

IGBT Module stack

Absolute maximum ratings			
Symbol	Conditions	Values	Unit
$I_{OUT\ MAX}$	Maximum permanent output current	1 600	A_{RMS}
$I_{IN\ MAX}$	Maximum permanent input current	1 700	A_{DC}
$V_{OUT\ MAX}$	Maximum output voltage	530	V_{AC}
$V_{BUS\ MAX}$	Maximum DC bus voltage (without switching)	1 100	V_{DC}
f_{OUT}	Maximum inverter output frequency	500	Hz
f_{SW}	Maximum switching frequency	15	kHz

Electrical characteristics / Typical PV solar application				$T_{cooling\ air}^{1)} = 40^{\circ}C$ unless otherwise specified		
Symbol	Conditions	min	typ	max	Unit	
Ratings						
$I_{OUT\ RATED}$	Rated output current	No overload,		1 470	A_{RMS}	
V_{OUT}	Rated output voltage	Chip junction $T^{\circ} < 150^{\circ}C$ (Max junction temperature = $175^{\circ}C$)		360	V_{AC}	
PF	Power factor	with SEMIKRON axial fan "AF" option ²⁾		1	-	
P_{OUT}	Rated output power			915	kW	
f_{SW}	Inverter switching frequency			3	kHz	
f_{OUT}	Output frequency			50	Hz	
V_{BUS}	Rated DC voltage			800	V_{DC}	
$P_{LOSS\ INV}$	Total power losses			11 860	W	
LTE	Inverter lifetime			100 ¹⁾	kHrs	

Electrical characteristics / Typical AC-Drive application				$T_{cooling\ air}^{1)} = 40^{\circ}C$ unless otherwise specified		
Symbol	Conditions	min	typ	max	Unit	
Ratings						
$I_{OUT\ RATED}$	Rated output current	Overload 150% / 1min / 5min		1 030	A_{RMS}	
V_{OUT}	Rated output voltage	Chip junction $T^{\circ} < 150^{\circ}C$ (Max junction temperature = $175^{\circ}C$)		400	V_{AC}	
PF	Power factor	with SEMIKRON axial fan "AF" option ²⁾		0,85	-	
P_{OUT}	Rated output power			605	kW	
f_{SW}	Inverter switching frequency			3	kHz	
f_{OUT}	Output frequency			100	Hz	
V_{BUS}	Rated DC voltage			650	V_{DC}	
$P_{LOSS\ INV}$	Total power losses			7 980	W	
LTE	Inverter lifetime			100 ¹⁾	kHrs	

Filtering characteristics				
V_{BUS}	Rated DC voltage applied to the caps bank with switching	800	1 000	V_{DC}
$V_{DC\ CAP}$	Max DC voltage applied to the caps bank without switching	1 100		V_{DC}
$\tau_{d5\%}$	Discharge time of the capacitors (5%)	600		s
C_{DC}	Capacitor bank capacity	5,34	6,19	mF
LTE	Calculated LTE of the caps with forced air cooling	100		kHrs

Stack Insulation				
V_{ISOL}	Frame / Power stage AC/DC (insulation test voltage DC, 60s)	4 200		V

SEMIKUBE® SlimLine - Frame SL150

3-phase IGBT inverter

Ordering No. 08801380

Description SKS SL 150 GD 50/10 - E4 P1 AF

Ordering No. 08801379

Description SKS SL 150 GD 50/10 - E4 P1 G

Features

- Slim design for 300mm deep cabinet
- IP54 heatsink side
- Fast mounting and dismounting
- Current measurement accuracy <2% of $I_{OUT\ RATED}$ at 25°C <1% of $I_{OUT\ RATED}$ at 25°C on request
- Overvoltage, short circuit, and overtemperature protection
- Air cooled power stack
- IEC 62109-1
- UL 1741, UL 508 C version on request
- D-Sub 25 pin driver interface
- CAN interface for error storage, diagnostic and setting

Typical Applications

- Solar PV Inverters
- AC Drives
- Active Front End

Remarks

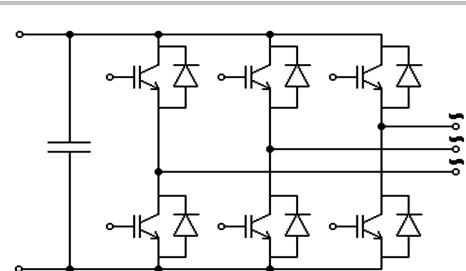
For information regarding installation and conditions of use, please refer to SEMIKUBE SlimLine user manual

Footnotes

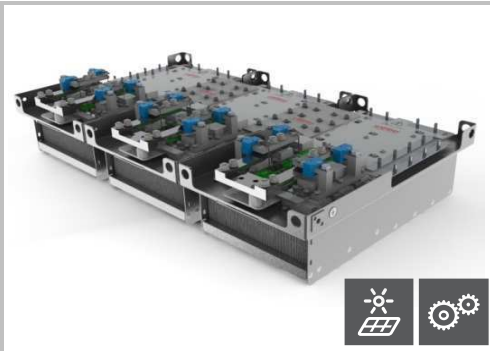
1) $T_{cooling\ air} = 40^{\circ}C$, < 1000m, with fan option 088 01139, mounted on DC side

$T_{cabinet} = 55^{\circ}C$ with 2m/s air ventilation inside cabinet on stack to avoid hot spots

2) Performances with "AF" option on DC side according drawing page 4&5



B6CI



IGBT Module stack

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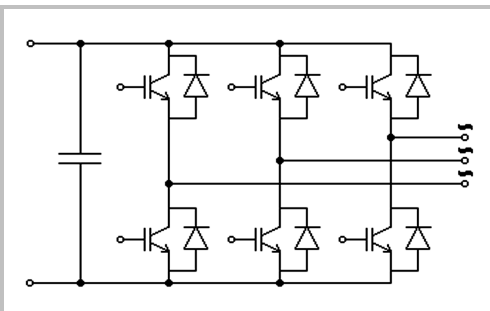
Remarks

For information regarding installation and conditions of use, please refer to SEMIKUBE SlimLine user manual

Footnotes

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2) Factory settings



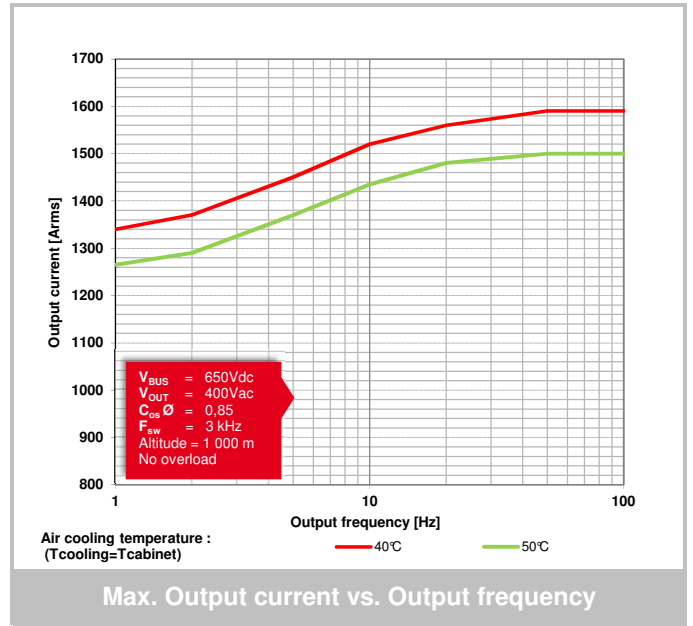
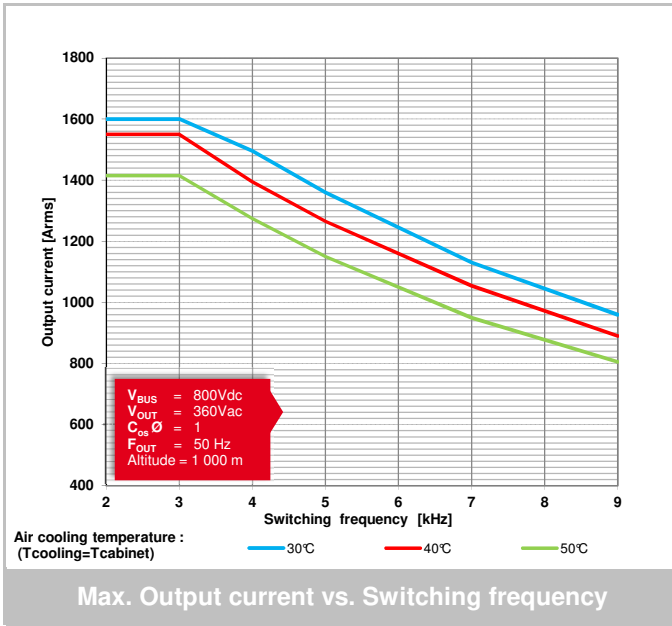
B6CI

Environmental conditions					
Characteristics	Conditions	min	typ	max	Unit
Storage, Transport, Operation					
Temperature	Storage: IEC 60721-3-1, class 1K4	-40		70	°C
	Transportation: IEC 60721-3-2, class 2K4	-40		70	°C
	Operation ¹⁾ : IEC 60721-3-3, class 3K3 extended	-30		60	°C
Humidity	Operation (3K3) extended (no condensation)	5		93	%

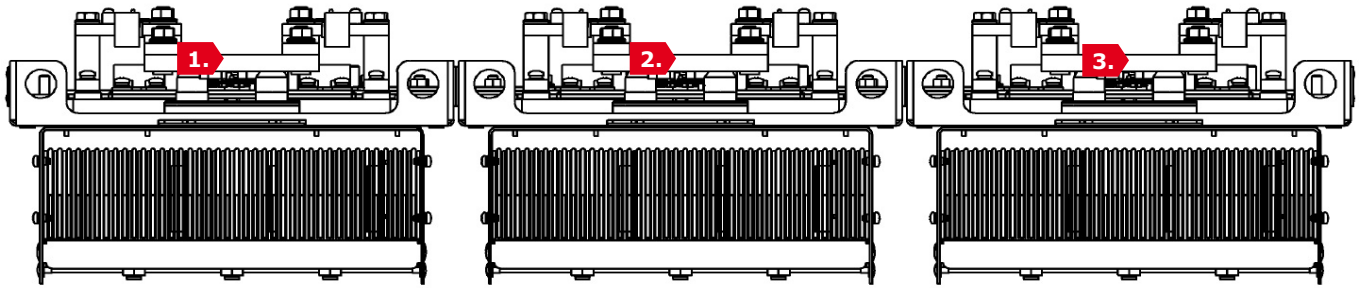
Standard compliance, Mechanical features					
Installation altitude	Altitude without voltage derating		2 000		m
Protection index	IEC 60529	Between air cooling and electrical connections		IP54	-
		At electronic side		IP00	-
Pollution degree	In compliance with IEC standards			PD2	-
Overvoltage category	According to UL1741 standard			OVC III	-
	According to IEC 62109-1 (Basic Insulation)			OVC II	-
Protective Separation (Sichere Trennung)	According to IEC 62109-1 standard			Reinforced insulation	-
Weight	3-phase IGBT inverter		92,5		kg
	3-phase IGBT inverter including fan assembly		97,5		

Axial fan data					
Heatsink fans	V _{SUPPLY}	Heatsink fan DC voltage supply	24	30	V _{DC}
	P _{FAN}	Rated power at V _{SUPPLY} , PWM 100%		660	W
	LTE	Fan Life time expectancy L _{T0Δ} at 40°C	115 000		h

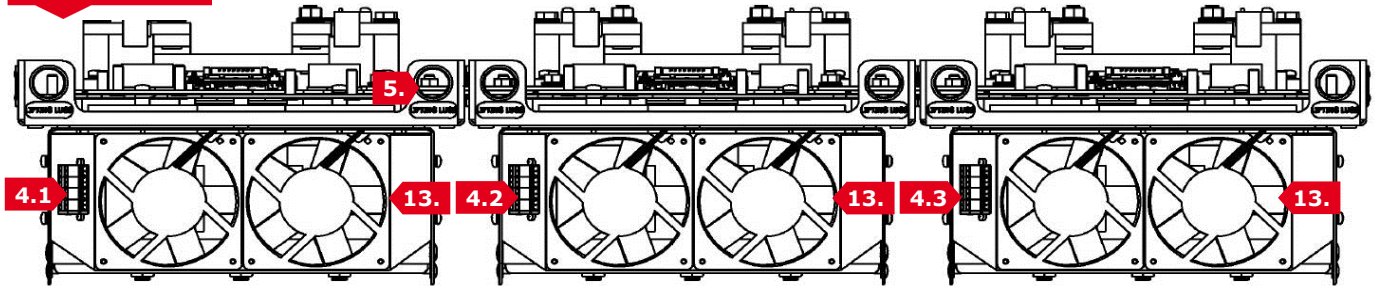
Driver Characteristics					
Symbol	Conditions	min	typ	max	Unit
Driver board data					
V _S	Supply voltage	19,2	24	28,8	V _{DC}
I _{VP, IDLE}	Supply primary current (no load)		150		mA
I _{VP, LOAD}	Max. supply primary current			2 000	mA
ViT+	input threshold voltage HIGH	10	V _s		V _{DC}
ViT-	input threshold voltage LOW		GND	5	V _{DC}
R _{IN}	Input resistance		10		kΩ
t _{powerup}	Power up time		200	300	ms
t _D	Dead Time		2		μs
Measurements & protections					
DC link voltage sensing	Scaling		10		mV.V ⁻¹
	Accuracy of analogue signal @ T _a =25°C	-2		+2	%
	Temperature coefficient			tbc	%.K ⁻¹
	U _{DC analogue OUT}	Max. output current			5
U _{DC analogue OUT}	Max. voltage range	-10		10	V _{DC}
	Max measurable DC Link Voltage			1 000	V _{DC}
	V _{DCTRIP}	Over voltage trip level O.V.P		1 000 ²⁾	V _{DC}
Current sensing	Scaling		3,364		mV.A ⁻¹
	Accuracy of analogue signal at 25°C		2		%
	Temperature drift of voltage output (IF_HB_ANLG / X1:10)			tbc	mV.K ⁻¹
	I _{analogue OUT per phase}	Max. output current			5
I _{analogue OUT per phase}	Voltage range	-10		10	V _{DC}
	I _{TRIPSC}	Over current trip level O.C.P		3 000 ²⁾	A _{PEAK}
Temperature sensing	Scaling over 30°C...110°C temperature range			VTana*8+30	mV.°C ⁻¹
	Linear temperature range	30		110	°C
	Accuracy of analogue signal over 65°C...110°C range	-2,5		2,5	%
T _{analogue OUT}	Max. output current			5	mA
	Max. voltage range	0		10	V _{DC}
T _{TRIP}	Over temperature trip level O.T.P		110 ²⁾		°C
T _{th}	Threshold level for reset after failure event		70		°C
HALT signal	Bidirectional signal with dominant (LOW)		GND	5	V _{DC}
	Bidirectional signal with recessive (HIGH)	10	V _s		V _{DC}



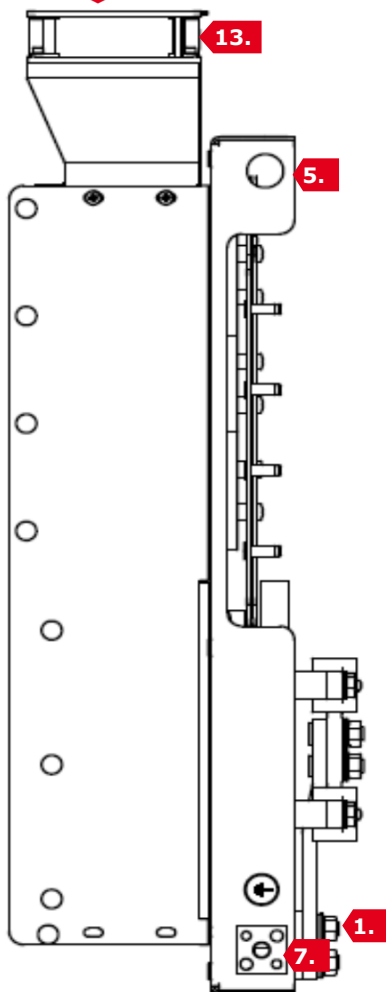
Bottom View



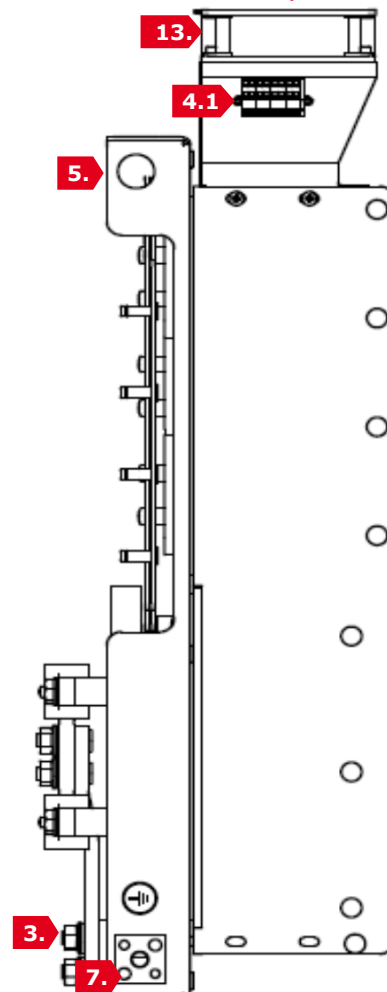
Top View

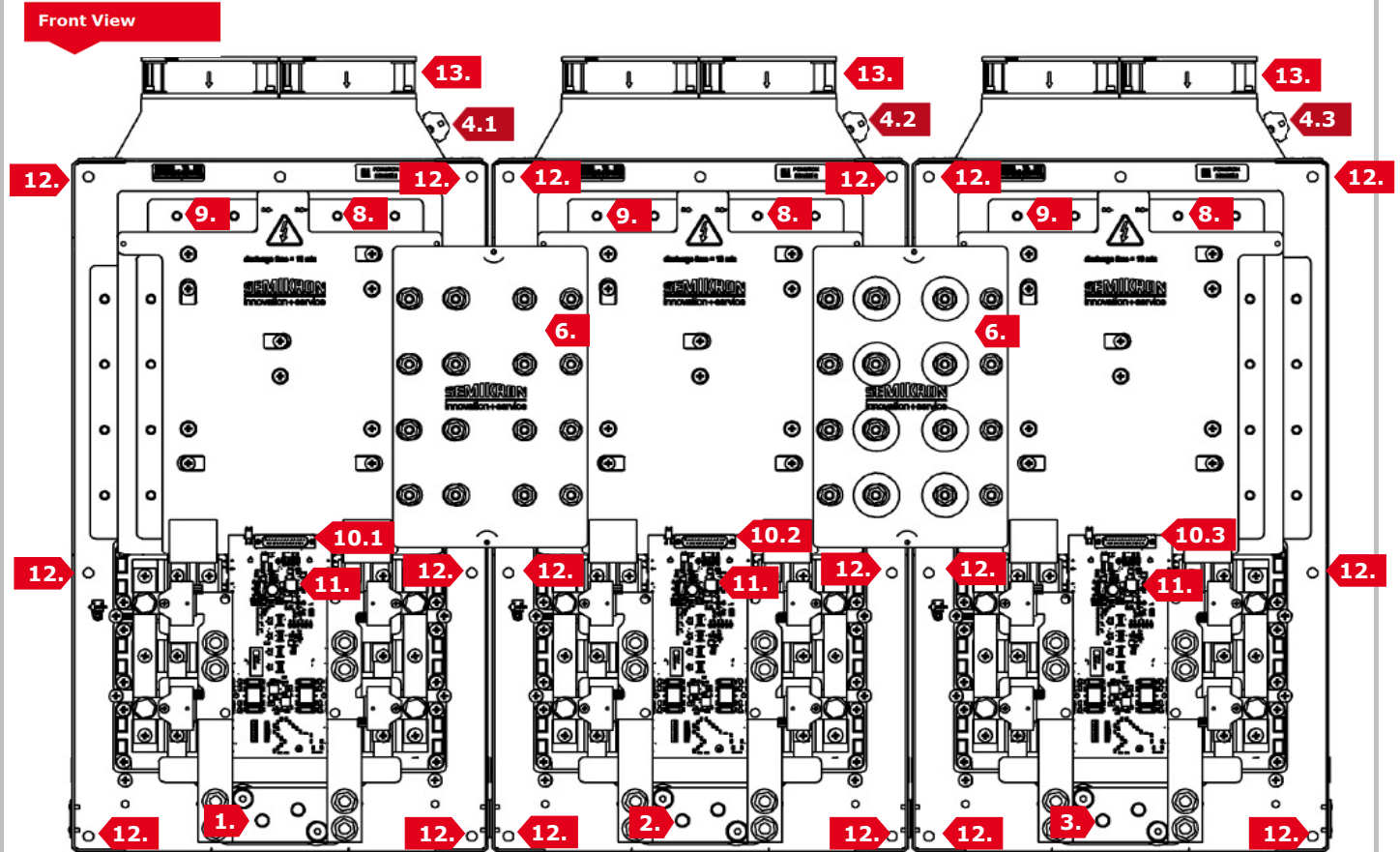


Left View



Right View





- 1. Phase "U" AC Output terminal
- 2. Phase "V" AC Output terminal
- 3. Phase "W" AC Output terminal
- 4.1 X10.1 - U leg - Fan system connector
- 4.2 X10.2 - V leg - Fan system connector
- 4.2 X10.3 - W leg - Fan system connector
- 5. Lifting lugs
- 6. SEMIKRON DC Interconnections (x2 - 16 per units)
- 7. Protective earth terminal (PE)
- 8. Positive Input terminal "DC+" (x6 screws)
- 9. Negative Input terminal "DC-" (x6 screws)
- 10.1 X1.1 - U leg - Driver connector
- 10.2 X1.2 - V leg - Driver connector
- 10.3 X1.3 - W leg - Driver connector
- 11. LED driver status
(Refer to "flashcode" for driver error status)
- 12. Mounting holes (x18)
- 13. Heatsink fan assembly mounted on AC side (option : 3x 08801139)

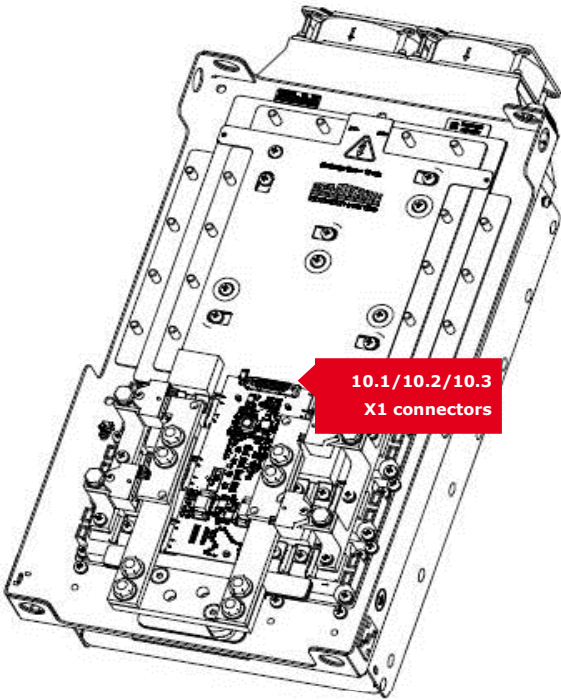
ⓘ **WARNING 1** : Stack shall be mounted using the dedicated mounting kit assembly (DC Interconnections, protective earth terminals) delivered with the stack, please refer to the Installation Manual

ⓘ **WARNING 2** : It is the customer's responsibility to ensure that the environment of the SlimLine is installed into conforms to the SlimLine specifications.

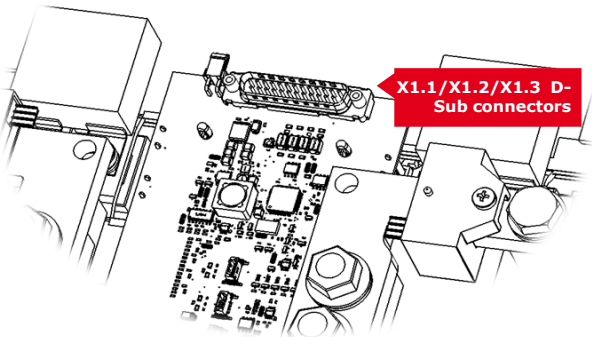
ⓘ **WARNING 3** : It is the customer's responsibility to ensure that the mechanical frame of the SEMIKUBE SL is installed into conforms to the Installation Manual

Connectors assignment

**X1.1/X1.2/X1.3
Connector
assignment**

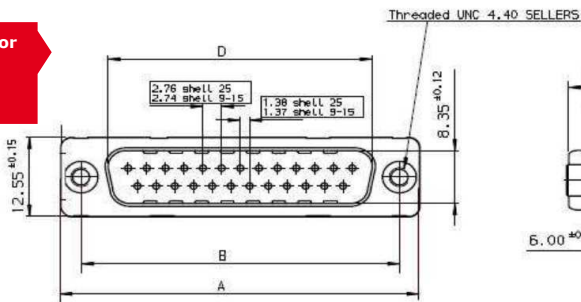


**10.1/10.2/10.3
X1 connectors**



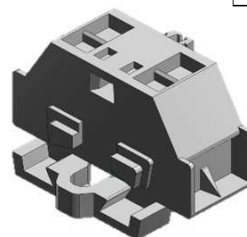
**X1.1 - U leg - Driver connector
X1.2 - V leg - Driver connector
X1.3 - W leg - Driver connector**

**X1 Connector
dimensions**



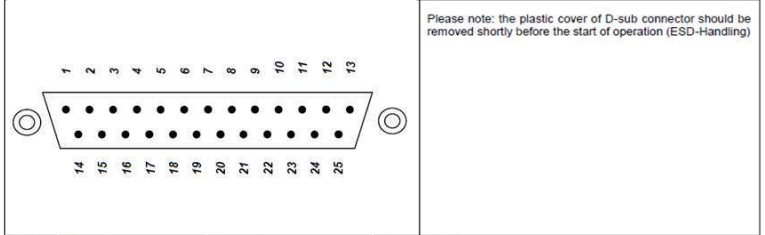
**X10 Connector
assignment**

X10:01	24Vdc (Red wire)
X10:02	GND (blue wire)
X10:03	PWM (purple wire)
X10:04	+ Uba (white wire)



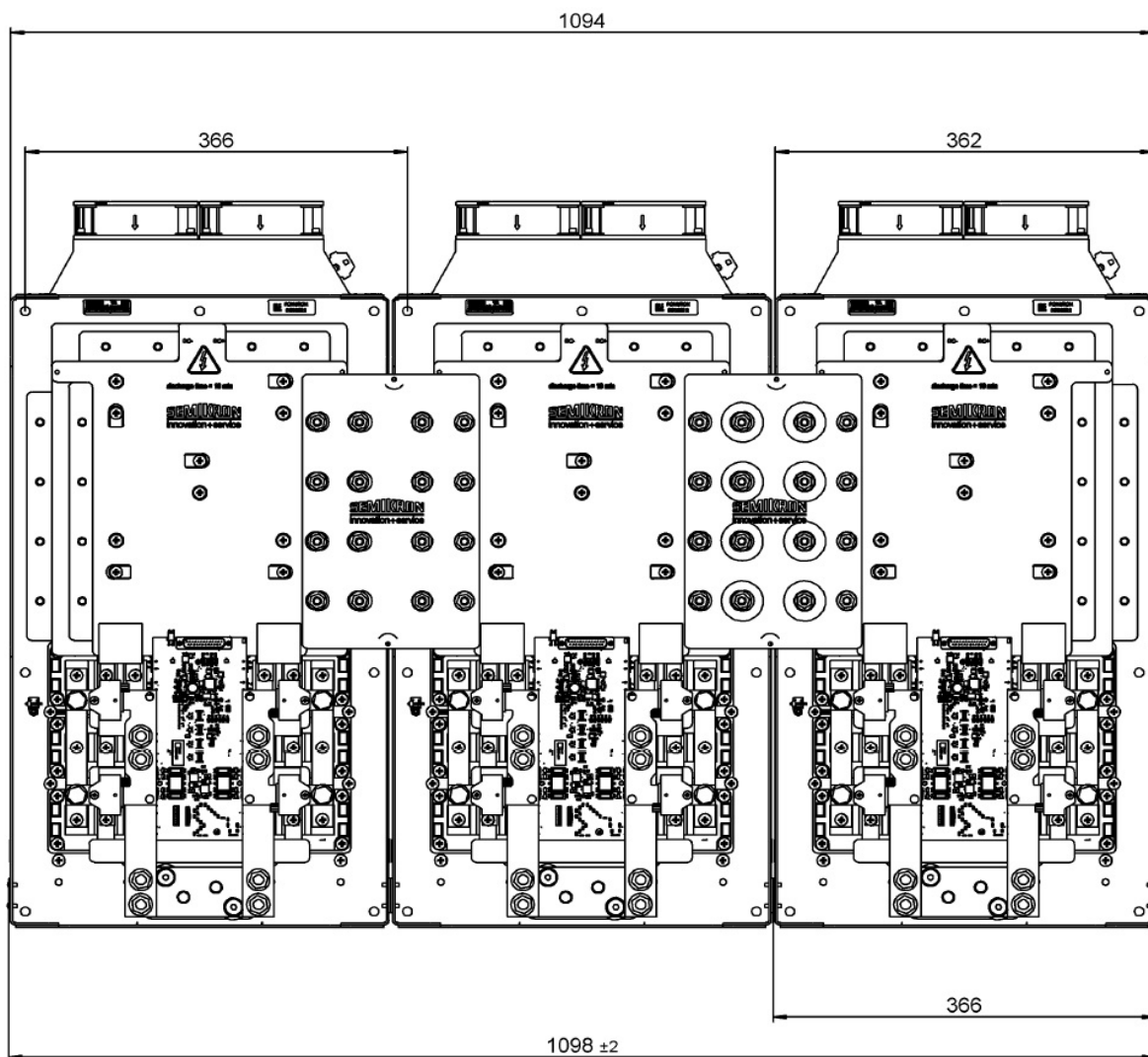
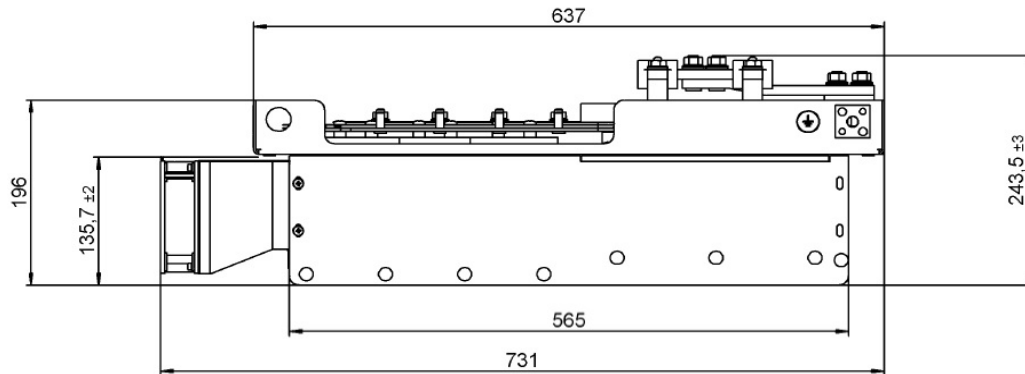
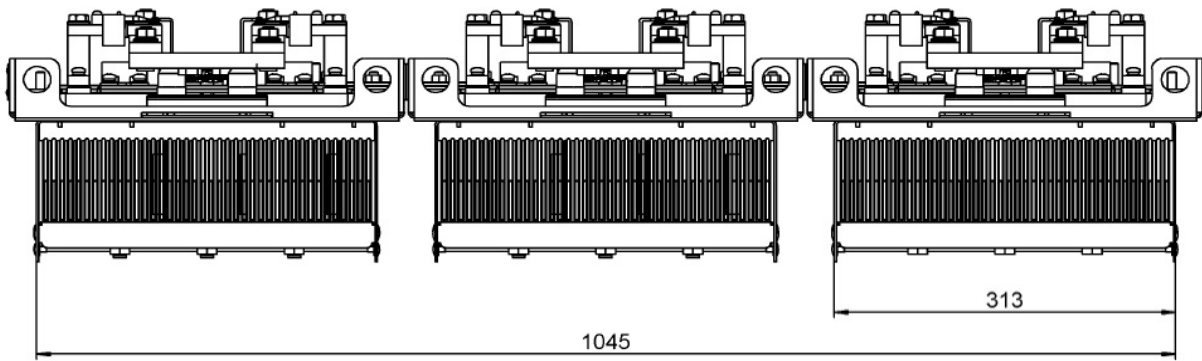
WAGO (261-333)
4-Conductor terminal block
with fixing flange

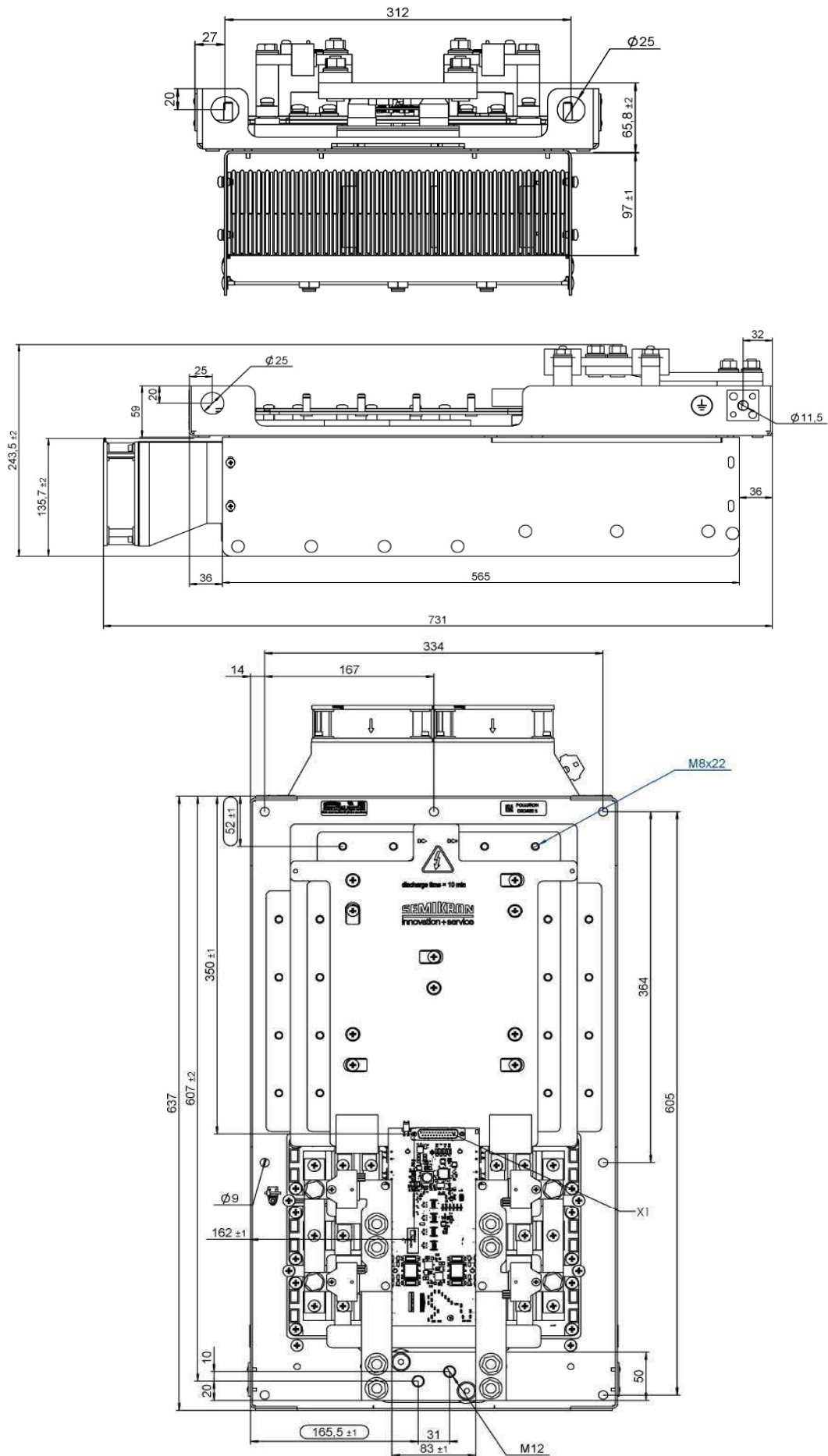
Connector X1000 (D-Sub 25 pin, male, vertical, top view)

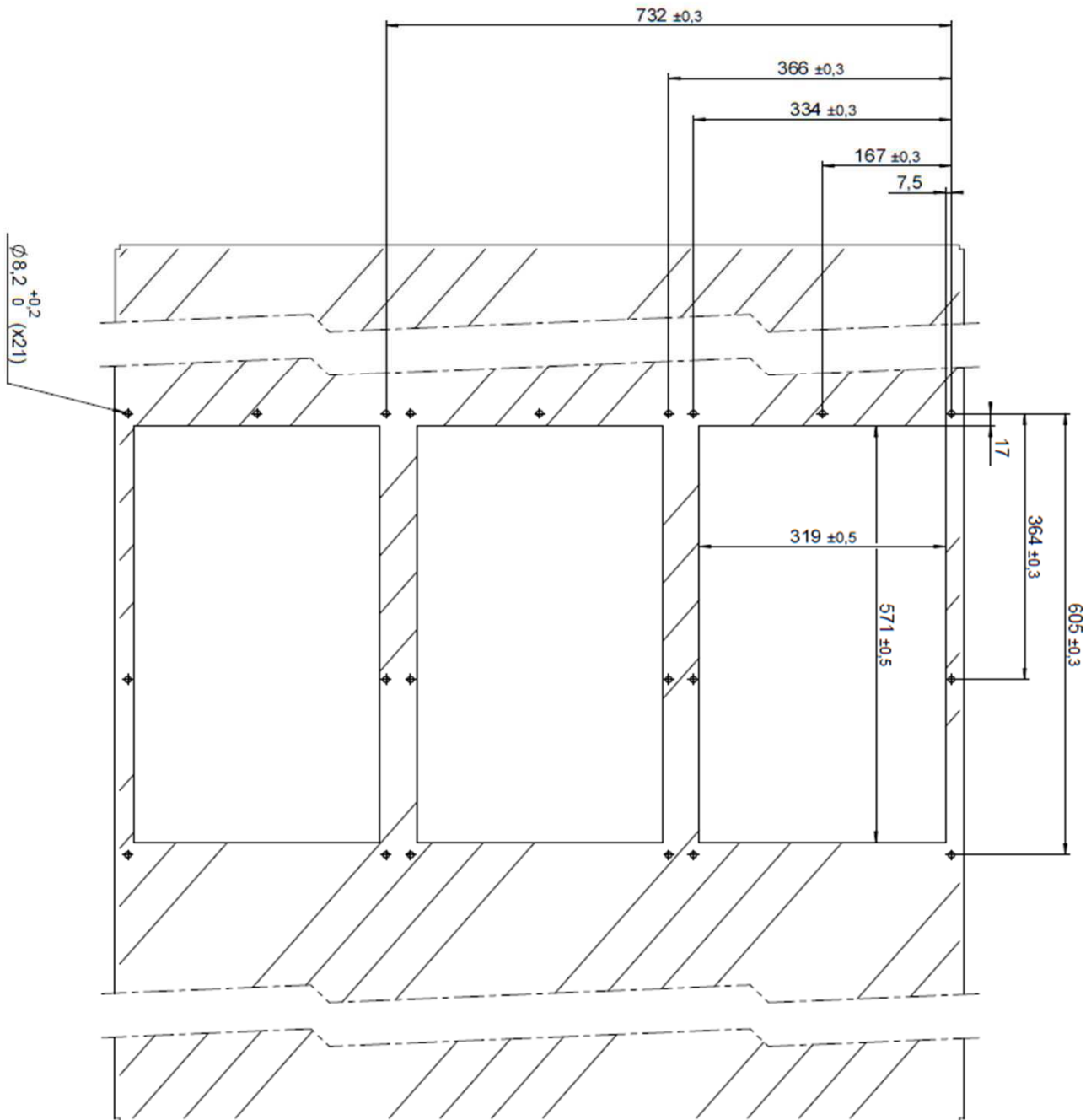


Please note: the plastic cover of D-sub connector should be removed shortly before the start of operation (ESD-Handling)

PIN	Signal	Function	Specification
1/2/3	IF_PWR_VP	Power Supply	+24V (+/- 20%)
4	IF_CMN_DIAG	Reserved	Not used
5	IF_CMN_nHALT	Digital I/O Bidirectional status signal	LOW (dominant) = not ready to operate (e.g. error) HIGH (recessive) = ready to operate
6	IF_CMN_ANLG0	Temperature signal	Max. output current: 5mA Turns ratio: 90,9mV/°C Max. voltage range: +10V Nominal voltage range: 0 ... 10V
7	IF_CMN_ANLG1	DC-Link voltage	Max. output current: 5mA Turns ratio: 10mV/V Max. voltage range: ±10V Nominal voltage range: 0 ... 10V
8	IF_HB_TOP	Switching signal input (HB1 TOP switch) [push pull]	10 kΩ input impedance, Digital IF_PWR_VP logic LOW = TOP switch off HIGH = TOP switch on
9	IF_HB_RSRVD	Reserved	Not connected
10	IF_HB_ANLG	I analog out HB [analog]	Max. output current: 5mA Turns ratio: 3,33mV/A Max. voltage range: ±10V Nominal voltage range: -10 ... 10V
11	IF_AUX_0A	CAN interface INPUT/ OUTPUT HIGH	Input impedance = infinite, Specification according to ISO 11898.
12	IF_AUX_1A		Internally connected to AUX_0A
13	IF_SHLD_GND	GND	Internally connected to PWR_GND
14/1 5/16	IF_PWR_GND	GND for IF_PWR_VP	
17	IF_CMN_GND	Ground for CMN_HALT, CMN_GPIO	Internally connected to PWR_GND
18	IF_CMN_GPIO	Status signal inverted HALT (unidirectional signal)	51,1 kΩ pull up, 10nF capacitance Digital IF_PWR_VP logic LOW (dominant) = ready to operate HIGH (recessive) = not ready to operate
19	IF_CMN_AGND0	GND for IF_CMN_ANLG0	Ground for temperature signal
20	IF_CMN_AGND1	GND for IF_CMN_ANLG1	Ground for DC Link signal
21	IF_HB_BOT	Switching signal input (HB1 BOT switch) [push pull]	10 kΩ input impedance, Digital IF_PWR_VP logic LOW = BOT switch off HIGH = BOT switch on
22	IF_HB_GND	GND for IF_HB1_TOP, IF_HB1_BOT, IF_HB1_rsvd	Internally connected to PWR_GND
23	IF_HB_GND	IF_HB_ANLG	
24	IF_AUX_0B	CAN interface INPUT/ OUTPUT LOW	Input impedance = infinite; Specification according to ISO 11898.
25	IF_AUX_1B		Internally connected to AUX_0B







* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff