BRAUN GMBH
FREQUENZ UND DREHZAHL

Quality certified according ISO 9001

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Speed Monitor
D224.11 (with RS232-Interface)
D224.12 (with PROFIBUS-Interface)

Instructions and Operation Manual

Contents **Page**

1. Specifications

Design

Snap-on track enclosure for DIN 50022 rail 35 mm,
Dimensions:
Length 100 mm, width (incl. terminal blocks) 104 mm, height 110 mm

Installation Conditions

Ambient temperature in operation.....0°C...+50°C
Ambient temperature in storage .....-40°C....+85°C

Electrical insulation grade I
Voltage grade I
Protection grade .....Enclosure IP40
.....Terminals IP20

Power Supply

Supply voltage U3 ..... 20…265 Vuc
Consumption ..... 7,5 VA

Measuring Input

Response Hysteresis selectable:
.....A5S-Level, Namur level, inductive level
Sensor supply..... 2x approx. 13V, max. 60mA resp. 8V via 1 kohms
Impedance (I) .....100 kohms
Minimum measuring time .....5 msec - 9.999 sec

Accuracy

+ 0.005 % of measurement + 1 in LSD

Analog Output

Isolated and programmable .....0/4..20mA
Resolution ..... 12 bit
Max. load ..... 500 ohms
Linearity error ..... < 0.1 %
Temperature drift ..... 0,02 %/°C at range of 0...60°C
Response time..... minimum measurement time + 3msec

Relay Outputs

4, each SPDT
Breaking capacity .....voltage min 10 mv, max. 250 V AC/DC
Current.....min. 10 ua, max 2 amp AC, 1 amp DC
Power rating .....max 100 W, 250 VA into ohmic load only.
Inductive load must be equipped with spark extinguisher
Response time..... minimum measurement time + 5msec

Display

5 digits LED red15 mm high, with adjustable decimal point, programmable

Data Interface

RS232 (D224.11) resp. PROFIBUS (D224.12)

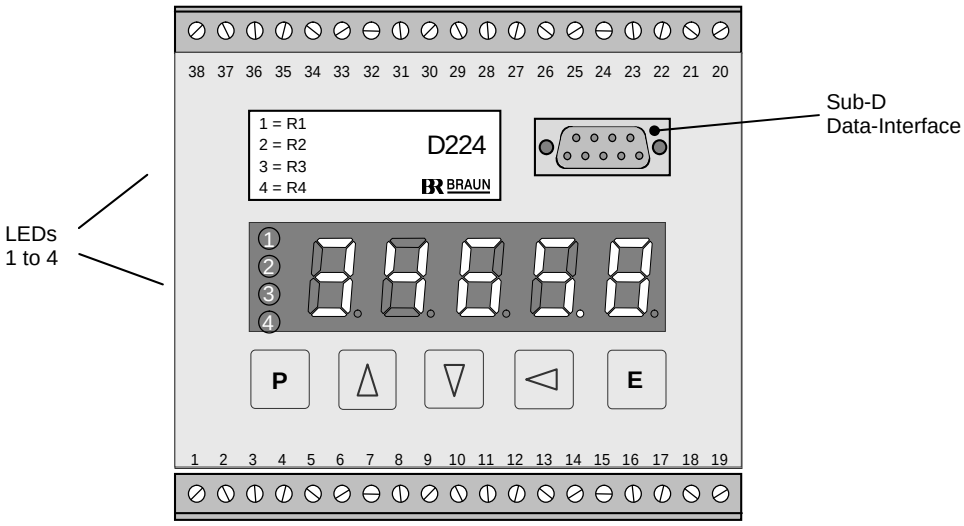
2. Description

2.1. Display and Frontside Operational Elements

2.1.1. Application

The D224 measures one or two speeds. Display, setpoints and analog output may be assigned to any measured quantity.
Adjustment of parameters via keys resp. data interface

2.1.2. Front View



2.1.3. Display and Operation

In normal operation the display reads the speed.
LED1 is on if Relay 1 (SP1) is energized.
LED2 is on if Relay 2 (SP2) is energized.
LED3 is on if Relay 3 (SP3) is energized.
LED4 is on if Relay 4 (SP4) is energized.

Display of maximum/minimum measured speed:
Display max.- speed, while key [△] is pressed,
Display min.- speed, while key [▽] is pressed.
Clear max. / min.-value with key [◁].
Clear max. / min.-value and latched alarms with key [◁] and [E].

Display of value channel A, while keys [△] and [E] are pressed.
Display of value channel B, while keys [▽] und [E] are pressed.

2.1.4. Error codes in Display:

-E1- : unauthorized access with incorrect Code No.

SE-01 : sensor supply fault channel A
SE-02 : sensor signal fault channel A
SE-03 : SE-01 and SE-02
SE-10 : sensor supply fault channel B
SE-20 : sensor signal fault channel B
SE-30 : SE-10 und SE-20

resp. combinations hereof, for example:
SE-11 : sensor supply fault of channels A and B

2.2. Features

Measuring Principle
Measurement is based on the frequency of the pulse train representing the speed. Basic quantity is the time between two or more of its pulses. An automatic function determines this number, in order to maintain a minimum period of time for every measurement to be extended over. This time minimum is programmable to 5 millisec or more, thus establishing a corresponding averaging and stabilization of measurements.
The corresponding speed value by required terms (unit and decimals), by which the display, the alarm circuit, and the analog output are reading, computes from these measurements. This process further considers the programmed application data (relation between machine speed and signal frequency).
In essence, the ideal combination of fast reaction, high accuracy, and reliability of results.

Display Step-Down after Input Interrupt
In normal operation, the display closely tracks the input sequence, with the programmed performance. After a sudden interrupt of (both) the input pulses, the instrument reduces the readings following an automatic step-down sequence. This starts as fast as the most recent measuring sequence before interrupt, but then decreases slower and slower (reciprocal) until it meets the programmed low end.

Display performance at input signal interrupt

Setpoint Speed Alarms
Four individual setpoints control an own relay output
Each with individually programmable response characteristics, and each with programmable starter.

Alarms

Analog Output
Output signal isolated and linear as current 0/4… 20 ma into 500 Ω max load.
Live zero programmable.
High and low end of conversion programmable.

Analog output

3. Programming of the Modules

3.1. Programming of the Modules via Front Keyboard

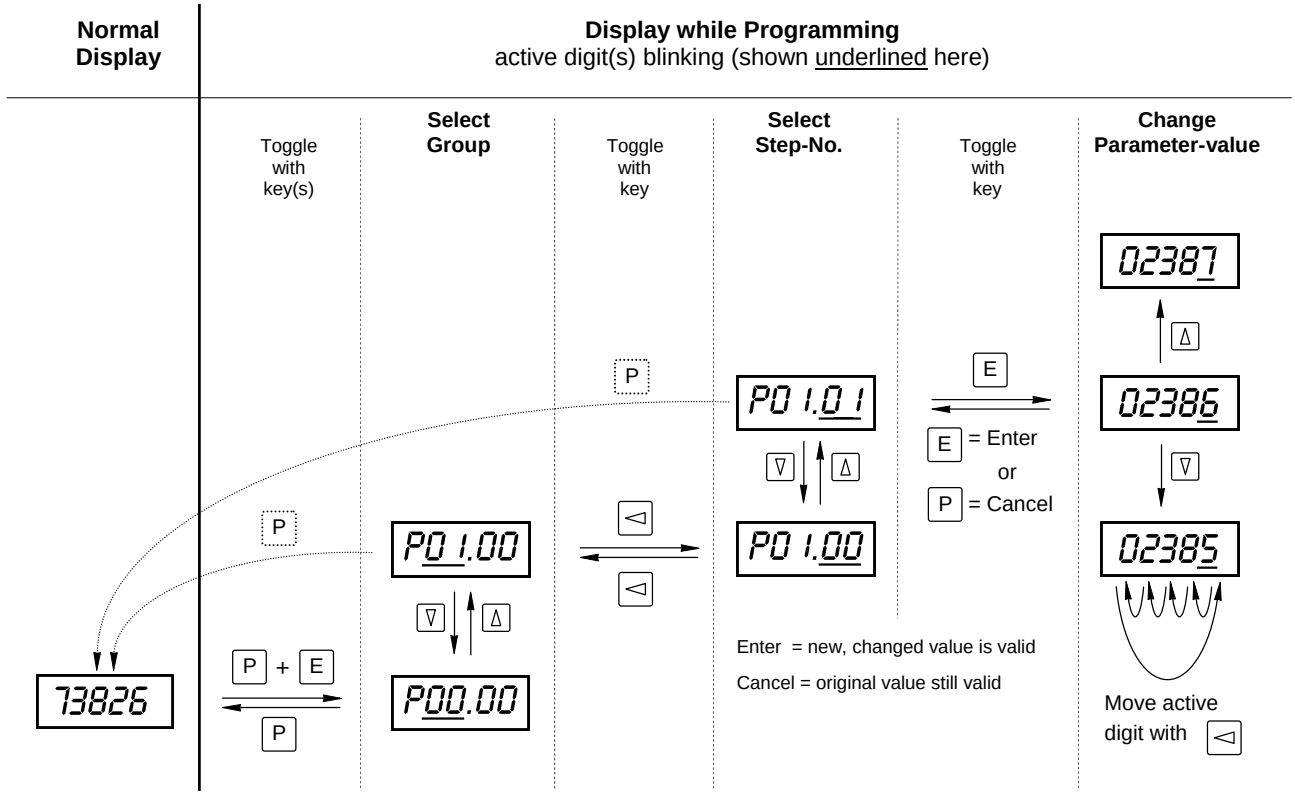
Short form Parameter-programming instruction

Principle: Select a Parameter by it's "Name" **Pgg.ss**,
where **gg** = Parameter- Group-No. and
ss = Step-No. within Group,

then check it's value and possibly change it.

Programming:
To enter the programming phase, press both keys [P] and [E] simultaneously; instead of normal display, P00.00 will be shown.
Select group- or. step-no. with keys [△] , [▽] .
Toggle between group- and step-range with key [◁] .
Show parameter's value with key [E] .
Select (move) active digit with key [◁] .
Adjust figure in active digit with keys [△] , [▽] .
Acknowledge with key [E] , Cancel (old value still valid) with key [P] .
Return to normal operation with key [P]

Example: change value of parameter P01.01 from 2386 to 2387 or 2385:



3.2. Programming via RS232-Interface

Only possible for OEM with special interface-software by BRAUN.

3.3. Summary of parameters and their default values

program-Step No.	parameter function		data set on delivery *) (initial data)
P00.00	access code request		0000
.01	new code figure		0000
.02	lock status : 1 = unlocked / 0 = locked		1 = unlocked
.03	minimum measuring time: 00005 to 9999 msec		100 (msec)
.04	time elapse of starter phase : 000 to 999 sec		000 (sec)
P01.00	Input A	decimals of input signal frequency	0 = none
.01		value of nominal input frequency	10000
.02		decimals of corresponding speed	0 = none
.03		corresponding speed (unit as desired)	10000
.04		low end of speed range	00001
.05		hysteresis of input trigger: 0 = A5S / 1 = NAMUR	0
.06		reserved for future application	0
.07		reserved for future application	0
.08		sensor monitoring: 0 = off / 1 = on / 2 = on and latched	0
.09		mode of monitoring: 0 = none / 1 = current / 2 = level / 3 = both	1
.10		fixed value: 001	001
P02.00	Input B	decimals of input signal frequency	0 = none
.01		value of nominal input frequency	10000
.02		decimals of corresponding speed	0 = none
.03		corresponding speed (unit as desired)	10000
.04		low end of speed range	00001
.05		hysteresis of input trigger: 0 = A5S / 1 = NAMUR	0
.06		reserved for future application	0
.07		reserved for future application	0
.08		sensor monitoring: 0 = off / 1 = on / 2 = on and latched)	0
.09		mode of monitoring: 0 = none / 1 = current / 2 = level / 3 = both	1
.10		fixed value: range 001	001
P03.00	Display	decimals of display-type A/B	2
.01		decimals of display-type (A-B)/B	2
.02		quantity-selector for display (see table)	0 = A
.03		LSDs on zero	0 = none
.04		display updating sequence	0.3 (s)
P04.00	Analog output	reference to quantity (see table)	0 = A
.01		high end value	10000
.02		low end value	00000
.03		zero level: 0 = no live zero / 1= live zero	1 = live zero
.04		fixed value: 1	1
.05		output level at sensor fault: 0 = no change /1 = min / 2 = max	0 = no change
.06		output characteristics: 0 = linear increase / 1 = linear decrease	0 = 0/4..20mamps

summary is continued on next side

P05.00	SP1	reference to quantity (see table)	0 = A
.01		setpoint SP1 (by same terms as programmed for display)	01200
.02		hysteresis bandwidth (XX.X % of SP1)	05.0 (%)
.03		hysteresis location: 0 = above / 1 = below / 2 = symm.	1 = below SP1
.04		relay state at n>SP1: 0 = energized / 1 = de-energized	1 = de-energized
.05		starter function effective for SP1: 0 = not / 1 = yes	0 = not effective
.06		alarm output assigned to starter phase	1 = n>SP1
.07		alarm state at sensor failure: 0 = no change / 1 = n>SP1 / 2 = n<SP1	0 = no change
P06.00	SP2	reference to quantity (see table)	0 = A
.01		setpoint SP2 (by same terms as programmed for display)	01200
.02		hysteresis bandwidth (XX.X % of SP2)	05.0 (%)
.03		hysteresis location: 0 = above / 1 = below / 2 = symm.	1 = below SP2
.04		relay state at n>SP2: 0 = energized / 1 = de-energized	1 = de-energized
.05		starter function effective for SP2: 0 = not / 1 = yes	0 = not effective
.06		alarm output assigned to starter phase	1 = n>SP2
.07		alarm state at sensor failure: 0 = no change / 1 = n>SP2 / 2 = n<SP2	0 = no change
P07.00	SP3	reference to quantity (see table)	0 = A
.01		setpoint SP3 (by same terms as programmed for display)	01300
.02		hysteresis bandwidth (XX.X % of SP3)	05.0 (%)
.03		hysteresis location: 0 = above / 1 = below / 2=symm.	1 = below SP3
.04		relay state at n>SP3: 0 = energized / 1 = de-energized	1 = de-energized
.05		starter function effective for SP3: 0 = not / 1 = yes	0 = not effective
.06		alarm output assigned to starter phase	1 = n>SP3
.07		alarm state at sensor failure: 0 = no change / 1 = n>SP3 / 2 = n<SP3	0 = no change
P08.00	SP4	reference to quantity (see table)	0 = A
.01		setpoint SP4 (by same terms as programmed for display)	01400
.02		hysteresis bandwidth (XX.X % of SP4)	05.0 (%)
.03		hysteresis location: 0 = above / 1 = below / 2 = symm.	1 = below SP4
.04		relay state at n>SP4: 0 = energized / 1 = de-energized	1 = de-energized
.05		starter function effective for SP4: 0 = not / 1 = yes	0 = not effective
.06		alarm output assigned to starter phase	1 = n>SP4
.07		alarm state at sensor failure: 0 = no change / 1 = n>SP4 / 2 = n<SP4	0 = no change
P09.00	Data Interface	baud rate of RS232-interface (see table)	3 = 19200
.01		"device no" in communication	015

*) unless stated otherwise in extra sheet.

3.4. Description of Parameters and their Settings

Parameter Group P00.xx **Code Figure, Parameter Lock, Minimum Measuring Period, Starter Time**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
P00.00 **Code Figure** Range: 0000 to 9999	If the parameters are locked (see P00.02), the code figure must be entered prior to any change of other parameters. If the code figure is not correct, -E 1- is displayed. Without code figure and P00.02 = 0, the values of all parameters may be inspected, but not changed.
P00.01 **New Code Figure** Range: 0000 to 9999	A new code figure may be set in P00.01. Then it replaces the previous one.
P00.02 **Parameter Lock** Range: 0 to 1	Setting 0 : Parameters are locked, change only possible with code figure 1 : Parameters unlocked, change of parameter values possible
P00.03 **Starter phase time extension** Range: 000 to 999	The starter condition is true as long as the signal at terminal Control input S3 (Starter) (versus reference terminal) is high (24 volts). The starter condition can be extended by the starter time elapse. This time starts as soon as the starter signal is removed (contact between terminals opened). The starter time extension is set within the range 000...999 (sec). The programmed time is valid for all setpoints.

Parameter Group P01.xx **Measurement Configuration Input A**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
Signal frequency (Hz): **P01.00** **Number of decimals** Range: 0 to 4 **P01.01** **Value** Range: 00001 to 99999 **Corresponding value of quantity** (any term): **P01.02** **Number of decimals** Range: 0 to 4 **P01.03** **Value** Range: 00001 to 99999	Scaling defines the relationship between the input signal frequency (in terms of Hz), and the corresponding display (in terms of RPM). Of course, they must refer to the same operation level. This reference point is recommended close to the high end of the intended operation range. In later operation, however, it may be overrun without error. Example: 1500 Hz corresponds to 3000 RPM : ⇒ P01.01 : 01500 P01.03 : 03000 General Note to Resolution: If there are more decimals are used than justified by the operational fluctuation of the variable, and the transmitter resolution, the minor digits in display will fluctuate accordingly, and also the analog output will not be stable.
P01.04 **Low end of operating range** Range: 00000 to 99999	If the variable falls lower than this level, the measurement will be cancelled to zero (also affecting sum / difference / ratios). This also applies to the analog output and the alarms. The low end is programmed by the same terms, as defined for the variable by steps P01.02 and P01.03.
P01.05 **Input response hysteresis** Range: 0 to 1	Input trigger response hysteresis, adapting the high level (V) path to the signal source in use. Setting 0 : normal hysteresis of 0.8 v to high level sensors 1 : reduced hysteresis of 0.1 v to two-leads NAMUR sensors
P01.06 **Reserved** Range: 0 to 1	Reserved for future applications
P01.07 **Reserved** Range: 0 to 1	Reserved for future applications
P01.08 **Sensor Monitoring Enable** Range: 0 to 2	If the sensor is monitored (if applicable to sensor), the failure alarm may be latched until it is reset. Setting 0 : sensor monitor disabled 1 : active, alarm not latched 2 : active, alarm latched

P01.09 **Sensor Monitoring Mode** Range: 0 to 3	The sensor can be monitored for its current drain (alarm if current drops below 2 ma (interrupt) or exceeds 80 mamps (short circuit in sensor supply). The signal lead can be monitored (at zero speed) to detect an interrupt there or a wrong connection). This function presumes a strong push-pull sensor characteristics (as with BRAUN A5S.. series of sensors). Setting 0 : no monitoring 1 : current monitoring 2 : signal level monitoring 3 : current and signal level
P01.10 **Predivider** Fixed value 001	Fixed value 001

Parameter Group P02.xx **Measurement Configuration Input B**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
Signal frequency (Hz): **P02.00** **Number of decimals** Range: 0 to 4 **P02.01** **Value** Range: 00001 to 99999 **Corresponding value of quantity** (any term): **P02.02** **Number of decimals** Range: 0 to 4 **P02.03** **Value** Range: 00001 to 99999	Scaling defines the relationship between the input signal frequency (in terms of Hz), and the corresponding display (in terms of RPM). Of course, they must refer to the same operation level. This reference point is recommended close to the high end of the intended operation range. In later operation, however, it may be overrun without error. Example: 220.0 Hz corresponds to 40.56 RPM : ⇒ P02.00 : 1 P02.01 : 0220.0 P02.02 : 2 P02.03 : 040.56 General Note to Resolution: If there are more decimals are used than justified by the operational fluctuation of the variable, and the transmitter resolution, the minor digits in display will fluctuate accordingly, and also the analog output will not be stable.
P02.04 **Low end of operating range** Range: 00000 to 99999	If the variable falls lower than this level, the measurement will be cancelled to zero (also affecting sum / difference / ratios). This also applies to the analog output and the alarms. The low end is programmed by the same terms, as defined for the variable by steps P02.02 and P02.03.
P02.05 **Input response hysteresis** Range: 0 to 1	Input trigger response hysteresis, adapting the high level (V) path to the signal source in use. Setting 0 : normal hysteresis of 0.8 v to high level sensors 1 : reduced hysteresis of 0.1 v to two-leads NAMUR sensors
P02.06 **Reserved** Range: 0 to 1	Reserved for future applications
P02.07 **Reserved** Range: 0 to 1	Reserved for future applications
P02.08 **Sensor Monitoring Enable** Range: 0 to 2	If the sensor is monitored (if applicable to sensor), the failure alarm may be latched until it is reset. Setting 0 : sensor monitor disabled 1 : active, alarm not latched 2 : active, alarm latched

P02.09 **Sensor Monitoring Mode** Range: 0 to 3	The sensor can be monitored for its current drain (alarm if current drops below 2 mamps (interrupt) or exceeds 80 ma (short circuit in sensor supply). The signal lead can be monitored (at zero speed) to detect an interrupt there or a wrong connection). This function presumes a strong push-pull sensor characteristics (as with BRAUN A5S.. series of sensors). Setting 0 : no monitoring 1 : current monitoring 2 : signal level monitoring 3 : current and signal level
P02.10 **Predivider** Fixed value 001	Fixed value 001

Parameter Group P03.xx **Display**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
P03.00 **Decimals for A/B** Range: 0 to 4	For the ratio A/B and the percentage difference (A-B)/B, the decimals in display can be defined independently. Set the required number of decimals as parameter in the corresponding program step. Do not use too many decimals! For the display of the absolute difference A-B and sum A+B, the decimals are set automatically to the coarser one of A resp. B.
P03.01 **Decimals for (A-B)/B** Range: 0 to 4	General Note to Ratio and Difference at the low end of range: Obviously, ratio and percentage difference can no longer be expressed if one of its variables drops below its low end. Either value would be questionable. Therefore, the display reads ----- under this condition. Analog output and alarms maintain their last position.
P03.02 **Display Selection** Range: 0 to 5	Each of the 5 quantities may be assigned to be displayed. Setting: 0 : display of A 1 : display of B 2 : display of A/B 3 : display of (A-B)/B 4 : display of A-B 5 : display of A+B
P03.03 **Zeroing LSDs** Range: 0 to 4	If the displayed variable does not have adequate stability, the lesser significant digits (LSD) may appear fluctuating. To avoid irritations by not significant digits, a number of them may be permanently kept at zero. Set the parameter to the number of LSDs to be kept on zero.
P03.04 **Display updating sequence** Range: 0.1 to 9.9	To achieve stabilized and legible readings, the display has its own independent up-dating sequence, different from the response time used by other functions. Set the parameter to the time required in steps of 0.1 sec (max 9,9s). Recommended value is 0.3 sec. The display value stays constant for the duration of one cycle sequence. The rapid response of analog output and setpoints is not influenced by this procedure.

Parameter Group P04.xx **Analog Output**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
P04.00 **Assignment of output** Range: 1 to 5	The analog output may be assigned to each one of the 5 quantities. Setting 0 : analog output assigned to A 1 : analog output assigned to B 2 : analog output assigned to A/B 3 : analog output assigned to (A-B)/B 4 : analog output assigned to A-B 5 : analog output assigned to A+B
P04.01 **High End of Analog Output** Range: 00001 to 99999	The high end defines the value (in terms of the assigned quantity) at which the analog output delivers 20 mamps /10 v.
P04.02 **Low End of Analog Output** Range: 00001 to 99999	The high end defines the value (in terms of the assigned quantity) at which the analog output delivers 0/4 mamps resp. 0/2 v. The low end may be set as high as 90 % of the high end, resulting in a 10 times spreading (enhancement) of the converted band. Further enhancement is not recommended.
P04.03 **Analog output zero level** Range: 0 to 1	Setting 0 : no live zero (0..20 mamps, 0..10 v) 1 : with live zero (4..20 mamps, 2..10 v)
P04.04 **Output Signal Mode** Fixed value: 1	Fixed value 1
P04.05 **Level at sensor failure** Range: 0 to 2	Level of analog output at sensor failure condition Setting 0 : no change of output 1 : output goes to < 0 ma 2 : output goes to > 20 ma
P04.06 **Output Characteristics** Range: 0 to 1	Characteristics of analog output (linear relation between output signal and quantity measured). Setting 0 : output is increasing with increasing speed 1 : output is decreasing with increasing speed

Parameter Group P05.xx **Defining Alarm SP1**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
P05.00 **Assignment of alarm** Range: 1 to 5	Assignment of alarm to quantity. Setting 0 : alarm assigned to A 1 : alarm assigned to B 2 : alarm assigned to A/B 3 : alarm assigned to (A-B)/B 4 : alarm assigned to A-B 5 : alarm assigned to A+B
P05.01 **Setpoint** Range: 00001 to 99999	The numerical value for the setpoint. Decimal point and sign according to the assigned quantity.
P05.02 **Hysteresis band width** Range: 00.0 to 99.9	The hysteresis is the margin between condition "excess" (>) and "no excess" (<), defined by its bandwidth. The width of hysteresis is set as a percentage (XX.X %) of the switching point.
P05.03 **Hysteresis position** Range: 0 to 2	Hysteresis band placed above or below setpoint or symmetrical around it. - "Above" means, the alarm goes to excess state (>) ,when the quantity exceeds "setpoint plus tolerance", and it cancels to no-excess (<), when the quantity drops below setpoint. - "Below" means, the alarm goes to excess (>), when the quantity exceeds the setpoint, and it cancels to no-excess (<), when the quantity drops below "setpoint minus tolerance". - In "symmetrical" mode, the alarm goes to excess (>), when the quantity exceeds the setpoint by half the tolerance band, and it cancels to no-excess (<), at half the tolerance below setpoint. Setting 0 : Hysteresis above SP 1 : Hysteresis below SP 2 : Hysteresis symmetrical around SP
P05.04 **Relay state at "excess"** Range: 0 to 1	Without power supply, the alarm outputs are non-conducting, and the relays are de-energized. To consider safety aspects of the application, this No-Power condition can be assigned to either alarm > or < condition. Setting 0 : energized at excess 1 : de-energized at excess = No-Power condition
P05.05 **Starter function enable** Range: 0 to 1	Each alarm may be included into the starter function. So it is possible, for instance, to disable a low speed alarm during the starter phase, whereas a high speed alarm may remain active all the time. Setting 0 : Starter function disabled 1 : Starter function enabled

P05.06 **Relay state at starter condition** Range: 0 to 1	Relay state at starter condition (if included) Setting 0 : "no excess" (n < SP) 1 : "excess" (n > SP)
P05.07 **Response to "sensor failure"** Range: 0 to 2	Setting 0 : ignore sensor failure, normal comparison with quantity 1 : set to "no excess" (n < SP) 2 : set to "excess" (n > SP)

Parameter Group P06.xx **Defining Alarm SP2**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
P06.00 **Assignment of alarm** Range: 1 to 5	Assignment of alarm to quantity.
P06.01 **Setpoint** Range: 00001 to 99999	The numerical value for the setpoint.
P06.02 **Hysteresis band width** Range: 00.0 – 99.9	The width of hysteresis is set as a percentage of the switching point.
P06.03 **Hysteresis position** Range: 0 to 2	Hysteresis band placed above or below setpoint or symmetrical around it.
P06.04 **Relay state at "excess"** Range: 0 to 1	Relay state assigned to "excess" condition
P06.05 **Starter function enable** Range: 0 to 1	Setpoint included / not included in starter function
P06.06 **Relay state at starter condition** Range: 0 to 1	Relay state at starter condition (if included)
P06.07 **Response to "sensor failure"** Range: 0 to 2	Response of alarm output to state "sensor failure"

Parameter Group P07.xx **Defining Alarm SP3**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
P07.00 **Assignment of alarm** Range: 1 to 5	Assignment of alarm to quantity.
P07.01 **Setpoint** Range: 00001 – 99999	The numerical value for the setpoint.
P07.02 **Hysteresis band width** Range: 00.0 – 99.9	The width of hysteresis is set as a percentage of the switching point.
P07.03 **Hysteresis position** Range: 0 to 2	Hysteresis band placed above or below setpoint or symmetrical around it.
P07.04 **Relay state at "excess"** Range: 0 to 1	Relay state assigned to "excess" condition
P07.05 **Starter function enable** Range: 0 to 1	Setpoint included / not included in starter function
P07.06 **Relay state at starter condition** Range: 0 to 1	Relay state at starter condition (if included)
P07.07 **Response to "sensor failure"** Range: 0 to 2	Response of alarm output to state "sensor failure"

Parameter Group P08.xx **Defining Alarm SP4**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
P08.00 **Assignment of alarm** Range: 1 to 5	Assignment of alarm to quantity.
P08.01 **Setpoint** Range: 00001 – 99999	The numerical value for the setpoint.
P08.02 **Hysteresis band width** Range: 00.0 – 99.9	The width of hysteresis is set as a percentage of the switching point.
P08.03 **Hysteresis position** Range: 0 to 2	Hysteresis band placed above or below setpoint or symmetrical around it.
P08.04 **Relay state at "excess"** Range: 0 to 1	Relay state assigned to "excess" condition
P08.05 **Starter function enable** Range: 0 to 1	Setpoint included / not included in starter function
P08.06 **Relay state at starter condition** Range: 0 to 1	Relay state at starter condition (if included)
P08.07 **Response to "sensor failure"** Range: 0 to 2	Response of alarm output to state "sensor failure"

Parameter Group P09.xx **Defining Data Interface Parameters**	
Parameter No. Meaning of Parameter Setting Range of Parameter	**Description of Parameters and their Settings**
P09.00 **Baudrate** Range: 1 to 4	For the operation of the serial data interface (RS 232) the Baudrate is adjustable (not relevant for Profibus). Setting 0 : 00300 Baud 1 : 01200 Baud 2 : 09600 Baud 3 : 19200 Baud 4 : 38400 Baud
P09.01 **Device No.** Range: 001 to 125	All members of a communication network must have different device nos.

3.5. Safety Notes

Safety Notes
This instrument has been designed and inspected according to standards DIN EN 61010-1. Observe these instructions and wiring diagrams carefully, to ensure this protection. The installation must only be done by adequately qualified personnel.

General Instructions
Specifically, connect the ground terminal of the instrument to a safe ground potential.
Do not open the instrument. Connections and all programming are done from outside. When removing it from its enclosure however, from whatever reason, make sure that power is switched off.
The instrument may be installed in any position, but not in the immediate neighborhood of interfering sources.

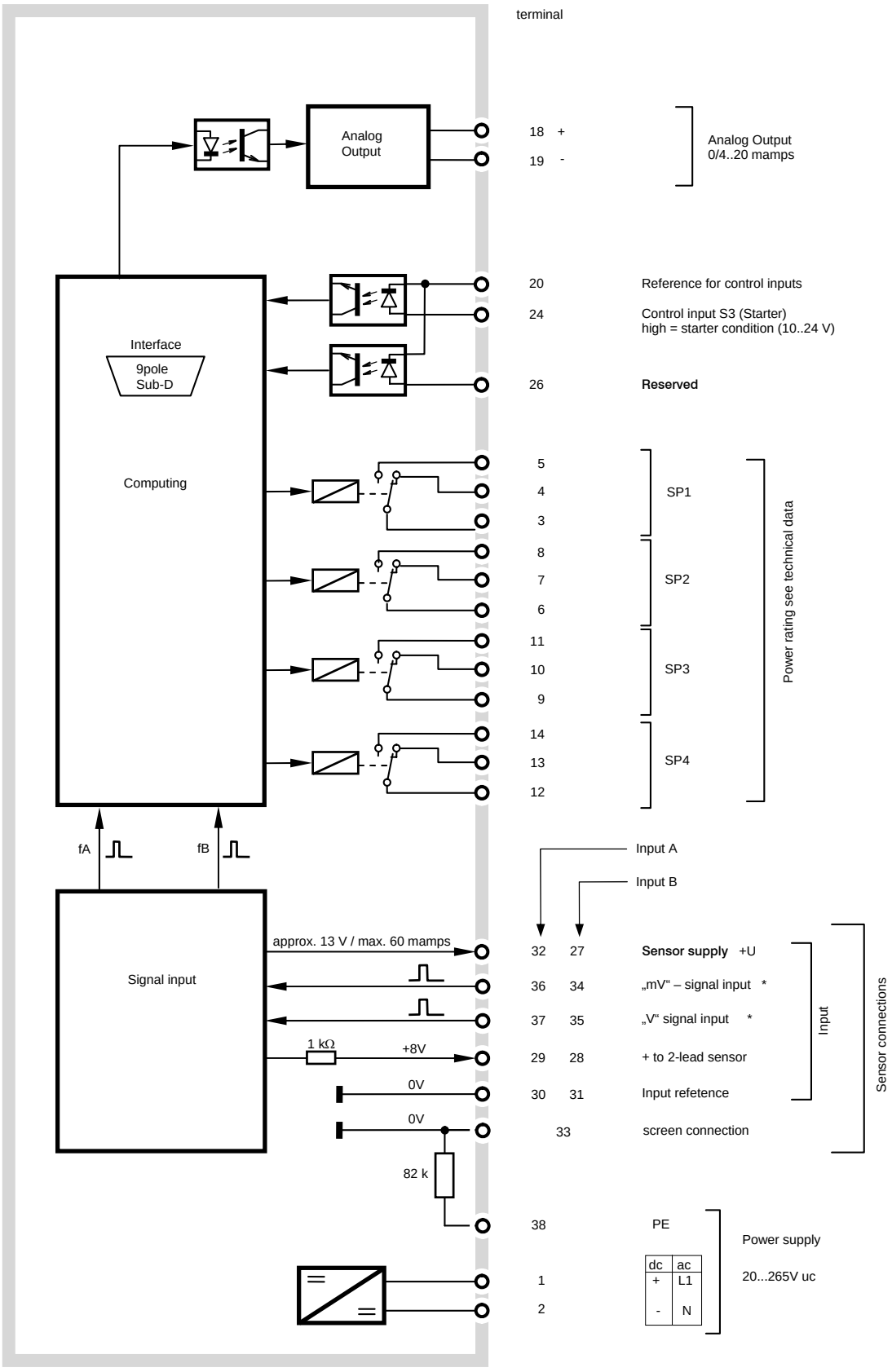
Signal leads must be carefully shielded, and should not be run in bundles with power or relay control leads.

The ground terminal (PE) is internally separated from common zero, but tied by a 100 k resistor to it.

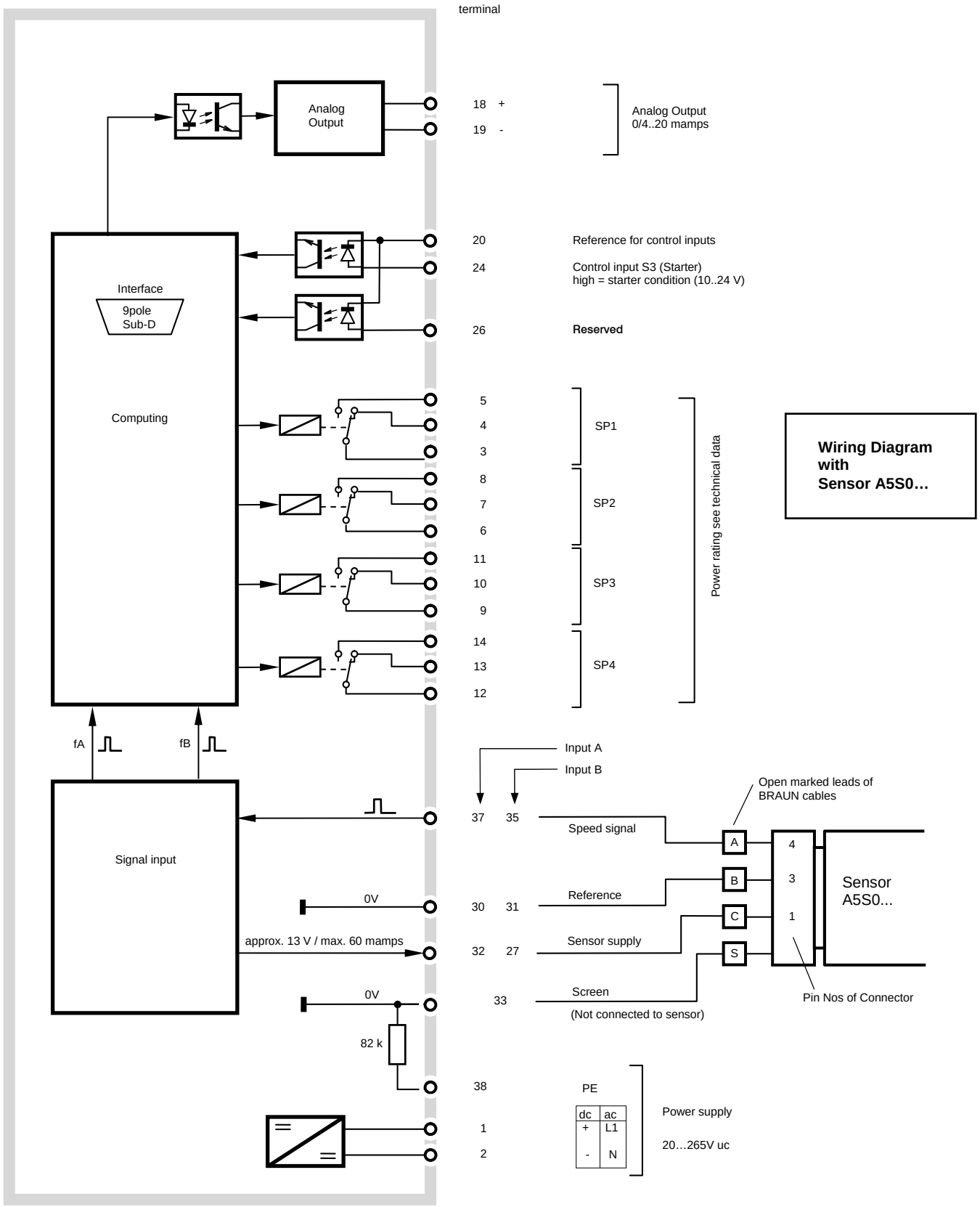
EMI
The unit complies with all relevant regulations, as determined by the Policy of the European Committee for Electrotechnical Standardization (CENELEC), for the Electromagnetic Compatibility (2014/30/EU).
Testing and inspection has been performed according to Standards EN 61000-4-2 and EN 61000-4-4. Thereby, the product meets all requirements to be marked by the CE sign.
Strict observance of these instructions during installation and use is an indispensable precondition hereto. Specifically to be observed:
Terminals must be kept off all undue access; power supply and all input and output leads must be protected against voltage interference, higher than specified operation data, and they must be protected against electrostatic discharge.

EMI

3.6. Wiring Diagram (common sensors)



3.7. Wiring Diagram with sensor A5S…



4. Serial Data-Interface RS232

General Informations

Standard: RS 232

Transmission standards

Transmission Mode:
no hand-shake, 8 bit data-word-length, 1 stop bit, no parity bit.

Baudrate:
programmable to:
0 : 00300 Baud
1 : 01200 Baud
2 : 09600 Baud
3 : 19200 Baud
4 : 38400 Baud

Device No:
programmable to any number 001...099.

Transmitted Informations
The unit transmits all those informations which are actually present. Independent from the display selection, each of these quantities is available via data interface:
Speed Value
Status of Setpoints

transmission of any quantity upon request

Data transmissions require a request from a host, and only one of the quantities listed above can be required at one time. Subsequent to the request, the required data are transmitted.

General note to data
- All messages may NOT contain any Blanks!
  Blanks in examples below are for clarity only.

- All command-characters must be written as uppercase-characters.

- control-characters STX, ETX, CR used below are not character-strings, but single characters according to ASCII-Table:

  STX : control-character (Hex-Code 02)
  ETX : control-character (Hex-Code 03)
  CR : control-character (Hex-Code 0D)

Data-Request Message

how to request for a specific data

To get one of the available quantities, the host should transmit the following message:

STX nnnHd ETX

where nnn = Device No (according to P09.01)
d = key figure assigned to required quantity:

1 = speed value A
2 = speed value B
3 = ratio A/ B
4 = ratio (A-B)/ B
5 = difference A-B
6 = status (setpoints)
7 = sum A+B

Data Transmission

response to request

Subsequently, the meter transmits the present value of the requested quantity, as follows:

STX /d/kvxxxxxx CR ETX

where d = type of quantity with key figure as above
k = number of decimals assigned to the quantity
v = sign (if any)
xxxxxx = numerical value, without decimal point.

Interface Connection

9 pole Sub-D

Timing

Response time subsequent to request message 2...15 millisec. Duration of message approx. 15 ms.

Interface-Test

(Baudrate acc. to parameter)

To activate Test-mode: press keys ◁, E and △ simultaneously.
Test starts with Display-test (show all digits continuously).
Proceed with key △ ,, till first digit shows "3" (Test Transmitter serial Interface) . Now all characters from 00.to.7F (hex) will be transmitted from the interface, shown on display as 3 xx , (xx = actually transmitted character).

Selftest transmitter

Proceed to Selftest receiver with key △ (Step 4).
Display shows received characters as 4 xx , if OK
or as 4 Exx, if an error has occurred.
where xx = received character.

Selftest receiver

Example: a sent or received ASCII-character 0 will be shown as 4 30.

Back to normal by pressing key P .

5. PROFIBUS-Interface

Common
Standard-model: Norm-Slave acc. to DIN.

Baudrate: automatic.

Station address (Device-No.) may be changed only from the front-keyboard,
no modification by User-Parameter!
Range: 001...125 .

Interface Connection: by 9-pin D-Sub-Connector.

Data transmission informations
Standard configuration (may be modified) — Data transmission
- 04 bytes output-data (to device) (reserved) — and
- 32 bytes input-data (from device) (16 words, consistent).

transmitted informations:

device -status	1	unsigned long	Data-types / -formats
speed value A	2	unsigned long	
speed value B	3	unsigned long	
ratio A/ B	4	unsigned long	
ratio (A-B)/ B	5	signed long	
difference A-B	6	signed long	
sum A+B	7	unsigned long	
reserved (fix 0)	8	signed long	

Transmission without decimal point, decimals according to parameter-setting. Standard transmission from device includes all 8 data-types. To improve bus-timing, a subset of (relevant) data-types may be selected.

Format of data "device -status":

Byte No. 0:

Bit-No.	7	6	5	4	3	2	1	0
	0	x	0	0	0	0	0	0

=1: if parameter settings have been changed manually by front-keys (valid until Status read)

Byte No. 1 fix = 0, reserved
Byte No. 2 fix = 0, reserved

Byte No. 3:

Bit-Nr.	7	6	5	4	3	2	1	0
	0	0	0	0	setp		x	x

- state of setpoint SP1 (0 : reverse, 1: forward)
- state of setpoint SP2 (0 : n < SP, 1: n >= SP) e.g. (0 : reverse, 1: forward)
- state of setpoint SP3 (0 : n < SP, 1: n >= SP) e.g. (0 : reverse, 1: forward)
- state of setpoint SP4 (0 : n < SP, 1: n >= SP) e.g. (0 : reverse, 1: forward)

User-Parameter-Data: refer to GSD-file(s)

User-Parameter

Parameter data block shown with reference to frontside-parameter-structure and preset data.

Data types:
unsigned8 = 8 Bit wide, no sign
unsigned16 = 16 Bit wide, no sign
unsigned32 = 32 Bit wide, no sign
signed32 = 32 Bit wide, with sign

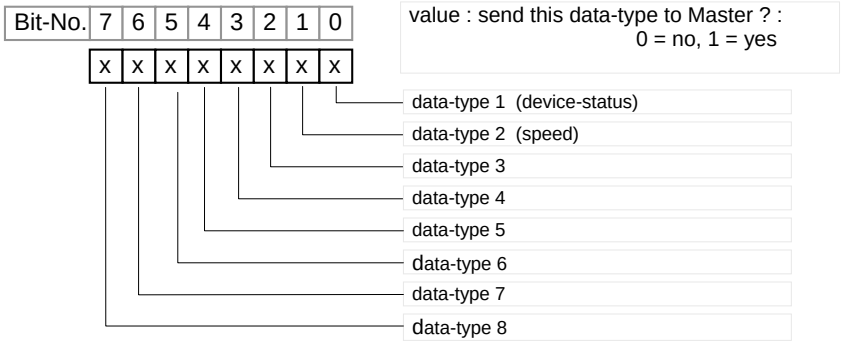
device-independent control-parameters to control Profibus data transmission:

control-parameters

control-parameter P99.01: reserved for future use.

control-parameter P99.02: " selection of input-data (-types)", if not all data are of interest and bus-time-consumption should be reduced.

selection of input-data (-types)



Important: while Projecting, the configuration must be adapted to the no. of selected data types. See examples on next page.

control-parameter P99.03: reserved for future use.

Possible Configurations (refer also to GSD -File):

- 1.: Input-data (from device) only, 4-byte-wide (def. as consistent, 2 words wide)

"Name"	Hex-value
Configuration-Module = "4 Byte In, 0 Byte Out"	0xd1,0
Configuration-Module = "8 Byte In, 0 Byte Out"	0xd3,0
Configuration-Module = "12 Byte In, 0 Byte Out"	0xd5,0
Configuration-Module = "16 Byte In, 0 Byte Out"	0xd7,0
Configuration-Module = "20 Byte In, 0 Byte Out"	0xd9,0
Configuration-Module = "24 Byte In, 0 Byte Out"	0xdb,0
Configuration-Module = "28 Byte In, 0 Byte Out"	0xdd,0
Configuration-Module = "32 Byte In, 0 Byte Out"	0xdf,0

- 2.: Input-data (from device), 4-byte-wide (def. as consistent, 2 words wide)
and 4 bytes output-data to device

Configuration-Module = "4 Byte In, 4 Byte Out"	0xd1,0xe1
Configuration-Module = "8 Byte In, 4 Byte Out"	0xd3,0xe1
Configuration-Module = "12 Byte In, 4 Byte Out"	0xd5,0xe1
Configuration-Module = "16 Byte In, 4 Byte Out"	0xd7,0xe1
Configuration-Module = "20 Byte In, 4 Byte Out"	0xd9,0xe1
Configuration-Module = "24 Byte In, 4 Byte Out"	0xdb,0xe1
Configuration-Module = "28 Byte In, 4 Byte Out"	0xdd,0xe1
Configuration-Module = "32 Byte In, 4 Byte Out"	0xdf,0xe1

Setup-example:

Data-types 1 and 2 are to be selected:
→ control-parameter P99.02 = 00000011 = 03 hexa.
→ 2 data-types (input) at 4 bytes each results in Configuration-Module
"8 Byte In, 0 Byte Out" → "0xd3,0"
(no output data here).

Data-type 2 only is to be selected:
→ control-parameter P99.02 = 00000010 = 02 hexa.
→ 1 data-type (input) at 4 bytes results in Configuration-Module
"4 Byte In, 0 Byte Out" → "0xd1,0"

Data-types 1, 2 and 8 are to be selected:
→ control-parameter P99.02 = 10000011 = 83 hexa.
→ 3 data-types (input) at 4 bytes each results in Configuration-Module
"12 Byte In, 0 Byte Out" → "0xd5,0"

Notes for Projecting

Additional components to create a project:

- .DIB and .BMP - files, that contain the bitmap-representation of Braun-devices.
  Select .DIB or .BMP according to the projecting-tool.

- one GSD-File per device, which allows comfortable setting of parameters (decimal digits + parameter-reference). This feature's use requires that the projecting-tool supports parameter-types "signed32" und "unsigned32" (like for example Siemens COM PROFIBUS (PC) V5.0 or higher).

  Else the parameter-references must be either
  - disabled by setting a semicolon ahead of each Ext_User_Prm_Data_Ref(...) in the GSD-File or
  - deleted (range between AAAA_DEL_START and AAAA_DEL_END) (previous backup recommended .....) and the parameters must be set in hexadecimal representation directly.

If in doubt: How to find out, if Your projecting tool allows comfort-version e.g. if it supports data-types "signed32" and "unsigned32":

Create a test-project using the original GSD-file.
Upon parameterization, the initial parameter-values will be shown in decimal format.
Now switch to "hexa view"; the parameter-values will be listed in a table in hex-format.
Compare those data with the ones in the GSD-file starting at
"User_Prm_Data = ...".
ONLY if the same places have the same value, comfortable parameterization may be used !