BETA

Modular HMI Platform

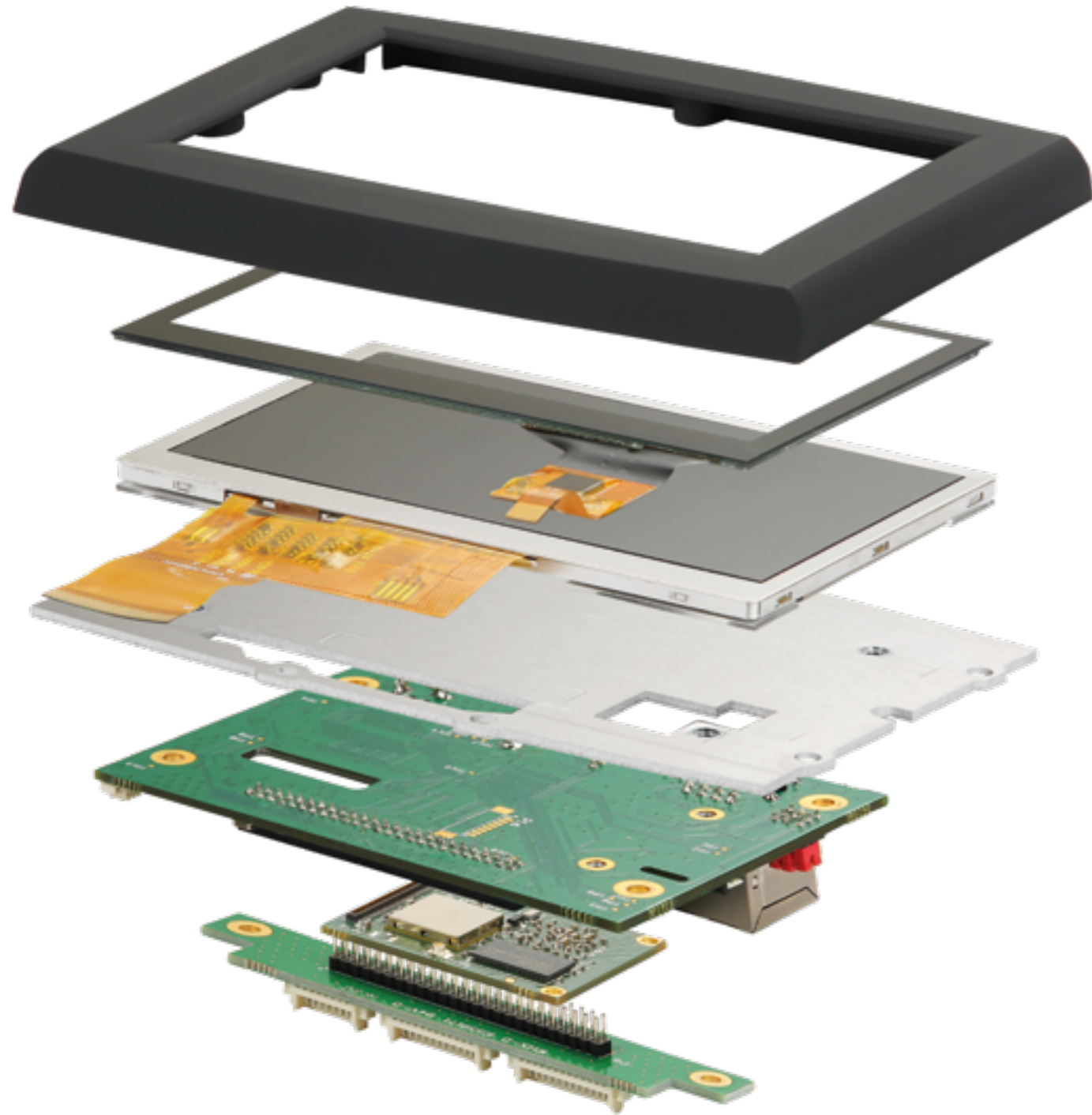Flexible configuration. Simple integration.

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Introducing BETA

What is BETA?

BETA is a highly configurable HMI (human-machine interface) with pre-integrated LCD, touch screen and embedded computer running your choice of operating system.

It has been designed to save you time and reduce risk by simplifying the HMI integration process in three major ways:

1. Its configurability means you **get a pre-assembled HMI with the right features for your project.**

2. Many of the **complex technical challenges have already been taken care of**, such as driving a display with high-speed video signals, EMC testing and approvals.

3. The provided interfaces and mounting capabilities make it **easy to integrate with existing electronic and mechanical assemblies.**

It's simple. Just choose the components that give you the features you need - whether it's the screen, the processor, I/O or otherwise - and receive an assembled HMI that's ready for you to load your application, integrate into your product and take to market.

Why choose BETA?

Flexible configuration
Reduce costs and complexity by customising the BETA HMI to match your requirements.

Easy integration
Integrate a BETA HMI with your pre-existing electronics through a variety of interfaces.

Pre-integrated
Major technical challenges and time-intensive tasks already taken care of.

Pre-tested
EMC, thermal testing and CE approval already carried out.

UK design & manufacture
BETA is designed and manufactured at our facility in the UK.

Long-term availability
In production until at least 2025 and with ongoing UK support throughout production.

Create your own BETA

Pick the features and functionality you require

BETA is designed to be modular, with maximum compatibility and extensibility at its core. For most component parts there are a range of options, allowing you to tailor the configuration to suit your specific needs.
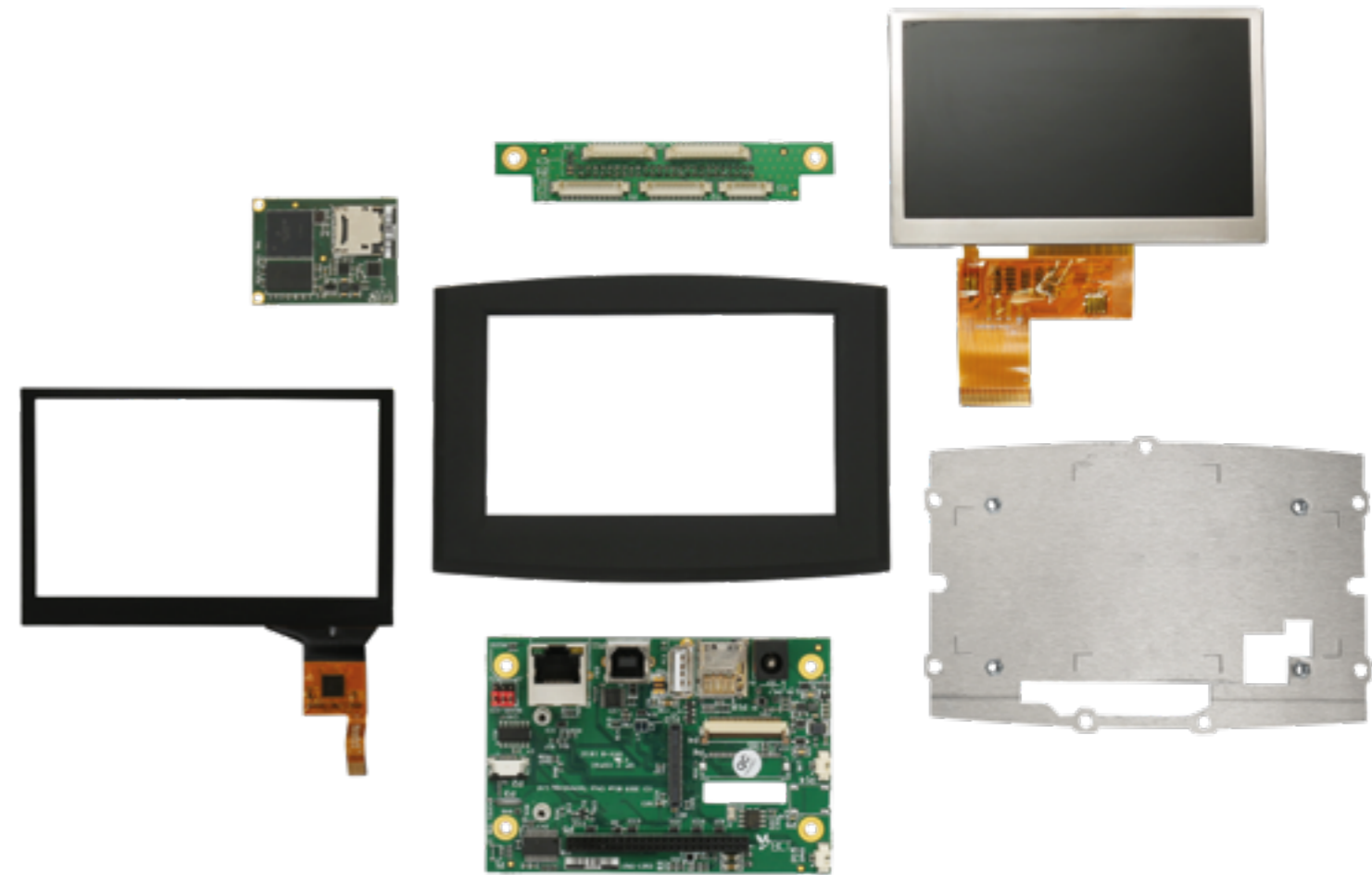
LCD

Finding the right display for your HMI is often a balancing act between cost, user experience and physical constraints. With that in mind, we have carefully sourced and tested a range of displays to give you options that make BETA suitable for a variety of systems, from handheld devices to industrial control panels.

LCD Options

Size	4.3"	7.1"	9.7"	12.1" (provisional)
Resolution	480x272	800x480	1024x768	1920x1080
Brightness	440 cd/m^2 typical	425 cd/m^2 typical	400 cd/m^2 typical	700 cd/m^2 typical
Contrast	500 typical	400 typical	800 typical	800 typical
Viewing Angles	50, 70, 70, 70 typical	60, 70, 70, 70 typical	89, 89, 89, 89 typical	80, 80, 80, 80 typical

Touch Interface

Integrating a touch screen HMI into your product puts a lot of emphasis on the touch interface itself. This interface - as the sole or primary component responsible for user input - has to be suitable for the end user's environment while at the same time being as responsive as possible, giving users immediate feedback.

We offer two popular touch technology choices as part of our BETA HMI, both suited for different situations.

Touch Interface Options

Projected Capacitive

For most applications, a projected capacitive touch screen is suitable. It's the same interface that's used in commercial smartphones where users benefit from a responsive, frictionless touch experience. Our projected capacitive option supports multi-touch for more advanced user interaction.

Resistive

Resistive touch works by responding to pressure on its surface as two sheets of material meet. It's a cost-effective alternative useful for situations where end users are wearing gloves and only a single touch point needs to be registered at any given moment.

Processor Board

The processor board is the brains of your BETA HMI. It takes care of running your software application using the onboard processor. In making your choice, you need to consider two key aspects; the operating system that your application will run on and the required processing power and graphics capabilities to run the application at an optimal level.

Processor Board Options

| Processor Module ID	TM1	TM2	XE1 (Integrated)
Architecture	ARM	ARM	x86 / x64
Processor(s)	NXP iMX6 SoloLite, Single Core Cortex-A9, 1GHz	NXP iMX6 SoloX, Asymmetric Dual Core Cortex-A9, 1GHz Cortex-M4, 200MHz	AMD Embedded G-Series LX Dual Core, 1GHz
Graphics	OpenVG 1.1 PXP (PiXel Processing Pipeline)	GPU2Dv2 - 2D Graphics Processor (BitBlt) GPU 3D OpenGL ES 2.0 PXP (PiXel Processing Pipeline)	AMD Radeon R1E graphics processor DirectX 11.2 OpenGL

Carrier Board (I/O)

The carrier board acts as the backbone of your BETA HMI. It handles the signals between the processor module, the LCD and the touch interface, as well as hosts the onboard I/O for connecting accessories and integrating your existing electronics.

There are several boards to choose from and each one comes with its own set of customisation options, allowing you to get the features you need while at the same time leaving out those that are surplus to requirements.

Carrier Board Options

Carrier Board ID	HB5 / HB6	HB7	XE1
Compatible Processor Modules	TM1 and TM2		Integrated
OS Support	Android Linux Ubuntu		Windows Linux Ubuntu Android x86
Display Support	Single display		Dual independent displays (HDMI)
Audio	Stereo Inputs and Outputs 0.5W Class D amplifier		Stereo Inputs and Outputs 2W Class D amplifier
Watchdog	Yes		
Real-Time Clock	Yes, with battery backup option		
Memory	1GB		2GB or 4GB
Primary Storage	MicroSD or eMMC		M.2 SSD or SATA DOM or SATA
Secondary Storage	MicroSD		MicroSD or M.2 SSD or SATA DOM or SATA
Mobile Communications	No	UMTS/HSPA, GSM, GPRS, EDGE, CSD, SMS Standard size SIM (optional Dual SIM)	SIM socket M.2 socket for modem
GPS	No	GPS/QZSS, GLONASS, Assisted fix	M.2 socket for module
CAN	x2 optional (via expansion adapter)	x2	No
Wireless	Optional WiFi 802.11 a/b/g/n (2.4GHz and 5GHz) Optional Bluetooth 4.1, BLE 4.0		WiFi, Bluetooth, and 4G via USB or M.2 modules
USB 2.0 Host	x1		x1 +1 via 50-way expansion interface
USB 2.0 Device	x1		No
USB 3.0	No		x1
Ethernet	10/100 MBit	No	10/100/1000 LAN
Accelerometer	Optional (via expansion adapter)	3 axis, 14/8-bit	No
Light Sensor	No	16-bit	No
I²C / SMBUS	x1		x1 (up to 400KHz)
RS232	x2		
RS232/422/485	x1	x1 (factory option)	
SPI	x1		No
GPIO	12 signals (1.8v or 3.3v, software-controlled)	5 signals	12 signals
Camera Interface	USB		
Expansion	50-way expansion interface		x2 M.2 sockets (2230 Key A, 2242 Key B) 50-way expansion interface
I/O Orientation	HB5 - Horizontal HB6 - Vertical	Vertical	
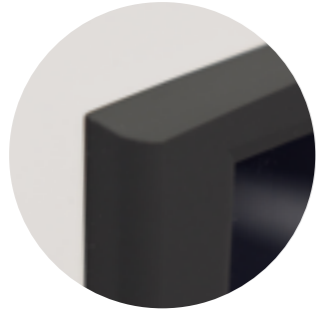
Soft Touch Plastic

For cost-sensitive applications where high-rated **IP sealing is not required**, our **soft-touch plastic** option is the one to choose.

Machined Aluminium

If your HMI requires **significant protection from dust** or water and a more **rugged frame** for harsher environments - or even just a more **premium feel** to your product - then choose our **machined aluminium** bezel.

Bezel Material & IP Sealing

As with the LCD and touch interface, it's important to balance cost, environmental and user experience requirements when it comes to choosing the bezel for your BETA HMI.

BETA provides two options for the bezel surrounding its front panel; either soft-touch plastic or machined aluminium. Alongside choosing a bezel material, you should factor in your required ingress protection (IP) rating as there are a number of choices available for this, too.

Bezel Material & IP Sealing Options

		Brightness	
		Soft-Touch Plastic	Machined Aluminium
Sealing	IP41	√	
	IP54	√	
	IP65		√

Rear Cover & Mounting

Depending on whether your system requires an integrated, mounted HMI or if you intend to load a software application on to a handheld, mobile device, we have a variety of options available to create a HMI that's right for your project.

Rear Cover & Mounting Options

Open Frame
Having an open frame allows your BETA to be panel-mounted or arm-mounted.

Rear Panel
If your BETA needs to be self-contained or mobile then you can include a rear panel to create a fully-enclosed unit. With a rear panel, your HMI can also be mounted on an arm.

Further Customisation Options

There are a number of additional customisation options available to make your BETA a perfect fit for your application.

OS Operating System

Whether you choose an SBC based on ARM or x86/x64 architecture, you have a number of OS options available including Android, Linux and Windows.

RAM Memory

Depending on the RAM requirements of your software application, you can choose the right amount of memory.

Power Connector

You can choose either a screw terminal or a DC jack connector, depending on how you intend to power your HMI. Alternatively, power it through the 50-way expansion connector.

Speaker

If you need an integrated speaker to give the user audio feedback or when playing media, a Class D amplifier and speaker is available.

Battery

If your HMI is handheld or likely to spend any time away from a static power source, you can take advantage of Lithium-Ion battery support.

Storage

We have a variety of storage options covering both sizes and format, from MicroSD to eMMC to SATA.

Extended Temperature

For demanding environments, your BETA may need to operate at extended temperatures.

Antenna

A number of pre-tested antennas are available for integration at production for WiFi, Bluetooth and GPS, including a smart antenna featuring advanced technology.

Starter Configurations

Picking your own individual HMI configuration gives you complete control and is ideal when you know the precise requirements of your project. On the other hand, if you're early in the development process and are just looking to get started with a HMI to see what's possible then you won't necessarily know the exact configuration required. With this in mind, we have created a number of 'Starter Configurations' to help you.

A pre-selected Starter Configuration provides an easy entry point if you're new to BETA. See below for our range of Starter Configurations, available off the shelf. We have selected these to represent key points across BETA's 'application spectrum'; while none may exactly match your target requirement, our aim is that one or another will be close enough for you to start meaningful application development.

The five Starter Configurations and their various application areas are summarised as:

Lite: For low-cost applications that still require the functionality expected of a feature-packed single board computer.

Standard: A drop-in solution for a wide range of applications where a modern user interface is required.

Pro: High-performance configuration for real-time data processing and 3D graphics.

Mobile: Designed for mobile and automotive applications.

Panel PC: Intended for industrial automation applications and legacy x86 system upgrades.

| Name	Lite	Standard	Pro	Mobile	Panel PC
LCD Screen Size	4.3"	7.1"	7.1"	7.1"	9.7"
Bezel & IP Sealing	Soft Touch Plastic (IP41)	Soft Touch Plastic (IP41)	Machined Aluminium (IP65)	Soft Touch Plastic (IP41)	Machined Aluminium (IP65)
Touch interface	Projected Capacitive or Resistive	Projected Capacitive or Resistive	Projected Capacitive or Resistive	Projected Capacitive or Resistive	Projected Capacitive or Resistive
Processor	iMX6 SoloLite ARM Cortex-A9 (1GHz)	iMX6 SoloLite ARM Cortex-A9 (1GHz)	iMX6 SoloX ARM Cortex-A9 (1GHz) ARM Cortex-M4 (200MHz)	iMX6 SoloLite ARM Cortex-A9 (1GHz)	AMD G-Series LX Dual Core (1GHz)
Graphics	OpenVG 1.1 PXP (PiXel Processing pipeline)	OpenVG 1.1 PXP (PiXel Processing pipeline)	GPU2Dv2 - 2D Graphics Processor (BitBlt) GPU 3D OpenGL ES 2.0 PXP - PiXel Processing Pipeline	OpenVG 1.1 PXP (PiXel Processing pipeline)	AMD Radeon R1E graphics DirectX 11.2
OS Support	Android Linux Ubuntu	Android Linux Ubuntu	Android Linux Ubuntu	Android Linux Ubuntu	Windows Linux Ubuntu Android x86
Memory	1GB DDR3L	1GB DDR3L	1GB DDR3L	1GB DDR3L	2GB or 4GB DDR3L
Storage	MicroSD socket or 8GB eMMC Flash	MicroSD socket or 8GB eMMC Flash	MicroSD socket or 8GB eMMC Flash	MicroSD socket or 8GB eMMC Flash	M.2 SSD or SATA SSD
WiFi & Bluetooth	Optional	Optional	Optional	Optional	Optional
I/O	x1 I²C x2 RS232 x1 RS232/422/485 x1 SPI USB 2.0 GPIO	x1 I²C x2 RS232 x1 RS232/422/485 x1 SPI USB 2.0 GPIO	x1 I²C x2 RS232 x1 RS232/422/485 x1 SPI USB 2.0 GPIO	x2 CAN x1 I²C x2 RS232 x1 RS232/422/485 x1 SPI USB 2.0 GPIO 3G / GSM GPS Accelerometer Light Sensor	x1 USB 3.0 x1 USB 2.0 SMBUS x2 RS232 x1 RS232/422/485 GPIO
Operating Temperature	Standard (0°c - 50°c) Extended (-20°c - 50°c)	Standard (0°c - 50°c) Extended (-20°c - 50°c)	Standard (0°c - 50°c) Extended (-20°c - 50°c)	Standard (0°c - 50°c) Extended (-20°c - 50°c)	Standard (0°c - 50°c)
Extras				Rear cover Battery	

Connecting Your Own Electronics

Every BETA HMI features a 50-way expansion interface that gives you options for integrating the system into your existing electronics with minimal additional development. This expansion interface can make use of expansion adapters to provide alternative connector types, such as Screw Terminal or PicoBlade, or to add new features, such as dual CAN bus interfaces and an accelerometer.
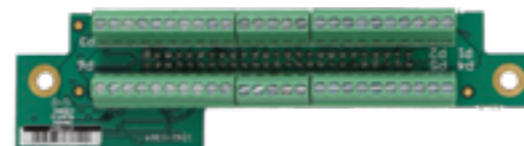
Expansion adapter options

Screw Terminal

The most common and versatile connector type allowing you to directly connect to each individual pin provided by the 50-way expansion interface.
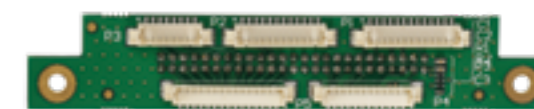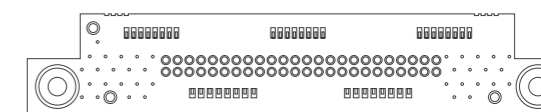
PicoBlade

Choose the PicoBlade expansion adapter for a tidy, compact and simple way to connect existing electronics to your BETA HMI.

Dual CAN, Accelerometer & Screw Terminal

This expansion adapter provides the same as connectivity as the dedicated Screw Terminal version, but also features dual CAN bus interface and an accelerometer.

Specify or Develop Your Own

You can also develop your own expansion adapter to suit your pre-existing electronics more precisely. We provide all of the necessary technical information required and our electronics and mechanical engineering teams will provide ongoing support to help you every step of the way.

More expansion adapters are due for release, increasing the number of available options.

Adding Your Software Application

You can have software loaded and running on a BETA within minutes. Whether you've already got a Windows application to port over to new hardware or you're starting from scratch using Android or Linux, we're here to provide you with expert software guidance to help you ship your product.

Software Development Options Options

Operating System

Whether your project is driven by its hardware or it software, choosing the right operating system is an important decision to make.

Windows

Program in C++, C#, Visual Basic and more.

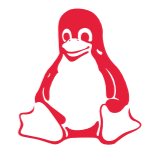Provides an easy path for legacy applications.

Ongoing security updates.

Android

Program in Java, C++ or Kotlin.

No license fees.

Lock down to 'kiosk mode' easily.

Linux

Program in C++, C, Java, Python and more.

Open source.

Complete development freedom.

Development Environment

Whichever operating system you choose, we can advise on what development environments are available and discuss their strengths and weaknesses.

Qt

Program in C++, QML or HTML5.

Feature-rich development environment.

Build attractive GUIs easily.

If you need any guidance or assistance with choosing an operating system or development environment for your project, please speak to a member of our team who will be happy to assist you.

Example Applications

Industrial Automation

- Machine Control
- Process Control
- Automated weighing and labelling

Warehouse Management

- Time & Attendance
- Order Picking and Processing
- Bar Code Scanning

Lab & Test

- Automated Test Equipment
- Gas and Liquid Analysis
- Real Time Data Collection

Security

- Video Surveillance
- Access Control
- Alarm Monitoring and Control

Building Automation

- Elevator Control
- Environmental Control
- Meeting Room Booking

Food & Beverage

- Point of Sale
- Digital Signage
- Vending Machine

Ordering a BETA Development Kit

Ordering a BETA Development Kit that closely matches your specific requirements allows you to rapidly develop a proof-of-concept prototype. Furthermore, you'll be able to do all of this safe in the knowledge that we, BETA's designer and manufacturer, are on hand to help you every step of the way.

To get hold of a BETA Development kit, you have three options:

A: Choose each of the individual components and we'll assemble it for you

B: Start with one of our Starter Configurations (see page 14-15)

C: Tell us your requirements and let us help you to choose

What's in a BETA Development Kit?

Along with your chosen BETA HMI configuration, your kit will also include accessories to help you start development. These include cables, a speaker, power supply and more (see typical Development Kit below).

About Blue Chip Technology

Blue Chip Technology design, manufacture and support custom embedded electronics and industrial computing solutions. We have a wealth of experience delivering projects for a wide array of markets, including (but not limited to):

› Automation	› Test & Measurement	› Defence
› Rail	› Energy	› Telecoms
› Security	› Marine	› Retail
› Healthcare	› Oil & Gas	› Logistics

Our expertise is in electronics, software and mechanical engineering. We excel at turning customer's ideas into successful products.

We specialise in developing electronics involving high-speed microprocessors running operating systems. We can also develop projects involving microcontrollers and a wide variety of interfaces.

We look for long-term partnerships with our customers where both parties can benefit from more effective and efficient communication, shared goals and, ultimately, shorter project times and lower overall costs.

We can provide a complete service

Minimising the number of third party suppliers can help to reduce the cost, complexity, risk and duration of your project. In most cases we can completely fulfil your requirements, from design through to delivery. Our full range of services includes:

› Electronics design	› Software support
› Enclosure design	› Ongoing technical support
› Supply chain management	› Product life management
› Manufacture	› Diagnostics & repair
› Compliance, approvals & certification	› Updates & product improvements

We provide a highly integrated service

With expertise and capabilities covering a wide range of disciplines and the co-location of our engineering, manufacturing and purchasing teams, our customers benefit from:

› More efficient development

› Faster, more effective communication

› Better project management

› Ultimately a higher quality end product

We believe in long-term partnerships and ongoing support

We are keen to support our customers throughout the life of their project, from start to finish. We provide guidance and advice where needed and continue to work with customers after a project is delivered to ensure the continual delivery of cost-effective, high-quality products.

We offer specialist expertise where required

We can design and develop a wide range of products from the latest microprocessors, microcontrollers, peripheral interfaces, operating systems and BIOS / bootloaders to enclosures made from plastics, sheet metal or extrusions.

We can supply products in flexible volumes

We have created a flexible and responsive on-site manufacturing service that can deliver to your business requirements. We work with you to agree quantities and lead times up front and then support your call offs to match your customer demand.

We can deliver products with a fast turnaround

Our 30+ years of experience of managing supply chains and delivering hundreds of projects, plus the co-location of our design, manufacturing and test capabilities, means our customers benefit from fast, efficient turnaround of high quality products.

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