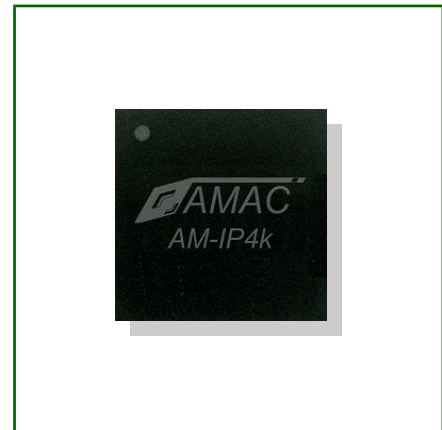


## Interpolation Circuit AM-IP4k

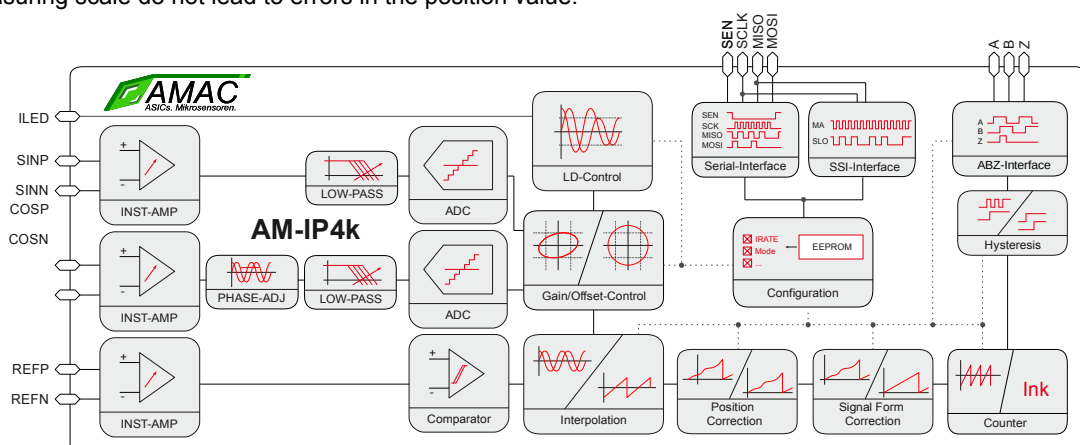
### Characteristics:

- Interpolation rate 4 ... 4096
- Input frequency max. 220kHz
- Input range 75mVpp ... 1000mVpp
- Adjustable input low pass filter 10kHz ... 250kHz
- Constant delay time for all resolutions
- AMAC-specific internal gain and offset control
- Signal shape correction
- Jitter suppression
- Output signals: ABZ, SPI, SSI
- EEPROM, multiturn counter, reference mark adjustment
- Power supply 3.3V
- Temperature range: -40°C ... +125°C



The interpolation circuit *AM-IP4k* serves to increase the resolution of incremental position and angular measuring systems with sinusoidal output signals. The input signals are subjected to an AMAC-specific internal gain and offset control and the signal period will be divided from 4 up to 4096 times. The ICs comprise three instrumentation amplifiers with adjustable gain factors. Incremental encoders which possess a voltage interface and measuring bridges up to 1Vpp can be connected directly. Sensors with current interface and photodiode-arrays are adapted by a simple external circuit. The IC operates with both single-ended or differential input signals. The noise of the sensor signals is prevented by a switching analog filter. Additionally, a digital hysteresis can suppress the edge noise of the output signals at low input frequencies and at standstill. The AM-IP4k is the first AMAC interpolator with implemented jitter suppression filter for ABZ outputs.

The quality of the signals issued by the sensors is monitored in the ICs. For that purpose it is possible to activate 9 different error signals indicating the type of the error. For the calculation of the position a set of sensor or scale specific coefficients for a 360 degree correction (rotary encoder) and a signal shape correction (both linear and rotary encoder) can be placed in the EEPROM of the IC. In that way, harmonics of the sinusoidal signals or inaccuracies of the measuring scale do not lead to errors in the position value.



The three integrated output interfaces ABZ, SPI, SSI and further features like the multi stage trigger signal processing, integrated timer, integrated multiturn counter, the processing of distance coded reference marks, the possibility to adjust the reference mark as well as adjustment and storage of the zero position make the ICs suitable for direct use in industrial controls or in fast multi-channel positioning measuring systems. With these features the ICs are also prepared for use in absolute positioning measuring systems. The AM-IP4k can be configured according to specific applications using the integrated EEPROM or via the serial interface (SPI).

## Technical Data:

Interfaces	
Analog input	<ul style="list-style-type: none"> <li>- Sinusoidal / cosinusoidal / reference (index) signals, differential or single-ended</li> <li>- Adjustable amplification for 1 V<sub>pp</sub> / 500 mV<sub>pp</sub> / 250 mV<sub>pp</sub> / 75 mV<sub>pp</sub></li> <li>- Input frequency max. 220kHz for all resolutions</li> </ul>
ABZ	<ul style="list-style-type: none"> <li>- 90° square-wave sequences (A/B/Z)</li> <li>- Adjustable width of zero signal Z to ¼ or 1 period A/B</li> <li>- Service signals for sensor adjustment</li> </ul>
SPI	<ul style="list-style-type: none"> <li>- 30-bit counter value / 16-bit multiturn value / 9-bit sensor state</li> <li>- Up to 25MHz, compatible to Standard-SPI 16 bit</li> <li>- Up to 500 000 measurement values per second</li> <li>- Signal filter for suppression of disturbances</li> </ul>
SSI	<ul style="list-style-type: none"> <li>- 30-bit counter value / 16-bit multiturn value / 2-bit sensor state</li> <li>- Gray code / binary code</li> <li>- Adjustable timing, SSI ring operation</li> <li>- Interface width configurable for 20bit or 32bit. Up to 5 MHz</li> </ul>

Feature / Parameter	
Interpolation rate	<ul style="list-style-type: none"> <li>- 4 ... 4096</li> <li>- user-defined interpolation table storable in EEPROM</li> </ul>
Signal correction	<ul style="list-style-type: none"> <li>- AMAC-specific digital controller for the offset, control range ±10% of the standard amplitude</li> <li>- AMAC-specific digital controller for the amplitude, control range 60% ... 120% of the standard amplitude</li> <li>- Digital potentiometer with 64 steps for phase correction; selectable range ±5° or ±10°</li> <li>- Input signal monitoring with configurable error indication</li> <li>- 360 degree correction (rotary encoder)</li> <li>- signal shape correction within Sin/Cos period (both linear and rotary encoder)</li> <li>- correction coefficients storable in EEPROM</li> </ul>
Suppression of disturbances	<ul style="list-style-type: none"> <li>- Adjustable low pass filter 10 kHz, 75 kHz, 250 kHz</li> <li>- Digital hysteresis for suppression of the edge noise at the output</li> <li>- Selectable minimum edge distance at the output (bandwidth limitation)</li> </ul>
Reference signal processing	<ul style="list-style-type: none"> <li>- Adjustable reference mark position in 32 steps 0 ... 360°</li> <li>- Definition of the optimum reference position via SPI or service signals</li> <li>- Processing of distance coded reference marks</li> <li>- Measured-value trigger at the reference mark position</li> </ul>
Miscellaneous	<ul style="list-style-type: none"> <li>- 2-stage measured value trigger</li> <li>- Zero-signal and teach-signal for adjustment and storage of zero position of the sensor</li> <li>- Multiturn counter</li> <li>- Constant delay time for all resolutions</li> <li>- controlled current output</li> <li>- configuration via Integrated EEPROM or SPI interface</li> </ul>

Important Characteristics	
Package	QFN56 (8 x 8 mm)
Operating Voltage	3.3V
Temperature Range	-40 ... +125°C

## Ordering Information:

Product Type	Description	Article Number
AM-IP4k	Interpolation circuit AM-IP4k, QFN56	PR-50400-10
AM-IPE4k	Interpolation unit with AM-IP4k (Standard configuration ABZ)	PR-50410-00
USB to SPI Converter	USB to SPI Interface Unit	PR-44025-10