IQ®4

BUILDING ENERGY MANAGEMENT SYSTEM
CONTROLLERS

TREND

INTRODUCTION

As the leading provider of Building Energy Management Systems (BEMS), Trend Control Systems Ltd is at the forefront in developing new and exciting technologies that control energy use within the built environment.

TAKE CONTROL OF YOUR BUILDING

Today's building owners, managers and occupiers are tasked with reducing energy consumption, lowering overall energy expenditure and minimising their carbon footprint, whilst maintaining comfortable conditions.

Given that up to 84 per cent of a building's energy usage can be controlled by a Trend BEMS, it is undoubtedly the most effective way to gain a true understanding of where savings can be made, monitored and sustained.

A Trend BEMS maximises the energy saving potential of a building services infrastructure through greater visibility and control. By extrapolating and analysing usage patterns in detail across the built environment, relevant changes can be automatically made wherever and whenever necessary.
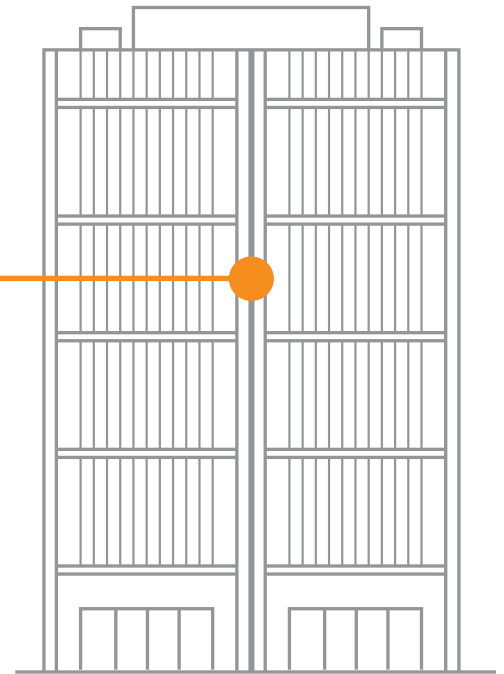
A BEMS comprises of four key components:

CONTROLLERS
—

Controllers receive signals from field devices and according to their programmed operational settings, take action to efficiently control plant equipment.

SUPERVISORS
—

Supervisors are user interfaces that view or amend the system data as well as providing a wide range of energy analysis and maintenance functions.

NETWORK
—

A network allows devices to communicate across a physical distance either using a local or wide area network, or remotely by using standard browser technology.

FIELD DEVICES
—

Field devices, such as sensors, meters, and motor controllers send or receive data directly to or from controllers for either local or remote control and monitoring.

ALL BASES COVERED

Trend's IQ®4 controllers offer unrivalled levels of flexibility and functionality, and pack the very highest levels of performance into devices with extremely small footprints.

Trend's groundbreaking IQ®4 technology offers a combination of advanced capabilities not found on any other building services controllers. Comprising the IQ®411, IQ®412, IQ®422, IQ®4E, IQ®4E modules and IQ®4NC, the range is designed to cover every possible application. They are perfect for the energy efficient, highly distributed local control of all HVAC control applications.

REDUCE PANEL SIZES

When it comes to allocating room for a BEMS in a commercial building, the size of its constituent parts really does matter.

Trend leads the way in reducing the footprint of its controllers without compromising on features. The IQ®4E is 40% smaller than the IQ®3xcite and, in addition, the use of vertical connectors means trunking can be situated immediately alongside the controller, saving even more space.

FLEXIBLE CONFIGURATION

With the widest possible combination of input/output (I/O) configurations, Trend's IQ®4 Internet enabled controllers utilise Ethernet and TCP/IP networking technologies, and utilise the BACnet protocol over IP. The ability to upgrade between point variants provides increased flexibility, and enhanced processing performance enables more complex applications to be controlled.

SECURE

Security has also been built in and each device is SSL encrypted and has robust password protection.

BETTER FOR THE LONG TERM

Communication is vital and each IQ®4 controller incorporates a web server that can deliver pages to a PC, tablet or mobile phone running an Internet browser. This allows for different customer preferences and requirements – even if they change in the future.

As with all Trend products, backwards compatibility is designed in from the outset. Able to communicate with any IQ®1, IQ®2 or IQ®3 controller, the IQ®4 modules are also interchangeable for additional future proofing, scalability and system longevity – all of which can protect the financial investment in a BEMS.

BACKWARDS COMPATIBLE
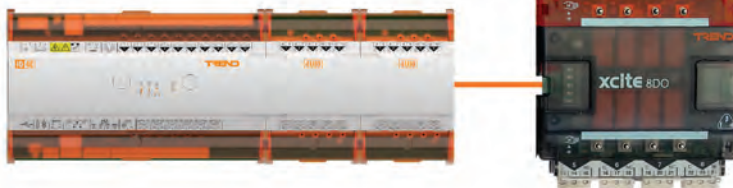
CONTROLLER RANGE

Trend's innovative range of IQ®4 controllers is setting new standards for building energy management systems (BEMS) design and integration.

IQ®4E

The IQ®4E controller has 10 universal inputs and 6 analogue voltage outputs and is expandable up to 192 points (depending on the controller variant) by adding I/O modules. This flexibility makes it suitable for a broad range of applications. The controller uses Ethernet and TCP/IP networking technologies with embedded XML and is fully compatible with other Trend IQ controllers. It supports BACnet over IP as standard. Trend communications over a current loop LAN is available as an option. A local PC or display (e.g. IQ®View4) can be connected to the RS232 port. A Wallbus port is also provided for use with room displays.

IQ®422

The IQ®422 series of intelligent controllers is designed for localised intelligent control of distributed plant. The complement of 6 universal inputs and 6 analogue voltage outputs make the product ideally suited to small-medium sized applications as well as advanced unitary control. Full compatibility with the Trend IQ® system enables the IQ®422 to integrate the local environmental needs with the main building energy management system, optimising both comfort and running costs.

IQ®411 and IQ®412

The IQ®41x series of intelligent controllers is designed for advanced unitary control systems and localised intelligent control of distributed plant. Full compatibility with other Trend IQ® controllers enables the IQ®41x to integrate the local environmental needs with the main air conditioning system in order to optimise both comfort and running costs.

IQ®4NC

The IQ®4NC enables Trend networks on different media (Ethernet, Trend current loop, or MS/TP) to be joined together in various configurations. It provides 4 virtual CNCs which allow supervisors or tools on the Ethernet network to connect to the Trend system. The IQ®4NC is available with either zero or 12 I/O channels.

SETTING THE STANDARD

Trend systems minimise energy consumption and maintain consistently comfortable building conditions, through close control and monitoring of heating, ventilation, air conditioning and other building services.

By investing in a Trend BEMS, building designers and managers can experience energy efficiency and cost savings like never before.

With the IQ®4 range, Trend has raised the bar even higher in terms of the features that can be incorporated into small footprint controllers.

Designed to meet the multi-faceted demands of today's built environment, IQ®4 addresses all flexibility, data availability and cost effectiveness.

To find out more call +44(0)1403 2188, email marketing@trendcontrols.com or visit www.trendcontrols.com

IQ®4E Controller
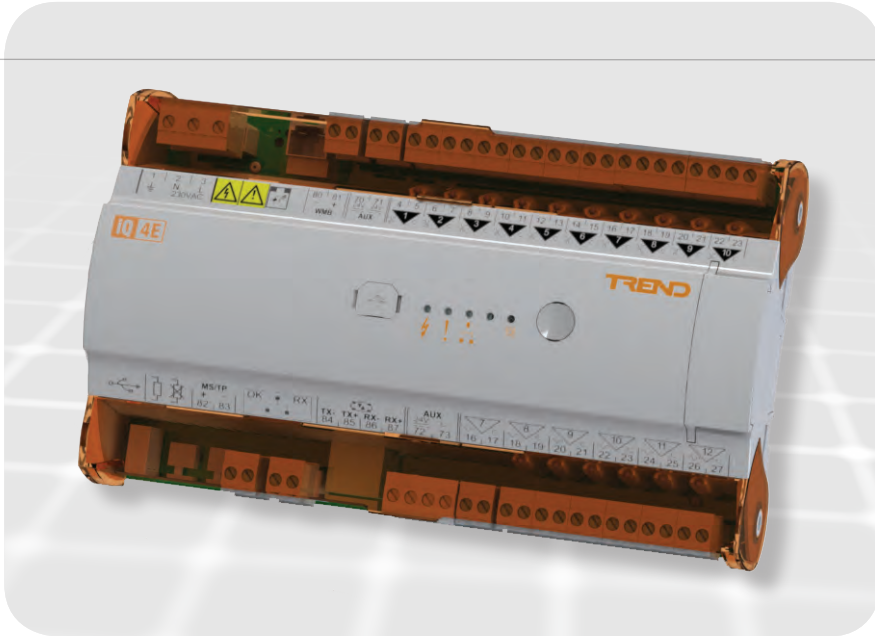
OVERVIEW

The IQ®4E controller has 10 universal inputs and 6 analogue voltage outputs and is expandable up to 192 points (depending on the controller variant) by adding I/O modules. This flexibility makes it suitable for a broad range of applications.

The IQ4E controller uses Ethernet and TCP/IP networking technologies with embedded XML and is fully compatible with other Trend IQ controllers. The IQ4E supports BACnet over IP as standard. Trend communications over a current loop LAN is available as an option. A local PC or display (e.g. IQView4) can be connected to the RS232 port. A Wallbus port is also provided for use with room displays.

KEY FEATURES

- 16 onboard I/O channels - 10 inputs and 6 outputs
- I/O bus supports up to a total of 192 I/O channels using additional I/O modules
- I/O bus length up to 300 m
- Ethernet 10/100 Mbps main network with TCP/IP protocol
- Trend current loop LAN option
- Embedded XML Web Services as standard
- BACnet over IP
- Wallbus for connection of local display devices
- RS232 and USB local supervisor/engineering ports
- DIN rail mounting, DIN 19 size 2 standard enclosure
- 230 Vac input power supply

KEY BENEFITS

- **Reduced panel size**
  With its small footprint IQ4E can be placed in smaller control panels, lending itself to confined space applications

- **Flexible I/O configuration**
  With the ability to upgrade between its available 16, 32, 64, 96, 128, 160 and 192-point variants, applications of all sizes can have a better matched control solution, thus reducing unused I/O and creating significant cost savings

- **Better performance**
  IQ4E's superior processing performance enables even the most complex HVAC applications to be controlled

- **Longer BUS and Distributed I/O**
  The IQ4E has improved I/O bus capabilities, with an available length of up to 300m and the potential for 30 I/O modules to be configured. Perfect for when I/O is required in other areas of the plant room.

- **Easy to engineer**
  With new strategy modules and soft addressing, IQ4E reduces the amount of time spent on each project. Not only does this reduce cost, it makes better use of a valuable time and engineering resource, particularly when combined with SET 7.0 Voice Commissioning
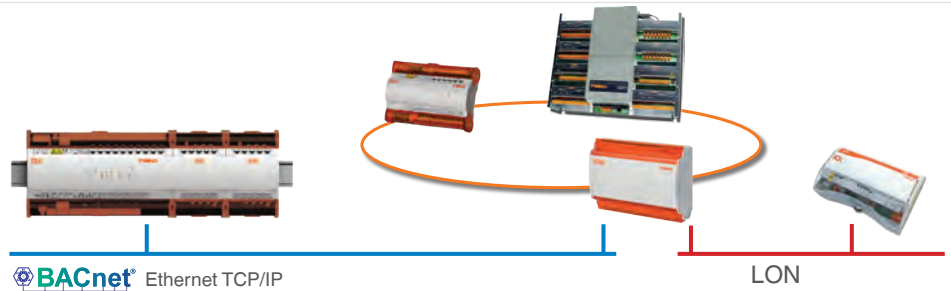
iQ4E

IQ®4E Controller
Better 4 the long term

IQ®4E is backwards compatible with IQ®2, IQ®1 and IQ®L

BACnet® Ethernet TCP/IP

LON

IQ®4E compatible with IQ®3xcite and IQ®eco installations

BACnet® MS/TP

BACnet® Ethernet TCP/IP

IQ®4E is compatible with IQ®3xcite I/O, IQ®3xcite is compatible with IQ4E I/O

ORDER CODE	DESCRIPTION	ORDER CODE	DESCRIPTION
IQ4E Controllers		**IQ4E I/O Modules**	
IQ4E/16/BAC/230	IQ4E with 16 I/O channels and 230 Vac supply	IQ4/IO/16DI	I/O Module with 16 digital input channels
IQ4E/32/BAC/230	IQ4E expandable to 32 I/O channels and 230 Vac supply	IQ4/IO/8DO	I/O Module with 8 digital/relay output channels
IQ4E/64/BAC/230	IQ4E expandable to 64 I/O channels and 230 Vac supply	IQ4/IO/4DO	I/O Module with 4 digital/relay output channels
IQ4E/96/BAC/230	IQ4E expandable to 96 I/O channels and 230 Vac supply	IQ4/IO/8UIO	I/O Module with 8 universal input/output channels
IQ4E/128/BAC/230	IQ4E expandable to 128 I/O channels and 230 Vac supply	**IQ4E I/O Connectors**	
IQ4E/160/BAC/230	IQ4E expandable to 160 I/O channels and 230 Vac supply	IQ4/IC/TERM/5	Pack of 5 spare I/O bus terminators
IQ4E/192/BAC/230	IQ4E expandable to 192 I/O channels and 230 Vac supply	IQ4/IC/LINK/5	Pack of 5 spare rigid I/O bus interconnectors
IQ4E/16/LAN/BAC/230	IQ4E with 16 I/O channels Trend current loop and 230 Vac supply	IQ4/IC/ADPT/10	Pack of 10 I/O bus cable adapters
IQ4E/32/LAN/BAC/230	IQ4E expandable to 32 I/O channels Trend current loop and 230 Vac supply	**IQ4E Upgrades**	
IQ4E/64/LAN/BAC/230	IQ4E expandable to 64 I/O channels Trend current loop and 230 Vac supply	IQ4E/16-32/UP	Upgrade from 16 to 32 channels
IQ4E/96/LAN/BAC/230	IQ4E expandable to 96 I/O channels Trend current loop and 230 Vac supply	IQ4E/32-64/UP	Upgrade from 32 to 64 channels
IQ4E/128/LAN/BAC/230	IQ4E expandable to 128 I/O channels Trend current loop and 230 Vac supply	IQ4E/64-96/UP	Upgrade from 64 to 96 channels
IQ4E/160/LAN/BAC/230	IQ4E expandable to 160 I/O channels Trend current loop and 230 Vac supply	IQ4E/96-128/UP	Upgrade from 96 to 128 channels
IQ4E/192/LAN/BAC/230	IQ4E expandable to 192 I/O channels Trend current loop and 230 Vac supply	IQ4E/128-160/UP	Upgrade from 128 to 160 channels
		IQ4E/160-192/UP	Upgrade from 160 to 192 channels

TREND

IQ®422 Controller

OVERVIEW

The IQ®422 series of intelligent controllers is designed for localised intelligent control of distributed plant. The complement of 6 universal inputs and 6 analogue voltage outputs make the product ideally suited to small-medium sized applications as well as advanced unitary control. Full compatibility with the Trend IQ® system enables the IQ®422 to integrate the local environmental needs with the main building energy management system, optimising both comfort and running costs.

KEY FEATURES

- **Ethernet 10/100 Mbps main network with TCP/IP protocol**
- **Trend current loop LAN option**
- **BACnet over IP option**
- **3 vCNC connections**
- **Small footprint with DIN rail mounting**
- **RS232 and USB local supervisor ports**
- **Soft addressing with Barcode addressing**
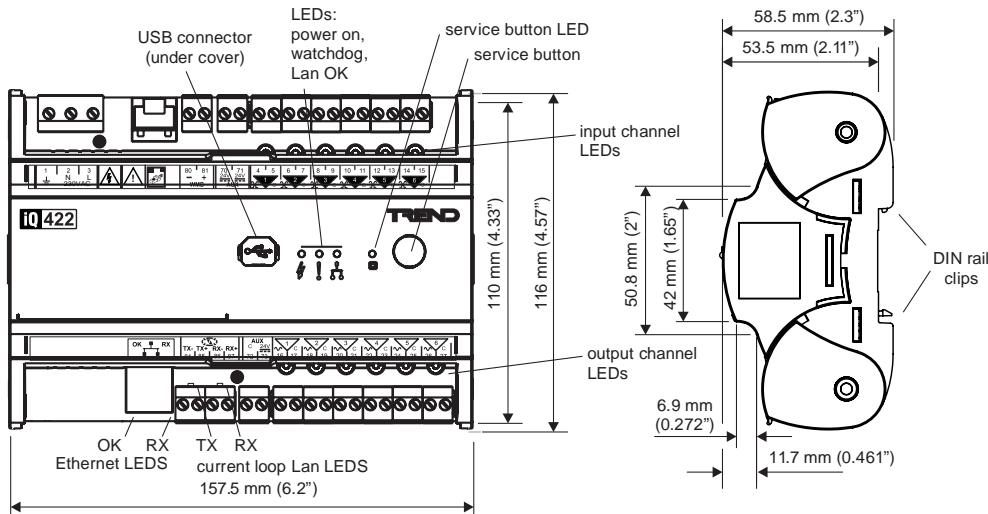- **Embedded XML Web Services as standard**

KEY BENEFITS

- **Reduced panel size**
  Trend's smallest ever physical footprint for a 6UI/6AO controller. With its small footprint and vertical connector block extraction the IQ®422 is ideally suited to confined space applications.

- **Reduced installation time**
  The IQ®422 has soft configurable inputs and addressing with automatic baud rate selection and IQTool compatibility. This greatly reduces engineering and commissioning time thereby reducing the cost of install.

- **Superior IT integration**
  The IQ®422 has an open system support and integration option that allows integration with IT infrastructure. A new style web interface facilitates the use of mobile devices, such as smartphones and tablets.

- **Cost effective means of controlling a variety of applications**
  With fully programmable 6UI/6AO the IQ®422 can provide intelligent control of a wide variety of plant. Perfect for small to mid sized applications with the power to support advanced control applications including remote web supervision with graphical representation and control adjustments.

iQ 422

IQ®422 Controller
Better 4 universal control

USB connector (under cover)

LEDs: power on, watchdog, Lan OK

service button LED
service button

input channel LEDs

58.5 mm (2.3")
53.5 mm (2.11")

110 mm (4.33")
116 mm (4.57")

50.8 mm (2")
42 mm (1.65")

DIN rail clips

output channel LEDs

6.9 mm (0.272")

11.7 mm (0.461")

OK   RX
Ethernet LEDS

TX   RX
current loop Lan LEDS

157.5 mm (6.2")

KEY INSTALLATION FEATURES

Baud rate (when a Trend LAN is used) is automatically detected and applied to the network.

Soft configurable universal inputs, no need for jumper setting.

DIN compatible casework to fit within standard electrical enclosures.

Network addressing via SET, no DIP switch setting required.

Barcode addressing option for faster commissioning.

Vertical connector block extraction enabling the use of smaller enclosures thereby reducing cost of install.
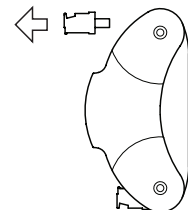
SIMPLIFYING INSTALLATION

The IQ®422 incorporates a number of features that simplify installation, engineering and commissioning, and is particularly suitable for energy efficient, highly distributed local control of services such as underfloor heating, natural ventilation, boiler plant, VT circuits, air handling units and air conditioning terminal units. It acts as a state-of-the-art upgrade to Trend's IQ®222 and IQ®3xact products and comes in 24V and 230V variants.

VIEW THE MOBILE DEVICE FRIENDLY IQ422 WEB INTERFACE:
iq4demo.trendcontrols.com, username: mobile, password: trend

ORDER CODE	DESCRIPTION
IQ422/12/24VAC	IQ422 24V Power Supply
IQ422/12/230	IQ422 230V Power Supply
IQ422/12/LAN/24VAC	IQ422 with Trend LAN 24V Power Supply
IQ422/12/LAN/230	IQ422 with Trend LAN 230V Power Supply
IQ422/12/BAC/24VAC	IQ422 with BACnet 24V Power Supply
IQ422/12/BAC/230	IQ422 with BACnet 230V Power Supply
IQ422/12/LAN/BAC/24VAC	IQ422 with Trend LAN & BACnet 24V Power Supply
IQ422/12/LAN/BAC/230	IQ422 with Trend LAN & BACnet 230V Power Supply

TREND

IQ®41x Controller

OVERVIEW

The IQ®41x series of intelligent controllers is designed for advanced unitary control systems and localised intelligent control of distributed plant. Full compatibility with other Trend IQ® controllers enables the IQ®41x to integrate the local environmental needs with the main air conditioning system in order to optimise both comfort and running costs.
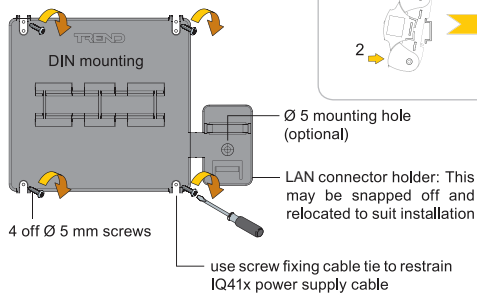
KEY FEATURES

- **Ethernet 10/100 Mbps main network with TCP/IP protocol**
- **Trend current loop LAN option**
- **BACnet over IP option**
- **Small footprint with DIN rail mounting**
- **RS232 and USB local supervisor ports**
- **Soft addressing with Barcode addressing**
- **Features to directly replace IQ®211, IQ®212, and IQ®7x series controllers**

KEY BENEFITS

- **Reduced panel size**
  With its small footprint IQ®41x can be placed in smaller control panels, lending itself to confined space applications.

- **Reduced installation cost**
  The IQ®41x design meets the required DIN form for standard electrical devices and as such can be fitted within regular electrical enclosures thereby reducing installation costs.

- **Minimal retrofit time**
  Directly compatible in terms of control capability and network technology with the IQ®21x and IQ®7x series. When used in conjunction with the mounting plate and cable extender accessory the IQ®41x is a physical footprint match.

- **Cost effective means of controlling small distributed applications**
  With an I/O count of up to 11 points and being fully programmable, the IQ®41x can provide intelligent control of small items of plant. Ethernet connectivity can provide both local and remote visibility via a simple web browser, including graphical representation and control adjustments - password permitting.

IQ 411

IQ®41x Controllers
Better 4 upgrading control

Replacing IQ®21x or IQ®7x using IQ®41x Adaptor Plate

A Mount Plate using existing holes

DIN mounting

Ø 5 mounting hole (optional)

LAN connector holder: This may be snapped off and relocated to suit installation

4 off Ø 5 mm screws

use screw fixing cable tie to restrain IQ41x power supply cable

B Mount IQ®41x on DIN rail clips

1

2
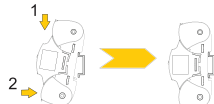
C Fit LAN cable extender if using current loop LAN

Trend LAN Trend LAN LAN cable extender LAN cable extender

Trend LAN LAN cable extender

LAN connector holder LAN connector holder

IQ41x Adaptor Plate

LAN connector holder

IQ41x Adaptor Plate
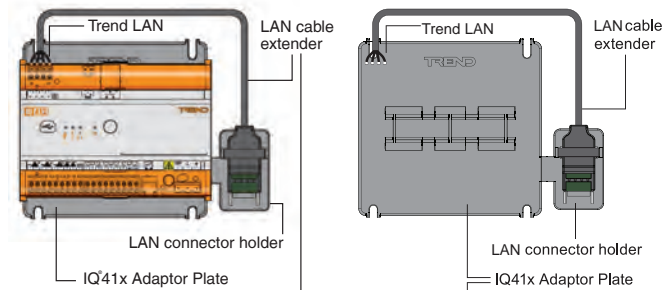
Cable extender: 450mm long

The IQ®41x Adaptor Plate exactly matches the footprint of the previous IQ®21x Controller
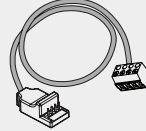
MINIMAL RETROFIT DISRUPTION

The IQ®41x has the same I/O terminal allocation as the IQ®21x and similar allocation to the IQ®7x. The compatibility means existing units can be replaced either on a progressive basis (one at a time if necessary as they will control and function alongside legacy products), or en masse as required.

ORDER CODE	DESCRIPTION
IQ411/24VAC	IQ411 24V Power Supply
IQ411/230	IQ411 230V Power Supply
IQ412/24VAC	IQ412 24V Power Supply
IQ412/230	IQ412 230V Power Supply
IQ411/LAN/24VAC	IQ411 with Trend LAN 24V Power Supply
IQ411/LAN/230	IQ411 with Trend LAN 230V Power Supply
IQ412/LAN/24VAC	IQ412 with Trend LAN 24V Power Supply
IQ412/LAN/230	IQ412 with Trend LAN 230V Power Supply
IQ411/BAC/24VAC	IQ411 with BACnet 24V Power Supply
IQ411/BAC/230	IQ411 with BACnet 230V Power Supply
IQ412/BAC/24VAC	IQ412 with BACnet 24V Power Supply
IQ412/BAC/230	IQ412 with BACnet 230V Power Supply
IQ41X ADAPTOR PLATE (IQ21X & IQ7X) X20	Mounting adaptor to facilitate simple upgrade
IQ41X LAN EXTENDER CABLE X20	LAN cable extender to facilitate simple upgrade

FIG.1
IQ®41x with Standard DIN Mount

FIG.2
IQ®41x with Adaptor Plate

TREND

TREND IQ® SYSTEM OVERVIEW

Energy Software

Trend Energy Manager software puts you in control of your building's environmental performance and costs. There is little or no requirement for extensive product training. It uses a simple browser interface and layout to ensure the system is intuitive and easy to learn.

Trend EnergyEYE is a software application that provides a dynamic view of a building's energy performance, allowing building occupants and visitors to see an organisation's commitment to improving the management of energy and its energy usage.

IQ®4 Main Plant Controllers

The IQ®4E controller has 10 universal inputs and 6 analogue voltage outputs and is expandable up to 192 points (depending on the controller variant) by adding I/O modules. This flexibility makes it suitable for a broad range of applications. The IQ84E controller uses Ethernet and TCP/IP networking technologies with embedded XML and is fully compatible with other Trend IQ® controllers. The IQ®4E supports BACnet over IP as standard. Trend communications over a current loop LAN is available as an option. A local PC or display (e.g. IQ®View4) can be connected to the RS232 port. A Wallbus port is also provided for use with room displays.

IQ®4 Plant Controllers

The IQ®4 series of intelligent controllers is designed for their advanced unitary control systems and localised intelligent control of distributed plant. Full compatibility with other Trend IQ® controllers enables the IQ®4 to integrate the local environmental needs with the main air conditioning system in order to optimise both comfort and running costs. With their small footprint IQ841x and IQ®422 can be placed in smaller control panels, lending themselves to confined space applications. The IQ®4 design meets the required DIN form for standard electrical devices and as such can be fitted within regular electrical enclosures thereby reducing installation costs.
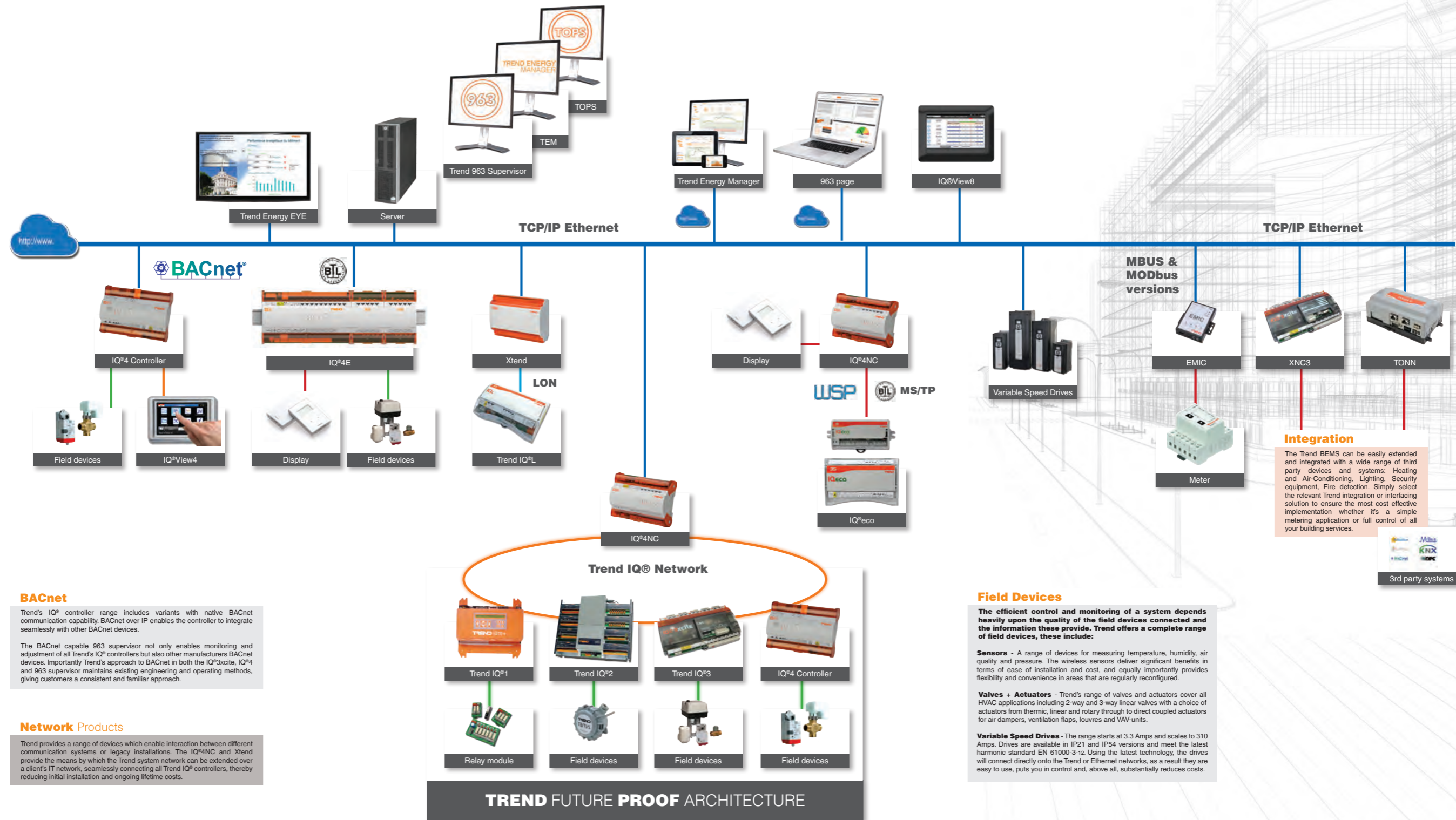
IQ®eco Terminal Unit Controllers -

Designed primarily for commercial buildings, the IQ®ecos provide intelligent solutions for either individual or open plan offices. They are also ideal for hotel applications where separate room control is required. The entire IQ®eco range has passed the WSP Association's Conformance Review and as such are BACnet certified.

Supervisors

Supervisors are used to graphically display monitored inputs and outputs, change control parameters and perform a wide range of energy analysis and maintenance functions, simplifying the user's interaction with the BEMS. Trend's 963 Supervisor is a client/server based software package where the 'client' requires nothing more than a standard web browser. 963 is available in both server and lite versions (client), and has a number of variants which include 963 Secure, 963 SNMP for transmitting alarms to IT monitoring systems and 963 SMS which enables retransmission of alarms to a GSM mobile phone. The TOPS (Trend Open Protocol Server) enables 963 to control and monitor both Trend and 3rd party BACnet products.

Displays

Trend provides a range of display options that allow different user types to interact with their BEMS without the fear of damage to the overall system.

The range covers single controller setpoint adjustment via push button of touch screen options through to site-wide graphical touch screen displays.

TOPS

TEM

Trend 963 Supervisor

Trend Energy Manager

963 page

IQ®View8

Trend Energy EYE

Server

TCP/IP Ethernet

TCP/IP Ethernet

BACnet®

BTL

MBUS & MODbus versions

IQ®4 Controller

IQ®4E

Xtend

LON

Display

IQ®4NC

MS/TP

WSP BTL

Variable Speed Drives

EMIC

XNC3

TONN

Field devices

IQ®View4

Display

Field devices

Trend IQ®L

IQ®eco

Meter

Integration

The Trend BEMS can be easily extended and integrated with a wide range of third party devices and systems: Heating and Air-Conditioning, Lighting, Security equipment, Fire detection. Simply select the relevant Trend integration or interfacing solution to ensure the most cost effective implementation whether it's a simple metering application or full control of all your building services.

3rd party systems

IQ®4NC

BACnet

Trend's IQ® controller range includes variants with native BACnet communication capability. BACnet over IP enables the controller to integrate seamlessly with other BACnet devices.

The BACnet capable 963 supervisor not only enables monitoring and adjustment of all Trend's IQ® controllers but also other manufacturers BACnet devices. Importantly Trend's approach to BACnet in both the IQ®3xcite, IQ®4 and 963 supervisor maintains existing engineering and operating methods, giving customers a consistent and familiar approach.

Network Products

Trend provides a range of devices which enable interaction between different communication systems or legacy installations. The IQ®4NC and Xtend provide the means by which the Trend system network can be extended over a client's IT network, seamlessly connecting all Trend IQ® controllers, thereby reducing initial installation and ongoing lifetime costs.

Trend IQ® Network

Trend IQ®1

Trend IQ®2

Trend IQ®3

IQ®4 Controller

Relay module

Field devices

Field devices

Field devices

TREND FUTURE PROOF ARCHITECTURE

Field Devices

The efficient control and monitoring of a system depends heavily upon the quality of the field devices connected and the information these provide. Trend offers a complete range of field devices, these include:

Sensors - A range of devices for measuring temperature, humidity, air quality and pressure. The wireless sensors deliver significant benefits in terms of ease of installation and cost, and equally importantly provides flexibility and convenience in areas that are regularly reconfigured.

Valves + Actuators - Trend's range of valves and actuators cover all HVAC applications including 2-way and 3-way linear valves with a choice of actuators from thermic, linear and rotary through to direct coupled actuators for air dampers, ventilation flaps, louvres and VAV-units.

Variable Speed Drives - The range starts at 3.3 Amps and scales to 310 Amps. Drives are available in IP21 and IP54 versions and meet the latest harmonic standard EN 61000-3-12. Using the latest technology, the drives will connect directly onto the Trend or Ethernet networks, as a result they are easy to use, puts you in control and, above all, substantially reduces costs.

TREND