KeControl C5 and KeConnect C5

The flexible control generation

KEBA®

Automation by innovation.

KEBA C5 Control Generation

For all those who expect more from an automation system

With the ultramodern C5 control generation KEBA sets new standards in automation technology which you will certainly find impressive. The extensive KeControl C5 system has a high-performance CPU with on-board HMI. The interface board features versatile standard interfaces which can be adapted to individual customer requirements.

In addition to this it is possible to integrate not only KEBA‘s own technology modules but also those developed by the customers themselves in the form of extension boards. The direct side-mounted KeConnect C5 I/O modules offer even greater functionality for a multitude of applications. Together, all our new control generation components form an unbeatable team to find the optimum solution for your individual requirements.

More flexibility – easy individualization and expandability

KeControl C5 stands out through its comprehensive modular design. Thanks to the customizable interface board, the extension modules which can be side-mounted on the left and the I/O modules which can be plugged in on the right, the customer has maximum freedom when configuring the individual automation system.

More scalability – the perfect control solution for any application

From conventional control tasks to high-end applications with intensive computing capacity – KeControl C5 offers the right computing power through a variety of performance classes for optimally configured automation solutions.

More communication capability – impressive freedom of design through top connectivity

Thanks to the open hardware and software architecture based on standard protocols (e.g. OPC UA, EtherCAT, etc.), not only KEBA‘s but also the customer‘s own components can be integrated easily in the control system. This ensures extensive investment protection and the realization of Industry 4.0 solutions.

It is an undisputed fact that the control system is the heart of all machine automation. But true added value is created through comprehensive solutions with hardware and software components that are perfectly tuned to each other. We offer you these based on over 40 years of experience in industrial automation.

More information available at www.keba.com/industrial-automation

Top performance in a compact format

KeControl C5 control systems

KeControl C5 complements our control family with high-performance compact control systems which are compelling above all through their space-saving design. Because reducing control cabinet space is not just a topic at KEBA, it is a guiding principle.

The control system is available in two different sizes. The narrow version stands out through an absolute minimum of space required, the wider version through maximum performance in a compact form.

CP 505
80 x 121 x 90.6 mm

draft version

The CP 505, our most compact control system with an optimum price-performance ratio

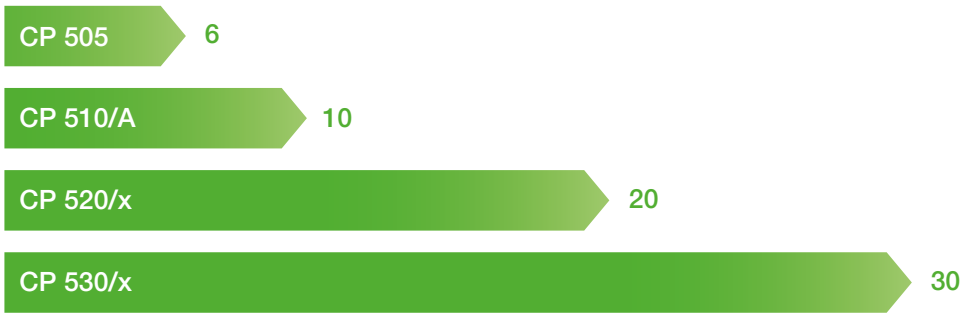
CP 5x0/x
157.1 x 121 x 90.6 mm

A form factor for three higher performance classes – the CP 510/A, CP 520/x and CP 530/x

The right performance for every application

The CPU of KeControl C5 is available in four different performance classes. KEBA carries out numerous different inhouse performance tests and breaks down the results to a common denominator. This enables a performance comparison without any additional work which in turn makes choosing the right CPU versions for your application considerably easier.

Performance values



Easy to use thanks to integrated human-machine interface

The KeControl CP 5x0/x features a two-line display integrated on the front of the control system for extremely straightforward operation and diagnosis. The standard menu contains all the basic functions (including e.g. backup/restore, hardware information and configurations). Complete customization is possible and quick and easy to implement using a standardized template. Furthermore, different menus designed for specific user groups can be created at the push of a button.

Ultramodern technologies and maximum functionality

Real-time communication via KEBA‘s own EtherCAT stack hardware

KeControl C5 relies entirely on the unique EtherCAT master implemented by KEBA which is computed in hardware and not software. This relieves the CPU and reduces jitter time on the bus. Thanks to the new Fast Control Technology integrated in the C5, system dead time in closed control circuits is reduced by up to 66% compared to conventional control.

Safe data management

The firmware and application data for the CP 505 is stored on an SD memory card which is conveniently accessible from the front of the control system. A CFast card which can be inserted on the top of the control system housing is used on the CP 5x0 versions. In both cases the data is stored reliably and can be accessed at any time.

High-end visualization on board

With KeControl C5 it is also possible to run high-end visualization (e.g. KEBA‘s own KeView-Style) on the control system parallel to the application without limiting the effect of real-time applications. Inexpensive passive panels without integrated CPU can thus be operated easily in combination with the C5 control line.

KeConnect C5 I/O modules

The KeConnect C5 I/O modules stand out through an optimum functionality to volume ratio. This reduces the space required in the control cabinet considerably and optimizes costs.

Our I/O modules are available in two different sizes to perfectly cater for customer requirements. The absolute minimum of space required for the narrow modules is highly impressive. The somewhat wider modules stand out through their extended scope of functions and added flexibility as a result.

- Up to 40 connection pins per module
- Possible to use special components which do not have enough space on a narrow module due to their larger design
- Better heat dissipation

Narrow module
13.8 x 106 x 82.5 mm

The KeConnect C5 - DM 570, a digital hybrid module and an example for a narrow module

Wide module
26.5 x 106 x 82.5 mm

The KeConnect C5 - AM 570, an analog hybrid module and an example for a wide module

Top flexibility with minimum time required

Maximum freedom of design

Our I/O modules can be either directly mounted on the KeControl C5 control system or also remotely run using a bus coupler. Using EtherCAT switch modules also enables you to set up star topologies. This means that customers of KEBA have maximum flexibility and freedom of design when creating their individual control system.

Use in third-party systems via EtherCAT

Not only KEBA control systems can be easily expanded with the KeConnect C5 modules. They can even be connected very easily to third-party control systems via an EtherCAT master interface and using a bus coupler with the ESI files provided.

High-performance bus connection enables top control quality

The KeConnect I/O system relies on EtherCAT as module bus. Even with remote I/O packages via bus coupler, no additional system dead times occur. The module bus interface connection is designed down to a cycle time of 62.5 µs. Together with the suitability of the KeConnect C5 module for Fast Control Technology, this fulfils all requirements for top control performance of your application.

Extensive diagnosis minimizes maintenance time

Depending on the device, the I/O modules feature LEDs for module status, for the signal status indication (directly next to the respective I/O pins) and for interface statuses. The information of all module-specific diagnoses (e.g. sensor break detection) is available in the superordinated control system for further processing.

Customer-friendly handling enables shorter assembly times

The KeConnect C5 modules can be mounted without tools on a mounting rail. Push-in connectors can be used for fast wiring and it is even possible to work with wires up to 1.5 mm2 with end ferrules. Connector coding is possible if required. Additional pins for sensor supplies, for example, are designed for time-saving module wiring so that these signals are distributed automatically from the start.

Higher machine availability thanks to straightforward servicing

Our I/O modules feature an electronic data plate which enables fast identification through a simple readout of a variety of information. Function expansions and troubleshooting can be carried out by means of a simple update in the field when required.

Overview

KeControl C5 - CP 505
Control unit
Available upon request

Product features

- Intel® Atom™ Processor E Series
- 1 GB RAM
- 1 x USB
- 1 x EtherCAT
- 2 x Ethernet
- Memory SD Card
- 1 x DVI
- 1 x CAN
- 1 x RS 232/485
- Module bus for KeConnect modules
- Connector modules

draft version

Brief description

The CP 505 is a fanless CPU of the KeControl C5 line with a variety of standard interfaces and expansion options. It is the optimum control for conventional control tasks up to computationally-intensive applications. With onboard CAN and a serial interface, all tasks can be solved very cost-effectively.

Our EtherCAT bus in combination with CPU computing power from single- to quad-core gives you top performance . The direct modularity of our KeConnect C5 modules makes it possible to operate I/O modules without an additional bus coupler.

On the left side, a PCIe connection in combination with USB and SATA offers high flexibility for the additional peripherals. Thanks to its high graphics performance it is also possible to run visualization applications directly on the controller. A DVI output enables a display on any output device.

Specifications

General	
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Galvanic isolation	No
Fan	No

Dimensions	
Height	121 mm
Width	80 mm (installed situation)
Depth	90.6 mm

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (not condensing)
Vibration / shock resistance	According to EN 61131-2

Core	
Processor	Intel® Atom™ Processor E Series
Memory	1 GB – 4 GB
Battery-buffered SRAM	512 kB

Power supply	
Supply voltage	24 V DC front (rated voltage tolerance) 19.2 V DC to 30 V DC according to EN 61131-2) *)

Information: *) for the power supply voltage: Section 5.1.1.3 of EN 61131-2:2007 is fulfilled to severity level PS1. To achieve severity level PS2, a power supply unit that fulfills the necessary requirements must be selected.

Interfaces	
System bus	Module bus (EtherCAT)
USB	1 x 3.0
EtherCAT	1 x RJ45
Ethernet	2 x RJ45
Extension modules	1 x Card Edge connector. More infos upon request
Graphic	1 x DVI
CAN	1 x Mini I/O
RS 232/485	1 x Mini I/O

Memory	
Memory card	1 x MicroSD

Cerification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeControl C5 - CP 510/A, CP 520/x, CP 530/x
Control units

Product features

- Intel® Celeron® until Intel® i7
- 2 – 8 GB RAM
- 2 x USB
- 1 x EtherCAT
- 2 x Gbit Ethernet
- 1 x DVI (LVDS available upon request)
- Memory card CFast
- Module Bus for KeConnect C5 modules
- Connector for extension modules

Brief description

The CP 5x0/x CPUs offer flexibility, scalability, and communication capability in an attractive form factor. The CP 510/A is a fanless variant, while the CP 520/x and the CP 530/x both have a fan. The latter two are suitable for high-end applications in combination with very computationally intensive tasks such as vision systems.

A flexible interface board offers different standard interfaces, which can be adapted to individual customer requirements. USB 3.0 and USB 2.0 guarantee optimum serviceability. Ethernet interfaces are available for operation in higher-level SCADA networks as well as the operation of active panels. An enormous graphic processing power makes it possible to use cost-optimized passive panel solutions.

Our EtherCAT hardware stack, developed in-house, offers strong advantages in control technology, drive technology and modules that require extremely short cycle times on the bus. Thanks to the modular design, KeConnect C5 I/O modules can be connected on the right-hand side and expansion cards for Ethernet, Ethernet real-time slave connections and Ethernet real-time masters can be connected on the left-hand side.

Specifications

General			
	CP 510/A	**CP 520/x**	**CP 530/x**
Overvoltage category	II		
Protection class	III according to EN 61010-2-201		
Galvanic isolation	No		
Fan	No	Yes	Yes

Dimensions, Weight			
	CP 510/A	**CP 520/x**	**CP 530/x**
Height	121 mm		
Width	157.1 mm (installed situation)		
Depth	90.6 mm		
Weight	900 g		

Environmental conditions

	CP 510/A	CP 520/x	CP 530/x
Operating temperature	+5 °C to +55 °C		
Storage temperature	-40 °C to +70 °C		
Relative air humidity	10 % to 95 % (not condensing)		
Vibration / shock resistance	According to EN 61131-2		

Core

	CP 510/A	CP 520/x	CP 530/x
Processor	Intel® Celeron®	Intel® Celeron®	7th Generation Intel® Core™ i7
Memory	2 GB	2 GB	4 GB
Battery-buffered SRAM	1 MB		

Power supply

Supply voltage	24 V DC front (rated voltage tolerance 19.2 V DC to 30 V DC according to EN 61131-2) *)
Max. inrush current	10 A
Max. total power consumption	140 W (self power consumption 62 W)
Max. power output • Module bus 5 V • Module bus 24 V	 30 W 48 W

Information: *) for the power supply voltage: Section 5.1.1.3 of EN 61131-2:2007 is fulfilled to severity level PS1. To achieve severity level PS2, a power supply unit that fulfills the necessary requirements must be selected.

Interfaces

System bus	Module bus (EtherCAT)
USB	1 x 2.0 1 x 3.0
EtherCAT	1 x RJ45
Ethernet 1 Gbit	2 x RJ45
Extension modules	1 x Card Edge connector. More information upon request
Graphics	1 x DVI (LVDS available on request)

Memory

Memory card	1 x CFast

MMI

MMI	2 x 16 LCD Display and 4 keys

Cerification of conformity

CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeControl C5 - NE 550, NE 551
Gbit Ethernet extension modules
Available upon request

Product featueres

- 1 x (NE 550) or 2 x (NE 551) Ethernet 1 Gbit RJ45 interface
- Connector for KeControl CPU Module

Brief description

The NE 55x cards can be connected to the KeControl C5 CPUs via a multi-pin connector on the left. They are internally connected via PCI Express. The NE 550 module provides one additional interface while the NE 551 module has two independent Ethernet interfaces.

Specifications

Interfaces		
	NE 550	**NE 551**
CPU module	1 x Card Edge connector	
Ethernet 1 Gbit	1 x RJ45	2 x RJ45

Dimensions	
Height	106 mm
Width	26.5 mm (installed situation)
Depth	82.5 mm (snap-on height 77.5 mm)

Environmental conditions	
Operationg temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Overvoltage category	II
Protection class	III according to EN 61010-2-201

Cerification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeControl C5 - FE 570, FE 571, FE 572, FE 573
Fieldbus master extension modules
Available upon request

Product features

- 1 x (FE 570) or 2 x (FE 571)
  EtherCAT Master RJ45 interface
- 1 x (FE 572) or 2 x (FE 573)
  EtherCAT Master M8 interface
- Connector for KeControl CPU Module

EtherCAT-Master module with integrated switch and RJ-45 plug

EtherCAT-Master module with integrated switch and M8 plug

Brief description

The fieldbus master modules are left-side plug-in modules for the KeControl C5 series which make it possible to build a wide range of systems and machines when using different fieldbus components.

The FE 57x expansion cards allow additional EtherCAT master interfaces on the CPU. Thus, there are no restrictions even with extensive EtherCAT configurations. The EtherCAT interfaces can be supplied either with M8 or with RJ45 connector(s). Depending on the requirement, individual industrial suitability can thus be achieved.

The FE 571 and the FE 573 have the possibility to have an integrated switch on board. This allows a star distribution of the EtherCAT slaves without additional hardware.

Specifications

Interfaces				
	FE 570	FE 571	FE 572	FE 573
CPU module	1 x Card Edge connector			
EtherCAT master	1 x RJ45	2 x RJ45	1 x M8	2 x M8

Dimensions	
Height	106 mm
Width	26.5 mm (installed situation)
Depth	82.5 mm (snap-on height 77.5 mm)

Environmental conditions	
Operationg temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Overvoltage category	II
Protection class	III according to EN 61010-2-201

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeControl C5 - FE 560

Real-time Ethernet slave extension module

Available upon request

Produkteigenschaften

- 1 x EtherCAT / Ethernet IP / Profinet / Sercos Slave (2 x RJ 45)
- Connector for KeControl CPU modules

draft version

Brief description

The FE 560 is an Ethernet fieldbus slave module that can be plugged in on the left side for the KeControl C5 series. The use of this module enables the connection to higher-level control systems.

Process data from the master can be received and further processed by the KeControl C5 controller. All relevant protocols such as EtherCAT, Ethernet / IP, Sercos III and Profinet are supported.

Specifications

Interfaces	
CPU module	1 x Card Edge connector
EtherCAT / Ethernet IP / Profinet / Sercos Slave	2 x RJ45

Dimensions	
Height	106 mm
Width	26.5 mm (installed situation)
Depth	82.5 mm (snap-on height 77.5 mm)

Environmental conditions	
Operationg temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Overvoltage category	II
Protection class	III according to EN 61010-2-201

Cerification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeControl C5 - FE 580
Sercos III master extension module
Available upon request

Product features

- 1 x Sercos III Master (2 x RJ45) interface
- Connector to KeControl CPU Module

Brief description

The FE 580 is a fieldbus master module for the KeControl C5 series which can be added on the left side. This expansion card enables an additional Sercos III master interface which means that Sercos III drives, for example, can be operated parallel to EtherCAT I/Os.

Specifications

Interfaces	
CPU module	1 x Card Edge connector
Sercos Master	2 x RJ45

Dimensions	
Height	106 mm
Width	26.5 mm (installed situation)
Depth	82.5 mm (snap-on height 77.5 mm)

Environmental conditions	
Operationg temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Overvoltage category	II
Protection class	III according to EN 61010-2-201

Cerification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - DI 570
Digital input module

Product features

- 19 digital inputs
- 2 inputs of them with period time measurement, e.g. for speed-/velocity evaluation
- Individually configurable input filters for each input

Brief description

The digital input module DI 570 provides 19 digital inputs. Binary 24 V DC control signals are recorded by the inputs and transmitted to the higher-level automation device. The input filters can be individually configured for each input.

The first two inputs are additionally equipped with a period-time evaluation which can be used, for example, for a speed or rotational speed measurement.

Specifications

Digital inputs	
Number of inputs / wiring	19 / sink
Input type	Typ 1 (according to EN 61131-2)
Voltage range for „1“	15 V ≤ UH ≤ 30 V
Voltage range for „0“	-3 V ≤ UL ≤ 5 V
HW input filter	Cut-off frequency 500 Hz
Debouncing	Individually configurable for each input
Status indication	Green LED for each input
Additional function	2 inputs with period time measurement, e.g. for speed-/velocity evaluation

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	250 µs
Supply voltage	24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	5 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V 0.4 W @ 24 V
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - DO 550
Digital output module

Product features

- 16 digital outputs
- Rated current 0.5 A @ 100 % simultaneity
- Short circuit- and overload detection for each output

Brief description

The digital output module DO 550 provides 16 digital outputs with a current load capacity of 0.5 A. The outputs are divided into two groups of 8 outputs each with their own group supply. The 24 V DC actuators connected to the outputs are controlled according to the binary control signals of the higher-level automation device.

The outputs designed to be short-circuit and overload-proof. When one of these states occurs, a corresponding diagnostic message is sent to the higher-level control module.

Specifications

Digital outputs	
Number of outputs / wiring	16 / source Subdevided into 2 groups with 8 outputs and own power supply
Output type	Semiconductor output
Rated voltage	24 V DC
Rated current	0.5 A @ 100 % simultaneity 1 A @ 50 % simultaneity each group
Protection device	Short circuit- and overload protection
Max. inductive load	0.7 J @ max. 0.2 Hz (outputs with integrated free-wheeling diode)
Status indication	Orange LED
Diagnosis	Short circuit- and overload detection for each output

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	250 µs
Supply voltage	24 V DC (front) 24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	5 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - DO 570
Digital output module

Product features

- 16 digital outputs 2 A with quick disconnect function for inductive loads
- Galvanic isolation
- Short circuit- and overload detection

Brief description

The digital output module DO 570 provides 16 digital outputs with a current load capacity of 2 A. The outputs are divided into two groups of 8 outputs each with their own group supply.

The 24 V DC actuators connected to the outputs are controlled according to the binary control signals of the higher-level automation device.

The outputs are equipped with a quick disconnect function for inductive loads (e.g. hydraulic valves). This allows machine operations to be sped up and increases productivity.

In addition, the output groups are designed to be electrically isolated from each other and to the electronics, which allows them to be used in safety-relevant applications in accordance with the requirements of the Institute for Occupational Safety (BIA - Berufsgenossenschaftliche Institut für Arbeitssicherheit).

The outputs designed to be short-circuit and overload-proof. If a short-circuit occurs, a corresponding diagnostic message is sent to the higher-level control module.

Specifications

Digital outputs	
Number of outputs / wiring	16 / source Subdevided into 2 groups with 8 outputs and own power supply
Output type	Semiconductor output
Rated voltage	24 V DC
Rated current	2 A @ 50 % simultaneity each group
Protection device	Short circuit- and overload protection
Max. inductive load	0.7 J @ max. 0.2 Hz
Status indication	Orange LED
Galvanic isolation	Yes, to electronics and among the groups
Diagnosis	Short circuit- and overload detection for each output

Dimensions, weight	
Height	106 mm
Width	26.5 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	87 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	250 µs
Supply voltage	24 V DC (front) 24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	5 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.8 W @ 5 V
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - DM 570
Digital hybrid module

Product features

- 8 digital inputs with individually configurable input filters
- 8 digital outputs 2 A, galvanic isolated, with quick disconnect function for inductive loads
- Short circuit- and overload detection

Brief description

The digital hybrid module DM 570 provides 8 digital inputs and 8 digital outputs with a current load capacity of 2 A. The outputs are organized in an output group with its own supply.

Binary 24 V DC control signals are recorded by the inputs and transmitted to the higher-level automation device. The input filters can be individually configured for each input.

The 24 V DC actuators connected to the outputs are controlled according to the binary control signals of the higher-level automation device.

The outputs are equipped with a quick disconnect function for inductive loads (e.g. hydraulic valves). This allows machine operations to be sped up and increases productivity.

In addition, the outputs are designed to be electrically isolated to the control system, which allows them to be used in safety-relevant applications in accordance with the requirements of the Institute for Occupational Safety (BIA - Berufsgenossenschaftliche Institut für Arbeitssicherheit).

The outputs designed to be short-circuit and overload-proof. If a short-circuit occurs, a corresponding diagnostic message is sent to the higher-level control module.

Specifications

Digital inputs	
Number of inputs / wiring	8 / sink
Input type	Typ 1 (according to EN 61131-2)
Voltage range for „1“	15 V ≤ UH ≤ 30 V
Voltage range for „0“	-3 V ≤ UL ≤ 5 V
HW input filter	Cut-off frequency 500 Hz
Debouncing	Individually configurable for each input
Status indication	Green LED

Digital outputs	
Number of outputs / wiring	8 / source 1 group with 8 outputs and own power supply
Output type	Semiconductor output
Rated voltage	24 V DC
Rated current	2 A @ 50 % simultaneity
Protection device	Short circuit- and overload protection
Max. inductive load	0.7 J @ max. 0.2 Hz
Status indication	Orange LED
Galvanic isolation	Yes, to electronics and among the groups
Diagnosis	Short circuit detection for each output, overload detection for the group

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	250 µs
Supply voltage	24 V DC (front) for group supply 24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	5 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V 0.3 W @ 24 V
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - AI 570, AI 571
Analog input modules

Product features

- Up to 8 high precision analog inputs with 16 bit resolution
- Voltage or ratiometric mode (configurable)
- Inputs with sensor fault detection
- Convenient wiring through integrated pins for sensor power supply with each encoder input
- Cycle times up to 125 µs

Brief description

The analog input modules AI 570 and AI 571 provide analog voltage inputs. They are suitable for voltage measurement as well as ratiometric measurement. The input range is from -10 to +10 V.

The input signals are digitized with a maximum resolution of 16 bits and can be made available to the higher-level automation device with a fastest possible cycle time of 125 µs.

Via configurable digital input filters, the analog inputs can be adapted to the control cycle times used in order to achieve optimum control characteristics.

If a sensor failure occurs, this is detected and the information is reported to the higher-level control module.

In order to enable convenient wiring, connection pins for the encoder supply are integrated with each encoder input. Thus, the user does not have to worry about the distribution of the encoder supply.

Specifications

Analog inputs		
	AI 570	**AI 571**
Number of inputs	8	4
Type	Voltage input	
Input mode	Configurable, voltage or ratiometric mode	
Signal range	Voltage mode: ± 10 V; ratiometric mode: 0 - Uref	
Resolution	16 bit (voltage mode); 15 bit (ratiometric mode)	
HW input filter	Filter 3rd order, crossover frequency 2500 Hz	
Digital filter	Configurable: no filter, 500 µs, 1 ms, 5 ms	
Common mode range	± 13.5 V	
Common mode rejection	> 80 dB	
Precision	Max error: ± 0.02 % of scale end value (at 25 °C)	
Diagnosis	Sensor break detection	

Dimensions, weight

	AI 570	AI 571
Height	106 mm	
Width	26.5 mm (installed situation)	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)	
Weight	87 g	71 g

Environmental conditions

Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General

	AI 570	AI 571
Minimum cycle time	125 µs	
Supply voltage	24 V DC (front) for sensor supply 24 V DC and 5 V DC (module bus)	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically	
Type of terminals	10 x 4-fold male header, 3.81 mm pitch	5 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V 1.9 W @ 24 V	0.9 W @ 5 V 1.3 W @ 24 V
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity

CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - AI 575, AI 576
Analog input modules

Product features

- Up to 8 high precision analog current inputs with 16 bit resolution
- Convenient wiring through integrated pins for sensor power supply with each encoder input
- Cycle time up to 125 µs

Brief description

The analog input modules AI 575 and AI 576 provide analog current inputs. The following signal input ranges can be configured: ±20 mA, 0 – 20 mA or 4 – 20 mA.

The input signals are digitized with a maximum resolution of 16 bits and can be made available to the higher-level automation device with a fastest possible cycle time of 125 µs.

Via configurable digital input filters, the analog inputs can be adapted to the control cycle times used in order to achieve optimum control characteristics.

In order to enable convenient wiring, connection pins for the encoder supply are integrated with each encoder input. Thus, the user does not have to worry about the distribution of the encoder supply.

Specifications

Analog inputs		
	AI 575	**AI 576**
Number of inputs	8	4
Type	Current input	
Signal range	Configurable: • ± 20 mA • 0 – 20 mA • 4 – 20 mA	
Resolution	• 16 bit (@ ± 20 mA) • 15 bit (@ 0 – 20 mA and 4 – 20 mA)	
HW input filter	Filter 3rd order, crossover frequency 2500 Hz	
Digital filter	Configurable: no filter, 500 µs, 1 ms, 5 ms	
Common mode range	± 13.5 V	
Common mode rejection	> 80 dB	
Precision	Max error: ± 0.02 % of scale end value (at 25 °C)	

Dimensions, weight

	AI 575	AI 576
Height	106 mm	
Width	26.5 mm (installed situation)	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)	
Weight	87 g	71 g

Environmental conditions

Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General

	AI 575	AI 576
Minimum cycle time	125 µs	
Supply voltage	24 V DC (front) for sensor supply 24 V DC and 5 V DC (module bus)	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically	
Type of terminals	10 x 4-fold male header, 3.81 mm pitch	5 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V 1.3 W @ 24 V	0.9 W @ 5 V 0.8 W @ 24 V
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity

CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - AO 570, AO 571
Analog output modules

Product features

- Up to 8 analog voltage outputs
- 12 bit resolution
- Cycle time up to 125 µs

Brief description

The analog output modules AO 570 and AO 571 provide analog voltage outputs. The signal range reaches from -10 to +10 V.

The output signals are generated with a resolution of 12 bits and can be sent to the output module with a fastest possible cycle time of 125 µs from the higher-level automation device.

Specifications

Analoge outputs		
	AO 570	**AO 571**
Number of outputs	8	4
Type	Voltage output	
Signal range	± 10 V	
Resolution	12 bit	
Load resistance	≥ 1000 Ω	
Highest capacitive load	≤ 10 nF	
Precision	Max. error: ± 0.15 % of scale end value (at 25 °C)	
Protection	Sustained short-circuit proof	

Dimensions, weight

Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions

Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General

	AO 570	**AO 571**
Minimum cycle time	125 µs	
Supply voltage	24 V DC and 5 V DC (module bus)	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically	
Type of terminals	5 x 4-fold male header, 3.81 mm pitch	3 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V 2.3 W @ 24 V	0.9 W @ 5 V 1.3 W @ 24 V
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity

CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - AO 576
Analog output module

Product features

- 4 analog current outputs
- 12 bit resolution
- Cycle time up to 125 µs

Brief description

The analog output module AO 576 provides 4 analog current outputs. The following signal ranges can be configured: ±10 mA, 0 – 20 mA or 4 – 20 mA.

The output signals are generated with a resolution of 12 bits and can be sent to the output module with a fastest possible cycle time of 125 µs from the higher-level automation device.

Specifications

Analog outputs	
Number of outputs	4
Type	Current output
Signal range	Configurable: • ± 10 mA • 0 – 20 mA • 4 – 20 mA
Resolution	12 Bit
Load resistance	< 600 Ω
Precision	Max. error: ± 0.15 % of scale end value (at 25 °C)

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	125 µs
Supply voltage	24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	3 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V 2.1 W @ 24 V
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - AM 570, AM 571, AM 572
Analog hybrid modules

Product features

- Up to 6 high precision analog inputs with 16 bit resolution, voltage or ratiometric mode
- Inputs with sensor fault detection
- Integrated pins for sensor power supply with each encoder input
- Up to 4 analog voltage outputs with 12 bit resolution
- Cycle time up to 125 µs

Brief description

The analogue hybrid modules AM 570, AM 571 and AM 572 provide a combination of analog voltage inputs and outputs. The inputs are suitable for voltage measurement as well as ratiometric measurement. The input as well as the output range are from -10 to +10 V.

The input signals are digitized with a maximum resolution of 16 bits, the outputs have 12 bit resolution. The data can be exchanged with the higher-level automation device with a fastest possible cycle time of 125 µs.

Via configurable digital input filters, the analog inputs can be adapted to the control cycle times used in order to achieve optimum control characteristics.

If a sensor failure occurs, this is detected at the inputs and the information is reported to the higher-level control module.

In order to enable convenient wiring, connection pins for the encoder supply are integrated with each encoder input. Thus, the user does not have to worry about the distribution of the encoder supply.

Specifications

Analog inputs			
	AM 570	**AM 571**	**AM 572**
Number of inputs	6	4	3
Type	Voltage input		
Input mode	Configurable, voltage or ratiometric mode		
Signal range	Voltage mode: ± 10 V; ratiometric mode: 0 - Uref		
Resolution	16 bit (voltage mode); 15 bit (ratiometric mode)		
HW input filter	Filter 3rd order, crossover frequency 2500 Hz		
Digital filter	Configurable: no filter, 500 µs, 1 ms, 5 ms		
Common mode range	± 13.5 V		
Common mode rejection	> 80 dB		
Precision	Max error: ± 0.02 % of scale end value (at 25 °C)		
Diagnosis	Sensor break detection		

Analog outputs

	AM 570	AM 571	AM 572
Number of outputs	4	4	2
Type	Voltage output		
Signal range	± 10 V		
Resolution	12 bit		
Load resistance	≥ 1000 Ω		
Highest capacitive load	≤ 10 nF		
Precision	Max. error: ± 0.15 % of scale end value (at 25 °C)		
Protection	Sustained short-circuit proof		

Dimensions, weight

	AM 570	AM 571	AM 572
Height	106 mm		
Width	26.5 mm (installed situation)		13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)		
Weight	87 g		71 g

Environmental conditions

Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General

	AM 570	AM 571	AM 572
Minimum cycle time	125 µs		
Supply voltage	24 V DC (front) for sensor supply 24 V DC and 5 V DC (module bus)		
Overvoltage category	II		
Protection class	III according to EN 61010-2-201		
Addressing on module bus	Automatically		
Type of terminals	10 x 4-fold male header, 3.81 mm pitch	8 x 4-fold male header, 3.81 mm pitch	5 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V 3.3 W @ 24 V		0.9 W @ 5 V 2.8 W @ 24 V
Status indication	LEDs for module- and EtherCAT state		

Certification of conformity

CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - AM 575, AM 577
Analog hybrid modules

Product features

- Up to 6 high precision analog current inputs with 16 bit resolution
- Convenient wiring through integrated pins for sensor power supply with each encoder input
- Up to 4 analog current outputs with 12 bit resolution
- Cycle time up to 125 µs

Brief description

The analogue hybrid modules AM 575, AM 577 provide a combination of analog current inputs and outputs. The following signal ranges can be configured: ±20 mA, 0 – 20 mA or 4 – 20 mA for inputs, ±10 mA, 0 – 20 mA or 4 – 20 mA for outputs.

The input signals are digitized with a maximum resolution of 16 bits, the outputs have 12 bit resolution. The data can be exchanged with the higher-level automation device with a fastest possible cycle time of 125 µs.

Via configurable digital input filters, the analog inputs can be adapted to the control cycle times used in order to achieve optimum control characteristics.

In order to enable convenient wiring, connection pins for the encoder supply are integrated with each encoder input. Thus, the user does not have to worry about the distribution of the encoder supply.

Specifications

Analog inputs		
	AM 575	**AM 577**
Number of inputs	6	3
Type	Current input	
Signal range	Configurable: • ± 20 mA • 0 – 20 mA • 4 – 20 mA	
Resolution	• 16 bit (@ ± 20 mA) • 15 bit (@ 0 – 20 mA and 4 – 20 mA)	
HW input filter	Filter 3rd order, crossover frequency 2500 Hz	
Digital filter	Configurable: no filter, 500 µs, 1 ms, 5 ms	
Common mode range	± 13.5 V	
Common mode rejection	> 80 dB	
Precision	Max error: ± 0.02 % of scale end value (at 25 °C)	

Analog outputs

	AM 575	AM 577
Number of outputs	4	2
Type	Current output	
Signal range	Configurable: • ± 10 mA • 0 – 20 mA • 4 – 10 mA	
Resolution	• 12 Bit	
Load resistance	< 600 Ω	
Precision	Max. error: ± 0.15 % of scale end value (at 25 °C)	

Dimensions, weight

	AM 575	AM 577
Height	106 mm	
Width	26.5 mm (installed situation)	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)	
Weight	87 g	71 g

Environmental conditions

Operating temperature	+0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General

	AM 575	AM 577
Minimum cycle time	125 µs	
Supply voltage	24 V DC (front) for sensor supply 24 V DC and 5 V DC (module bus)	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically	
Type of terminals	10 x 4-fold male header, 3.81 mm pitch	5 x 4-fold male header, 3.81 mm pitch
Max. power consumption over module bus	0.9 W @ 5 V 3.3 W @ 24 V	0.9 W @ 5 V 2.8 W @ 24 V
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity

CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - TI 550
Temperature measurement module

Product features

- 8 RTD sensor inputs for 2-wire-system respectively
  4 RTD sensor inputs for 3-wire-system
- Supported types: PT 100, PT 1000, Ni 100, Ni 1000, KTY, NTC
- Resistance measurement

Brief description

The temperature measuring module TI 550 provides measuring inputs for resistance sensors (RTD). Depending on the measurement technique used, either 8 sensors (for 2-wire measurement) or 4 sensors (for 3-wire measurement) can be connected.

PT 100, PT 1000, NI 100, Ni 1000, KTY and NTC sensors are directly supported. A general resistance measurement mode can be used to connect additional types.

Specifications

RTD (resistance temperature detectors) inputs	
Number of inputs / wiring	8 / 2-wire-system resp. 4 / 3-wire-system
Sonsor types	PT 100, PT 1000, Ni 100, Ni 1000, KTY 1k, KTY 2k, NTC 5k, NTC 10k, NTC 50k, resistance measurement
Measurement range	PT 100, PT 1000: -200 °C to +850 °C Ni 100, Ni 1000: -60 °C to +250 °C KTY 1k, KTY 2k: -55 °C to +150 °C NTC 5k, NTC 10k, NTC 50k: -15 °C to +150 °C Resistance range: 0 – 500 Ω, 0 – 5000 Ω, 0 – 500 kΩ
Resolution of measuring methode	16 Bit
Intrinsic deviation	± 0.5 °C for the range up to 100 °C (valid for PT sensors), Otherwise ≤ 0.1 % of maximum measurement range

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	1 ms
Supply voltage	24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	4 x 4-fold male header, 3.81 mm pitch, gold plated
Max. power consumption over module bus	tbd
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	In preparation: According to EMC directive 2014/30/EU
UL	In preparation: Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - TI 570, TI 571
Temperature measurement modules

Product features

- Up to 8 inputs for thermocouples
- Supported types: J, K, L, N
- µV-mode to integrate further types
- Galvanic isolation of each input

Brief description

The TI 570 and TI 571 temperature measuring modules provide measuring inputs for thermocouples. Thermocouple types J, K, L, N are directly supported. The microvolt mode can be used to connect additional thermocouple types.

The terminal temperature compensation can either be carried out internally or externally via any temperature input in the automation system.

Because of the galvanic isolation of each input, both insulated and non-insulated thermocouples can be used without adaptation of the wiring and without restrictions in noise immunity. This is extremely advantageous in applications in which various types have to be incorporated into the control system, for example, at tool exchange in injection molding machines, where insulated thermocouples are used in some tools and non-insulated thermocouples are installed in other tools.

Specifications

Thermocouple inputs		
	TI 570	**TI 571**
Number of inputs	8	4
Galvanic isolation	Yes, to electronics and among the inputs	
Thermocouple types	J, K, L, N	
Measurement range	Type J (Fe-CuNi): -100 °C to +700 °C Type K (NiCr-Ni): -100 °C to +1000 °C Type L (FeCu-Ni): -100 °C to +700 °C Type N (NiCrSi-NiSi): -100 °C to +1000 °C µV-mode: -6 mV to +43 mV	
Measuring principle	Integrating	
Measuring interval	Configurable: 20 / 40 / 100 ms	
Power frequency	Configurable: 50 / 60 Hz (for noise suppression)	
Input resistance	10 MΩ	
Maximum resistance of thermocouple	50 Ω	
Resolution of measuring methode	@ measuring intervals ≥ 40 ms: 16 bit @ 20 ms measuring interval: 15 bit	
Intrinsic deviation	± 1 % of measuring value or ± 2.5 °C absolute (higher value is relevant)	
Compensation of terminal temperature	• Internal • External via any temperature input in the control system	

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

KeConnect C5 - TI 570, TI 571
Temperature measurement modules

General		
	TI 570	**TI 571**
Minimum cycle time	1 ms	
Supply voltage	24 V DC and 5 V DC (module bus)	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically	
Type of terminals	4 x 4-fold male header, 3.81 mm pitch, gold plated	2 x 4-fold male header, 3.81 mm pitch, gold plated
Max. power consumption over module bus	0.9 W @ 5 V 1 W @ 24 V	
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - MM 540
Positioning module

Product features

- 2 incremental encoder inputs for 5 V and 24 V encoders
- 4 latch inputs, sink or source (wiring configurable)
- 2 digital outputs, rated current 0,3 A
- Integrated pins for sensor power supply with each encoder input

Brief description

The MM 540 incremental encoder module provides two interfaces for the connection of optional 5 V (differential) or 24 V incremental encoders.

The position measurement is performed by forward/backward counting of increments via the A and B track. A resolution increase of the position is achieved by a predictive approach in the position measurement.

The frequency is determined by a measuring method with adaptive gate time. The frequency evaluation of both the rising and the falling edges of both tracks results in a significantly better time resolution of the frequency value at low encoder frequencies compared to the control cycle time (available with input INC 0). Thanks to an adjustable gate time, the behavior of the frequency measurement with respect to responsiveness and resolution can be adapted to the requirements of the respective application.

Further features of the MM 540:

- Rotary position transducer monitoring via zero track information
- Latch function of counter status via external latching inputs (DI0 - DI3) with time stamp
- Latch function of counter status via zero pulse with time stamp
- Counter function with or without directional evaluation
- Sensor failure monitoring of tracks A, B and zero (only for differential mode)
- Various referencing options of the position

Specifications

Incremental encoder inputs	
Number of inputs	2
Resolution	32 Bit
Galvanic isolation	No
Max. encoder frequency	1 MHz (differential)
Interpretation	Position: 1-fold, 2-fold, 4-fold (configurable) Counter function with and without interpretation of direction
Max. impulse rate	4 MHz @ 4-fold interpretation (differential)
Counter range	32 Bit
Input range	Configurable, 5 V (differential) or 24 V
Diagnosis	Sensor break detection of track A, B, zero (only differential)

Frequecy measurement		
	Encoder input INC 0	Encoder input INC 1
Measuring method	Frequency measurement with adaptive gate time	
Interpretation	Frequency interpretation with both edges of both tracks Updated frequency values after each quarter of gate time	Frequency interpretation with rising edge of track A Updated frequency values after each gate time
Resolution	0.01 Hz	
Minimum catchable frequency	Configurable, minimum 0.75 Hz → lower frequencies are interpreted as 0 (standstill)	

Encoder power supply	
Selection of encoder supply voltage	Bridge at connector X5 determines if supply voltage is 24 V or 5 V
Rated voltage	24 V DC loop through (fuse protected) from 24 V input connector 5 V DC internally generated out of 24 V via input connector
Rated current	250 mA for each encoder

Latch inputs	
Number of inputs	4
Response time	20 µs
Wiring	Sink or source, configurable
Assignment	Free assignment of each latch input to one of the encoder inputs
Status indication	Green LED

KeConnect C5 - MM 540
Positioning module

Digital outputs	
Number of outputs / wiring	2 / source
Output type	Semiconductor output
Rated voltage	24 V DC
Rated current	0.3 A
Protection device	Short circuit- and overload protection
Max. inductive load	tbd
Status indication	Orange LED

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	tbd

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	125 µs
Supply ratings	24 V DC (front) for sensor and output supply 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	3 x 4-fold male header, 3.81 mm pitch 2 x Industrial Mini-IO type 2 (incremental encoder interfaces)
Max. power consumption over module bus	1.7 W @ 5 V
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	In preparation: According to EMC directive 2014/30/EU
UL	In preparation: Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - MI 550
Positioning module

Product features

- 4 SSI interfaces
- Data transfer rate up to 1 Mbit/s
- Convenient wiring through integrated pins for sensor power supply with each encoder input
- Sensor fault detection for each SSI interface
- Cycle time up to 125 µs

Brief description

The SSI interface module MI 550 provides 4 interfaces for the integration of SSI encoders into the automation system.

Via various configuration settings, such as bit rates, telegram lengths, bit masks etc., the individual SSI interfaces can be adapted to the specifics of the encoders being used.

The inputs are equipped with sensor failure detection. The corresponding diagnostic information is transmitted to the higher-level automation system for further use.

Specifications

SSI interfaces	
Number of interfaces	4
Transfer rate	125 kbit/s, 250 kbit/s, 500 kbit/s, 1 Mbit/s
Resolution	Max. 32 bits (number of bits is configurable)
Supported data code	Binary code, gray code
Voltage for sensor supply	24 V DC
Max. current for sensor supply	150 mA for each interface
Diagnosis	Sensor break detection
Protection device	Short circuit protection by self resetting fuse

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	125 µs
Supply voltage	24 V DC (front) for sensor supply 24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	1 x 4-fold male header, 3.81 mm pitch 4 x Industrial Mini-IO type 2 (SSI-interfaces)
Max. power consumption over module bus	1.6 W @ 5 V
Status indication	LEDs for module- and EtherCAT state

Zertifizierungen	
CE	Gemäß EMV-Richtlinie 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - FM 500
Communication module

Product features

- 2 CANopen interfaces
- Transfer rate up to 1 Mbit/s
- Excellent noise immunity through shielded connection
- Bus termination configurable via DIP-switches on module front

Brief description

The FM 500 communication module provides 2 CANopen interfaces for the integration of CAN devices into the automation system.

Depending on the line length, the interfaces can operate with a maximum transmission rate of 1 Mbit/s. The connection is made via interference-proof, shielded Industrial Mini IO connectors. The states of the interfaces are displayed via send and receive LEDs.

Bus termination can be set via DIP switches accessible from the front of the module.

Specifications

CAN interfaces	
Number of interfaces	2
Transfer rate	125 kbit/s – 1 Mbit/s, configurable via SW
Galvanic isolation	No
Bus termination	Configurable via DIP-switch on module front
Transmission media	Shielded cable
Indication	Status LEDs for RX and TX

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	1 ms
Supply voltage	24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	2 x Industrial Mini-IO type 2
Max. power consumption over module bus	1.3 W @ 5V
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	In preparation: Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - IM 500
Communication module

Product features

- 1 CANopen interface
  - transfer rate up to 1 Mbit/s
- 1 serial interface
  - interface type configurable by SW (RS 232-C or RS 422/485-A)
- Excellent noise immunity through shielded connections
- Bus termination adjustable via DIP-switch

Brief description

The IM 500 communication module provides 1 CANopen interface and 1 serial interface.

Depending on the line length, the CAN interface can operate with a maximum transmission rate of 1 Mbit/s.

The serial interface can optionally be configured as RS 232-C or RS 422/485-A interface. The connection is made via interference-proof, shielded Industrial Mini IO connectors.

Bus termination for CAN and serial interface can be set via DIP switches accessible from the front of the module.

Specifications

CAN interfaces	
Number of interfaces	1
Transfer rate	125 kbit/s – 1 Mbit/s, configurable via SW
Galvanic isolation	No
Bus termination	Configurable via DIP-switch on module front
Transmission media	Shielded cable
Indication	Status LEDs for RX and TX

Serial interfaces	
Number of interfaces	1
Type	RS-232-C or RS 422/485-A, configurable via SW
Transfer rate	1.2 kbit/s – 115.2 kbit/s, configurable via SW
Galvanic isolation	No
Bus termination	Configurable via DIP-switch on module front
Transmission media	Shielded cable

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	tbd

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Minimum cycle time	1 ms
Supply voltage	24 V DC and 5 V DC (module bus)
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Addressing on module bus	Automatically
Type of terminals	2 x Industrial Mini-IO type 2
Max. power consumption over module bus	tbd
Status indication	LEDs for module- and EtherCAT state

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	In preparation: Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - SM 510, SM 520
Communication modules

Product features

- Serial interfaces
- Interface types: RS 232-C resp. RS 422/485-A, Current loop
- Excellent noise immunity through shielded connections
- Bus termination adjustable via DIP switch

Brief description

The SM 510 communication module provides two interfaces, which can be optionally configured as RS 232-C or RS 422/485-A interfaces. Bus termination for RS 422/485 serial interfaces can be set via DIP switches accessible from the front of the module.

The SM 520 communication module has a serial 20 mA current loop interface. The interface operates both for the sender as well as for the receiver in active or passive mode. DIP switches on the front are provided for switching the operating mode. At a maximum transmission rate of 9.6 kBit/s a line length of up to 1,000 m is possible.

The connection to both communication modules is made via interference-proof, shielded Industrial Mini IO connectors.

Specifications

Serial interfaces		
	SM 510	**SM 520**
Number of interfaces	2	1
Type	RS-232-C or RS 422/485-A, configurable via SW	Current Loop
Transfer rate	1.2 – 115.2 kbit/s, configurable via SW	1.2 – 9.6 kBit/s, configurable via SW
Galvanic isolation	No	No
Bus termination	Adjustable via DIP switch on module front	–
Operating modes	–	Transmitter/receiver, active/passive (configurable via DIP-switch on module front)
Transmission media	Shielded cable	

Dimensions, weight	
Height	106 mm
Width	13.8 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	71 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General		
	SM 510	SM 520
Minimum cycle time	1 ms	
Supply voltage	24 V DC and 5 V DC (module bus)	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically	
Type of terminals	2 x Industrial Mini-IO type 2	1 x Industrial Mini-IO type 2
Max. power consumption over module bus	1.25 W @ 5 V	1.2 W @ 5 V 1.35 W @ 24 V
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	In preparation: Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - BL 570, BL 575
Communication modules

Product features

- EtherCAT bus coupler module for connecting KeConnect C5 modules
- ID-Switch for EtherCAT addressing
- EtherCAT connectivity RJ45 respectively M8

Brief description

The BL 570 and BL 575 are bus coupling modules with which KeConnect C5 module packages can be distributed or decentralized via EtherCAT. They are equipped with an EtherCAT-In and an EtherCAT-Out connection. Additional EtherCAT couplers or EtherCAT devices can be connected in the same line via the EtherCAT-Out connector.

If required, the EtherCAT address can be set using the ID switch, which can be operated from the front of the module (assignable in the module configuration). Otherwise, the EtherCAT addressing is done automatically.

The BL 570 uses RJ45 connection technology and the BL 575 uses M8 connection technology.

Specifications

EtherCAT	
Interfaces	EtherCAT In EtherCAT Out
Baud rate	100 Mbit/s
Addressing	EtherCAT addressing via 8-fold DIP switch
Status indication	Link/activity LED for each EtherCAT connector

Dimensions, weight		
	BL 570	**BL 575**
Height	106 mm	
Width	26.5 mm	
Depth	82.5 mm (snap-on height: 77.5 mm)	86.2 mm (snap-on height: 81.2 mm)
Weight	91 g	

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General		
	BL 570	BL 575
Minimum cycle time	62.5 µs	
Supply voltage	24 V DC (front)	
Max. power input	77 W @ 24 V	
Max. inrush current	6 A	
Protection device	Reverse voltage protection	
Output power to supply connected modules via module bus	max. 25 W @ 5 V max. 48 W @ 24 V	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically or via addressing switch (DIP-switch)	
Type of terminals	Power supply: 4-fold male header, 3.81 mm pitch	
	EtherCAT: RJ45 connector	EtherCAT: M8 connector, 4 pins
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - NM 570, NM 575
Communication modules

Product features

- Switch to enable EtherCAT star topologies
- 2 ports for EtherCAT branches
- EtherCAT connectivity RJ45 respectively M8

Brief description

The NM 570 and NM 575 are switch modules that enable EtherCAT star topologies to be designed. Either EtherCAT devices or even entire EtherCAT lines can be connected to each of the two EtherCAT ports.

The NM 570 uses RJ45 connection technology and the NM 575 uses M8 connection technology.

Specifications

EtherCAT	
Interfaces	2 ports for EtherCAT branches
Baud rate	100 Mbit/s
Status indication	Link/activity LED for each EtherCAT connector

Dimensions, weight

	NM 570	NM 575
Height	106 mm	
Width	26.5 mm (installed situation)	
Depth	82.5 mm (snap-on height: 77.5 mm)	86.2 mm (snap-on height: 81.2 mm)
Weight	91 g	

Environmental conditions

Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General

	NM 570	NM 575
Minimum cycle time	62.5 µs	
Supply voltage	5 V DC (module bus)	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically	
Type of terminals	EtherCAT: RJ45 connector	EtherCAT: M8 connector, 4 pins
Max. power consumption over module bus	1 W @ 5 V	
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity

CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - IM 581, IM 582
Hybrid modules

Product features

Combination of
- up to 4 high precision analog inputs with 16 bit resolution
- up to 6 analog outputs with 12 bit resolution
- up to 3 SSI interfaces
- cycle times up to 125 µs

Brief description

The IM 581 and IM 582 are hybrid modules that combine analog voltage inputs respectively analog voltage outputs with SSI interfaces.

The analog inputs have 16 bit resolution and are suitable for voltage measurement as well as ratiometric measurement. The input range is from -10 to +10 V.

Via configurable digital input filters, the analog inputs can be adapted to the control cycle times used in order to achieve optimum control characteristics.

The analog outputs have a resolution of 12 bits. The signal range is from -10 to +10 V.

SSI encoders can be integrated into the automation system via the SSI inputs. Via various configuration settings, such as bit rates, telegram lengths, bit masks etc., the individual SSI interfaces can be adapted to the specifics of the encoders being used.

The data exchange can occur with the higher-level automation device with a fastest possible cycle time of 125 µs.

Specifications

Analog inputs (only IM 581)	
Number of inputs	4
Type	Voltage input
Input mode	Configurable, voltage or ratiometric mode
Signal range	Voltage mode: ± 10 V; ratiometric mode: 0 - Uref
Resolution	16 bit (voltage mode); 15 bit (ratiometric mode)
HW input filter	Filter 3rd order, crossover frequency 2500 Hz
Digital filter	Configurable: no filter, 500 µs, 1 ms, 5 ms
Common mode range	± 13.5 V
Common mode rejection	> 80 dB
Precision	Max error: ± 0.02 % of scale end value (at 25 °C)
Diagnosis	Sensor break detection

Analog outputs (only IM 582)	
Number of outputs	6
Type	Voltage output
Signal range	± 10 V
Resolution	12 bit
Load resistance	≥ 1000 Ω
Highest capacitive load	≤ 10 nF
Precision	Max. error: ± 0.15 % of scale end value (at 25 °C)
Protection	Sustained short-circuit proof

SSI interfaces		
	IM 581	IM 582
Number of interfaces	2	3
Transfer rate	125 kbit/s, 250 kbit/s, 500 kbit/s, 1 Mbit/s	
Resolution	Max. 32 bits (number of bits is configurable)	
Supported data code	Binary code, Gray code	
Voltage for sensor supply	24 V DC	
Max. current for sensor supply	150 mA for each interface	
Diagnosis	Sensor break detection	
Protection device	Short circuit protection by self resetting fuse	

Dimensions, weight	
Height	106 mm
Width	26.5 mm (installed situation)
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	87 g

KeConnect C5 - IM 581, IM 582
Hybrid modules

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General		
	IM 581	IM 582
Minimum cycle time	125 µs	
Supply voltage	24 V DC (front) for sensor supply 24 V DC and 5 V DC (module bus)	
Overvoltage category	II	
Protection class	III according to EN 61010-2-201	
Addressing on module bus	Automatically	
Type of terminals	6 x 4-fold male header, 3.81 mm pitch 2 x Industrial Mini-IO type 2	4 x 4- fold male header, 3.81 mm pitch 3 x Industrial Mini-IO type 2
Max. power consumption over module bus	1.4 W @ 5 V 1.2 W @ 24 V	1.4 W @ 5 V 1.8 W @ 24 V
Status indication	LEDs for module- and EtherCAT state	

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

KeConnect C5 - PI 570
System modules

Product features

- Power supply module
- Enhances the supplying power in case of insufficient output power of bus coupler or CPU unit to supply all directly connected I/O modules

Brief description

The PI 570 power supply unit is used when the supply power of the integrated power supply unit of a CPU module or a bus coupling module is not sufficient to supply all directly connected KeConnect C5 modules internally.

If a PI 570 is integrated into the KeConnect C5 module package, then all modules arranged on the right are supplied. The supply pins to the left of the module bus interfaces are disconnected.

Specifications

Dimensions, weight	
Height	106 mm
Width	26.5 mm
Depth	82.5 mm (snap-on height: 77.5 mm)
Weight	91 g

Environmental conditions	
Operating temperature	0 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Relative air humidity	10 % to 95 % (non condensing)
Vibration / shock resistance	According to EN 61131-2

General	
Supply voltage	24 V DC (front)
Max. power input	75 W @ 24 V
Max. inrush current	6 A
Protection device	Reverse voltage protection
Output power for supplying connected modules via module bus	max. 25 W @ 5 V max. 48 W @ 24 V
Overvoltage category	II
Protection class	III according to EN 61010-2-201
Type of terminals	Power supply: 4-fold male header, 3.81 mm pitch

Certification of conformity	
CE	According to EMC directive 2014/30/EU
UL	Industrial Control Equipment (Programmable Controllers) UL 61010-1 UL 61010-2-201

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KEBA AG Headquarters, Gewerbepark Urfahr, 4041 Linz/Austria,
Phone: +43 732 7090-0, Fax: +43 732 730910, keba@keba.com

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