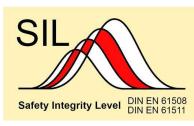
MSK200ia-E, MSK200ib-E

<u>Manual</u>

WINSMART-Support from MSK200-Version 4.0 MODBUS-RTU Communication HART Signal Connection





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Manual for MSK200ia-E, MSK200ib-E

WINSMART-Support from MSK200-Version 4.0 MODBUS-RTU Communication HART Signal Connection

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Disclaimer

We have checked the content of the printed document for compliance with the described hardware and software. Nevertheless, deviations cannot be excluded and consequently we cannot assume any guarantee for complete accordance. The data in this printed document are checked regularly. Corrections and additions are made in the following version in each case. We would be grateful for any suggestions for improvement.

Subject to technical modifications



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Classification of safety instructions

This manual contains instructions that you have to observe for your personal safety as well as to avoid material damage. These instructions are highlighted using a triangular warning sign and shown as follows, depending on the degree of risk.



HAZARD

means that death or severe physical injury will occur if the appropriate precautionary measures are not taken.



WARNING

means that death or severe physical injury may occur if the appropriate precautionary measures are not taken.



CAUTION

with a triangular warning sign means that minor physical injury may occur if the appropriate precautionary measures are not taken.

CAUTION

without a triangular warning sign means that material damage may occur if the appropriate precautionary measures are not taken.



ATTENTION

means that an undesired result or state may ensue if the corresponding instruction is not followed.

NOTE



denotes important information about the product, handling of the product or the respective part of the documentation, is aimed at drawing special attention to the latter and should be complied with.

In addition to the instructions in this manual, the generally applicable safety and accident prevention regulations must be observed.

If the information contained in this document should not be sufficient in any specific case, you can obtain more detailed information from our telephone service.

Please read this manual carefully prior to installation and commissioning.

CE mark

This product meets the specifications according to the EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC.



General remarks

This device left the plant in flawless condition in terms of its safety features. To preserve this condition and ensure safe operation of the device, the user has to observe the instructions and warning notes indicated in this operating manual.

NOTE

For the sake of clarity the manual does not contain complete detailed information on all product types and can therefore not take into account every conceivable case with respect to installation, operation and maintenance.

Should you wish further information or should special problems arise that are not treated in sufficient detail in the manual, you can obtain the necessary information by telephone.

Moreover, we point out that the content of the manual shall not constitute part of or amend a previous or existing contract, agreement or legal relationship. All obligations of Mütec Instruments GmbH shall result from the respective contract of purchase, which also contains the complete and solely valid warranty terms. These contractual warranty terms shall neither be extended nor limited by the information contained in the manual.

The content reflects the technical state of the art regarding printing. It is subject to technical modifications in the course of further development.

WARNING

Devices with the type of protection designated as "intrinsic safety" lose their conformity certification as soon as they have been operated in circuits that do not meet the values specified in the test certificate. Flawless and safe operation of this device requires proper transport, proper storage, installation and assembly as well as careful operation and maintenance. The device may only be used for the purposes specified in this operating manual.

DISCLAIMER

All modifications to the device fall within the responsibility of the user unless expressly specified otherwise in the operating manual.

Qualified PERSONNEL

are persons who are familiar with installation, assembly, repair and operation of the product and have the qualifications necessary for their work, such as:

- Training, instruction and/or authorization to operate and maintain equipment/systems in accordance with the standards of safety technology for electrical circuits, high pressures and corrosive as well as hazardous media.
- In the case of equipment with explosion protection: training, instruction and/or authorization to perform work on electrical circuits for potentially explosive equipment.
- Training or instruction in accordance with the standards of safety technology regarding care and use of appropriate safety equipment.

CAUTION

Potentially electrostatic components may be destroyed by voltage that is far below the limits of human perception. Such voltage occurs even when you touch a component or electrical connections of a component and are not electrostatically discharged. The damage that occurs to a component because of overvoltage usually cannot be detected immediately and does not become noticeable until after a longer operating period.

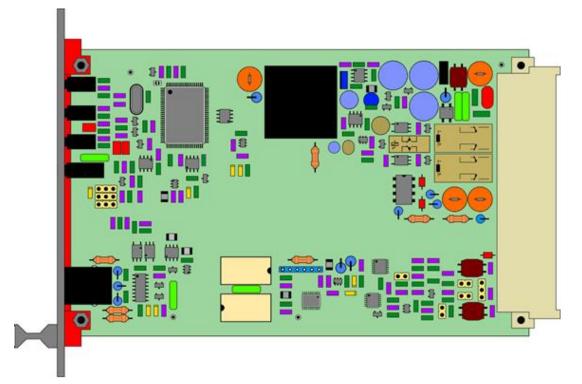




Introduction

MSK200ia-E, MSK200ib-E

DIN-Rail Transmitter Supply Unit as per IEC/EN 61508 - SIL 2



Features:

- DuoTec[®]-System (2 Controller with parallel monitoring)
- Failsafe-Technology for self-monitoring
- HART Signal Connection
- 4 A/D converters (16-bit, 12-bit, 10-bit)
- 1 D/A converter (15-Bit)
- 5 self-monitoring circuits
- 5 galvanically isolated alarm outputs (3x relay contact, 2x transistor)
- 1 intrinsically safe transmitter supply output [EEx ia/ib] IIC
- 1 intrinsically safe mA measurement signal input [EEx ia/ib] IIC
- 1 analogue output for constant current or constant voltage
- 1 galvanically isolated RS232 interface
- 1 galvanically isolated RS485 interface
- 24V AC/DC supply unit



1. General information for installation and operation

Identification in accordance with Guideline 94/9/EG:

	(C) 0158 🥨 II (2) G
device group	
intrinsically safe equipment with external circuits for connection for category 2 devices	
for explosive mixtures of air and flammable gases, steams or vapours	
Identification of explosion protection:	
	[Ex ia] IIC

	-	1	
intrinsically safe electrical equipment		J	
explosion protection			J
equipment group			

Safety instruction

If it is assumed that safe operation is not longer possible, the device must be taken out of service and secured against accidental operation.

Reasons for this can be:

- visible damage of the device
- failure of electrical function
- longer storage at temperatures over 85°C
- heavy transport stress

Before the device is put back into operation, a professional routine check must be performed in accordance with DIN EN 61010, Part 1. This examination should be made at manufacturers' side. Repair work at ex-devices may be accomplished only under attention by §9 of the ex regulation (Elex V).

Devices with intrinsically safe circuits may be never operated in not-intrinsically safe circuits. If ex devices in not-intrinsically safe circuits are operated, these need to be marked particularly and the ex labels must be removed absolutely, so these devices do not find use for intrinsically safe electric circuits later again. A later check of the devices on observance of the conditions for the explosion protection is possible with a disproportionately high expenditure only and is rejected therefore usually.

Proper use

The transmitter supply unit **MSK200ia/ib-E** delivers power to intrinsically safe 2-wire transmitters or can be used as an isolation amplifier for an intrinsically safe current signal of 0/4 - 20 mA.

The transmitter supply circuit on the contacts d/z28 + d/z30 and the mA input circuit on the contacts d/z30 + d/z32 are in accordance with explosion protection "intrinsic safety" category "ia" and "ib".

For operating the 19"-europecard needs to be assembled into a rack or a casing. Otherwise the required degree of protection IP20 according to IEC publication is not reached.



To connect an intrinsically safe HART terminal for parameterisation or testing the 2-wire transmitter there is a front socket used as link to the intrinsically safe circuit.

The maximum ambient temperature range of -20 °C to +60 °C may not be exceeded.

The transmitter supply unit MSK200i..-E is an associated electrical equipment of explosion protection (EEx ia) IIC or (EEx ib) IIC and must be operated outside potentially explosive areas always. Only the transmitter supply



circuit and the 0/4-20mA-measuring circuit can be directed into explosive areas. Only electrical circuits certified as intrinsically safe may be connected to both circuits.

Before operation, the intrinsically safety must be verified for both the supply circuit connection and the 0/4 - 20 mA signal circuit with the connected equipment, including wires.

The EG Examination Certificate and the regulations of EN 60079-14: 1996 ff must be observed

Installation and operation

The installation of the transmitter supply unit equipment has to take place in such a way that clearance of bright parts of intrinsically safe electric circuits amount to the metallic housing parts at least 3 mm and to the bright parts of the not-intrinsically safe electric circuits at least 6 mm.

According to the EN 60079-11 connecting units for the outside intrinsically safe electric circuits need to be arranged in such a way that bright parts are at least 50 mm away from connecting pieces or bright conductors of not-intrinsically safe electric circuits.

The terminal connections of the mounting rail housing to the intrinsically safe electric circuits and the notintrinsically safe electric circuits are characterized on the type plate clearly. Additionally the 4-poled terminals of the intrinsically safe electric circuits are implemented in blue.

The assembly/disassembly, installation, operation, and maintenance may be only performed by qualified personnel in the automation industry under appropriate regulations and the MSK200i..-E operating instructions.

The technical data and power requirement information should be noted for the Installation.

2. Technical Features

A parallel monitoring of the dual processor system (DuoTec[®]-technology) in connection with further safeguards as per EN 61508 fulfils the guidelines for the SIL2-level.

Configuring, parameter setting and calibration are interface-controlled and are performed simply and quickly by the user with the user-friendly **WINSMART**[®] Windows program. Logging and reconstruct after programming of the selected configuration on the device allows the commands **Save/Print Configuration**.

The HART signal connection to the intrinsically safe power supply circuit can be done using the front socket.

Alarm monitoring takes place by two relay contact and two transistor outputs. Additional another relay contact output is available for signalizing the safety functions. All output circuits are galvanically isolated from each other and from the power supply.

The analogue output is designed for constant current of 0/4-20 mA. A voltage of 0/2-10 V at the output is also possible because of a resistive shunt of 500 Ω realized by a jumper.

The RS232 interface at the front socket and the RS485 interface at the multipole connector are galvanically isolated from other circuit elements and from the power supply.



3. ATEX (electrical maximum values)

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for the connection of an intrinsically safe circuit with following maximum values:VoltageUiDC30VCurrent intensityli110mAPowerPi700mWEffective internal capacityCiNegligibleEffective internal inductivityLiNegligible	intrinsically safe mA-input circuit (contacts	d/z30 and d/z32)			
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Effective internal capacityCiNegligibleEffective internal inductivityLiNegligible	Current intensity				
Effective internal inductivity Li Negligible					mW
Ambient temperature areaTamb-20 to +70°C	Effective internal inductivity	Li		Negligible	
	Ambient temperature area	Tamb		-20 to +70	°C



4. Fault conditions and fault signalling

No.	Fault source/ Fault cause	Alarm LED	Analogue output in fault event (programmable)	Alarms (programm able)	Restart after fault elimination	Remark
1	EEPROM: check sum incorrect	constant light	alarm value or instantaneous value	lim-prio, on, off, limit	MSK200 must be reconfigured, parameterized, and calibrated	Parameter table in RAM loaded with default values
2	Master controller: RAM/EPROM memory incorrect	constant light	alarm value or fixed value	lim-prio, on, off, limit	automatic (after system reset)	Parameter set or program damaged
3	Slave controller: Communication, RAM or CPU defective	constant light	alarm value or fixed value	lim-prio, on, off, limit	automatic	
4	Slave controller: 5V supply incorrect	constant light	alarm value or instantaneous value	lim-prio, on, off, limit	automatic	with ≥ 4 % deviation from the reference value
5	Master controller: 3V3 supply incorrect	constant light	alarm value or instantaneous value	lim-prio, on, off, limit	automatic	with ≥ 4 % deviation from the reference value
6	analogue output: signal deviation	constant light	alarm value or instantaneous value	lim-prio, on, off, limit	automatic	parameterizable: from ≥ 0.2 %
7	A/D converter signal deviation	constant light	alarm value or instantaneous value	lim-prio, on, off, limit	automatic	parameterizable: from $\ge 0.2 \%$
8	mA measurement circuit or supply circuit: min signal shortfall	constant light	alarm value or fixed value	lim-prio, on, off, limit	automatic	parameterizable: from 0 mA
9	mA measurement circuit or supply circuit: max signal exceedance	constant light	alarm value or fixed value	lim-prio, on, off, limit	automatic	parameterizable: up to 22 mA
10	transmitter supply circuit incorrect	constant light	alarm value or instantaneous value	lim-prio, on, off, limit	automatic	with ≥ 20 % deviation from reference value
11	alarm outputs: Relay pin Rel1, Rel2 or Rel3 defective	constant light	alarm value or instantaneous value	lim-prio, on, off, limit	automatic	Parallel contact of relay serves as reference!



In general an alarm only remains queued for maintenance requirement for the duration of the fault, signalled by Rel3 and the alarm LED. The fault source is shown in the Diagnostic Manager in the fields **Current Faults** and **Fault Memory**. A short fault occurring is represented by a blinking alarm LED and the diagnostic manager only indicated in the fault memory. Each case of faults is recorded and it is possible to distinguish between a present fault and a no longer fault by using the diagnostic manager.



5. Technical Data

ANALOGUE INPUT (AI)

A parameterizable filter of first order of (0.1 – 99.9)s!

mA-measuring input AE

mA-measurement range: measurement range: input resistance: $0 \dots 22 \text{ mADC}$ free configurable $51 \Omega + 2x U_D$

SUPPLY CIRCUIT (SP)

A parameterizable filter of first order of (0.1 – 99.9)s!

Supply circuit SP

U _{max} :	
U _{min} :	
I _{max} :	
P _{max} :	

22.4 V at 4 mA load 17.3 V at 20 mA load 24 mA 360 mW

ANALOGUE OUTPUT (AO)

A parameterizable filter of first order of (0.1 – 9.9)s! Galvanic isolation between input, analogue output and power supply!

Max. range: Standard range: Load resistance: Accuracy: Load resistance influence: Rise time: Constant current 0...22 or 22...0 mA 0/4-20 mA max. 500 Ohm at 20 mA 0.02 % of final value < 0.005 % < 150 ms Voltage

0...11 or 11...0 V 0/2-10 V min. 50 kΩ 0.02 % of final value 0.5 % at R_L=100 kΩ < 150 ms

CONTACT OUTPUTS (REL1, REL2), TRANSISTOR OUTPUT (DO1, DO2)

Devices with intrinsically safe circuit may be connected over the contact and transistor output with devices with operating voltages under 250V only!

Alarm conditions are indicated with yellow front-side LED's!

Number:	4 independently adjustable limit values
Setting:	physically values with WINSMART®-Program
Accuracy:	like measured value accuracy
Alarm type:	free configurable
Alarm output:	2x relay contact and 2x transistor output
Alarm delay:	free configurable from 0 9.9 s
Switching hysteresis:	free configurable from 0 99.9 %
Mode of operation:	operating or zero current principle
Alarm function:	input signal monitoring and maintenance requirement report
Contact outputs REL1/REL2	
Contact:	Opening or closing contact (corresponding to jumper adjustment)
Breaking capacity:	max. 62.5 VA resp. max. 30 W
Voltage:	max. 125 V AC or 110 V DC
Switching current:	max. 1 A
Min. contact voltage:	10 mVDC
Min. contact current:	10 μA
Contact material:	AG Pd + 10 μAu
Relay-type:	as per IEC 947-5-1 resp. EN60947
Transistor output DO1/DO2	
Switching performance:	< 1.4 W
Switching Voltage:	< 28 VDC
Switching current:	< 50 mA



CONTACT OUTPUT (REL3) for MAINTENANCE REQUIREMENT

Devices with intrinsically safe circuit may be connected over the contact of the relay with devices with operating voltages under 250 V only!

Alarm conditions are indicated with a red front-side LED!

Mode of operation:
Alarm function:
Contact position:
Switching performance:
Switching Voltage:
Switching current:
Min. contact voltage:
Min. contact current:
Contact material:
Relay-type:

zero current principle maintenance requirement report closed in good condition max. 62.5 VA resp. max. 30 W max. 125 V AC or 110 V DC max. 1 A 10 mVDC 10 μA AG Pd + 10 μAu as per IEC 947-5-1 resp. EN60947

INTERFACES (COM, RS485, HART)

Galvanic separation of COM and RS485 to power supply and all other circuit elements!

RS232/COM:
RS485:
Baud rate:
Device address:
HART:

via front socket for PC-connection with Mütec-interface cable Half-duplex, without scheduling 9600 bps 1-248 power supply circuit (0 ... 3 kHz band width)

POWER SUPPLY

Power supply indicator:
Power supply range:green LED signal = good condition
19 ... 30 VDC or 18 ... 28 VACPower consumption
Feed separator:1.6 W (at 24VDC and 4 mA at analogue output)
2.1 W (at 24VDC and 20 mA at analogue output)
1.1 W (at 24VDC and 4 mA at analogue output)
1.4 W (at 24VDC and 20 mA at analogue output)

GENERAL DATA

Measuring value accuracy	
Maximum:	< 0.05 % from final value
Typical:	< 0.025 % from final value
Temperature coefficient	
Maximum:	< 0.01 %/K
Typical:	< 0.005 %/K
Galvanic separation	
Input/output/supply:	300 V _{eff} (rated insulation voltage, overvoltage category II, Contamination level 2, safe separation as per EN 61010, EN 50178); 2.5 kV AC testing voltage (50 Hz, 1 min.);
Input/output:	375 V (peak value as per EN 60079-11)
Input/supply:	375 V (peak value as per EN 60079-11)
Environmental condition:	
Acceptable temperature:	-20 °C +70 °C
	-30 °C +80 °C
Acceptable humidity (at operating	g):10 % 95 % r.F. without condensation
Electric connection	
Female multipoint connector:	48-core according to DIN 41612 – form of construction F
Proceeding of self-monitoring	
Measuring input:	1 monitoring cycle with adjustable tolerance
Analogue output:	1 monitoring cycle with adjustable tolerance
Supply voltages:	2 monitoring cycles
Transmitter-feed circuit:	1 monitoring cycle
Relay (REL1 REL3):	indirect contact monitoring
Maintenance requirement:	Constant light of red front-LED and REL3-contakt opened



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A maintenance requirement report always occurs via the relay contact of the REL3, which is operated in zero signal current principle. The relay contact closed in the status offers the option of series connection with further REL-3 pins of other devices and thus common alarm monitoring. The relays REL-1 and REL-2 and the transistor outputs DO1 and DO2 can be involved in the alarm signalling.

Conformity

Ex-directive (ATEX):	EN 60079-0, EN 60079-11, EN 60079-26
EMV-directive 2004/108/EG:	EN 61000-6-2, EN 61000-6-4, EN 61326-1

ATEX: Maximum values of [Ex ia] IIC-circuits

Operation as separator

Maximum voltage U₀	25.8	3 V
Maximum current Io	65	mΑ
Maximum power P _o	420	mW
Maximum capacity C _o	83	μF
Maximum inductivity Lo	4	mΗ

Operation as isolation amplifier

Maximum voltage U _i	30 V
Maximum current l _i	110 mA
Maximum power Pi	700 mW
Maximum capacity C _i	negligible
Maximum inductivity Li	negligible

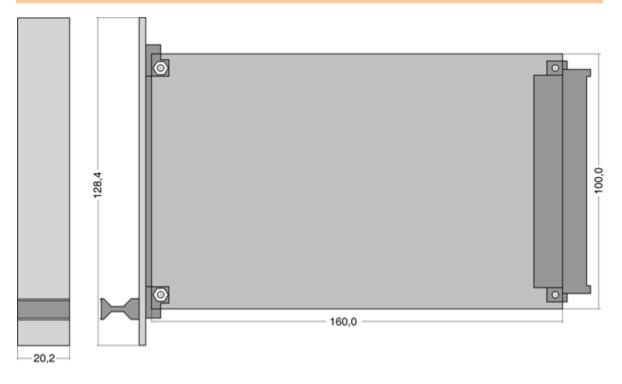
Mounting

The device can only be operated outside a potentially explosive area!

Form of construction: Protection class: Mounting: 19"-europecard with 4 TE front panel IP20 for the required protection class the device has to be installed in a rack or in an appropriate housing free 220 g

Mounting/Position Weight

Dimensions of MSK200





5.1. Configuration protocol

A configuration dated protocol can be created for the MSK200 using the **WINSMART[®] program** with the command "Print configuration."

The TAG number, unit-specific device address, serial number and version number are logged as identification in the unit software.

The extensive comments saved in the device, with a maximum of 2000 ASCII characters, are printed out in a protocol with the first 60 characters.

All parameters for input, output and the alarm settings are listed in a table. In addition, the permissible tolerance deviations of the measuring input, analogue output and user for the

monitoring circuit are listed in a table.

MÜTEC GmbH Configuration protocol for MSK200		07-05-2012
TAG No.:	Software	version: 4.01
Serial No.: Model	Device ad	dress: 1
MEASURING VALUE		
Measuring range beginning	4.00	mA
Measuring range ending	20.00	mA
Filter time	0.5	S
MEASURING RANGE CONTROL		
MIN-value		mA
MAX-value	20.50	mA
PHYSICAL DESCRIPTION		
Measuring range beginning		mA
Measuring range ending	20.00	mA
<u>OUTPUT</u>		
Area beginning		mA
Area ending		mA
MIN-limit		mA
MAX-limit Alarm value		mA mA
Filter time		S
	0.5	3
ALARM 1 Alarm type	MIN-Ala	rm
Alarm type		nal current
Alarm value	Ŭ	mA
Hysteresis		%
Alarm delay	0.5	S
ALARM 2		
Alarm type	MAX-Ala	arm
Function	zero sig	nal current
Alarm value		mA
Hysteresis		%
Alarm delay	0.5	S
ALARM 3		
Alarm type		
Function		mA mA
Alarm value Hysteresis	8.00 1.0	MA %
Alarm delay		⁷⁰ S
		C
Time window for rate of change alarm	20.0	S
MONITORING MEASURES		
mA-Input - maximum Tolerance	+/- 5.0	%
Analog Output - maximum Tolerance	. +/- 5.0	%
OUTPUT		
Fault sources: Analogue Output Relay 1 Rel	<u>ay 2</u>	Logic 1
Analogue Output Alarm value limit limi	t	on
	-prio	out
Minimum mA-value Alarm value lim-prio lim-	prio	out
	prio prio	on lim prio
Internal device failure Current value lim-prio lim-	prio	lim-prio



5.2. Maximum line resistance for the analogue output

Analogue output circuit (AO) for constant current:

Max. range:	022 mA
Standard range:	0/4-20 mA
Load:	max. 500 Ω by 20 mA
Accuracy:	0.02 % of final value
Load influence:	<0.005 %

The maximum load for the analogue output circuit is the sum of the cable resistances and the input resistor (shunt) the following assembly:

```
R_{load} = 2 x R_{C} + R_{Shunt} \le 500 \Omega
```

Cable resistance:

$R_c = I \times \varrho \times A^{-1}$	ϱ = 0.0178	$[\Omega \text{ mm}^2 \text{ m}^{-1}]$
	A = 0.25 x $d^2 x \pi$	[mm²]

Calculation of cable length (distance):

I = 0.5 (500 Ω - R_{Shunt}) x ϱ^{-1} x A [m]

Cable length as a function of cable diameter and input resistance:

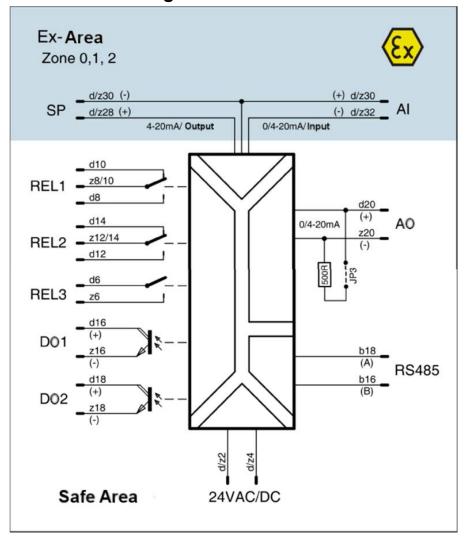
R _{Shunt} [Ω]	C _{Diameter} [mm]	C _{Cross section} [mm ²]	C _{Length} [m]	C _{Length} [km]
100	0.6	0.283	3179	3.18
	0.7	0.385	4325	4.33
	0.8	0.502	5640	5.64
	0.9	0.636	7146	7.15
	1.0	0.785	8820	8.82

R _{Shunt} [Ω]	C _{Diameter} [mm]	C _{Cross section} [mm ²]	C _{Length} [m]	C _{Length} [km]
200	0.6	0.283	2385	2.39
	0.7	0.385	3244	3.24
	0.8	0.502	4230	4.23
	0.9	0.636	5360	5.36
	1.0	0.785	6615	6.62

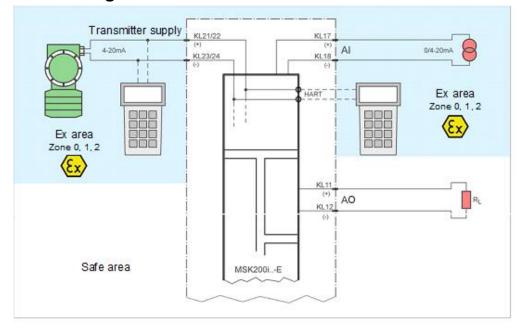
R _{Shunt} [Ω]	C _{Diameter} [mm]	C _{Cross section} [mm ²]	C _{Length} [m]	C _{Length} [km]
300	0.6	0.283	1590	1.59
	0.7	0.385	2163	2.16
	0.8	0.502	2820	2.82
	0.9	0.636	3573	3.57
	1.0	0.785	4410	4.41



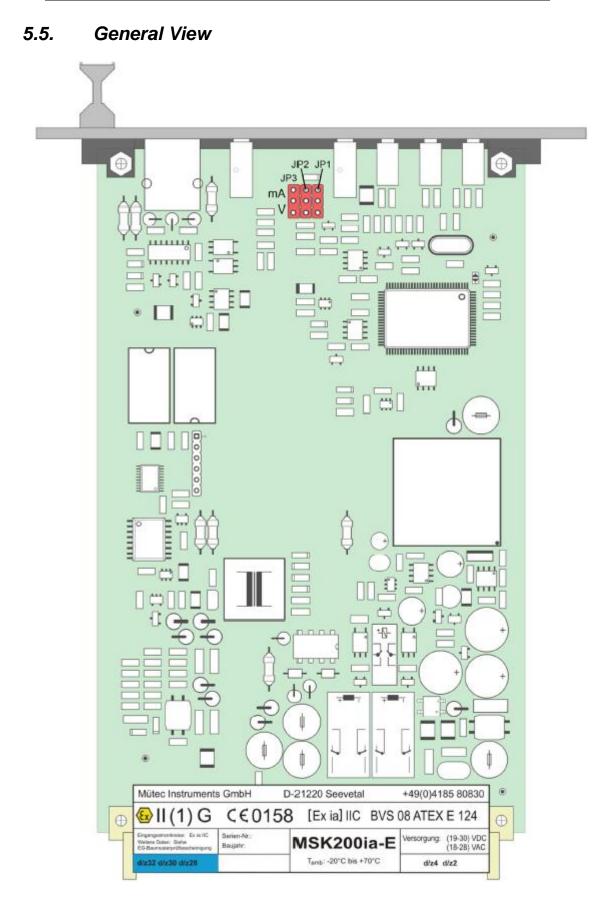
5.3. Basic Circuit Diagram



5.4. HART signal connection

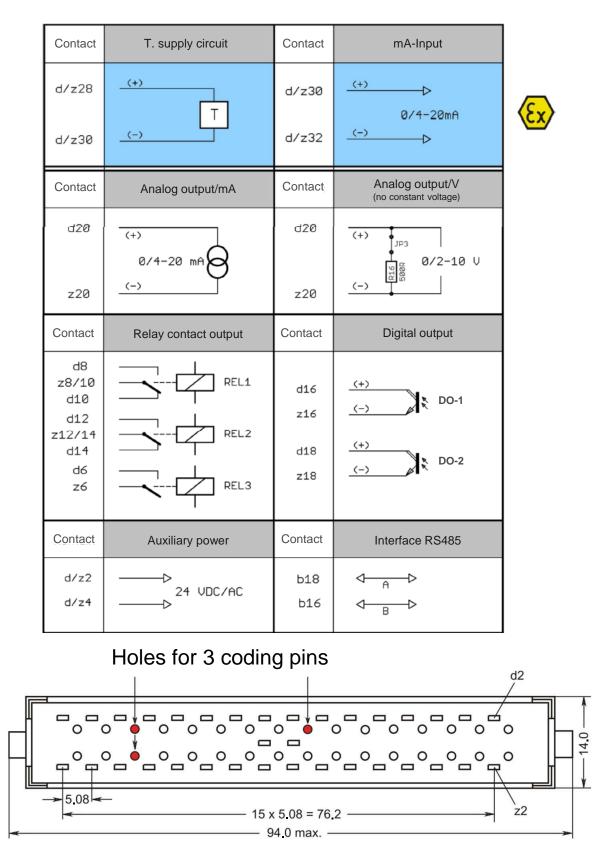








5.6. Terminal connection





6. Configuration program

MSK main menu				
File Permissions Calibration Configuration L				
WINSMART ^(R)	configuration program			
Version 7.0 Release 26	(c) 1995-2011 MÜTEC GmbH			
Quit	Device type O MTP-200			
Interface	MSK version 3.02			
Read in MSK data	Measure input			
MSK program	Analog output			
X Overwrite calibration values?				
PC interface COM3 - System controlling				
MSK address 1 Comment memory				
Connected MTP/MSK units Diagnostic manager				
Search addresses	Online representation			
Address Serial No. TAG No.	MSK identification			
	Serial No. Muster			
	TAG No.			
	Address 1			

The illustration above shows the opening screen of the WINSMART configuration program for the MSK200 and MTP200 with the corresponding version and release number of the program.

The command **File** in the menu bar is used to access existing configuration files and for saving and printing of the current configuration. Two of the three operating levels, which can be accessed by using the command **Permission**, are secured by passwords. The operating level for calibration of measure inputs and analogue outputs has a special importance. Only after password input and the command **Calibration** it is possible to access one of two masks.

To communicate with the WINSMART program it is necessary to enter the COM address in the field **PC** Interface and **MSK address** (left area of the screen in the section Interface). A device with unknown address can be identified by using the function **Search address**. After finding the device address the **Serial-No.** and **TAG-No.** will be shown.

Administration of access rights for three operating levels secured by codes and calibration for the measuring input and analogue output. The WINSMART configuration program supports both MSK200 and MTP200.



For information about the MTP200, which will not be covered in the following description, refer to the existing MTP200 manual.

The buttons arranged below offer access to configuration and parameter settings for the MSK200 input and output. The desired settings for the SIL2 monitoring circuit can be made in the relevant screen with the button **System Controlling**. The **Diagnostic Manager** reports the status of the device and also saves faults that arise even briefly. The **online display** offers the user a precise analogue and digital illustration of the measured input magnitudes and output signals.



6.1. Menu bar and commands

🔤 M	ISK main menu		
File	/	Configuration Language	
		NSMART ^(R) configuration program	
	Save configuration Print configuration	(c) 1995-2011 MÜTEC GmbH	
	Print comment	Device type MTP-200 MSK-200	
_	Quit	MSK version 3.02	

6.1.1. File \rightarrow Load configuration

The MSK200 parameter set saved in a file with extension ***.MSK** on the hard drive is loaded into the Windows configuration program. Thus a parameter set already created and saved can be copied fast and reliably into other devices, if the same configuration is needed for these.

6.1.2. File → Save configuration

The MSK200 parameters of the configuration program are saved on the hard drive in a file with the extension ***.MSK** and archived. For later duplication into another MSK200, the file must only be loaded in the set-up program and transferred in the MSK200 with the command **MSK program**.

6.1.3. File \rightarrow Print configuration

All MSK200 parameters of the configuration program and the first 60 characters of the comments are printed out as a dated protocol and the device characteristic data on a DIN-A4 page. The printer available under Windows is used. The character font and print format are fixed and cannot be changed by the user.

6.1.4. File \rightarrow Print comment

The extensive comments saved in the device as dated protocol with a maximum 2000 ASCII characters and the device characteristic data are printed out on a DIN-A4 page. The printer available under Windows is used. The character font and print format are fixed and cannot be changed by the user.

6.1.5. File \rightarrow Quit program

The message Program quitting appears with a request for confirmation by OK or Cancel.

6.1.6. Access rights → Enter password

After the corresponding password is entered, entry is enabled to the otherwise locked functions of the configuration program.

MSK main menu	
File Permissions Calibration Configuration Language	
Enter password	program
Change password Password level 1 Password level 2	(c) 1995-2011 MÜTEC GmbH
Quit	O MTP-200

The configuration program is divided into 3 access areas: The open program area contains no settings and so is always accessible. **Password level 1** contains all parameter settings.



Free input to this level is secured only after password assignment

Password level 2 contains calibration excluding configuration. This input is secured by a password assigned by the manufacturer (**5180**). Of course this password can be replaced with a new one by the user. Furthermore password 2 gives access to all parameters and functions of the device.



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6.1.7. Access rights \rightarrow Change password \rightarrow Password level 1

Passwords	
Password area 1 (all adjustments except of calibration)	
Old password	No entry with the first assignment of a password!
New password	L
New password (confirm):	
Save	
Save Lance	

Password level 1 covers all parameter settings of the MSK200 and is only enabled for authorised personnel (e.g. maintenance staff, service technician) to access all configurable settings.

The password may have a maximum of 20 alphanumeric characters and is entered and saved in the corresponding fields as in the screen.

	6.1.8.	Access rights →	Change password \rightarrow F	Password level 2
--	--------	-----------------	---------------------------------	------------------

Passwords	
Password area 2 (calibration)	
Old password	Enter 5180 for the first change of the pre-occupied password!
New password (confirm):	
Save Cancel	

Password level 2 secures parameter settings for calibration and the function **Overwrite calibration values.** It is reserved exclusively for technicians with special knowledge of the device and its functions.

Password level 2 is secured by a password (5180) assigned by the manufacturer.

A newly assigned password may have a maximum of 20 alphanumeric characters and is entered and saved according to the indicated fields as in the screen

6.1.9. Calibration \rightarrow Calibrate input

🔤 MSK main menu		
File Permissions	Calibration Configuration	Language
	Calibrate input	configuration program
Version 7.0	Calibrate output	(c) 1995-2011 MÜTEC GmbH

A calibration is only necessary for the analogue in- and output signal. Before calibration the parameter set must be read from MSK200 into WINSMART-program.



Interface		Before beginning of the
Read in MSK data		calibration the parameters from the MSK200 must be read in!
MSK program		
X Overwrite calibration values?		May be implemented only for the actualization of the calibration parameters
PC interface	DM3 🔻	contained in the MSK200!
MSK address	-	

Calibrate input TAG No:		
Back to main menu		
Current signal		
1. Point of calibration 4.000 mA	Read in	
2. Point of calibration 20.000 mA	Read in	
Supply circuit		
	Read in	

The calibration of the mA-Input at the contacts d/z30 and d/z32 takes place with a power supply in two steps. The calibration point can be freely selected, however an appropriate distance and the measuring range as calibration range is always recommended for high accuracy.

The calibration procedure begins with simulating the mA value in the MSK200 measuring input for the first calibration point and activating the command **Read**. The messages **Measuring...** and **Done** appear in the next screen. After confirmation with **OK**, the calibration value is transferred and displayed analogue in bar units on the screen. The proportional bar scale in the illustration serves for control and attends to calibration faults.



Same calibration values for the 1st and 2nd calibration point \Rightarrow same bar lengths \Rightarrow no measured value illustration possible \Rightarrow output jumps!

Next, the second calibration point is simulated with the measuring input mA value, confirming calibration with **Read** and finalized with **OK**.

For monitoring the supply circuits at the contacts d/z30 and d/z32 a reference level at 20mA is needed, which can be simulated easily with a current sink. The voltage value is recorded by clicking the button **Read** and is figured in bar units for monitoring.

Finally the calibration values needs to be transferred to the MSK200. Therefor mark the box **Overwrite calibration values?** with a cross and click the button **MSK program**. The transfer starts and the question **Existing parameters will be overwritten. Continue anyway?** appears in the screen. This procedure is started with **OK** and the next message reads: **Transferring parameters**. A final OK completes the procedure and the calibration.



6.1.10. Calibration \rightarrow Calibrate output

alibrate output	TAG No:	
<u>B</u> ack to mai	n menu	
Calibrate		
<u>4</u> mA	<u>2</u> 0 mA	The 2 points of output calibration for current are the values of 4 and 20 mA and for voltage the values of 2 and 10 V.
		Coarse adjustment by shifting the buttons!
		Exact adjustment by clicking these surfaces!
<u> </u>	-	Final attitude by clicking these Buttons!
0.K.	0.K.	< After every calibration confirm !

Before beginning each calibration, the parameter set must be read from the MSK200. A 4½-place digital circuit analyser is connected to the MSK200 output terminals and the output signal is adjusted with the jumpers JP1...JP3 for constant current or voltage.

The calibration screen contains 2 V and 10 V for voltage output or 4 mA and 20 mA for current output marked by sliding controls. The alignment procedure for the coarse, exact and final adjustment is free selectable and is confirmed with the **OK** button. After comparing the ZERO and SPAN value the determined calibration parameters need to be transferred to the MSK200 by clicking **MSK program** and **Overwrite calibration values**



The output signal 0/2-10 V is generated by a constant current 0/4-20 mA, which runs over a resistive shunt of 500 Ω , assuming that JP1...JP3 is set on "V".

Therefore a voltage results in a fault of 1 % in the case of a burden resistance of 50 k Ω , which is completely eliminated by recalibration.

6.1.11. Restore configuration

🔤 MSK main menu					
File Permissions	Calibration Co	onfiguration La	inguage		
	w	Restore confi	guration	program	
Version 7.0	Release 26			(c) 1995-2011 N	IÜTEC GmbH

The **Configuration** of the device contains all MSK200 values and is automatically saved as an entry under Windows with **Read MSK data**. Thus each device can be reset to the original operating condition with the command **Restore configuration**, under the condition that both procedures are executed at the same PC. After the command **Restore configuration**, all values in the Windows screens and in the MSK200 are reset with the original data set. This procedure offers the convenient option to reset a device provided with erroneous calibration values or reset parameters with manufacturer values.



6.1.12. Language \rightarrow English, German, Dutch

MSK main menu		
File Permissions Calibration Configuration	Language	
WINSMART ^{(F} Version 7.0 Release 26	English German Dutch	rogram (c) 1995-2011 MÜTEC GmbH
Quit		ice type O MTP-200

There are three language versions in the **WINSMART** program selectable

6.2. Interface and connected devices

	Read in M	SK data	
	MSK pr	ogram	
X Overwrite calibration values?			
PC interface COM3 -			
MSK address			
Connected MTP/MSK units			
Address Serial No. TAG No.			

Communication between the MSK 200 and the Windows PC is made by the front-side COM/RS232 or RS485 interface at the contacts b16 or b18.

By plugging on the COM-cable at the front socket, the change over from RS485- (offline) to COM-interface (online) is made automatically.

After disconnection of COM-connection, the RS485 interface is reactivated.

The RS232 interface and the RS485 interface are galvanic separated from all other circuit parts and auxiliary power.

6.2.1. Reading MSK data

The command **Read MSK data** starts a data transmission of the entire parameter set of the MSK200 to the configuration program. The interface connection will only work if the correct entries are made in the screen for the serial COM interface (COM1 to COM20)) and MSK address (1-255). Should the MSK address be unknown or not marked on the device, then the unknown address can be determined with the command **Search for addresses**. After conclusion of the correct transmission, the message **Reading parameters** appears and must be confirmed with OK.

6.2.2. Programming MSK data

The command **Program MSK** transfers the parameter set contained from WINSMART program to the MSK200. After command input the following message appears on the screen: **Existing parameters will be overwritten. Continue anyway?**

With **OK** the procedure is started, after which the confirmation appears **Transferring parameters** and is confirmed with **OK** to complete the transmission.

6.2.3. Overwriting calibration values

If the box for **Overwrite calibration values** is selected in the input screen, the calibration parameters for analogue input or analogue output can be transferred to the MSK200 with the command **Program MSK**, possibly updated in the configuration program.

The message then appears in the screen:

Existing parameters will be overwritten. Continue anyway?

The procedure is started with **OK** and the next message reads:

Transferring parameters. A final OK completes the transmission

6.2.4. PC interface

The addresses COM1 to COM20 are selectable.



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6.2.5. MSK-address

The MSK address setting regulates communication over the interface with the receiver. The PC, as the master device, sends a transmission with the device address that is read with each MSK200 (slave) by using the COM interface in case of an individual compound or using the RS485 interface in case of a multidrop connection. Only the MSK device with the set address communicates to the master. Consequently, MSK devices with same address may not be connected.

6.2.6. Connected MSK devices → Search for addresses

A search function lists the connected and addressable MSK devices with their specific characteristic data such as **address**, **serial number** and **TAG number**.

6.3. MSK identification

MSK identification		
Serial No.	Muster	
TAG No.		
Address	1 •	
	·	

6.3.1. Serial No.

The **serial number** is a 8-digit manufacturer-specific unit number ensuring clear identification for each MSK200. It consists of a date code (year + calendar week) and a sequential number. The **serial number** cannot be edited!

6.3.2. TAG No.

The TAG number can contain maximum 8 alphanumeric characters as user-defined device identification.

6.3.3. Address

For the device address, a maximum entry of 3 digits in the **address** field is set. Setting a device address involves:

- 1. Selection of device address with max. 3 digits in the MSK identification field;
- 2. Setting of the current device address in the **Interface** field;
- 3. Execute the Program MSK command and confirm;
- 4. Read back the MSK data with the command Read MSK data (after finishing these actions, the new device address is indicated in the field MSK identification).



For a successful device connection the 3 digits address in the **MSK identification** field and in the **Interface** field has to be correspond with the device address.



6.4. Measuring input

Measure input TAG No:	200
Back to main menu	
Measure value	
Start of range 4.000 mA	
End of range 20.000 mA	
Filter time 0.5 s	
Square root of the input signal?	
Measure value control	
MIN-value 3.500 mA	
MAX-value 20.500 mA	
Physical representation of measure value	
Measure unit bar	
Decimal point 00.00 -	
Start of range 0.0 bar	
End of range 2.0 bar	
WINSMART	
	ī —
ATTENTION! With a changing of the comma position also the comma position of the alarm value in the display 'alarm outputs' will be changed.	
ОК	

A **filter time** of minimum 0.1 to maximum 99.9 seconds defines a first order filter for the measure signal. With a larger filter time, the measured value is more damped.



There in the mask measure input specified measuring range (e.g. 0.000 to 2.000 bar) complies 0 to 100 % of range for the limit value monitoring. The minimum adjustable limit value is 0.000 bar and the maximum 2.000 bar. For a correct parameterization of MSK200 make adjust first the measuring range and second

the limit values. If you changed later the measuring range, always check the limit value alarms as well.

For standardized measurement signals further entries must be made in rubric **Physical representation of measure value**. They are needed for a representation in the online mask.

Unit: Decimal point: Start of range: End of range: MIN value: MAX value Physical unit of measured variable (bar, °C, K, etc.) None, 1, 2 or 3 places after the decimal point Physical measure value at start of range Physical measure value at end of range Minimal measure value for initiation of fault alarm Maximal measure value for initiation of fault alarm



For a correct limit value control must be placed the minimal measure value and the maximal measure value out of the range from the measured range because an exceedance of this limits triggers the maintenance alarm.



6.5. Analogue output

Analog output TAG	No:	
<u>B</u> ack to main	ı menu	
Output type (mA/V)	is determined by the setting of jumper 3	
Output		
Filter time	0.1 s MIN-limit 3.6 m/	A
Start of range	4.0 mA MAX-limit 21.0 mA	×
End of range	20.0 mA Alarm value 22.0 mA	×
	Square root of the output signal?	

The **Filter time** of minimum 0.1 seconds up to maximum 9.9 seconds defines a first order filter for the output signal. The analogue value is more strongly dampened with increasing filter time.

For analogue output the illustration range is set by the definition of values for **Start of range** and **End of Range**.

This applies during voltage output amounting to a max. output range 0 - 11 V or with current output 0 - 22 mA. Exceedance can be reliably prevented within the illustrated range by the input **MIN limit** and **MAX limit** of the defined output range.

The **Alarm value** function defines a fixed value for analogue output. This is activated if a correct recording of the measured value is no longer possible in the input due to a fault and is programmed in the screen for **System controlling** with the function **Alarm value** for analogue output.

Square root extraction can be realized by activating the button Square root of the output signal.

All adjustments made in this mask are stored and activated by the command **Program MSK**.



In principle it is possible to register an alarm value of 0. In this case the breakage monitoring at mA-output can not differentiate between alarm value and line break. The result is a constant switching of relay-3.



During voltage exit neither a short circuit nor an interruption of the connection to the burden can be recognized!

mA-values for an output signal without and with square root extraction:

Input signal	Output signal without square root extraction	Output signal with square root extraction
0 %	4.00 mA	4.00 mA
25 %	8.00 mA	12.00 mA
50 %	12.00 mA	15.31 mA
75 %	16.00 mA	17.86 mA
100 %	20.00 mA	20.00 mA



Alarm outputs 6.6.

Alarm outputs TAG No:			
Back to main menu]		
Alarm 1 (relay-1)			
Alarm value 6.00 mA		Alarm type MIN alarm	-
Hysteresis 1.0 %	Delay time 0.5 S	Function De-energize	d 💌
Alarm 2 (relay-2)			
Alarm value 18.00 mA		Alarm type MAX alarm	•
Hysteresis 1.0 %	Delay time 0.5 S	Function De-energize	d 🔹
Alarm 3 (transistor output-1)			
Alarm value 8.00 mA		Alarm type MIN alarm	•
Hysteresis 1.0 🏾 🗶	Delay time 0.5 S	Function De-energize	d 🔻
Alarm 4 (transistor output-2)			
Alarm value 14.00 mA		alarm type MAX alarm	•
Hysteresis 1.0 %	Delay time 0.5 S	Function De-energize	d 💌
'Time interval for g	radient alarm 20 S		

The mask for the alarm outputs enables quick setting of all parameters due to the clear display of the three alarms available (2x relay contact output, 1x transistor output).

A value between 0 and 99.9% of the measuring range is assigned to each alarm value hysteresis. For a measuring range of 500°C a temperature level hysteresis of 2% corresponding to 10°C, with an activated MAX alarm of up to 400°C is only reverse with a temperature level of < 390 °C. An alarm delay up to a maximum of 9.9 seconds guarantees that briefly exceeded alarm values do not activate the alarm.

Available alarm types:

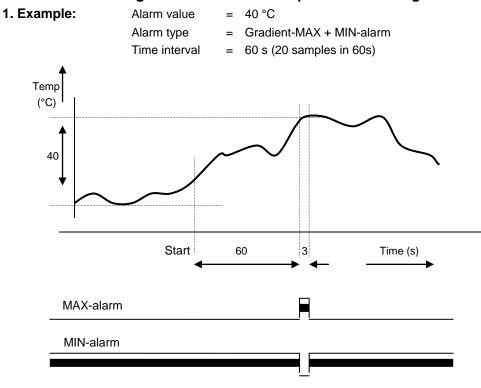
No function:

MAX alarm MIN alarm Gradient MAX alarm Gradient MIN alarm	with rising measured value with falling measured value with rising and falling function line with rising and falling function line
Available alarm functions:	
Open circuit principle: Closed circuit principle:	in good status the relay is not under current in good status the relay is under current

The gradient alarm needs a time interval as an additional parameter. It shows a time period between 0 and 9999 seconds, in which 20 samples are collected and used as the basic for the gradient alarm calculation.

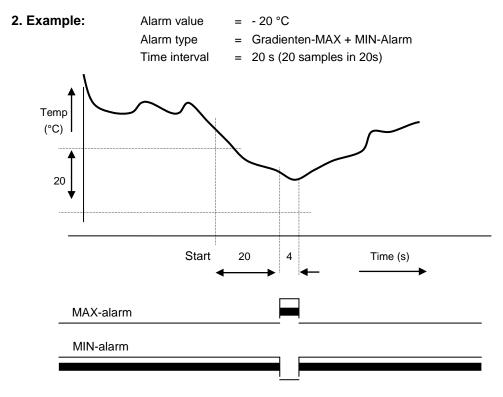
alarm output is switched off

Alarm value and alarm type are available in the online mask. Activated limiting value alarms are marked in red.



6.6.1. Differentiated gradient alarm and the parameter settings

Every time interval contains 20 samples. The minimum pulse duration at the alarm output is $0.05 \times 60 \text{ s} = 3 \text{ s}!$



Every time interval contains 20 samples. The minimum pulse duration at the alarm output is $0.05 \times 20 \text{ s} = 1 \text{ s}!$



6.7. Monitoring conditions

System controlling TAG No:		
Back to main menu		
Control circuit for	Maximum tole	rance
Input for mV signal	+/- 1.0	% of range
Resistor input	+/- 1.0	% of range
Analog output	+/- 1.0	% of nominal value (=20mA/10V)
Analog and alarm output controlling	in case of fault	
Error sources	Analog output	Relay 1 Relay 2 Transistor1 Transistor2
mV measure loop	Alarm value 🔻	limit 🔻 limit 💌 limit 💌 limit 💌
Resistor measure loop	Alarm value 🔻	on v on v on v
Output signal loop	Alarm value 🔻	off 💌 off 💌 off 💌 on 💌
Sensor or wire break	Alarm value 💌	off 🔹 off 💌 off 💌
Relay 1, relay 2, relay 3	Momentary value 💌	limit 💌 on 💌 limit 💌 on 💌
Internal device error	Momentary value 💌	lim-prio 💌 lim-prio 💌 lim-prio 💌

A deviation fault between +/- (0.2 - 5.0) % is configured for mA measuring input and analogue output respectively.

A tolerance beyond that activates an alarm for maintenance requirement by the relay 3 and a constant light alarm LED on the front of the unit.

All faults in 6 fault sources, identifiable in the system, are summarized together in the screen. Each fault source has optionally different settings for analogue output and the alarm outputs are to be assigned determining behaviour in the fault event. The configuration for the alarm outputs (function, alarm type etc.) takes place exclusively in the **Alarm output** screen, where defined alarm outputs are dimmed out **no function** switched off and in the **System controlling** screen. In the fault event, the functions of analogue output and alarm outputs defined are overlaid in the **System controlling** screen to ensure controlled behaviour.



Alarm outputs can be switched off by **no function.** Therefore they are not available in the mask **System controlling** for maintenance requirement alarm.

No fault source is assigned to the 16-bit processor, because in the fault event for analogue output and alarm outputs, no safe condition can be guaranteed. It is of course possible with hardware operation, that a failure of the master processor could activate the SIL2 alarm for maintenance requirement.



Analogue output in the event of fault:

Function	Ranking	Definition
alarm value	☆☆☆	The output signal jumps to the alarm value defined in the analogue output mask!
frozen value	☆☆	The output signal remains at the value before fault occurrence and is in an offline mode!
instantaneous value	☆	The output signal is updated and in online mode, but can be erroneous!

Relay and transistor outputs in the event of fault:

Function	Ranking	Definition
on	★☆☆☆	The alarm output is switched on and the device required maintenance!
off	☆☆☆	The alarm output is switched off!
lim-prio	☆☆	The alarm output is switched off, only there is no limit value alarm.
limit	☆	The alarm function is only the limit value monitoring!

Truth table for limit values and maintenance alarm:

Function	Limit value alarm	Maintenance alarm	Alarm output	Notes
on	x	on	on	Only the fault alarm switched the alarm output!
off	x	on	off	The fault alarm switches off the limit value alarm!
lim pro	x	on	off	The fault alarm switches off
lim-pro	on (alarm exists!)	on	on	the limit value alarm, but not an existing limit value alarm!
limit	off	x	on	Only the limit value alarm
mm	on	x	off	switched the alarm output

x=optional (on or off)



With a fault occurrence, the behaviour of the analogue output and alarm outputs correspond to the parameterization in the mask **System controlling** without taking account of the ranking. After the occurrence of a second fault the highest rank of the functions involved determines the behaviour of the analogue output and alarm outputs. (See some examples on next page)



02/2014 _____

First example:

1. Fault: measure loop

Analog and alarm output cont	rolling in case of fault			
Error sources	Analog output	Relay 1	Relay 2	Transistor1
mV measure loop	Alarm value	▼ off ▼	limit 💌	r lim-prio ▼
	\downarrow	↓	\downarrow	Ļ
Control of outputs:	Alarm value	off	limit	lim-prio

2. Fault occurs later: mA-Input

Analog and alarm output contr	olling in case of fault [—]			
Error sources	Analog output	Relay 1	Relay 2	? Transistor1
mV measure loop	Alarm value	▼ off ▼	limit	▼ lim-prio ▼
Resistor measure loop	Alarm value	▼ on ▼	on	▼ lim-prio ▼
	Ļ	↓	↓	Ļ
Control of outputs:	Alarm value	on	on	on

The behaviour of the outputs determined by the ranking:

Analogue output	stays on Alarm value
Relay 1	changes from relay off to relay on
Relay 2	changes from relay limit to relay on
Logic 1	stays on lim-prio

Second example:

2 fault occur parallel

Analog and alarm output control	ing in case of fault			
Error sources	Analog output	Relay 1	Relay 2	Transistor1
mV measure loop	Momentary value	• on •	off	▼ lim-prio ▼
Resistor measure loop	Alarm value	• off 🗨	limit	▼ lim-prio ▼
	Ļ	Ļ	Ļ	Ļ
Control of outputs:	Alarm value	on	off	lim-prio

The behaviour of the outputs determined by the ranking:

Analogue output	changes to Alarm value
Relay 1	is switched on
Relay 2	is switched off
Logic 1	stays on lim-prio

6.8. Diagnostic manager

laintenance for	Current fault	Fault memory	
mV circuit			
Resistor circuit	Г		
Output signal	×	×	
Sensor or wire break	Γ	×	
Relay 1, relay 2, relay 3			
Internal device error			
slave processor			
Supply for slave processor	Г		
Supply for master processor	Г		
RAM/EPROM	Γ	Γ	
EEPROM			
Reset fault memory]		

The **Diagnostic Manager** records all occurred faults clearly inside and outside the MSK200. All 11 monitoring functions are listed in a table and provided with windows for **Current fault** and **Fault memory** respectively.

Each current fault is signalled as a maintenance alarm by the continuous red lighted alarm LED and relay 3. The diagnostic manager shows the source of these faults in the window **current faults** and **fault memory**. It is not possible to delete the **fault memory** for a current fault in case the fault is not solved.

The identification of the **fault memory** occurs with a cross, if the determined case of a fault is terminated independent of the duration. Thus the fault cause can be always seen with brief fault events.

By pressing the button **Reset fault memory**, all **fault memory** will be deleted under the condition that these faults are removed.



The **diagnostic manager** documents also short-time occurring faults. After a supply power breakdown the fault memory will be deleted.



6.9. Comment memory

Comment memory TAG No:		
Back to main menu		
Commisioning of the loops:	10.01.2012	*
Next calibration:	01/2013	
Read in comment	Save comment	Print comment

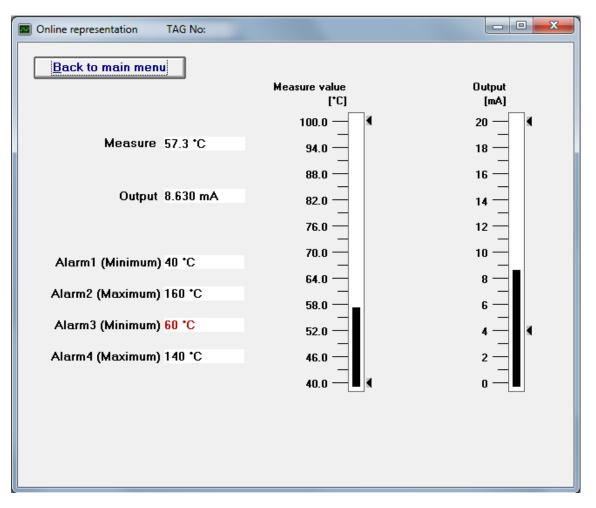
The **comment memory** offers the user a convenient option of saving comments or notes in the MSK200 device. The allowed capacity for comments is a maximum 2000 ASCII characters and may be sufficiently dimensioned for most applications. For protocols, this text can be printed out with the command **Print comment** under **Windows**. The character font and print format are fixed and cannot be edited.

Read comment: text is loaded into the WINSMART program from the MSK200

Save comment: text is written into the MSK200 from the WINSMART program



6.10. Online representation



The **online representation** shows the input and output signal both analogue and digital. Additional the alarms with their limit values are figured. During exceeded limit value or alarm activation, the value is displayed in red. Unused alarms (**no function**) are not recorded in the **online display**.