

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01		
Product Support	PSR cycloconverter				
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A	Page: 1 (10)

PSR cycloconverter product family

ENVIRONMENTAL INFORMATION

Recycling instructions

Table of contents

1. Introduction	2
2. Product package	3
3. Product materials	4
4. Product use	7
5. Product disposal	8
6. Manufacturing	10
7. Environmental management system of ABB Industry Oy	10

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01		
Product Support	PSR cycloconverter				
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A	Page: 2 (10)

1. Introduction

This document covers the environmental information of the following product:
- PSR cycloconverter product family made in Finland.

The document comprises a summary of materials used in the products and instructions how to handle an end-of-life product.

This document is intended for ABB internal use. While environmental regulations vary from country and region to another, and are also evolving rapidly by time, it is recommended to contact local environmental authorities for up-to-date information when consulting with customers or other stakeholders about proper product material recovery or other treatment.

Information for local customers, like where an end-of-life product can be returned, is recommended to be provided with this information.

Further information is available from
ABB Product Support
P.O. Box 116
FIN-00381 Helsinki
Finland
Telephone +358-10-22 11
Telefax +358-10-22 26700

The information presented in this publication does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequences of its use. Publication thereof does not convey nor imply any license under patent - or other industrial or intellectual - property rights.

This document is based on ACS600c environmental information (FIDRI reference number 00077166).

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01	
Product Support	PSR cycloconverter			
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A
			Page: 3 (10)	

2. Product package

Plastic and wood-based materials used in the package can be recycled and other materials can be landfilled. No harmful materials are used in the package.

To avoid pollution caused by unnecessary transportation, the manufacturing factory is not taking back used packages. Package recycling is organized by the importing ABB sales company locally, according to local regulations.

Package recycling is recommended while recycling preserves raw materials and reduces waste being landfilled.

In the following table the packing materials of different package types are listed and grouped.

1. Standing crate	2. Seaworthy export packing to Europe	3. Seaworthy export packing outside Europe (Al-foil)	4. Seaworthy export packing to Europe and North America (VCI-film)
Rough board	rough board	rough board	rough board
Cardboard	corrugated board		
	plywood, wood	plywood, wood	plywood, wood
	Antistatic PE-film	antistatic PE-film	
	stretch PE-film		
	PE-film		PE-film with VCI
		bubble plastic	bubble plastic
	PC board		
			Plastic supports
		rubber board (optional)	
		Al-foil	
Steel strap			
	VCI paper	VCI paper	VCI-paper
	desiccant	desiccant	
	silicone seal	silicone seal	

For abbreviations, see Chapter 3.

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01		
Product Support	PSR cycloconverter				
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A	Page: 4 (10)

3. Product materials

Material distribution by weight is presented in the following table. Individual components and their main construction materials are listed below.

Cycloconverter		2600-6000 kg
Zn- coated steel, painted steel	Doors, side & roof plates	48 %
Copper + surface coating (Ni,Sn)	Busbar	18 %
AlMnSi	Heatsinks	17 %
Various	Power components, separate units	10%
Various	Electromechanics (PCB, relay, etc)	3 %
SS	Water cooling unit	2 %
Water	Cooling liquid	1 %
GF	Insulative plates	1 %

Control unit (C1- and C2-cabinets)	
Control panel	GF, Cu, Sn, plastic
Printed circuit boards	GF, Cu, Sn, plastic
I/O-modules	GF, Cu, Sn, plastic
Power supply units	Zn-coated steel, GF, Cu, Sn, plastic
Relays, contactors	Cu, steel, brass, plastic
Miniature circuit breakers	Cu, steel, brass, plastic
Transformers	steel, Cu, plastic, varnish
Phase units and excitation (cabinets A1-3, B1-3, E1)	
Printed circuit boards	GF, Cu, Sn, plastics
Transient absorbers (MVR)	Al, plastic
Over voltage protection module SCYC 51201	Al + see thyristors and printed circuit boards
Earth-fault relay	Cu, steel, brass, plastic
Shunt resistances	Cu
Fuse-bases	Cu, steel, plastic
Fuses	Cu, SS, ceramics, Ag
Measuring transducers	PC, Cu, Pt
Measuring transformers, meters	steel, Cu, plastics, varnish
Power resistors (pre-resistors)	plastics, steel, ceramics
Pulse transformers	Cu, plastics
Current transformers	Cu, plastics
Thyristors	Cu, Si, Mo, Q,ceramics, Ni, Rh

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01	
Product Support	PSR cycloconverter			
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: Page: A 5 (10)

Cooling elements (heatsinks)	Al
Capacitor of RC-circuits	PUR, PP, metals
Power resistors of RC-circuits	Al, MgO, ceramics, NiCr,Si, PFTE, Cu, ceramics
Thyristor clamps	plastic, steel
Heat transmission grease for thyristors	Q, ZnCr, Li stearate
Cooling system	
Water cooled system (W1- and W2-cabinets)	
Pumps	SS (AISI 316), Fe,Cu, plastics, FPM(Viton), EPDM
Heat exchanger	SS (AISI 316), Cu
Valves	SS (AISI 316)
Metallic water pipes	SS (AISI 316)
Water pipes with insulative material	PEX, PVDF, PA
Flow meter	SS(AISI 316, AISI 329),PA, NBR, PBT, PC
Temperature measuring transducer and sensor	Pt, Cu, PVC
Pressure sensor & transmitter	SS (AISI 316), plastics
Hour counter	steel,Cu, plastics
Housing for conductivity sensor	Al
Conductivity sensor, transmitter	SS (AISI 316), plastic
Measuring and control apparatus	SS (AISI 316)
Expansion vessel	SS, EPDM
Mechanical filter element	akrylic-phenolic resin
Deionizing filter housing	SS, plastic
Filter housing	Al, brass, steel
Ion-exchange resin	- SO3, - N(CH3)2, DVB. PS
Cooling water	deionized water, MEG or PEG
Couplings, fast couplings	Al, SS (AISI 316)
Air cooled system (F1- and F2-cabinets)	
Fans	SS (AISI 316), Fe,Cu
Air channel walls	GF
Grids on doors	plastics
Air flow plate	Al
Air flow equaliser	Zn-coated steel
Air pressure sensor	plastics
Mechanics (all cabinets)	
Protective covers	PC, Zn-coated steel
Supporting insulators	PA , PTFE, EP,brass, Al, steel

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01		
Product Support	PSR cycloconverter				
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A	Page: 6 (10)

Busbar	Al, Cu, Sn-coated CU, Ni-coated Cu
Doors, side & roof plates	Zn-coated steel/polyester powder paint
Frame bars, partition plates, base channels, slide rails	galvanised steel
Cover plates, cover strips	galvanised steel + paint
Intermediate supports	steel + paint
Lifting bars	steel + paint
Insulating material	PC (Makrolon, Lexan), GF
Bolt and screw connection materials	Zn-coated steel
Other (all cabinets)	
Wires, cables	Cu, Sn, PVC, PTFE (Teflon), Si
Optic cables, optic connectors	plastic
Stripterminals	Cu, Ag, Sn
Terminal blocks, socket-outlets	steel, brass, Cu, plastics

Abbreviations:

Brass	Cu, Zn
Ceramics	Mg- and Al- oxides
DVB	divinylbenzene
EP	epoxy
EPDM	ethylenepropylenediene rubber
FPM	fluoro elastomer (rubber)
GF	glasfibre
MEG	monoethylene glycol
PBT	polybutylenetrephtalate
PC	polycarbonate
PCB	Printed circuit board
PE	Polyethylene
PEG	propylene glycol
PEI	polyether imide
PEX	cross-linker polyethylene
PF	phenol formaldehyde
PMMA	polymethyl methacrylate
PP	polypropylene
PS	polystyrene
PTFE	polytetrafluoroethylene (Teflon)
PUR	polyurethane
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride
Q	silicone (rubber)
SS	stainless steel
UP	unsaturated polyester
VCI	volatile corrosion inhibitor

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01		
Product Support	PSR cycloconverter				
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A	Page: 7 (10)

3.3 Product manuals and sales brochures

All brochures and manuals can be recycled.

4. Product use

The use of a frequency converter has several positive environmental impacts, like

- Substantial energy savings can be reached using a cycloconverter. According to investigations, these savings are in pump and fan drives typically 50 %. This means reduced CO₂ and NO_x emissions in power plants, due to reduced energy demand.
- Process controllability is improved when a state-of-the art drive is used as a part of a process control system, meaning reduced waste
- When a process can be driven in an optimal way, process equipment's (like conveyors' and pumps') wearing is reduced and life time increased, decreasing environmental loading caused by manufacturing new equipment
- Noise is in most cases reduced
- Natural resources like wood in pulp & paper industry are saved while process efficiency is improved

The cycloconverter itself does not cause any emissions while in use. Due to reduced energy consumption, overall harmful emissions are reduced as described above.

For more information on product use, see User's Guide.

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01		
Product Support	PSR cycloconverter				
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A	Page: 8 (10)

5. Product disposal

Product disposal can be made in two alternative ways. The product can be disassembled manually or crushed in a shredding machine.

5.1 Manual disassembly

The product is disassembled manually and parts are sorted according to their material contents as follows:

- iron metals (cabinets, pipings)
- aluminum (heatsinks)
- copper (busbars)
- plastics
- printed circuit boards*
- other*

* For more information, see 5.3 List of potentially harmful materials

Metal parts (iron, copper and aluminum) can easily be recycled, other materials according to local arrangements.

5.2 Mechanical shredding

In this method, subunits of the product are mechanically shredded into small pieces and materials are sorted using dedicated sorting processes. In the cycloconverter drive this is possible only after disassembling smaller units (like PCBs and other electrical equipment) out from the drive. Components containing harmful materials must, however, be removed before shredding (for more information, see 5.3 List of potentially harmful materials).

5.3 List of potentially harmful materials

Definitions and regulations of hazardous materials differ from country to country and are also changing when knowledge of materials increases. The materials used in the product are materials typically used in electric and electronic devices.

The list given below is based on the following references:

1. EACEM (European Association of Consumer Electronics Manufacturers)
List of Environmentally Relevant Substances
2. Substances contained in products of the electrical/electronics industry.
Zentralverband Elektrotechnik- und Elektronikindustrie (ZVEI) e.V.,
Frankfurt am Main. 1995.
3. European Commission DG XI Environment, Nuclear Safety and Civil
Protection. Proposal for a directive on waste from electrical
and electronic equipment. Second draft. Brussels, 27 July 1998.
4. European Waste Catalogue EWC, EU Directive 94/3/EC.

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01		
Product Support	PSR cycloconverter				
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A	Page: 9 (10)

Table: List of possibly harmful substances in different materials and components after previously mentioned references

Component	Harmful substance(s)	Reference
Printed circuit boards	lead (in solder)	1 2 3
	tetrabromobisphenol A (TBBA, flame retardant)	1 2 3
Plastics	None	
Metals	None	
Electromechanics	None	
Cables	PVC	1

5.4 One recycling method

The procedure described below complies with regulations valid in Finland in January, 1999.

- steel recycled as material
- aluminum recycled as material
- copper recycled as material
- plastics energy recovery (incineration) or landfilled
- printed circuit boards recycled to collect precious materials
- cables landfilled or recycled as material
- other materials energy recovery (incineration) or landfilled

ABB Automation Technologies	Recycling Instructions		DOCRIPSRCYC01		
Product Support	PSR cycloconverter				
Department: TLC	Date: 18.12.2003	Author: Harri Lipponen	Checked / Approved: Mikko Eskelinen	Revision: A	Page: 10 (10)

6. Manufacturing

The product is manufactured by ABB Industry Oy, Helsinki. The environmental system of the manufacturing unit is certified to ISO 14001 (since November, 1996). The accessories and option modules are manufactured by other manufacturers, mainly in Finland.

7. Environmental management system of ABB Industry Oy

Environmental management system (EMS)

ABB Industry Oy has an environmental system covering all divisions and functions of the company. The EMS is certified to ISO 14001 since November, 1996.

The company's environmental objectives include among others items as follows,

- reduce use of material in products, difficult to recycle or reuse
- improve recyclability of products
- reduce environmental burden caused by packaging materials.

ABB Industry Oy's environmental policy

ABB Industry Oy is committed to an environmental policy, which is based on the following:

1. We develop and manufacture products such as alternating current electrical drives and automation systems that save our customers energy and raw materials and give them better control over their processes. We strive continuously to make our products environmentally more sound by applying results obtained in recyclability and life-cycle assessments.
2. We are committed to reducing the harmful environmental impacts of our operations by continuously improving the operation of our production processes.
3. Our minimum requirement is to abide by all acts, decrees and official regulations on environmental protection in all our operations; we aim to ensure that all our subcontractors do likewise. We work closely with our suppliers in seeking environmentally sound solutions.
4. We regularly review the substance and practice of our environmental policy in the light of our environmental management system, setting new environmental goals and targets annually. We regularly inform our staff and other affiliated groups about our environmental concerns, and make sure that our environmental policy is available to the public.

Our environmental management system, certified to ISO 14001, is the tool for carrying out our environmental policy. The line organisation, assisted by the environmental organisation, is responsible for ensuring that we fulfil our obligations with respect to environmental protection. In raising and maintaining the environmental awareness of our staff, we assign high priority to training.