

# Multilevel highspeed inverter 110 1.1

## MLI 110 1.1 Preliminary Datasheet REV 001

Control of motors and generators up to 150,000 rpm. Speed safely under control – lower system costs



## General Description

### High speed kept under control

- DC supply voltage up to 800 VDC
- Nominal phase current up to 110 ARMS
- Stator frequency up to 2,500 Hz
- PWM switching frequency up to 35kHz

### Features

- Compact design
- High power density
- Liquid-cooled, inlet temperature < 60°C (under full load conditions)
- Interface to higher-level control system (according to CANopen, J1939 on request)
- Field-proven sensorless speed and torque control
- Temperature monitoring interface
- Motor position interface (on request)
- Digital Signal Processor with high control performance
- Integrated EMI filter
- DC voltage measurement and supervision
- Two phase current measurements
- IP67 enclosure

## Table of Contents

• Characteristics	2
• Power Connectors (HV)	4
• Signal Connectors (LV)	4
• Sensor Connector	5
• Encoder Connector	5
• Mechanical Data – Enclosure Mounting Drawing	6
• Company Overview	8
• For further questions	8
• Disclaimer	8

## Characteristics

Symbol	Conditions	Min.	Typ.	Max.	Unit
$V_{DC}$	DC supply voltage	200		800	V
$I_{nom}$	$I_{rms}$ nominal - $dV/dt = 10$ lt/min - 50%Glykol/50%H <sub>2</sub> O - $T_{coolant} = 60^{\circ}C$ - $T_{air} = 60^{\circ}C$ - $V_{CC} = 750V$ - $f_{out} > 100$ Hz - $f_{sw} = 30$ kHz		110	130 (max. 1.5s)	Arms
$f_{sw}$	Switching frequency	20	30	35	kHz
$I_{DC}$	DC input current			100	A
$C_{DC}$	DC-link capacitance		113		$\mu F$
$C_y$	EMI capacitor; DC to enclosure		0.096		$\mu F$
$R_{BL}$	DC+ to DC-		176		k $\Omega$
$t_d$	Discharge time to $V_{DC} < 60V$			60	Sec
$V_{WFRI}$	Working Voltage for Reinforced Isolation			636	V
<b>Mechanical Data</b>					
$m$	Weight (without cooling water)		7		kg
$L$	Length (without connector)		400		mm
$W$	Width (without connector)		270		mm
$H$	Height (without connector)		77		mm
$M_t$	AC / DC terminals (M5) torque			4.5	Nm
$M_c$	Cover of terminal box (M4) torque			2.4	Nm
$M_{gnd}$	GND connection (M5) torque			4.5	Nm
$M_m$	Mounting screws (M6) torque			6.5	Nm
<b>Liquid Cooling</b>					
$T_{coolant}$	Operating range	-30		60	$^{\circ}C$
$dV/dt$	Flow rate	6	10		lt/min
$dp$	Pressure drop @10 lt/min		<100		mbar
$P$	Operating pressure (gauge)			2	Bar

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Symbol	Conditions	Min.	Typ.	Max.	Unit
$V_{coolant}$	Coolant quantity of integrated cooling circuit		450		cm <sup>3</sup>
Inlets	Coolant inlets	for 16mm flexible pipe			
<b>Environmental Data</b>					
$T_{air}$	Ambient temperature operating range	-30		85	°C
$T_{no}$	Non-operating temperature range	-40		85	°C
IP	Enclosure protection level (Connector mated)		IP67		
Altitude	$V_{DC} = 636V$			4000	m
<b>Interface</b>					
$V_S$	Auxiliary supply voltage primary side	8	14	36	V
$I_{S\_sleep}$	Auxiliary supply current primary side in sleep mode			100	μA
$I_S$	Auxiliary supply current primary - $V_S = 14V$ - IGBT inverter standby		850		mA
$I_S$	Auxiliary supply current primary - $V_S = 14V$ - IGBT inverter switching @35kHz		1250		mA
$t_{por}$	Power-on reset completed (gate driver primary & secondary side)			1.5	s
<b>Protection Functions</b>					
$V_{DCtrip}$	DC-Link voltage trip level (HW) +DC/2 & -DC/2		485		V
$I_{sstrip\_max}$	Maximal phase current trip level (HW)		240		A
<b>Motor Temperature 1</b>					
$R_{ts}$	Measurable range 1 (PT100)	0		199	Ω
	Measurable range 2 (KTY-84)	0		2360	Ω
<b>Motor Temperature 2</b>					
$R_{ts}$	Measurable range 1 (PT100)	0		199	Ω
	Measurable range 2 (KTY-84)	0		2360	Ω
<b>Motor Position Sensing</b>					
	ABZ encoder interface				

## Power Connectors (HV)

Pin	Terminal	Size	Torque	Cable harness
A:01	DC+	M5 (max 16mm <sup>2</sup> ) Depth of thread 6mm	3Nm	1 x M32
A:02	DC-	M5 (max 16mm <sup>2</sup> ) Depth of thread 6mm	3Nm	
B:01	Phase U	M5 (max 16mm <sup>2</sup> ) Depth of thread 6mm	3Nm	1 x M32 or 3 x M20
B:02	Phase V	M5 (max 16mm <sup>2</sup> ) Depth of thread 6mm	3Nm	
B:03	Phase W	M5 (max 16mm <sup>2</sup> ) Depth of thread 6mm	3Nm	

## Signal Connectors (LV)

LV Connector: Amphenol AMPSEAL 776280-1 (Plug 776286-1) (TE Connectivity)

Please check datasheet of the manufacture for mating cycles.

Pin	Signal	Function	Specification
C:01	KL31	Auxiliary supply voltage negative	
C:02	CAN_L	CAN	
C:03	CAN_H	CAN	
C:04	IN	Interlock	
C:05	OUT	Interlock	
C:06	KL30	Auxiliary supply voltage positive	
C:07	DO1	Digital Output 1	
C:08	DO2	Digital Output 2	

## Sensor Connector

Sensor Connector: Binder Serie 713 M12 (09 3431 700 04)

Please check datasheet of the manufacture for mating cycles.

Pin	Signal	Function	Specification
D:01	MOT_TEMP_A+	Motor Temperature 1	
D:02	MOT_TEMP_A-	Motor Temperature 1	
D:03	MOT_TEMP_B+	Motor Temperature 2	
D:04	MOT_TEMP_B-	Motor Temperature 2	

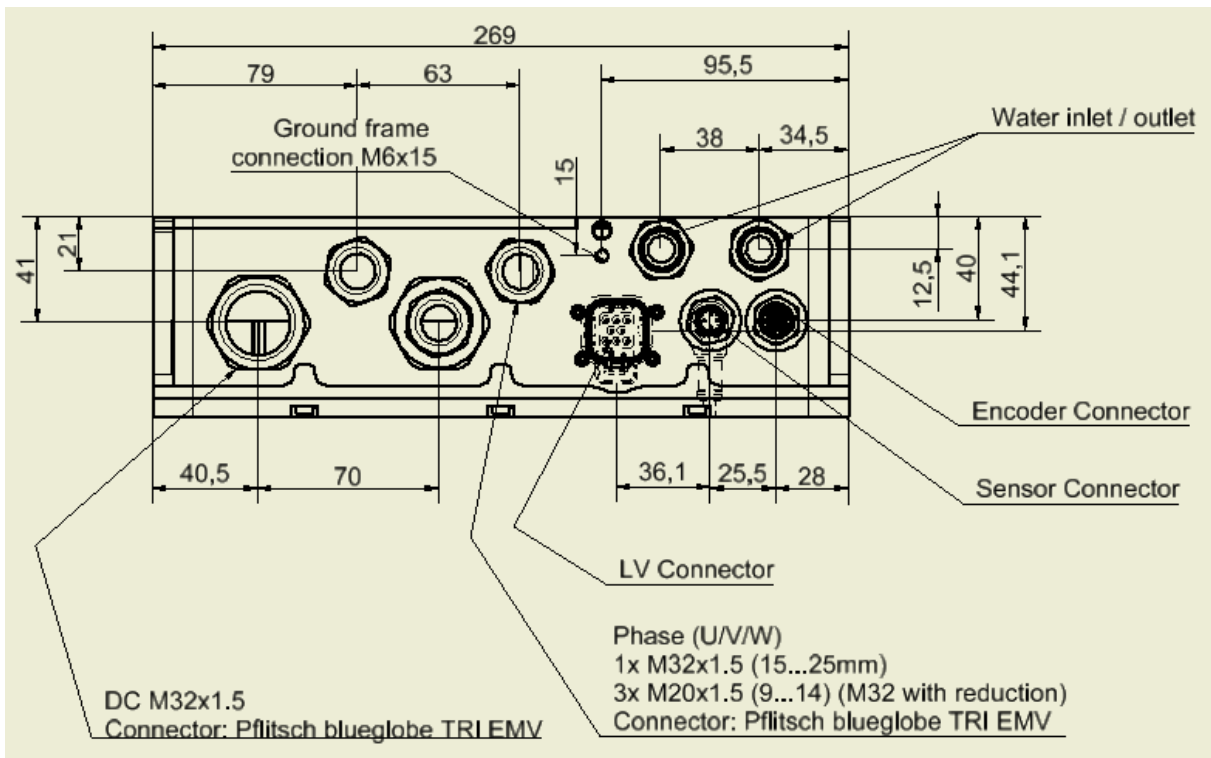
## Encoder Connector

Sensor Connector: Binder Serie 713 M12 (09 3482 700 08)

Please check datasheet of the manufacture for mating cycles.

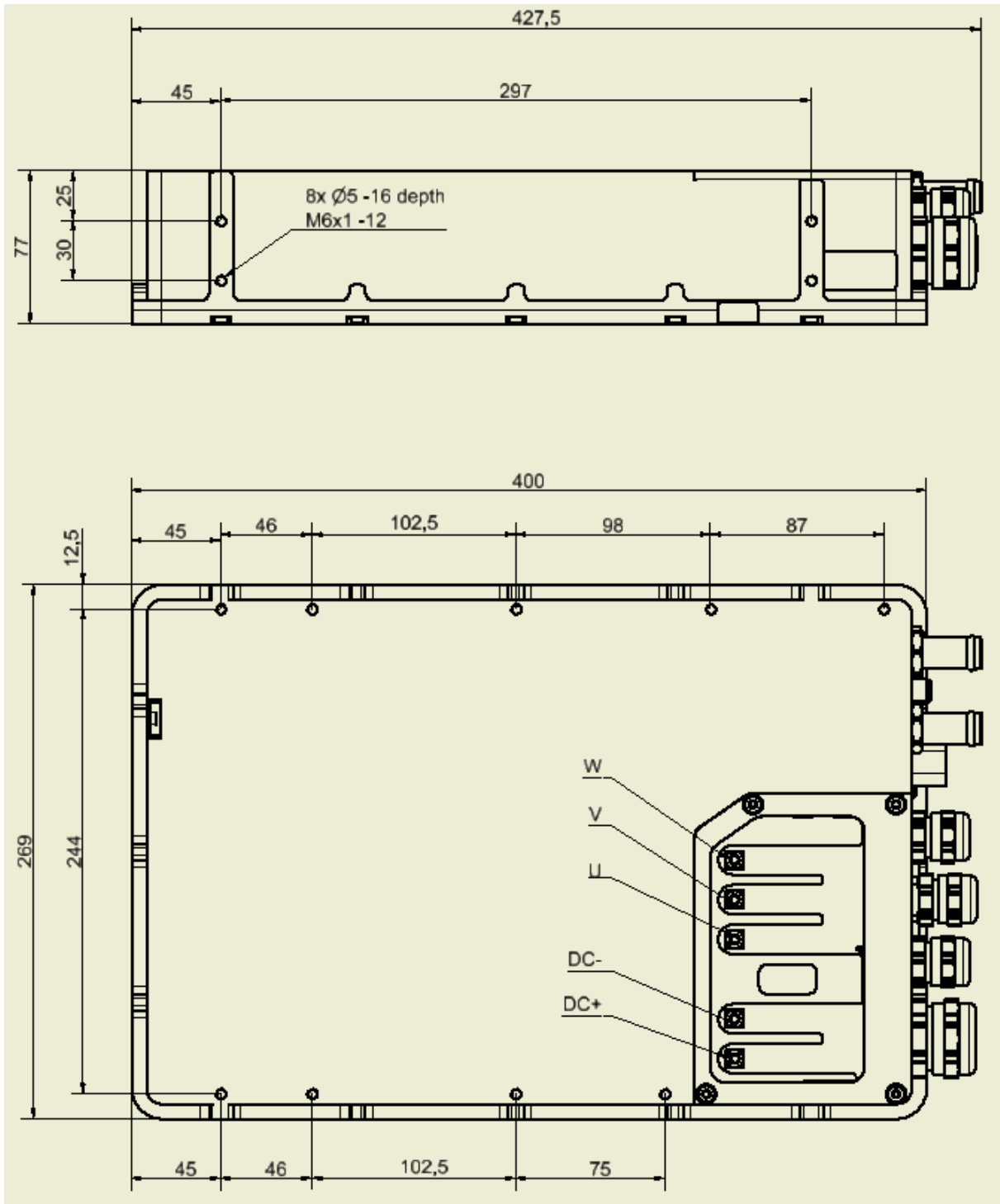
Pin	Signal	Function	Specification
E:01	GND	GND Encoder Supply	0V
E:02	PWR	Encoder Supply	5V +/- 5%
E:03	A+	Track A	RS-422
E:04	A-	Track A	RS-422
E:05	B+	Track B	RS-422
E:06	B-	Track B	RS-422
E:07	Z+	Index	RS-422
E:08	Z-	Index	RS-422

Mechanical Data – Enclosure Mounting Drawing



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## Company Overview

Specific applications for electric drive technology and power electronics

Our comprehensive systems expertise in electric drive technology and power electronics is based on our specialist knowledge of electrical machines with related inverters/DC-DC converters, including the associated software, along with the courage to change perspective.

We have the expertise to combine single components into individual systems solutions. By pooling our experience, knowledge and technology, we are able to meet your requirements with precision.

### System Engineering

- Systems modelling and analysis expertise
- Hardware/software co-simulation

### Electrical Machines

- High-performance electric motors and generators
- Outstanding power density and efficiency
- From prototyping to series production

### Hardware

- Advanced SiC or IGBT inverters for main and auxiliary drives
- Low-voltage MOSFET inverters
- Grid-tied or island-mode power generation inverters
- Highly efficient and compact DC/DC converters (isolated / non-isolated)
- DSP- and/or FPGA-based control electronics

### Software

- Embedded real time applications on DSP and FPGA devices
- Motor control strategies for maximum efficiency
- Software solutions for grid-tied and islanding mode power generation
- QUASAR™ proprietary motor control software for all machine types
- Q-control, proprietary Windows®-based diagnostic and configuration tools

With Drivetek, you get the entire system from one competent partner.

### Markets

Our markets are automotive and transportation, industry, aerospace, energy.

## For further questions

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## Disclaimer

Preliminary Datasheet. Drivetek reserves the right to change specifications and design without notice.