

# AC/DC Field Excitation Converter

12 kW

## 15 ERB 200 M100 W00

$V_{IN\ nom} = 110\ V_{AC}$      $V_{O\ nom} = 100\ V$      $I_{O\ nom} = 120\ A$

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>INPUT:</b>						
<b>Power Stage</b>						
$V_{IN}$	Input voltage range	Continuously	40	110	250	V <sub>ac</sub>
f	Input frequency range		16		130	Hz
$\Delta f/sec$	Input frequency variation				5	Hz/s
$V_{IN\ Min}$	Converter shutdown					V
$V_{IN\ Max}$	Converter shutdown					V
$I_{IN}$	Input current	$V_{IN} = 250\ V\sim, I_{OUT} = 0\ A$ $V_{IN} = 110\ V\sim, I_{OUT} = 120\ A$ $V_{IN} = 40\ V\sim, I_{OUT} = 120\ A$				mA A A
	Input Fuse		External circuit breaker			
	Input protection		Varistor			
<b>DC/DC Aux. Converter</b>						
$V_{IN}$	Input voltage range	Continuously	48	72	96	V <sub>DC</sub>
		Short time $t \leq 0.1\ sec$	44		48	V <sub>DC</sub>
		Short time $t \leq 1.0\ sec$	96		104	V <sub>DC</sub>
	Voltage dip @ Diesel Start	Short time $t \leq 1.0\ sec$	22			V <sub>DC</sub>
$t_H$	Hold up time 72V voltage dips	Class S2 EN 50155	10			ms
	LED function	When connected to $V_{IN}$	LED Yellow ON			
f	Switching frequency			130		kHz

### OUTPUT: Power Unit

$40\ V\sim \leq V_{IN} \leq 250\ V\sim$

STEP DOWN CONVERTER						
$P_{OUT\ Nom}$	Output power			12		kW
$V_{OUT\ Nom}$	Output voltage adjustment, factory set	$0\ A \leq I_{OUT} \leq 120\ A$		+ 100		V <sub>DC</sub>
$V_{OUT}$	Output voltage accuracy	$0\ A \leq I_{OUT} \leq 120\ A$		2		%
$I_{OUT}$	Output current range	$T_A = -40^\circ C \dots +70^\circ C$ class T3	0		120	A
$I_{OUT}$	Output current limit adjustable	Minimal step width 5A	0		120	A
$I_{osc}$	Output short circuit current	short circuit between + $V_O$ and - $V_O$				A
$L_{load}$	$T_A = +28^\circ C$	Excitation inductance		1.68		H
$R_{load}$	$T_A = +28^\circ C$	Resistance from excitation winding		1.124		$\Omega$
	Sense Lines	none				
$C_O$	Converter Capacitance	Output stage		-		mF

### GENERAL SPECIFICATIONS

f	Switching frequency	$V_{IN} = 110\ V\sim, I_{OUT} = 120\ A$		100		kHz
$\eta$	Efficiency	$P_{OUT} \geq 0.7 \times P_{OUT\ Nom}$	87	91		%
$T_a$	Operating Temperature Range	@ EN 50155, IEC 60571 Class T3	- 40		+ 70	$^\circ C$
	MTBF (SN 29500)	$V_{IN} = 110\ V\sim, I_{OUT} = 120\ A, T_A = +40^\circ C$		400 000		h
	No load, short circuit proof			Continuously		

### Control & Monitor Signals

Input Signals						
$I_{err}$	Output over current	$I_{err} \geq 150\ A$ , ERB stops operation	150			A
$T_{HS}$	thermal overload field excitation heatsink	$\vartheta$ heatsink	100			$^\circ C$
$F_{int}$	collecting failure signal					
Enable	Digital signal for start unit	Unit OFF Unit ON	0 40		30 96	V V
$V_c$	Output voltage set-point value	Analogue signal + 4mA to + 20mA	0		400	V <sub>DC</sub>
Output Signals						
$I_{exc}$	Excitation current	+ 10V signal, impedance load $\geq 5k\Omega$ 0V: $I_{exc} = 0\ A$ 10V: $I_{exc} = 150\ A$	0		10	V
$V_{out}$	Output volage exc. unit	+ 10V signal, impedance load $\geq 5k\Omega$ 0V: $V_{exc} = 0\ V$ 10V: $V_{exc} = 400\ V$	0		10	V
$V_{in}$	Chained input voltage	+ 10V signal, impedance load $\geq 5k\Omega$ 0V: $V_{in\_ch} = 0\ V$ 10V: $V_{in\_ch} = 300V_{eff}$	0		10	V
$f_{in}$	Frequency input voltage	+ 10V signal, impedance load $\geq 5k\Omega$ 0V: $f_{in} = 0\ Hz$ 10V: $f_{in} = 130\ Hz$	0		10	V
Op	Re – registration signal	Digital signal unit in operation, $R_I > 3k\Omega$				
Fail	Failure signal	Digital signal unit in operation, $I_o < 1\ A$				

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>SAFETY / DIMENSIONS</b>						
	Creepage, Clearance (PD2) PCB: FR4, V0	Input – Output Input – Case Output – Case	- 2.0 2.0			mm mm mm
	Converter Dielectric Strength Test unit test with ramp function 2 s – 3 s – 2 s	Input, Output → case DC/DC converter Input/Output → case			2'100 1'000	V <sub>DC</sub> V <sub>DC</sub>
	Power Connectors	Input, Output, SE	3 bolts (M8) 2 bolts (M8) Screwing bolt (M8)			
	DC/DC Input Connector 74V Battery	PHOENIX	MC 1,5/2 STF -3,81			
	Pin Assignment		see drawing			
	Protection Class, Protection degree		I, IP 20			
	Dimensions see drawing	w x h x d	480 x 420 x 300			mm
	Assembling	Chassis mounting with screws				
	Weight			30.5		kg

### ENVIRONMENTAL CONDITIONS

T <sub>A</sub>	Operating Range	Continuously EN 50155 class T3	- 40		+ 70	°C
T <sub>Sto</sub>	Storage Range		- 40		+ 85	°C
	Cooling		Free convection			
	Humidity	EN 50155, IEC 60571	75% averaged year, 95% 30 days			
	Vibration / Shock	IEC 61373, IEC 68-2-27, EN 50155 Cat. I 3 shocks each Axis	50 m / s <sup>2</sup> , 30 ms			

### EMV

	Emission	Line conducted and radiated	EN 50121 - 3 - 2: 2006			
	Immunity	ESD EN 61000 - 4 - 2	6 kV / 8 kV performance criteria - B -			
		High Frequency Field EN 61000 - 4 - 3	20 V / m 80 MHz ... 1 GHz *) performance criteria - A -			
		Burst EN 61000 - 4 - 4	Level 3 asym., sym. performance criteria - A -			
		Surge EN 61000 - 4 - 5	2 kV asym. / 1 kV sym. R <sub>i</sub> = 42 Ω (Opt. 12 Ω) performance criteria - B -			
		HF – Current Injection EN 61000 - 4 - 6	10 V <sub>eff</sub> , R <sub>i</sub> = 150 Ω performance criteria - A -			

### STANDARDS

Applied Standards:	EN 50155: 2006	BN 411 002	EN 50124 - 1: 2006	EN 50121 - 3 - 2: 2001	IEC 60571 : 12   2006
	SN 29 500	EN 50 121 - 1	EN 50125 - 1	EN 60068 - 2 - 6, 2...27	EN 61000 - 4 - 2...6
	IEC 571	IEC 61373	EN 60721 - 3 - 5	EN 61373	EN 60529

Technical specifications valid for: - 40° C ≤ T<sub>A</sub> ≤ + 70° C, 40 V ~ ≤ V<sub>IN</sub> ≤ 250 V ~ and 48 V<sub>DC</sub> ≤ V<sub>IN PS</sub> ≤ 96 V<sub>DC</sub>, unless otherwise noted.

\*) 1400 MHz – 2100MHz 10V/m 2100MHz – 2500MHz 5V/m

### Dimensions (in mm) and pin assignment

#### Pin Assignment XC10

Pin	
PHOENIX: MSTBT 2,5/12-SFF-5,08	
1	Failure Signal
2	Failure Signal
3	GND Failure Signal
4	GND Enable Signal
5	ENABLE Input
6	GND
7	Linked Input Voltage
8	I <sub>exc</sub>
9	V <sub>out</sub>
10	V <sub>in</sub> (frequency)
11	Voltage Reference
12	GND Voltage Ref.

Battery XB 10	
1	+ 74V
2	GND (74V)