

2 EL5151 - Product description

2.1 Introduction

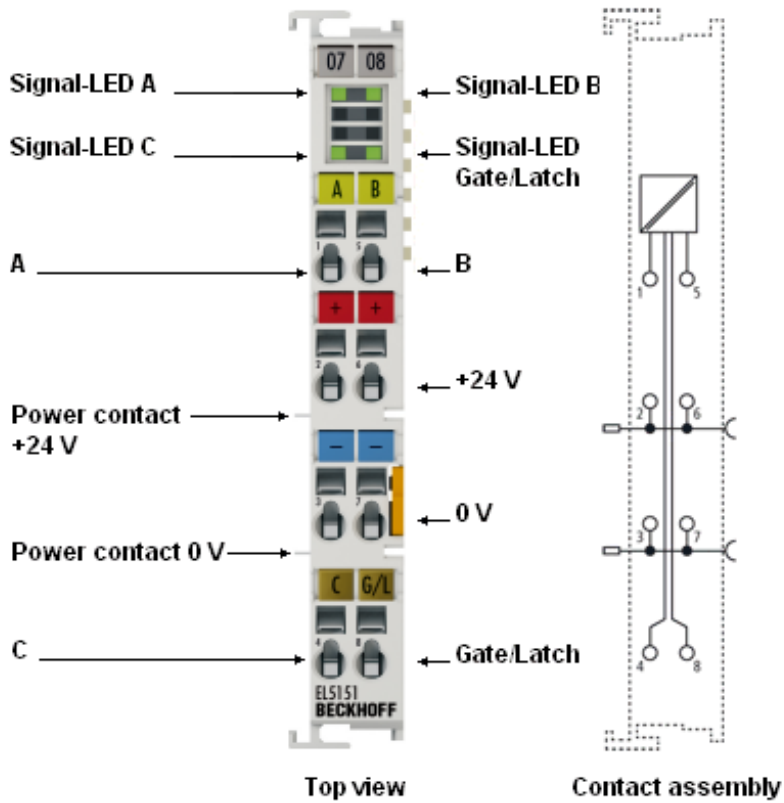


Fig. 4: EL5151

Incremental encoder interface, 24 V HTL, 100 kHz

The EL5151 EtherCAT Terminal is an interface with 24 V inputs for the direct connection of incremental encoders. A 32 bit counter with a quadrature decoder and a 32 bit latch for the zero pulse can be read, set or enabled.

The measurement of period and frequency is possible. The gate input allows the locking of the counter, selectively with a high or low level. The latch input is similarly configurable and evaluates high or low levels.

From FW 02 the EL5151 supports distributed clocks, i.e. the input data can be synchronously acquired with other data that are similarly connected, distributed to distributed clock terminals. The universal system accuracy is around $< 100 \text{ ns}$.

With a moving axis, the micro-increment functionality offers 256 times higher axis position resolution than physically provided by the encoder.

The EL5151 can also be used as a single-channel 32/16 bit counter on channel A, in which case the signal level on channel B defines the count direction.

Quick links

- [EtherCAT function principles](#)
- [Mounting and wiring \[► 42\]](#)
- [Commissioning \[► 63\]](#)
- [Operating modes and settings \[► 137\]](#)

2.2 Technical data

Encoder	EL5151
Technology	Incremental encoder interface, HTL 24 V _{DC}
Sensor inputs	1
Encoder connection	A, B, C, gate/latch input, 24 V
Encoder operating voltage	24 V (-15%/+20%), (generated from the 24 V _{DC} power contacts)
Signal voltage "0" (inputs A, B, C, gate/latch)	0 V ... 5 V (EN 61131-2, type 1)
Signal voltage "1" (inputs A, B, C, gate/latch)	15 V ... 30 V (EN 61131-2, type 1)
Counter	1 x 32/16-bit binary, switchable
Limit frequency	max. 400,000 increments/s with 4-fold evaluation), corresponds to 100 kHz
Quadrature decoder	4-fold evaluation

Function and communication	EL5151
Timestamp [► 139] resolution	1 ns
Timestamp accuracy	100 ns
Distributed Clocks	yes (from Firmware 02 [► 216])
Supports NoCoeStorage [► 37] function	yes (from Firmware 02 [► 216])
Configuration	via TwinCAT System Manager
Special features	gate or latch function, microincrements, timestamping of edges, period duration and frequency measurement, up/down counters

Supply and potentials	EL5151
Power supply for electronic	via the E-Bus
Supply voltage	24 V _{DC} (-15%/+20%)
Current consumption from the E-bus	typ. 130 mA
Current consumption from the power contacts	0.1 A (excluding sensor load current)
Electrical isolation	500 V (E-bus/field voltage)

Environmental conditions	EL5151
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 humidity	95%, no condensation

General data	EL5151
Weight	approx. 50 g
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Mounting [► 42]	on 35 mm mounting rail conforms to EN 60715
Installation position	variable

Standards and approvals	EL5151
Vibration/shock resistance	according to EN 60068-2-6/EN 60068-2-27, see also Installation instructions [► 51] for terminals with increased mechanical load capacity
EMC immunity/emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP20
Approvals/markings*	CE, EAC, UKCA, cULus [► 47] ATEX [► 43] , IECEx [► 44]

*) 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 EL5151-0021 - Product description

3.1 Introduction

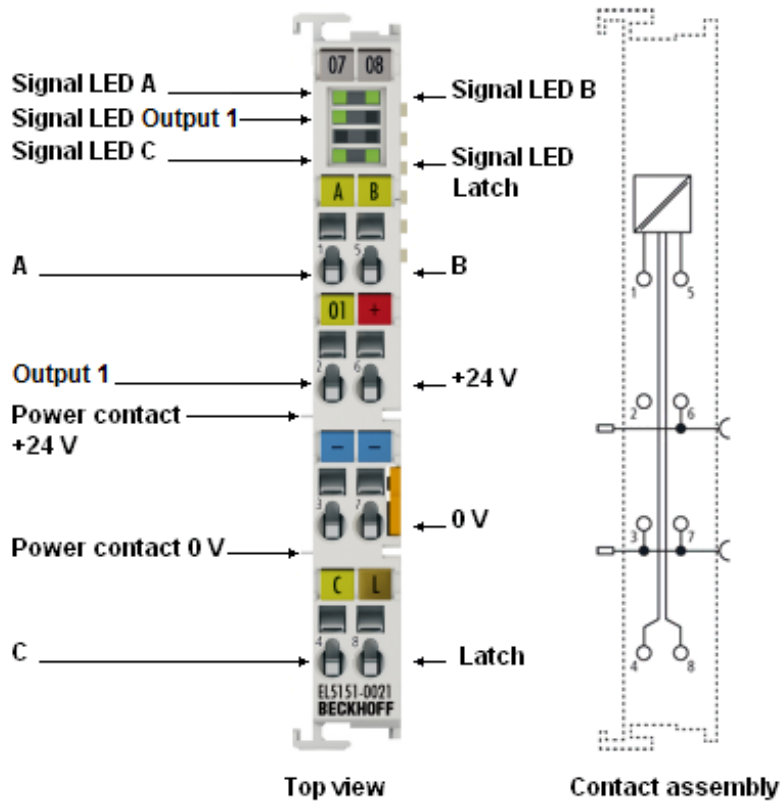


Fig. 5: EL5151-0021

Incremental encoder interface, 24 V HTL, 100 kHz, with parameterizable 24 V DC output

The EL5151-0021 EtherCAT Terminal is an interface with 24 V inputs for the direct connection of incremental encoders. A 32 bit counter with a quadrature decoder and a 32 bit latch for the zero pulse can be read, set or enabled.

The latch input allows the saving of the counter value, selectively on a high or low level.

For workpiece measurement the counter values are acquired on positive and / or negative edges at the latch input and saved as 32-bit values.

The 24 V output can be set manually or via the compare function.

The EL5151-0021 can also be used as a single-channel 32 bit counter on channel A, in which case the signal level on channel B defines the count direction.

Quick links

- [EtherCAT function principles](#)
- [Mounting and wiring \[► 42\]](#)
- [Commissioning \[► 63\]](#)
- [Operating modes and settings \[► 152\]](#)

3.2 Technical data

Encoder	EL5151-0021
Technology	Incremental encoder interface, HTL 24 V _{DC}
Sensor inputs	1
Encoder connection	A, B, C, latch input, 24 V
Encoder operating voltage	24 V (-15%/+20%), (generated from the 24 V _{DC} power contacts)
Signal voltage "0" (inputs A, B, C, gate/latch)	0 V ... 5 V (EN 61131-2, type 1)
Signal voltage "1" (inputs A, B, C, gate/latch)	15 V ... 30 V (EN 61131-2, type 1)
Counter	1 x 32 bit binary
Limit frequency	max. 400,000 increments/s with 4-fold evaluation), corresponds to 100 kHz
Quadrature decoder	4-fold evaluation

Digital output	EL5151-0021
Number of output	1
Rated voltage of the output	24 V _{DC} (-15% / +20%)
Output current	Max. 0.5 A (short-circuit-proof)
Switching times	T _{ON} : 15 µs typ., T _{OFF} : 20 µs typ.

Function and communication	EL5151-0021
Distributed Clocks	no
Supports NoCoeStorage [► 37] function	yes
Configuration	via TwinCAT System Manager
Special features	Latch function, parameterizable output 24 V _{DC} (compare function), workpiece measurement, up/down counters

Supply and potentials	EL5151-0021
Power supply for electronic	via the E-Bus
Supply voltage	24 V _{DC} (-15%/+20%)
Current consumption from the E-bus	typ. 130 mA
Current consumption from the power contacts	0.1 A (excluding sensor load current)
Electrical isolation	500 V (E-bus/field voltage)

Environmental conditions	EL5151-0021
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 humidity	95%, no condensation

General data	EL5151-0021
Weight	approx. 50 g
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Mounting [► 42]	on 35 mm mounting rail conforms to EN 60715
Installation position	variable

Standards and approvals	EL5151-0021
Vibration/shock resistance	according to EN 60068-2-6/EN 60068-2-27, see also Installation instructions [► 51] for terminals with increased mechanical load capacity
EMC immunity/emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP20
Approvals/markings*	CE, EAC, UKCA cULus [► 47]

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

4 EL5151-0090 - Product description

4.1 Introduction

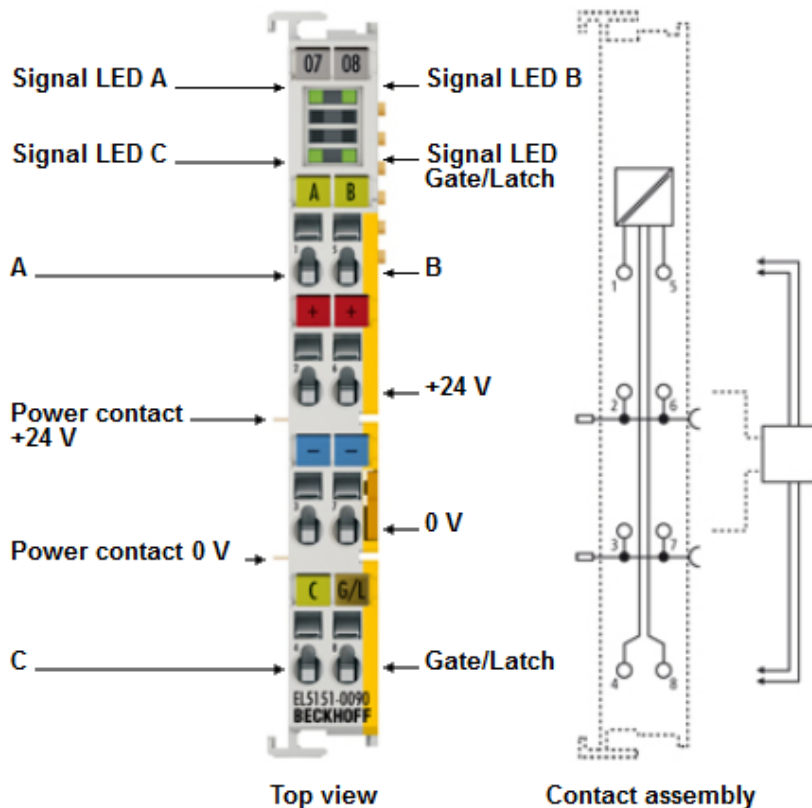


Fig. 6: EL5151-0090

Incremental encoder interface, 24 V HTL, 100 kHz, TwinSAFE SC

The EL5151-0090 EtherCAT terminal supports the full functionality of the EL5151. The EtherCAT Terminal is an interface with 24 V inputs for the direct connection of incremental encoders. A 32 bit counter with a quadrature decoder and a 32 bit latch for the zero pulse can be read, set or enabled. The measurement of period and frequency is possible. The gate input allows the locking of the counter, selectively with a high or low level. The latch input is similarly configurable and evaluates high or low levels.

The EL5151-0090 supports distributed clocks, i.e. the input data can be synchronously acquired with other data that are similarly connected, distributed to distributed clock terminals. The universal system accuracy is around < 100 ns.

With a moving axis, the micro-increment functionality offers 256 times higher axis position resolution than physically provided by the encoder.

The EL5151-0090 can also be used as a single-channel 32/16 bit counter on channel A, in which case the signal level on channel B defines the count direction.

Additionally the EL5151-0090 supports TwinSAFE SC (TwinSAFE Single Channel) technology. This enables the use of standard signals for safety tasks in any networks of fieldbuses.

Quick links

[EtherCAT function principles](#)

[Mounting and wiring](#) [► 42]

[Commissioning](#) [► 63]

[Operating modes and settings](#) [► 152]

[EL5151-0090 - TwinSAFE SC process data](#) [► 168]

[EL5151-0090 - Objects TwinSAFE Single Channel](#) [► 197]

[EL5151-0090 - CoE object description](#) [► 187]

4.2 Technical data

Encoder	EL5151-0090
Technology	Incremental encoder interface, HTL 24 V _{DC}
Sensor inputs	1
Encoder connection	A, B, C, gate/latch input, 24 V
Encoder operating voltage	24 V (-15%/+20%), (generated from the 24 V _{DC} power contacts)
Signal voltage "0" (inputs A, B, C, gate/latch)	0 V ... 5 V (EN 61131-2, type 1)
Signal voltage "1" (inputs A, B, C, gate/latch)	15 V ... 30 V (EN 61131-2, type 1)
Counter	1 x 32/16-bit binary, switchable
Limit frequency	max. 400,000 increments/s with 4-fold evaluation), corresponds to 100 kHz
Quadrature decoder	4-fold evaluation

Function and communication	EL5151-0090
Timestamp [► 139] resolution	1 ns
Timestamp accuracy	100 ns
Distributed Clocks	yes
Supports NoCoeStorage [► 37] function	yes
Configuration	via TwinCAT System Manager
Special features	TwinSAFE SC, gate or latch function, microincrements, timestamping of edges, period duration and frequency measurement, up/down counters

Supply and potentials	EL5151-0090
Power supply for electronic	via the E-Bus
Supply voltage	24 V _{DC} (-15%/+20%)
Current consumption from the E-bus	typ. 130 mA
Current consumption from the power contacts	0.1 A (excluding sensor load current)
Electrical isolation	500 V (E-bus/field voltage)

Environmental conditions	EL5151-0090
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 humidity	95%, no condensation

General data	EL5151-0090
MTBF (+55°C)	> 1,490,000 h
Weight	approx. 50 g
Dimensions (W x H x D)	approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Mounting [► 42]	on 35 mm mounting rail conforms to EN 60715
Installation position	variable

Standards and approvals	EL5151-0090
Vibration/shock resistance	according to EN 60068-2-6/EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP20
Approvals/markings*	CE, EAC, UKCA, cULus [► 47] ATEX [► 43] , IECEx [► 44]

*) 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