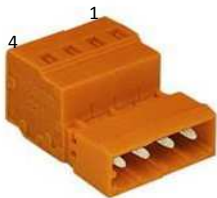
DC fan connection



Fan connection detail

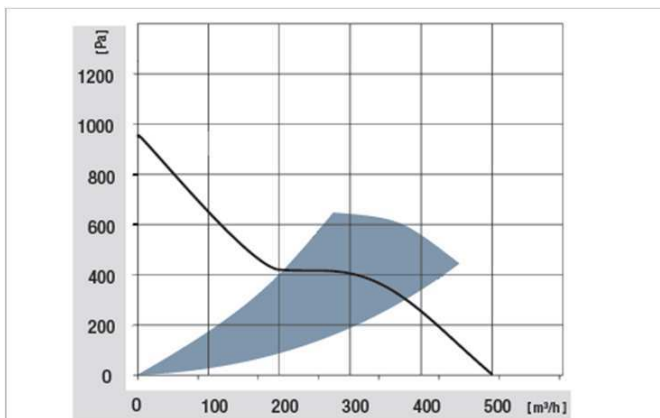


Fan connection detail

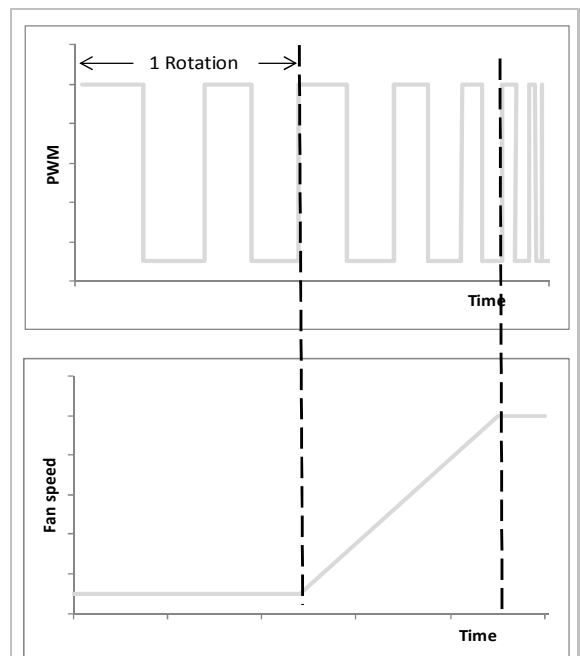


Pin	Designation
1	GND
2	+24VDC
3	PWM
4	MONITOR

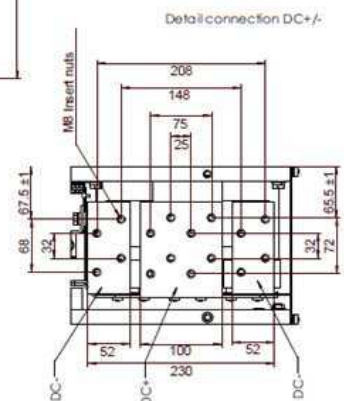
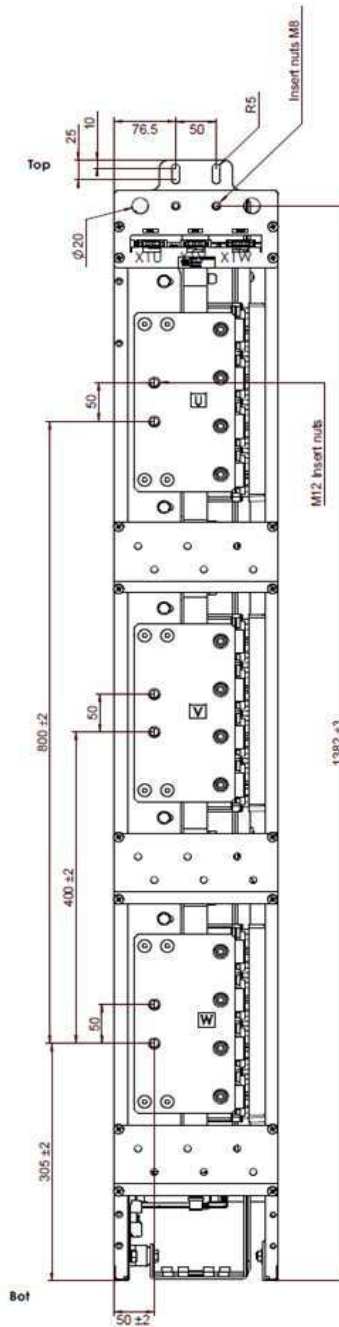
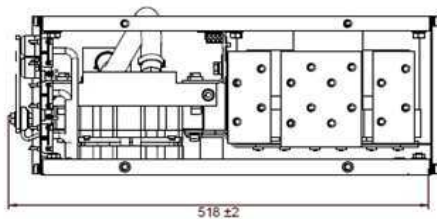
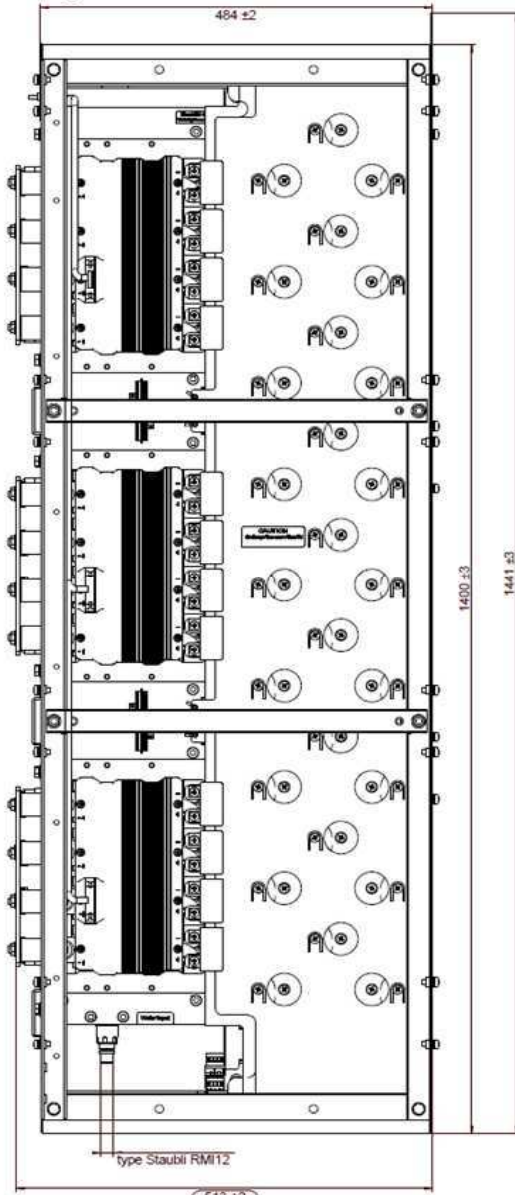
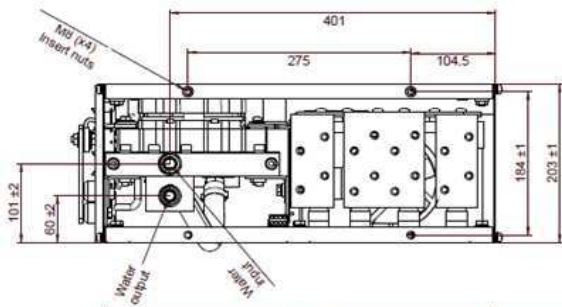
DC fan speed control



Characteristic pressure drop vs air flow

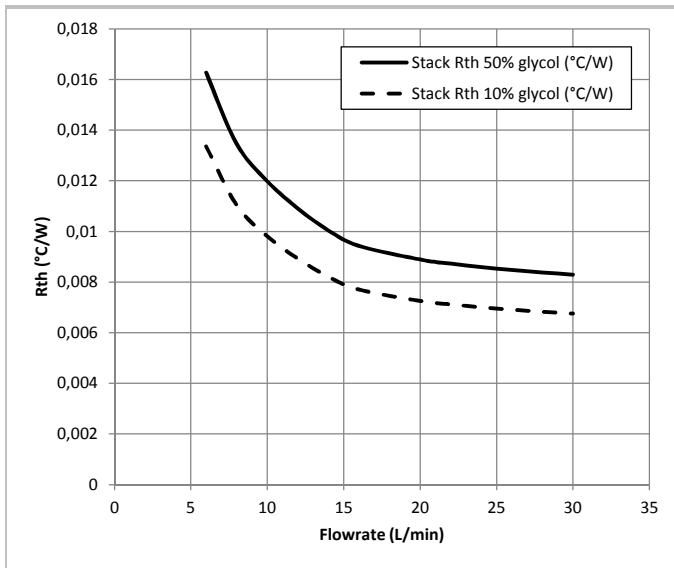


Speed control behavior

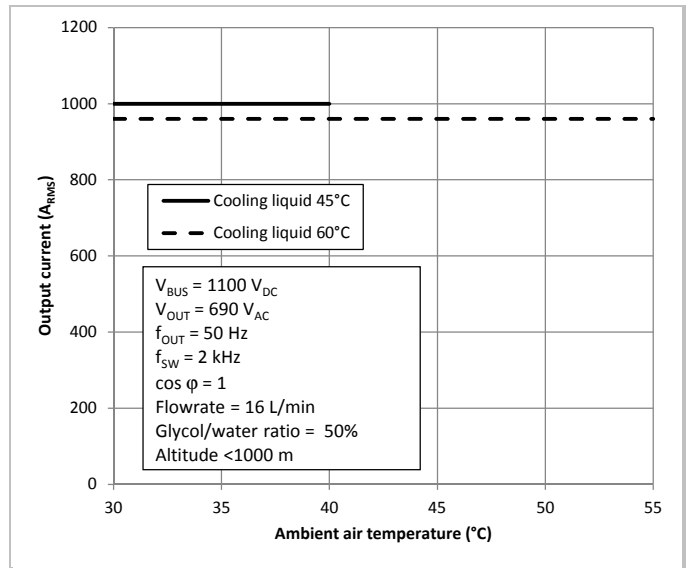


Dimensions

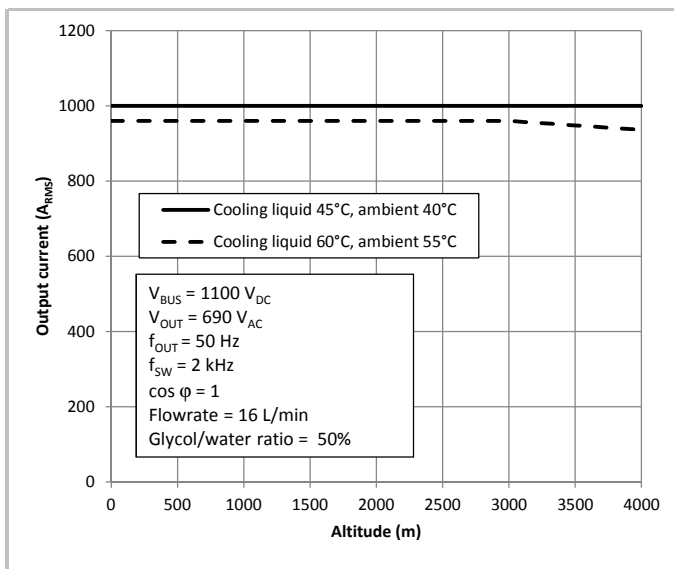
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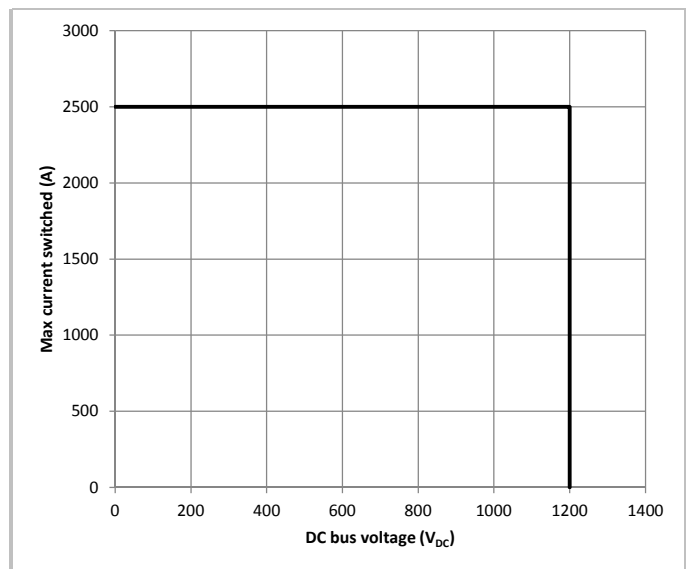
Rth_{sink-water}(stack) vs. Liquid Flow



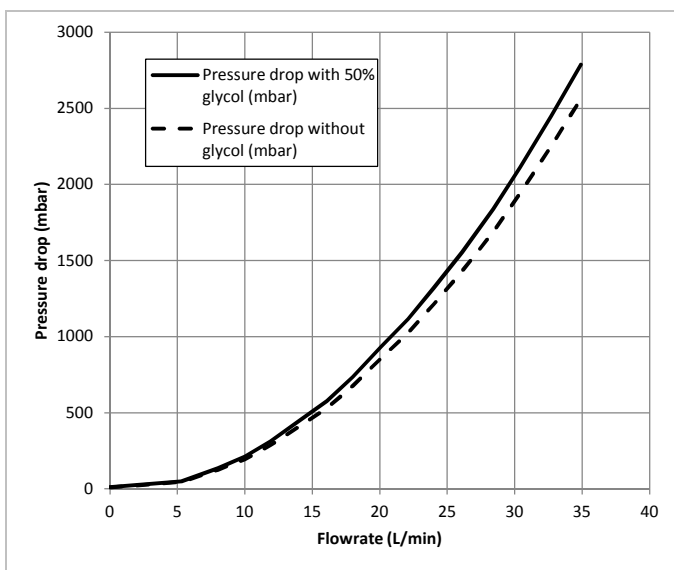
Permanent Output Current vs. Ambient Temperature



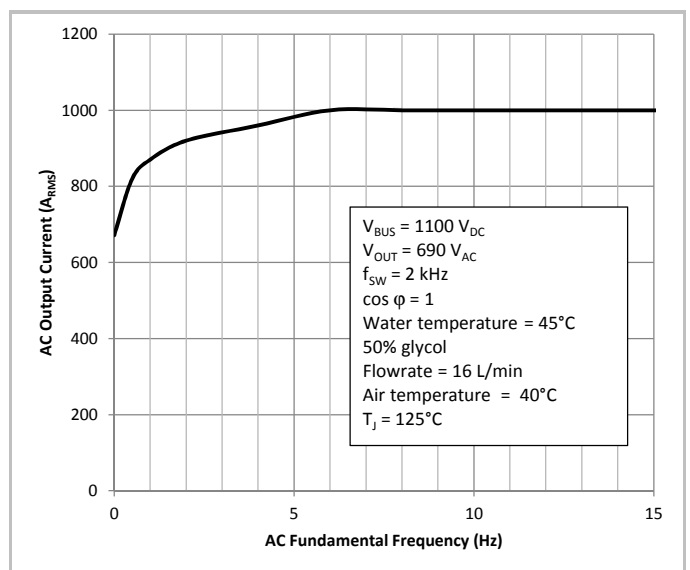
Permanent Output Current vs. Altitude



Safe Operating Area



Pressure Drop vs. Flowrate



Permanent Output Current vs. Output Frequency