BK MIKRO 8 PB

Control System for Tool Breakage and Object Monitoring
with PROFIBUS Interface

Operating Instructions
Issue 2.01 dated 5.2.2007

MICROCOMPUTERS · SYSTEMS · COMPONENTS · TUTTLINGEN GMBH

General Notice

Safety guidelines

These operating instructions contain notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:

Immediate danger

to life and limb of personnel and others.
Non-compliance may cause death or serious (crippling) injury.

Danger

Hazardous situation

to life and limb of personnel and others.
Non-compliance may cause death or serious injury.

Warning

Potentially hazardous situation

Non-compliance may cause slight injury;

possible damage to property.

Caution

Notes on correct handling

Non-compliance may cause damage to the product and/or damage to parts/items in the vicinity.

Environmental protection

Non-compliance may have an impact on the environment.

Intended use

BK MIKRO is a control system suitable for tool as well as for object and free space monitoring applications. It may only be used for the applications described in the technical documents, and only in connection with devices or components from other manufacturers which have been approved or recommended by us.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Warning

Qualification of personnel

Only qualified personnel may carry out the following activities on the control system: installation, commissioning, operation, maintenance.

Qualified persons in accordance with the safety guidelines are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Disclaimer of liability

We have checked the contents of this document for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

EEC directive EMC 89/336/EEC

The following applies to BK MIKRO control system:

Products which carry the CE symbol meet the requirements of the EEC directive 89/336/EEC on electromagnetic compatibility.

The EEC declarations of conformity and the related documentation will be maintained at the following address for inspection by the responsible officials in accordance with article 10(1) of the above stated EEC directive:

MSC Tuttlingen GmbH
Rudolf-Diesel-Straße 17
78532 Tuttlingen

BK MIKRO 8 PB corresponds the specification of UL 508.

Areas of use

Control systems of the BK MIKRO series meet the applicable, harmonized, European standards for the respective area of applications.

Fitting conditions

The fitting conditions and safety notes in the operating instructions must be adhered to when commissioning and operating the devices.

Copyright

These operating instructions are intended for the operator and the operator's personnel only. This document and its contents may not be disclosed to third parties, either in full or in part, by reproduction, transmission or any other means without express written authority.

Non-compliance may lead to prosecution under criminal law.

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Purpose

These operating instructions are part of the documentation of the BK MIKRO 8 PB. They provide service personnel and system advisors with the information required to install, commission, operate and maintain the BK MIKRO 8 PB.

1   Characteristics

BK MIKRO 8 PB is a control system suitable for tool as well as for object and free space monitoring applications.

The complete BK MIKRO 8 PB system comprises

- a control unit
- a sensor (scanner),
- a connection cable.

BK MIKRO 8 PB is based on existing design concepts for tool, object and free space monitoring and can be used universally for different types of monitoring by the integration of multifarious functions:

- Object monitoring, Tool monitoring, free space monitoring with PROFIBUS connection. Tool monitoring with specification (angle/tolerance) of PROFIBUS master (SPS/PLC)

- Tool monitoring without PROFIBUS connection. Monitoring of the scanning position whose precise location has been previously entered by "Teach-in", e.g. to carry out a tool check before each working cycle. Through five selection inputs up to 32 tools can be learned and monitored.

Principle of operation
The wand of the scanner scans tools, objects or critical process spaces free of potential, in line with machine cycles.

A control unit equipped with a micro-computer triggers the movement of the wand upon an external signal or about a PROFIBUS message and passes the scanning result and PROFIBUS messages on to the machine control via relay contacts.

The galvanically isolated inputs and outputs guarantee a high degree of operational safety and protection against interferences.

Further features
- Scanning in clockwise (CW) or counter-clockwise (CCW) direction
- Two steps for scanning intensity
- Output relay contacts selectable as normally open or normally closed
- Ranges of tolerance for "O.K." message adjustable
- Indication of the scanning result by two LEDs "O.K." and "K.O." on the control unit
- Detection of cable breaks

2   System Components

2.1   Control unit

The BK MIKRO 8 PB control unit consists of:

Power board / Bus board	Control board

Connection: PROFIBUS-DP
    9 pin Sub-D socket to
    connect PROFIBUS
Connection: Power supply 24 VDC
    4 pin, keyed terminal block
Connection: Grounding PE
    4 pin, keyed terminal block
Connection: Relay outputs "O.K." and "K.O."
    4 pin, keyed terminal block
	Connection: Scanner
	    8 pin plug to connect scanner
	Connection: Inputs optional
	    (Start, Teach, Selection)
	    2 x 4 pin, keyed terminal block
	Light-emitting diodes
	    Four LEDs to indicate status information
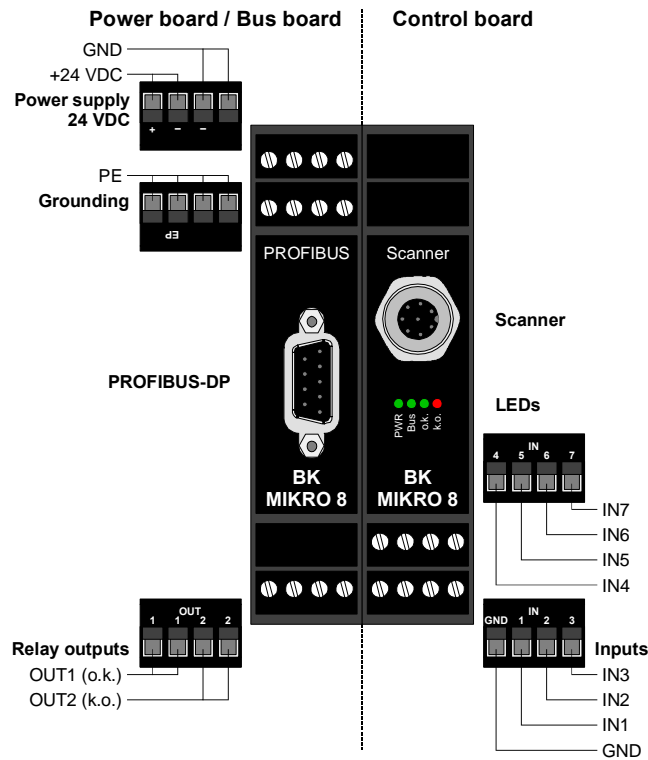
Fig. 2-1:   Control unit – front view with connections

Note:

These plugs may only be inserted or removed when the power supply has been disconnected.

2.1.1   Technical data

Housing	Insulating material housing, protection class II, built-in unit
Protection type	IP 20
Dimensions (W x H x D)	45 mm x 99 mm x 114.5 mm
Case mountings	Sectional rail, 35 mm, to DIN EN 50022
Power supply voltage	24 VDC ±20% PELV[1] I_{max} = 0.4 A
Power consumption	10 VA max.
Control voltage	24 VDC ±20% PELV[1]
Inputs - Input current - Pulse duration	Galvanically isolated 5 mA approx. 40 ms min.
Switched outputs	2 x 30 VDC, 2 A max.
Operational life of relay	5×10^{7} switching cycles
Connections	Plug-in screw terminals for connecting - power supply - grounding - relay outputs - control inputs, selection input Scanner, small circular socket, 8 pin PROFIBUS, Sub-D socket, 9 pin
Climatological conditions	Classification 3K3 under EN 50178
Ambient temperature	0 ºC to +50 ºC
Storage temperature	–25 ºC to +80 ºC
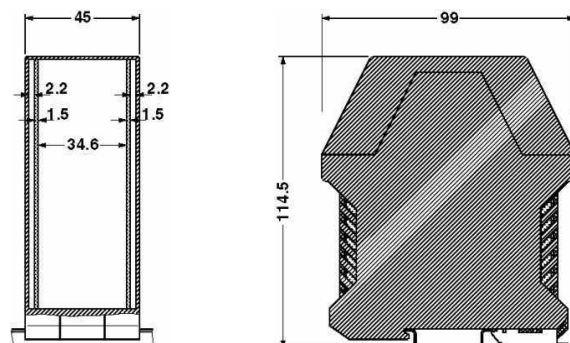
General tolerances
ISO 2768 – mK

Fig. 2-2:   Control unit – dimensions

Note:

The control unit of BK MIKRO 8 PB is a **built-in unit** !

[1]   PELV = Protected Extra Low Voltage
The voltage applied must meet the requirements for an extra low function
potential with safe disconnection (PELV).

2.1.2 Connection terminals

Note:
The nominal tightening torque for the clamping screws of the terminal connectors should be 0.5 – 0.6 Nm or 4.4 – 5.3 pound-inches (lbf in).

Caution

24V – power supply 24 VDC

	+	Input of 24 VDC supply voltage (2 terminals)
GND +24 VDC	–	Reference potential of 24 VDC supply voltage (2 terminals)

PE – potential earth

	PE	Connection to earth potential (4 terminals)
PE		

OUT – relay outputs

	1	**O.K. relay** Indication of a no fault message (O.K.) (2 terminals)
OUT1 (O.K.) OUT2 (K.O.)	**2**	**K.O. relay** Indication of a fault message (K.O.) (2 terminals)

The terminals have been designed as dry relay contacts. By internal parameters, they may be configured as either normally closed or normally open.

The contacts have been designed for 24 VDC and, by additional internal circuits, protected against inductive switch-off peaks of up to 19 W (2 ms).

Note:

Relay as normally closed contact:	active	=	open
	inactive	=	closed
Relay as normally open contact:	active	=	closed
	inactive	=	open

When there is **no power** to the unit, the **contacts always** will be **open**.

Even when using relay as normally closed, they are open (like the active status) when the power supply is not connected.

IN – control inputs and selection input

	GND	Reference potential for control inputs and selection input
	1	**"Teach" - control input** An input level of +24 VDC relative to "GND" terminal will trigger a learn cycle (the "Teach-in"). The position stored during the learning cycle will remain stored even after the unit has been switched off.
	2	**"Start" - control input** An input level of +24 VDC relative to "GND" terminal will trigger a "Start" cycle (the real scanning process).
	3	**"Tool position" - selection input 0** L = inactive H = active
	4	**Selection input 1**
	5	**Selection input 2**
	6	**Selection input 3**
	7	**Selection input 4**

Through the 5 selection inputs 32 different tool positions can be reached.
The selection of the tool positions is effected in an binary way, that means that through activating and deactivating the different positions can be reached.

e.g. Tool position	Selection inputs				
	S4	S3	S2	S1	S0
0	L	L	L	L	L
10	L	H	L	H	L
23	H	L	H	H	H
31	H	H	H	H	H

L ≙ Low (free or 0 V)

H≙ High (24 V)

2.2 Scanner

2.2.1 Characteristic properties

The scanner housing is cylindrical and smooth, thus permitting easy installation (e.g. by using the mounting bracket). The scanner is designed for easy access for servicing and changing the wand. Aligning the scanner is easy and requires no additional instruments or aids.

The TK8A scanner offers two special features:

- Scanning wands are available in lengths up to 380 mm
  This allows greater distances between the scanner and tools or objects that it is checking.

- Scanning plate at the scanning wand
  This makes it possible to use the scanner directly at the tool magazine to make positive contact with the tool's tip.

The TK8A scanner has a mechanical backstop that limits the rotary movement of the wand. Using scanner TK8A with a different control unit than BK MIKRO 8 PB may damage the scanner and control unit.

Scanner	Wand length	Time period of scanning operation 180°	Resolution
TK8A	Up to 380mm with plate	Ca 1.3 s	+- 0.1°

Note:
Wrong scanner parameters lead to wrong measurement results.

Warning

Note:
The wand is a wearing part.
Due to the injury hazard, users should exercise particular caution within any BK MIKRO rotating area.

Warning

2.2.2   Technical data

Housing	Anodized aluminum
Protection type	IP 67
Wand length	380 mm, with scanning plate 80 mm x 15 mm, 284 mm, with scanning plate 65 mm x 15 mm, exchangeable wand
Scanning angle	300° max. (with backstop)
Control unit connection	Small circular connector, M12x1, 8 pin
Ambient temperature	0 ºC to +80 ºC
Storage temperature	–25 ºC to +85 ºC
Scanning cycles	> 5 million at minimum scanning intensity

circ. 264/360   ø20   ø3.0   9.5

Scannning plate
65x15(284), V2A
80x15(380), V2A

Scanning wand
Length 284/380 mm

Wand holder

Housing

Connector
angled, 8 pin

Connection cable
connector at the control unit end, 8 pin

General tolerances
ISO 2768 – mK

59   max. 98   max. 114   26.5   42.5

Connection cable
straight connector at the scanner end, 8 pin
connector at the control unit end, 8 pin
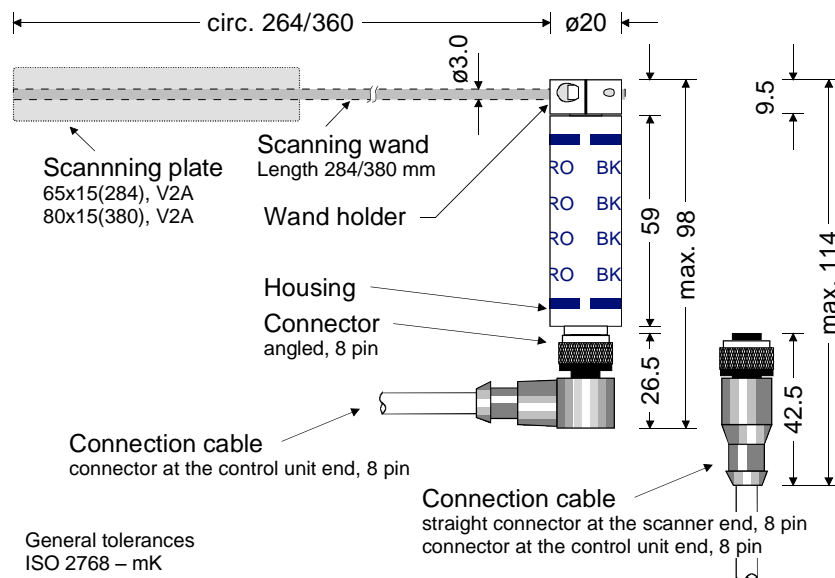
Fig. 2-3:   Scanner

3   Operating modes
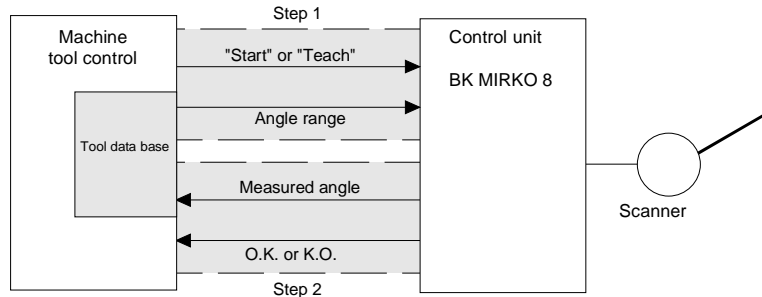
General function sequence

Fig. 3-1:   Function sequence

The scanner moves CW or CCW (according to settings) to the zero position (= internal backstop) during switch-on of the control unit.

For this operation it is necessary that the internal backstop can be reached without obstacle between wand and zero position (e.g. object or tool).

3.1   Operating mode PROFIBUS-DP

3.1.1   Scanning in one direction

Angle set value via data base

In order to check a tool (e.g. drill), the control unit receives a target angle from the machine control system via PROFIBUS. This value has been calculated according to the tool length which is filed in the tool data base. Then the measurement can begin by setting the "start" bit.

If the wand contacts an object within the measuring range, an O.K. message will be transmitted via PROFIBUS. The digital output for O.K. message is switched to high or low level.

Angle set value via "Teach-in"

If a tool without data base entry should be checked, it will be neccesary to perform a "Teach-in" procedure before. The angle set value has to be larger than the effective angle. The value serves only as limit of the angle range during this cycle.

If the wand contacts an object within the angle range, an O.K. message will be triggered and the measured angle will be transmitted via PROFIBUS to the machine control system.

This angle can be filed in the tool data base to the corpresponding tool. To check the tool, the stored angle value (with tolerance) is transmitted to the control unit. Then the measurement can begin by setting the bit "start".

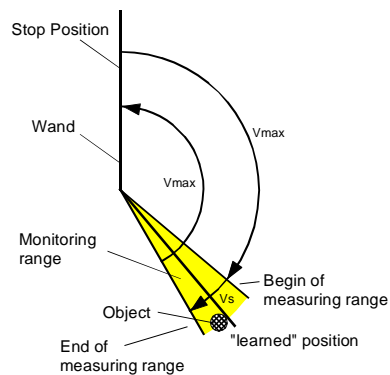**"Start" cycle with CW travel**

Fig. 3-2:   "Start" cycle with CW travel

Monitoring range = learned (defaulted) position $\pm$ tolerance

V_{max} = max. speed of scanning wand
V_s = speed of scanning wand preset by "Scanning intensity"

3.1.2   Scanning in both directions

A new stop position between two objects (tools) can be allocated the wand by a freely definable angle set value with the function "GO position" (see also chapter 3.5 "Process data").

No objects (tools) must be within the movement area of the wand during this process! After the wand has reached this new stop position, the two objects can be charged and sampled. The scanning direction can be defined by the angle set value (see fig. 3-3).

Function

If the bits "Go position" and "Start" or "Go position" and "Teach" are set simultaneously, the wand will begin with the scanning cycle (see chapter 3.5).

The wand moves back to the stored new stop position after the scanning cycle.
An O.K. or K.O. message will be transmitted to the machine control system simultaneously.

The direction of rotation (see chapter 3.5) is defined with the angle set value:

If the angle is larger than the stop position, the wand will move away from the zero position.
If the angle is smaller than the stop position, the wand will move towards the zero position.

The wand can be moved back to the zero position by setting the bit "Go Back".

Requirement: the two objects should have been removed before!
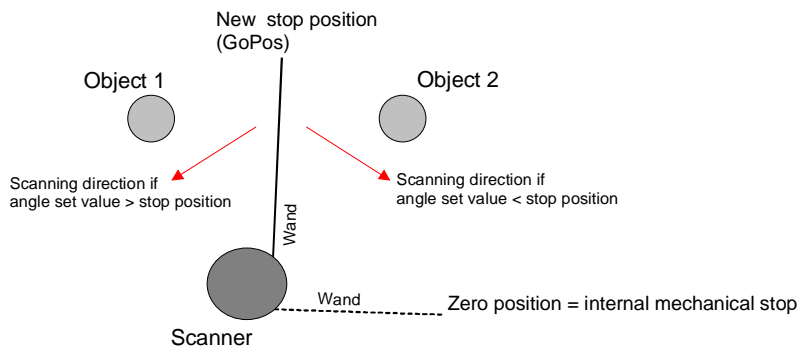
Fig. 3-3:   Scanning CW / CCW

3.2   Operating mode digital I/O

3.2.1   "Teach-in" cycle

If a pulse to the "Teach" input is set, the wand will begin with the scanning cycle. The wand swivels out until it contacts on an object. This position will be stored in the control units internal data base. The number of the tool is defined by the selected teach input.

The default values for tolerance and scanning intensity can be adjusted with the configuration software or with the DIP switches.

Whether the wand has not contacted any object during the "Teach" cycle, it moves to a maximum angle of 300° returns and sets the "K.O." message.

The scanning range extends in the "Start" and "Teach" cycles from of 8 ° to 300 °.

3.2.2   "Scanning" cycle

The tool number that you would like to check needs to be selected with the correct binary pattern, then the "start" impulse is applied. The wand will then begin the scanning process.

If the wand contacts the object at the learned position, an "O.K." message will be set. If the wand stopped before the monitoring range or exceeds the area, a "K.O." message will be set.

The wand swivels with high speed and slows down to scan the monitoring range with reduced speed and strength (see Fig. 3-2).

3.3 Electric design (Physical Layer)

3.3.1 Interface

The PROFIBUS interface is realized as a floating RS-485 interface (electrically insulated).

A standard 9 pin Sub-D socket is used for plug.

The pin assignment of the 9 pin Sub-D socket corresponds to PROFIBUS standard.
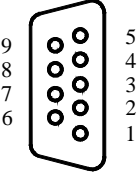
Sub-D socket, 9 pin	Pin	Signal	Function
	1	n.c.	not connected
	2	n.c.	not connected
	3	RxD/TxD–P	Data line B
	4	RTS	Request To Send
	5	GND	Data reference potential
	6	5V	5 VDC
	7	n.c.	not connected
	8	RxD/TxD–N	Data line A
	9	n.c.	not connected

Fig. 3-4:   PROFIBUS-DP interfae

Supported baud rates	
9.6	kbaud
19.2	kbaud
45.45	kbaud
93.75	kbaud
187.5	kbaud
500	kbaud
1.5	MBaud
3	MBaud
6	MBaud
12	MBaud

The baud rate is identified automatically.

3.3.2   LEDs to indicate status information

Four light-emitting diodes (LEDs) on the front panel of the BK MIKRO 8 PB control board are used to indicate status information.

One LED is attached to PROFIBUS.
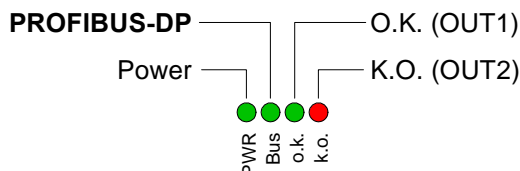
Fig. 3-5:   Light-emitting diodes

LED	Color	Designation	Function	Status
Bus	**green**	**PROFIBUS-DP (RDY)**	**Data transmission (RUN)**	**flashing**
			PROFIBUS not active	**out**
PWR	green	Power	Power supply 24 VDC	on
O.K.	green	O.K. (OUT1)	Scanning "O.K."	on
K.O.	red	K.O. (OUT2)	Scanning "K.O."	on

3.3.3   Address setting

The PROFIBUS address is set in binary form by the 8 pin DIP switch S1 on the control board in the case interior.

"1" means ON (setting to center of the board).

"0" means OFF.

DIP switch no. 8 is not used for addressing.
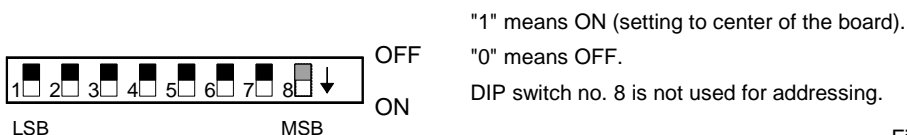
Fig. 3-6:   DIP switch S1

Example:

DIP switch S1	Value of the DIP switch no.								Address
	1	**2**	**3**	**4**	**5**	**6**	**7**	**(8)**	
	1	0	0	1	0	0	0	X	9
	0	1	1	0	0	1	0	X	38
	0	0	1	1	1	1	1	X	124

Switch settings on delivery:

	0	**1**	**0**	**0**	**1**	**1**	**0**	**X**	**50**

3.4   Configuration

PLC ⟶ BK MIKRO 8 PB: 3 data words output (2 bytes each)

Output words		Function
AW1	Bit 0...7	Parameter identification
AW1	Bit 8...15	
AW2	Bit 0...7	Control word
AW2	Bit 8...15	
AW3	Bit 0...7	Angle set value
AW3	Bit 8...15	

BK MIKRO 8 PB ⟶ PLC: 3 data words input (2 bytes each)

Input words		Function
EW1	Bit 0...7	Parameter identification
EW1	Bit 8...15	
EW2	Bit 0...7	Status word
EW2	Bit 8...15	
EW3	Bit 0...7	Angle
EW3	Bit 8...15	

Data from PLC to BK MIKRO 8 PB control unit will be transmitted via control words of the PROFIBUS (process channel).

Data from BK MIKRO 8 PB control unit to PLC will be transmitted via status words.

Data transmission runs cyclically.

3.5   Process data: Output words 2 and 3

From PLC to BK MIKRO 8 PB control unit

Control word AW2

15	14	13	12	11	10	9	8		7	6	5	4	3	2	1	0

└ — Tolerance byte — ┘   │ │ │ └ Start
                                                         │ │ └ — Teach
                                                         │ └ — — Go Back
                                                         └ — — — Go Position
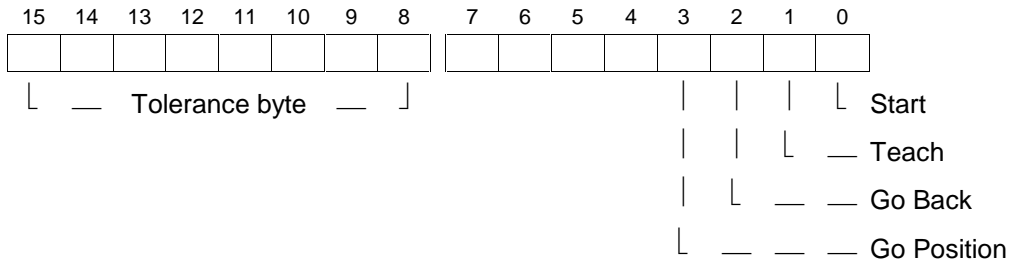
Tolerance byte	
Value	Degree [°]
0	Param.
1	0.2
2	0.2
3	0.3
...	...
255	25.5

Tolerance: Specification of the angle in multiples of 0.1 degree [°]

Accept value of parameter no. 5 (Tolerance range)

Not 0.1, but 0.2 (required precision)

Angle set value AW3

15	14	13	12	11	10	9	8		7	6	5	4	3	2	1	0
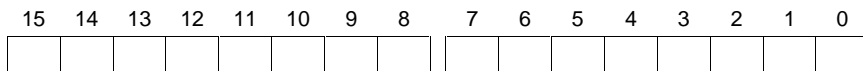
Angle set value	
Value	Degree [°]
0	0
1	0.01
2	0.02
3	0.03
...	...
65535	655.35

Angle set value: Specification of the angle in multiples of 0.01 degree [°]

Angle min.   8°:   320 hex   =   0000 0011 0010 0000
Angle max.   300°:   7530 hex   =   0111 0101 0011 0000

3.6   Status words: Input words 2 and 3

From BK MIKRO 8 PB control unit to PLC

Status word EW2

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

```
 |   |   |   |   |   |   |                   |   |       |   └   Wand in stop position
 |   |   |   |   |   |   |                   |   |   └   —   Scanning active
 |   |   |   |   |   |   |                   |   |
 |   |   |   |   |   |   |                   |   └   —   —   —   O.K.
 |   |   |   |   |   |   |                   └   —   —   —   —   K.O.
 |   |   |   |   |   |   |
 |   |   |   |   |   |   |
 |   |   |   |   |   |   |
 |   |   |   |   |   |   └   —   —   —   —   —   —   —   —   Error: Cable break
 |   |   |   |   |   └   —   —   —   —   —   —   —   —   Error: Scanner
 |   |   |   |   └   —   —   —   —   —   —   —   —   Error: Control unit
 |   |   |   └   —   —   —   —   —   —   —   —   Error: Wand
 |   |   └   —   —   —   —   —   —   —   —   Error: Angle set value
 |   └   —   —   —   —   —   —   —   —   Error: Control word
 └   —   —   —   —   —   —   —   —   Error: Parameter
```
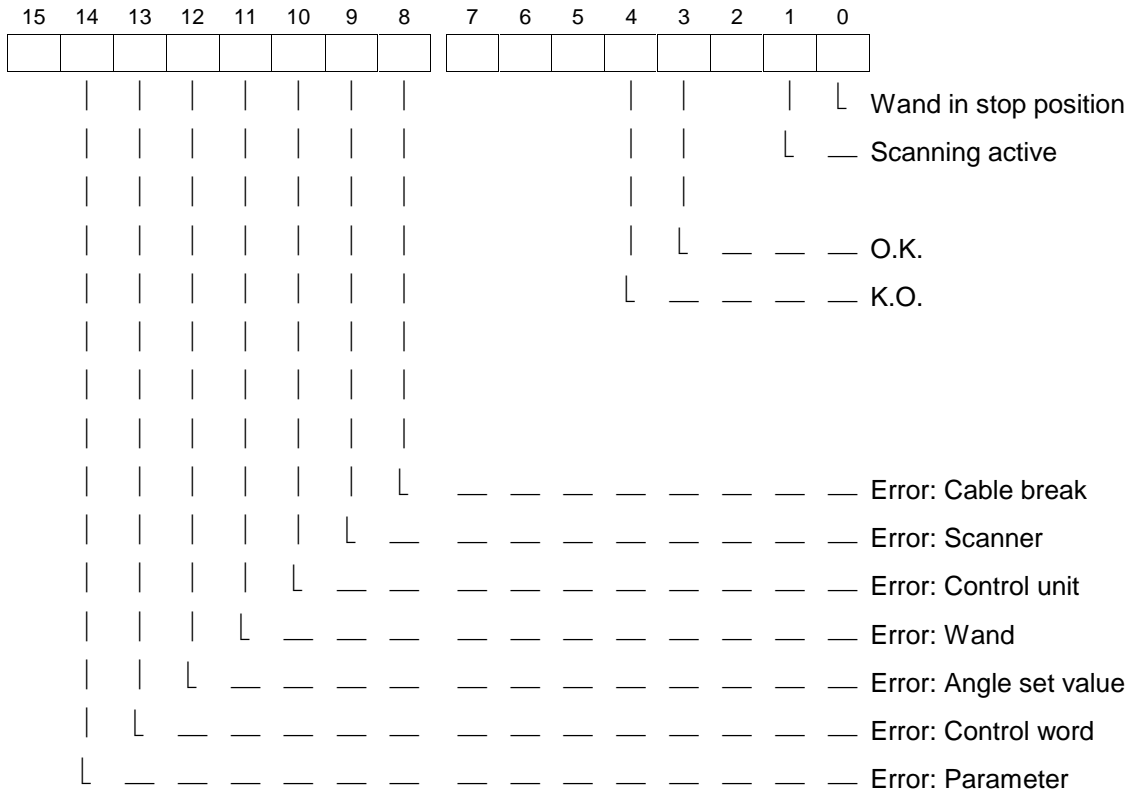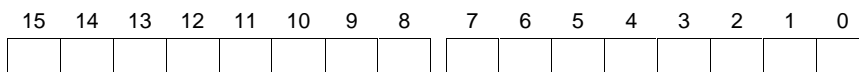
Angle EW3

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Angle: Specification of the angle in multiples of 0.01 degree [°]

Angle	
Value	Degree [°]
0	0
1	0.01
2	0.02
3	0.03
...	...
65535	655.35

3.7 Parameter

The transmission of the parameters runs also cyclically via the process channel of the PROFIBUS.

From PLC to BK MIKRO 8 PB control unit

Parameter identification AW1

15	14	13	12	11	10	9	8		7	6	5	4	3	2	1	0

Read: Parameter byte

Parameter value — ┘   Parameter number   Write: Parameter byte

(0...255)   (0...31)   Reserve
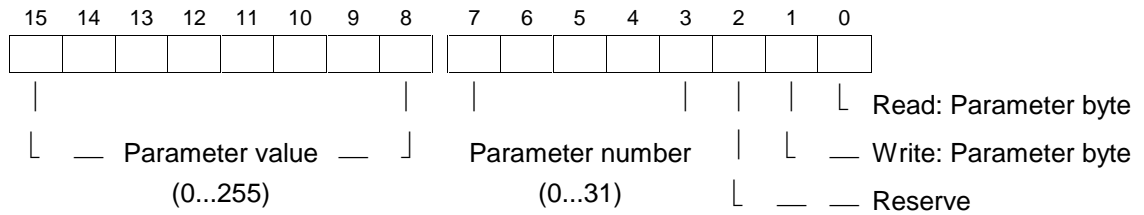
From BK MIKRO 8 PB control unit to PLC

Parameter identification EW1

15	14	13	12	11	10	9	8		7	6	5	4	3	2	1	0

Parameter updated

Parameter value — ┘   Parameter number   Error during writing

(0...255)   (0...31)   Error during reading
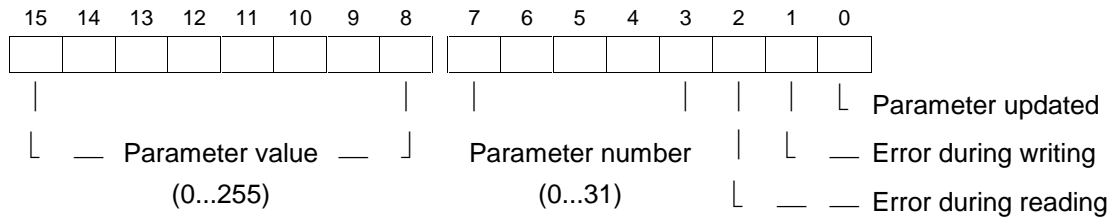
3.7.1   Parameter list

Number	Name	Default	Min.	Max.	Format	Description
0	Scanning intensity	0	0	1		**0 = Low** 1 = High
1	Out1 (O.K.) Relay output	1	0	1		0 = InActive normally closed **1 = Active normally open**
2	Out2 (K.O.) Relay output	1	0	1		0 = InActive normally closed **1 = Active normally open**
3	Monitoring	1	0	1		0 = Free space **1 = Object**
4	Rotation direction	1	0	1		0 = Counter-clockwise **1 = Clockwise**
5	Tolerance range	30	2	255	0.1° / unit	**3.0°** (Default)
6	Scanner	1	1	1		**TK8A**
7	P1 Low byte	0	0	255	0.01° / unit	Position 1
8	P1 High byte	18	0	255	2.56° / unit	**46.08°** (Default)
9	P2 Low byte	0	0	255	0.01° / unit	Position 2
10	P2 High byte	53	0	255	2.56° / unit	**135.68°** (Default)
11	Return travel monitoring	0	0	1		**0: no effect to outputs.** 1 : If wand does not come back during return travel, K.O. output will be active.
12	Power On	1	0	1		0 : Wand will not travel after Power On. **1 : Wand will travel to stop position after Power On.**
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29	Date month	Read_only				Date month
30	Date year	Read_only				Date year
31	Version	Read_only				Software version

Tab. 3-7:   Parameter list

3.7.2 Declarations concerning parameters

The table shows the allocation of parameters 0 ... 31.

There are parameters that can be read and to which can be written,
as well as read_only parameters that can only be read.

An attempt to write a read_only parameter causes an error message.

- Scanning intensity
  Scanning intensity determines permissible force and permissible speed during learning cycle
  and/or within tolerance range of start cycle. There are two steps of setting.

- Out1 and Out2
  Using these parameters relay output 1 (O.K.) and/or relay output 2 (K.O.) can be defined,
  as it will operate in the "active" state.

  After switch-on these outputs are always on the set state "normally closed" or "normally open"
  without a scanning has occurred before.

- Monitoring
  Using this parameter, monitoring mode can be set to object monitoring or free space
  monitoring.
  In case of object monitoring an object will be scanned, and if the object is detected in the
  defaulted area the O.K. output will be activated, or if the object is not detected the K.O. output will
  be activated.
  In case of free space monitoring it will be checked whether the predefined area can be scanned
  by the wand without detecting an obstacle.
  This monitoring mode does not allow any learning cycle.
  Monitoring ranges are defined either by angle set value and tolerance set value or by parameters
  position P1 and P2.
  For tolerance 0, +/– the parameter value "Tolerance range" is used as tolerance range.
  For angle set value 0, P1 and P2 are used as tolerance range.

- Rotation direction
  Using this parameter the scanning direction can be changed.

  As soon as the parameter is changed, the wand starts to the "new stop position"
  and will set a "new" reference position.

- Tolerance range
  The tolerance range can be set by this parameter. With this information the tolerance range
  has not to be set in start cycle.

  Tolerance range = 0 in control word: +/– parameter value is used as tolerance range.

- Scanner
  Settings of the scanner (for further applications).

- Position 1:   P1 Low byte, P1 High byte and
  Position 2:   P2 Low byte, P2 High byte
  Using these parameters the angle set value can be preset by P1 and P2.
  These values are used as range set value as soon as angle set value = 0.

- Return travel monitoring
  Using this parameter the O.K. output can be activated in case of non-attaining the stop position.
  If return travel monitoring is not active, this information can also be interrogated in bit
  "Wand in stop position" via PROFIBUS.

- Power On
  Using this parameter it can be prevented that the wand starts moving immediately after switch-on of the power supply.

  Usually set parameter to 0: Default!

4 Installation Notes

4.1 Mounting bracket

The delivering program offers a mounting bracket for the scanner as accessories.

Article no. 61 07 165 contains the following parts:

Designation	Material	Part no.
Mounting bracket	AlCuMgPb, F 38, tickness 8, naturally anodized	1, 2
2 cheese head screws with hexagonal hole M3x40	8.8 zinced	3
2 self-securing nuts M3	8 zinced	4
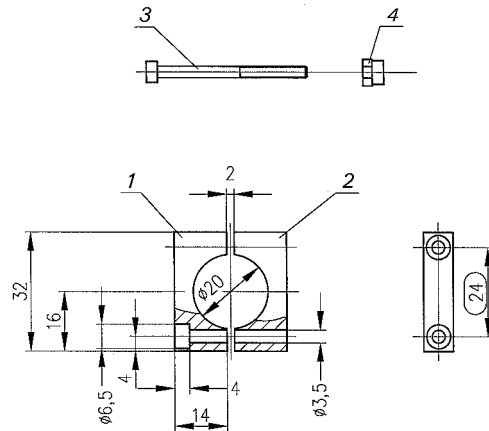
General tolerances ISO 2768 – mK
burred edges

Fig. 4-1:   Mounting bracket

4.2 Interference prevention

All inputs are opto-decoupled and thus maximally protected against interference voltage peaks, as caused, for example, by inductive sources.

Relay outputs are protected by varistors against inductive interference voltage peaks. Depending on the type of load used, further interference suppression measures may be necessary.

To ensure optimum operational safety, suppression measures, if required, must be taken at the source, i.e. directly where interference is caused.

Possible additional noise filters:

- RC combination (included in the contactor suppliers' product ranges)
- Varistors
- Diodes

5   Ordering Information

Control unit	Article no.
BK MIKRO 8 PB	63 04 236

Scanner	Article no.
TK8A, without scanning wand	63 04 237

Connection BK MIKRO 8 PB : control unit – scanner	Length	Article no.
Control cable, straight connector, 8 pin	5 m	62 04 251
Control cable, angled connector, 8 pin	5 m	62 04 252
Control cable, straight connector, 8 pin	15 m	62 04 253

Accessories and spare parts	Article no.
Scanning wands BK MIKRO 8 PB:	
- thickness 3 mm, length 380 mm, plate 80x15	62 04 260
- thickness 3 mm, length 380 mm, plate 80x15 with wand holder and back load	62 04 261
- thickness 3 mm, length 284 mm, plate 65x15	62 04 262
Mounting bracket	61 07 165
PROFIBUS connector with PG connection plug	62 04 257

Operating Instructions	Article no.
BK MIKRO 8 PB	68 36 239

Basic system
63 04 237 + 62 04 260 + 62 04 251 + 63 04 236