Single Channel Speed Monitor for Rotating Equipment with SIL2 requirements
E16521D.1

E16521D.1 Front View

KEY FEATURES

- SIL2 / IEC 61508:2010 compliant
- Single Channel Monitor with sensor monitoring and self-test function
- Frequency range 0 Hz…50 kHz
- 1 Analog Output 0/4…20 mA
- Bright red digital LED display
- 1 Safety Output as DPST relay
- 3 Alarm Outputs, 1 as SPST relay and 2 as PhotoMOS relays
- Input for BRAUN A5S… sensors
- Square wave Pulse Output
- RS232 Data Interface
- Two Monitors, suitably configured with their output contacts linked together, may provide a protection system with 1oo2 or 2oo2 redundancy
- Universal Power Supply range 20…265 Vuc

BENEFITS

- Fast, precise and safe
- Maintenance-free during Lifetime, therefore minimized TCO
- Universal range of application, throughout mechanical and electrical engineering, in the chemical industry, in power plants, at test stands
- Increased safety with 1oo2 architecture
- Maximum availability with 2oo2 architecture

Fast, precise and safe – from zero motion to highest speed

The BRAUN Single Channel Speed Monitor E16521D.1 for increased safety requirements is SIL2 / IEC 61508:2010 compliant. It monitors motors, pumps, feeders, gears, rollers and small turbines and provides protection against overspeed at any required value of rotational speed, including standstill.

The signal input is especially designed for BRAUN A5S… sensors.

With single channel processing (1oo1) security provision is solely determined by the device configuration. Therefore the use of sensor monitoring with integrated plausibility control is essential. In such a case no redundancy is provided. Should a fault be detected the entire system will be shut down immediately.

With two channel systems there is a choice of implementation, dependent upon requirements. In principle the two monitors operate in parallel yet independently. Alarm indication can be realized through the linkage of their Alarm Outputs.
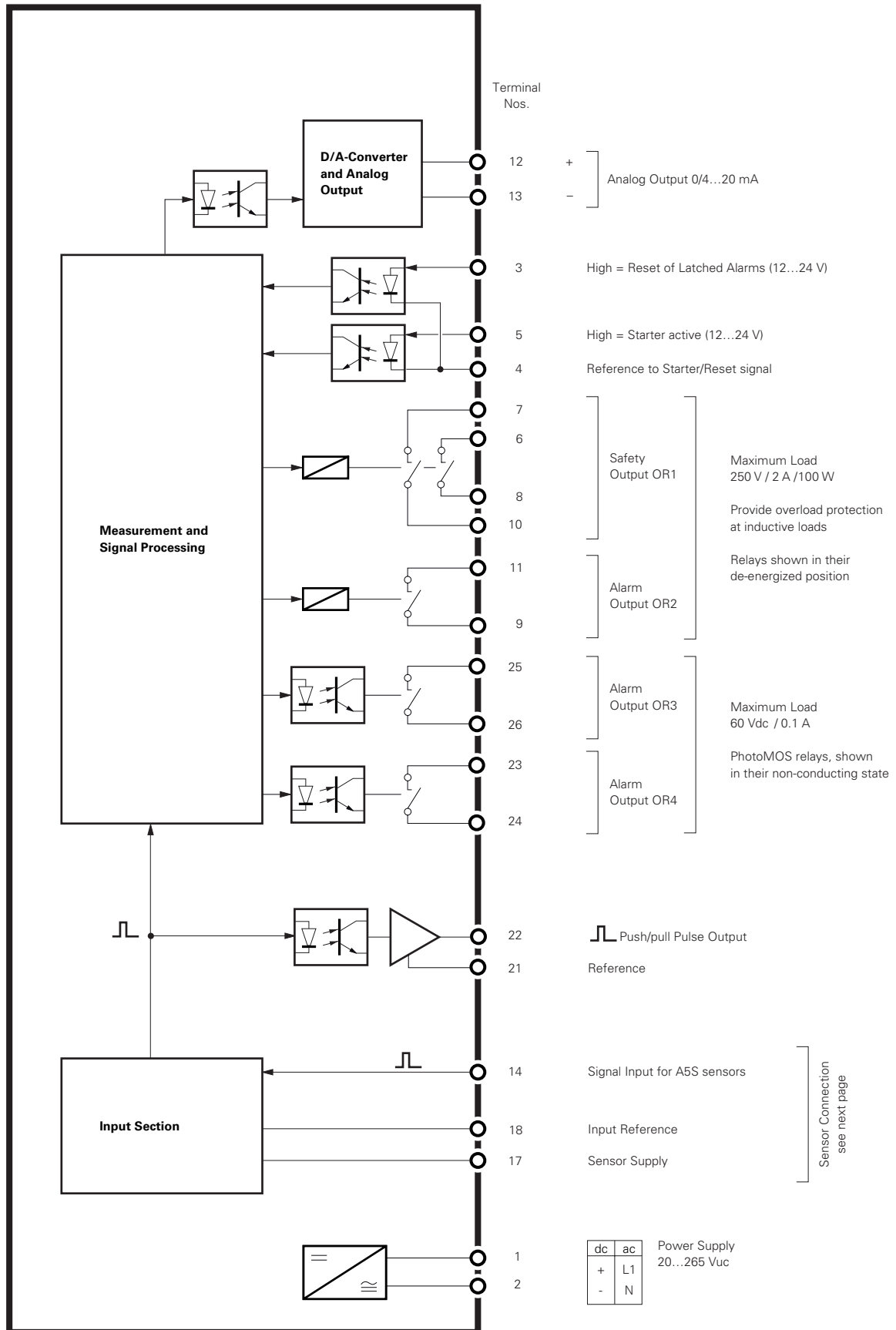
For 1oo2 processing we have system redundancy with enhanced security through comparative diagnosis. In the case of fault detection the entire system will be shut down. With 2oo2 processing we still have system redundancy but with enhanced availability. Only if both monitors fail the entire system will be shut down.

The E16521D.1 Speed Monitor permanently monitors the speed sensor for its correct function. During its complete lifetime cycle the Monitor does not require any external proof tests and is completely maintenance-free.
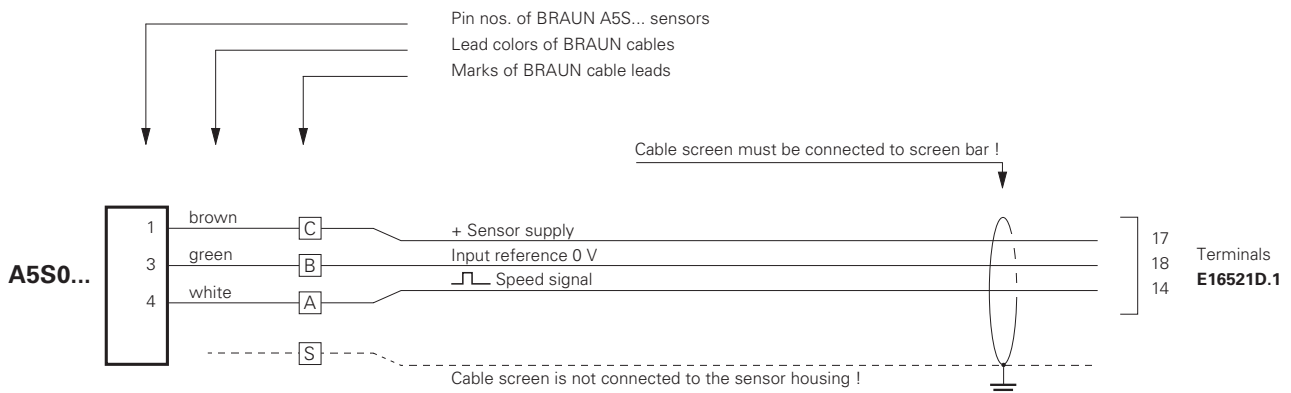
Specifications of E16521D.1

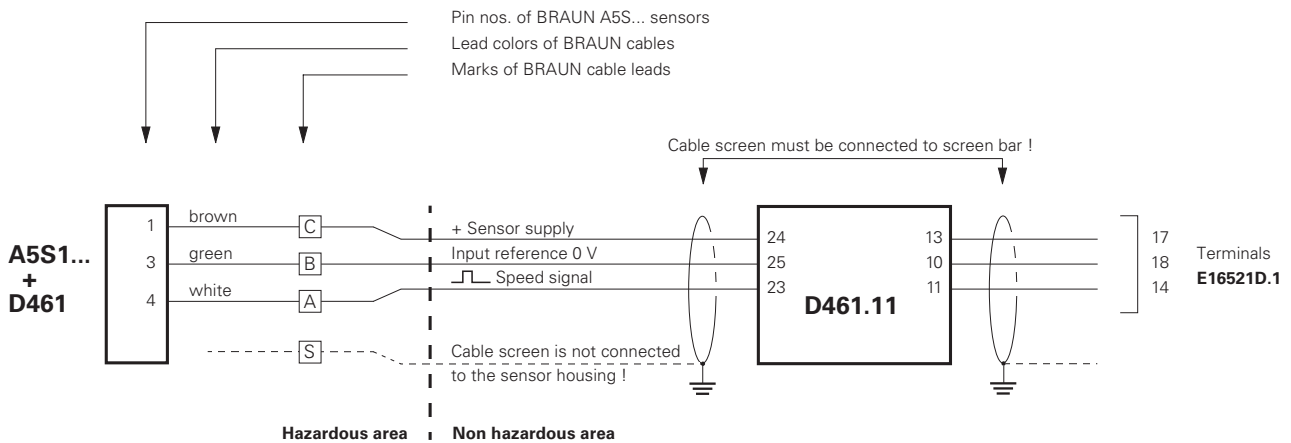|	
Conformity to Standards	SIL2 acc. IEC 61508:2010, EN ISO 13849:2008; PLc 2014/30/EU, EN IEC 61000-6-4, EN IEC 61326-3-2 2014/35/EU, EN IEC 61010-1
Measuring Principle	Frequency measurement, based on the input pulse distance, extended over a minimum period of time, programmable 5 milliseconds…9.999 seconds.
Accuracy	±0.005% of value ±1 in last digit
Response	1 input pulse interval + programmed minimum time + 5 milliseconds
Analog Output	Isolated and protected against external short circuit. Current 0/4…20 mA with max. load of 500 ohms.
Range	High and low end of span programmable
Resolution	12 bit (1 : 4096)
Linearity error	<0.1 %
Drift by temperature	<0.02% within 0…+60 °C (+32…+140 °F)
Relay Outputs	1 Safety Output: OR1 as DPST, 3 Alarm Outputs: OR2 as SPST, OR3 and OR4 as PhotoMOS (SPST).
Setpoint adjustment	Individually programmable from zero speed up to any high speed
Response characteristics	Hysteresis individually programmable in its position and width
Contact rating	Relay contacts OR1 and OR2: 220 Vdc, 2 A, 60 W resp. 250 Vac, 2 A, 62.5 VA (inductive loads need external spark extinguishing device) PhotoMOS relays OR3 and OR4: 60 Vdc, 0.1 A, 3 W
Alarm state position	Individually programmable for excess, no power and input failure condition, starter period
Starter function	Released by external control signal (12…24 V) to isolated input Extension programmable up to 999 sec.
Display	5 digits with red LED figures, 10 mm high Indicating the variable during operation, parameters during the programming phase
Data Interface	RS232 at USB Mini B front socket for setting the parameters (equipment required see below)
Programming	Manually by front keys, alternatively via RS232 (equipment required see optional accessories)
Data protection	Parameters safe-guarded against power failure and code protected against unauthorized access
Signal Input	Isolated circuit, responding to pulse signals
Frequency range	0 Hz…50 kHz
Signal level range	Maximum 30 V
Response levels	high at >6.5 V, low at <4 V
Input impedance	100 kohms
Scaling factor	Programmable by 5 digits, considering any relation to the variable
Suitable sensor types	All BRAUN A5S… sensors
Sensor failure monitoring	Short-circuit or interrupt of supply, signal lead break sensors (with push/pull output only). A detected failure sets any of the alarms into a pre-programmable state.
Sensor supply	Approx. 13 V / max. 60 mA
Pulse Output	Repeating the input signal, isolated and push/pull with approx. 20 V level
Power Supply	Universal supply range 20…265 Vuc. Power consumption approx. 5 W, resp. 5 VA Insulation category Class 1
Connectors (Wiring)	Screw mounting, 2 plug-in terminal blocks, accepting 0.2…2.5 mm² cross section
Environmental Conditions	Ambient temperature in operation: 0…+60 °C (+32…+140 °F) Ambient temperature in storage: -40…+85 °C (-40…+185 °F) Relative humidity max. 95%, non-condensing
Design	Snap-on-track plastic enclosure for 35 mm rail, field mounting enclosure (Option -G) on request
Dimensions	See drawing dimensions
Protection Grade	IP 40 for enclosure, IP 20 for terminals (also available in field mounting version, with transparent cover IP 65/NEMA 4)
Weight	approx. 0.3 kg, resp. 1.0 kg for version -G
Optional Accessories	**IS-RS232-E16:** CD-ROM with Interface Software to program parameters **L3D01:** Plug-in adapter cable, with 9-pole Sub-D (female) plug to PC

Function Diagram and Connections of E16521D.1

Terminal Nos.		
D/A-Converter and Analog Output	12 +	Analog Output 0/4...20 mA
	13 −	
Measurement and Signal Processing	3	High = Reset of Latched Alarms (12...24 V)
	5	High = Starter active (12...24 V)
	4	Reference to Starter/Reset signal

Safety Output OR1 — Terminals 7, 6, 8, 10

Maximum Load 250 V / 2 A / 100 W

Provide overload protection at inductive loads

Alarm Output OR2 — Terminals 11, 9

Relays shown in their de-energized position

Alarm Output OR3 — Terminals 25, 26

Maximum Load 60 Vdc / 0.1 A

Relays shown in their de-energized position

Alarm Output OR4 — Terminals 23, 24

PhotoMOS relays, shown in their non-conducting state

| 22 | ⊓ Push/pull Pulse Output |
| 21 | Reference |

Input Section

14	Signal Input for A5S sensors
18	Input Reference
17	Sensor Supply

Sensor Connection see next page

| 1 | |
| 2 | |

dc	ac
+	L1
-	N

Power Supply 20...265 Vuc

Connection of BRAUN A5S0... sensor to E16521D.1

Pin nos. of BRAUN A5S... sensors
Lead colors of BRAUN cables
Marks of BRAUN cable leads

Cable screen must be connected to screen bar !

A5S0...

Pin	Color	Mark		
1	brown	C	+ Sensor supply	17
3	green	B	Input reference 0 V	18
4	white	A	Speed signal	14
		S		

Terminals **E16521D.1**

Cable screen is not connected to the sensor housing !

Connection of BRAUN A5S1... Ex sensor with Isolating Barrier D461 to E16521D.1

Pin nos. of BRAUN A5S... sensors
Lead colors of BRAUN cables
Marks of BRAUN cable leads

Cable screen must be connected to screen bar !

A5S1... + D461

Pin	Color	Mark			D461.11		
1	brown	C	+ Sensor supply	24		13	17
3	green	B	Input reference 0 V	25		10	18
4	white	A	Speed signal	23		11	14
		S					

Terminals **E16521D.1**

Cable screen is not connected to the sensor housing !

Hazardous area | **Non hazardous area**
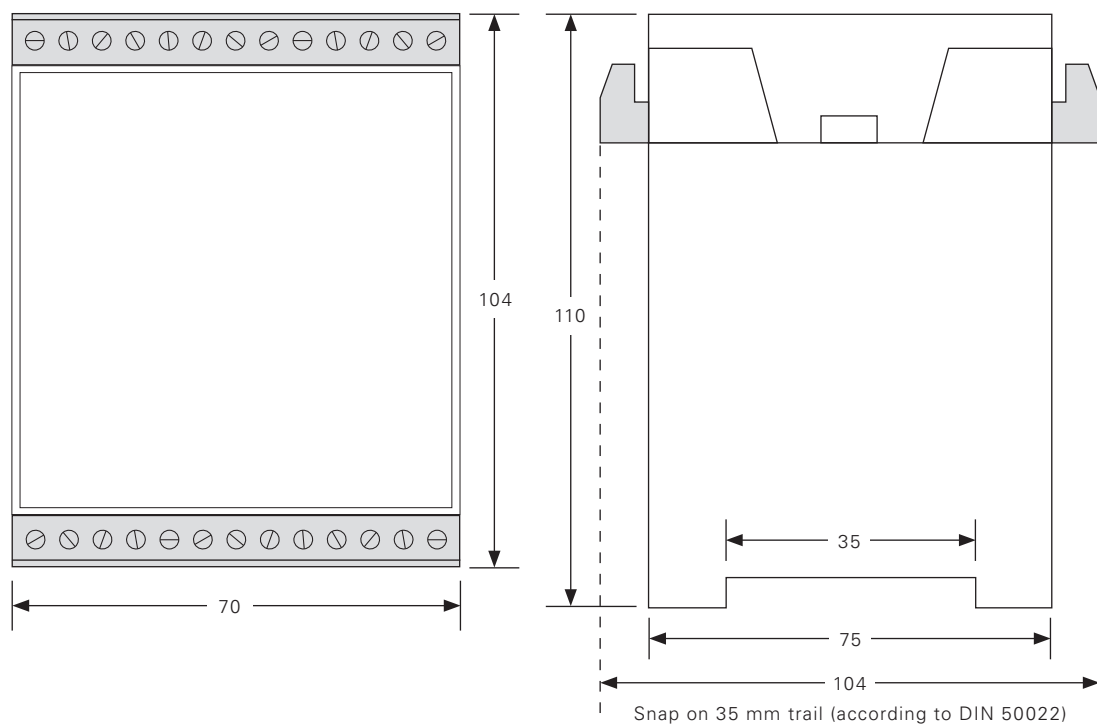
Optional Accessories

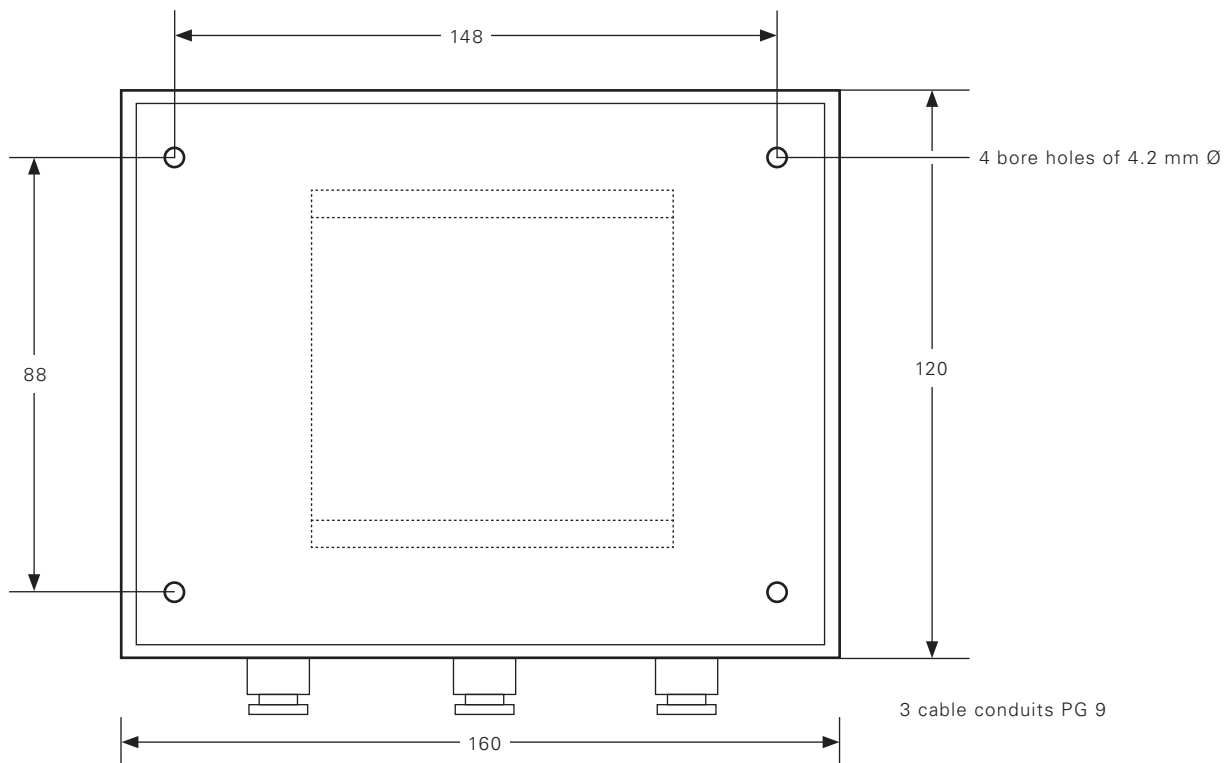View of E16521D.1 Speed Monitor including field mounting enclosure with transparent cover.
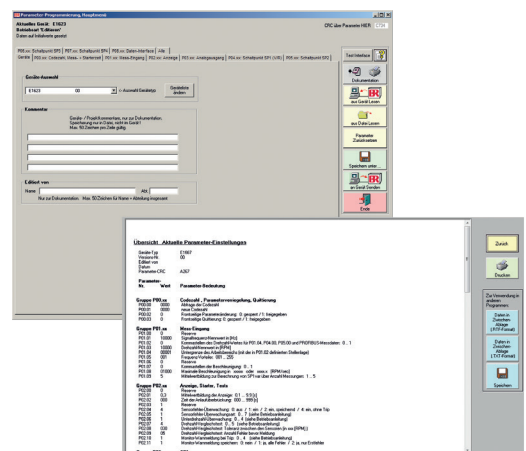
View of E16 Configuration Software, compatible up to Windows 10.

Dimensions (in mm)

Dimensions of Rail Mounting Enclosure (standard)

104

110

35

75

104

70

Snap on 35 mm trail (according to DIN 50022)

Dimensions of Field Mounting Enclosure (Option -G)

148

4 bore holes of 4.2 mm Ø

88

120

3 cable conduits PG 9

160

Ordering Key E16521D.1

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┌──────────────┐  ┌──┐
│ E16 5 2 1 D . 1 │ │-G│
└──────────────┘  └──┘
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Enclosure
suffix -G = field mounting enclosure with transparent cover
(omit if not required)

Examples:

E16521D.1 :   Standard version for BRAUN A5S… sensors

E16521D.1-G : Version with field mounting enclosure
                with transparent cover

BRAUN – Speed Monitoring and Protection Systems for Rotating Equipment

BRAUN Industrial Electronics develops, produces and sells an array of "Rotating equipment" Protection Systems for use in industrial applications worldwide. These systems comply with the highest standards of safety and availability.

As a globally leading technology provider with over 50 years of experience BRAUN has been continually meeting and mastering the challenges associated with protecting the facilities of companies within the power generation, oil, gas and chemical industries. BRAUN Protection Systems have been installed in over 100 countries worldwide, particularly in those areas where rotational equipment safety is of the highest priority.
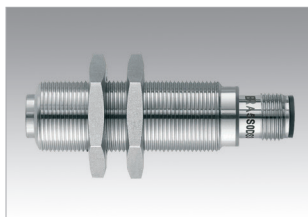
For our OEM customers BRAUN is both a solution oriented systems provider and a reliable partner.

Our solutions comprise a variety of products for the detection and monitoring of speed and related parameters.

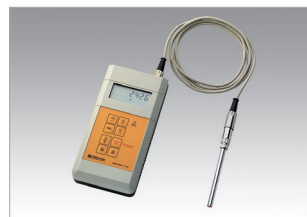Always matching the requirement. Always the perfect solution for safety and availability.

PROTECTION SYSTEMS   **SPEED SENSORS**   **TACHOMETERS**   **PORTABLE TACHOMETERS**

BR BRAUN
Speed and Frequency

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