Exista
POWER SUPPLIES

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Autronic
A FORTEC GROUP MEMBER

DC-DC CONVERTER **ACR 350/C**
RAILWAY CONVERTER.

FOR CHASSIS MOUNTING

HIGHLIGHTS

+ **Output Power up to 360 Watts****

+ **Efficiency up to 94%**

+ **Hold-up-time > 10ms**

+ **Redundant Operation**

+ **Wide Input Range**

+ **Wide Temperature Range**

+ **RoHS compliance**

+ **According to EN50155**

INPUT

Input Voltage Nominal	24/36/48 VDC, 72/96/110 VDC

OUTPUT

Output Voltage	24 V (other outputs on request)
Initial Set Accuracy	< 1%*
Minimum Load	No minimum load
Short Circuit	Continuous short circuit proof
Line Regulation	< 0,5%
Load Regulation	<1% (0% - 100% load)
Ripple & Noise	<1% pk-pk, 20 MHz bandwidth*
Start Time	< 900 ms
Max. Output Capacitance	500 uF x $I_{out\ max}$
Temperature Coefficient	<0.02%/°C

FEATURES

Reverse Polarity Protection	By internal fuse to V_{in} max
Enable Signal	Switched to high level, the converter switches off. Open pin enables the converter.
Thermal Warning Signal	Isolated open-collector output. Active level: Low when the case reaches the temperature of 5-10°C below the OTP.
Output Power Good	Isolated open-collector output. Active level: Low when output voltage is over 80% of $V_{out\ nom}$
Sense + / -	Remote sense to compensate for lead drops of the output line up to 0,5 V.
Redundant Operation	The breakdown of a converter will be monitored by the Power Good Signal
Green LED	To indicate operating mode

* For T_{amb} = 25°C, $V_{in\ nom}$, $I_{out\ nom}$
** Derating with additional heatsink of < 1,0 K/W : Ta > +70°C: 4 %/°C
   For Vin = 14,4V...20V Ta > +55°C: 2,5 %/°C
   The maximum ambient temperature without additional cooling
   $T_{amb} = 95°C – 1,8 \frac{°C}{w} \times P_{out}$ (w) $(\frac{100\%}{\eta(\%)} -1)$

   $P_{out} = (95°C - T_{amb}) / (1,8 \times (\frac{100\%}{\eta(\%)} -1)$

   Also with heatsink, ensure that flange temperature not exceeds 95°C
*** In built-in condition our devices may show different EMC properties

PROTECTION

Over Voltage Protection (OVP)	120-130% $V_{out\ nom}$, latched
Over Current Protection (OCP)	$I_{out\ nom}$ > 105%. The output switches-off when $V_{out\ nom}$ < 70% and restarts automatically latest after 3.5 s of elimination of the overload.
Over Temperature Protection (OTP)	Shutdown at +95 -100°C case with approx. 5°C hysteresis and auto recovery.

GENERAL

Product Standard	EN 50155:2007
Isolation	2200 VDC Input to Output
	1500 VDC Input to Baseplate
	710 VDC Output to Baseplate
Switching Frequency	Typ. 100 /130 kHz
Dimensions [mm]	182,0 x 105,0 x 50,0
Weight	approx. 870 g
MTBF	1.000.000 h acc. to IEC/TR 62380 (40°)

ENVIRONMENTAL

Operating Ambient Temp.	-40°C to +85°C**
Operating Case Temp.	-40°C to +95°C
Storage Temperature	-55°C to +100°C
Vibration / Shock / Bump	EN 61373:1999, Cat. 1B

EMC & SAFETY

EMC Standard	EN 50121-3-2:2006
Conducted Emissions	EN 55011:2009+A1:2010, Class B (Quasi Peak)***
Radiated Emissions	EN 55011:2009+A1:2010, Class A***
ESD Immunity	EN 61000-4-2:2009, level 3 (6kV/8kV), Criteria A
Burst	EN 61000-4-4:2004+A1:2010, level 3 (2kV), Criteria A
Surge	EN 50121-3-2:2006, line to line ±1kV, 42R, and line to case ±2kV, 42R, Criteria A
	EN 61000-4-5:2006, level 1, ±0,5kV, Criteria A
Conducted Immunity	EN 61000-4-6:2007, level 3 (10V), Criteria A
Radiated Immunity	EN 61000-4-3:2006+A1:2008+A2:2010, 20V/m, Criteria A

TECHNICAL DATA

For T_{amb}=25°C, $V_{in\ nom}$, $I_{out\ nom}$, unless otherwise specified.

SPECIFICATION Input 14,4 – 67,2 VDC (24/36/48 Vin nom)

	TYPE		ACR350/C		
	ORDER NUMBER		75 51 24 0122 5		
	CHARACTERISTIC	Unit			
INPUT	Input Voltage Nominal	V	24	36	48
	Input Voltage Operating	V	16,8…60		
	Input Voltage Range	V	14,4…67,2 (t ≤ 1,0 sec.)		
	Under Voltage Turn-on	V	< 16,8		
	Under Voltage Turn-off	V	< 14,4		
	Input Current @ Vin nom full load	A	11,6	7,58	5,62
	Input Current @ Vin = 14,4 V	A	20,0		
	Input Current @ No Load	A	0,2	0,17	0,13
	Disabled Input Current	mA	10	8	6
	Internal Fuse	A	20		
OUTPUT	Output Voltage Nominal	V	24		
	Output Current Nominal	A	10,5		
	Output Power	W	252		
	Efficiency @ Pout (80%) (typical)	%	92	93	93
	Efficiency @ Pout (100%) (typical)	%	91	93	93
	Transient Response 25% / 75% Load Step, Recovery Time<1 ms	mV	±200		

SPECIFICATION Input 43,0 – 154,0 VDC (72/96/110 Vin nom)

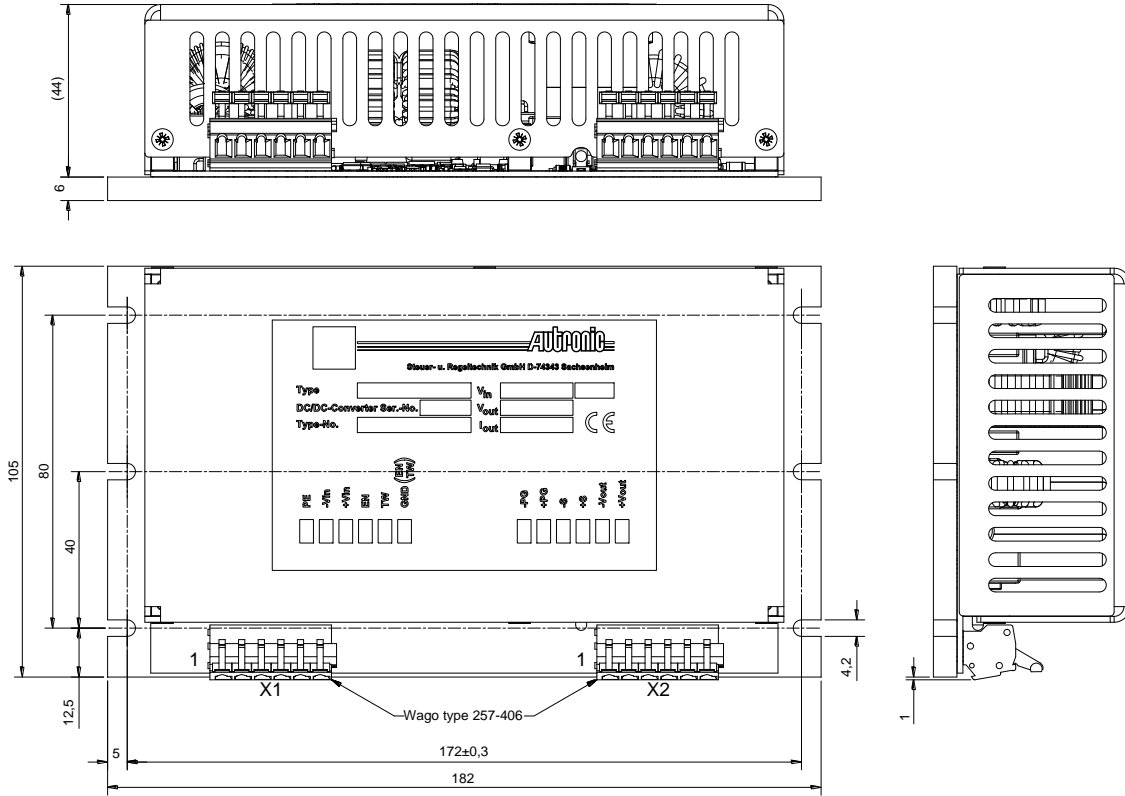|	TYPE		ACR350/C		
	ORDER NUMBER		77 51 24 0222 2		
	CHARACTERISTIC	Unit			
INPUT	Input Voltage Nominal	V	72	96	110
	Input Voltage Operating	V	50,4…138		
	Input Voltage Range	V	43,0…154 (t ≤ 1,0 sec.)		
	Under Voltage Turn-on	V	< 50,4		
	Under Voltage Turn-off	V	< 43,0		
	Input Current @ Vin nom full load	A	5,35	4,04	3,45
	Input Current @ Vin = 43 V	A	9,2		
	Input Current @ No Load	A	0,08	0,07	0,05
	Disabled Input Current	mA	5	5	5
	Internal Fuse	A	10		
OUTPUT	Output Voltage Nominal	V	24		
	Output Current Nominal	A	15		
	Output Power	W	360		
	Efficiency @ Pout (80%) (typical)	%	94	94	94
	Efficiency @ Pout (100%) (typical)	%	93	93	94
	Transient Response 25% / 75% Load Step, Recovery Time<1ms	mV	±300		

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TECHNICAL DATA

For T_{amb}=25°C, $V_{in\,nom}$, $I_{out\,nom}$, unless otherwise specified.

MECHANICAL DETAILS

1. Dimensions are in mm.
2. Unless otherwise specified, general tolerances +/-0,5 are for values in brackets (XX).
   Values not in brackets are according to ISO 2768-1m.

Coating: Lackwerke Peters ELPEGUARD SL 1307-FLZ/2
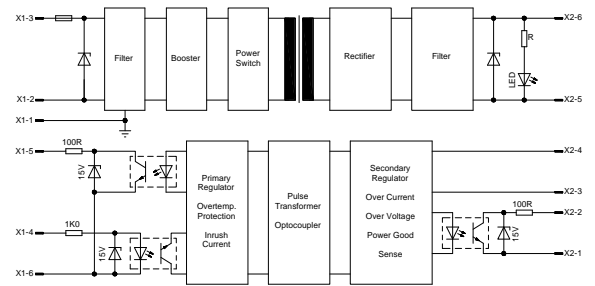
Wago type 257-406

Production acc. to IPC-A-610 (exception bonding)

PINNING

Pin		Function	Pin		Function
X1-1	Case	Potential of the case	X2-1	-PG	Negative Power Good
X1-2	-V_{in}	Negative Input Voltage	X2-2	+PG	Positive Power Good
X1-3	+V_{in}	Positive Input Voltage	X2-3	-S	Negative Sense
X1-4	EN	Enable	X2-4	+S	Positive Sense
X1-5	TW	Thermal Warning	X2-5	-V_{out}	Negative Output Voltage
X1-6	EN/ TW GND	Ground of EN and TW	X2-6	+V_{out}	Positive Output Voltage

BLOCK DIAGRAM

NOTES

Installation Instructions:

The converters have to be installed according to the guidelines currently in force, like other open electronic component assemblies. Attention must be paid to sufficient ventilation, carry off heat, fastening and protection against accidental contact. The mounting surface must be flat and able to remove the thermal energy of the baseplate (baseplate temperature must not exceed +95°C). Plug in not under voltage if converter connected parallel or in series. Attention! At Pout max (constantly) a warming up of the case up to 40°C over the ambient temperature is possible.

The pin X100-1, case: (▽ / ⏚), has to be properly connected to Chassis/Earth in order to assure operation.

If +Vin is connected to Chassis/Earth an additional external fuse at –Vin is necessary.

Internal Fuse:

The converter is equipped with a soldered-in-time-lag fuse corresponding to IEC 60127-2 for input protection. In case of fault the supplying current source must be capable to blow the fuse.
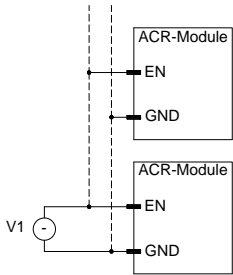
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DESCRIPTION OF FEATURES

For T_{amb}=25°C, $V_{in\ nom}$, $I_{out\ nom}$, unless otherwise specified.

ENABLE SIGNAL

Switched this input EN-Pins to high level >3,3V then the converter switches off.

This may be done with an external control voltage (V1).

V1:

0…0,8 V (Enable inactive, converter on)

3,3…5,0 V (Enable active, converter off)

Input current: from 1,0mAmin to 5,0mAmax

If the signal Enable not potential–free required, then -EN can be connected to -V_{in}

When not in use, leave Enable pin not-connected.

THERMAL WARNING SIGNAL

Maximum ratings

TW to GND: 0...10 V

I_{TW}: ≤ 1 mA

Saturation voltage < 0,8 V

When not in use, leave Thermal Warning pin not-connected.

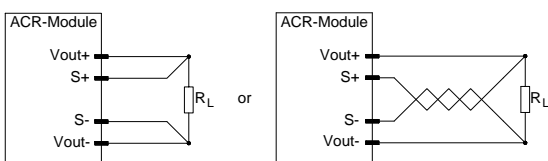### OUTPUT POWER GOOD

Maximum ratings

+PG to -PG: 0...10 V

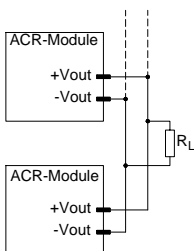I_{PG}: ≤ 1 mA

Saturation voltage < 0,8 V

When not in use, leave Output Power Good pins not-connected.

SENSE +/-

When not in use, leave Sense pin not-connected.

REDUNDANT OPERATION

Do not use Sense for redundant operation.

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