

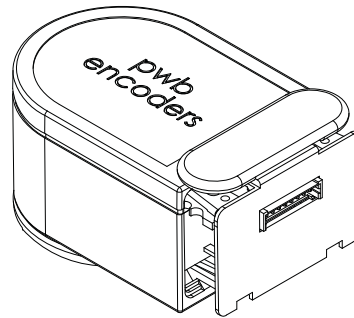
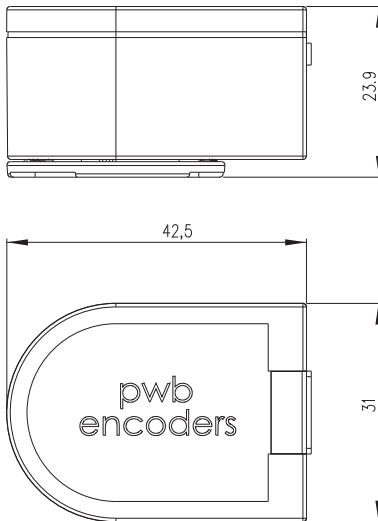
Description

The AE30 is a reliable low cost optical hollow shaft encoder that can be fixed quickly and easily on different sizes of motor shafts.

The encoder provides two square wave outputs in quadrature (90 degrees phase shifted) and one optional index channel (one pulse per revolution).

The resolution of the encoder is determined by the number of counts per revolution (CPR). Power supply and signals are provided by an 8 pin Molex connector.

Dimensions



Encoder Resolution (CPR)
100
200
256
360
400
500
512
1000
1024

Main characteristics

- Hollow shaft encoder
- High performance in compact size
- Robust plastic housing
- Quick and easy assembly
- Resolutions up to 1024 counts per revolution (CPR)
- Up to 100 kHz output frequency
- Two channel quadrature output (A / B)
- Two channel quadrature output with index pulse (A / B / I)
- TTL compatible outputs
- Output circuit : pull-up
- Operating temperature range: up -40 °C to +100 °C
- Several shaft diameter options
- No signal adjustment required
- Compliant EU-directive 2002/95/EG (RoHS)

Motor shaft Ø Diameter (mm)
A = 1.800
B = 2.000
C = 2.500
D = 3.000
E = 3.175 (1/8")
F = 3.969 (5/32")
G = 4.000
H = 4.763 (3/16")
I = 5.000
J = 6.000
K = 6.350 (1/4")
L = 8.000

Applications

- For high volume applications like factory and office automation
- Consumer electronics, white goods, automatic handlers, doors and windows controls

Absolute maximum ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage temperature ^{M1}	T _S	-40		100	°C	
Storage temperature ^{M2}	T _S	-40		85	°C	
Supply voltage	V _{CC}	-0.5		to 7.0	V _{DC}	
Output voltage	V _{out}	-0.5		to V _{CC}	V	
Output current	I _{out}	-1.0		5.0	mA	per Channel

Recommended operating conditions

Encoding characteristics over recommended operating range and recommended mounting tolerances unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating temperature ^{M1}	T _A	-40		100	°C	
Operating temperature ^{M2}	T _A	-40		85	°C	
Supply voltage	V _{CC}	4.5	5.0	5.5	V _{DC}	Ripple < 100 mV _{p-p}
Load capacitance	C _L			100	pF	internal pull-up 3.3 kΩ
Count frequency	f			100	kHz	rpm x N / 60 x 10 ⁻³

Note: M1/M2: see ordering codes

The encoder performance is guaranteed up to 100 kHz, higher frequencies are allowed (for details please contact our customer support)

Electrical characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply current 2 channel	I _{CC}			40	mA	
Supply current 3 channel	I _{CC}			85	mA	
High level output voltage	V _{OH}	2.4			V	I _{OH} = -200 μA
Low level output voltage	V _{OL}			0.4	V	I _{OL} = 3.86 mA
Output waveform rise time	t _r		200		ns	C _L = 25 pF
Output waveform fall time	t _f		50		ns	R _L = 1 MΩ V _{CC} = 5V
Ch. I rise after Ch. A or Ch. B fall	t ₁	10	100	250	ns	
Ch. I fall after Ch. A or Ch. B rise	t ₂	70	150	300	ns	

Note: Ch. A & Ch B. quadrature output + Ch. I index output

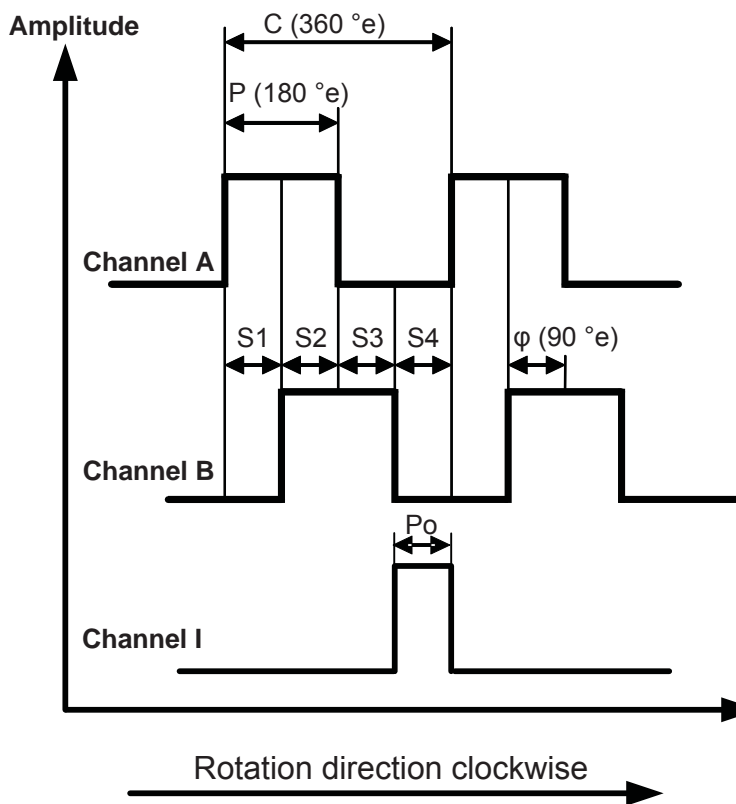
ESD Warning: Normal handling precautions should be taken to avoid static discharge damage to the sensor.

Encoder characteristic

Encoding characteristics over recommended operating range and recommended mounting tolerances unless otherwise specified.

	Parameter	Symbol	Min.	Typ.	Max.	Unit
2 channel + index ^{M1}	Pulse width error	ΔP		± 7	± 30	$^{\circ}e$
	State width error	ΔS		± 5	± 30	$^{\circ}e$
	Phase error	$\Delta\Phi$		± 2	± 15	$^{\circ}e$
	Index pulse width	P_0	60	90	120	$^{\circ}e$
2 channel ^{M2}	Pulse width error	ΔP		± 7	± 45	$^{\circ}e$
	State width error	ΔS		± 5	± 45	$^{\circ}e$
	Phase error	$\Delta\Phi$		± 2	± 20	$^{\circ}e$

Note: M1/M2: see ordering codes



Definitions

Count (N): The number of bar and window pairs or increments per revolution (CPR) of the code wheel.

One Cycle C: One period of the signal, related to 1 bar and 1 window. It is measured in electrical degrees, one cycle is 360 electrical degrees ($^{\circ}e$).

Cycle Error (ΔC): The deviation in electrical degrees of the pulse width from its ideal value. It is an indication of cycle uniformity.

Pulse Width (P): The number of electrical degrees when an output is "HIGH" during one cycle, nominally 180 $^{\circ}e$ or half a cycle.

Pulse Width Error (ΔP): The deviation in electrical degrees of the pulse width from its ideal value of 180 $^{\circ}e$.

State Width (S): The number of electrical degrees between a transition in the output of channel A and the neighbouring transition in the output of channel B. There are 4 states per cycle, each nominally 90 $^{\circ}e$ (S1 – S4).

State Width Error (ΔS): The deviation in electrical degrees of each state width from its ideal value of 90 $^{\circ}e$.

Phase (ϕ): The number of electrical degrees between the centre of the high state on channel A and the centre of the high state on channel B. This value is nominally 90 $^{\circ}e$ (the signals A and B can be used for quadrature).

Phase Error ($\Delta\Phi$): The deviation in electrical degrees of the phase from its ideal value of 90 $^{\circ}e$.

Index pulse width (P_0): The number of electrical degrees when the index is high during one full shaft revolution.

Connector output

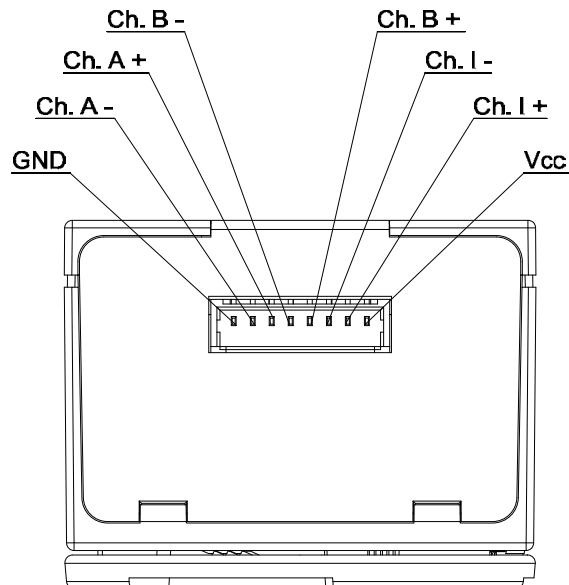
Encoder header connector: Wennmacher CX-W125R-8-DIP^{M1}
Molex 53048-0810^{M2}

Housing connector: Wennmacher CX-H-125-8 with CX-T125F terminals^{M1}
Molex 51021-0800 with 50079-8000 terminals^{M2}

Pin-out description

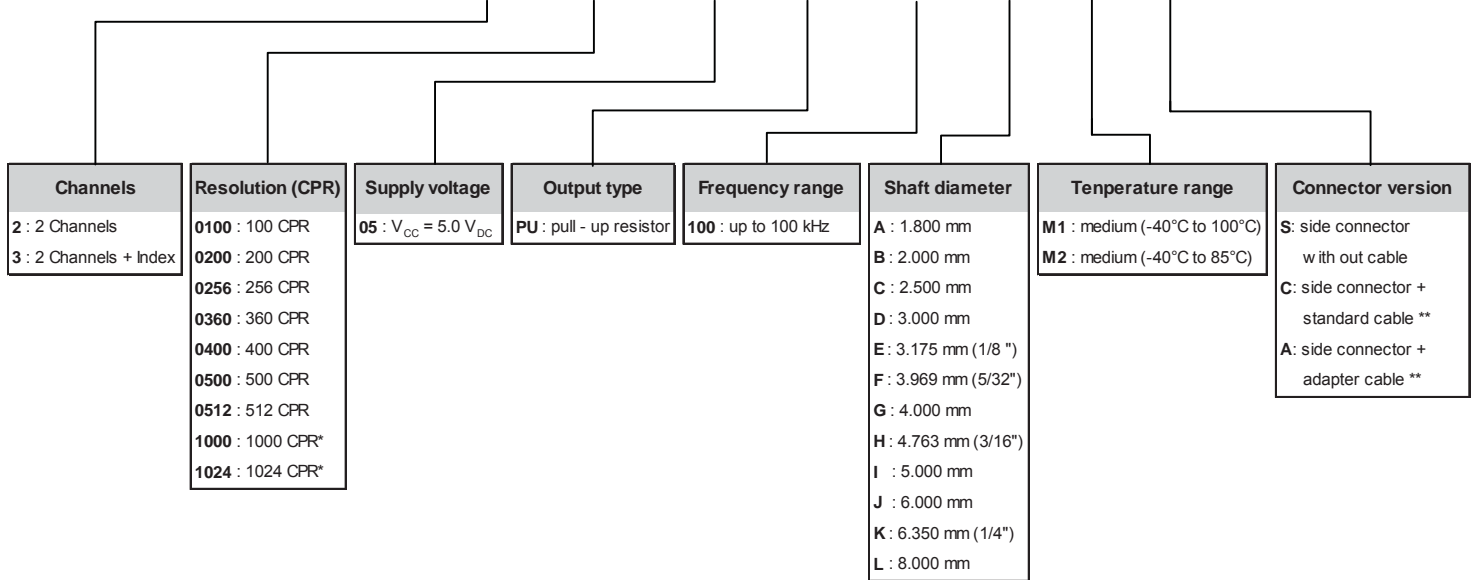
Pin	Output pin	Description	Wire colors (UL 10002) ^{M1}	Wire colors (UL 1061) ^{M2}
1	Vcc	Power supply	red	red
2	I+	Index I+	green	green
3	I-	Not connected	blue	blue
4	B+	Channel B+	purple	purple
5	B-	Not connected	brown	brown
6	A+	Channel A+	yellow	yellow
7	A-	Not connected	white	orange
8	GND	Ground	black	black

Note: M1/M2: see ordering codes & cable accessories



Ordering codes

AE30 - X - XXXX - XX - XX - XXX - X - XX - X



Note:

* only as 2-channel version available

** see page 9

Available accessories (no parts of standard delivery):

- standard cable 300 mm length
- adapter cable 500 mm length
- adapter plates for different motors
- centering gauge for different motor shafts (highly recommended for correct assembly)
- fastening screws 3pcs DIN 7985 M2 X 8
- fastening screws 2pcs DIN 965 M3 X 8