BK MIKRO 4

Control System for
Tool, Object and Free Space Monitoring

Operating Instructions
Issue 2.02 dated 05.02.2007

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:

Danger

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

Warning

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

Caution

Potentially hazardous situation
Non-compliance may cause slight injury;
possible damage to property.

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

Warning

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.

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:

$C\!\!\in$ 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 4 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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Table of Figures

Purpose

These operating instructions are part of the documentation of the BK MIKRO 4.
They provide service personnel and system advisors with the information required
to install, commission, operate and maintain the system BK MIKRO 4.

1   Characteristics

BK MIKRO 4 is a control system suitable for tool as well as for object and free space monitoring applications.

The complete BK MIKRO 4 system comprises

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

BK MIKRO 4 is based on existing design concepts for tool and free space monitoring and can, therefore, be used universally for two different types of monitoring:

- **Monitoring** of a **scanning position** whose precise location has been previously entered by "Teach-in", e.g. to carry out a tool check before each working cycle (tool monitoring).
- **Monitoring** a **scanning range** freely selectable via two adjusting switches, e.g. to carry out tool checks for tools with varying diameters (object monitoring), or for ejection checks (free space monitoring).

Further features enabling customized system configuration include:

- Relay contacts switch-selectable as normally open or normally closed
- Selection of clockwise or counter-clockwise travel direction for the scanner
- Two settings for scanning intensity / speed
- Detection of cable breaks

Principle of Operation

When given the signal to "Start", the system will monitor the presence of a particular tool or check a certain area for obstacles.

Two different monitoring methods may be selected:

- Monitoring with Learn Cycle
  The monitoring system will first determine the exact position of the tool by a "Teach-in" cycle. This is followed by "Start" cycle, during which the wand will be moved into the position "just learned", and a comparison takes place.
- Monitoring by Setting a Range
  A scanning range will be set via two rotary switches. Following each "Start" signal, the wand will travel through this angle to determine monitoring results.

All outputs to the machine will be via two relay contacts, configurable as normally closed or normally open. For evaluation, the "O.K." relay, the "K.O." relay, or both may be used.

2   System Components

2.1   Control Unit

230 V AC
L1 | N

230 V AC
L1 | N

Versorgungspannung
(wahlweise)
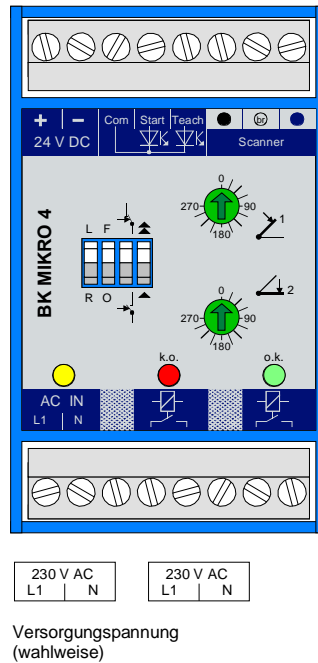
Fig. 2-1: Control Unit – Front View

2.1.1   Characteristic Properties

The BK MIKRO 4 system control unit is housed in an insulating material housing of protection class II.

On its front panel, the control unit is fitted with plug-in screw terminals to connect all machine inputs and outputs, supply voltage, and the scanner.

Note:

The control unit – a built-in unit – is available in three models for **different supply voltages**:

• 24 V DC
• 120 V AC
• 230 V AC

2.1.2   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 75 mm x 107.5 mm
Case Mountings	Sectional Rail, 35 mm, to DIN EN 50022
Power Supply Voltage	Depending on Model: 24 VDC 120 VAC 230 VAC
Power Consumption	6 VA max.
Control Voltage	24 VDC (internal / external)
Inputs	Galvanically Isolated
– Input Current	5 mA approx.
– Pulse Duration	6 ms min.
Switched Outputs	2 x 250 VAC / 30 VDC, 2 A
Making/Breaking Capacity	500 VA / 60 W (max.), 10 mA min. at 10 V
Operational Life of Relay	5 x 107 Switching Cycles
Connections	Plug-in Screw Terminals for Connecting – Power Supply – Control Inputs – Relay Outputs – Scanner
Climatological Conditions	Classification 3K3 under EN 50178
Ambient Temperature	0 ºC to +50 ºC
Storage Temperature	–25 ºC to +80 ºC
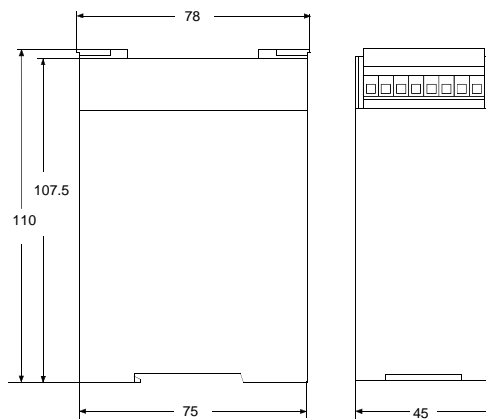
Fig. 2-2: Control Unit – Dimensions

Note:

The control unit of BK MIKRO 4 is a **built-in unit** (DIN EN 60950). The system is explicit approved for operation in closed rooms (control cabinet)!

2.1.3   Screw Terminals

The screw terminals have been arranged on two plug-in terminal blocks. These blocks are keyed so that they cannot be accidentally plugged into the wrong socket.

When in operation, plastic caps cover the screws in the front. Wires to be connected are routed from the top or bottom of the unit.

Power supply, control inputs, relay outputs, and the scanner are all connected via these screw terminals.
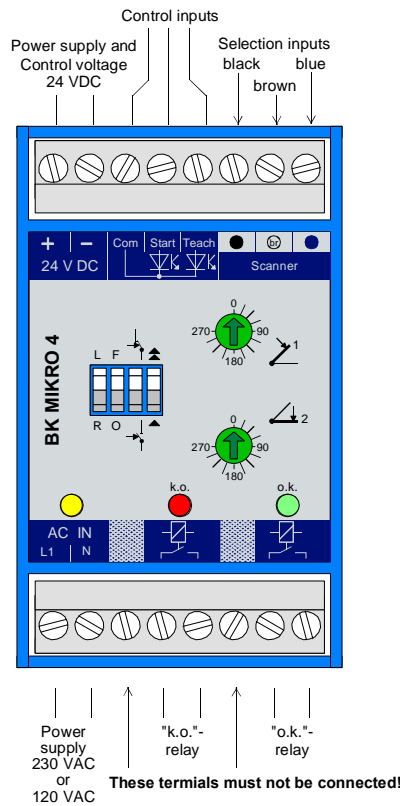

Fig. 2-3: Control Unit – Connections

Note:

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

Unmarked terminals must not be connected.

Caution

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).

Warning

Power Supply

"24 VDC" Model

- "**+**" 24 VDC Terminal
  Supply Voltage Input 24 VDC $\pm$ 20%

  Input Current 0.25 A max.

  The voltage applied must meet the requirements for an extra low function potential with safe disconnection.

- "**–**" 24 VDC Terminal
  Reference potential of 24 VDC supply voltage

"120 VAC" and "230 VAC" Models

Depending on the specific model, the unit will be supplied preconfigured for "120 VAC" or "230 VAC". The relevant version will be marked on the label next to the supply connections on the front panel.

- "L1" Terminal
  Supply Voltage Input, depending on model:

  120 VAC (I_{max} = 0.05 A) or
  230 VAC (I_{max} = 0.025 A)

- "N" Terminal
  Supply Voltage Input, depending on model:

  120 VAC (I_{max} = 0.05 A) or
  230 VAC (I_{max} = 0.025 A)

- "**+**" 24 VDC Terminal
  Control voltage for controlling inputs "Start" and "Lern" (Learn)

  24 VDC (16 V ... 32 V) unregulated

  The control voltage meets the requirements for an extra low function potential with safe disconnection.

  Output Current 0.1 A max.

  If an external control voltage is applied, this terminal is not connected.

Note:

The secondary voltage (24V) of the 120/230V Versions can be used to supply the control inputs. It is not allowed to supply other accessories which are located outside the overall enclosure.

- "**–**" 24 VDC Terminal
  When using the internal control voltage, this terminal must be connected to the control inputs terminal "Com".

  If an external control voltage is applied, this terminal is not connected.

Note:

Alternatively, "120 VAC" and "230 VAC" models may also be supplied with 24 VDC.

In this case, terminals "L1" and "N" must not be connected.

Terminals "+24 VDC" and "–24 VDC" are to be connected as described above for model "24 VDC".

Control Inputs

- "Com" Terminal
  Reference potential for control inputs

- "Start" Terminal
  An input level of +24 VDC relative to terminal "Com" will trigger a "Start" cycle
  (the real scanning process).

  The input current is approximately 5 mA.

  Pulses lasting less than 6 ms will be disregarded.

- "Lern" (Learn) Terminal
  An input level of +24 VDC relative to terminal "Com" will trigger a "learning" cycle
  (the "Teach-in").

  The input current is approximately 5 mA.

  Pulses lasting less than 6 ms will be disregarded.

  The position stored during the learning cycle will remain stored even after the unit has been switched off. Therefore, a new "Teach-in" session is required only when your tool geometry changes, or the scanner is changed.

  If a range is set via a switch, any connection to terminal "Lern" (Learn) will be ignored.

Relay Outputs

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

The contacts have been designed for 250 VAC and, by additional internal circuits, protected against inductive switch-off peaks of up to 19 W (2 ms).

Maximum switching power is 500 VA.

Maximum switching current may not exceed 2 A.

- "K.O." Relay Terminals

  These two terminals are used to indicate a fault message (K.O.).

- "O.K." Relay Terminals

  These two terminals are used to indicate a no fault message, i.e. a good cycle (O.K.).

Note:

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

Scanner Connections

Three screw terminals are used to connect scanner TK4K. The connections are marked according to the color-coding of the cable wires.
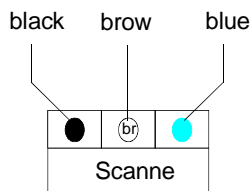
black   brow   blue

Scanne

Fig. 2-4: Control Unit – Scanner Connections

Note:

Using a different scanner may damage the scanner and control unit.

2.1.4   Light-Emitting Diodes

Three light-emitting diodes (LEDs) on the front panel provide information about the current status of the BK MIKRO 4 monitoring system:

- Power Supply / Status
  yellow LED to indicate supply voltage or status

- "K.O." Relay
  red LED to indicate fault message

- "O.K." Relay
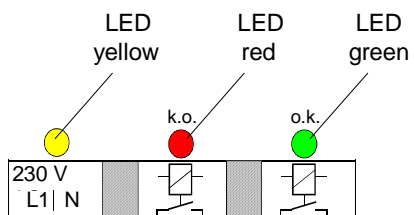 green LED to indicate no fault message

LED   LED   LED
yellow   red   green

k.o.   o.k.

230 V
L1 N

Fig. 2-5: Control Unit – Light-Emitting Diodes

2.1.5   Toggle Switches

Using the four toggle switches arranged next to each other on the control unit front panel, the following functions may be set.
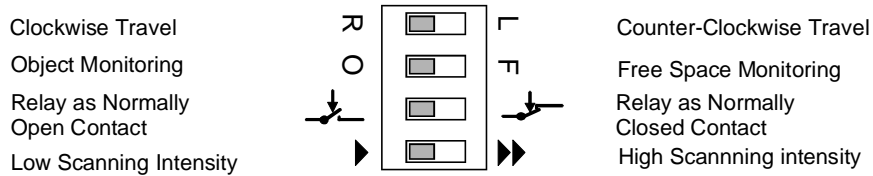
Clockwise Travel	⊐ [■] ⌐	Counter-Clockwise Travel
Object Monitoring	O [■] ⫟	Free Space Monitoring
Relay as Normally Open Contact	╱ [■] ╲	Relay as Normally Closed Contact
Low Scanning Intensity	▶ [■] ▶▶	High Scannning intensity

Fig. 2-6: Control Unit – Toggle Switches

Note:

Setup on Delivery – All switches are toggled downwards!

Caution

"Clockwise/Counter-Clockwise" Switch

Direction of rotation for the scanner

Clockwise rotation is effected when rotating to the right, scanner viewed from behind (the connection side), looking up length of scanner.

"Object / Free Space Monitoring" Switch

"O.K." result for finding an object in the scanning window or not finding an object

The "Free Space Monitoring" function is permitted only if a scanning range has been set via the rotary switches (it is not possible to „learn" an empty space).

"Normally Open Contact / Normally Closed Contact" Switch

Mode of operation for the two output relays

"Scanning Intensity" Switch

Speed of scanner in its scanning range

Note:

For normal tool detection applications, this switch should be in the "low" position, as the lower impact force of the scanner is designed to protect the unit from wear and tear.

2.1.6   Rotary Switches

The two rotary switches are used to set

- a mode of operation and

- a scanning range.

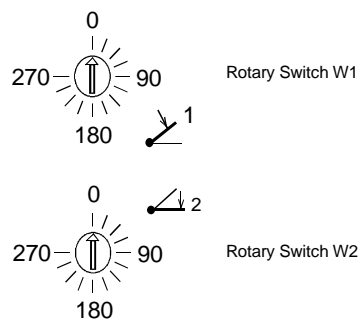Switch positions from 0° to 270° (in 22.5° steps) are possible.

Fig. 2-7: Control Unit – Rotary Switches

Note:

W1 = 0	Return travel monitoring is switched off.
W1 > 0	Return travel monitoring possible depending on start signal length.
W2 = 0	Monitoring a scanning position following "Teach-in".
W2 > W1	Monitoring by setting a scanning range:

     – W1 defines where a scanning range starts, W2 where it ends; rotary direction is set by toggle switch.

     – W1 = 0 is possible (return travel monitoring is switched off).

     – W2 $\leq$ 270, positions > 270° are not permitted.

     – Monitoring range starts at approximately 10°. Smaller angles will be interpreted as a "sticking scanner" problem.

2.2   Scanner TK4K

Fig. 2-8: Scanner TK4K

General tolerances
ISO 2768 – mK
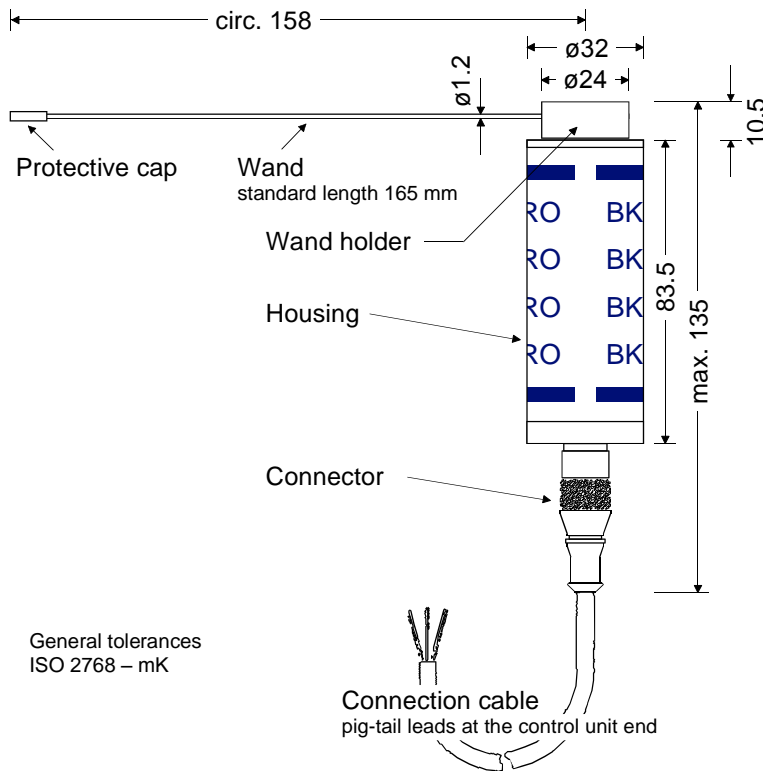
2.2.1   Characteristic Properties

The scanner housing is cylindrical and smooth, thus permitting easy installation. 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.

When a supply voltage is applied, the scanner will always move into its mechanically set initial position. The scanner will be held in this position by applying a low voltage until a pulse on the "Lern" (Learn) or "Start" screw triggers a scanning cycle.

Using scanner TK4K with a different control unit than BK MIKRO 4 may damage the scanner and control unit.

Note:

- Due to its small diameter, a wand is easily overlooked.

- Your wand is a wearing part! Each contact with a rotating object will cause corresponding wear on the wand. This may even lead to the metal wand breaking.

Warning

Due to the injury hazard this causes, users should exercise particular caution within any BK MIKRO rotating area.

2.2.2 Technical Data

Housing	Anodized Aluminum
Protection Type	IP 67
Wand Length	165 mm (standard)
Scanning Angle	0° to 270°
Control Unit Connection	Connector, M12x1, 3 pins
Ambient Temperature	0 ºC to +80 ºC
Storage Temperature	–25 ºC to +85 ºC
Scanning Cycles	> 5 million at minimum scanning intensity

Note:

To prevent injury, your wand will be supplied complete with a protective cap.

2.2.3 Scanning Wand

Initial Position

Depending on your desired direction of rotation, the wand must first be set to its initial position. This is done by manually turning the wand holder towards right or left until it reaches its mechanically set full stop position.

From this rest position any desired scanning angle can be implemented by appropriate alignment of the entire scanner, complete with its wand in stop position, on to the test object, and securing in its new position (e.g. by using a collet chuck).

Zeroing

In order to make sure that the scanner always returns to the stop position that has been previously set and stays there, after power-up a slight electric current is applied to the motor of the scanner and continuously maintained.

How to change

After undoing hollow screw (M3), the wand can easily be removed from its holder.
Insert new wand into holder and tighten.

Option: Wand Holder for Small Chips

If BK MIKRO 4 is used to monitor manufacturing processes where materials with **small chips** are processed (e.g. cast iron, diecast aluminum, brass), we recommend the use of our specially designed wand holder for this purpose.

Scanning Angle

Any scanning angle between 0° and 270° can be used.

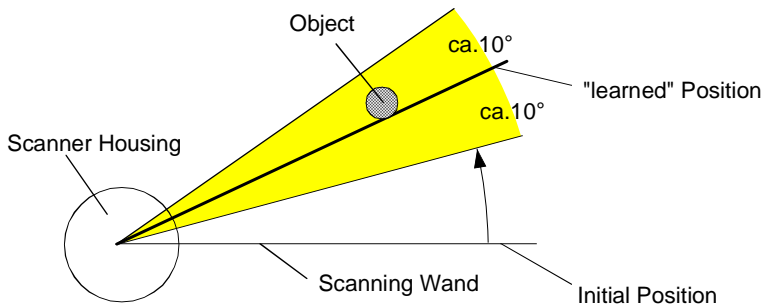Angle tolerances for a good message is ±10°, in relation to the "learned" position.

Fig. 2-9: Angle Tolerances

Direction of Rotation and Scanning Intensity

Direction of rotation and scanning intensity of the scanner can be set via toggle switches in the control unit front panel.

Scanning intensity and scanning speed are directly interdependent.
There are two switch positions for setting intensity.

Wand Impact Forces

Depending on preset scanning intensity and length of wand, the scanner strikes the object to be monitored with different impact forces.

Switch Position	at a wand length of	
	150 mm	100 mm
▲	350 mN	500 mN
▲▲	700 mN	1000 mN

2.3   Connection Cable

Control unit and scanner are connected by a **3-wire cable**:

- pig-tail leads for connecting to the screw terminals on the control unit
  (note color coding of wires!)
- molded plug at the scanner end
- length 5 m, can be extended to a maximum length of approximately 25 m.

Note:
To avoid unnecessarily reducing the operational life of this cable, it should not be subject to more than a minimum amount of movement during operating cycles.

3   Functions

BK MIKRO 4 can be operated in two different ways:

- monitoring with learn function ("Teach-in" Mode)

- monitoring by setting a scanning range (Switch Mode)

Both modes of operation allow return travel monitoring.

3.1   Mode of Operation

3.1.1   Scanning Process

By applying a low voltage, the scanner will be held at rest in its mechanical stop position. Applying a "Start" pulse will trigger a scanning cycle.

Initially, the scanner will travel at maximum speed to the start of a given monitoring range. However, its motor will slow down to a preselected scanning speed in time before a learned position or a preselected angle set by rotary switch W1 is reached.

The monitoring range will then be traversed at the preset scanning speed and its related force which is to be used to scan an object or range.

During the entire operation, all pulses generated by the scanner's internal encoder will be continuously processed.

If the system detects that the scanner no longer moves or has exceeded the end of the monitoring range (W2 setting), the direction of rotation immediately changes, and the scanner will return at maximum speed into its stop position.

„Teach-in" Mode   **Switch Mode**
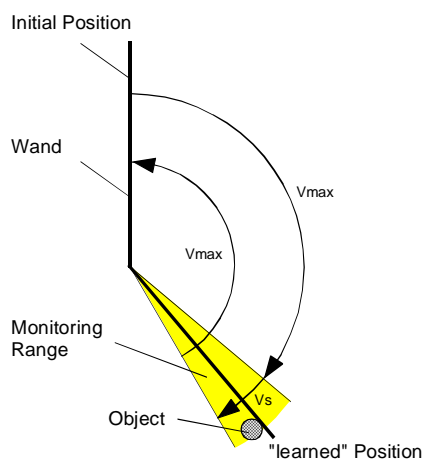
Fig. 3-1: Scanning Cycle
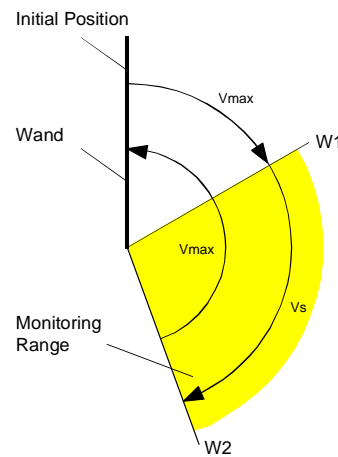
v_{max} = max. speed of scanner

v_S = speed of scanner preset by toggle switch

W1, W2 = angles preset by rotary switches

3.1.2 Output of Results

- Fault message (K.O.)

  A fault message will be output immediately on detection.
  The scanner will return to its stop position.

- Good cycle message (O.K.)

  – without return travel monitoring
    Results will be indicated on reaching the scanner reversing point,
    as its return travel will not influence scanning results.

  – with return travel monitoring
    On reaching the stop position, scanning process results will be indicated.
    This ensures that the scanner will have left the monitoring range at the time
    the results are output and that there are no further waiting periods to be considered.

In the **"O.K." state**, the "O.K." relay will be active, while the "K.O." relay remains inactive.

In **all other cases**, "K.O." will be indicated, i.e. the "O.K." relay will be inactive, the "K.O." relay will be active.

Note:

"K.O." will not only be indicated when a tool has broken but also when the scanner cannot leave its stop position for any reason (e.g. mechanical "sticking", cable break etc.).
The results of a scanning cycle will remain latched until the following cycle starts.

3.1.3 Return Travel Monitoring

BK MIKRO 4 allows users to select whether or not return travel monitoring is desired.

- If rotary switch W1 = 0, return travel monitoring is off.

- If rotary switch W1 > 0, return travel monitoring is enabled.

  The start signal length then determines whether the return travel will be monitored:

  Before return travel begins, i.e. at the reversing point of the scanner,
  the system will re-read the current start signal status.

  – If the start signal is still present, return travel monitoring begins.

  – If the start signal has already been removed, an immediate output of results will follow. Return travel monitoring will not be performed.

3.2 Monitoring with Learn Function

Requirement: rotary switch W2 = 0

The scanning range will be determined by a learning cycle (external control signal).

This mode of operation is the typical mode for **tool detection** applications:

The system will check for the presence of the tool at the learned position.

3.2.1 Teach-in

The learn cycle, the "Teach-in", will be started by an active input signal (duration 6 ms min.) on the "Lern" (Learn) screw terminal. Both relay outputs for "O.K." and "K.O." will become inactive.

The scanner will travel in its preset direction of rotation with its preset speed.

- If a tool is detected, its position will be stored, and the scanner returns to its initial position. In addition, the "O.K." relay will be activated.

- If the scanner rotates to a maximum of 270° without detecting any tool, the "K.O." relay will be activated.

In this case, i.e. following a faulty learning action, the previously stored position will remain in force. The LEDs "O.K." and "K.O." will indicate the result.

Note:

A **position** learned during "Teach-in" **will remain stored**, even after removal of power to the unit.

Ensure that **tool geometry** (layout and dimensions) at "Teach-in" corresponds to the geometry used during monitoring in the "Start" mode.

3.2.2 Start

A "Start" cycle will be triggered by an active input signal (duration 6 ms min.) on the "Start" screw terminal. Both relay outputs for "O.K." and "K.O." will become inactive.

The scanner will travel to the previously "learned" position of the object to check for its presence.

- If the tool is in its "correct" position, the "O.K." relay will be activated. Angle tolerance for a good signal (O.K.) is $\pm 10°$ in relation to the learned position.

- If the tool is not detected, i.e. either it is missing or there is an obstacle within the scanner rotating area, the "K.O." relay will be activated.

In addition, the LEDs "O.K." and "K.O." on the control unit will indicate the result.

3.3   Monitoring by Setting a Scanning Range

Requirement: rotary switch W2 ≠ 0

Rotary switch W1 and W2 settings will define the scanning range.

In this mode of operation, BK MIKRO 4 is suitable for **monitoring tools** with differing diameters (object monitoring) as well as for **ejection monitoring** (free space monitoring):

Two rotary switches are used to define a scanning range which is to be monitored before each working cycle.

3.3.1   Setting Range

The desired scanning range must be defined using rotary switches W1 and W2:

W1 marks where the range starts, W2 where it ends.

Each rotary switch can be adjusted in 12 steps where each step represents an angle of 22.5° respectively. The direction of rotation is set by its toggle switch.

Illegal settings will be indicated to users by both LEDs flashing. The two relays, however, will remain inactive.
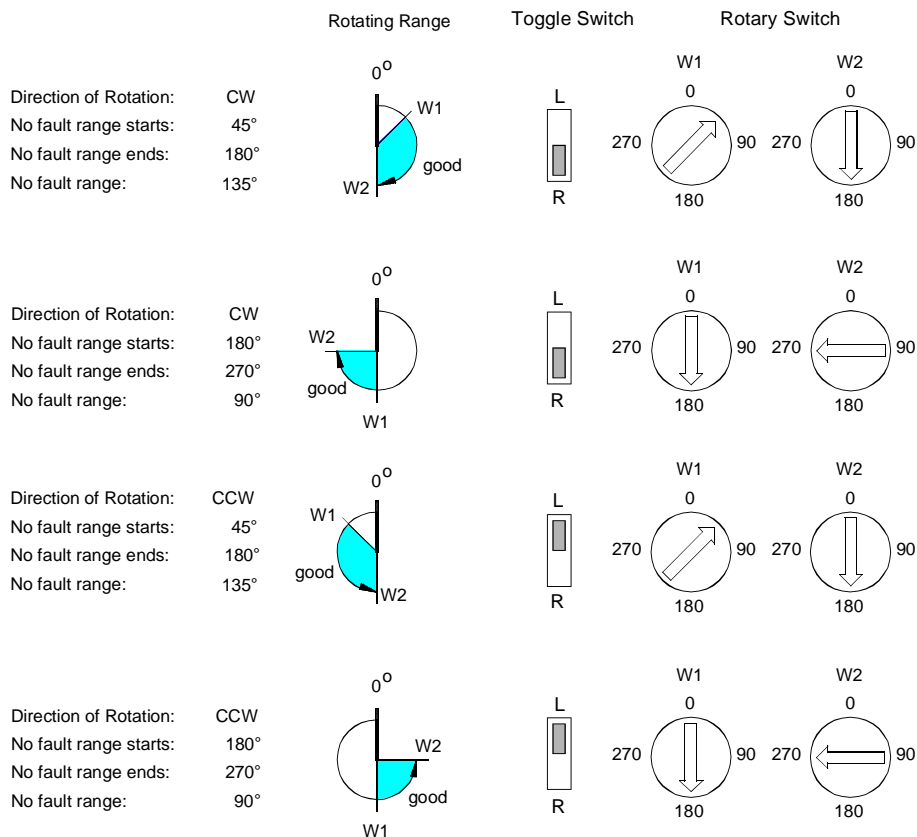
Examples for Range Settings:

Fig. 3-2: Range Settings using Rotary Switches

3.3.2   Start

A "Start" cycle will be triggered by an active input signal (duration 6 ms min.) on the "Start" screw terminal. During scanning operation, both relay outputs will be inactive
(LEDs "O.K." and "K.O." not illuminated).

Control Operation "Object Monitoring"

Using "Object Monitoring", the control unit will change into an "O.K." state, i.e. it will issue a good message, if during a scanning cycle the operation sequence described below is followed:

- The scanner leaves its stop position.

- The angle preset via rotary switch W1 has been exceeded.

- The angle preset via rotary switch W2 has not been reached.

Control Operation "Free Space Monitoring"

The control operation "Free Space Monitoring" differs from the object monitoring mode in that within its monitoring range no object must be detected.

Its "O.K." state is characterized by:

- The scanner leaves its stop position.

- The angle preset via rotary switch W2 has been exceeded.

Caution:
When performing "Free Space Monitoring", a **broken wand** will always trigger an **"O.K." signal**.

Note:
- Toggle switch "Scanning Intensity" set to "high" will enable scanning operation at a higher speed.

- Life expectancy of the wand will not be reduced, since the unit will rarely contact a part using "Free Space Monitoring".

3.4   Deflection of Wand

Rotation angles will be detected by scanner encoder pulses. These pulses are derived from the rotation of the motor. For scanning, a metal needle (wand) is used which, depending on the scanning force, can be deflected. As the scanner motor is still turning when the end of this wand has already come to a stop, differences between the set and actual rotation ranges will result.

For all speeds, wand deflection is compensated to a range of less than 10°. Deflection will depend, however, on wand length.

3.5   Scanning Times During "Start" Cycle

Pulse Duration: ≥ 6 ms

Measuring Time: Results will be indicated.

Cycle Time: Scanner back in initial position.

Angle	Scanning Intensity	"Teach-in" Mode		Switch Mode	
		Meas. Time	Cycle Time	Meas. Time	Cycle Time
15°	low/high	125 ms	250 ms	125 ms	250 ms
270°	low	425 ms	850 ms	850 ms	1400 ms
270°	high	400 ms	800 ms	400 ms	800 ms

The result of several test series shows: Cycle time ≈ double measuring time (advance and return travel)

Times depend on the length of the path to be traveled, and the preset scanning intensity; for small angles, only a small difference in the times for low and high scanning intensities.

3.6   Status Indication

3.6.1   Yellow LED

Fast Flashing = Self-Test

After power-up, the system will carry out a self-test indicated by fast flashing of this yellow LED.

Steady Illumination = Ready to Operate

Following its self-test, the system is ready to operate. The LED stops flashing and remains steady.

Slow Flashing = Motor Fault / Cable Break

The system has detected a motor fault or cable break. Outputs will be switched inactive, the unit will remain in its present state, indicated by slow flashing of this yellow LED.

3.6.2   Red/Green LED

Steady Illumination = Indication following Scanning Cycle

The red LED indicates a fault message.

The green LED indicates a no fault message.

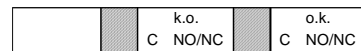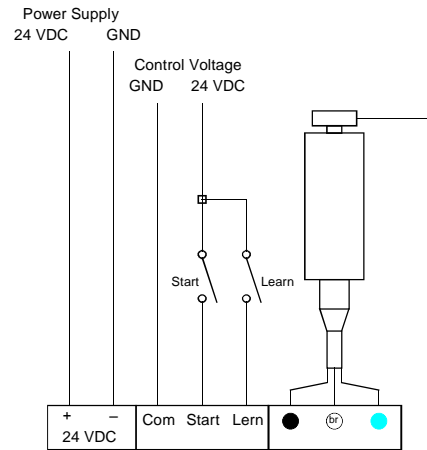#### Flashing = Illegal Settings

A flashing red and green LED simultaneously indicates that one or both of the rotary switches is incorrectly set, and/or that the "Free Space Monitoring" mode has been selected without setting the rotary switches.
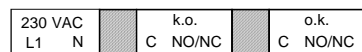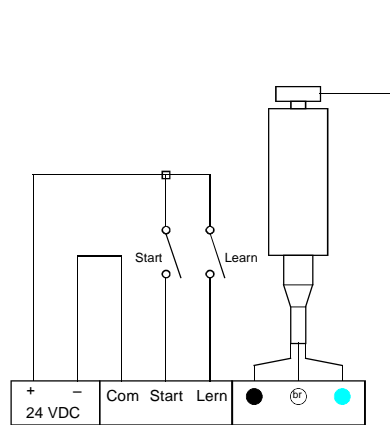
4   Installation Notes
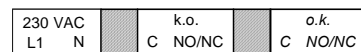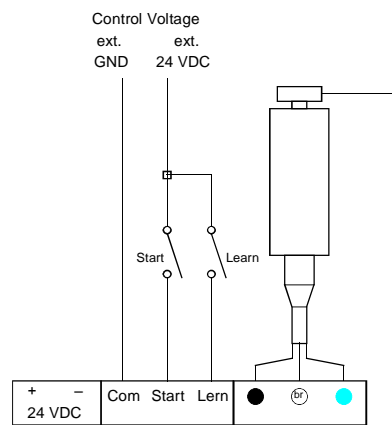
4.1   Control Voltage Connection
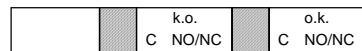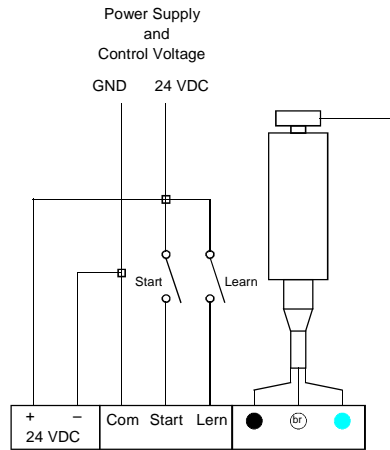
BK MIKRO
24 VDC
common power and control voltage supply

BK MIKRO 4
24 VDC
separate control voltage

BK MIKRO
230 VAC (120 VAC)
internal control

BK MIKRO
230 VAC (120 VAC)
external control

Fig. 4-1: Control Voltage Connection

Note:

Any connections to the "Lern" (Learn) terminal in the mode where ranges are switch-selected will be ignored.

4.2   Mounting Bracket

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

Article no. 61 07 082 contains the following parts:

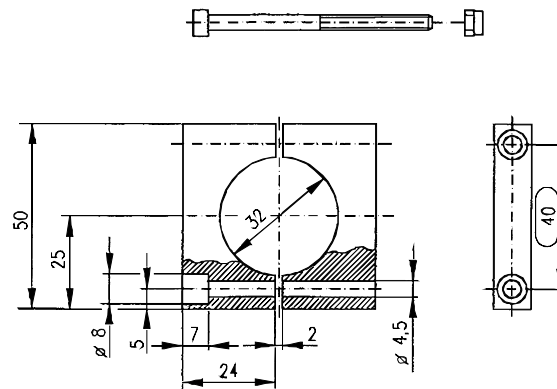|	
Mounting Bracket	AlCuMgPb, F 38, thickness 10, naturally anodized
2 cheese head screws c/w hexagonal hole M4x60	8.8 zinced
2 self-securing nuts M4	8.8 zinced

Fig. 4-2: Mounting Bracket

4.3   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 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 Number
BK MIKRO 4	24 VDC	63 04 206
BK MIKRO 4	120 VAC	63 04 200
BK MIKRO 4	230 VAC	63 04 201

Scanner	Article Number
TK4K (without cable)	63 04 210

Connection BK MIKRO 4 : Control Unit - Scanner	Length	Article Number
Connection Cable	5 m	59 08 027
Connection Cable	10 m	59 08 028
Connection Cable	25 m	59 08 029

Accessories and Spare Parts		Article Number
Scanning Wands BK MIKRO 4:		
– Length 165 mm (standard)	10 pcs.	62 04 022
– Length 250 mm	10 pcs.	62 04 216
– HSS, Length 165 mm	1 piece	62 04 215
– HSS, Length 250 mm	1 piece	62 04 231
Wand Holder (standard) c/w Wand		62 04 023
Wand Holder for Small Chips c/w Wand		62 04 214
Mounting Bracket		61 07 082

Operating Instructions	Article Number
BK MIKRO 4	68 36 171