



FIBOX
Enclosing innovations

Enclosure catalogue

Version 4.0GB

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Polycarbonate and ABS enclosures

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Polycarbonate and ABS enclosures

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Polycarbonate and ABS enclosures

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Polycarbonate and ABS enclosures

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Polycarbonate and ABS enclosures

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Polycarbonate enclosures

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Polycarbonate and ABS enclosures

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FEX polycarbonate enclosures 188 x 188 x 130 - 558 x 378 x 180 mm

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Fibox MNX



Fibox EURONORD



Fibox TEMPO



Fibox EK



Fibox CAB

FIBOX – Enclosing innovations

Innovation is defined as something newly introduced. Perhaps it is a new method, an improved solution, a new design, or an entirely new device. Whatever your innovation, it represents a change for the better, and as always, it is the result of both your inspiration and your hard work.

At Fibox, we appreciate your effort and match it with our own. Fibox is the leading innovator in developing enclosure solutions to protect your electrical and electronic designs from hostile environments. Simply put, we enclosure your innovations.

40 YEARS EXPERIENCE

In 1966, Fibox introduced the first modular enclosure injection moulded from polycarbonate plastic. These enclosures began a new era in electrical panel building. From the beginning, a commitment to innovation resulted in continuous product improvement, resulting in more than 20 patents. Our on-going product development has fuelled the dramatic and rapid growth of Fibox.

Whatever your application, the Fibox enclosure product family features the widest range of high quality enclosures for the packaging and protection of electrical and electronic components and systems. Fibox offers over 1000 enclosure variations. Enclosures can be delivered in standard off-the-shelf configurations, or customized to your exact specification. For higher volume OEM's, Fibox offers custom moulds and contract manufacturing.

TECHNICAL INNOVATION

Fibox is the industry leader in developing both new products and new technologies for injection moulding thermoplastic enclosures. At Fibox, we consider moulding technology a key element contributing to product improvement. For example, the Fibox MNX enclosure series features 2 component moulding technology to insure a precision-formed TPE gasket that guarantees superior ingress protection ratings. Fibox was first to introduce this innovation, and continues as the only producer applying this technology to electrical enclosures.

A further example is our emphasis on multiple slide technology for mould construction. While more complex and costly, this type of mould provides our OEM customers with cost-effective alternatives for modifying standard enclosures to meet their specific needs.

But beyond technology, our success depends upon understanding the requirements of our customers and the value they place upon our contributions to their success. We know our customers derive the inspiration for their innovations by listening to and understanding the needs of their customers. Thus, our products are designed in close cooperation with our customers and we value the input of our global customer base to produce new enclosure solutions, useful functional accessories and on-going product innovations.

More information

e-mail: info@fibox.fi, sales@fibox.co.uk

www.fibox.com

FIBOX's policy is to continually improve its products.

Specifications in this Enclosure Catalogue are subject to change without further notice.

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FIBOX web services

Always up-to-date

Please visit www.fibox.com regularly to find out the latest developments from the Fibox team. Fibox is continuously launching new products and improving services in the pursuit of helping its customers to succeed. Fibox prides itself in supplying high quality products with excellent service. Besides orders shipped correctly and on time, excellent service also means providing an extensive package of design aids and technical information about Fibox products and services.

Engineering assistance

Selecting the right enclosure for your application is made easier with clear, easily accessible technical and engineering data. At www.fibox.com you can obtain detailed technical information about enclosures including photos, raw material specifications, dimensional drawings and CAD files. Additionally, Fibox also offers copies of regulatory agency approvals and certificates in pdf format.

CAD drawings

Fibox supports engineers, designers and buyers with full CAD drawings either in 2D or 3D formats. Engineering time and costs can significantly be reduced by using easily accessible Fibox 3D models, which are widely used globally. All CAD files can be downloaded at www.fibox.com.

Download catalogues and leaflets

At www.fibox.com you find a variety of brochures and catalogues in pdf format. Please visit our web site at www.fibox.com to download the latest catalogues and leaflets.

Around the world

As a global company Fibox has currently full web services in Chinese, Danish, Dutch, English, Finnish, French, German, Japanese, Korean, Polish, Russian and Swedish.

Let us know how we can improve

Please give us feedback. Contact us via www.fibox.com or email at info@fibox.fi. We are committed to improve our service to you. Please help us by sharing your opinions to make Fibox World even better.



www.fibox.com

Guide for selecting the right FIBOX enclosure

Enclosure family															
	MNX		DG		TEMPO	PICCOLO		EURONORD				SOLID		MCE	
Material	PC	ABS	PC	ABS	ABS	PC	ABS	PC	ABS	AL	GRP	PC	ABS	PC	
Pages	13 - 38		39 - 42		43 - 50	51 - 58		59 - 116				117 - 128		129 - 139	
Number of versions	168	98	2	1	10	22	22	87	46	31	12	48	48	8	
Size min (mm)	100x100x35		280x190x111		187x122x90	110x80x65		50x45x32				188x188x130		200x116x105	
Size max (mm)	360x255x150		280x190x111		344x289x117	230x140x125		310x600x180				558x378x180		580x306x145	
IP rating	IP 66/67	IP 66/67	IP 66/67 IP 65(M)	IP 66/67	IP 65	IP 66/67	IP 66/67	IP 66/67	IP 66/67	IP 66/67	IP 66/67	IP 66/67	IP 66/67	IP 65	
IK rating	IK 08	IK 07	IK 08	IK 07	IK 07	IK 08	IK 07	IK 08	IK 07	IK 08	IK 08	IK 08	IK 08	IK 08	
Enclosure flammability rating	UL94-5V	UL94HB	UL94-5V	UL94HB	UL94HB	UL94-5V	UL94HB	UL94-5V	UL94HB		UL94-5V	UL94-5V	UL94HB	UL94-5V	
ATEX-certified enclosures															
Electronics enclosures	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Industrial enclosures	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Instrumentation enclosures	■	■	■	■	■	■	■	■	■	■	■				
Modular enclosures														■	
Outdoor enclosures	■		■			■		■		■	■	■		■	
Power distribution enclosures														■	
Terminal enclosures	■	■	■	■	■	■	■	■	■	■	■	■	■		
UL- enclosures	■					■		■				■		■	
Wall mounting cabinets												■	■	■	

- PC = polycarbonate
- ABS = acrylnitrile-butadiene-styrene
- AL = aluminium
- GRP = glass fibre reinforced polyester

Enclosure family

	EK	CAB			QUICK		SPACE LINK	CARDMASTER		ALX	FEX-PC-7	PEX
	PC	PC	ABS	GRP	PC	ABS	PC	PC	ABS	AL	PC	GRP
	137 - 150	151 - 168			169 - 178		179 - 190	191 - 200		202	203	204
	97	28	28	7	16	14	28	26	18	13	24	12
	190x190x130	150x150x110			300x200x170		200x300x170	160x166x78		45x50x32	188x188x130	75x80x55
	760x560x250	1000x800x300			600x400x270		600x400x270	316x363x156		600x310x180	558x378x180	405x400x120
	IP 66/67	IP 65	IP 65	IP 66	IP 66/67	IP 66/67	IP 65	IP 65	IP 65	IP 66	IP 66	IP 66/67
	IK 08	IK 08	IK 08	IK 10	IK 08	IK 08	IK 08	IK 08/07	IK 07	IK 08	IK 08	IK 08
	UL94-5V	UL94-5V	UL94HB	UL94HB	UL94-5V	UL94HB	UL94-5V	UL94-5V	UL94HB		UL94-5V	UL94-5V
										■	■	■
	■				■	■			■			
	■	■	■	■	■	■	■	■	■			
		■	■					■	■			
	■						■					
										■	■	■
	■	■			■		■	■				
		■	■	■	■	■	■					

FIBOX quality creates customer advantage

Fibox has developed a sophisticated quality system to assure our customers of the reliability and consistency of our products and our service. All aspects of our operations, from design and development through to production and product delivery, are documented to ensure superior performance. Performance you can rely on.

Fibox is an ISO 9001 certified manufacturer and was awarded its certificate by Bureau Veritas Quality International in 1992. This approval covers specifications defined by ISO 9001:2000.



The FIBOX QUALITY system

The Fibox quality system applies not only to product quality and safety, but availability of product, accuracy of shipments, technical support and customer service. The continued success of this programme is assured by regular internal and independent external audits.

NEMA/UL classification of protection

The National Electrical Manufacturers Association (NEMA) is a US Manufacturers Organisation which actively promotes standardised product specifications for electrical apparatus.

NEMA performance criteria and test methods are used by Underwriters Laboratories as guidelines for investigation and listing of electrical enclosures.

Approximate IP equivalents in parentheses
























Nema

1	Indoor use primarily to provide a degree of protection against contact with the enclosed equipment and against a limited amount of falling dirt. (IP30)
2	Indoor use to provide a degree of protection against limited amounts of falling water and dirt. (IP31)
3	Outdoor use to provide a degree of protection against wind blown dust, rain, and sleet; undamaged by the formation of ice on the enclosure. (IP64)
3R	Outdoor use to provide a degree of protection against falling rain and sleet; undamaged by the formation of ice on the enclosure. (IP32)
3S	Outdoor use to provide a degree of protection against windblown dust, rain and sleet; external mechanisms remain operable while ice laden.
4	Indoor or outdoor use to provide a degree of protection against splashing water, windblown dust and rain, hose directed water; undamaged by the formation of ice on the enclosure. (IP66)
4X	Indoor or outdoor use to provide a degree of protection against splashing water, windblown dust and rain, hose directed water; undamaged by the formation of ice on the enclosure, resists corrosion. (IP66)
6	Indoor or outdoor use to provide a degree of protection against the entry of water during temporary submersion at a limited depth; undamaged by the formation of ice on the enclosure.
6P	Indoor and outdoor use to provide a degree of protection against the entry of water during prolonged submersion at a limited depth.
11	Indoor use to provide by oil immersion a degree of protection of the enclosed equipment against the corrosive effects of corrosive liquids and gases.
12, 12K	Indoor use to provide a degree of protection against dust, falling dirt and dripping non-corrosive liquids. (IP65)
13	Indoor use to provide a degree of protection against dust and spraying of water, oil and non-corrosive coolants. (IP65)

The IP and IK classifications

Ingress protection class of enclosures is given in the form of IP classification, a two digit coding which is shown below. Fibox has tested the enclosures according to EN 60529. The standard requires the second digit to be tested from class 6 upwards separately to each level of class, thus the double marking IP 66 / IP 67 indicates that the actual tests have been made for both levels.

The new European standard for empty enclosures, EN 62208 includes the IK impact test too. This test is described in EN 50102, and as Fibox enclosures are tested to EN 62208, the data for impact resistance will be available as well.

FIRST DIGIT Protection against solid objects		SECOND DIGIT Protection against liquids		IK CODE Protection against mechanical impacts	
IP	TEST	IP	TEST	IK	TEST
0	 no protection	0	 no protection	00	 no protection
1	 protected against solid objects up to 50 mm e.g. to 50 mm e.g. hands	1	 protected against vertically falling drops of water	01-05	 impact < 1 joule
2	 protected against solid objects up to 12 mm e.g. fingers	2	 protected against direct sprays of water up to 15° from the vertical	06	 500 g 20 cm impact 1 joule
3	 protected against solid objects over 2,5 mm (tools+ small wires)	3	 protected against water sprayed from all directions - limited ingress permitted	07	 500 g 40 cm impact 2 joule
4	 protected against solid objects over 1 mm (tools+ small wires)	4	 protected against water sprayed from all directions - limited ingress permitted	08	 1,7 kg 29,5 cm impact 5 joule
5	 protected against dust - limited ingress permitted (no harmful deposit)	5	 protected against low pressure jets of water from all directions - limited ingress permitted	09	 5 kg 20 cm impact 10 joule
6	 totally protected against dust	6	 protected against strong jets of water e.g. for use on shipdecks - limited ingress permitted	10	 5 kg 40 cm impact 20 joule
		7	 15 cm protected against the effects of immersion between 15 cm and 1 m		
		8	 1 m protected against long periods of immersion under pressure		

How to select the right enclosure material

Size is normally the first and the most dominant criterion when looking for the right enclosure for a specific application. Enclosure performance, i.e. material performance, is usually the second property considered. The following list of benefits and drawbacks indicates the basic differences between the various FIBOX enclosure materials.

Polycarbonate (PC)

Standard polycarbonate (PC) or Glass fibre reinforced (PC + GLAS)

Benefits:

- Very high impact resistance
- Also available in transparent form
- Easy machining with normal tools
- High IP rating
- Clean attractive finish
- Wide operating temperature range
- Self-extinguishing

- Good resistance to chemical attack
- Light weight
- Good UV resistance
- Excellent insulating properties
- Cost-effective material for harsh environments

Drawbacks:

- No EMC shielding

Acrylnitrile-butadiene-styrene (ABS)

Benefits:

- Easy machining with normal tools
- Easy colouring through pigmentation
- Low weight
- Good resistance to chemical attack
- Excellent insulating properties

Drawbacks:

- Slightly lower impact resistance compared with PC
- Slightly lower operating temperature range compared with PC
- Slightly lower UV resistance compared with PC. Recommended for outdoor use if protected against weather influences
- Not available in transparent form
- No EMC shielding

Aluminium (AL)

Benefits:

- Good resistance to chemical attack (painted)
- High impact resistance
- Wide operating temperature range
- Easy earthing
- EMC shielding. Note: to some extent already as standard enclosures
- Good heat sink properties
- Rigid construction

Drawbacks:

- More expensive than PC
- Heavier than PC and ABS
- Machining with special tools only

Glass fibre reinforced polyester (GRP)

Benefits:

- Excellent record of resistance to corrosion and chemical attack
- High impact resistance
- Rigid construction
- High weather resistance
- Wide operating temperature range
- Fire resistant
- Good insulating properties

Drawbacks:

- More expensive than PC
- Cannot be machined using standard tools
- No EMC shielding
- Heavier than other plastic enclosures

Comparison of materials

The following table gives a general idea of the properties of the various materials. For more detailed information on material performance in your specific application environment please consult your local FIBOX representative.

	PC	ABS	GRP ²⁾	AL ¹⁾	PA6	PS
Outdoor use	•••••	•	•••••	•••••	•••••	•
Indoor use	•••••	•••••	•••••	•••••	•••••	•••••
Cost	•••	•••••	•	•	••	•••••
Light weight	•••••	•••••	•••	•	•••••	•••••
High rigidity	•••	•	•••••	•••••	•••	•
Impact resistance	•••••	•••	•••••	•••••	•••	•
Chemical resistance						
Salt water environments	•••••	••	•••••	••••• ¹⁾	•••••	••
Neutral salts	•••••		•••••	••••• ¹⁾	•••••	•••••
Acids, low concentrations	•••••	•••••	•••••	••	•••••	•••••
Acids, high concentrations	•••	•	•••	•	•	•
Alkalis, low concentrations	•••	•••••	•••••	•	••	•••••
Alkalis, high concentrations	•	•••••	•••••	•	•	•••••
Petroleum	•••	•	•••••	•••••	•••••	•
Hydraulic oil	•••••	•••••	•••••	•••••	•••••	•••••
Alcohols	•••••	•••	•••••	•••••	•••••	•••
Solvents	•	•	•••••	•••••		•
Cooling fluids	•••	•••••	•••••	•••		•••••

••••• = Excellent

• = Poor

¹⁾ Polyester powder coated AISi cast aluminium

²⁾ Glass fibre reinforced

Data subject to change without notice.

FIBOX enclosure gaskets offer the best protection

Gasketing plays an essential role in enclosure protection. In the long run, the IP rating and its reliability depend mainly on the properties of the gasket used in the enclosure. Key performance factors of a gasket are its compression set and proper fit in the gasket groove. The best general purpose gasket material is polyurethane which has an exceptionally low compression set. When accurately injection foamed, the polyurethane gaskets stay tightly in the right place. And EPDM material provides the best protection against the most popular industrial chemicals. However, it is wise to check the effect of a chemical on each gasket material since the chemical resistance of gasket materials varies greatly.

In some cases the performance of an enclosure can be modified by changing its gasket. The degree of protection depends on the material and the cross-section profile of the gasket. When choosing gasket material, compare the elasticity properties of different materials and how these properties are affected by cold and heat, or by contact with various chemicals. An important factor is that both the enclosure and gasket must withstand the same chemicals in order to reach a safe resistivity.

FIBOX enclosures are well designed

The degree of ingress protection (IP) of an enclosure is mainly dependent on the properties of its gasket. Nevertheless, the gasket must also properly fit the enclosure. In addition to the cross-section profile of the gasket, there is the cross section of the gasket's contact with the surfaces of the enclosure bases and covers. If the cross-section structures and manufacturing accuracy of an enclosure are not top quality, the IP rating will remain low even when equipped with a good gasket. Naturally, all FIBOX enclosures are carefully designed and precision made. Using FIBOX enclosures, you only need to focus on the variances in gasket materials.

FIBOX enclosure gaskets are made of PUR, EPDM, neoprene and silicon materials. Table 1 includes some commonly used physical properties of the gaskets. Note that the chemical resistances in the box and in Table 2 are only rough generalisations to give you some clues to gasket material behavior. The resistance of each chemical should be checked separately. For additional information, please contact Fibox.

Property	Unit	TPE	PUR	EPDM	Neoprene	Silicon
Temperature range	°C	-40 - +120	-50 - +130	-50 - +120	-40 - +100	-60 - +170
Tensile strength	Mpa	5	0,4	13,0	8,0	9,4
Elongation at break	%	700	110	300	250	540
Hardness	Shore A	30	12	65	66	52
Density	g/cm3	1,13	0,33	1,12	1,6	1,15
Compression set	%	17	5	20	35	14

Table 1: Gasket materials: physical properties comparison

Chemical Performance	TPE	PUR	EPDM	Neoprene	Silicon
Neutral salts	••••	••••	••••	••••	••••
Acids, low concentrations	••••	•••	••••	•••	•••
Acids, high concentrations	•••	•	•••	•	•
Alkalis, low concentrations	••••	•••	••••	••••	•••
Alkalis, high concentrations	•••	•	••••	•••	•
Petroleums	•	•	•	•••	•
Hydraulic oils	•	••••	•	•••	•
Alcohols	••	•••	••••	••••	••••
Cooling fluids	•••	•••	••••	•••	••••

Table 2: Gasket materials: chemical resistance comparison

PUR = polyurethane
 TPE = thermoplastic elastomer
 EPDM = ethylene – propylene – diene – monomer

FIBOX customizing services

FIBOX machining services

To increase the range and flexibility of our enclosure solutions, Fibox has developed a comprehensive range of services, permitting cost effective customization for specific applications. The two most important of these are machining services and customized tooling.

Our sophisticated CNC machinery can supply enclosures with holes, cutouts and openings to your specification. This solution is best suited for small to medium volumes of enclosures. Fibox knowledge of enclosure materials ensures that the machining method is compatible with the chosen enclosure material.

Prior to machining a production run, product specification and drawings need to be prepared. Either the customer or Fibox can create these drawings. Enclosure specifications and technical data are available at www.fibox.com. CAD support 2D-drawings are available in IGES, DWG and DXF formats and 3D-models in IGES and Parasolid formats adaptable to your design system requirements.

Assembly services

Many enclosure solutions utilize Fibox accessories to improve the functionality of the enclosure system. Fibox can provide assembly services and install accessories specified by the end user, allowing delivery of "ready to use" mechanical packaging assemblies, saving labour costs and speeding up the manufacturing process. The Fibox accessory program includes a large number of items ranging from hinges and latches, cable glands and wiring accessories, to inspection windows and ventilators.

Customized tooling

For large volume OEM requirements, it is often possible to customize the moulding of a standard product to meet the OEM's specific needs. Provided the mould is a sophisticated multiple slide mould, any enclosure side may be customized without requiring an entirely new mould. It is important that the OEM consult with Fibox early in their design process to determine what, if any, mould change restrictions exist. Altering an existing Fibox mould can be a very cost effective alternative to creating a custom mould. In essence, you lease a high volume, standard product mould with minimal initial tooling cost. This can shorten product development times and permit customizing even those products with projected short life cycles. Your new product reaches the market sooner.

Coloured plastic enclosures

Fibox offers custom moulding of standard enclosures in customer specified colours. Standard colour specifications are based upon RAL system, however custom colour matching is possible. The type of plastic has significant impact on colour match, colour consistency and cost. Please consult your Fibox representative for guidance. Custom colour moulding becomes economical in volumes over 1000 pieces, but lower volumes are also possible. Cost adders are based upon increased raw material costs, plus the cost to prepare moulds prior to production and then clean the moulds and injection machines after production. These mould preparation costs are highly volume dependent.

Painted enclosures

Painting enclosures is recommended for plastic enclosures when volumes do not justify custom moulding. Critical colour matching, if required, is also easier to accomplish with paint. Paint type is dependent upon the choice of enclosure material. Please consult your Fibox representative for guidance.

EMC - plastic enclosures

Plastic enclosures can be prepared to provide EMC shielding. Various methods are available, but painting the internal surface with Cu paint is the preferred method. This coating, combined with a conductive gasket material such as CHO-SEAL 1350, can provide significant shielding levels. Proper selection of materials is very application specific. Please consult your Fibox representative for guidance.

Printed enclosures

Silk screen printing is recommended for enclosure batches of less than 1000 pieces. This method is mainly suitable for flat surfaces, and can be used for large areas. Tampo printing is the best solution for volumes greater than 1000 pieces. It is suitable for printing on both flat and curved surfaces of limited size. Tampo printing is also ideal for tight spots like the inside surface of the enclosure.





FIBOX – Solutions for demanding environments

