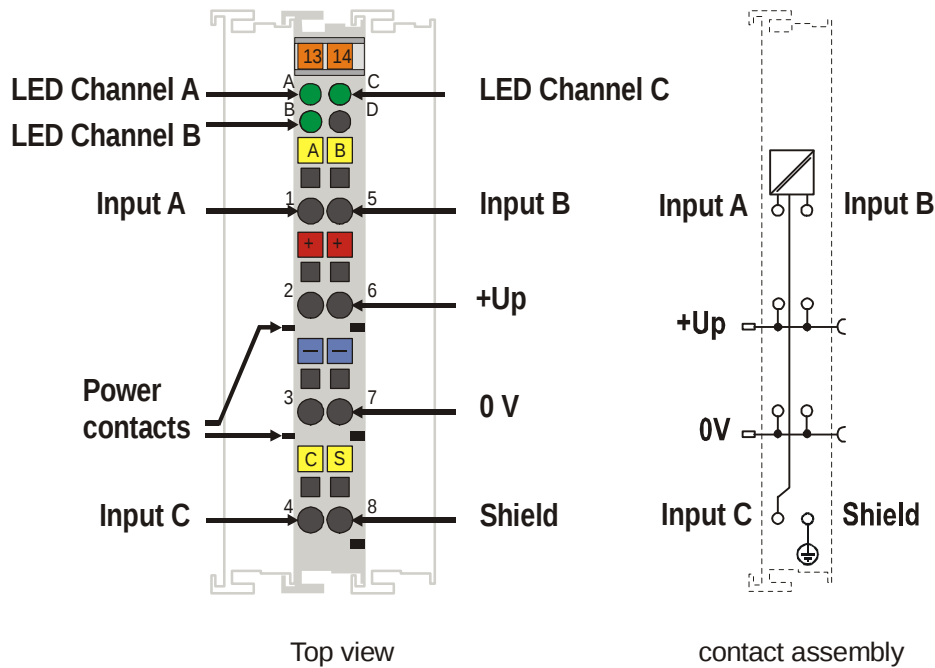




Interface terminals for incremental encoders

with special operation mode *frequency measurement via adjustable time window*

This data sheet for special terminals KL5111-0015 and KL5111-0016 is an addendum to the documentation of the standard terminal KL5111-0000 (see www.beckhoff.com).

The terminals carry out a interval measurement with a minimum measuring time that can be specified via the process data and returns the number of measured pulses and the interval. The controller calculates the frequency from the number of cycles and the cycle duration (the display of frequency and the current counter value can be set via the feature register). The sign of the pulses indicates the direction of rotation.

The terminals analyses encoder signals (the V/R counter is adjustable). The time window specified in the process data must be greater than 1 millisecond. The C input cannot be used in this version, and standard KL5111 interval measurement is not possible.

Functional description

Frequency range	0 to 250 kHz (counting frequency 1MHz with quadruple analysis)
Measuring time	1 ms to 1000 ms
Measuring time resolution	100 µs / Digit (internally rounded off to 400 µs)
Interval resolution	200 ns / Digit

In the default setting, a time window is specified via the process output data DataOUT 0, DataOUT 1.

DataIN 0, DataIN 1 (deltaCnt, 16-bit signed INT) contains the counted pulses. The sign indicates the direction of rotation. DataIN 2, DataIN 3, DataIN 4 (T_{per}) contains the interval with a resolution of 200 ns / digit. In encoder mode, the frequency is calculated as follows:

$$\text{frequency} = \text{deltaCnt} / (4 \times T_{per} \times 200 \times 10^{-9})$$

Note the factor 4, arising from the quadruple analysis of the encoder. The counter reading can be divided by four, since in this mode the latch process occurs at the rising edge of the A input. The counter difference in a particular direction of rotation is therefore always a multiple of four. The situation may be different if the direction changes, since this may lead to a different counter reading.

Technische Daten

Technical Data	KL5111-0015	KL5111-0016
Sensor connection	A, B, C; 24 V	A, B, C; 5 V
Sensor operating voltage	24 V _{DC}	5 V _{DC}
Counter	16 Bit binary	
Cut off frequency	1 MHz	
Quadrature decoder	4 time evaluation	
Zero pulse latch	16 bit	
Commands	read, set, activate	
Bit width in the process image	E/A: 2 x 16 Bit data, 2 x 8 Bit Control / Status	
Current consumption from power contacts	typically 0,1 A (without sensor load current)	
Current consumption from K-Bus	typically 50 mA	
Weight	ca. 60 g	
Dimensions (B x H x T)	ca. 15mm x 100mm x 70mm (aligned width 12mm)	
Permissible ambient temperature range	-0°C ... +55°C (during operation)	
	-25°C ... +70°C (during storage)	
Permissible relative humidity	5% ... 95%, no condensation	
Installation position	any	
Vibration / shock resistance	according to EN 60068-2-6 / EN 60068-2-27, EN 60068-2-29	
EMC resistance Burst / ESD	according to EN 61000-6-2 / EN 61000-6-4	
Protection class	IP20	
Approval	CE	

Register overview for KL5111-0015 and KL5111-0016

Register	Name	Default value	R/W	Memory
R0	reserved	-	-	-
...	...	...	...	...
R5	reserved	-	-	-
R6	diagnostic register (not used)	0x0000	R	RAM
R7	command register (not used)	0x0000	R	RAM
R8	terminal type	5111	R	ROM
R9	firmware version	e.g. 0x001A	R	ROM
R10	multiplex shift register	0x0218	R	ROM
R11	signal channels	0x0218	R	ROM
R12	minimum data length	0x1818	R	ROM
R13	data structure	0x0000	R	ROM
R14	reserved	-	-	-
R15	alignment register	variable	R/W	RAM
R16	hardware version	e.g. 0x0001	R/W	SEEPROM
R17	reserved	-	-	-
...	...	...	...	...
R28	reserved	-	-	-
R29	extended terminal type	0x000F / 0x0010	R/W	SEEPROM
R30	reserved	-	-	-
R31	codeword register	0x0000	R/W	RAM
R32	feature register	0x2000	R/W	SEEPROM
R33	time window for frequency measurement	0x0000	R/W	SEEPROM
R34	reserved	0x0000	-	-
...	...	...	...	...
R63	reserved	0x0000	-	-

R32 - Feature register for KL5111-0015 and KL5111-0016 in detail

Bit	Value	Description	default
R32.15	0 _{bin}	Encoder interface is activated	0 _{bin}
	1 _{bin}	Counter mode is activated	
R32.14	-	reserved	0 _{bin}
R32.13	0 _{bin}	operation mode active	1 _{bin}
	1 _{bin}	special operation mode frequency measurement via adjustable time window active	
R32.12 Only in connection with R32.13	0 _{bin}	DIN0, DIN1 contains the number of pulses DIN2, DIN3, DIN4 contains the interval over these pulses with a resolution of 200 ns/digit At a maximum frequency of 30 kHz, the specification via the process data should be less than 0x100 At a maximum frequency of 15 kHz, the specification via the process data should be less than 0x200 etc.	0 _{bin}
	1 _{bin}	The frequency is calculated in the terminal. DIN0, DIN1 contains the current counter reading DIN2, DIN3, DIN4 contains the frequency with a resolution of 1 Hz / digit	
R32.11 to R32.0	-	reserved	0 _{bin}