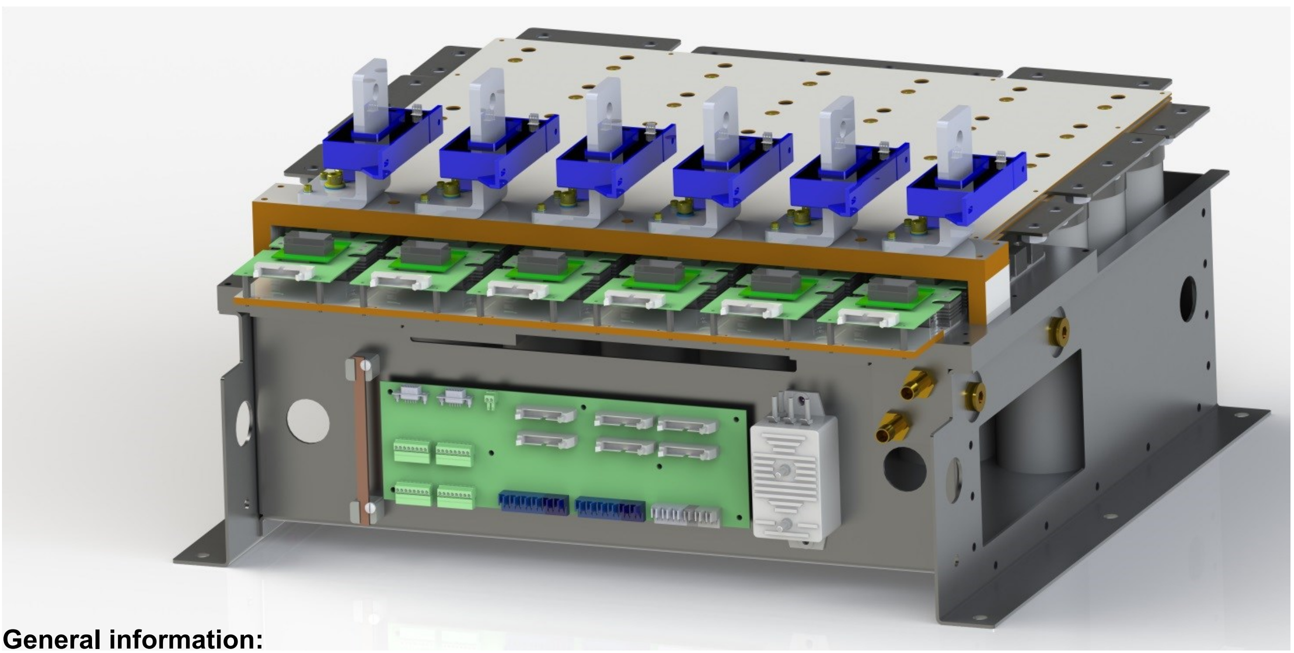
Datasheet

Modular Inverter System VARIS™ XT-06-12

- **Individual circuit arrangement**
- **Hard- and soft paralleling possible**
- **Water cooling**
- **24150µF capacitance per module**
- **Current, voltage and temperature measurement**
- **Interfaceboard with signal processing**



General information:

VARIS™ XT consists of six half bridge IGBT modules with 21 dc-link capacitors. All semiconductors are placed on one cooling plate for a perfect homogenous cooling. Its modular design allows paralleling of the AC-output/input as well as paralleling of the dc-link with other VARIS™ XT. Possible circuit arrangements are active front end topologies, two single three phase inverters, and one three phase inverter with almost twice the power of a single three phase inverter through direct paralleling or soft paralleling via external balancing inductors.

An interfaceboard located on the front of the VARIS™ XT summarizes all IGBT signals as well as voltage, current and temperature measurements.

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1. General Circuit Arrangements:

The following figure shows the general circuit arrangement. VARIS™ XT can be divided into six half bridge modules (P1-P6) that are all connected to one DC-link.

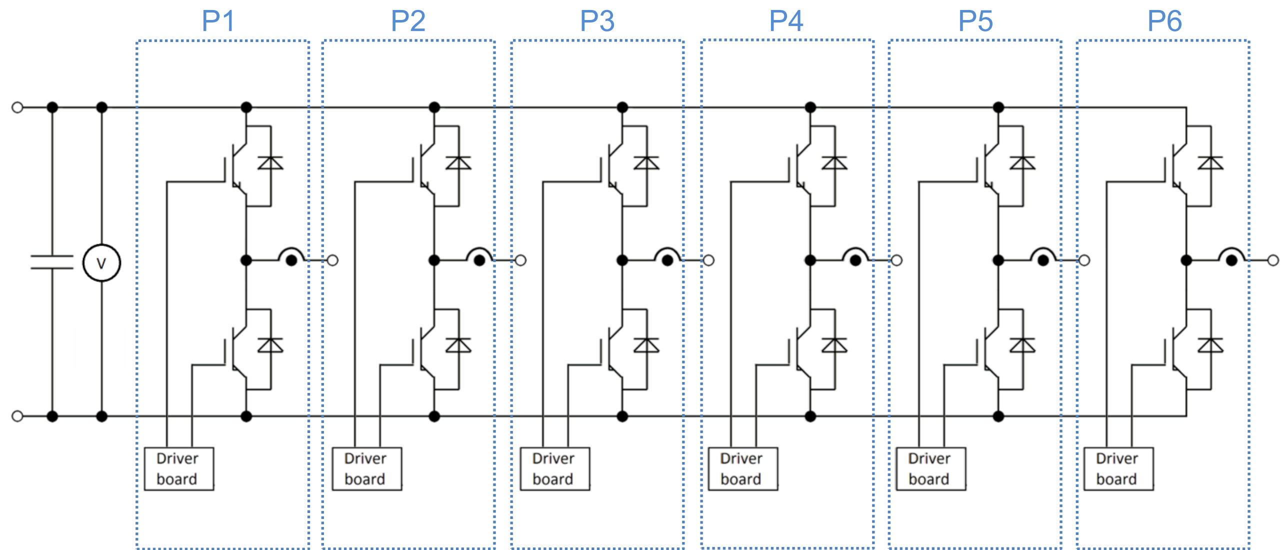


Figure 1: Standard hardware setup

Depending on the application different circuit arrangements are possible. For higher power, all circuits shown below can be expanded with additional VARIS™ XT modules.

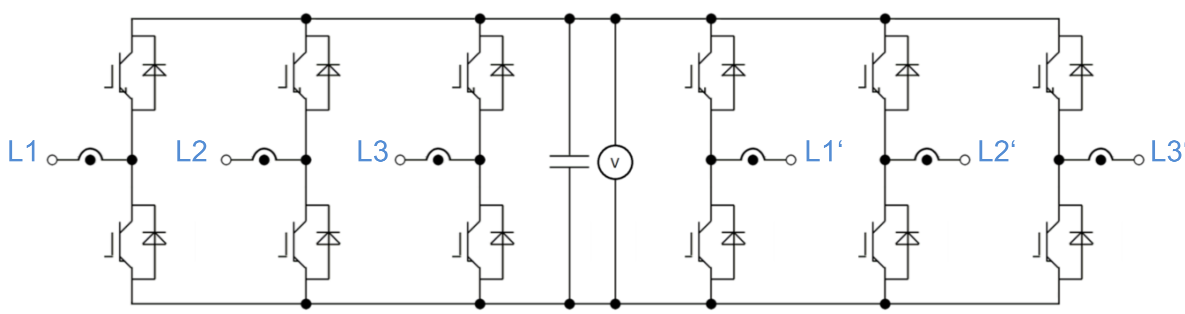


Figure 2: Frequency or Back-to-Back Inverter

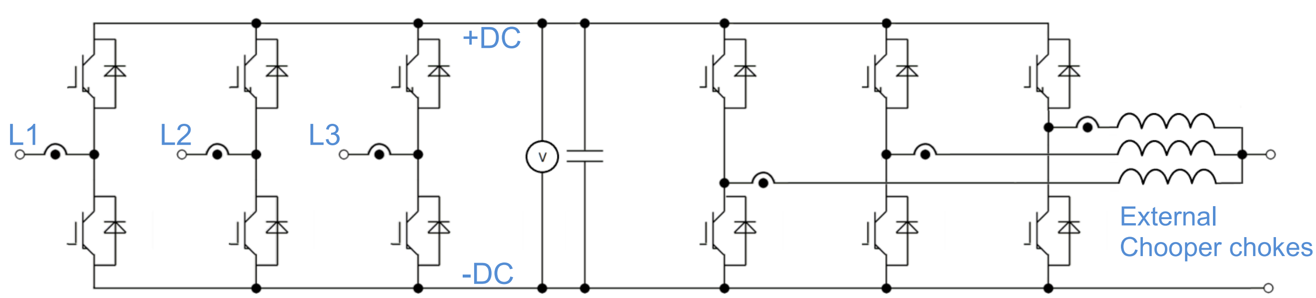


Figure 3: 3 phase AFE with triple interleaved Chopper

Our IGBT modules are optimized for direct paralleling, which means they have the same $V_{ce(sat)}$ forward voltage among themselves.
However, when using direct paralleling the current measurement has to be external. Optional current sensors for direct paralleling are available on request.

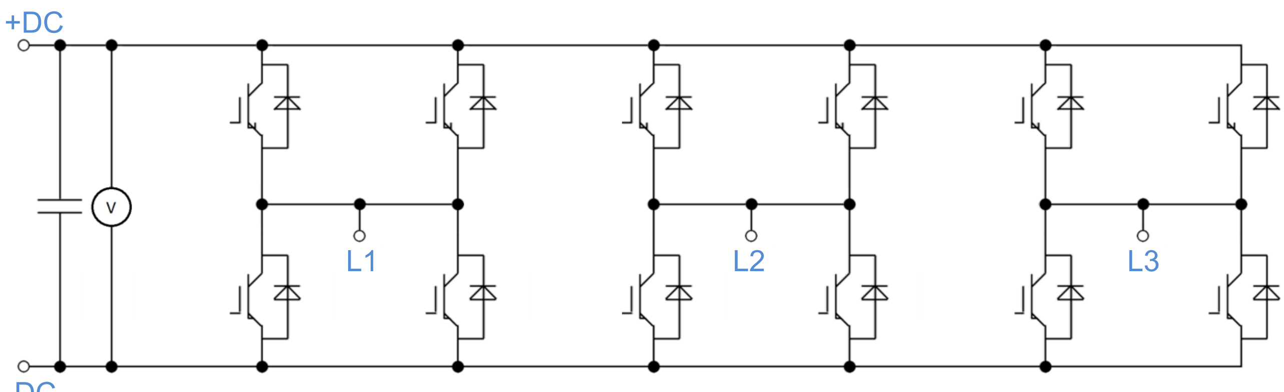


Figure 4: Direct paralleling of the AC- output/input

In a soft paralleling configuration with external balancing chokes, the included standard current sensors can be used.

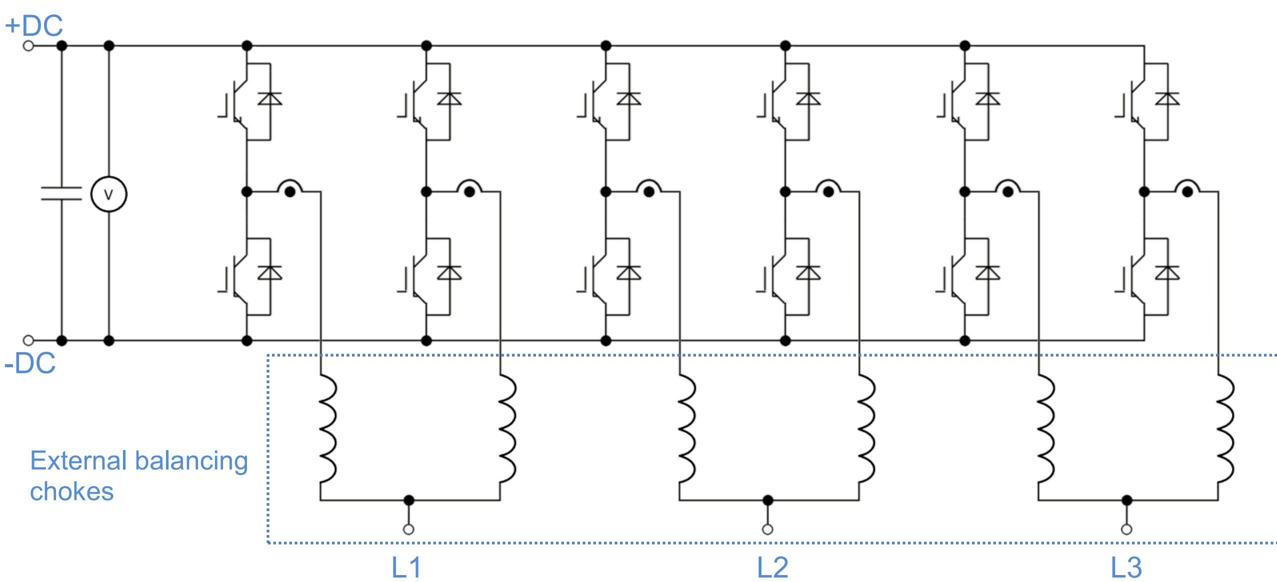


Figure 5: Soft paralleling of the AC- output/input with external balancing chokes

2. *Technical Data Module:*

Absolute maximum rated values		**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Collector emitter voltage	IGBT, T_{vj}=25°C	V_{ces}			1200	V
Peak reverse voltage	Diode, T_{vj}=25°C	V_{rrm}			1200	V
DC-link voltage		V_{dc}			800	V
Maximum line voltage	±10% tolerance	V_{line}			400	V_{RMS}
Insulation test voltage according EN 61800-5-1	f=50Hz, t=1min	V_{iso}			3000	V_{RMS}
Repetitive peak collector current, IGBT	t_p <=1ms	I_{crm}			1200	A
Repetitive peak forward current, Diode	t_p <=1ms	I_{frm}			1200	A
Continuous output current per phase leg	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet}/T_{amb} ≤ 25°C, T_{vjsw}≤125°C	I_{ac}			827	A_{RMS}
Continuous output current per phase leg (paralleled IGBT modules)					1323	
Junction temperature under switching conditions	At continuous current I_{ac}	T_{vjsw}			125	°C
Junction temperature under overload conditions	At $I_{ac\_over1/2}$ (see page 14)	T_{vjsw}			150	°C

Characteristic values		**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Rated voltage	DC-link	V_{dc}		600	800	V
Total capacitance	Capacitor rated tolerance ±10%	C_{dc}		24150		µF
DC-link current ripple	T_{amb} <=55°C	$I_{ripple\_ Cdc}$			1260	A_{RMS}
Capacitor type	IEC61071 Standard, 50 FIT (100000h, $\theta_{Hotspot}$ ≤ 70°C)			PP-Foil		
Balance or discharge resistor per DC link unit	Optional, refers to customers desired discharge time			TBD		kΩ

System data general			**Sym-bol**	**Min.**	**Typ.**	**Max.**	**Unit**
EMC robustness	According to EN 61800-3	Power	V_{burst}		TBD		kV
		Control	V_{burst}		TBD		kV
		Aux	V_{surge}		TBD		kV
Storage temperature	Without remains of coolant		$T_{storage}$	-40		80	°C
Operational ambient temp.			T_{op_amb}	-20		55	°C
Humidity No condensation	max. relative humidity		Rel. H		75		%
	occasional		Occ. H		85		
	30 days/year		30 day. H		95		
Cabinet cooling air velocity	PCB, DC link capacitor, bus bar		V_{air}	2			m/s
Vibration	According DIN IEC 60721				TBD		m/s²
Mech. shock	According DIN IEC 60721				TBD		m/s²
Protection degree					IP00		
Pollution degree					2		
Dimensions	Width x Depth x Height			753	668	414,5	mm
Water flow			Q		12	30	L/min
Water pressure drop	at Q		Δp		250	1350	mbar
Test pressure	heatsink		p		7		bar
Coolant inlet temperature			T_{inlet}	-25		55	°C
Coolant composition	Recommended mix ratio: Water (W) – antifreeze (AF)			48 (W)		52 (AF)	%
Cooling channel material	Aluminum						
Water connection	Standard terminal at the front, inner thread				½		inch
Weight					81.8		kg

3. Technical Data Interfaceboard:

The Interfaceboard is located right next to the Driverboards and summarizes the IGBT signals as well as the AC-output current measurements, DC-link voltage measurement, and PT100 temperature measurement.

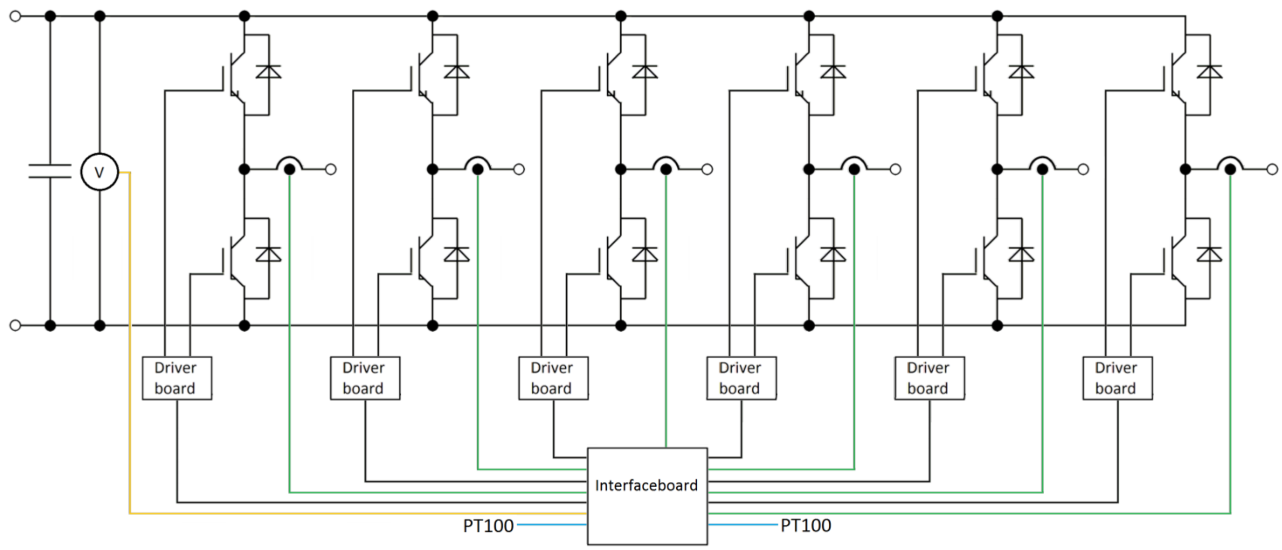


Figure 6: VARIS™ XT circuit arrangement with Interfaceboard

The board contains switches for a paralleling of the IGBT phase legs. If activated, the customer IGBT signals are automatically split and directed to the corresponding paralleled modules.

The interfaceboard combines the IGBT highside and lowside feedback signals to one feedback signal from each IGBT module. This minimizes the wiring effort, and still guaranties a feedback from each module.

For noise reduction all signals are filtered and amplified. A hardware interlock of the PWM signals automatically shuts down the system when a short circuit or under voltage of one driverboard is detected. When the error disappears the system goes back to normal operation.

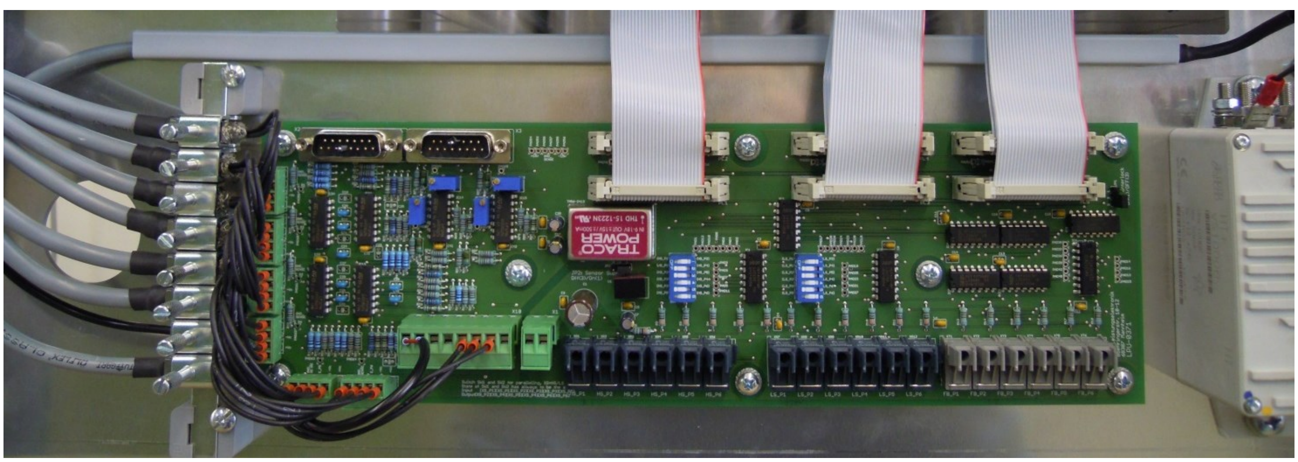


Figure 7: Interfaceboard LPG-0371 (Illustration similar)

Interfaceboard: General system data		**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Supply voltage	Phoenix MSTBA2 connector Pin 1	V_{DD}	14.5	15	15.5	V_{DC}
Driverboard ground	Phoenix MSTBA2 connector Pin 2	GND		0		V_{DC}
Supply current inter-face-board during stand-by	Stand-by, $f_{SW} = 0$	I_{driver}		970		mA
Supply current interfa-ceboard during opera-tion	at $f_{SW} = 2kHz$	I_{driver}		1774		mA
	at $f_{SW} = 6kHz$			2500		mA
	Max.				5000	mA

Interfaceboard: Optical interface	**Versatile link HFBR-connectors**	**Symbol**		**Signal**		
Gate signal highside P1	Fiber optic receiver HFBR-2531	XR1		HS_P1		
Gate signal highside P2	Fiber optic receiver HFBR-2531	XR2		HS_P2		
Gate signal highside P3	Fiber optic receiver HFBR-2531	XR3		HS_P3		
Gate signal highside P4	Fiber optic receiver HFBR-2531	XR4		HS_P4		
Gate signal highside P5	Fiber optic receiver HFBR-2531	XR5		HS_P5		
Gate signal highside P6	Fiber optic receiver HFBR-2531	XR6		HS_P6		
Gate signal lowside P1	Fiber optic receiver HFBR-2531	XR7		LS_P1		
Gate signal lowside P2	Fiber optic receiver HFBR-2531	XR8		LS_P2		
Gate signal lowside P3	Fiber optic receiver HFBR-2531	XR9		LS_P3		
Gate signal lowside P4	Fiber optic receiver HFBR-2531	XR10		LS_P4		
Gate signal lowside P5	Fiber optic receiver HFBR-2531	XR11		LS_P5		
Gate signal lowside P6	Fiber optic receiver HFBR-2531	XR12		LS_P6		
Status signal P1	Fiber optic transmitter HFBR-1531	XT1		FB_P1		
Status signal P2	Fiber optic transmitter HFBR-1531	XT2		FB_P2		
Status signal P3	Fiber optic transmitter HFBR-1531	XT3		FB_P3		
Status signal P4	Fiber optic transmitter HFBR-1531	XT4		FB_P4		
Status signal P5	Fiber optic transmitter HFBR-1531	XT5		FB_P5		
Status signal P6	Fiber optic transmitter HFBR-1531	XT6		FB_P6		

Interfaceboard: Electrical interface X2	15 SUB-D Connector (FCI D15S24A4GV00LF Female)	Symbol	Min.	Typ.	Max.	Unit
Pin 1	Sensor ground	GND_{SENSE}		0		V
Pin 2	Positive supply voltage	$+V_{CC}$		+15		V_{DC}
Pin 3	Sensor ground	GND_{SENSE}		0		V
Pin 4	Current sensor signal P1 at I_{pn} =2000A converted into voltage	C_{P1} at I_{pn}		±10		V
Pin 5	Sensor ground	GND_{SENSE}		0		V
Pin 6	Current sensor signal P2 at I_{pn} =2000A converted into voltage	C_{P2} at I_{pn}		±10		V
Pin 7	Sensor ground	GND_{SENSE}		0		V
Pin 8	Current sensor signal P3 at I_{pn} =2000A converted into voltage	C_{P3} at I_{pn}		±10		V
Pin 9	Sensor ground	GND_{SENSE}		0		V
Pin 10	Negative supply voltage	$-V_{CC}$		-15		V_{DC}
Pin 11	Sensor ground	GND_{SENSE}		0		V
Pin 12	temperature sensor (PT100) signal T1	V_{T1}	0(0°C)		+11,5 (150°C)	V
Pin 13	Sensor ground	GND_{SENSE}		0		V
Pin 14	DC-link voltage sensor signal at V_{pn} =1500V	V_{DC} at V_{pn}		+10		V
Pin 15	Sensor ground	GND_{SENSE}		0		V

Interfaceboard: Electrical interface X3	15 SUB-D Connector (FCI D15S24A4GV00LF Female)	Symbol	Min.	Typ.	Max.	Unit
Pin 1	Sensor ground	GND_{SENSE}		0		V
Pin 2	Positive supply voltage	$+V_{CC}$		+15		V_{DC}
Pin 3	Sensor ground	GND_{SENSE}		0		V
Pin 4	Current sensor signal P4 at I_{pn} =2000A converted into voltage	C_{P4} at I_{pn}		±10		V
Pin 5	Sensor ground	GND_{SENSE}		0		V
Pin 6	Current sensor signal P5 at I_{pn} =2000A converted into voltage	C_{P5} at I_{pn}		±10		V
Pin 7	Sensor ground	GND_{SENSE}		0		V
Pin 8	Current sensor signal P6 at I_{pn} =2000A converted into voltage	C_{P6} at I_{pn}		±10		V
Pin 9	Sensor ground	GND_{SENSE}		0		V
Pin 10	Negative supply voltage	$-V_{CC}$		-15		V_{DC}
Pin 11	Sensor ground	GND_{SENSE}		0		V
Pin 12	temperature sensor (PT100) signal T2*	V_{T1}	0(0°C)		+11,5 (150°C)	V
Pin 13	Sensor ground	GND_{SENSE}		0		V
Pin 14	DC-link voltage sensor signal at V_{pn} =1500V	V_{DC} at V_{pn}		+10		V
Pin 15	Sensor ground	GND_{SENSE}		0		V

*T2 by default no PT100 sensor connected

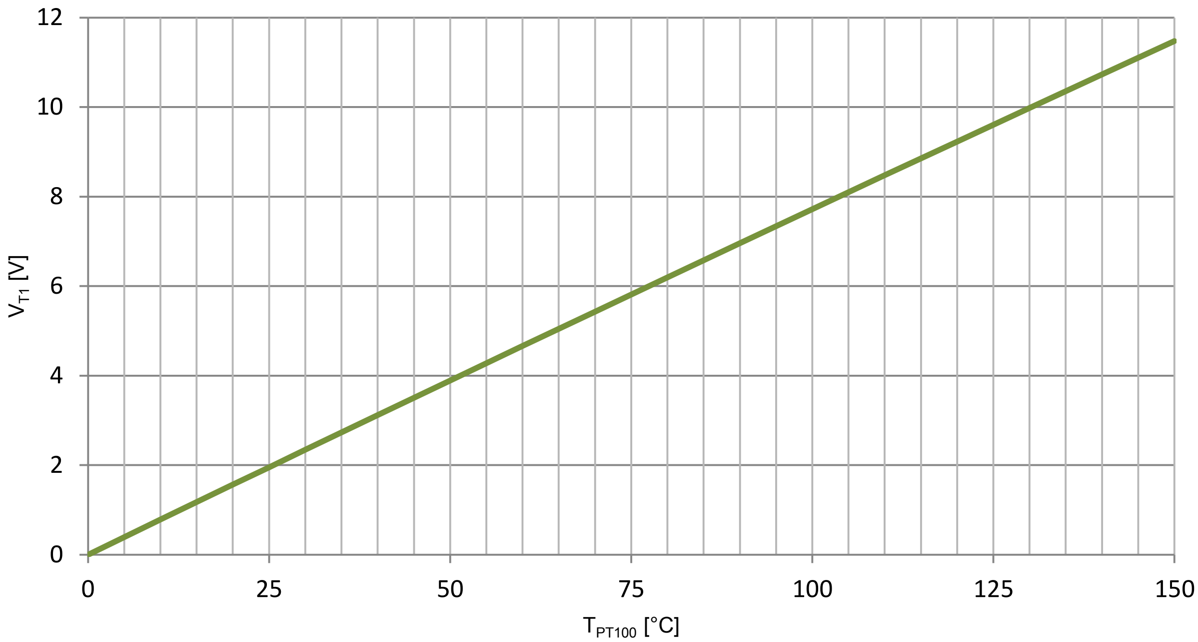


Figure 8: Characteristic curve of the analog heatsink temperature V_{T1} over the PT100 temperature sensor

4. Technical Data Driverboard:

Each IGBT module has its own driverboard, and all driverboard signals are brought together at the interface-board. The signal transfer from driverboard to interfaceboard is electrical, and from interfaceboard to customer control optical.
However, VARIS™ XT is also available without interfaceboard. In this case the customer can choose between an optical or an electrical driverboard signal transmission.

Driverboard: general system data		**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Supply voltage Pin 1 GND, Pin 2 Vaux		V_{aux}	14.5	15	15.5	V_{DC}
Supply current driver-board during stand-by	Stand-by, f_{SW} = 0, optical	I_{driver}		266		mA
	Stand-by, f_{SW} = 0, electrical	I_{driver}		74		mA
Supply current driver-board during operation	at f_{SW} = 2kHz, optical	I_{driver}		304		mA
	at f_{SW} = 2kHz, electrical			100		mA
	at f_{SW} = 6kHz, optical			379		mA
	at f_{SW} = 6kHz, electrical			151		mA
Maximum switching frequency	T_{amb} <=85°C	f_{SW_max}			15	kHz
	T_{amb} <=70°C				25	kHz
IGBT NTC temperature measurement range**	Electrical: analog voltage signal	T_{NTC}	-25		150	°C

Driverboard: Electrical interface	**26 Pin Latch/Ejector, 2.54mm grid (e.g. 3M 34296002)**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Pin 1,3	Supply voltage	V_{DC}		15		V_{DC}
Pin 5,7	Supply voltage	V_{CC}		15		V_{DC}
Pin 9	Status lowside, 15V CMOS out	SO2_OUT		15		V
Pin 11	Signal input lowside	SI_INB		15		V
Pin 13	Status highside, 15V CMOS out	SO1_OUT		15		V
Pin 15	Signal input highside	SI_INA		15		V
Pin 17	Do not connect					
Pin 19	Do not connect					
Pin 21	Status lowside with acknowledg-ment pulse	Status2		15		V
Pin 23	Status highside with acknowledg-ment pulse	Status1		15		V
Pin 25	Analog output of NTC**	V_{Temp_Out}	0		5	V
Pin 2,4,6,8,10,12,14, 16,18,20,22,24,26	Ground	GND				

Driverboard: Optical interface	**Versatile link HFBR-connectors**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate signal highside	Fiber optic receiver HFBR-2521	XR1				
Status signal highside	Fiber optic transmitter HFBR-1521	XT1				
Gate signal lowside	Fiber optic receiver HFBR-2521	XR2				
Status signal lowside	Fiber optic transmitter HFBR-1521	XT2				

Electrical interface X1	**Driver supply when using optical interface MSTBA4-5.08mm**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Pin 1	Ground	GND				
Pin 2	Supply voltage	V_{CC}		15		V_{DC}
Pin 3	Supply voltage	V_{DC}		15		V_{DC}
Pin 4	Analog output of NTC**	V_{Temp_Out}	0		5	V

**The temperature of the IGBT-module NTC is converted into a voltage. The following formula gives the conversion from voltage to temperature and vice versa. (Unit of T_{NTC} in absolute Kelvin)

$$T_{NTC} = \frac{B}{\ln\left(\frac{(X*R_S*R_P-R_S*V_{Temp\_Out}*R_P)}{R_{25}*(V_{Temp\_Out}*R_P-R_S*X+R_S*V_{Temp\_Out})}\right)+\frac{B}{298,15}}$$

Formula 1.0

The following constants are valid for the used NTC:

Constants of formula 1.0	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Resistance	Rs		220		Ω
Resistance	Rp		1800		Ω
B value	B		3433		K
Resistance	R25		5000		Ω
Factor	X		11		

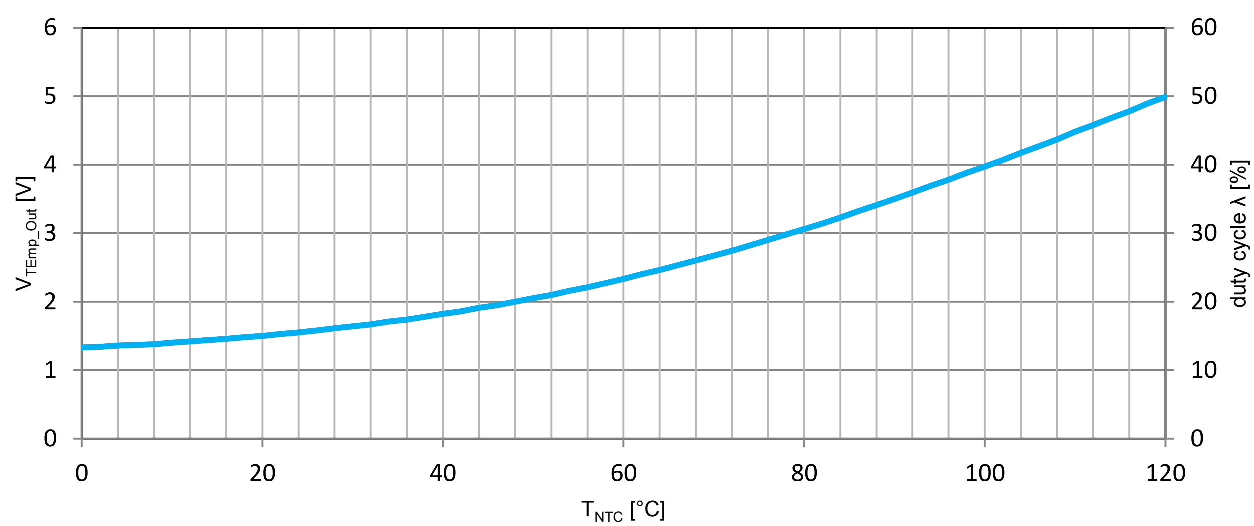


Figure 9: Characteristic curve of the analog temperature sense output V_{Temp_Out} and the duty cycle λ over the IGBT NTC temperature T_{NTC}

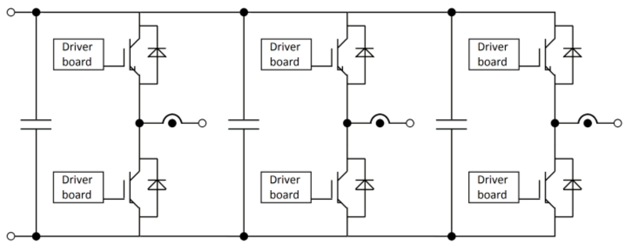
5. Technical Data Sensoring:

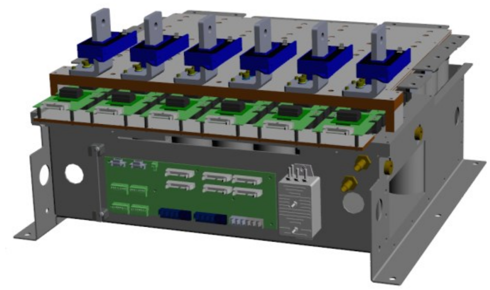
The supply voltage of all sensors is provided by the interfaceboard. The actual values of current, voltage and temperature are amplified, filtered, and directed to two SUB-D connectors (details see interfaceboard section). However this section gives a quick overview of the sensors used and their accuracy.

Current sensor interface		**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Positive supply voltage		$+V_a$			+15	V
Negative supply voltage		$-V_a$	-15			V
Nominal primary current		I_{pn}		$\pm$1000		A
Measuring range		I_{p_max}	-3000		3000	A
Output voltage		V_{out} at I_{pn}		±4		V
Ratio primary current I_{pn} to secondary voltage V_{out}				250		A/V
Current consumption		I_{pn}		<20		mA
Accuracy at I_{pn}	at T_{amb} = 25°C, excluding electrical offset voltage		-1.0		+1.0	%
Electrical offset voltage	at T_{amb} = 25°C		-20		+20	mV
Frequency Bandwidth		BW	DC		25	kHz
Electrical interface	**4 Pin connector (e.g. Molex 5045-04A)**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Pin 1	Positive supply voltage	$+V_a$		+15		V
Pin 2	Negative supply voltage	$-V_a$		-15		V
Pin 3	Output	M				V
Pin 4	Ground	GND		0		V

Voltage sensor interface		**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Positive supply voltage		$+V_a$			+15	V
Negative supply voltage		$-V_a$	-15			V
Nominal primary voltage		V_{pn}		$\pm$1000		V
Measuring range		V_{p_max}	-1500		1500	V
Output current		I_{out} at V_{pn}		±50		mA
Ratio primary votalge V_{pn} to secondary current I_{out}				20000		V/A
Current consumption		I_{pn}		<20		mA
Accuracy at V_{pn}	at T_{amb} = 25°C		-0.9		+0.9	%
Electrical offset current	at T_{amb} = 25°C		-0.15		+0.15	mA
Frequency Bandwidth		BW	DC		25	kHz
Electrical interface	**M4 screw terminal**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Pin 1	Positive supply voltage	$+V_a$		+15		V
Pin 2	Negative supply voltage	$-V_a$		-15		V
Pin 3	Output	M				V
Pin 4	Earth	E				V
Pin 5	Positive high voltage	HV+				V
Pin 6	Negative high voltage	HV-				V

6. Technical Data 3- Phase Inverter:





The following values are for a single three phase inverter configuration. VARIS™ XT can basically create two three phase inverters with twice the power given below (system power). When paralleling the AC- output/input, a derating has to be considered. For this please see chapter 7.

Characteristic values		**Cooling type**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Rated continuous current per leg	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet} ≤ 25°C, T_{vjsw}≤125°C	Water	I_{ac}			827	A_{RMS}
Rated continuous output power 3 phase inverter	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet} ≤ 25°C, T_{vjsw}≤125°C	Water	P_{out}			545	kW
Rated continuous over- current t_{on} ≤ 60s	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet} ≤ 25°C, t_{on} ≤ 60s T_j≤150°C	Water	I_{ac_over1}			848*	A_{RMS}
Rated continuous over- current t_{on} ≤ 3s	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet} ≤ 25°C, t_{on} ≤ 3s T_j≤150°C	Water	I_{ac_over2}			848*	A_{RMS}
Power losses per phase leg	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, at I_{ac} T_{vjsw}≤125°C	Water	P_{loss_leg}			2314	W
Power losses 3 phase inverter	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, at I_{ac} T_{vjsw}≤125°C	Water	P_{loss_tot1}			6942	W
Power losses VARIS™ XT (2x 3 phase inverter)	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, at I_{ac} T_{vjsw}≤125°C	Water	P_{loss_tot2}			13884	W
Switching frequency		Water	f_{sw}		2000		Hz
Power factor			cos(φ)	-1.00		1.00	

*over current I_{ac_over1} and I_{ac_over2} are limited due to semiconductor restrictions

Current and Power ratings water cooled 3-phase configuration:

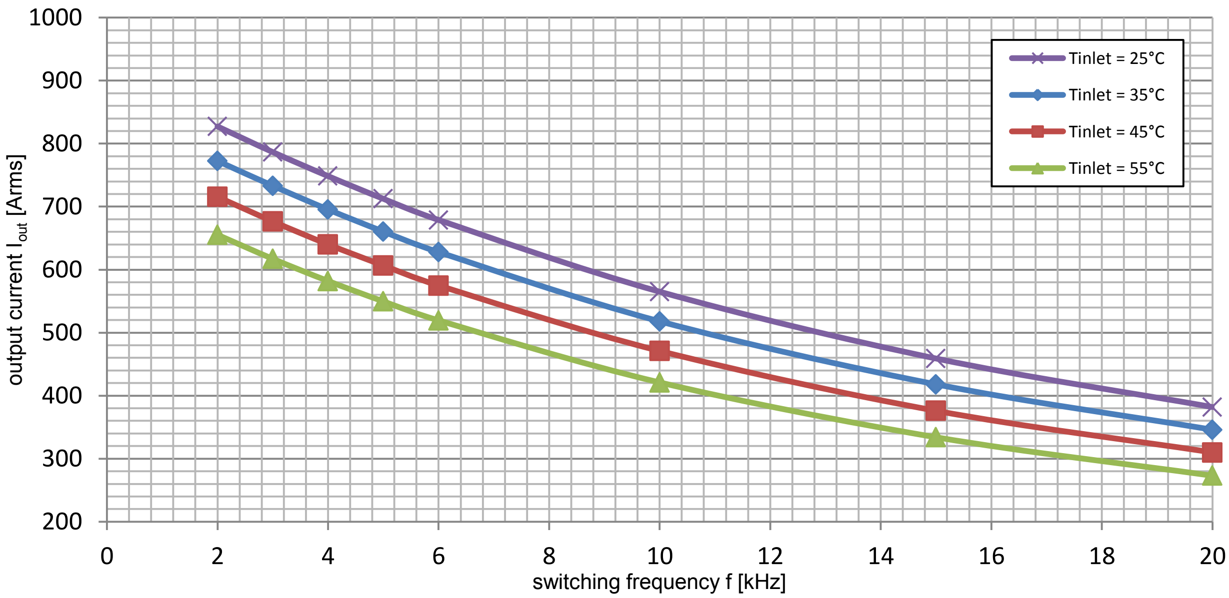


Figure 10: Current rating VARIS™ XT Compact-06-12-W (3-phase, water cooled)
Measurement at V_{dc}=600V, Q = 4,3 L/min, V_{ac}=400Vrms, cos(φ)=0.95, m=1.0, f_{ac_sine}=50Hz, T_{vjsw}≤125°C

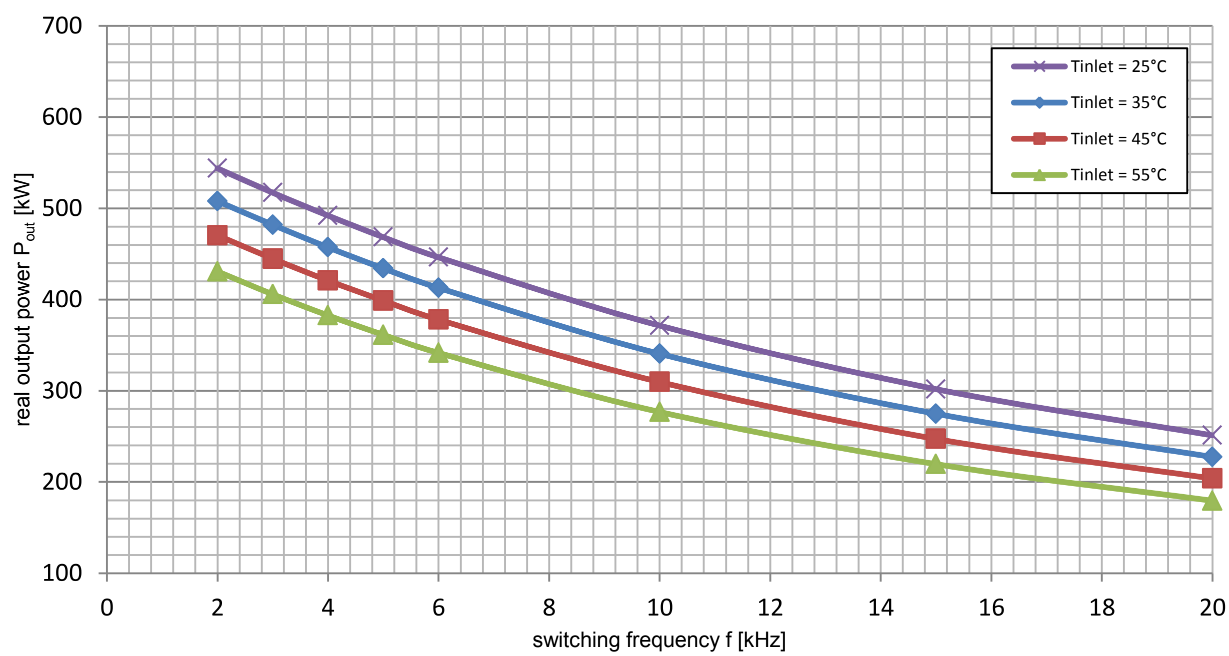
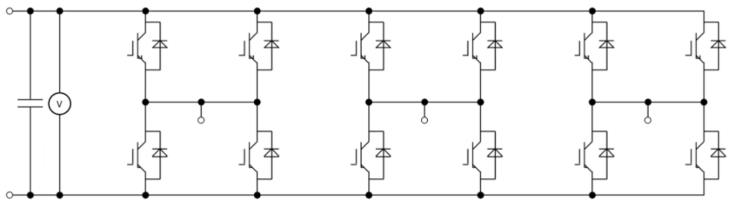


Figure 11: Power rating VARIS™ XT Compact-06-12-W (3-phase, water cooled)
Measurement at V_{dc}=600V, Q = 4,3 L/min, V_{ac}=400Vrms, cos(φ)=0.95, m=1.0, f_{ac_sine}=50Hz, T_{vjsw}≤125°C

7. Technical Data Paralleling:



The following values are for a single three phase inverter configuration with two IGBT Modules in parallel.

Characteristic values		**Cooling type**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
Rated continuous current per leg	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet} ≤ 25°C, T_{vjsw}≤125°C	Water	I_{ac}			1323	A_{RMS}
Rated continuous output power 3 phase inverter	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet} ≤ 25°C, T_{vjsw}≤125°C	Water	P_{out}			870	kW
Rated continuous over- current t_{on} ≤ 60s	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet} ≤ 25°C, t_{on} ≤ 60s T_j≤150°C	Water	I_{ac_over1}			1356*	A_{RMS}
Rated continuous over- current t_{on} ≤ 3s	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, T_{inlet} ≤ 25°C, t_{on} ≤ 3s T_j≤150°C	Water	I_{ac_over2}			1356*	A_{RMS}
Power losses per phase leg	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, at I_{ac} T_{vjsw}≤125°C	Water	P_{loss_leg}			4628	W
Power losses 3 phase inverter (losses of all 6 modules)	V_{dc}=600V, V_{ac}=400Vrms, cos(φ)=0.95, f_{ac_sine}=50Hz, f_{sw}=2kHz, m=1.0, at I_{ac} T_{vjsw}≤125°C	Water	P_{loss_tot2}			13884	W
Switching frequency		Water	f_{sw}		2000		Hz
Power factor			cos(φ)	-1.00		1.00	

*over current I_{ac_over1} and I_{ac_over2} are limited due to semiconductor restrictions

Current and Power ratings water cooled 3-phase configuration with paralleled outputs:

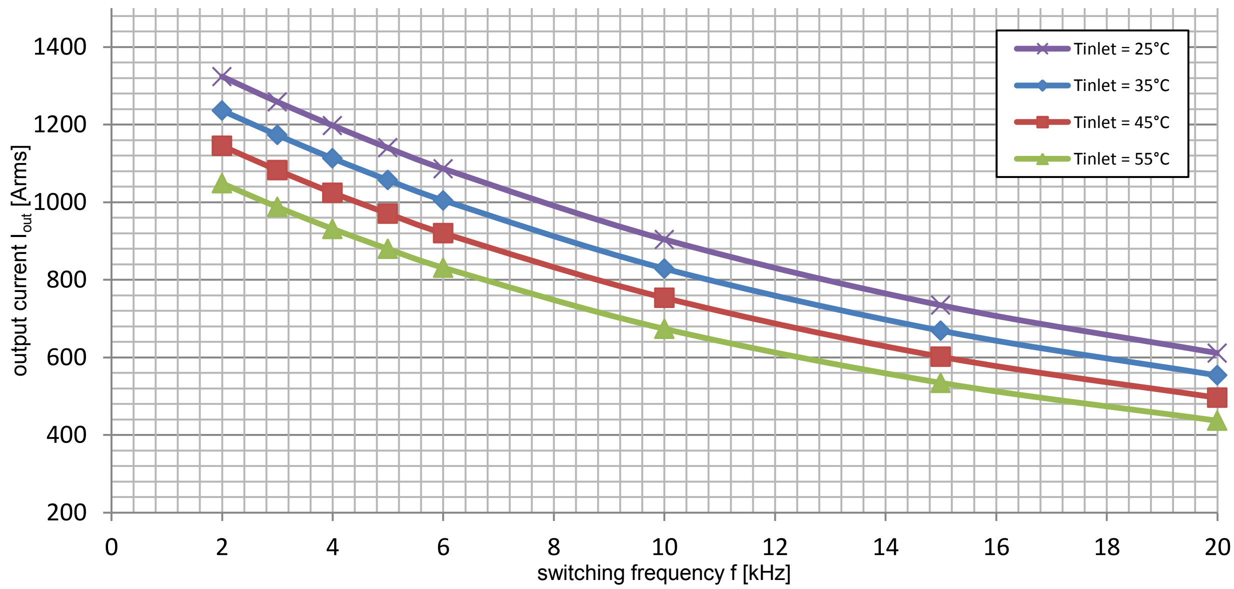


Figure 12: Current rating VARIS™ XT-06-12 (3-phase configuration, paralleled modules)
Measurement at V_{dc}=600V, Q = 12 L/min, V_{ac}=400V_{RMS}, cos(φ)=0.95, m=1.0, f_{ac_sine}=50Hz, T_{vjsw}≤125°C

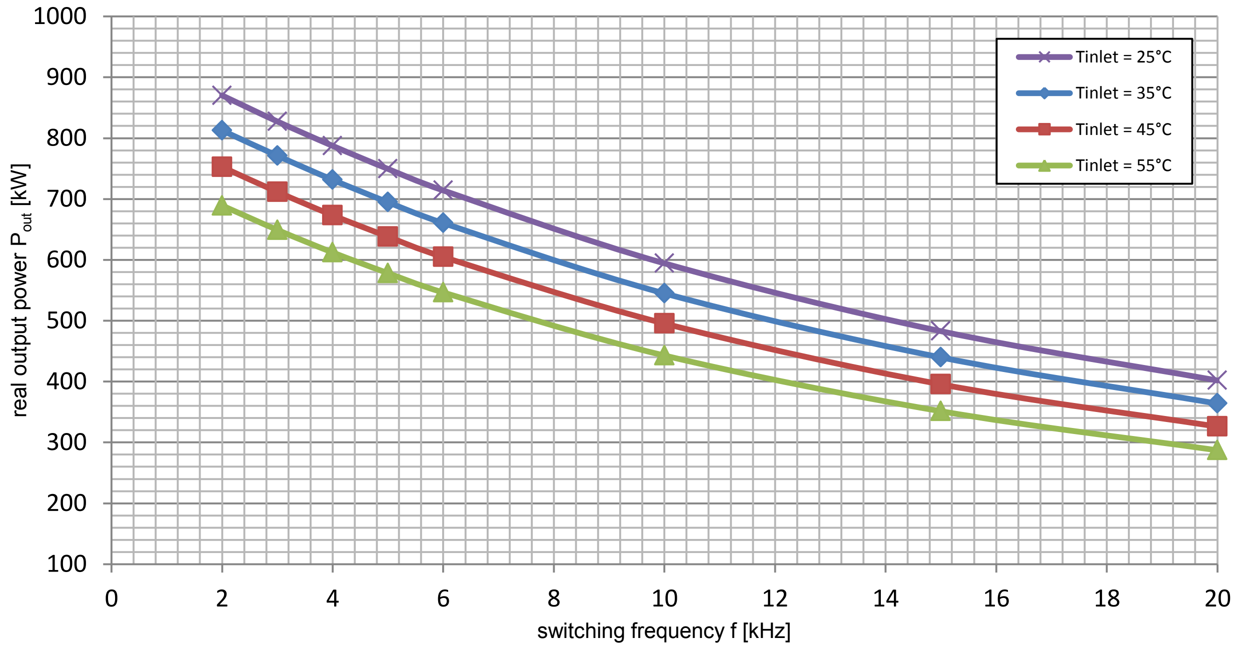
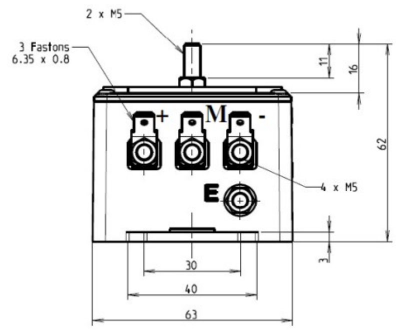


Figure 13: Power rating VARIS™ XT-06-12 (3-phase configuration, paralleled modules)
Measurement at V_{dc}=600V, Q = 12 L/min, V_{ac}=400V_{RMS}, cos(φ)=0.95, m=1.0, f_{ac_sine}=50Hz, T_{vjsw}≤125°C

8. Interfaces and Connections:

<table>
<tr><td colspan="2">Current- and Voltage- Sensor Interface:</td></tr>
<tr><td>Current sensor:</td><td>Voltage sensor:</td></tr>
<tr><td>
</td><td>
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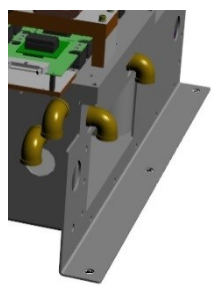
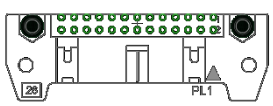
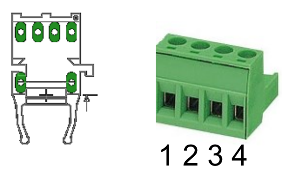
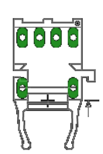
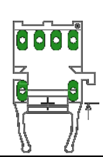
<tr><td colspan="2">Water Connection (1/2 inch) two possibilities to connect:</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">Signal Interfaces Driverboard:</td></tr>
<tr><td>Driverboard electrical 26 Pin Latch/Ejector, 2.54mm grid (e.g. 3M 34296002):</td><td>Driverboard optical (HFBR-15xx, supply voltage MSTBA4 5.08mm):</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td colspan="2">Signal Interfaces Interfaceboard:</td></tr>
<tr><td>2x 15 Pin female SUB-D for electrical sensor signals (female on PCB):</td><td>12x HFBR-2531 for IGBT control signals:</td></tr>
<tr><td>
</td><td></td></tr>
<tr><td>MSTBA2 for power supply:</td><td>6x HFBR-1531 for IGBT feedback signals:</td></tr>
<tr><td>
</td><td></td></tr>
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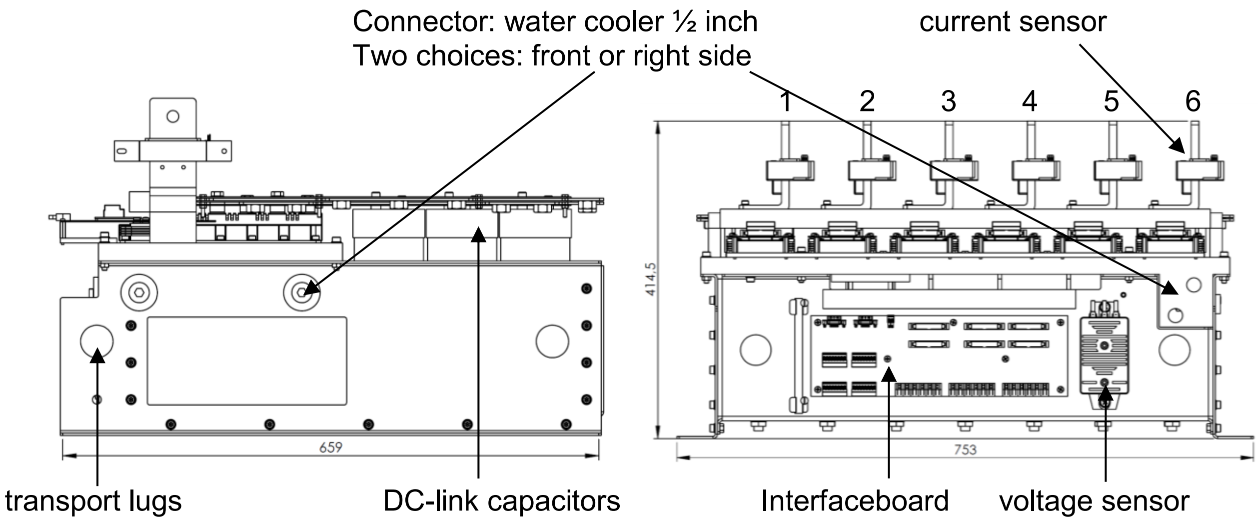
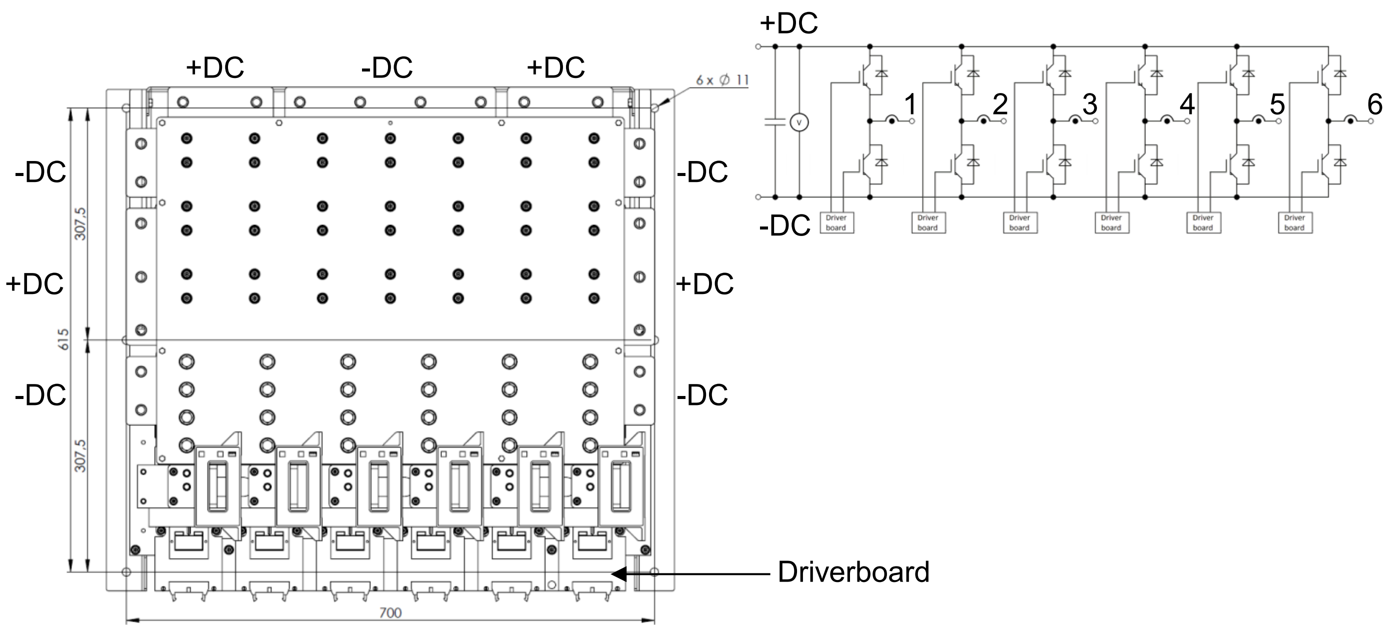
9. Mechanical Drawings:

- All dimensions in millimeter (mm)





GvA Leistungselektronik GmbH reserves the right to adapt or amend the content of this technical information at any time and without prior notification.

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