BECKHOFF New Automation Technology

Documentation | EN

EL30xx

Analog Input Terminals (12 Bit)

Table of contents

BECKHOFF

Version: 5.9

1 Product overview Analog Input Terminals

The following EtherCAT terminals were described within this documentation:

EL3001, EL3002, EL3004, EL3008 [▶ 19]
1, 2, 4 and 8 channel, -10 V to +10 V; 12 bits, single-ended

EL3011, EL3012, EL3014 [▶ 35]
1, 2 and 4 channel, 0 to 20 mA; 12 bits, differential inputs

EL3021, EL3022, EL3024 [▶ 47]
1, 2 and 4 channel, 4 to 20 mA; 12 bits, differential inputs

EL3041, EL3042, EL3044, EL3048 [▶ 59]
1, 2, 4 and 8 channel, 0 to 20 mA; 12 bits, single-ended

EL3051, EL3052, EL3058 [▶ 75]
1, 2 and 8 channel, 4 to 20 mA; 12 bits, single-ended

EL3054 [▶ 83]
4 channel, 4 to 20 mA; 12 bits, single-ended, supply for current-loop-fed sensors

EL3061, EL3062, EL3064, EL3068 [▶ 91]
1, 2, 4 and 8 channel, 0 to 10 V; 12 bits, single-ended

EL3062-0030 [▶ 99]
2 channel, 0 to 30 V; 12 bits, single-ended

EL3072 [▶ 111]
2 channel, 12 bits, multifunction, 10/0...+10 V or -20/0/+4...+20 mA, single-ended inputs

EL3074 [▶ 116]
4 channel, 12 bits, multifunction, 10/0...+10 V or -20/0/+4...+20 mA, single-ended inputs

2 Foreword

2.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.
The qualified personnel is obliged to always use the currently valid documentation.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Trademarks

Beckhoff®, TwinCAT®, TwinCAT/BSD®, TC/BSD®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, Safety over EtherCAT®, TwinSAFE®, XFC®, XTS® and XPlanar® are registered trademarks of and licensed by Beckhoff Automation GmbH. Other designations used in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 with corresponding applications or registrations in various other countries.

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Copyright

2.2   Guide through documentation

	NOTICE
	Further components of documentation
	This documentation describes device-specific content. It is part of the modular documentation concept for Beckhoff I/O components. For the use and safe operation of the device / devices described in this documentation, additional cross-product descriptions are required, which can be found in the following table.

Title	Description
EtherCAT System Documentation (PDF)	• System overview • EtherCAT basics • Cable redundancy • Hot Connect • EtherCAT devices configuration
I/O Analog Manual (PDF)	Notes on I/O components with analog in and outputs
Explosion Protection for Terminal Systems (PDF)	Notes on the use of the Beckhoff terminal systems in hazardous areas according to ATEX and IECEx
Control Drawing I/O, CX, CPX (PDF)	Connection diagrams and Ex markings (conform to cFMus)
EtherCAT Terminals in the Marine Sector (PDF)	Notes for operation of the Beckhoff EtherCAT Terminal System in the Marine Sector (DNV GL)
Infrastructure for EtherCAT/Ethernet (PDF)	Technical recommendations and notes for design, implementation and testing
Software Declarations I/O (PDF)	Open source software declarations for Beckhoff I/O components

The documentations can be viewed at and downloaded from the Beckhoff website (www.beckhoff.com) via:

- the "Documentation and Download" area of the respective product page,
- the Download finder,
- the Beckhoff Information System.

2.3   Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE
The environment, equipment, or data may be damaged.

Information on handling the product

> **i** This information includes, for example:
> recommendations for action, assistance or further information on the product.

2.4 Documentation issue status

Version	Comment
5.9	• Update chapter "Technical data" • Structure update
5.8	• Update chapter "Installation" • Update chapter "Commissioning" • Structure update
5.7	• Update chapter "Technical data" • Update chapter "Connection notes for 20 mA measurement" • Update chapter "LEDs and connection" • Structure update
5.6	• Update chapter "LEDs and connection" • Structure update
5.5	• Update chapter "Technical data" • Structure update • Update revision status
5.4	• Update chapter "Technical data" • Update chapter "Commissioning" • Update object description and parameterization • Structure update • Update revision status
5.3	• EL3072 and EL3074 added • Update chapter "Introduction" • Update chapter "Technical data" • Update chapter "Commissioning" • Update object description and parameterization • Structure update • Update revision status
5.2	• Update chapter "LEDs and connection" • Structure update
5.1	• Update chapter "Configuration of 0/4..20 mA differential inputs" • Connection diagrams updated • Update revision status • Structure update
5.0	• Chapter "Commissioning": subchapter "Basics about signal isolators, barriers" inserted
4.9	• Update chapter "Technical data" • Update chapter "Firmware compatibility" • Structure update
4.8	• Update chapter "UL notes" • Update chapter "Firmware compatibility" • Structure update
4.7	• Correction to chapter "EL306x - Technical data" • Structure update • Update revision status
4.6	• Update Technical data • Update chapter "Connection technology" -> "connection" • Structure update • Update revision status
4.5	• Update chapter "Commissioning"
4.4	• Update chapter "Notes on analog specifications" • Update chapter "LEDs and connection" • Note on ESD protection added • Update revision status
4.3	• Update chapter "Notes on the documentation" • Update Technical data • Update revision status

Version	Comment
4.2	• Addition chapter "Limit, Swap Limit • Addition chapter "Configuration data", index 0x80n0:0E added • Chapter "TwinCAT 2.1x" -> "TwinCAT Development Environment" updated • "TwinCAT Quickstart" added
4.1	• Update connection diagrams • Update chapter "Notes on analog specifications" • Corrections to chapter "Data stream and correction calculation" • Update revision status
4.0	• First release in PDF format • Structure update • Corrections to chapter "Calculation of process data"
3.1	• Update chapter "Technical data" • Addenda chapter "Installation instructions for enhanced mechanical load capacity" • Structure update • Update revision status
3.0	• Update chapter "Technical data" • Update chapter "Analog specifications" • Update Firmware revision status
2.9	• Update chapter "Technical data" • Update chapter "Analog specifications" • Update Firmware revision status
2.8	• Update chapter "Technical data" • Update Firmware revision status
2.7	• Update chapter "Technical data" • Update chapter "Process data" • Update Firmware revision status
2.6	• Structure update • Update chapter "LEDs and connection" • Update Firmware revision status
2.5	• Update chapter "Configuration of 0/4..20 mA differential inputs"
2.4	• Structure update, Technical notes
2.3	• Update connection diagrams
2.2	• Addenda chapter "Configuration of 0/4..20 mA differential inputs"
2.1	• Update chapter "Introduction" • Update chapter "LEDs and connection" • EL301x, EL302x added
2.0	• Update connection diagrams • Structure update
1.9	• Update connection diagrams
1.8	• Expanded note on filter settings added
1.7	• Note on filter settings added
1.6	• Complements and corrections
1.5	• LED amended
1.4	• Process image, trademark notes amended, firmware chapter amended
1.3	• Technical notes added
1.2	• Technical notes added
1.1	• Technical data added
1.0	• First release
0.1	• Provisional documentation for EL30xx

2.5 Version identification of EtherCAT devices

2.5.1 General notes on marking

Designation

A Beckhoff EtherCAT device has a 14-digit designation, made up of

- family key
- type
- version
- revision

Example	Family	Type	Version	Revision
EL3314-0000-0016	EL terminal 12 mm, non-pluggable connection level	3314 4-channel thermocouple terminal	0000 basic type	0016
ES3602-0010-0017	ES terminal 12 mm, pluggable connection level	3602 2-channel voltage measurement	0010 high-precision version	0017
CU2008-0000-0000	CU device	2008 8-port fast ethernet switch	0000 basic type	0000

Notes

- The elements mentioned above result in the **technical designation**. EL3314-0000-0016 is used in the example below.
- EL3314-0000 is the order identifier, in the case of "-0000" usually abbreviated to EL3314. "-0016" is the EtherCAT revision.
- The **order identifier** is made up of
  - family key (EL, EP, CU, ES, KL, CX, etc.)
  - type (3314)
  - version (-0000)
- The **revision** -0016 shows the technical progress, such as the extension of features with regard to the EtherCAT communication, and is managed by Beckhoff.
  In principle, a device with a higher revision can replace a device with a lower revision, unless specified otherwise, e.g. in the documentation.
  Associated and synonymous with each revision there is usually a description (ESI, EtherCAT Slave Information) in the form of an XML file, which is available for download from the Beckhoff web site.
  From 2014/01 the revision is shown on the outside of the IP20 terminals, see Fig. *"EL5021 EL terminal, standard IP20 IO device with batch number and revision ID (since 2014/01)"*.
- The type, version and revision are read as decimal numbers, even if they are technically saved in hexadecimal.

2.5.2 Version identification of EL terminals

The serial number/ data code for Beckhoff IO devices is usually the 8-digit number printed on the device or on a sticker. The serial number indicates the configuration in delivery state and therefore refers to a whole production batch, without distinguishing the individual modules of a batch.

Structure of the serial number: **KK YY FF HH**

KK - week of production (CW, calendar week)
YY - year of production
FF - firmware version
HH - hardware version

Example with serial number 12 06 3A 02:

12 - production week 12
06 - production year 2006
3A - firmware version 3A
02 - hardware version 02

Fig. 1: EL2872 with revision 0022 and serial number 01200815

2.5.3 Beckhoff Identification Code (BIC)

The Beckhoff Identification Code (BIC) is increasingly being applied to Beckhoff products to uniquely identify the product. The BIC is represented as a Data Matrix Code (DMC, code scheme ECC200), the content is based on the ANSI standard MH10.8.2-2016.
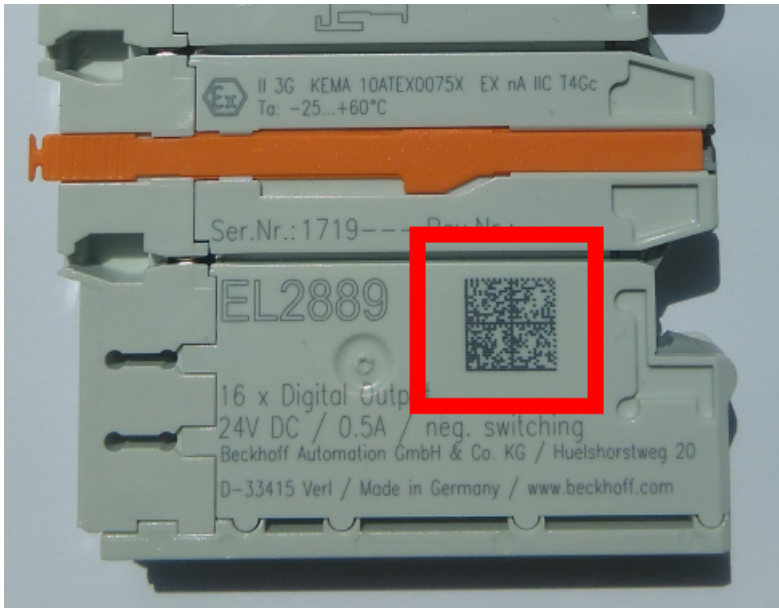
Fig. 2: BIC as data matrix code (DMC, code scheme ECC200)

The BIC will be introduced step by step across all product groups.

Depending on the product, it can be found in the following places:

- on the packaging unit
- directly on the product (if space suffices)
- on the packaging unit and the product

The BIC is machine-readable and contains information that can also be used by the customer for handling and product management.

Each piece of information can be uniquely identified using the so-called data identifier (ANSI MH10.8.2-2016). The data identifier is followed by a character string. Both together have a maximum length according to the table below. If the information is shorter, spaces are added to it.

Following information is possible, positions 1 to 4 are always present, the other according to need of production:

Posi-tion	Type of information	Explanation	Data identifier	Number of digits incl. data identifier	Example
1	Beckhoff order number	**Beckhoff order number**	1P	8	1P072222
2	Beckhoff Traceability Number (BTN**)**	**Unique serial number, see note below**	SBTN	12	SBTNk4p562d7
3	Article description	**Beckhoff article description, e.g. EL1008**	1K	32	1KEL1809
4	Quantity	**Quantity in packaging unit, e.g. 1, 10, etc.**	Q	6	Q1
5	Batch number	Optional: Year and week of production	2P	14	2P401503180016
6	ID/serial number	Optional: Present-day serial number system, e.g. with safety products	51S	12	51S678294
7	Variant number	Optional: Product variant number on the basis of standard products	30P	32	30PF971, 2*K183
...					

Further types of information and data identifiers are used by Beckhoff and serve internal processes.

Structure of the BIC

Example of composite information from positions 1 to 4 and with the above given example value on position 6. The data identifiers are highlighted in bold font:

1P072222**S**BTNk4p562d7**1K**EL1809 **Q**1 **51S**678294

Accordingly as DMC:

Fig. 3: Example DMC **1P**072222**S**BTNk4p562d7**1K**EL1809 **Q**1 **51S**678294

BTN

An important component of the BIC is the Beckhoff Traceability Number (BTN, position 2). The BTN is a unique serial number consisting of eight characters that will replace all other serial number systems at Beckhoff in the long term (e.g. batch designations on IO components, previous serial number range for safety products, etc.). The BTN will also be introduced step by step, so it may happen that the BTN is not yet coded in the BIC.

NOTICE
This information has been carefully prepared. However, the procedure described is constantly being further developed. We reserve the right to revise and change procedures and documentation at any time and without prior notice. No claims for changes can be made from the information, illustrations and descriptions in this information.

2.5.4   Electronic access to the BIC (eBIC)

Electronic BIC (eBIC)

The Beckhoff Identification Code (BIC) is applied to the outside of Beckhoff products in a visible place. If possible, it should also be electronically readable.

Decisive for the electronic readout is the interface via which the product can be electronically addressed.

K-bus devices (IP20, IP67)

Currently, no electronic storage and readout is planned for these devices.

EtherCAT devices (IP20, IP67)

All Beckhoff EtherCAT devices have a so-called ESI-EEPROM, which contains the EtherCAT identity with the revision number. Stored in it is the EtherCAT slave information, also colloquially known as ESI/XML configuration file for the EtherCAT master. See the corresponding chapter in the EtherCAT system manual (Link) for the relationships.

The eBIC is also stored in the ESI-EEPROM. The eBIC was introduced into the Beckhoff I/O production (terminals, box modules) from 2020; widespread implementation is expected in 2021.

The user can electronically access the eBIC (if existent) as follows:

- With all EtherCAT devices, the EtherCAT master (TwinCAT) can read the eBIC from the ESI-EEPROM
    - From TwinCAT 3.1 build 4024.11, the eBIC can be displayed in the online view.
    - To do this,
      check the checkbox "Show Beckhoff Identification Code (BIC)" under
      EtherCAT → Advanced Settings → Diagnostics:
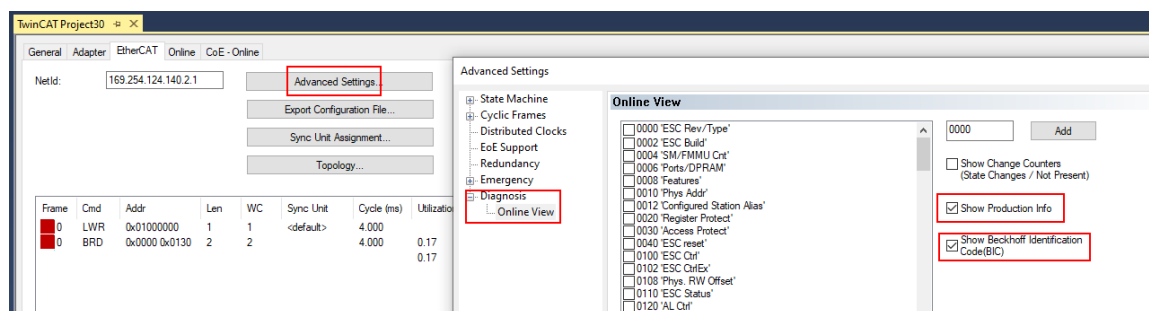
- The BTN and its contents are then displayed:

    - Note: as can be seen in the illustration, the production data HW version, FW version and production date, which have been programmed since 2012, can also be displayed with "Show Production Info".

    - Access from the PLC: From TwinCAT 3.1. build 4024.24 the functions *FB_EcReadBIC* and *FB_EcReadBTN* are available in the Tc2_EtherCAT Library from v3.3.19.0 for reading into the PLC..

- In the case of EtherCAT devices with CoE directory, the object 0x10E2:01 can additionally by used to display the device's own eBIC; the PLC can also simply access the information here:

◦ The device must be in PREOP/SAFEOP/OP for access:

Index	Name	Flags	Value		
1000	Device type	RO	0x015E1389 (22942601)		
1008	Device name	RO	ELM3704-0000		
1009	Hardware version	RO	00		
100A	Software version	RO	01		
100B	Bootloader version	RO	J0.1.27.0		
1011:0	Restore default parameters	RO	> 1 <		
1018:0	Identity	RO	> 4 <		
10E2:0	Manufacturer-specific Identification C...	RO	> 1 <		
10E2:01	SubIndex 001	RO	1P158442SBTN0008jekp1KELM3704	Q1	2P482001000016
10F0:0	Backup parameter handling	RO	> 1 <		
10F3:0	Diagnosis History	RO	> 21 <		
10F8	Actual Time Stamp	RO	0x170bfb277e		

- ◦ The object 0x10E2 will be introduced into stock products in the course of a necessary firmware revision.
- ◦ From TwinCAT 3.1. build 4024.24 the functions *FB_EcCoEReadBIC* and *FB_EcCoEReadBTN* are available in the Tc2_EtherCAT Library from v3.3.19.0 for reading into the PLC.

- For processing the BIC/BTN data in the PLC, the following auxiliary functions are available in *Tc2_Utilities* from TwinCAT 3.1 build 4024.24 onwards
    - ◦ F_SplitBIC: The function splits the Beckhoff Identification Code (BIC) sBICValue into its components based on known identifiers and returns the recognized partial strings in a structure ST_SplitBIC as return value.
    - ◦ BIC_TO_BTN: The function extracts the BTN from the BIC and returns it as a value.

- Note: in the case of electronic further processing, the BTN is to be handled as a string(8); the identifier "SBTN" is not part of the BTN.

- Technical background
The new BIC information is additionally written as a category in the ESI-EEPROM during the device production. The structure of the ESI content is largely dictated by the ETG specifications, therefore the additional vendor-specific content is stored with the help of a category according to ETG.2010. ID 03 indicates to all EtherCAT masters that they must not overwrite these data in case of an update or restore the data after an ESI update.
The structure follows the content of the BIC, see there. This results in a memory requirement of approx. 50..200 bytes in the EEPROM.

- Special cases
    - ◦ If multiple, hierarchically arranged ESCs are installed in a device, only the top-level ESC carries the eBIC Information.
    - ◦ If multiple, non-hierarchically arranged ESCs are installed in a device, all ESCs carry the eBIC Information.
    - ◦ If the device consists of several sub-devices with their own identity, but only the top-level device is accessible via EtherCAT, the eBIC of the top-level device is located in the CoE object directory 0x10E2:01 and the eBICs of the sub-devices follow in 0x10E2:nn.

PROFIBUS, PROFINET, DeviceNet devices etc.

Currently, no electronic storage and readout is planned for these devices.

3   Product description

3.1   EL300x

3.1.1   EL3001

3.1.1.1   EL3001 - Introduction
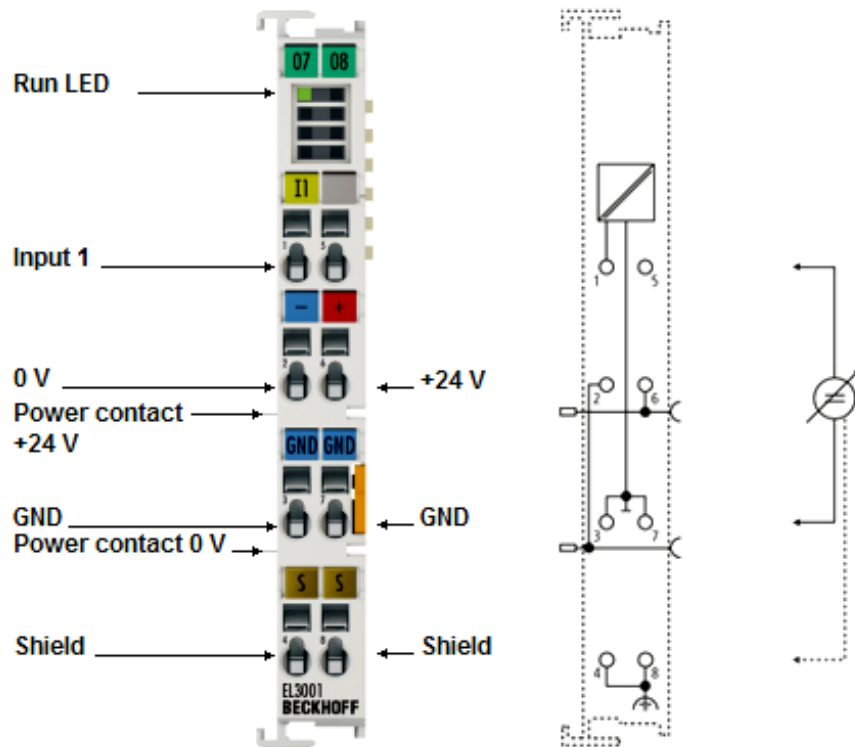
Fig. 4: EL3001

Analog Input Terminal; 1 channel, 12 bits, -10 V ... +10 V, single-ended input

The EL3001 analog input terminal processes signals in the range from -10 to +10 V. The voltage is digitized to a resolution of 12 bits and transmitted, electrically isolated, to the higher-level automation device.

The input channel of the EL3001 EtherCAT Terminal is a single-ended input and has an internal ground potential that is not connected to the power contacts.

The EL3001 is the 1-channel version and is characterized by its fine granularity and electrical isolation.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 249]

3.1.1.2   EL3001 - Technical data

Technical data	EL3001
analog inputs	1
Signal voltage	-10 V ... +10 V
Internal resistance	> 130 kΩ
Resolution	12 bits (16 bits presentation))
Sampling type	simultaneous
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 70 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.1.1.3 EL3001 - Connection, display and diagnostics
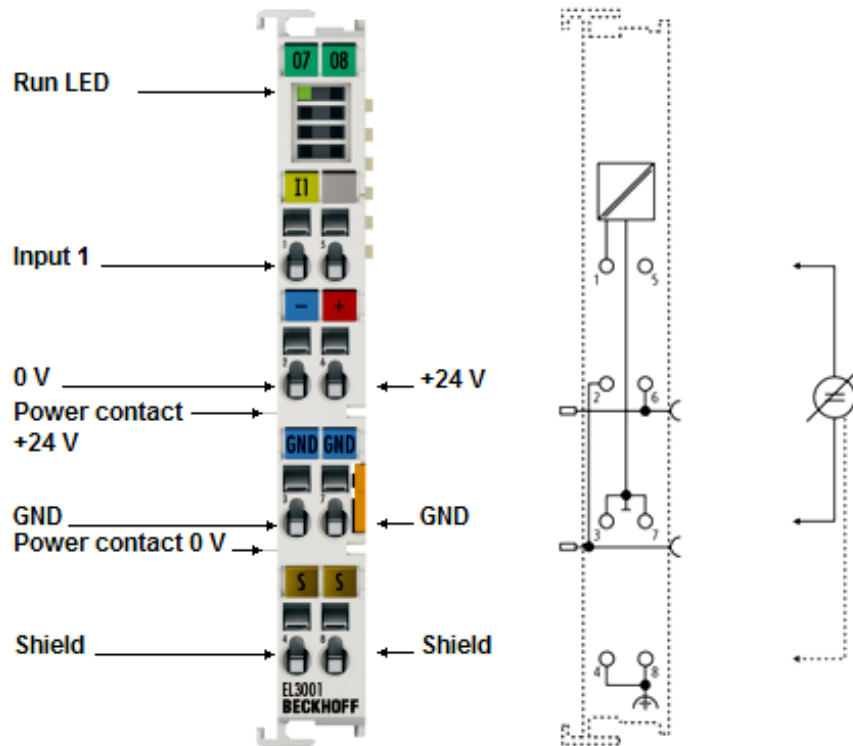
Fig. 5: LED and connection EL3001

RUN - LEDs

LED	Color	Meaning	
RUN *)	green	These LEDs indicate the terminal's operating state:	
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible

*) If several RUN LEDs are present, all of them have the same function.

EL3001 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	not applicable (voltage input)
0 V	2	0 V	negative power contact	1 A
GND	3	Signal ground for input 1	7	40 mA
Shield	4	Shield (FE)	8; DIN rail	100 mA **)
n. c.	5	not connected	-	-
24 V	6	24 V	positive power contact	1 A
GND	7	Signal ground for input 1	3	40 mA
Shield	8	Shield (FE)	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

3.1.2   EL3002

3.1.2.1   EL3002 - Introduction
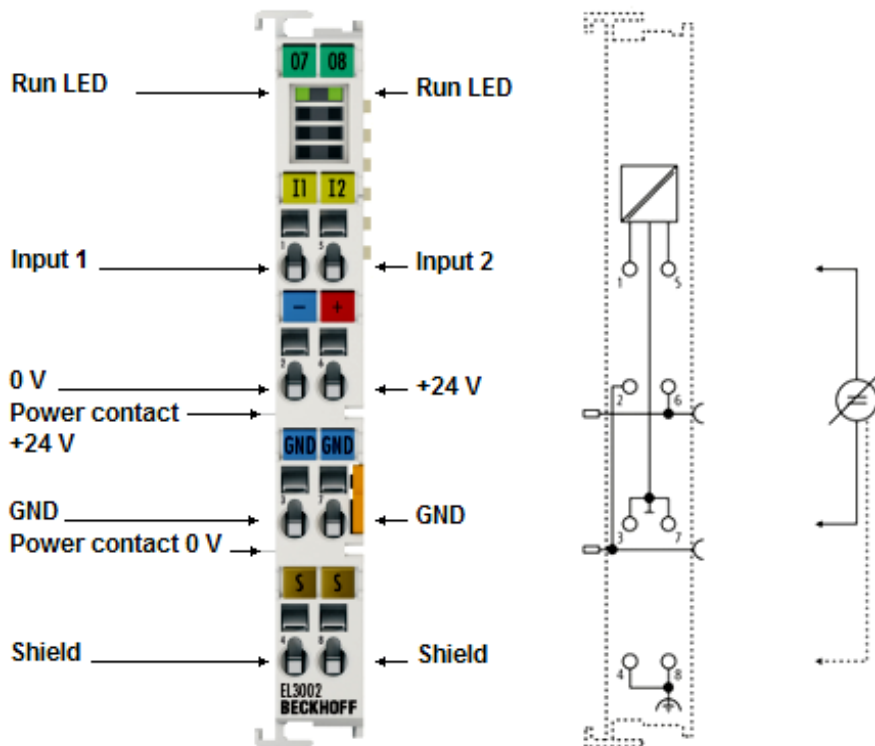
Fig. 6: EL3002

Analog Input Terminal; 2 channels, 12 bits, -10 V ... +10 V, single-ended inputs

The EL3002 analog input terminal processes signals in the range from -10 to +10 V. The voltage is digitized to a resolution of 12 bits and transmitted, electrically isolated, to the higher-level automation device.

The input channels of the EL3002 EtherCAT Terminal are single-ended inputs and have a common internal ground potential, which is not connected to the power contacts.

The EL3001 is the 1-channel version and is characterized by its fine granularity and electrical isolation.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 256]

3.1.2.2 EL3002 - Technical data

Technical data	EL3002
analog inputs	2
Signal voltage	-10 V ... +10 V
Internal resistance	> 130 kΩ
Resolution	12 bits (16 bits presentation))
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 70 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.1.2.3   EL3002 - Connection, display and diagnostics
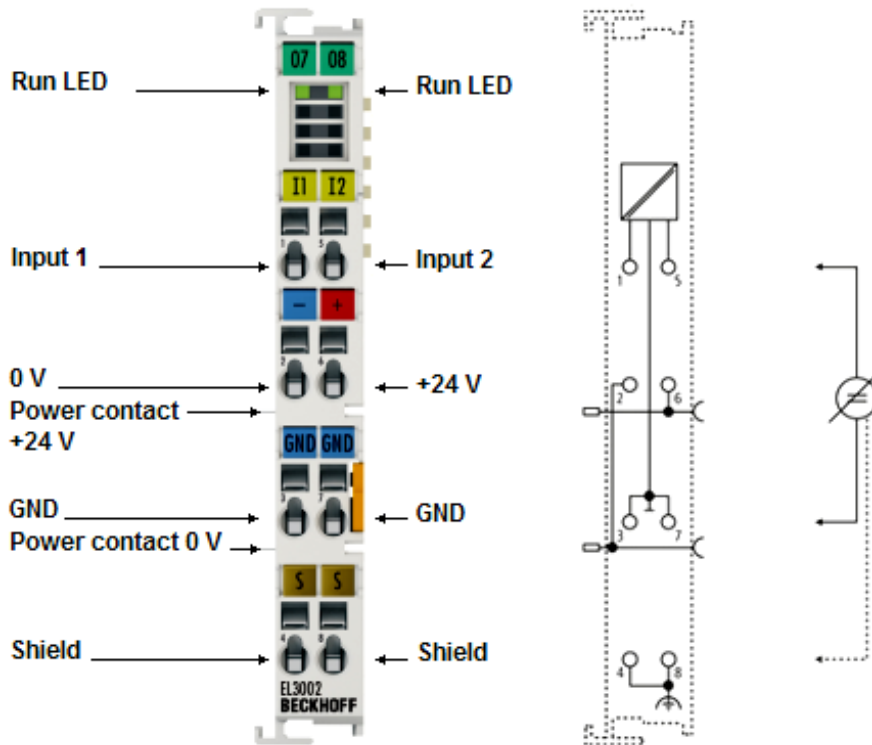
Fig. 7: LED and connection EL3002

RUN - LEDs

LED	Color	Meaning	
RUN *)	green	These LEDs indicate the terminal's operating state:	
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible

*) If several RUN LEDs are present, all of them have the same function.

EL3002 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	not applicable (voltage input)
0 V	2	0 V	negative power contact	1 A
GND	3	Signal ground for input 1	7	40 mA
Shield	4	Shield (FE)	8; DIN rail	100 mA **)
Input 2	5	Input 2	-	not applicable (voltage input)
24 V	6	24 V	positive power contact	1 A
GND	7	Signal ground for input 2	3	40 mA
Shield	8	Shield (FE)	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

3.1.3   EL3004

3.1.3.1   EL3004 - Introduction
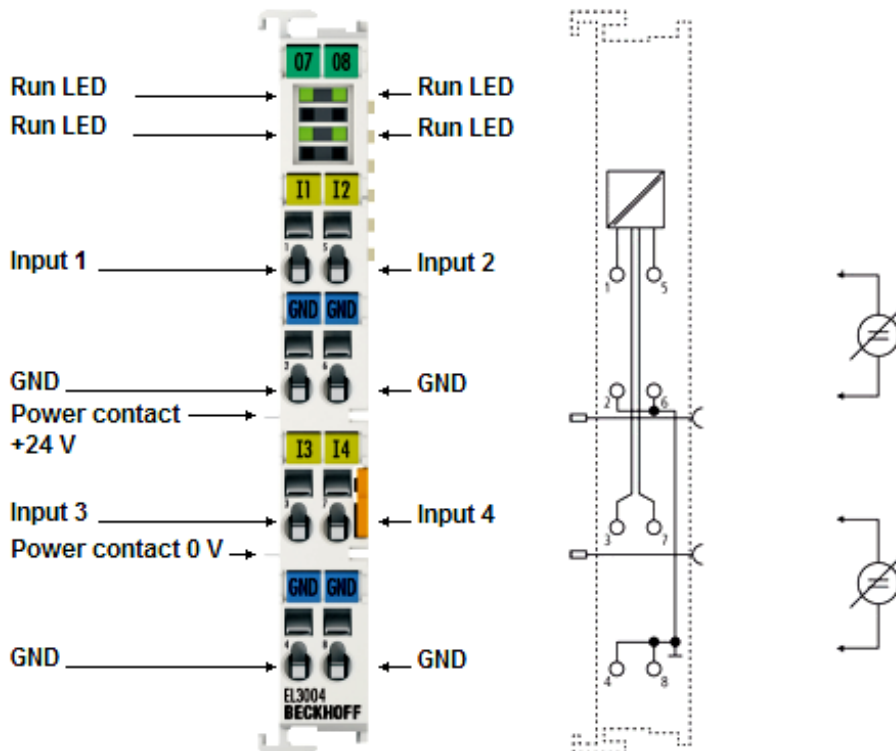
Fig. 8: EL3004

Analog Input Terminal; 4 channels, 12 bits, -10 V ... +10 V, single-ended inputs

The EL3004 analog input terminal processes signals in the range from -10 to +10 V. With a resolution of 12 bits, the voltage is digitized and transported, electrically isolated, to the higher-level automation device. The power contacts are connected through.

In the EL3004 EtherCAT Terminal the four single-ended inputs are configured as 2-wire versions and have a common internal ground potential, which is not connected to the power contacts.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 263]

3.1.3.2 EL3004 - Technical data

Technical data	EL3004
analog inputs	4
Signal voltage	-10 V ... +10 V
Internal resistance	> 130 kΩ
Resolution	12 bits (16 bits presentation))
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 70 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.1.3.3   EL3004 - Connection, display and diagnostics
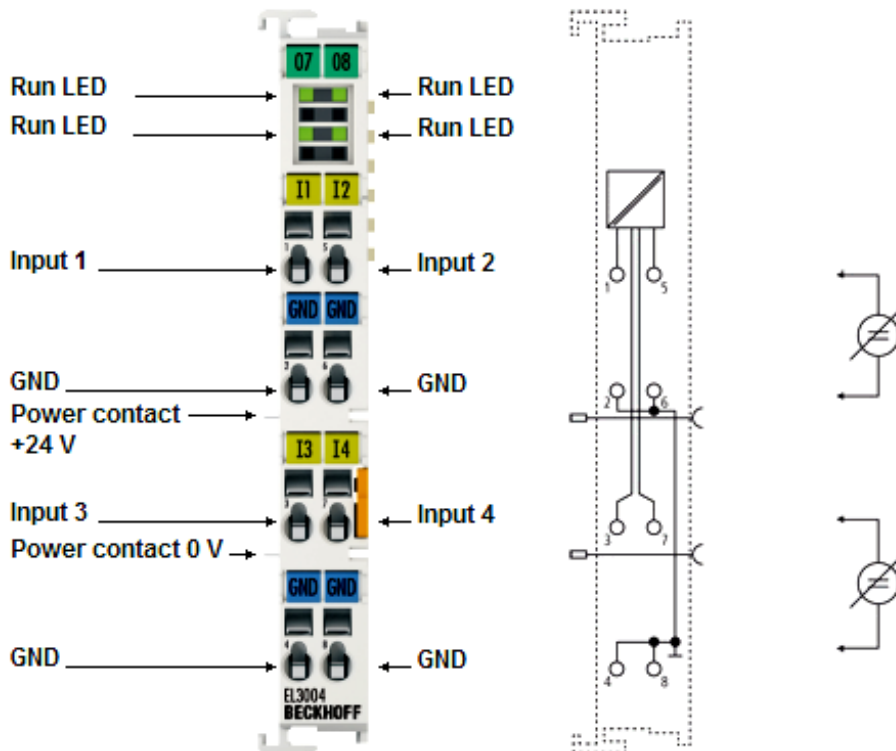
Fig. 9: LED EL3004

RUN - LEDs

LED	Color	Meaning	
RUN *)	green	These LEDs indicate the terminal's operating state:	
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible

*) If several RUN LEDs are present, all of them have the same function.

EL3004 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	not applicable (voltage input)
GND	2	Signal ground for input 1	4,6,8	40 mA
Input 3	3	Input 3	-	not applicable (voltage input)
GND	4	Signal ground for input 3	2,6,8	40 mA
Input 2	5	Input 2	-	not applicable (voltage input)
GND	6	Signal ground for input 2	2,4,8	40 mA
Input 4	7	Input 4	-	not applicable (voltage input)
GND	8	Signal ground for input 4	2,4,6	40 mA

*) Constant and peak value

3.1.4 EL3008

3.1.4.1 EL3008 - Introduction
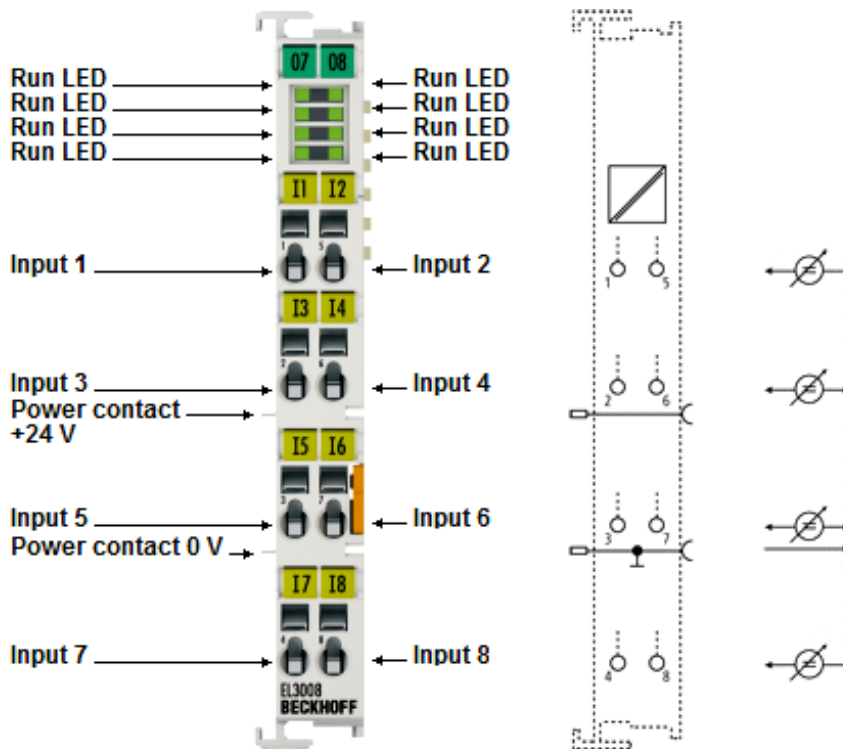
Fig. 10: EL3008

Analog Input Terminal; 8 channels, 12 bits, -10 V ... +10 V, single-ended inputs

The EL3008 analog input terminal processes signals in the range from -10 to +10 V. With a resolution of 12 bits, the voltage is digitized and transported, electrically isolated, to the higher-level automation device. The power contacts are connected through.

The EL3008 combines eight channels in one housing. The reference ground for the inputs is the 0 V power contact.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 271]

3.1.4.2   EL3008 - Technical data

Technical data	EL3008
analog inputs	8
Signal voltage	-10 V ... +10 V
Internal resistance	> 130 kΩ
Resolution	12 bits (16 bits presentation))
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 1.25 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 70 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.1.4.3   EL3008 - Connection, display and diagnostics
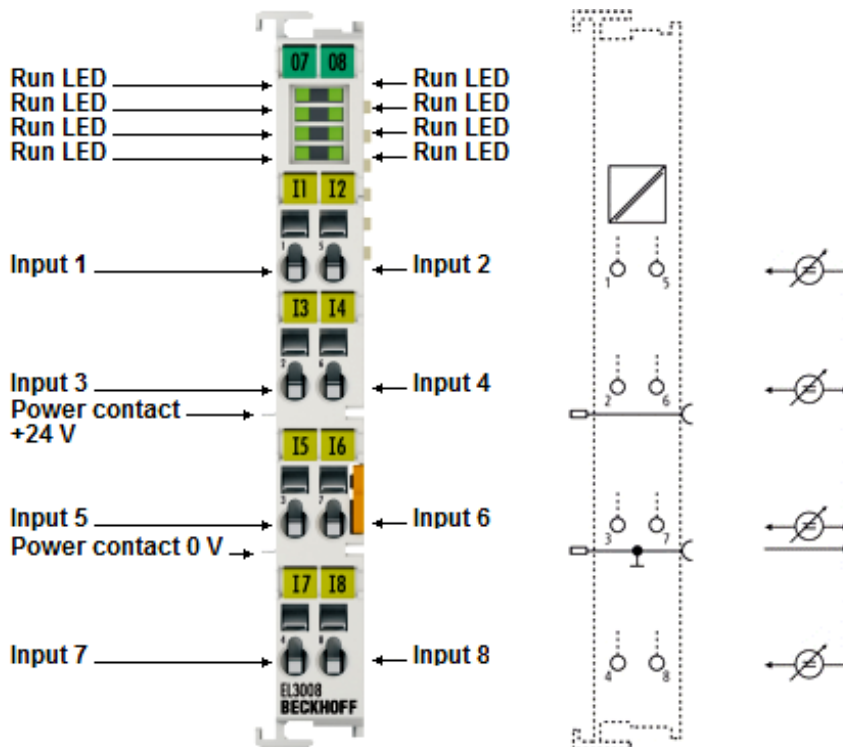
Fig. 11: LED EL3008

RUN - LEDs

LED	Color	Meaning	
RUN *)	green	These LEDs indicate the terminal's operating state:	
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible

*) If several RUN LEDs are present, all of them have the same function.

EL3008 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	not applicable (voltage input)
Input 3	2	Input 3	-	not applicable (voltage input)
Input 5	3	Input 5	-	not applicable (voltage input)
Input 7	4	Input 7	-	not applicable (voltage input)
Input 2	5	Input 2	-	not applicable (voltage input)
Input 4	6	Input 4	-	not applicable (voltage input)
Input 6	7	Input 6	-	not applicable (voltage input)
Input 8	8	Input 8	-	not applicable (voltage input)

*) Constant and peak value

3.2 EL301x

3.2.1 EL3011

3.2.1.1 EL3011 - Introduction
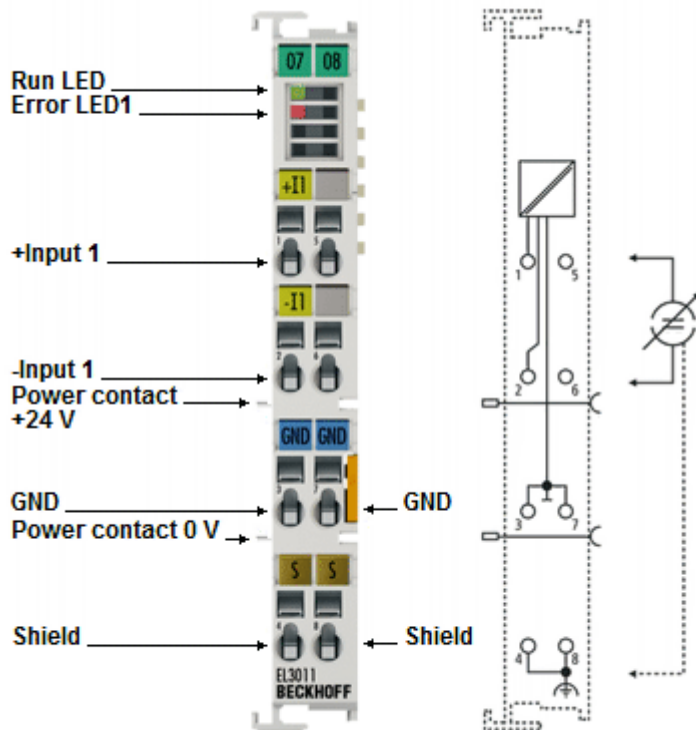
Fig. 12: EL3011

Analog Input Terminal; 1 channel, 12 bits, 0 ... 20 mA, differential input

The EL3011 analog input terminal processes signals in the range from 0 to 20 mA. The current is digitized to a resolution of 12 bits and transported, electrically isolated, to the higher-level automation device. The input channel of the EL3011 EtherCAT Terminal is a differential input and has an internal ground potential that is not connected to the power contacts.

Overcurrent is displayed not only in the process image, but also by an error LED.

The EL3011 is the 1-channel version and is characterized by its fine granularity and electrical isolation.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 283]

3.2.1.2 EL3011 - Technical data

Technical data	EL3011
analog inputs	1
Signal current	0…20 mA
Internal resistance	85 Ω typ. + diode voltage
Input filter cut-off frequency	1 kHz
Common-mode voltage U_{cm}	max. 10 V
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms default, configurable
Resolution	12 bits (16 bits presentation, including sign)
Sampling type	simultaneous
Ground reference	differential
Support NoCoeStorage [▶ 129]	yes
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Electrical isolation	500 V (E-bus/field voltage)
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 55 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.2.1.3 EL3011 - Connection, display and diagnostics
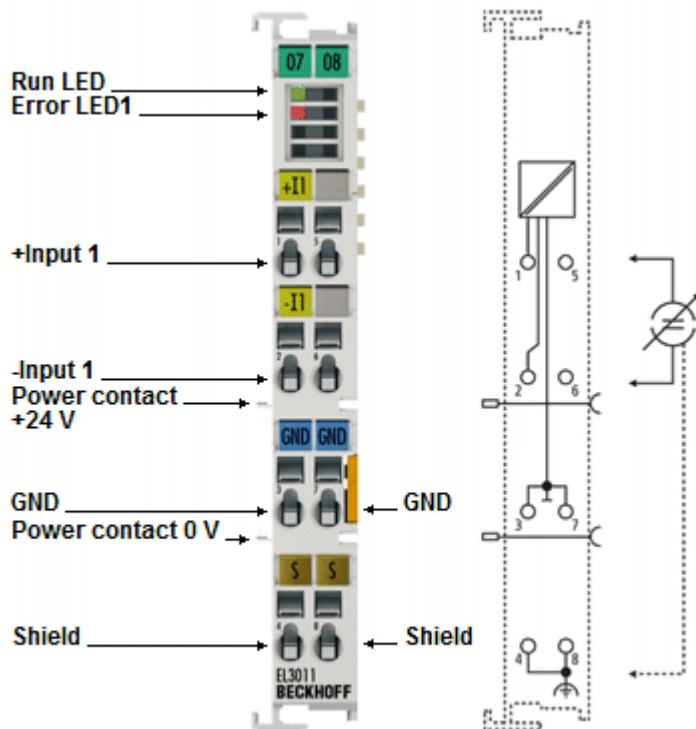
Fig. 13: RUN and ERROR LED EL3011

LED	Color	Meaning		
RUN *)	green	These LEDs indicate the terminal's operating state:		
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal	
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set	
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state	
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible	
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)		

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

ⓘ Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

EL3011 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
+ Input 1	1	+ Input 1	-	40 mA
- Input 1	2	- Input 1	-	40 mA
GND	3	Signal ground for input 1	7	40 mA
Shield	4	Shield (FE)	8; DIN rail	100 mA **)
n.c.	5	not connected	-	-
n.c.	6	not connected	-	-
GND	7	Signal ground for input 1	3	40 mA
Shield	8	Shield (FE)	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

3.2.2 EL3012

#### 3.2.2.1 EL3012 - Introduction
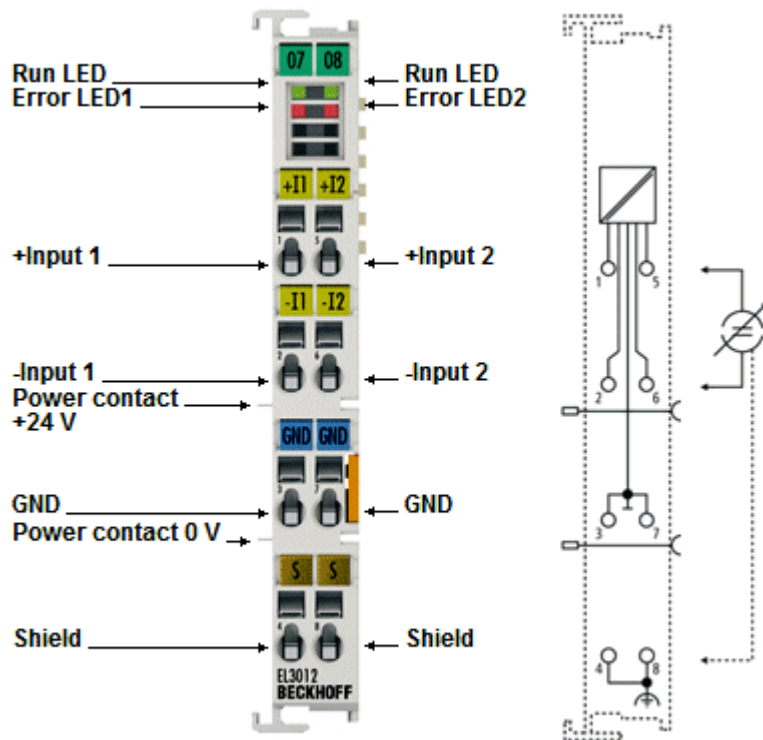
Fig. 14: EL3012

Analog Input Terminals; 1 and 2 channel, 12 bit, 0 ... 20 mA, differential inputs

The EL3011 and EL3012 analog input terminals process signals in the range between 0 and 20 mA. The current is digitized to a resolution of 12 bits, and is transmitted, in an electrically isolated form, to the higher-level automation device. The input channels of the EL3011/EL3012 EtherCAT Terminals are differential inputs and have a common internal ground potential, which is not connected to the power contacts.

Overcurrent is displayed not only in the process image, but also by an error LED for each channel.

The EL3011 is the single-channel version and is characterized by its fine granularity and electrical isolation. The EL3012 combines two channels in one housing

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 290]

3.2.2.2　EL3012 - Technical data

Technical data	EL3012
analog inputs	2
Signal current	0…20 mA
Internal resistance	85 Ω typ. + diode voltage
Input filter cut-off frequency	1 kHz
Common-mode voltage U_{cm}	max. 10 V
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms default, configurable
Resolution	12 bits (16 bits presentation, including sign)
Sampling type	multiplex
Ground reference	differential
Support NoCoeStorage [▶ 129]	yes
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Electrical isolation	500 V (E-bus/field voltage)
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 55 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.2.2.3 EL3012 - Connection, display and diagnostics
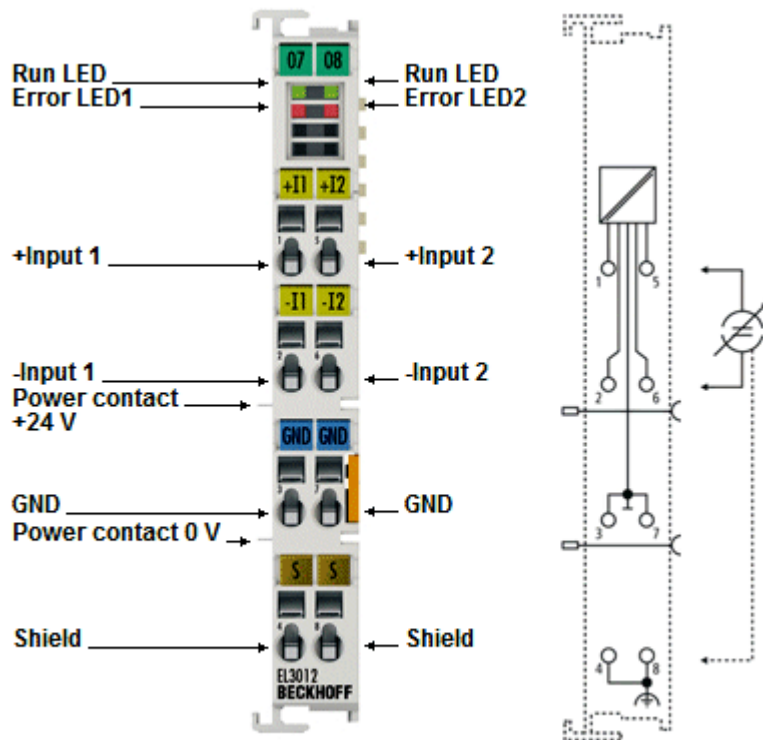
Fig. 15: RUN and ERROR LED EL3012

LED	Color	Meaning	
RUN *)	green	These LEDs indicate the terminal's operating state:	
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)	

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

BECKHOFF

EL3012 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
+ Input 1	1	+ Input 1	-	40 mA
- Input 1	2	- Input 1	-	40 mA
GND	3	Signal ground for input 1	7	40 mA
Shield	4	Shield (FE)	8; DIN rail	100 mA **)
+ Input 2	5	+ Input 2	-	40 mA
- Input 2	6	- Input 2	-	40 mA
GND	7	Signal ground for input 2	3	40 mA
Shield	8	Shield (FE)	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

3.2.3 EL3014

3.2.3.1 EL3014 - Introduction
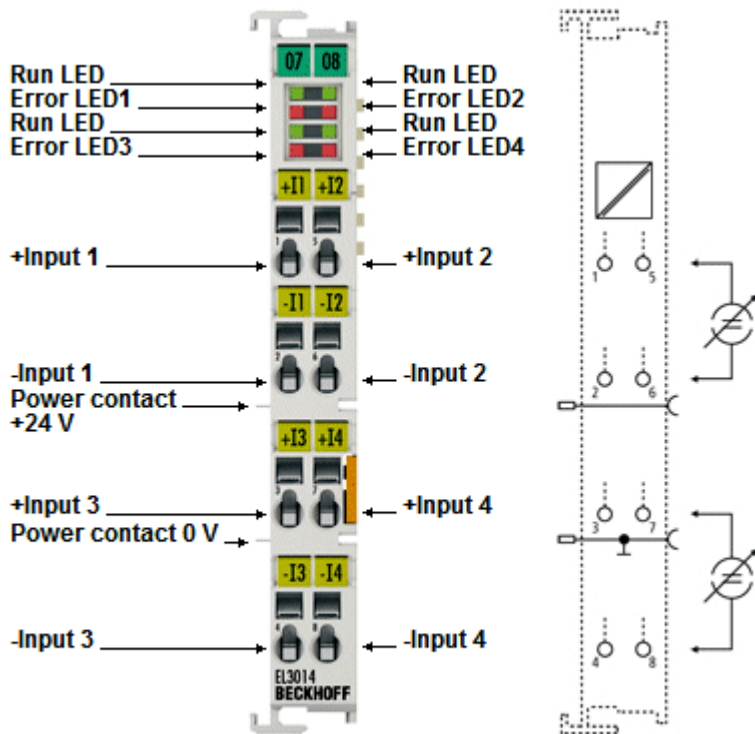
Fig. 16: EL3014

Analog Input Terminals; 4 channel, 12 bits, 0 ... 20 mA, differential inputs

The EL3014 analog input terminal handles signals in the range from 0 to 20 mA. The current is digitized to a resolution of 12 bits, and is transmitted, in an electrically isolated form, to the higher-level automation device. The input channels of the EtherCAT Terminal are differential inputs and have a common reference ground, which is connected to the 0 V power contact.

Overcurrent is displayed not only in the process image, but also by an error LED for each channel.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 297]

3.2.3.2   EL3014 - Technical data

Technical data	EL3014
analog inputs	4
Signal current	0…20 mA
Internal resistance	85 Ω typ. + diode voltage
Input filter cut-off frequency	1 kHz
Common-mode voltage U_{cm}	max. 10 V
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms default, configurable
Resolution	12 bits (16 bits presentation, including sign)
Sampling type	multiplex
Ground reference	differential
Support NoCoeStorage [▶ 129]	yes
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Electrical isolation	500 V (E-bus/field voltage)
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 55 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.2.3.3 EL3014 - Connection, display and diagnostics
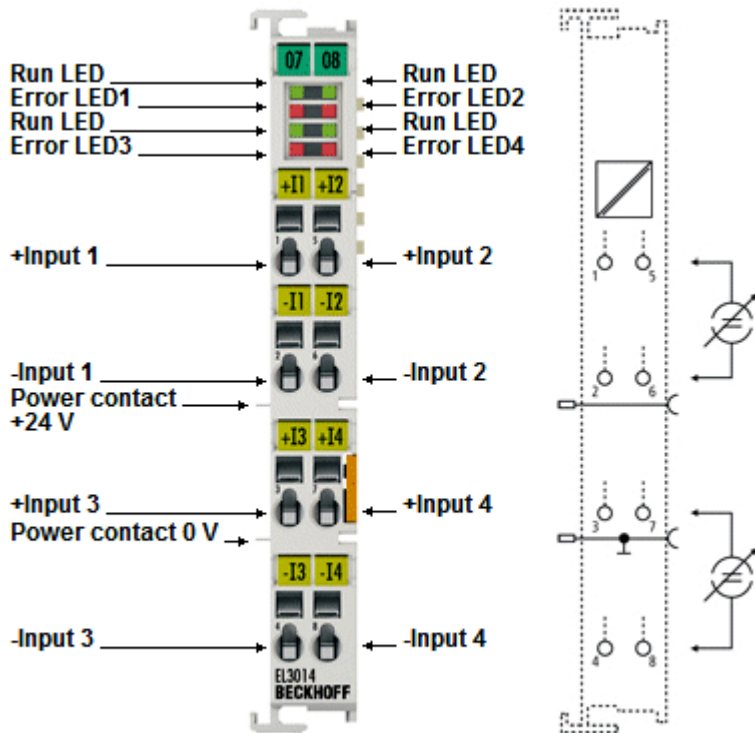
Fig. 17: RUN and ERROR LED EL3014

LED	Color	Meaning		
RUN *)	green	These LEDs indicate the terminal's operating state:		
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal	
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set	
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state	
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible	
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)		

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

EL3014 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
+ Input 1	1	+ Input 1	-	40 mA
- Input 1	2	- Input 1	-	40 mA
+ Input 3	3	+ Input 3	-	40 mA
- Input 3	4	- Input 3	-	40 mA
+ Input 2	5	+ Input 2	-	40 mA
- Input 2	6	- Input 2	-	40 mA
+ Input 4	7	+ Input 4	-	40 mA
- Input 4	8	- Input 4	-	40 mA

*) Constant and peak value

●
ℹ **Overcurrent protection of the 20 mA inputs**

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.3 EL302x

3.3.1 EL3021

3.3.1.1 EL3021 - Introduction
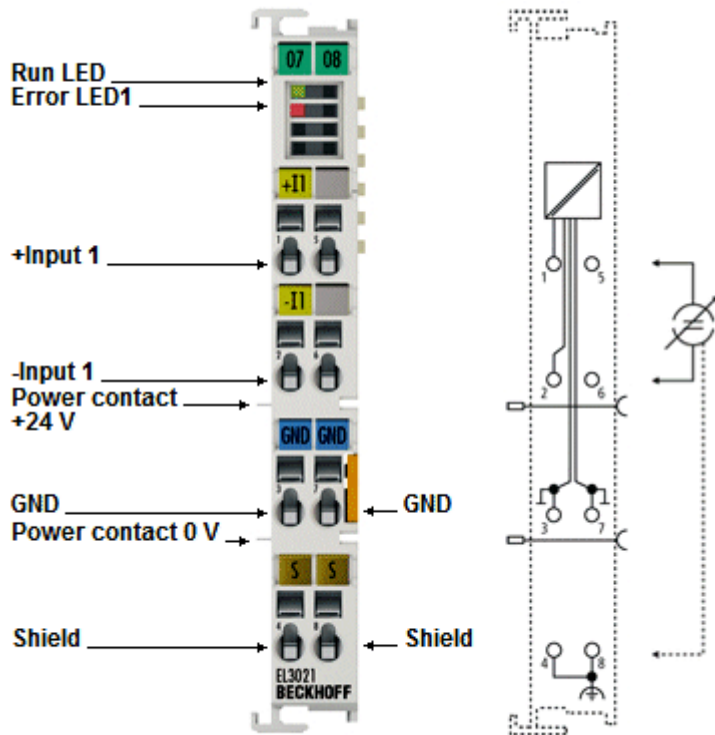
Fig. 18: EL3021

Analog Input Terminal; 1 channel, 12 bits, 4 ... 20 mA, differential input

The EL3021 analog input terminal processes signals in the range from 4 to 20 mA. The current is digitized to a resolution of 12 bits and transported, electrically isolated, to the higher-level automation device. The input channel of the EtherCAT Terminals is a differential input and has an internal ground potential that is not connected to the power contacts.

Overcurrent and wire break are displayed not only in the process image, but also by an error LED.

The EL3021 is the 1-channel version and is characterized by its fine granularity and electrical isolation.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 305]

3.3.1.2   EL3021 - Technical data

Technical data	EL3021
analog inputs	1
Signal current	4…20 mA
Internal resistance	85 Ω typ. + diode voltage
Input filter cut-off frequency	1 kHz
Common-mode voltage U_{cm}	max. 10 V
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms default, configurable
Resolution	12 bits (16 bits presentation, including sign)
Sampling type	simultaneous
Ground reference	differential
Support NoCoeStorage [▶ 129]	yes
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Electrical isolation	500 V (E-bus/field voltage)
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 55 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.3.1.3 EL3021 - Connection, display and diagnostics
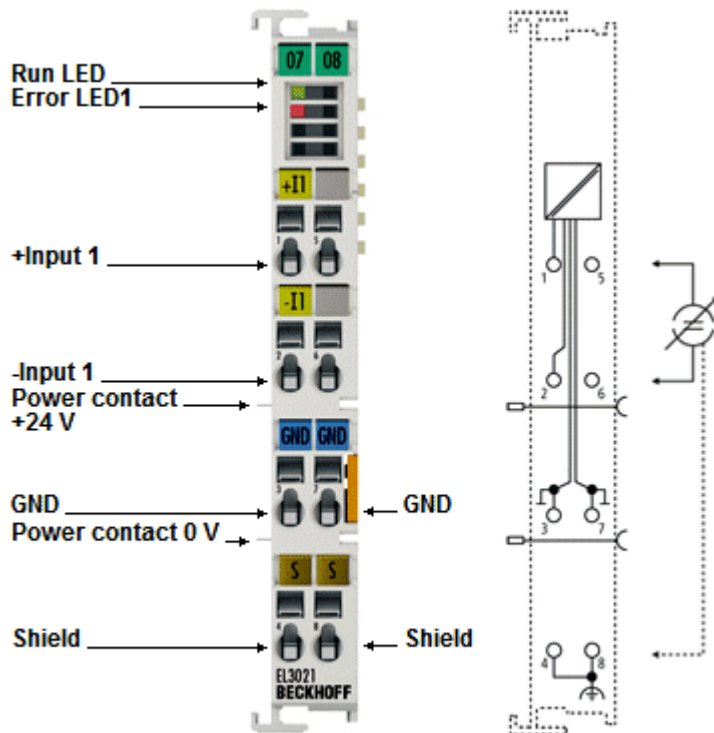
Fig. 19: RUN and ERROR LED EL3021

LED	Color	Meaning		
RUN *)	green	These LEDs indicate the terminal's operating state:		
			off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
			flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
			single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
			on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)		

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

ⓘ **Overcurrent protection of the 20 mA inputs**

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

EL3021 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
+ Input 1	1	+ Input 1	-	40 mA
- Input 1	2	- Input 1	-	40 mA
GND	3	Signal ground for input 1	7	40 mA
Shield	4	Shield (FE)	8; DIN rail	100 mA **)
n.c.	5	not connected	-	-
n.c.	6	not connected	-	-
GND	7	Signal ground for input 1	3	40 mA
Shield	8	Shield (FE)	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			

3.3.2 EL3022

3.3.2.1 EL3022 - Introduction
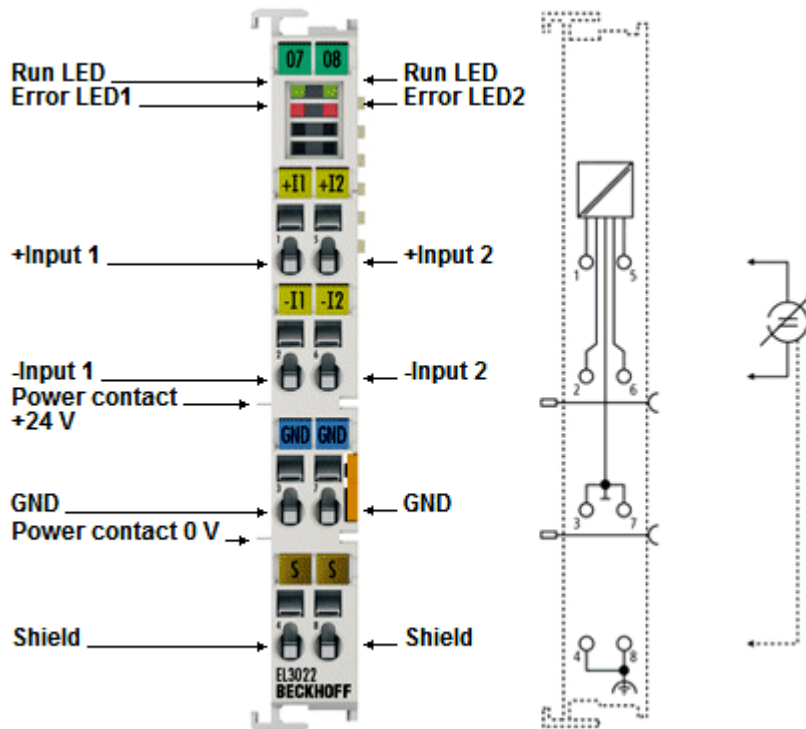
Fig. 20: EL3022

Analog Input Terminal; 2 channels, 12 bits, 4 ... 20 mA, differential inputs

The EL3022 analog input terminal processes signals in the range from 4 to 20 mA. The current is digitized to a resolution of 12 bits and transported, electrically isolated, to the higher-level automation device. The input channels of the EtherCAT Terminal are differential inputs and have a common internal ground potential, which is not connected to the power contacts.

Overcurrent and wire break are displayed not only in the process image, but also by an error LED for each channel.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 312]

3.3.2.2 EL3022 - Technical data

Technical data	EL3022
analog inputs	2
Signal current	4…20 mA
Internal resistance	85 Ω typ. + diode voltage
Input filter cut-off frequency	1 kHz
Common-mode voltage U_{cm}	max. 10 V
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms default, configurable
Resolution	12 bits (16 bits presentation, including sign)
Sampling type	multiplex
Ground reference	differential
Support NoCoeStorage [▶ 129]	yes
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Electrical isolation	500 V (E-bus/field voltage)
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 55 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.3.2.3 EL3022 - Connection, display and diagnostics
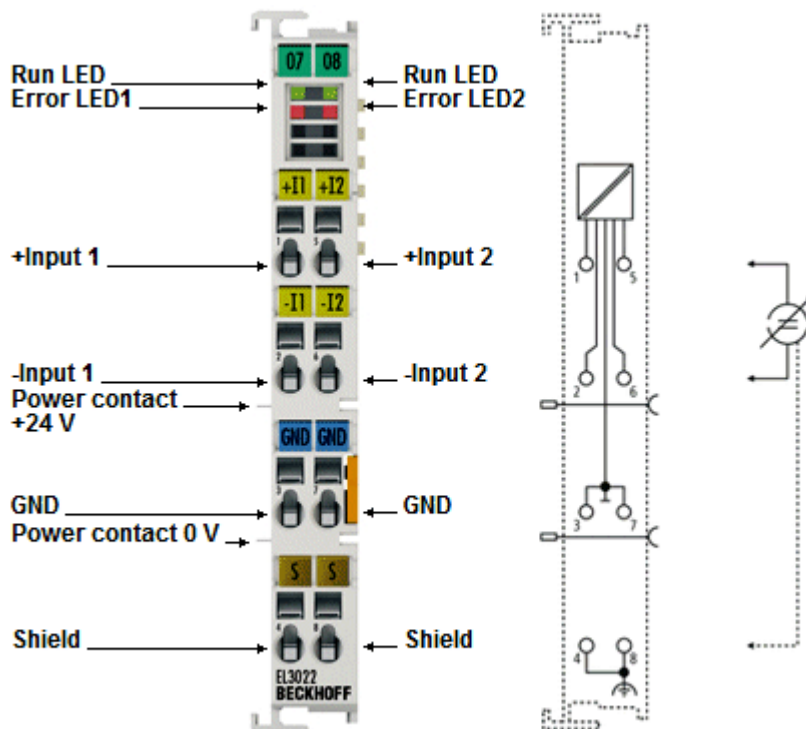
Fig. 21: RUN and ERROR LED EL3022

LED	Color	Meaning	
RUN *)	green	These LEDs indicate the terminal's operating state:	
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)	

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

ℹ **Overcurrent protection of the 20 mA inputs**

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

EL3022 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
+ Input 1	1	+ Input 1	-	40 mA
- Input 1	2	- Input 1	-	40 mA
GND	3	Signal ground for input 1	7	40 mA
Shield	4	Shield (FE)	8; DIN rail	100 mA **)
+ Input 2	5	+ Input 2	-	40 mA
- Input 2	6	- Input 2	-	40 mA
GND	7	Signal ground for input 2	3	40 mA
Shield	8	Shield (FE)	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

3.3.3   EL3024

3.3.3.1   EL3024 - Introduction
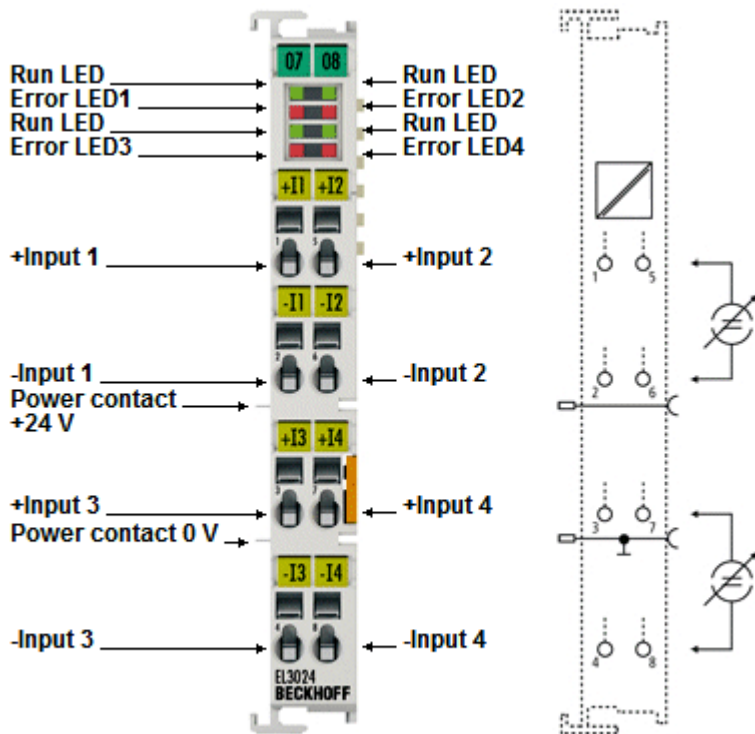
Fig. 22: EL3024

Analog Input Terminals; 4 channel, 12 bits, 4 ... 20 mA, differential inputs

The EL3024 analog input terminal handles signals in the range from 4 to 20 mA. The current is digitized to a resolution of 12 bits, and is transmitted, in an electrically isolated form, to the higher-level automation device. The input channels of the EtherCAT Terminal are differential inputs and have a common reference ground, which is connected to the 0 V power contact.

Overcurrent and open circuit are displayed not only in the process image, but also by an error LED for each channel.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 319]

3.3.3.2 EL3024 - Technical data

Technical data	EL3024
analog inputs	4
Signal current	4…20 mA
Internal resistance	85 Ω typ. + diode voltage
Input filter cut-off frequency	1 kHz
Common-mode voltage U_{cm}	max. 10 V
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms default, configurable
Resolution	12 bits (16 bits presentation, including sign)
Sampling type	multiplex
Ground reference	differential
Support NoCoeStorage [▶ 129]	yes
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Electrical isolation	500 V (E-bus/field voltage)
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 55 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.3.3.3 EL3024 - Connection, display and diagnostics
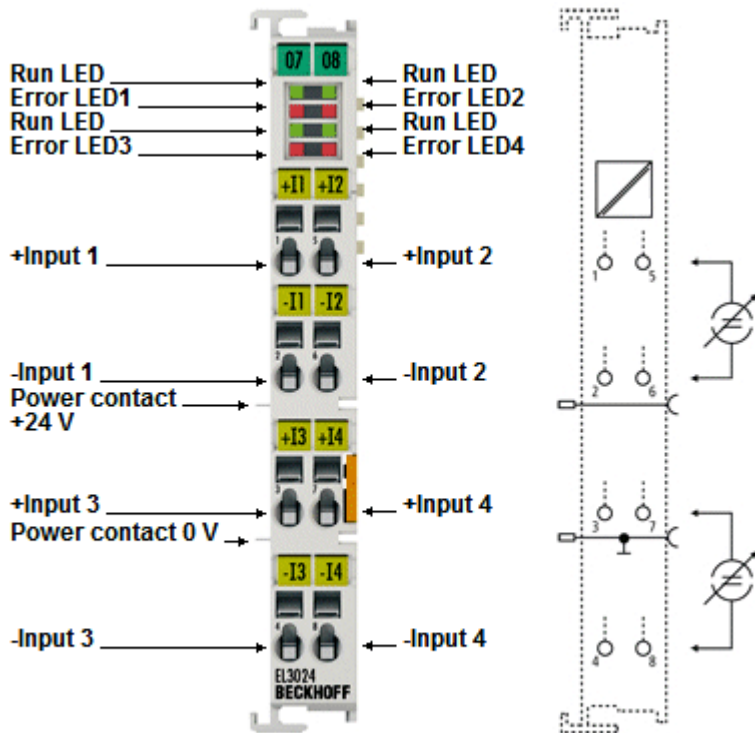
Fig. 23: EL3024

LED	Color	Meaning	
RUN *)	green	These LEDs indicate the terminal's operating state:	
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)	

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

EL3024 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
+ Input 1	1	+ Input 1	-	40 mA
- Input 1	2	- Input 1	-	40 mA
+ Input 3	3	+ Input 3	-	40 mA
- Input 3	4	- Input 3	-	40 mA
+ Input 2	5	+ Input 2	-	40 mA
- Input 2	6	- Input 2	-	40 mA
+ Input 4	7	+ Input 4	-	40 mA
- Input 4	8	- Input 4	-	40 mA

*) Constant and peak value

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.4 EL304x

3.4.1 EL3041

3.4.1.1 EL3041 - Introduction
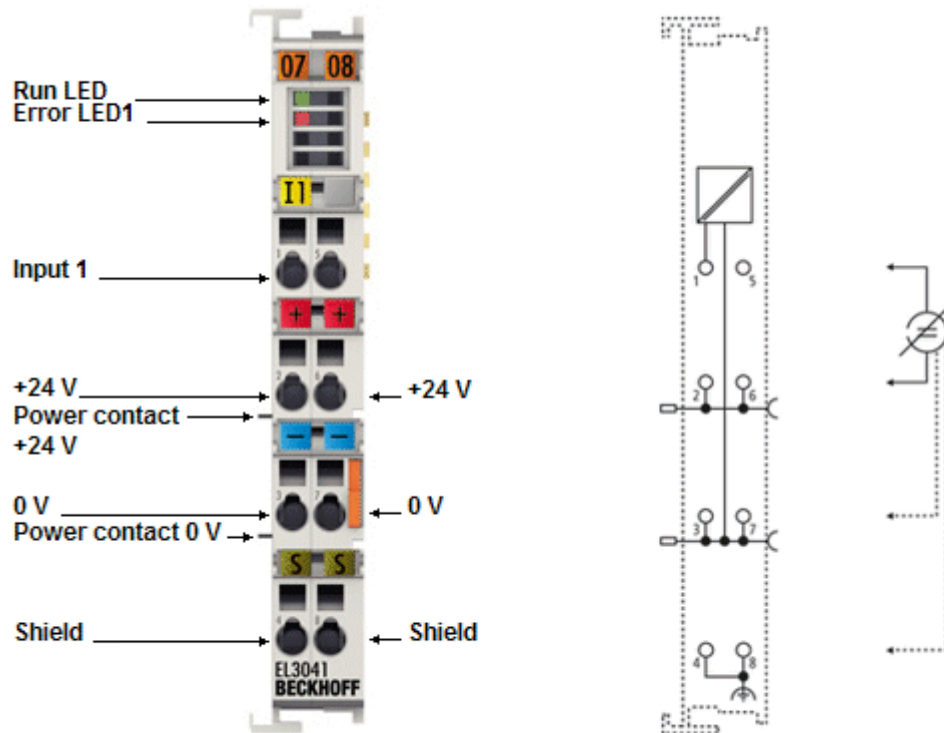
Fig. 24: EL3041

Analog Input Terminal; 1 channel, 12 bits, 0 ... 20 mA, single-ended input

The job of the EL3041 analog input terminal is to supply power to measuring transducers located in the field, and to transmit analog measuring signals, electrically isolated, to the automation device. The voltage for the sensors is supplied to the terminals via the power contacts. The EtherCAT Terminal indicates overload via error LEDs.

The power contacts can optionally be supplied with operating voltage in the standard way or via a power supply terminal (EL9xxx) with electrical isolation. The input electronics is independent of the supply voltage of the power contacts.
The 0 V power contact is the reference potential for the input.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 327]

3.4.1.2   EL3041 - Technical data

Technical data	EL3041
analog inputs	1
Signal current	0 mA ... 20 mA
Internal resistance	typ. 85 Ω
Resolution	12 bits (16 bits presentation)
Sampling type	simultaneous
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 60 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA GL, ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.4.1.3   EL3041 - Connection, display and diagnostics
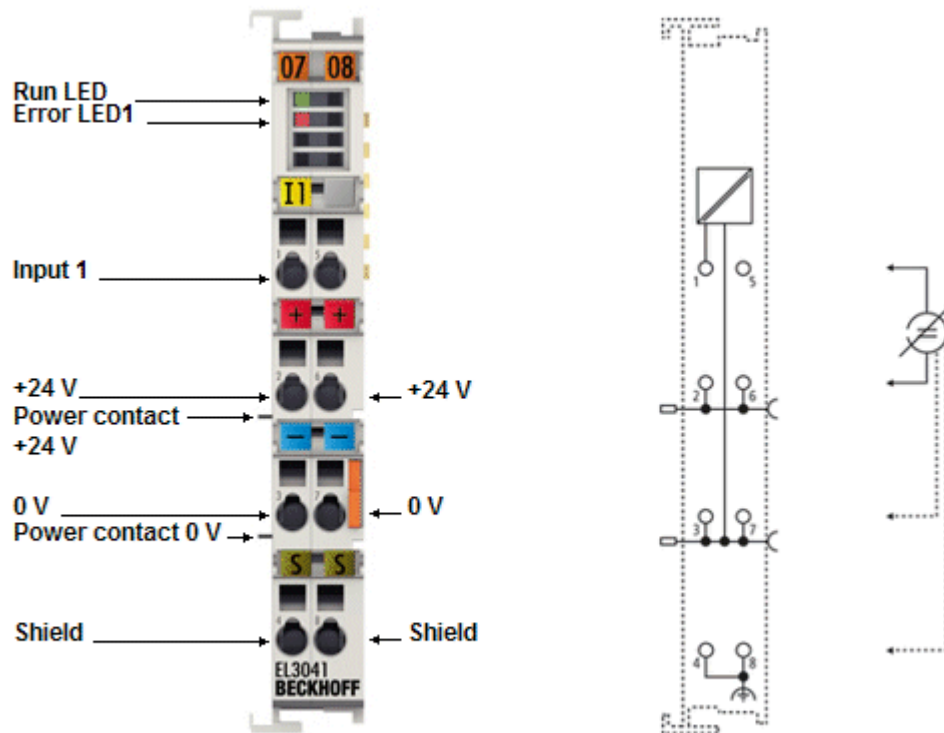
Fig. 25: RUN and ERROR LED EL3041

LED	Color	Meaning		
RUN *)	green	These LEDs indicate the terminal's operating state:		
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal	
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set	
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state	
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible	
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)		

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

BECKHOFF

EL3041 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	40 mA
24 V	2	24 V	6; positive power contact	1 A
0 V	3	0 V	7; negative power contact	1 A
Shield	4	Shield (FE)	8, DIN rail	100 mA **)
n. c.	5	not connected	-	
24 V	6	24 V	2; positive power contact	1 A
0 V	7	0 V	3; negative power contact	1 A
Shield	8	Shield (FE)	4, DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

● **Overcurrent protection of the 20 mA inputs**

ℹ The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.4.2   EL3042

3.4.2.1   EL3042 - Introduction
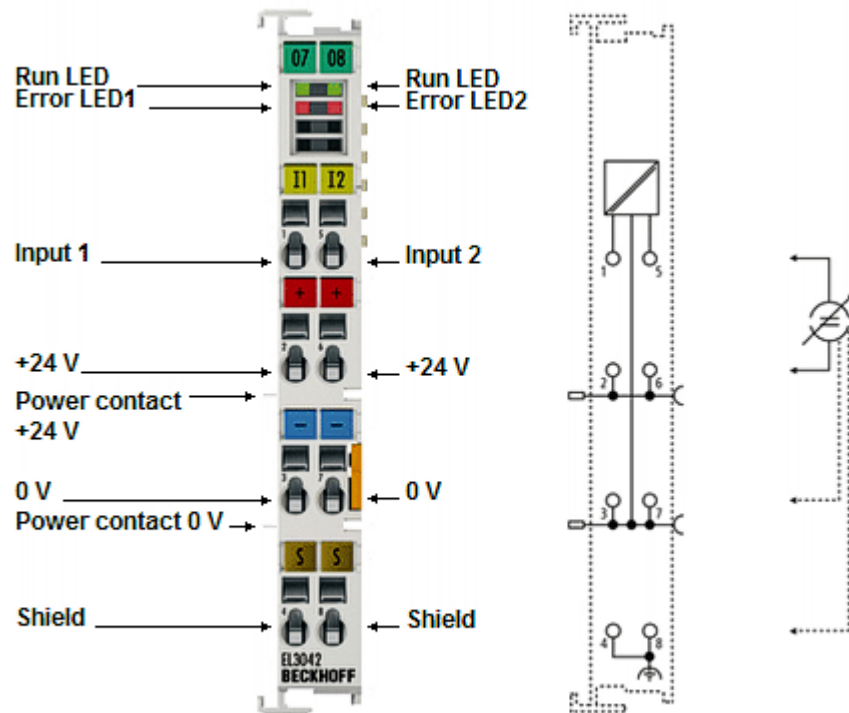
Fig. 26: EL3042

Analog Input Terminal; 2 channels, 12 bits, 0 ... 20 mA, single-ended inputs

The job of the EL3042 analog input terminal is to supply power to measuring transducers located in the field, and to transmit analog measuring signals, electrically isolated, to the automation device. The voltage for the sensors is supplied to the terminals via the power contacts. The EtherCAT Terminals indicate overload via error LEDs.

The power contacts can optionally be supplied with operating voltage in the standard way or via a power supply terminal (EL9xxx) with electrical isolation. The input electronics are independent of the supply voltage of the power contacts.
The 0 V power contact is the reference potential for the inputs.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 334]

3.4.2.2   EL3042 - Technical data

Technical data	EL3042
analog inputs	2
Signal current	0 mA ... 20 mA
Internal resistance	typ. 85 Ω
Resolution	12 bits (16 bits presentation)
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 60 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA GL, ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.4.2.3   EL3042 - Connection, display and diagnostics
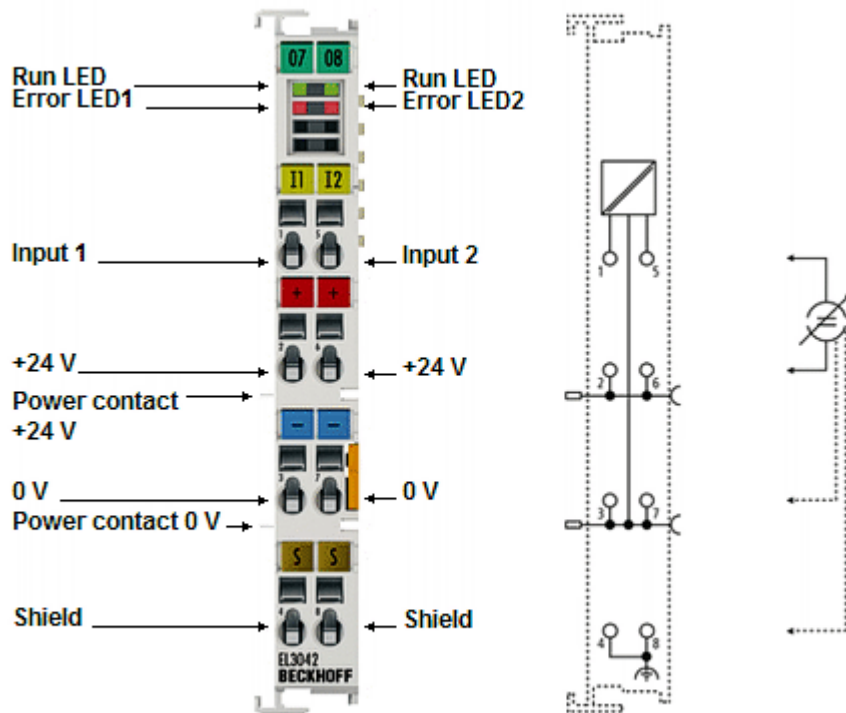
Fig. 27: RUN and ERROR LED EL3042

LED	Color	Meaning		
RUN *)	green	These LEDs indicate the terminal's operating state:		
		off	State of the <u>EtherCAT State Machine [▶ 212]</u>: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for <u>firmware updates [▶ 461]</u> of the terminal	
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set	
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the <u>Sync Manager [▶ 214]</u> channels and the distributed clocks. Outputs remain in safe state	
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible	
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)		

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

BECKHOFF

EL3042 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	40 mA
24 V	2	24 V	6; positive power contact	1 A
0 V	3	0 V	7; negative power contact	1 A
Shield	4	Shield (FE)	8; DIN rail	100 mA **)
Input 2	5	Input 2	-	40 mA
24 V	6	24 V	2; positive power contact	1 A
0 V	7	0 V	3; negative power contact	1 A
Shield	8	Shield (FE)	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.4.3 EL3044

3.4.3.1 EL3044 - Introduction
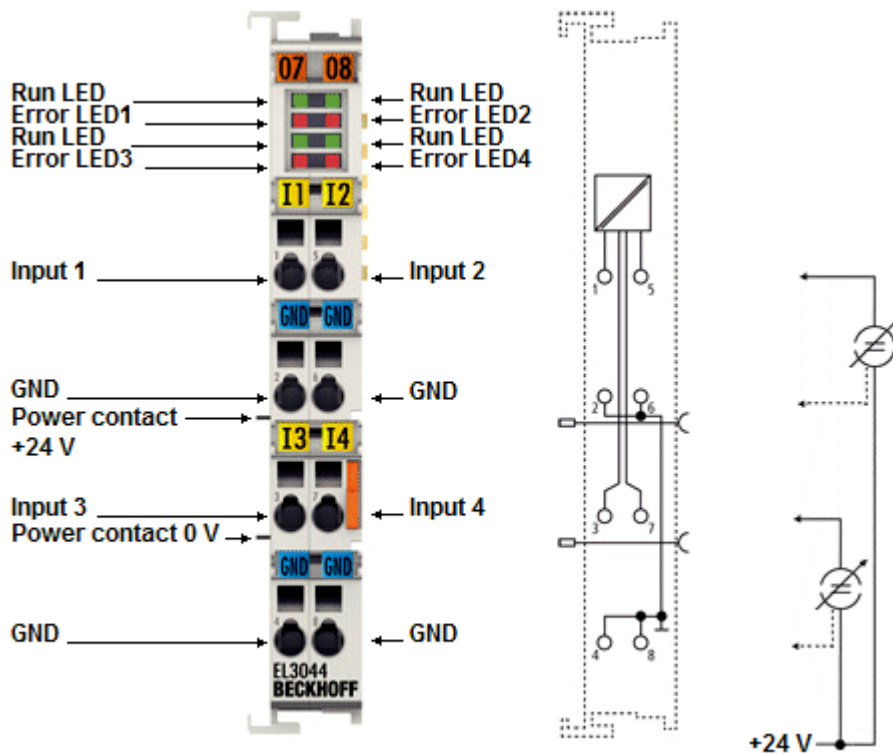
Fig. 28: EL3044

Analog Input Terminal; 4 channels, 12 bits, 0 ... 20 mA, single-ended inputs

The EL3044 analog input terminal processes signals in the range from 0 to 20 mA. The current is digitized to a resolution of 12 bits and transported, electrically isolated, to the higher-level automation device.
The power contacts are connected through. The EtherCAT Terminals indicate overload via error LEDs.

In the EL3044 EtherCAT Terminal the four single-ended inputs are configured as 2-wire versions and have a common internal ground potential, which is not connected to the power contacts.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 341]

3.4.3.2 EL3044 - Technical data

Technical data	EL3044
analog inputs	4
Signal current	0 mA ... 20 mA
Internal resistance	typ. 85 Ω
Resolution	12 bits (16 bits presentation)
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 60 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*]	CE, EAC, UKCA GL, ATEX [▶ 136], IECEx [▶ 137], cFMus [▶ 139], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc
cFMus	Class I, Division 2, Groups A, B, C, D Class I, Zone 2, AEx/Ex ec IIC T4 Gc

3.4.3.3   EL3044 - Connection, display and diagnostics
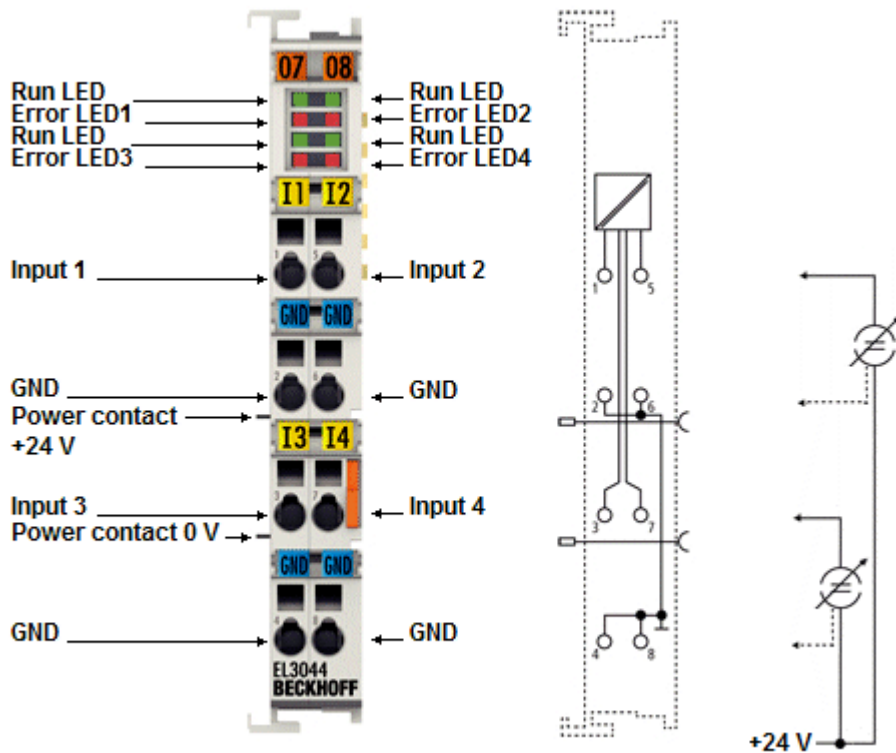
Fig. 29: RUN and ERROR LED EL3044

LED	Color	Meaning		
RUN *)	green	These LEDs indicate the terminal's operating state:		
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal	
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set	
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state	
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible	
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)		

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

EL3044 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	40 mA
GND	2	Signal ground for input 1	4, 6, 8	40 mA
Input 3	3	Input 3	-	40 mA
GND	4	Signal ground for input 3	2, 6, 8	40 mA
Input 2	5	Input 2	-	40 mA
GND	6	Signal ground for input 2	2, 4, 8	40 mA
Input 4	7	Input 4	-	40 mA
GND	8	Signal ground for input 4	2, 4, 6	40 mA

*) Constant and peak value

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.4.4   EL3048

3.4.4.1   EL3048 - Introduction
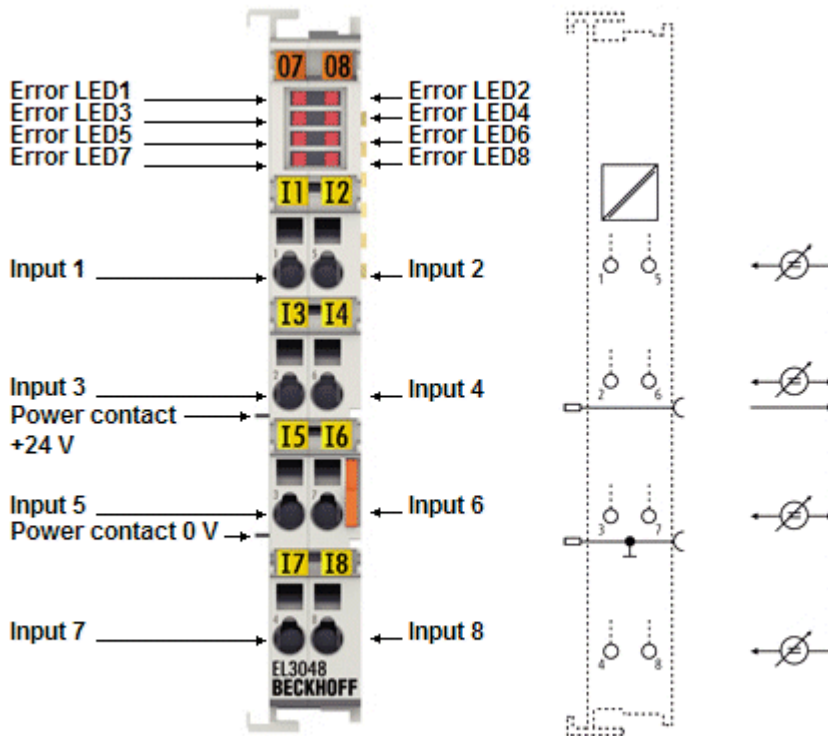
Fig. 30: EL3048

Analog Input Terminal; 8 channels, 12 bits, 0 ... 20 mA, single-ended inputs

The EL3048 analog input terminal processes signals in the range from 0 to 20 mA. The current is digitized to a resolution of 12 bits and transported, electrically isolated, to the higher-level automation device.
The power contacts are connected through. The EtherCAT Terminals indicate overload via error LEDs.

The EL3048 combines eight channels in one housing. The reference ground for the inputs is the 0 V power contact.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 349]

3.4.4.2   EL3048 - Technical data

Technical data	EL3048
analog inputs	8
Signal current	0 mA ... 20 mA
Internal resistance	typ. 85 Ω
Resolution	12 bits (16 bits presentation)
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 1.25 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 60 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.4.4.3 EL3048 - Connection, display and diagnostics
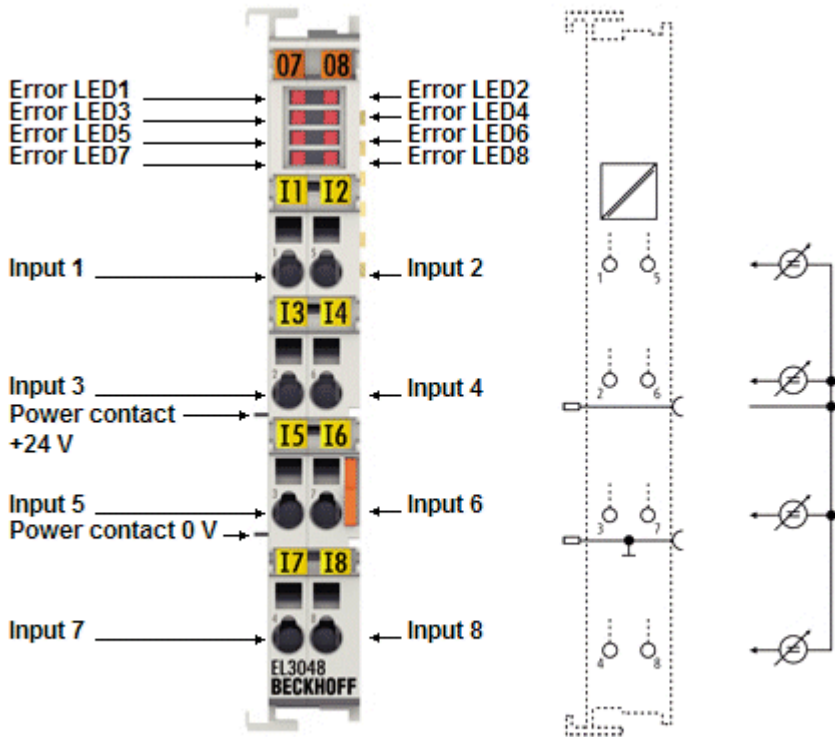
Fig. 31: EL3048

LED	Color	Meaning
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded

**) The error display shows the signal processing state for each channel

EL3048 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	40 mA
Input 3	2	Input 3	-	40 mA
Input 5	3	Input 5	-	40 mA
Input 7	4	Input 7	-	40 mA
Input 2	5	Input 2	-	40 mA
Input 4	6	Input 4	-	40 mA
Input 6	7	Input 6	-	40 mA
Input 8	8	Input 8	-	40 mA

*) Constant and peak value

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.5   EL305x

3.5.1   EL3051

3.5.1.1   EL3051 - Introduction
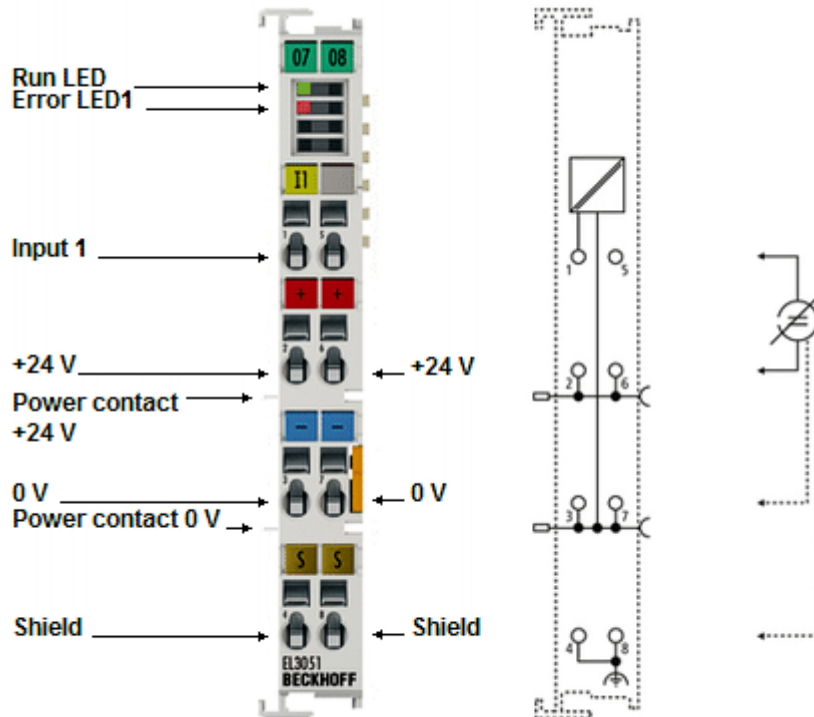
Fig. 32: EL3051

Analog Input Terminal; 1 channel, 12 bits, 4 ... 20 mA, single-ended input

The job of the EL3051 analog input terminal is to supply power to measuring transducers located in the field, and to transmit analog measuring signals, electrically isolated, to the automation device.

The voltage for the sensors is supplied to the terminals via the power contacts. The power contacts can optionally be supplied with operating voltage in the standard way or via a power supply terminal (EL9xxx) with electrical isolation.

The input electronics is independent of the supply voltage of the power contacts. The reference potential for the inputs is the 0 V power contact.
Overload and wire break are indicated by the error LEDs.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 361]

3.5.1.2 EL3051 - Technical data

Technical data	EL3051
analog inputs	1
Signal current	4 mA ... 20 mA
Internal resistance	typ. 85 Ω
Resolution	12 bits (16 bits presentation)
Sampling type	simultaneous
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 60 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.5.1.3   EL3051 - Connection, display and diagnostics
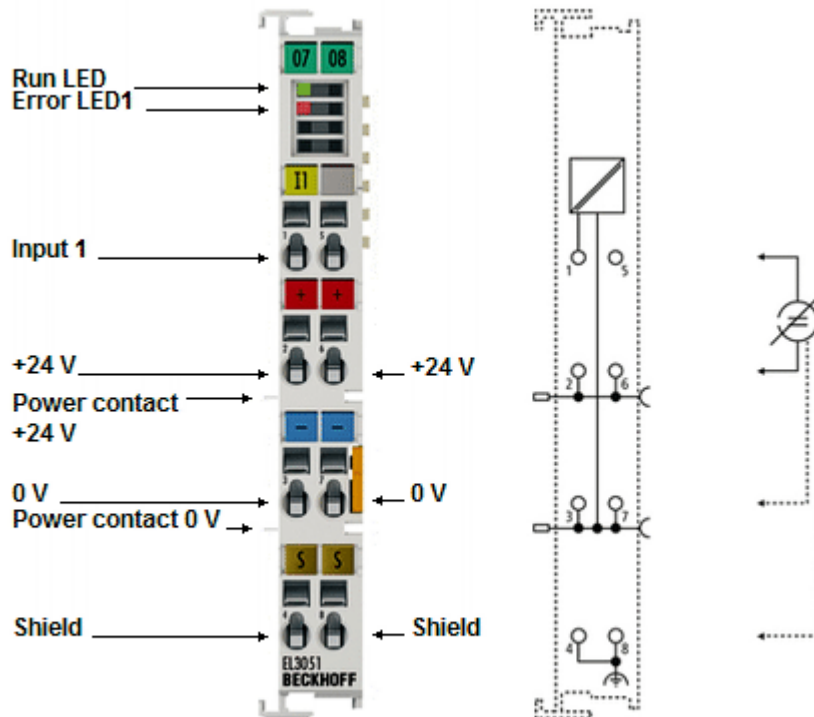
Fig. 33: RUN and ERROR LED EL3051

LED	Color	Meaning	
RUN *)	green	These LEDs indicate the terminal's operating state:	
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)	

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

EL3051 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	40 mA
24 V	2	24 V	6; positive power contact	1 A
0 V	3	0 V	7; negative power contact	1 A
Shield	4	Shield	8; DIN rail	100 mA **)
n. c.	5	not connected	-	-
24 V	6	24 V	2; positive power contact	1 A
0 V	7	0 V	3; negative power contact	1 A
Shield	8	Shield	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.5.2   EL3052
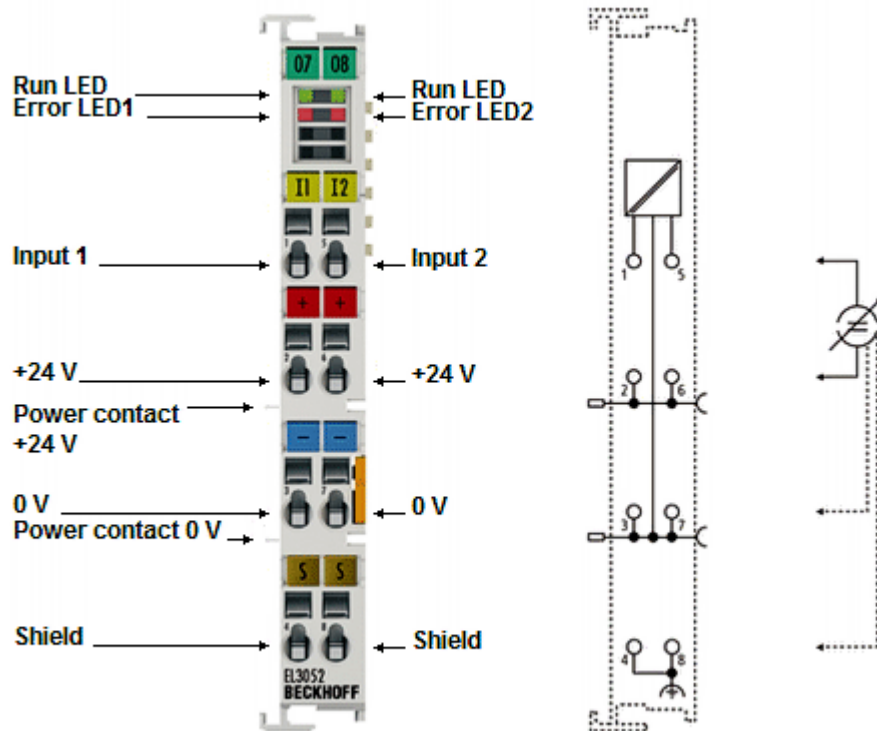
3.5.2.1   EL3052 - Introduction

Fig. 34: EL3052

Analog Input Terminal; 2 channels, 12 bits, 4 ... 20 mA, single-ended inputs

The job of the EL3052 analog input terminal is to supply power to measuring transducers located in the field, and to transmit analog measuring signals, electrically isolated, to the automation device.

The voltage for the sensors is supplied to the terminals via the power contacts. The power contacts can optionally be supplied with operating voltage in the standard way or via a power supply terminal (EL9xxx) with electrical isolation.

The input electronics is independent of the supply voltage of the power contacts. The reference potential for the inputs is the 0 V power contact.
Overload and wire break are indicated by the error LEDs.

Quick links

- EtherCAT basics

- Process data and operation modes [▶ 223]

- Object description and parameterization [▶ 368]

3.5.2.2 EL3052 - Technical data

Technical data	EL3052
analog inputs	2
Signal current	4 mA ... 20 mA
Internal resistance	typ. 85 Ω
Resolution	12 bits (16 bits presentation)
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 60 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.5.2.3 EL3052 - Connection, display and diagnostics
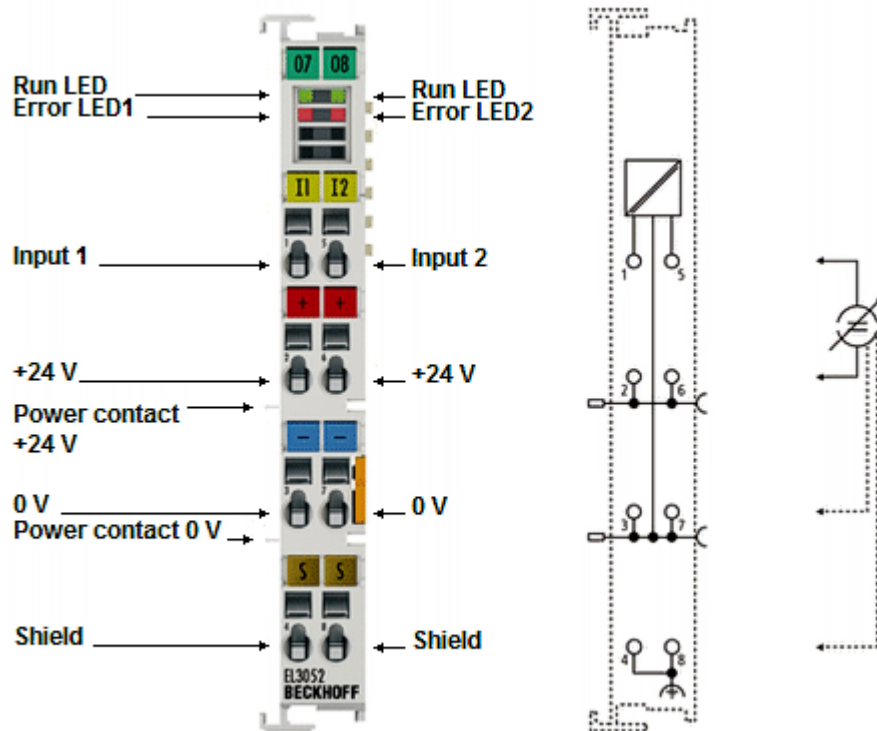
Fig. 35: RUN and ERROR LED EL3052

LED	Color	Meaning		
RUN *)	green	These LEDs indicate the terminal's operating state:		
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal	
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set	
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state	
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible	
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)		

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

EL3052 Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	40 mA
24 V	2	24 V	6; positive power contact	1 A
0 V	3	0 V	7; negative power contact	1 A
Shield	4	Shield (FE)	8; DIN rail	100 mA **)
Input 2	5	Input 2	-	40 mA
24 V	6	24 V	2; positive power contact	1 A
0 V	7	0 V	3; negative power contact	1 A
Shield	8	Shield (FE)	4; DIN rail	100 mA **)

*) Constant and peak value

**) Shield lines should be de-energized!

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.5.3 EL3054

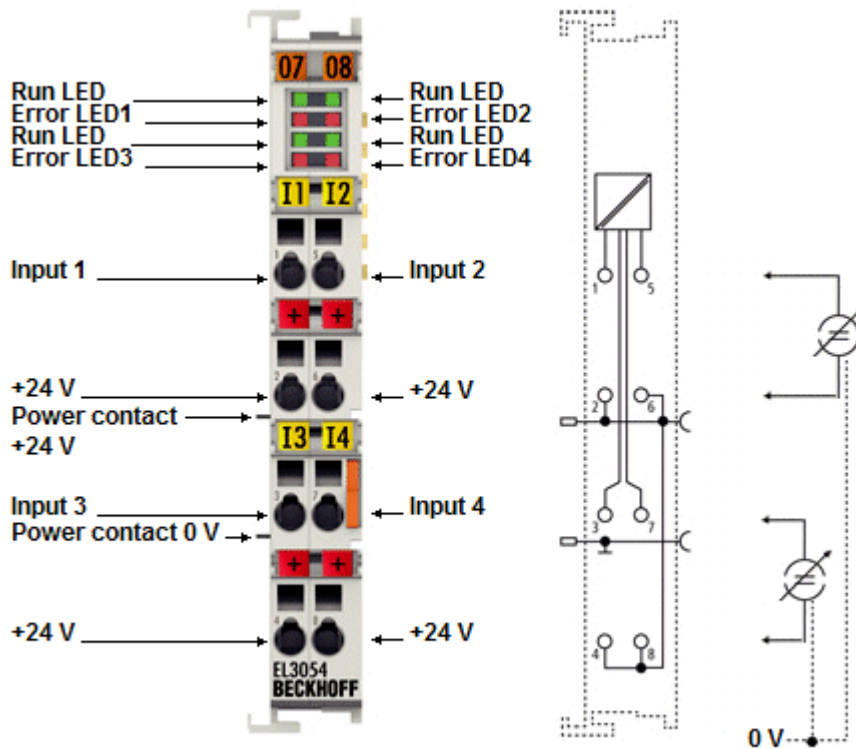#### 3.5.3.1 EL3054 - Introduction

Fig. 36: EL3054

Analog Input Terminal; 4 channels, 12 bits, 4 ... 20 mA, single-ended inputs

The EL3054 analog input terminal processes signals in the range from 4 to 20 mA. The current is digitized to a resolution of 12 bits and transported, electrically isolated, to the higher-level automation device. The input electronics is independent of the supply voltage of the power contacts. The power contacts are connected through; the reference ground of the inputs is the 0 V power contact.
The error LEDs signal overload and wire break.

In the EL3054 with four inputs the 24 V power contact is connected to the terminal, in order to enable connection of 2-wire sensors without external supply.

Quick links

- EtherCAT basics

- Process data and operation modes [▶ 223]

- Object description and parameterization [▶ 375]

3.5.3.2   EL3054 - Technical data

Technical data	EL3054
analog inputs	4
Signal current	4 mA ... 20 mA
Internal resistance	typ. 85 Ω
Resolution	12 bits (16 bits presentation)
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 0.625 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 60 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*)]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.5.3.3 EL3054 - Connection, display and diagnostics
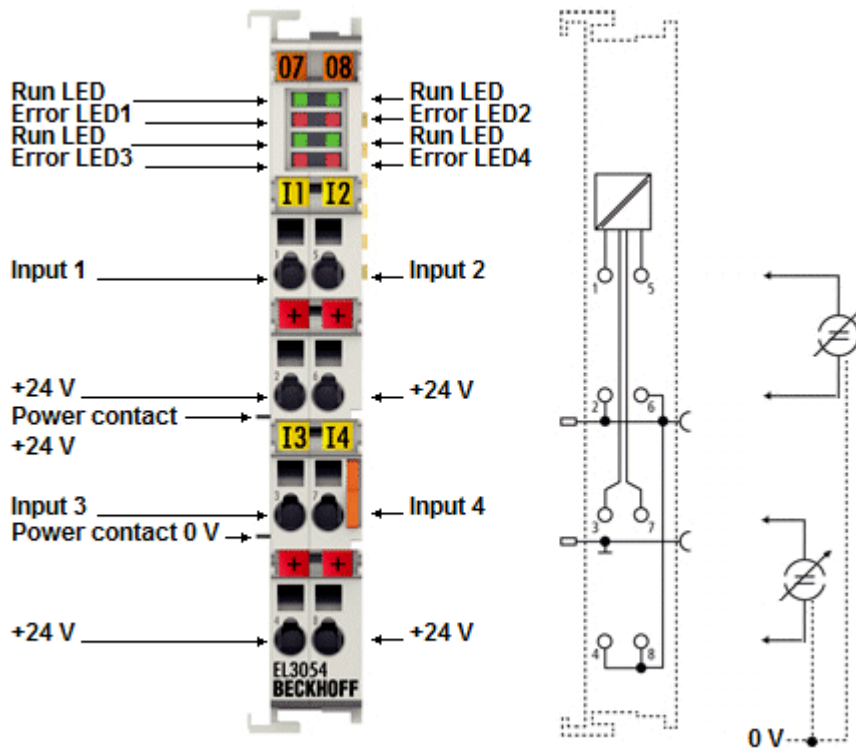
Fig. 37: RUN and ERROR LED EL3054

LED	Color	Meaning		
RUN *)	green	These LEDs indicate the terminal's operating state:		
		off	State of the EtherCAT State Machine [▶ 212]: **INIT** = initialization of the terminal or **BOOTSTRAP** = function for firmware updates [▶ 461] of the terminal	
		flashing	State of the EtherCAT State Machine: **PREOP** = function for mailbox communication and different standard-settings set	
		single flash	State of the EtherCAT State Machine: **SAFEOP** = verification of the Sync Manager [▶ 214] channels and the distributed clocks. Outputs remain in safe state	
		on	State of the EtherCAT State Machine: **OP** = normal operating state; mailbox and process data communication is possible	
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded (under- or overrun)		

*) If several RUN LEDs are present, all of them have the same function.
**) The error display shows the signal processing state for each channel.

EL3054 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	40 mA
+24 V	2	+24 V	4, 6, 8; positive power contact	1 A
Input 3	3	Input 3	-	40 mA
+24 V	4	+24 V	2, 6, 8; positive power contact	1 A
Input 2	5	Input 2	-	40 mA
+24 V	6	+24 V	2, 4, 8; positive power contact	1 A
Input 4	7	Input 4	-	40 mA
+24 V	8	+24 V	2, 4, 6; positive power contact	1 A

*) Constant and peak value

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.

3.5.4   EL3058
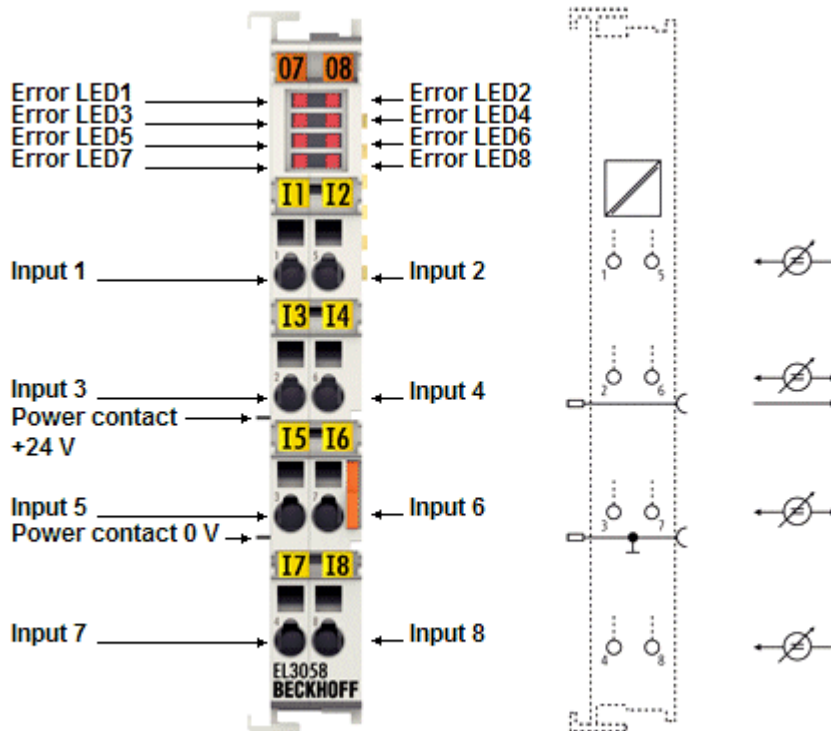
3.5.4.1   EL3058 - Introduction

Fig. 38: EL3058

Analog Input Terminal; 8 channels, 12 bits, 4 ... 20 mA, single-ended inputs

The EL3058 analog input terminal processes signals in the range from 4 to 20 mA. The current is digitized to a resolution of 12 bits and transported, electrically isolated, to the higher-level automation device. The input electronics is independent of the supply voltage of the power contacts. The power contacts are connected through; the reference ground of the inputs is the 0 V power contact.
The error LEDs signal overload and wire break.

Quick links

- EtherCAT basics
- Process data and operation modes [▶ 223]
- Object description and parameterization [▶ 383]

3.5.4.2   EL3058 - Technical data

Technical data	EL3058
analog inputs	8
Signal current	4 mA ... 20 mA
Internal resistance	typ. 85 Ω
Resolution	12 bits (16 bits presentation)
Sampling type	multiplex
Ground reference	single ended
Conversion time (default setting: 50 Hz filter)	typ. 1.25 ms
Input filter cut-off frequency	1 kHz
Measuring error (total measuring range)	< ± 0.3% (at 0 °C ... +55 °C, (related to the full scale value) < ± 0.5% (when using the extended temperature range)
Power supply for the electronics	via the E-bus
Current consumption via E-bus	typ. 130 mA
Distributed clocks support	no
Support NoCoeStorage [▶ 129]	yes
Electrical isolation	500 V (E-bus/field voltage)
Dielectric strength	max. 30 V
Bit width in process image (default setting)	2 bytes status, 2 bytes value per channel
Configuration	no address or configuration settings required
Weight	approx. 60 g
Permissible ambient temperature range during operation	-25 °C ... +60 °C (extended temperature range)
Permissible ambient temperature range during storage	-40 °C ... +85 °C
Permissible relative air humidity	95 %, no condensation
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Installation [▶ 134]	on 35 mm mounting rail according to EN 60715
Enhanced mechanical load capacity	yes, see also Installation instructions for enhanced mechanical load capacity [▶ 145]
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
Protection rating	IP20
Installation position	variable
Identification / approval[*]	CE, EAC, UKCA ATEX [▶ 136], IECEx [▶ 137], cULus [▶ 141]

*) Real applicable approvals/markings see type plate on the side (product marking).

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

3.5.4.3   EL3058 - Connection, display and diagnostics
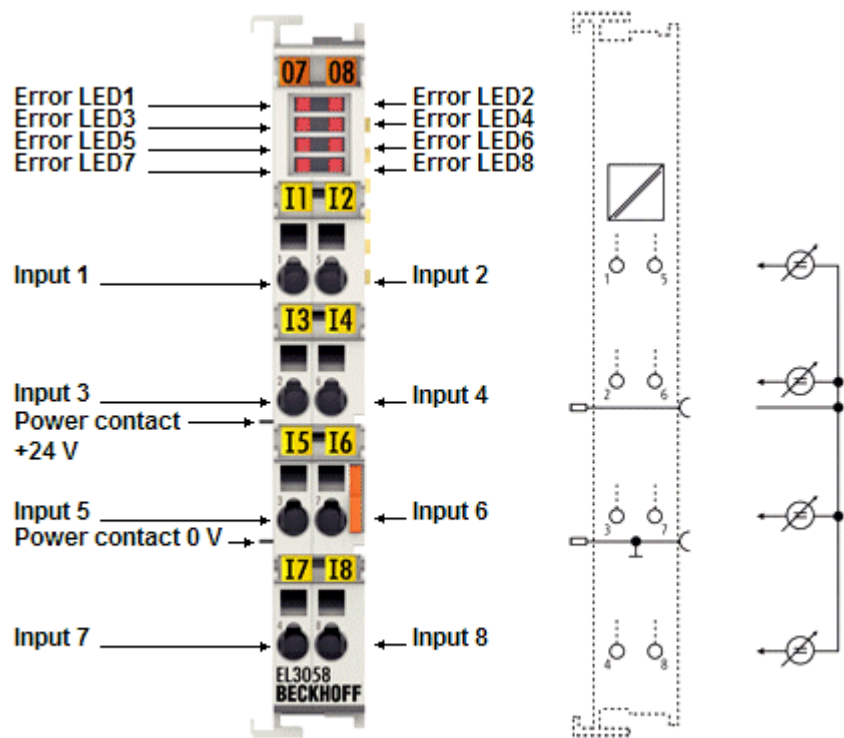

Fig. 39: EL3058

LED	Color	Meaning
ERROR **)	red	Fault indication for broken wire and if the measuring range for the respective channel is exceeded

**) The error display shows the signal processing state for each channel

EL3058 - Connection

Terminal point		Description	Internally connected with connection	Max. current carrying capacity *)
Name	No.			
Input 1	1	Input 1	-	40 mA
Input 3	2	Input 3	-	40 mA
Input 5	3	Input 5	-	40 mA
Input 7	4	Input 7	-	40 mA
Input 2	5	Input 2	-	40 mA
Input 4	6	Input 4	-	40 mA
Input 6	7	Input 6	-	40 mA
Input 8	8	Input 8	-	40 mA

*) Constant and peak value

Overcurrent protection of the 20 mA inputs

The current inputs are protected against damage by overcurrent by an internal current limitation, currents > 30mA may occur. In the event of a fault, the current limiter must not be overloaded by a voltage > 30V from the source device.

Overcurrent is displayed in the process image as "Overrange". After occurrence, the error condition must be stopped immediately, the source device switched off or disconnected from the input terminal. If the error condition persists for a longer period of time, the internal terminal current limitation reduces the absorbed signal current for thermal reasons, depending on the ambient conditions also below 20 mA.