

## Speed and Direction Monitors 224.1S2 with direction signal contact, analog output, alarm contact, display



Snap-on-track Version D224.1S2

### Speed Measurement

This section utilizes the pulse train, as provided by the A5S40...43 sensors, and additionally by the frequency trace of the A5S30...33.

It uses the advantageous measuring principle, distinguished by quartz controlled pulse distance evaluation, automatically extended over a programmable minimum period of time. The ideal combination of fast response and averaging of measurements, as appropriate for the application.

By the 5-digits scaling facility, any required reading can be established.

Measuring accuracy  $\pm 0.01\% \pm 1$  in last significant digit.

Minimum time extension for every measuring period programmable 30 millisecc up to 10 seconds.

The programmable low end of the speed range determines the opposite mentioned zero speed criterion selectable for the direction signal.

### Display

5 digit, with bright red figures, 14 mm high. Decimals and blank zeroes can be programmed. The display update sequence may be increased beyond the minimum measuring period.

During the programming phase, the display reads the step number and its corresponding parameter.

Direction indicated by a red LED on/off.

### Application Characteristics

- With any application requiring secured observation of its sense of motion: for instance feeding pumps, the turn gear of a turbine, the automatic testing equipment for electric hand tools.
- Evaluating dual trace phased shifted signals, from all types of sensor, including those from 2 sensors suitably placed at one target. Preferably those from the dual trace sensors of series A5S40...A5S43.... Those may be failure monitored. Also accepting the signals from a sensor of series A5S30...33.

### Providing:

- a direction signal SPDT contact with programmable response,
- a speed setpoint alarm SPDT contact (convertible to a parallel operating direction signal),
- a programmable linear analog speed output 20 ma / 10 v,
- a digital speed display and direction LED light,
- a RS232 data interface

### Direction Signal

The unit detects the target's forward/reverse direction from the sensor signals. For this assignment, it offers a programmable selection of definitions:

- Motion controlled delay of the reverse signal:  
The reverse condition will not be released until a (programmable) number of pulses in reverse direction has occurred, within a (programmable) period of time. Thus, a slight reverse motion or oscillation at the machine stop will not result in an unwanted reverse signal. It will not be released, before the machine resumes a certain reverse speed. The "forward" signal however will appear without delay after one pulse in forward sense.
- Attachment to zero speed:  
Per program, the direction signal may alternatively be tied to a zero speed status, which is detected at a designated level (see opposite low end definition).  
The thus enforced signal can be programmed to be forward or reverse.
- Assignment of the direction signal to a detected sensor failure:  
per program, the direction signal may be enforced to be forward or reverse, whenever the sensor monitor detects a failure.

### Direction Signal output

With standard (default) programming, one relay signals the direction by its SPDT contact, following one of the above criteria. Per program, the relay position at no power can be assigned to forward or reverse motion.

If required, the second relay output of the unit, normally assigned to a programmable speed alarm, may be joined to the direction section per program. Thereby, a tw in circuits SPDT signal is achieved, useful for instance, to reverse the analog speed signal provided.

Power handling facility of each SPDT contact  
max 250 v/2 amp AC resp. 100 watts DC. External overload protection required.

**Speed Setpoint Alarm**

Output with SPDT relay contacts. Response characteristics individually programmable: setpoint, hysteresis bandwidth and location, condition at no power and during starter period. Response delay approx. 5 millisecc + measuring period. This output may be programmed, to disregard the speed alarm, but to jointly follow the direction signal. Power handling max 250 v/2 amp AC resp. 100 watts DC, overload protection required.

**Data Interface**

RS232 (for PROFIBUS see version 224.1S4). Transmitting measurements subsequent to request. No configuration of parameters via Interface.

**Power Supply Options**

18...40 volts AC/DC (suffix U1 to model No)  
85..265 volts AC/DC (suffix U2 to model No)  
Power consumption approx 5 VA.

**Operating Conditions**

Ambient temperature 0°C ... +50 °C (30 ...95 °F). Optionally, the snap-on-track version (D) is available with extended temperature range -25 ... + 65 °C (suffix M to model No). Humidity max 70%, without condensation. Insulation Category I

**Compatibility to Standards**

EMI according to EN 610000-6.2, EN 610000..-6.4, Safety according to EN 61010-1

**Sensor Input**

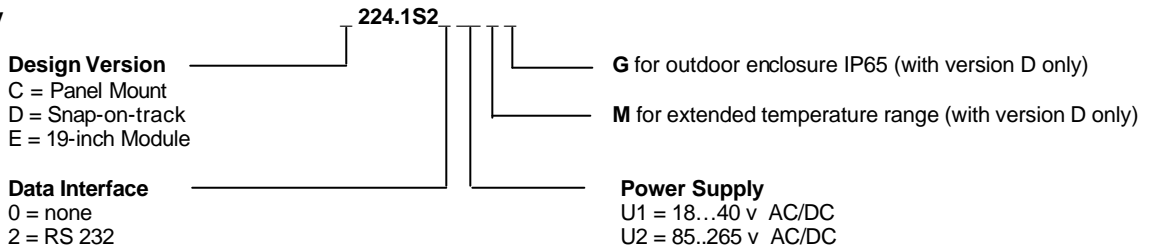
Compatible with any sensor of series A5S30...A5S33 or A5S40... A5S43, including its supply. Likewise, the unit can operate with corresponding intrinsically safe sensors of series A5S1..., installed in a hazardous Ex -area, if transmitted via an Isolating Barrier D461.21.

Other sources, if used, must provide the same signals: two pulse trains of the same frequency representing the speed, but clearly phase shifted against each other, alternatively a binary signal indicating forward/reverse. Response level hi/lo >+7/<+4 v, into an input impedance of 100 kohms. Frequency range 0 - 100 kHz.

**Design versions**

Various design versions are available, with identical functional characteristics.  
Panel mount version ( C ): Front frame 96x48 mm, protection grade IP50. Plastics enclosure, depth 125 mm, mounting by brackets supplied with. Panel thickness up to 10 mm, opening 92x45 mm. Weight approx. 200 grams. Rear side terminals for wire up to 2.5 mm<sup>2</sup>, protection grade IP20.  
Snap-on-track version ( D ): For DIN rail 35 mm. Plastics enclosure, protection grade IP50. Length 100 mm, width 75 mm, height 111 mm. Weight approx. 200 grams. Terminals for wire gage up to 2.5 mm<sup>2</sup>, protection grade IP20.  
19-inch module ( E ): For rack height 3HE (132 mm). Front width 8TE (44 mm). Weight approx. 100 grams. Rear side connector according to DIN 41612, size F, lines b + z. Plug-in socket as extra available.

**Ordering Key**



## Speed and Direction Monitors 124.1 S2 with direction signal contact, analog output, alarm contact, display

### Application Characteristics

- For all applications where the sense of motion is a critical factor: feeding pumps, the turn gear of a turbine, the automatic testing equipment for electric hand tools, for instance.
- Evaluating the electronic output signals from a sensor of series A5S30 ...A5S33 (which unifies speed and direction detection in one sensor), to provide:
- a direction signal SPDT contact with programmable response,
- a speed setpoint alarm SPDT contact (convertible to a parallel operating direction signal),
- a programmable linear analog speed output 20 ma / 10 v,
- a digital speed and direction display.

### Direction Signal

The unit not only converts the immediate electronic direction signal from the sensor to an isolated relay SPDT signal. For this assignment, it offers a programmable selection of definitions:

- Motion controlled delay of the reverse signal:  
The reverse condition will not be released until a (programmable) number of pulses in reverse direction has occurred, within a (programmable) period of time. Thus, a slight reverse motion or oscillation at the machine stop will not result in an unwanted reverse signal. It will not be released, before the machines resumes a certain reverse speed. The "forward" signal however will appear without delay after one pulse in forward sense.
- Attachment to zero speed:  
Per program, the direction signal may alternatively be tied to a zero speed status, which is detected at a designated level (see speed measurement). The thus enforced signal can be programmed to be forward or reverse.
- Double pole contact signal:  
The second relay output of the unit, normally assigned to a setpoint controlled speed alarm, may be joined to the direction section per program. A double poled relay signal thus is achieved, useful for instance, to reverse the analog speed signal provided.

### Direction signal output:

With standard (default) programming, one relay signals the direction by its SPDT contact, following one of the above criteria. Per program, the relay position at no power can be assigned to forward or reverse motion.

If required, the second relay output of the unit, normally assigned to a programmable speed alarm, may be joined to the direction section per program. Thereby, a twin circuits SPDT signal is achieved, useful for instance, to reverse the analog speed signal provided.

Power handling facility of each SPDT contact:  
max 250 v/2 amp AC resp. 100 watts DC. External overload protection required.

### Compatibility to Standards

EMI according to EN 61000-6.2, EN 61000.-6.4,  
Safety according to EN 61010-1

### Speed Measurement

This section utilizes the pulse train, as additionally provided by the A5S30 ...33 sensors. It uses the advantageous measuring principle, distinguished by quartz controlled pulse distance evaluation, automatically extended over a programmable minimum period of time. The ideal combination of fast response and averaging of measurements, as appropriate to the application. By the 5-digits scaling facility, any required reading can be established.

Measuring accuracy  $\pm 0.01\% \pm 1$  in last significant digit.  
Minimum time extension for every measuring period programmable 30 millisecc up to 10 seconds.

The programmable low end of the speed range determines the aforementioned zero speed criterion selectable for the direction signal.

### Speed Setpoint Alarm

Output with SPDT relay contact. Response characteristics individually programmable: setpoint, hysteresis bandwidth and location, condition at no power and during starter period.

Response delay approx. 5 millisecc + measuring period.

Power handling max 250 v/2 amp AC resp. 100 watts DC, overload protection required.

### Display

5 digit, with bright red figures. Versions C and D have 14 mm height, version E uses 8 mm. Decimals and blank zeroes can be programmed. The display update sequence may be increased beyond the minimum period.

During the programming phase, the display reads the step number and its corresponding parameter.

Direction indicated by a red LED on/off.

### Sensor Input

Compatible with any sensor of series A5S30...A5S33, including its supply.

Likewise, the unit can operate with corresponding signals from a sensor of series A5S14... A5S17 installed in a hazardous Ex-area, if transmitted via an Isolating Barrier D461.21.

Other sources, if used, must provide the same signals: a pulse train signal with its frequency representing the speed and a binary signal indicating forward/reverse, both with hi/lo level  $>+7/<+4$  v, into an input impedance of 100 kohms.

Frequency range 0 - 100 kHz.

### Power Supply Options

18...40 volts AC/DC (suffix U1 to model No)

85...265 volts AC/DC (suffix U2 to model No)

Power consumption approx 5 VA.

### Operating Conditions

Ambient temperature 0°C ... +50 °C (30 ...95 °F).

Optionally, the snap-on-track version (D) is available with extended temperature range -25 ... + 65 °C (suffix M to model No).

Humidity max 70%, without condensation.

Insulation Category I

**Design versions**

Various design versions are available, with identical functional characteristics.

**Panel mount version ( C ):**

Front frame 96x48 mm, protection grade IP50. Plastics enclosure, depth 125 mm, mounting by supplied brackets. Panel thickness up to 10 mm, opening 92x45 mm. Weight approx. 200 grams. Rear side terminals for wire up to 2.5 mm<sup>2</sup>, protection grade IP20.

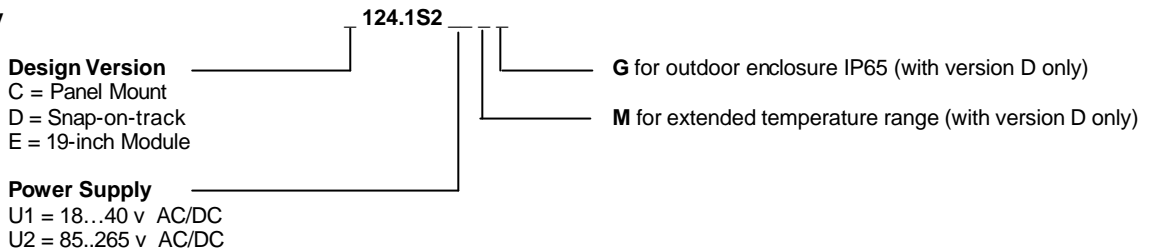
**Snap-on-track version ( D ):**

For DIN rail 35 mm. Plastics enclosure, protection grade IP50. Terminals for wire gage up to 2.5 mm<sup>2</sup>, protection grade IP20. Length 100 mm, width 75 mm, height 111 mm. Weight approx. 200 grams.

**19-inch module ( E ):**

For rack height 3HE (132 mm). Front width 8TE (44 mm). Weight approx. 100 grams. Rear side connector according to DIN 41612, size F, lines b + z. Plug-in socket as extra available.

**Ordering Key**



## Meters 124.1 for Speed, Ratio, Difference

### Versions 124.1S4 equipped with PROFIBUS interface, alarm contacts, display

#### Application Characteristics

- Measuring one or two speeds and transmitting results via PROFIBUS to other data handling equipment - including composite values as ratio, difference, sum.
- Monitoring two of these quantities by programmable alarms.
- Applicable to all process variables which are transmitted as a series of pulses or as AC-voltage. Compatible with all our speed sensors, and many other transmitters for speed and flow.
- Specifically preferred with automotive and motor testing installations, with paper and textile machines to monitor stretch and shrinkage, with flow systems for the ratio between streams.

#### Measuring Principle

2 measuring channels, M and B, operate in parallel. Both use the advantageous frequency measuring principle, distinguished by pulse distance evaluation, automatically extended over a programmable period of time. The ideal combination of tracking speed and average, as appropriate for the application. The unit precisely regards the relationship between the process quantity (speed) and the transmitted frequency, by digital (scaling), individually for both channels. Thus, any required reading can be established.

Measuring accuracy  $\pm 0.01\% \pm 1$  in last significant digit.  
Minimum time extension for every measuring period programmable 30 millisecond up to 10 seconds.

#### Composite Quantities

With the measured results from both channels M and B, the unit continuously computes their ratio, difference, and sum. Thereby, a total of 6 different quantities are at the user's disposal:

Variable M

Variable B

Ratio  $M \div B$

Difference  $M - B$

Sum  $M + B$

Percentage difference  $(M - B) \div B$ .

Any two of these can be selected to be alternatively displayed, switched by key or external control. LED lights indicate the actually valid display selection.

All of them are available via the PROFIBUS interface.

#### Sensor Signal Inputs

Both channels M and B provide two input paths, accepting all our sensors. Both are isolated from power supply, and have common zero.

The high level path responds with on/off  $>7<4$  volts. Max. signal 150 v. Impedance 100 k. Frequency 0-100 kHz.

The high sensitivity path responds to  $> 50$  millivolts<sub>RMS</sub>, max 35 v DC may be superimposed. Max. signal 100 v. Impedance 50 k. Frequency 1-50 kHz.

Sensor supply 12 volts/60 ma (common to both channels), and 2x8 volts via 1k for 2leads NAMUR types.

#### PROFIBUS Interface

Data transmitted: Actual results of all 6 quantities listed, alarm conditions, status of unit.

Cycle time: approx. 8 msec (32 bytes at 12 MBaud).

Unit address No. 001 ...125 (selectable at front side only).

Data socket: 9-pole Sub-D.

Unit configuration via PROFIBUS: All parameters for the measurement and performance of the alarms, and to control the volume of data transmitted.

#### Setpoint Alarms

2 alarms with SPDT relay contacts. Per program to be (jointly) assigned to any of the 6 listed quantities. Response characteristics individually programmable: setpoint, hysteresis bandwidth and location, condition at no power and during starter period. Response delay approx. 5 millisecond + measuring period. Handling max 250 v/2 amp AC resp. 100 watts DC. Overload protection externally required.

#### Display

5 digit (resp. 4 digit and minus sign), with bright red figures. Versions C and D have 14 mm height, version E uses 8 mm. Decimals and blank zeroes can be programmed. The display update sequence may be increased over the minimum measuring period. During the programming phase, the display reads the step number and its corresponding parameter.

MAX/MIN memory:

Maximum and minimum measurements are memorized to be recalled to the display by keys. Another key initiates a new memorizing period, cancelling previous values.

#### Power Supply Options

18...40 volts AC/DC (suffix U1 to model No)

85...265 volts AC/DC (suffix U2 to model No)

Power consumption approx 5 VA.

#### Operating Conditions

Ambient temperature 0°C ... +50 °C (30 ...95 °F)

Optionally, the snap-on-track version (D) is available with extended temperature range -25 ... + 65 °C (suffix M to model No).

Humidity max 70%, without condensation.

Insulation Category I

#### Compatibility to Standards

EMI according to EN 61000-6.2, EN 61000.-6.4,

Safety according to EN 61010-1

**Design**

Various design versions are available, with identical functional characteristics.

**Panel mount version ( C ):**

Front frame 96x48 mm, protection grade IP50. Plastics enclosure, depth 125 mm, mounting by brackets supplied with. Panel thickness up to 10 mm, opening 92x45 mm. Weight approx. 200 grams. Rear side terminals for wire up to 2.5 mm<sup>2</sup>, protection grade IP20.

**Snap-on-track version ( D ):**

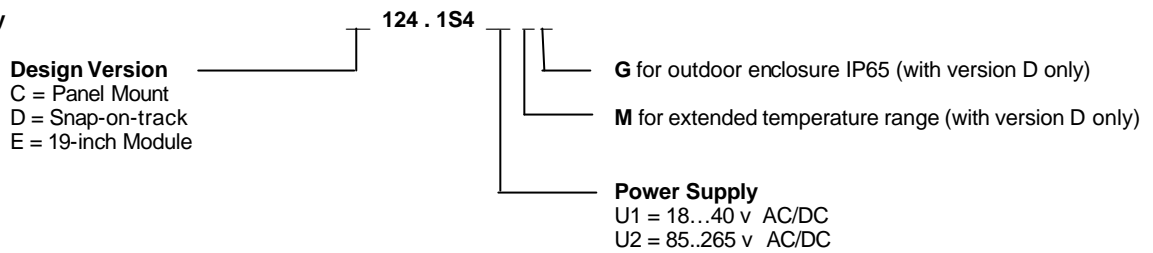
For DIN rail 35 mm. Plastics enclosure, protection grade IP50. Length 100 mm, width 75 mm, height 111 mm. Weight approx. 200 grams. Terminals for wire gage up to 2.5 mm<sup>2</sup>, protection grade IP20.

Optionally, version (D) is available placed in a outdoor mounting enclosure grade IP65 (~ NEMA4) with cable conduits (suffix G).

**19-inch module ( E ):**

For rack height 3HE (132 mm). Front width 8TE (44 mm). Weight approx. 100 grams. Rear side connector according to DIN 41612, size F, lines b + z. Plug-in socket as extra available.

**Ordering Key**



## Meters 124.1 S6 for Speed and Acceleration equipped with analog output, alarm contacts, display

### Application Characteristics

- 1 speed measuring channel with additional facility to compute the rotational acceleration from subsequent speed measurements.
- Programmable for conversion into analogue signal, controlling the setpoint alarms, and the display.
- Compatible with all our high level speed sensors, and other speed transmitters of corresponding type.
- Specifically preferred for use with power plant turbines in order to observe the required mode of operation, and as an additional warning of impending danger.

### Measuring Principle

Using the advantageous quartz controlled pulse distance evaluation, automatically extended over a programmable minimum period of time. Thus determining response time and averaging of measurements to achieve a high stability of readings, as specifically required for the acceleration detection.

Digital 5-digit scaling precisely adjusts the meter to the data of the specific application.

Measuring accuracy  $\pm 0.01\% \pm 1$  in last significant digit.

Minimum time extension for each measuring period programmable 30 millisecond up to 10 seconds.

Special parameters adapt the unit to the performance best suited to determine the acceleration: defining the reading unit, and the number of measurements to be included into the acceleration computing cycle..

### Unit terms

Recommended for the speed: RPM with decimals set as applicable.

Programmable for the acceleration: RPM/min or RPM/sec, decimals as applicable.

### Sensor Signal Input

Compatible with any sensor of our series A5S05... to A5S09..., including its supply. Also the frequency path of series A5S3.. and A5S4, or transmitters G1000. Sensors A5S1..., installed in an hazardous Ex-area, need our isolating barrier D461 between. General response level on/off  $>7/ <4$  volts. Max. signal 150 v. Impedance 100 k. Frequency 0-100 kHz. Sensor supply 12 volts/60 ma.

### Analog Output

Isolated circuit, convertible to full scale 20 ma (max load 500 O) or 10 volts (max load 3 ma). Live zero programmable. Output assigned by program to either speed or acceleration. Resolution 12 bit (1: 4096). Linearity error  $< 0.1\%$  of full scale. Tracking delay = measuring or computing period.

### Setpoint Alarms

2 alarms with SPDT relay contacts. Assigned (jointly) per program to either speed or acceleration. Response characteristics individually programmable: setpoint, hysteresis bandwidth and location, condition at no power and during starter period. Response delay approx. 5 millisecond + measuring period. Handling max 250 v/2 amp AC resp. 100 watts DC. Overload protection externally required.

### Display

5 digits (resp. 4 digits and minus sign), with bright red figures. Versions C and D have 14 mm height, version E uses 8 mm. Decimals and blank zeroes can be programmed. The display update sequence may be increased beyond the minimum period. During the programming phase, the display reads the step number and its corresponding parameter. HOLD function

### Data Interface (Option)

RS232 or RS485.

Transmitting measurements subsequent to request. No configuration of parameters via Interface.

### Power Supply Options

18...40 volts AC/DC (suffix U1 to model No)

85...265 volts AC/DC (suffix U2 to model No)

Power consumption approx 5 VA.

### Operating Conditions

Ambient temperature  $0^{\circ}\text{C} \dots +50^{\circ}\text{C}$  ( $30 \dots 95^{\circ}\text{F}$ )

Optionally, the snap-on-track version (D) is available with extended temperature range  $-25 \dots +65^{\circ}\text{C}$  (suffix M to model No).

Humidity max 70%, without dew.

Insulation Category I

### Compatibility to Standards

EMI according to EN 61000-6.2, EN 61000.-6.4, Safety according to EN 61010-1

**Design**

Various design versions are available, with identical functional characteristics.

**Panel mount version ( C ):**

Front frame 96x48 mm, protection grade IP50. Plastics enclosure, depth 125 mm, mounting by brackets supplied with. Panel thickness up to 10 mm, opening 92x45 mm. Weight approx. 200 grams. Rear side terminals for wire up to 2.5 mm<sup>2</sup>, protection grade IP20.

**Snap-on-track version ( D ):**

For DIN rail 35 mm. Plastics enclosure, protection grade IP50. Length 100 mm, width 75 mm, height 111 mm. Weight approx. 200 grams. Terminals for wire gage up to 2.5 mm<sup>2</sup>, protection grade IP20.

Optionally, version (D) is available placed in a outdoor mounting enclosure grade IP65 (~ NEMA4) with cable conduits (suffix G).

**19-inch module ( E ):**

For rack height 3HE (132 mm). Front width 8TE (44 mm). Weight approx. 100 grams. Rear side connector according to DIN 41612, size F, lines b + z. Plug-in socket as extra available.

**Ordering Key**

