novotechnik
Siedle Group

Vert-X Technology

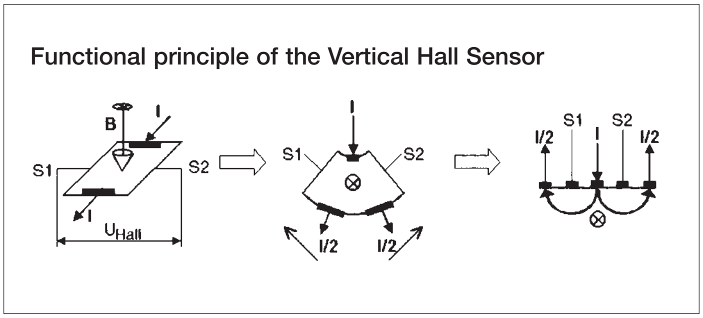

Fig. 1

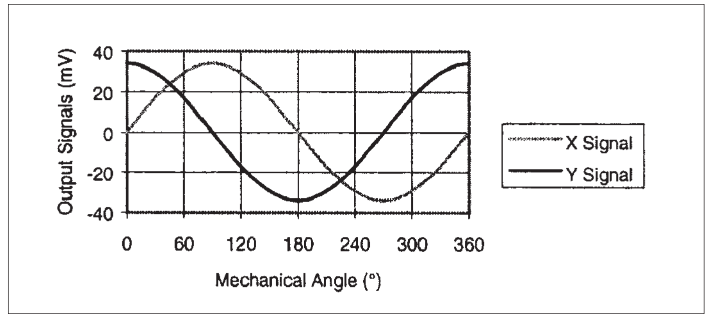

Fig. 3

Functional principle of the Vertical Hall Sensor

A Hall sensor enables the displacement effect to be measured in a charge-carrying semiconductor that exercises a B magnetic field on the electrons being processed. The measured variable is the U_{Hall} voltage slip that is proportional to the strength of the magnetic field.

The fact that the signal progression via the measuring range is negatively influenced by unintentional changes in magnetic field strength needs to be taken into account when measuring paths or angles according to the Hall principle. The Vertical Hall Principle disconnects one of the power connections and "unfolds" the silicon chip properly until all the connections are on one level.

As illustrated in Fig. 1, the flow direction of the magnetic field does not change in the process. As a result, the magnetic field is measured in parallel to the connection level. The Hall voltage between the S1 and S2 connections depends on the direction of the magnetic field.

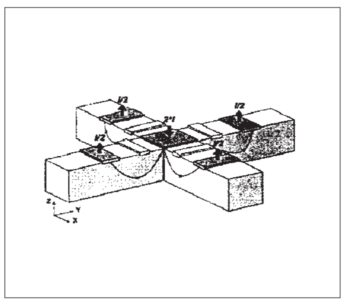

Fig. 2

The measuring principle

The VX22 consists of a vertical Hall sensor whose novel cross-shaped structure is directly affixed to the silicon chip (Fig. 2). This structure enables magnetic field parts to be measured in the x and y directions. Thanks to the use of lithographic technology, the phase displacement of the two resulting signals can be tightly maintained at 90°C.

Therefore, only the ratio between sinusoidal and cosinusoidal parts can be used to determine the angle. The absolute values of the signal amplitudes are not required.

The device has an accuracy of 0.35 degrees, the resolution itself amounts to 0.1 degrees. These values are equivalent to an accuracy of 10 bits and a resolution of 12 bits at 360 degrees.

The hardly measurable hysteresis amounts to ±0.1 degrees ±1 LSB (least significant bit).

The microprocessor for any situation

The Hall sensor issues two signals (Fig. 3). These are then transmitted to the microprocessor integrated into the new absolute angle sensor. The microprocessor performs the angle calculations, taking into account any entered parameters. This sensor enables practically any type of measuring assembly to be used.

Each position of the sensor is assigned to a reference value and the system evaluator always knows exactly where the sensor is in relation to this reference. Overall, up to 12 output channels are optionally available. Of these, up to four can be used as analog outputs.

The remaining channels can be assigned to diverse functions, such as digital switches, digital or special outputs adjusted to user specifications. The number of switching points per rotation amounts to a maximum of 4096 points. The user can also determine more switching points on an axis without having to fall back on the mechanical switch.

Angular ranges as well as curves can also be programmed in the sensor's microprocessor. In addition, various outputs can be established, for example, various analog voltage outputs, PWM, and CAN bus. Thanks to these options, most of the interfaces on the market today are feasible. The sensors are EMC-tested in order to fulfill the requirements concerning electromagnetic compatibility.

From ice cold to very hot

The new angle sensor was designed for a large range of temperatures. It functions at an operating temperature of between -40°C to +85°C. By optimizing the materials, the sensor's range of application should expand during the next step to a maximum temperature of +125°C. The critical element in this process is the electronic components. Despite the broad temperature range, electronic temperature compensation is not necessary because the sensor barely reacts to temperature influences.

Subject to changes