Your Product

- Our Key Competence

Moulding and Encapsulation

Cable Assembly

Customizing

Fiber Cable Assembly

Assembly Projects

Mikkelsen electronics · a partner in progress

Contents

The Best Solution for You

Product specification

IPC, UL, other requirements

PPAP / FMEA

3D drawing

3D flow simulation

3D prototype

Climatic simulation chamber

Inhouse tool making – CNC/EDM or 3D printed sample tools

Working instructions

Assembly, moulding, encapsulation, potting, casting

ESD protected work stations

Barcode serial number marking

Laser stripping

Crimping

Soldering robot

IPC certified staff

Electrical tests and reports generated for:

Continuity, shorts, insulation resistance, High voltage tests etc.

Microscope, Interferometer, Insertion and return loss inspection

Bandwidth measuring and Dispersion test

X-ray

Automatic optical inspection system (AOI)

3D geometrical analysis (First article inspection)

Infrared camera for troubleshooting

Your own buffer stock or packaging

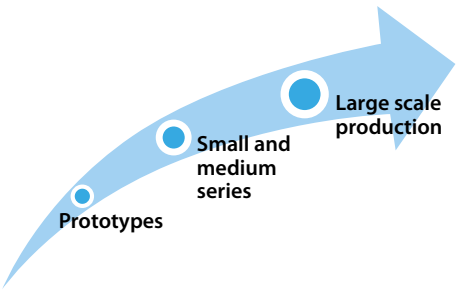
From small and medium series to large scale production

Customised cable with Technomelt moulding

Twisted pair flat cable

Cable Assembly

At Mikkelsen we have been producing customized cables for decades. The medical industry, the food industry, the defence, as well as the automotive, marine and offshore industries are just a few examples of where we have adapted products to specific industry requirements and standards. Our working stations are ESD secured and our skilled staff handle any quantity, from prototypes to larger series.



Laser stripping

For i.e. IPC 620-3 assemblies the laser stripper has proven itself indispensible as it guarantees that the metal conductors inside the cable are still 100% intact once the insulation material has been stripped off.

Soldering robot

If your application demands selective point-to-point soldering, we have an automated solution to offer you. Our soldering robot will carry out your tasks rapidly, with optimum quality and repeatability.

Assembly Projects

Do you need a helping hand?

Avoid bottlenecks by assigning your production to Mikkelsen. Our experienced staff are part of your package when you place an order with Mikkelsen and they are trained specifically in their particular part of the assembly line.

Qualified staff

When you place your assembly with Mikkelsen you are ensured a high knowledge in quality systems, such as the PPAP and IPC standards, for example. Our staff are continuously trained in specific assembly skills by our own IPC trainer which enables us to recertify our staff every six months. Furthermore, we can benefit from our versatile experience gathered in the course of more than 30 years of assembly.

Hands on or automated production? And where?

Some products can be automated and others need a human hand. We do both. Our production specializes in customizing your product. So we adapt our production to your requirements. Geographically you can choose between production in Denmark and our own European or Asian cost favourable production facilities.

If you wish we can also help you build up your own production – turnkey, prototypes or leasing of machines.

Headset solution with Technomelt

Moulding and Encapsulation

Do you need a water-resistant, vibration-safe, cost-efficient, chemical-resistant protection of your application? Then consider Technomelt. As an extra we can offer you to combine with plastics.

Moulding and Encapsulation

The low pressure moulding replaces several manufacturing operations such as moulding plastic housings and potting with epoxy. Depending on the physical environment in which your product will be used and on your requirements we can encapsulate your product.
Our more well-known solutions include moulding of strain relief, customized connectors and protection of PCBs. Technomelt moulding is often used to solve problems with humidity. In other cases Technomelt is used in forming specific customized solutions that solve specific challenges - for example space problems, stacking of components or mounting problems.

Working instructions

Needless to say, we do not start production without a working instruction. And we also ensure that our staff understand this description and are able to follow it. All our staff are continuously trained to work with various machines, processes and standards. This way we guarantee high-quality work performed by skilled staff.

3D drawing and simulation

The 3D drawing forms the basis of the tool which is developed specifically for you. We can calculate and simulate the correct flow of the material, the pressure of the machine and the amount of the material.

In-house tool making

The secret lies within the tool and the precision of our CNC milling and electro discharge machining (EDM). A correct tool saves material and gives you a better and more time-saving solution. At Mikkelsen we have produced more than 1000 tools for our customers, making us the most experienced Technomelt tool maker in Europe and by making our own tools we can offer you more flexibility and the innovation that comes with having the process in-house.

Normally we produce our tools in aluminium which cools your product almost instantaneously. Then the staff can handle your item immediately and you need not plan time for hardening or cooling – easy, fast and cost saving.

Aluminium tool and 3D printed tool

Technomelt Moulding

- Low injection pressure, 5-40 Bar
- Low injection temperature, 180°-240°C
- Application temperature -40°/+150°C
- Protects against harsh environments – water, oil, dust, vibration, chemicals
- Comes in various colours, surfaces and transparencies
- Low cooling time (10-50 sec.)

For the Benefit of the Environment

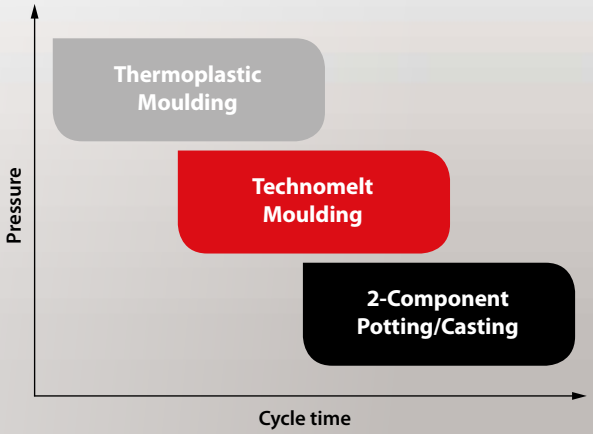
Technomelt is based on non-toxic and renewable raw materials.

2-Component Potting/Casting

- Potting at atmospheric pressure
- Injection temperature = room temperature
- Application temperature -40°/+130°C
- Protects against harsh environments – water, oil, dust, vibration, chemicals
- Comes in various colours, surfaces and transparencies
- Hardening time (4 – 24 hours)

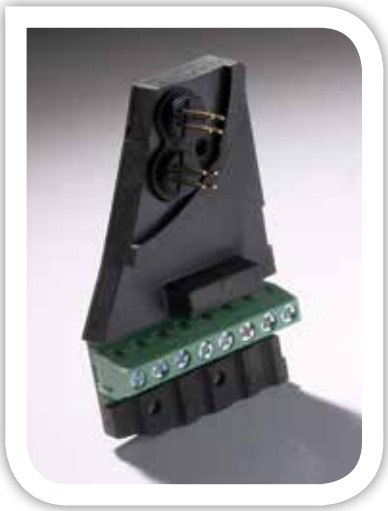
Thermoplastic Moulding

- High pressure injection, e.g. ABS, PVC, PP, PE, or other thermoplastic materials
- Can be used with Technomelt
- Hardens instantaneously
- Protects against harsh environments – water, oil, dust, vibration, chemicals
- Precise and consistent quality
- Available in almost any colour



Encapsulated LED

Typical Low Pressure Mouldings



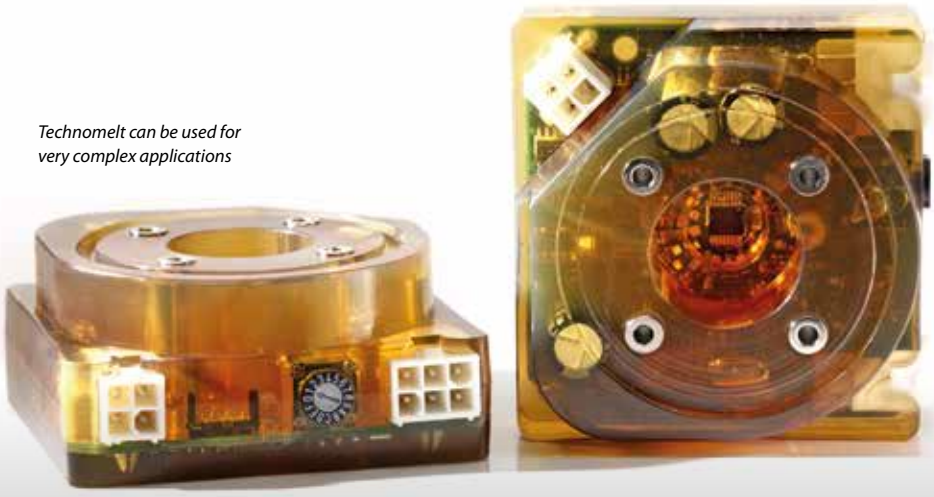
PCB overmould. Optional premould in Technomelt with thermoplastic over-mould

Strain relief

Cable bundling

LED encapsulation

Technomelt can be used for very complex applications



Technical Data

Technomelt Polyamid Hotmelt

Product	Test Method	PA6208 PA6208 BLACK	PA633 PA638 BLACK	PA 646 BLACK	PA 648 BLACK	PA 2035	PA 678	PA 676 BLACK
Colour		Amber Black	Amber Black	Black	Black	Amber	Black	Black
Service Temp Range °C		-40 to +100	-40 to +130	-40 to +130	-40 to +130		-40 to +140	-50 to +140
Softening Point °C	ASTM E28	+155	+175	+175	+175	195 to 205	187	+190
Viscosity at +210 °C (mPa.s)	ASTM D3236	3,000	3,500	7,000	7,300	3,500 to 6,500 (at 220°C)	2,500 to 4,000	7,500
Shore Hardness	ISO 868/15s	A82	A90	A92	A93		A90	A89
Creep Resistance °C	Henkel Method MH11	*+130*	*+155*	*+155*	*+155*		+160	+165
Cold Flexibility °C	ASTM D3111	*-40*	*-30*	*-35*	*-30*		-40	-55
Special Properties		*RTI-value for 6208 S: 85°C, UL-V0*	*UL-V0*	*UL-V0*	*UV-stabilized*	Pleat sealing/ bonding of filters	UL-V0	Very good cold flexibility, very good temp resistance
Adhesion Properties		PA6208 PA6208 BLACK	PA633 PA638 BLACK	PA 646 BLACK	PA 648 BLACK	PA 2035	PA 678	PA 676 BLACK
PA6.6		Good	Moderate	Moderate	Moderate	Please ask	Please ask	Moderate
PVC		Good	Good	Excellent	Moderate	Please ask	Please ask	Moderate
ABS		Good	Moderate	Moderate	Moderate	Please ask	Please ask	Moderate

Technomelt Hotmelt

Product	Test Method	AS 5375	AS 5361	AS 4226
Colour		White/Light beige	White/Light beige	Transparent/colourless
Service Temp Range °C		-30 to +85	-30 to +100	-40 to +85
Softening Point °C	ASTM E28	+141	+155	+165
Viscosity at +210 °C (mPa.s)	ASTM D3236	2,400	4,000	45,000
Shore Hardness	ISO 868/15s	A50	A68	D45
Creep Resistance °C	Henkel Method MH11	+90	+130	+110
Special Properties		Broad adhesion range	Broad adhesion range, UL V2	Transmission rate at 2mm thickness:

Wavelenght	Transmission rate
450 mm	89,0%
600 mm	90,5%
800 mm	91,0%
850 mm	91,5%

Adhesion Properties		AS 5375	AS 5361	AS 4226
PA6.6		Good	Good	Moderate
PE		Good	Good	
PP		Excellent	Excellent	
ABS		Good	Good	
PVC		Moderate	Moderate	Good
PC		Moderate	Moderate	Good

3D

3D Printing

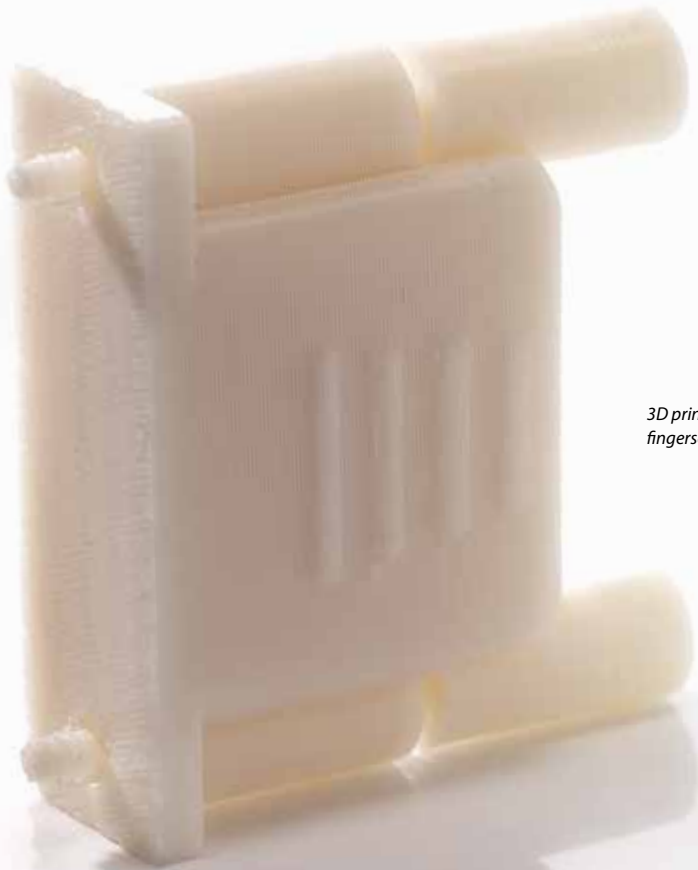
Low production costs and a fast delivery of the tool make 3D printed tools an interesting option. The unique 3D printing process gives you more than just a glimpse of your finished product, as you can use it for producing your initial prototypes and a small series.

The 3D printer can print items with an area of max. 355mm x 254mm x 254mm. The materials used for 3D prints are suitable for temperatures up to 200°C and are approved for aircraft industries for example.

3D Scanning

The 3D scanner converts the shape of your unique item, with precision, into a file that can be read by a CAD-programme. The file can be used for geometrical analysis and first article inspection. The optical measuring system is an additional sophisticated feature to quality control.

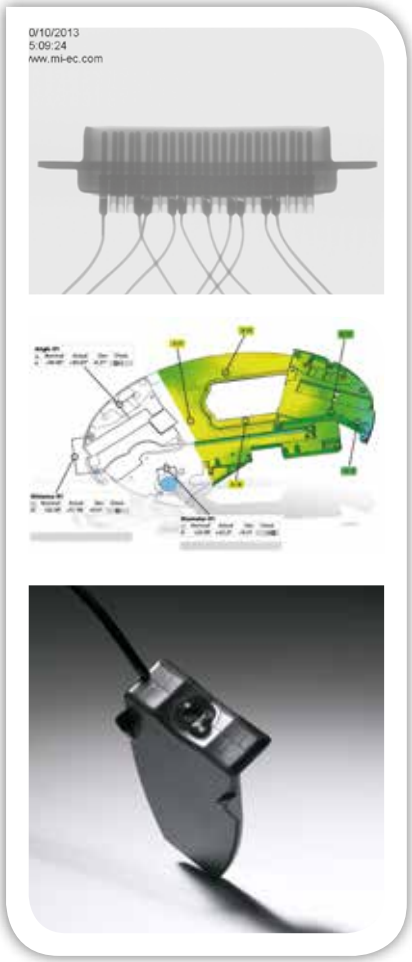
- 3D printer for tools, prototypes and items with movable parts
- 3D scanner for quality control, analysis and inspection



3D printed Dsub with movable fingerscrews

Testing

All components and cables are approved in our incoming inspection and all finalised items are visually and/or electrically tested before shipped to you. Details regarding the test are always agreed with you before the start of production.



Test Options and Quality Control

- **X-ray**
  The X-ray process can discover malfunctions in the cores, soldering etc. It may also give you valuable information in case you need specific certificates for your products.

- **Infra-red camera for troubleshooting**
  The infra-red camera detects any short circuits.

- **Temperature and climatic test chamber**
  For applications in challenging environments we are able to simulate high/low temperatures (-40°C to 180°C) and humidity (10% to 98%).

- **Automatic Optical Inspection System – AOI**
  The system detects variations in surface compared to a master sample.

- **Microgrind system**
  The microgrind system is a control used for analysing soldering and crimps.

- **Barcodes**
  A unique barcode which is printed on each cable can be used for identification, tests and reports.

- **3D scanning**
  Geometrical and 3D item analysis
  First article inspection
  Optical measuring system.

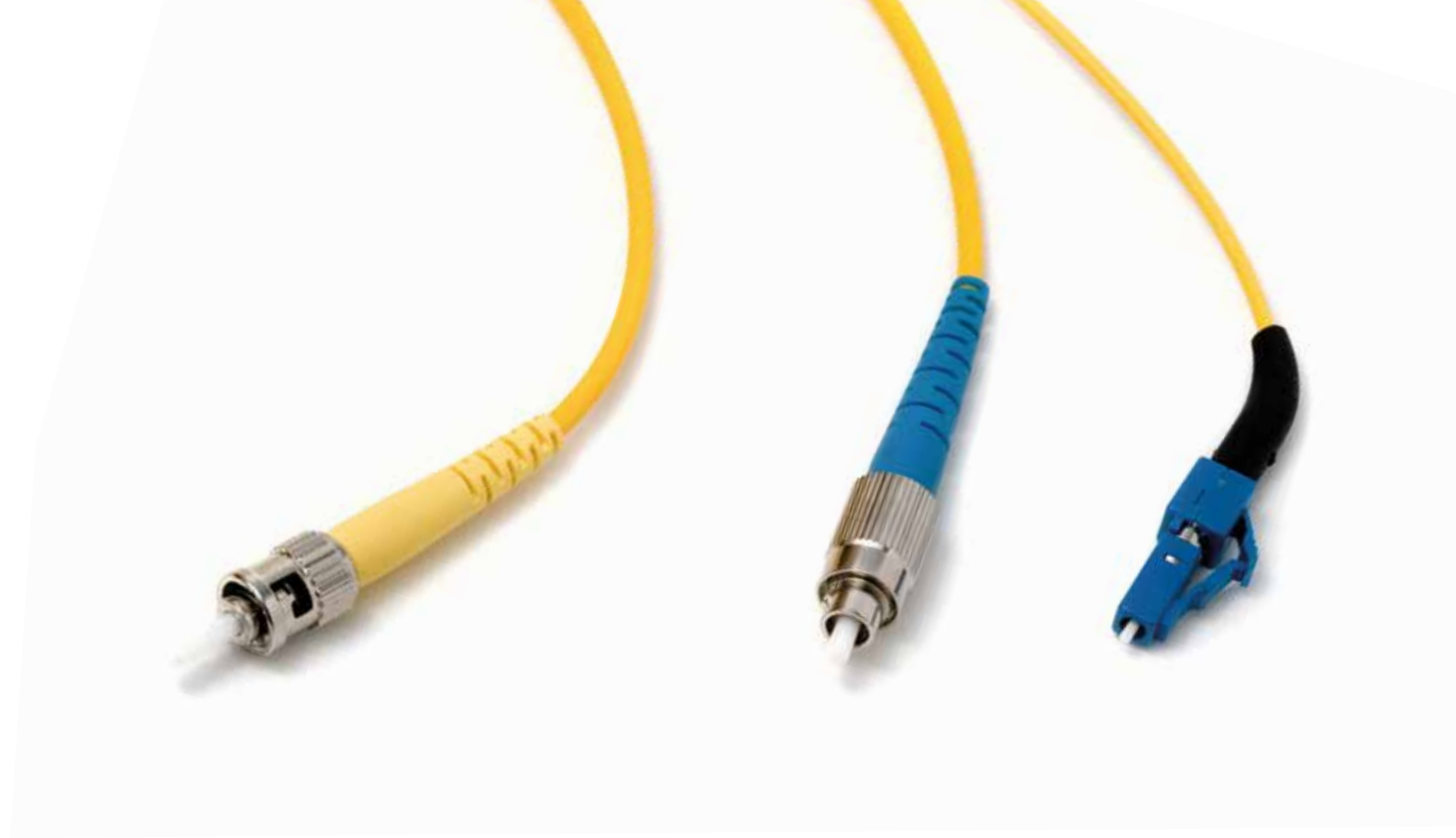
- **Electrical tests for IPC standard 620 class 3**

- **Programmable test equipment for:**
  High voltage, short and continuity test by small resistance values.
  Capacitive measuring eg. one point connected screen or twisted wires.
  Ability to generate test report for each test.

Fiber Optics
- Single Mode and Multi Mode

Whether you need single mode or multi mode fiber optics, simplex, duplex or breakout Mikkelsen can deliver exactly the solution of your choice. We produce fiber optics within all spans of sophistication – from simple fiber optics to more complicated fiber optics where you need advanced testing equipment. And no quantity is too small or too big for us.

Do you need a second opinion on your application? Use our testing facilities.



Automated 3-step fiber optics stripping machine

When you require precision work for stripping of fiber optics and kevlar this machine is the most advanced tool for stripping without damaging the fiber.

Testing your fiber optics

All production orders at Mikkelsen are produced according to the IPC 620 quality system, including visual and functional testing and we also offer you PPAP.

The following reports are available: Microscope control, insertion loss control and reflection loss control.

DAISI – Digital Automated Interferometer for Surface Inspection

If you need to have a complete measurement of the ferrule endface, the interferometer measures, digitalises, automatically cleans and delivers a report of how the ferrule looks.

Optical Dispersion and Bandwidth Measuring System

For laboratory tests or other tests where you need to measure the bandwidth.

Quality and Standards

ISO 9001:2008

Quality is a top priority for us and we always do our best to find the right solution for you. Therefore Mikkelsen was ISO9001-certified for the first time in 1999. Now we are ISO9001:2008-certified and depending on the specific project we work according to various standards.

IPC 620 class 1,2 and 3

IPC is both a standard and a network for knowledge transfer, and Mikkelsen has been certified since 2012. At Mikkelsen all staff in charge of your production order have been educated in each process they handle. To guarantee the continuous education of our staff we have our own IPC 610 and 620 trainer.

UL certificate

Are you exporting to the US or Canada? Then you might need UL approved cabling. At Mikkelsen we have been UL certified since 2006 and therefore have experience in producing wiring harnesses according to UL standards so that you can safely place the UL approval mark on your product.

We produce according to the following standards:
IPC-620A, IPC JSTD-001E and IPC-7711/7721

PPAP

With our PPAP quality system all processes are simulated and all working stages are analysed in order to predict and avoid defects and errors. PPAP or Production Part Approval Process has been used in the automotive supply chain for quite some time and now the method has been adopted by other industries. We have used the PPAP since 2011. The system focuses on how to avoid errors in the production line. Therefore all steps of the production process are analysed for possible defects and errors and the PPAP forms a strong system of minimising the risks of failures while securing uninterrupted and consistent production.

… as an Addition

Logistics

Do you need us to deliver a total package solution? And what about keeping your products in stock so that you no longer have to spend time handling parts and packages?

At Mikkelsen you can have your own buffer stock and save transportation and stocking costs. And if you prefer, we can pack your products in your own boxes and send them to your customers with your invoices as if your products came directly from you. Easy and cost saving.

Credit Check

We at Mikkelsen have always taken great pride in having solid balances and being in the black. Therefore we have been AAA-rated since 2009. After all, we believe that confidence is earned.

AAA®

Highest creditworthiness

© Soliditet 2013

Discretion

We always secure a high degree of discretion. Do you have additional requirements such as hand-picking the staff handling your applications or separating your production physically? Talk to us – we have done it before.

Our Qualified Staff

Needless to say, we put all our efforts into servicing you with a qualified staff. A typical Mikkelsen employee has worked with Mikkelsen for a number of years and is both qualified and specialized in his/her particular area. We keep our staff for a long time and are proud that they stay with us for long thus ensuring a high level of experience and qualification.

Today the Mikkelsen team counts over 65 qualified staff members

Mikkelsen Electronics has been in the electronic industry for more than 40 years. By always being curious we have been able to adapt to the changes in this fast moving industry. We are not afraid of learning more or giving that little bit extra to serve our customers. We take great pride in cooperating with you in order to find the best solution to your application.

Head office:
Mikkelsen Electronics A/S
Havremarken 3 - 5
Postboks 90
DK-3520 Farum

T +45 4434 0300
F +45 4434 0310
www.mi-ec.com
info@mi-ec.com

Nordic office:
Mikkelsen Electronics A/S
Box 12135
S-102 24 Stockholm

T +46 8501 50 760
F +46 8501 50 765
www.mi-ec.com
info@mi-ec.com