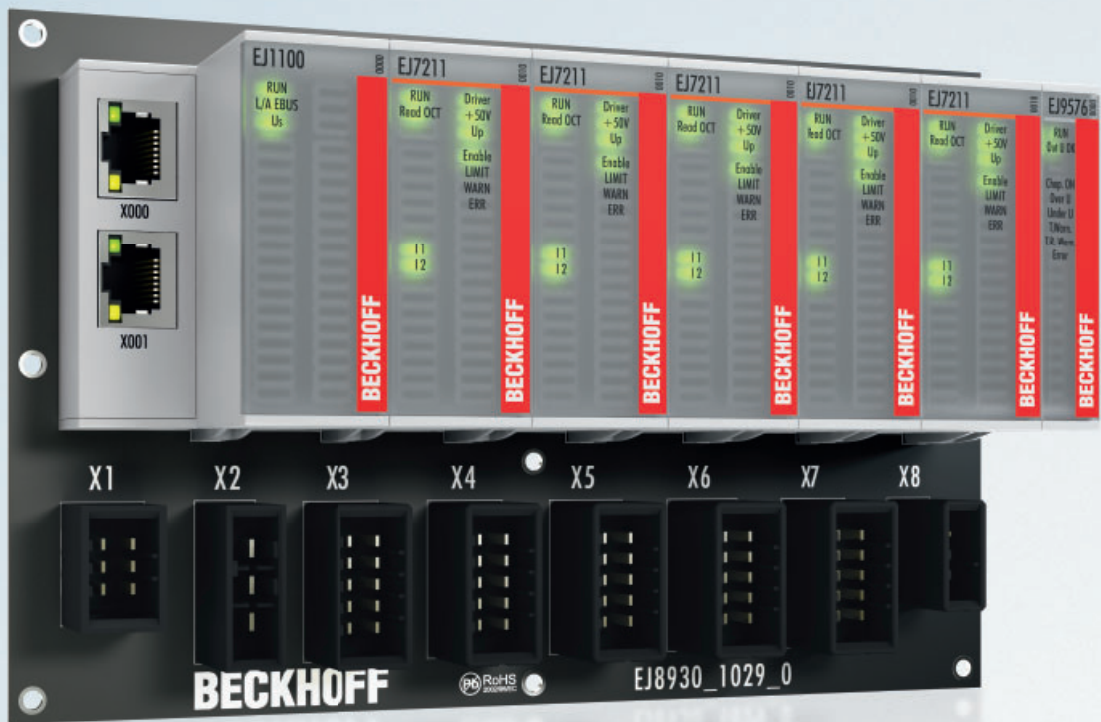


EtherCAT®



Highlights

- Very compact EtherCAT I/O system in IP 20 for plug-in into a circuit board (signal distribution board)
- Optimised for high-volume production
- Application-specific connector interface

EtherCAT Plug-in Modules

Bus Terminals for circuit boards

► www.beckhoff.com/EtherCAT-Plug-in-Modules

- 552 Product overview
- 554 System description
- 555 Technical data

557 EtherCAT Couplers

- 557 EtherCAT Couplers E-bus

558 EtherCAT plug-in modules digital I/O

- 558 Digital input EJ1xxx
- 561 Digital output EJ2xxx

563 EtherCAT plug-in modules analog I/O

- 563 Analog input EJ3xxx
- 564 Analog output EJ4xxx

565 EtherCAT plug-in modules special functions

- 565 Position measurement EJ5xxx
- 566 Communication EJ6xxx
- 567 Motion EJ7xxx

568 System modules

- 568 System modules EJ9xxx

1044 TwinSAFE

Product overview EtherCAT plug-in modules

EtherCAT Couplers

EtherCAT Couplers E-bus	EJ1100	557	EJ1101-0022	557
			external connectors, power supply module and optional ID switches	

EtherCAT plug-in modules | Digital input: EJ1xxx

Signal	2-channel	4-channel	8-channel	16-channel
5 V DC			EJ1128 559	
24 V DC (filter 3.0 ms)			EJ1008 558 type 3	EJ1809 558 type 3
			EJ1859 558 type 3, 8 inputs, 8 outputs, $I_{MAX} = 0.5$ A	EJ1889 558 negative switching
24 V DC (safe inputs)		EJ1914 560 TwinSAFE, 4 safe inputs	EJ1918 560 TwinSAFE, 8 safe inputs	
			EJ1957 560 TwinSAFE, 8 safe inputs, 4 safe outputs	

EtherCAT plug-in modules | Digital output: EJ2xxx

Signal	2-channel	4-channel	8-channel	16-channel
24 V DC ($I_{MAX} = 0.5$ A)			EJ2008 561	EJ2809 561
			EJ1859 558 type 3, 8 inputs, 8 outputs, $I_{MAX} = 0.5$ A	EJ2889 561 negative switching
24 V DC (safe outputs)		EJ2914 562 TwinSAFE, 4 safe outputs	EJ2918 562 TwinSAFE, 8 safe outputs	
		EJ1957 562 TwinSAFE, 8 safe inputs, 4 safe outputs		
PWM	EJ2502 561 24 V DC, 0.5 A			

EtherCAT plug-in modules | Analog input: EJ3xxx

Signal	2-channel	4-channel	8-channel	16-channel
± 10 V		EJ3004 563 single-ended, 12 bit	EJ3108 563 6 x differential inputs, 2 x single-ended, 16 bit	
Resistance thermometer (RTD)	EJ3202 563 16 bit	EJ3214 563 16 bit		

EN 61131-2 specification ► www.beckhoff.com/EN61131-2

EtherCAT plug-in modules | Analog output: EJ4xxx

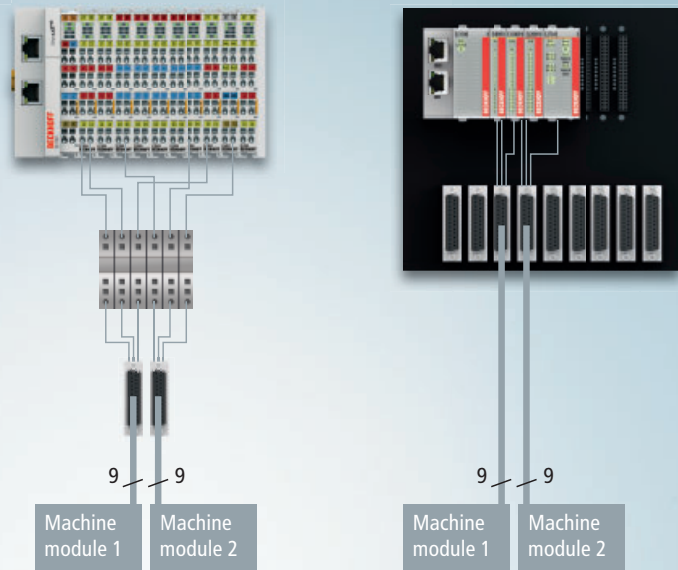
Signal	2-channel	4-channel
0...10 V	EJ4002 12 bit 564	
±10 V		EJ4134 16 bit 564

EtherCAT plug-in modules | Special functions: EJ5xxx, EJ6xxx, EJ7xxx

Signal	1-channel	2-channel
Position measurement		EJ5002 SSI encoder interface 565
Safety	EJ6910 TwinSAFE Logic 566	
Motion	EJ7047 stepper motor module, $I_{MAX} = 5.0$ A, 50 V DC, incremental encoder, vector control 567	EJ7342 DC motor output stage, $I_{MAX} = 3.5$ A, 50 V DC, incremental encoder 567
	EJ7211-0010 servomotor module, $I_{MAX} = 4.5$ A _{RMS} , 50 V DC, OCT 567	

EtherCAT plug-in modules | System: EJ9xxx

Signal	System
System	EJ9001 placeholder module 568
Power supply and accessories	
24 V DC	EJ9400 input 24 V DC, E-bus power supply, 2.5 A 569
	EJ9404 input 24 V DC, E-bus power supply, 12 A 569
	EJ9505 input 24 V DC, output 5 V DC, 0.5 A 569
μF	EJ9576 brake chopper module, up to 72 V DC, 155 μF 568



Signal distribution via single-core wiring

Signal distribution via signal distribution board

EJxxxx | EtherCAT plug-in modules

The EtherCAT I/O plug-in modules are based electronically on the well-known EtherCAT Terminals, and they provide the same broad variety of signals, including functional safety (TwinSAFE). Their electromechanical design enables them to be plugged directly into an application-specific signal distribution board. This routing board distributes signals and power supply to machine modules via prefabricated cables with application-specific plug connectors. The main advantage of the signal distribution board is the highly automated production process, from the manufacture of the circuit board and its assembly through to the inspection. All connector interfaces can be placed on the circuit board according to customer specifications. The connector level, which is matched to the application, considerably optimises the wiring procedure, for example with the use of prefabricated cables and coded plug connectors.

The manufacturing process can be accelerated as far as possible and the risk of wiring errors is minimised. This saves working time and thus costs. It allows production at different worldwide locations with a minimum of risk, since errors are avoided through automation and coding.

The EtherCAT plug-in modules offer an alternative to conventional point-to-point wiring in control cabinets, since they simplify wiring, and reduce the system installation

time and testing costs where machines are manufactured in high numbers.

Compact design for an optimised machine footprint

Similar to the EtherCAT Terminal system, a module strand consists of a Bus Coupler and any desired I/O modules. In contrast to the EtherCAT Terminals, however, the EtherCAT plug-in modules have no spring-loaded contacts, since the wiring level is implemented differently: for communication, signal distribution and the supply of power to the modules plug connectors on the back side of the modules and the conductive tracks of the signal distribution board are used.

Measuring just 12 x 55 x 66 mm, the EJ modules are extremely compact; compared to the EtherCAT Terminals they are almost 50 % smaller in relation to volume. In conjunction with coding holes in the signal distribution board, coding pins on the underside of the EJ modules ensure protection against incorrect plug insertion. Thus, the risk of errors can be minimised during assembly and service.

The EtherCAT plug-in modules and the plug level for sensors and actuators can be placed flexibly on the signal distribution board. The signal distribution board is developed either by the user or as custom solution by Beckhoff.

I/O solution for standard applications

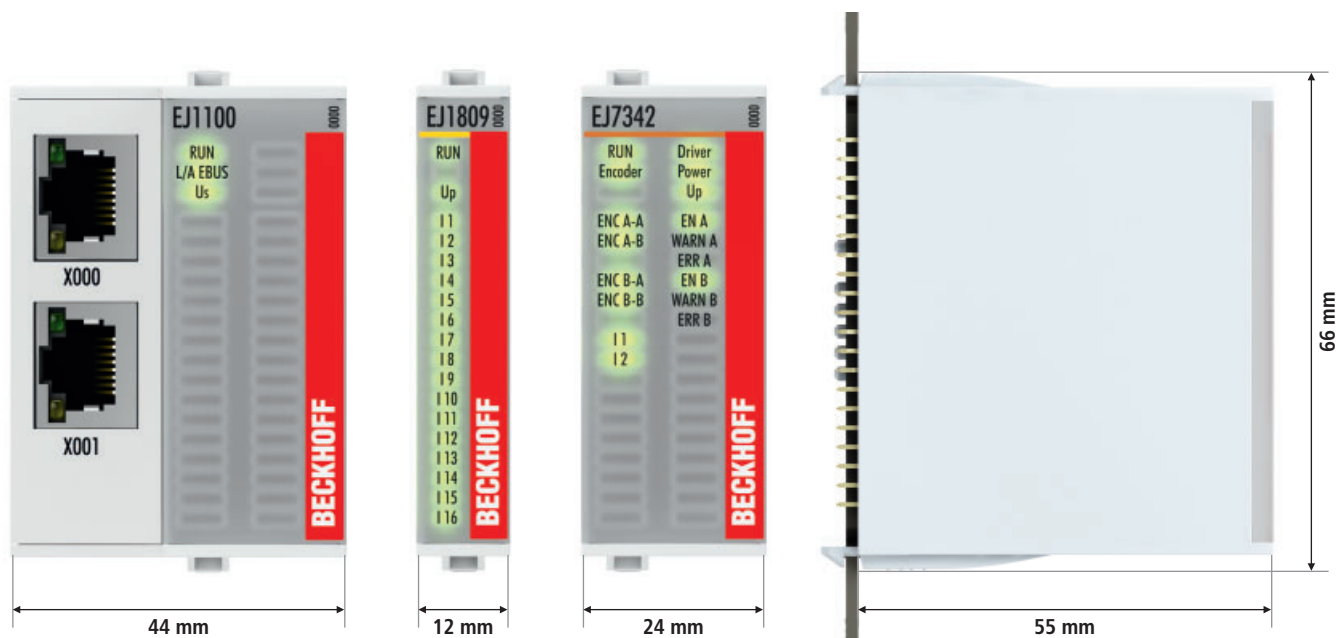
The EJ system supplements the modular Beckhoff I/O portfolio for controllers used in medium to high-volume production of standard machines. It is also suitable for applications where the reduction of error probability is critical for the exact replication of a machine. In general, the use of the EJ system is recommended for machine manufacturers who want to create a platform of common parts across their product range.

In addition, the EJ system directly addresses projects with a shortage of skilled workers. Especially when production facilities are distributed across various locations with different skill levels, the risk of errors increases along with the complexity of the machines. With the combination of I/O modules, signal distribution board and prefabricated cables, the EJ system offers efficient "Plug & Work" solutions for machine controllers.

Signal distribution board

The EtherCAT plug-in modules can be directly attached to a PCB. This application-specific PCB (signal distribution board) distributes signals and power supply to individual application-specific plug connectors, in order to connect the controller to further machine modules.

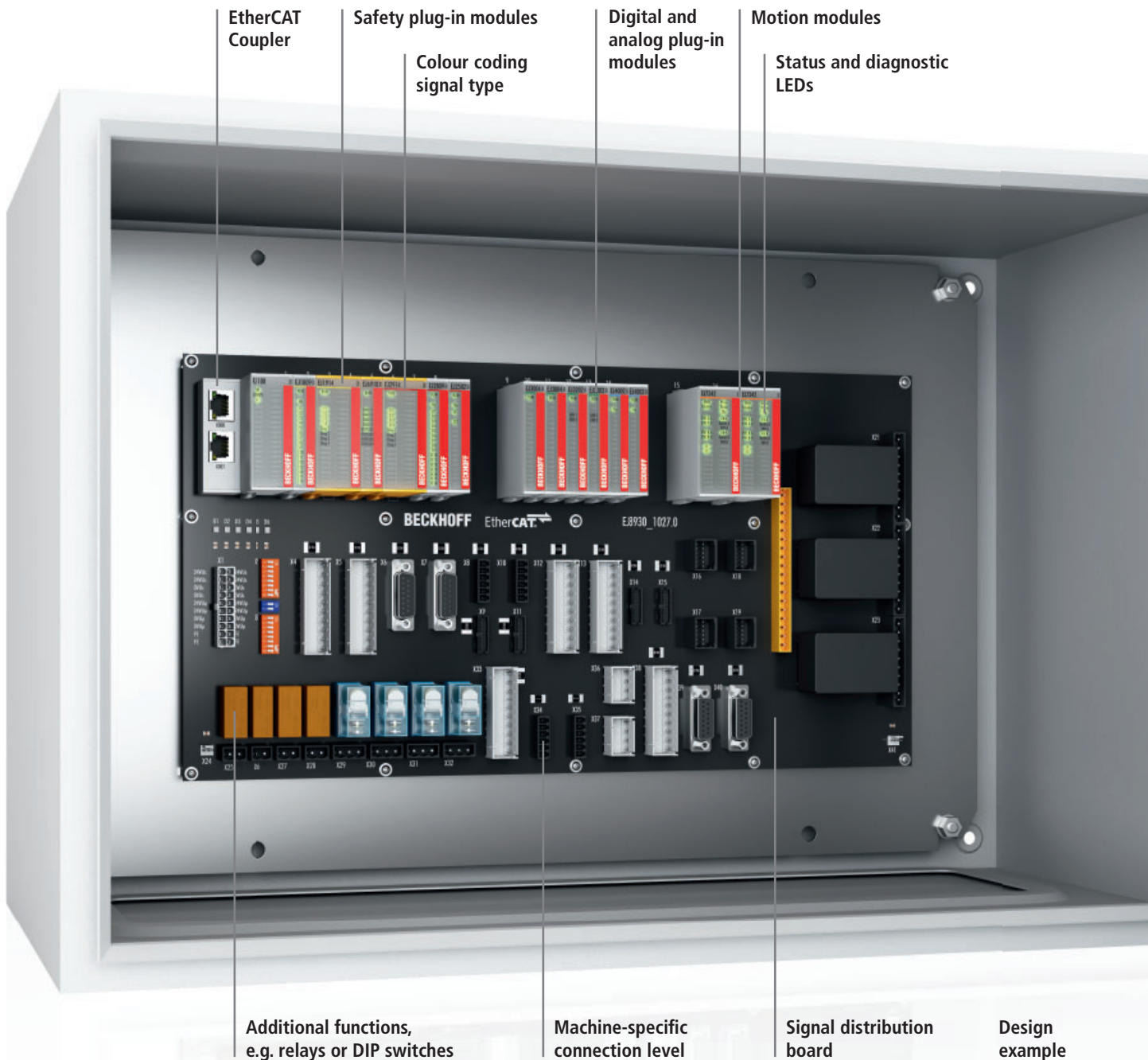
Technical data – EtherCAT plug-in modules



Technical data	EJ1100 coupler	12 mm EJ module	24 mm EJ module
Design form	EtherCAT I/O plug-in module		
Material	polycarbonate		
Installation	on signal distribution board		
Mechanical coding	EJ plug-in module: signal-specific coding pins on the housing, signal distribution board: holes in the printed circuit board		
Locking	latching lug in circuit board cut-out		
Connection method	field wiring: application-specific wiring level on the signal distribution board, EJ plug-in module: 2 x 20-pin socket strip		
EtherCAT connection	direct	via EJ1100 coupler	via EJ1100 coupler
Electrical isolation	500 V (E-bus/field potential)		
Current supply E-bus	2200 mA	–	–
Bus interface	2 x RJ45	–	–
Dimensions (W x H x D)	44 mm x 66 mm x 55 mm	12 mm x 66 mm x 55 mm	24 mm x 66 mm x 55 mm
Operating/storage temperature	0...+55 °C/-25...+85 °C		
Relative humidity	5...95 %, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6/EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2/EN 61000-6-4 (with corresponding signal distribution board)		
Protection class/ installation position	EJ module: IP 20/horizontal, EJ system: dependent on signal distribution board and housing		

EtherCAT Plug-in Modules

► www.beckhoff.com/EtherCAT-Plug-in-Modules



EtherCAT Coupler

The EJ1100 and EJ1101-0022 couplers connect EtherCAT with the EtherCAT plug-in modules (EJxxxx). They convert the passing telegrams from Ethernet 100BASE-TX to E-bus signal representation.

The couplers are connected to the network via the upper Ethernet interface. The lower RJ45 socket may be used to connect further EtherCAT devices in the same strand.

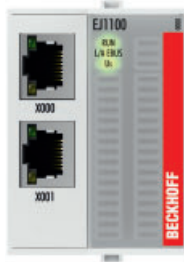
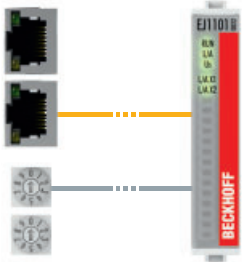
The external RJ45 sockets of the EJ1101-0022 can be installed directly on the signal distribution board. In combination with the external power supply modules EJ9400 (2.5 A) and EJ9404 (12 A), many configurations can be implemented (cabinet feed-throughs, built-in solutions, etc.).

With the EJ1101-0022 a unique ID can be assigned to a group of EtherCAT components via external ID switches. This group can then be located at any position within the EtherCAT network. Variable topologies are therefore easily implementable.





EJ94xx | Power supply plug-in modules see page [569](#)

EtherCAT Coupler

EtherCAT Coupler with external connectors, power supply module and optional ID switches

Technical data	EJ1100	EJ1101-0022
Task within EtherCAT system	coupling of EtherCAT plug-in modules (EJxxxx) to 100BASE-TX EtherCAT networks	
Data transfer rates	100 Mbaud	
		
Bus interface	2 x RJ45	2 x RJ45 (external)
Type/number of peripheral signals	max. 4.2 GB addressable I/O points	max. 4.2 GB addressable I/O points
Data transfer medium	Industrial Ethernet cable (min. Cat.5), shielded	Industrial Ethernet/EtherCAT cable (min. Cat.5), shielded
Current consumption from U _s	70 mA + (∑ E-bus current/4)	–
Current consumption from U _e	load	–
Distance between stations	max. 100 m (100BASE-TX)	depends on signal distribution board
Delay	typ. 1 μs	typ. 1 μs
Power supply	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)
Current consumption E-bus	–	typ. 310 mA
Current supply E-bus	2200 mA	–
Operating temperature	0...+55 °C	0...+55 °C
Approvals	CE	CE
Further information	www.beckhoff.com/EJ1100	www.beckhoff.com/EJ1101-0022

Digital input | 24 V DC



	8-channel digital input, 24 V DC, type 1/3	16-channel digital input, 24 V DC, type 1/3	8-channel digital input + 8-channel digital output, 24 V DC, type 1/3	16-channel digital input, 24 V DC, negative switching
Technical data	EJ1008	EJ1809	EJ1859	EJ1889
Specification	EN 61131-2, type 1/3			negative switching "0": 18...30 V DC, "1": 0...7 V DC, typ. 3 mA input current
Input filter	typ. 3.0 ms			
Number of inputs	8	16	8 inputs + 8 outputs	16
	 <p>The EJ1008 digital input acquires the binary control signals from the process level and transmits them, in an electrically isolated form, to the higher-level automation unit.</p>	 <p>The EJ1809 digital input acquires the binary control signals from the process level and transmits them, in an electrically isolated form, to the higher-level automation unit.</p>	 <p>The EJ1859 EtherCAT plug-in module combines eight digital inputs and eight digital outputs in one device.</p>	 <p>The EJ1889 digital input acquires the binary control signals from the process level and transmits them, in an electrically isolated form, to the higher-level automation device. The reference point for all inputs of the EJ1889 is the 24 V field voltage.</p>
Nominal voltage	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)
Current consumption E-bus	typ. 80 mA	typ. 80 mA	typ. 90 mA	typ. 80 mA
Distributed clocks	–	–	–	–
Special features	standard input module for bouncing signals (filter 3 ms)	standard input module with high number of channels for slow 24 V DC edges	combi module, 8 x output 24 V DC, max. output current 0.5 A, load type: ohmic, inductive, lamp load, reverse voltage protection	negative switching
Operating temperature	0...+55 °C	0...+55 °C	0...+55 °C	0...+55 °C
Approvals	CE	CE	CE	CE
Further information	www.beckhoff.com/EJ1008	www.beckhoff.com/EJ1809	www.beckhoff.com/EJ1859	www.beckhoff.com/EJ1889

Digital input | 5 V DC

The EJ1128 EtherCAT plug-in module acquires the binary 5 V DC control signals and transmits them, in an electrically isolated form, to the higher-level automation unit. The inputs feature HCT CMOS technology, i.e. the resulting switching thresholds allow the use of sensors with HC CMOS outputs as well as TTL outputs.

The power for the module (5 V DC) can be supplied via the EJ9505 power supply module.

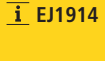
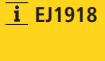
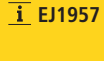



8-channel digital input, 5 V DC

Technical data	 EJ1128
Specification	"0": < 0.8 V DC, "1": > 2.4 V DC, typ. 50 µA
Input filter	typ. 0.05 µs
Number of inputs	8
	
Nominal voltage	5 V DC
Current consumption E-bus	typ. 80 mA
Distributed clocks	–
Electrical isolation	500 V (E-bus/field potential)
Special features	fast CMOS input
Operating temperature	0...+55 °C
Approvals	CE
Further information	www.beckhoff.com/EJ1128




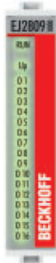
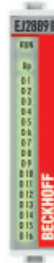

For availability status see Beckhoff website at: www.beckhoff.com/EJ1128

Digital input | 24 V DC, TwinSAFE







	4-channel digital input, TwinSAFE, 24 V DC	8-channel digital input, TwinSAFE, 24 V DC	8-channel digital input, 4-channel digital output, TwinSAFE, 24 V DC
Technical data	 EJ1914	 EJ1918	 EJ1957
Safety standard	DIN EN ISO 13849-1:2008 (Cat 4, PL e) and IEC 61508:2010 (SIL 3)		
Max. output current	–		500 mA, Σ 2 A
Number of inputs	4	8	8
Number of outputs	–	–	4
			
Protocol	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
Current consumption power contacts	–	–	–
Current consumption E-bus	approx. 200 mA	approx. 200 mA	approx. 200 mA
Fault response time	≤ watchdog time (parameterisable)	≤ watchdog time (parameterisable)	≤ watchdog time (parameterisable)
Special features	4 safe inputs	8 safe inputs	8 safe inputs, 4 safe outputs
Operating/storage temperature	0...+55 °C/-25...+85 °C	0...+55 °C/-25...+85 °C	0...+55 °C/-25...+85 °C
Approvals	in preparation	in preparation	in preparation
Further information	www.beckhoff.com/EJ1914	www.beckhoff.com/EJ1918	www.beckhoff.com/EJ1957

 For availability status see Beckhoff website at: www.beckhoff.com

Digital output | 24 V DC






	8-channel digital output, 24 V DC, 0.5 A	16-channel digital output, 24 V DC, 0.5 A	16-channel digital output, 24 V DC, 0.5 A, negative switching	2-channel pulse width output, 24 V DC, 0.5 A
Technical data	EJ2008	EJ2809	EJ2889	EJ2502
Load type	ohmic, inductive, lamp load			
Max. output current	0.5 A (short-circuit-proof) per channel			
Switching times	typ. T _{ON} : 60 µs, typ. T _{OFF} : 300 µs	typ. T _{ON} : 60 µs, typ. T _{OFF} : 300 µs	typ. T _{ON} : 50 µs, typ. T _{OFF} : 200 µs	T _{ON} : > 750 ns, T _{OFF} : > 500 ns
Number of outputs	8	16	16	2
	 <p>The EJ2008 digital output connects the binary control signals from the automation unit on to the actuators at the process level with electrical isolation.</p>	 <p>The EJ2809 digital output connects the binary control signals from the automation unit on to the actuators at the process level with electrical isolation.</p>	 <p>The EJ2889 digital output connects the binary control signals from the automation unit on to the actuators at the process level with electrical isolation.</p>	 <p>The EJ2502 output modulates the pulse width of a binary signal and outputs it electrically isolated from the E-bus.</p>
Nominal voltage	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)
Current consumption E-bus	typ. 110 mA	typ. 110 mA	typ. 130 mA	typ. 110 mA
Distributed clocks	–	–	–	–
Base frequency	–	–	–	1...20 kHz, 250 Hz default
Duty factor	–	–	–	0...100 %
Resolution	–	–	–	9...15 bit
Breaking energy	< 150 mJ/channel	< 150 mJ/channel	< 100 mJ/channel	–
Reverse voltage protection	yes	yes	yes	yes
Short circuit current	typ. < 2 A	typ. < 2 A	typ. < 7 A	typ. < 1.5 A
Special features	–	–	negative switching	separate frequency can be set for each channel
Operating temperature	0...+55 °C	0...+55 °C	0...+55 °C	0...+55 °C
Approvals	CE	CE	CE	CE
Further information	www.beckhoff.com/EJ2008	www.beckhoff.com/EJ2809	www.beckhoff.com/EJ2889	www.beckhoff.com/EJ2502

Digital output | 24 V DC, TwinSAFE

	8-channel digital input, 4-channel digital output, TwinSAFE, 24 V DC	4-channel digital output, TwinSAFE, 24 V DC	8-channel digital output, TwinSAFE, 24 V DC
Technical data	 EJ1957	 EJ2914	 EJ2918
Safety standard	DIN EN ISO 13849-1:2008 (Cat 4, PL e) and IEC 61508:2010 (SIL 3)		
Max. output current	500 mA, Σ 2 A	500 mA	
Number of inputs	8	–	–
Number of outputs	4	4	8
			
Protocol	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT	TwinSAFE/Safety over EtherCAT
Current consumption power contacts	–	–	–
Current consumption E-bus	approx. 200 mA	approx. 221 mA	approx. 221 mA
Fault response time	\leq watchdog time (parameterisable)	\leq watchdog time (parameterisable)	\leq watchdog time (parameterisable)
Special features	8 safe inputs, 4 safe outputs	4 safe outputs	8 safe outputs
Operating/storage temperature	0...+55 °C/-25...+85 °C	0...+55 °C/-25...+85 °C	0...+55 °C/-25...+85 °C
Approvals	in preparation	in preparation	in preparation
Further information	www.beckhoff.com/EJ1957	www.beckhoff.com/EJ2914	www.beckhoff.com/EJ2918



 For availability status see Beckhoff website at: www.beckhoff.com

Analog input | -10...+10 V, PT100

	4-channel analog input -10...+10 V, 12 bit, single-ended	8-channel analog input -10...+10 V, 16 bit, 6 differential and 2 single-ended inputs	2-channel analog input, PT100 (RTD), 16 bit	4-channel analog input, PT100 (RTD), 16 bit
Technical data	EJ3004	EJ3108	EJ3202	 EJ3214
Resolution	12 bits (16 bits presentation)	16 bit	0.1 °C per digit	
Conversion time	typ. 0.625 ms (default setting: 50 Hz filter)	min. cycle time 1 ms	approx. 85 ms default setting, 2...800 ms configurable	approx. 170 ms default setting
Number of inputs	4 (single-ended)	6 (differential) + 2 (single-ended)	2	4
				
	The EJ3004 analog input processes signals in the range between -10 and +10 V.	The EJ3108 analog input processes signals in the range between -10 and +10 V.	The EJ3202 analog input allows resistance sensors to be connected directly.	The EJ3214 analog input allows resistance sensors to be connected directly in 3-wire connection.
Signal type	-10...+10 V	-10...+10 V	RTD	RTD
Measuring error	< ±0.3 % (relative to full scale value)	< ±0.3 % (relative to full scale value)	< ±0.5 °C for PT sensors	< ±0.5 °C for PT sensors, 4 x 3-wire connection
Current consumption E-bus	typ. 120 mA	typ. 300 mA	typ. 165 mA	typ. 190 mA
Distributed clocks	–	–	–	–
Sensor types	–	–	PT100, PT200, PT500, PT1000, Ni100, Ni120, Ni1000 resistance measure- ment (e.g. potentiometer, 10 Ω...1.2/4 kΩ), KTY sensors (types see documentation)	PT100, PT200, PT500, PT1000, Ni100, Ni120, Ni1000 resistance measure- ment (e.g. potentiometer, 10 Ω...1.2/4 kΩ), KTY sensors (types see documentation)
Measuring range	-10...+10 V	-10...+10 V	-200...+850 °C (PT sensors); -60...+250 °C (Ni sensors)	-200...+850 °C (PT sensors); -60...+250 °C (Ni sensors)
Internal resistance	> 130 kΩ	differential: typ. 20 MΩ, single-ended: typ. 10 MΩ	–	–
Input filter limit frequency	1 kHz	typ. 200 Hz	typ. 1 kHz	typ. 1 kHz
Special features	standard and compact pro- cess image, switchable mea- suring data representation, activatable FIR/IIR filters, limit value monitoring, overload display in the process data	switchable measuring data representation, limit value monitoring, overload display in the process data	integrated digital filter, limit value monitoring, variable connection tech- nology	integrated digital filter, limit value monitoring, variable connection tech- nology
Operating temperature	0...+55 °C	0...+55 °C	0...+55 °C	0...+55 °C
Approvals	CE	CE	CE	CE
Further information	www.beckhoff.com/EJ3004	www.beckhoff.com/EJ3108	www.beckhoff.com/EJ3202	www.beckhoff.com/EJ3214

 For availability status see Beckhoff website at: www.beckhoff.com/EJ3214

Analog output | -10/0...10 V

	2-channel analog output, 0...10 V, 12 bit	4-channel analog output, -10...+10 V, 16 bit
Technical data	EJ4002	EJ4134
Signal voltage	0...10 V	-10...+10 V
Resolution	12 bit	16 bit
Conversion time	~ 150 µs	~ 200 µs (0...100 %)
Number of outputs	2	4
	 <p>The EJ4002 analog output generates signals in the range between 0 and 10 V.</p>	 <p>The EJ4134 analog output generates signals in the range between -10 and +10 V.</p>
Load	> 5 kΩ (short-circuit-proof)	> 5 kΩ (short-circuit-proof)
Current consumption E-bus	typ. 90 mA	typ. 90 mA
Distributed clocks	–	yes
Distributed clock precision	–	<< 1 µs
Output error	< ±0.1 % (relative to end value)	< ±0.1 % (relative to end value)
Special features	Optional watchdog: user-specific output value with ramp; user synchronisation can be activated.	Watchdog parameterisable; user synchronisation can be activated.
Operating temperature	0...+55 °C	0...+55 °C
Approvals	CE	CE
Further information	www.beckhoff.com/EJ4002	www.beckhoff.com/EJ4134


Position measurement | SSI encoder interface

The EJ5002 plug-in module allows the direct connection of two SSI encoders. The data is transmitted to the controller synchronously with the clock cycle dictated by the EJ5002. Various parameters make it possible to flexibly adapt the EJ5002 to the respective application. Different parameters can be set and analysed like operation mode, SSI transfer rate, coding and data length. Furthermore, an additional bit can be displayed in the process image.

The 24 V power supply for the encoder can be provided directly via the feed-in on the signal distribution board. For optional 5 V power, the EJ9505 power supply module can be used.

The EJ5002 supports distributed clocks. Cyclic reading of the SSI encoder can thus be started with high precision, enabling detailed dynamic analysis of the axis in the control system.


SSI encoder interface

Technical data	EJ5002
Technology	SSI encoder interface
Number of channels	2
	
Encoder connection	binary input: D+, D-, binary output: CI+, CI-
Input voltage	24 V DC (-15 %/+20 %)
Current consumption	typ. 120 mA
E-bus	
Data transfer rates	variable up to 1 MHz, 250 kHz default
Data direction	read
Distributed clocks	yes
Signal input	difference signal (RS422)
Signal output	difference signal (RS422)
Current consumption	typ. 20 mA (without sensor)
Special features	adjustable baud rate, coding and data length
Operating temperature	0...+55 °C
Approvals	CE
Further information	www.beckhoff.com/EJ5002




Communication | TwinSAFE

The EJ6910 TwinSAFE Logic can establish up to 212 connections to other TwinSAFE devices. Several EJ6910 can be cascaded in a TwinSAFE network with up to 65,535 TwinSAFE devices. The EJ6910 EtherCAT plug-in module features certified safety function blocks, which are configured according to the application. Safety functions such as emergency stop, safety door monitoring, two-hand control, etc. can thus easily be selected and linked. All blocks can be freely connected among each other and are complemented by operators such as AND, OR, etc. The required functions are programmed via the TwinCAT Safety Editor and loaded into the EJ6910 TwinSAFE Logic via the fieldbus. The EJ6910 is suitable for applications according to IEC 61508 SIL 3 and DIN EN ISO 13849-1:2008 PL e.



TwinSAFE Logic

Technical data	EJ6910
Technology	TwinSAFE Logic
Safety standard	DIN EN ISO 13849-1:2008 (Cat 4, PL e) and IEC 61508:2010 (SIL 3)
	 <p>The TwinSAFE Logic can establish 212 connections to other TwinSAFE devices.</p>
Protocol	TwinSAFE/Safety over EtherCAT
Nominal voltage	24 V DC (-15 %/+20 %)
Current consumption power contacts	–
Current consumption E-bus	approx. 222 mA
Cycle time	500 µs...~10 ms
Fault response time	≤ watchdog time (parameterisable)
Permitted degree of contamination	2
Climate class EN 60721-3-3	3K3
Special features	backup restore
Operating/storage temperature	0...+55 °C/-25...+85 °C
Approvals	CE, TÜV SÜD
Further information	www.beckhoff.com/EJ6910

Motion | Stepper, servo and DC motor modules

	Stepper motor module 50 V DC, 5 A, with incremental encoder, vector control	Servomotor module for OCT, 50 V DC, 4.5 A _{RMS}	2-channel DC motor output stage 50 V DC, 3.5 A
Technical data	EJ7047	EJ7211-0010	EJ7342
Technology	direct motor connection		
Load type	uni- or bipolar stepper motors	permanent-magnet synchronous motors	DC brush motors, inductive
Output current	max. 5 A (overload- and short-circuit-proof)	output current I _N : 4.5 A (rms), peak current I _N : 9.0 A (rms) for 1 s	per channel max. 3.5 A (short-circuit-proof, common thermal overload warning for both output stages)
Number of channels	1 stepper motor, encoder input, 2 digital inputs, 1 output (0.5 A) configurable	1 servomotor, absolute feedback, motor brake, 2 digital inputs	2 DC motors, 2 digital inputs, encoder input
			
Nominal voltage	8...50 V DC	8...50 V DC	8...50 V DC
Current consumption E-bus	typ. 140 mA	typ. 130 mA	typ. 160 mA
Distributed clocks	yes	yes	yes
Maximum step frequency	1000, 2000, 4000 or 8000 full steps/s (configurable)	–	–
Step pattern	64-fold micro stepping	–	–
Current controller frequency	approx. 30 kHz	32 kHz	–
Frequency range	–	0...599 Hz	–
PWM clock frequency	–	16 kHz	30 kHz with 180° phase shift each
Duty factor	–	–	0...100 % (voltage-controlled)
Control resolution	approx. 5000 positions in typ. applications (per revolution)	–	max. 10 bits current, 16 bits speed
Encoder input signal	5...24 V DC, 5 mA, single-ended	–	5...24 V DC, 5 mA, single-ended
Pulse frequency	max. 400,000 increments/s (with 4-fold evaluation)	–	max. 400,000 increments/s (with 4-fold evaluation)
Special features	travel distance control, encoder input, vector control	compact and system-integrated, absolute feedback, One Cable Technology (OCT), plug-and-play	travel distance control, encoder input
Operating temperature	0...+55 °C	0...+55 °C	0...+55 °C
Approvals	CE	CE	CE
Further information	www.beckhoff.com/EJ7047	www.beckhoff.com/EJ7211-0010	www.beckhoff.com/EJ7342





System | Placeholder, brake chopper

	Placeholder module	Brake chopper module, 72 V, 155 μ F
Technical data	EJ9001	EJ9576
Technology	placeholder module	brake chopper
Diagnostics	–	temperature on board, over-/undervoltage
	 <p>The placeholder modules can be plugged into unused slots on the signal distribution board. The slots reserved in such a way can be equipped with functional modules when the range of functions is extended.</p>	 <p>The EJ9576 buffers the connected voltage via its integrated capacitors and connects the external brake resistor if the preset threshold of the internal voltage is exceeded.</p>
Nominal voltage	–	arbitrary up to 72 V
Current consumption E-bus	typ. 60 mA	typ. 85 mA
Capacity	–	155 μ F
Ripple current (max.)	–	10 A
Internal resistance	–	< 5 m Ω
Chopper voltage	–	adjustable
Recommended ballast resistor	–	10 Ω , typ. 100 W (dependent on application)
Overvoltage control range	–	typ. 1 V, parametrisable by CoE data
Ballast resistor clock rate	–	load-dependent, max. 100 μ s, 2-point control
Electrical isolation	500 V (E-bus/field potential)	1500 V (E-bus/field potential)
Special features	placeholder module for subsequent functional extensions	adjustable threshold
Operating temperature	0...+55 $^{\circ}$ C	0...+55 $^{\circ}$ C
Approvals	CE	CE
Further information	www.beckhoff.com/EJ9001	www.beckhoff.com/EJ9576

System | Power supply modules

The EJ94xx and EJ95xx module series are designed for the modified feeding of the operating voltage into the module strand. The EJ9400 and EJ9404 EtherCAT plug-in modules are used in combination with the EJ1101-0022 EtherCAT Coupler to supply the E-bus with power. Data is exchanged between the EtherCAT Coupler and the plug-in module over the E-bus. Each EtherCAT plug-in module draws a certain amount of current from the E-bus (see technical data: current consumption E-bus). This current is fed into the E-bus by the power supply plug-in module. To supply the E-bus with power, two performance classes are available: 2.5 A (EJ9400) and 12 A (EJ9404). The power supply is selected according to the number of EtherCAT plug-in modules that must be supplied.

The EJ9505 power supply module generates an output voltage of 5 V DC from the (24 V DC) input voltage. This output voltage can be used to supply power to EtherCAT plug-in modules or external sensors. The power LEDs indicate the module's operating state; the error LED indicates short circuit or overcurrent. The input voltage and the output voltage are not electrically isolated.

	Power supply plug-in module for E-bus, 2.5 A	Power supply plug-in module for E-bus, 12 A	Power supply plug-in module, 5 V DC, with diagnostics
Technical data	EJ9400	EJ9404	 EJ9505
Technology	power supply module for E-bus		power supply module
Diagnostics in the process image	–		yes
			
Input voltage	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)	24 V DC (-15 %/+20 %)
Output voltage	–	–	5 V DC ±1 %
Input current	approx. 10 mA + (E-bus/6.25)	approx. 10 mA + (E-bus/6.25)	load-dependent
Max. output current	2.5 A	12 A	0.5 A
Short-circuit-proof	–	–	yes
Current consumption E-bus	–	–	typ. 70 mA
Electrical isolation	–	–	–
Special features	E-bus supply in combination with the EJ1101-0022 EtherCAT Coupler	E-bus supply in combination with the EJ1101-0022 EtherCAT Coupler	stabilised output voltage
Operating temperature	0...+55 °C	0...+55 °C	0...+55 °C
Approvals	CE	CE	CE
Further information	www.beckhoff.com/EJ9400	www.beckhoff.com/EJ9404	www.beckhoff.com/EJ9505



For availability status see Beckhoff website at: www.beckhoff.com/EJ9505