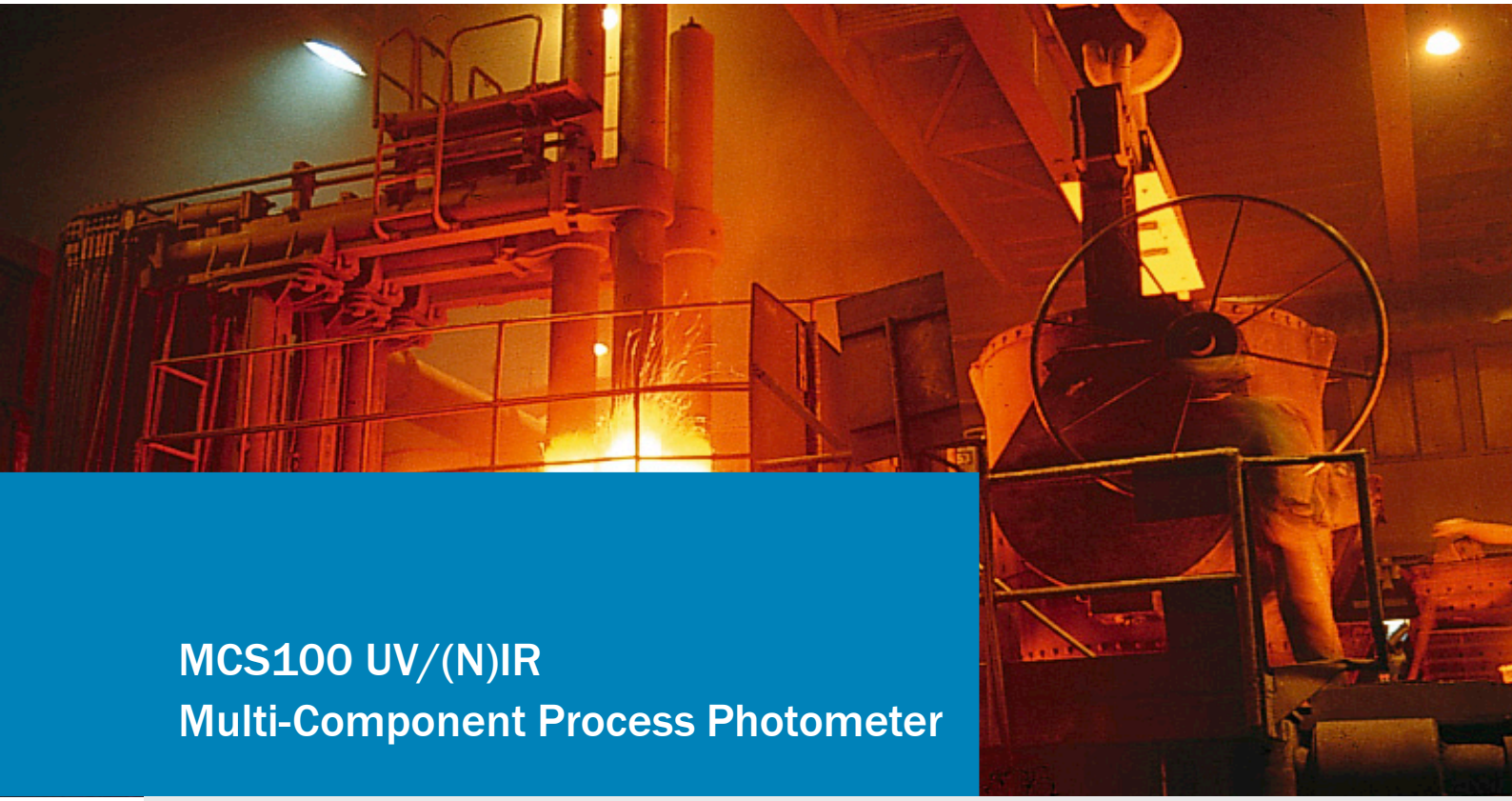
PRODUCT INFORMATION



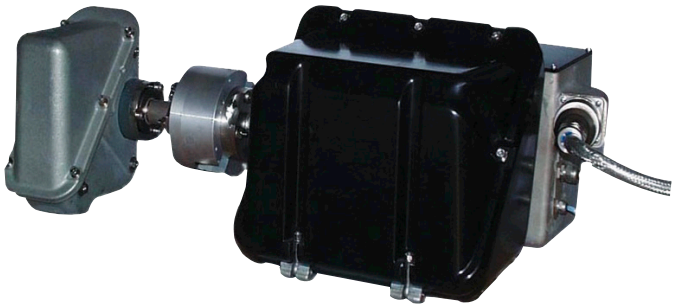
MCS100 UV/(N)IR
Multi-Component Process Photometer

Process analysis for top quality products
Continuous measurements of many components in liquid or gases

SICK | MAIHAK
Analyzers and Process Instrumentation

Online – Measuring Technology For Optimal Process Quality And Safety

In chemical processing the quality of the product The process measuring technique is vital for the quality of the product in chemical processes. Top quality products demand top quality process measuring techniques. SICK MAIHAK, provides the appropriate measuring systems as well as complete (ready to use) measuring solutions.



MCS 100 physics unit

MCS 100 electronics unit

Numerous applications

The MCS 100 – the multi-component process photometer – is designed for continuous measurements of many components using one system, in liquid or gas, high pressure and high temperatures. A measuring system that fulfills even the most stringent process requirements.

Global Applications

Process photometers from SICK MAIHAK are used all over the world for the monitoring of gaseous (from Acetaldehyde to Vinylchloride) and liquid (from Acetone to traces of water) samples. Our experienced technical laboratory provides support for the solution of specialized applications.

High precision with an excellent price/ performance ratio

The multi-component analysis measurement is a high precision measuring method, allowing for an efficient price/ ratio performance. By simultaneously analyzing numerous components with interference compensation greater accuracy than with a single component system is achieved.

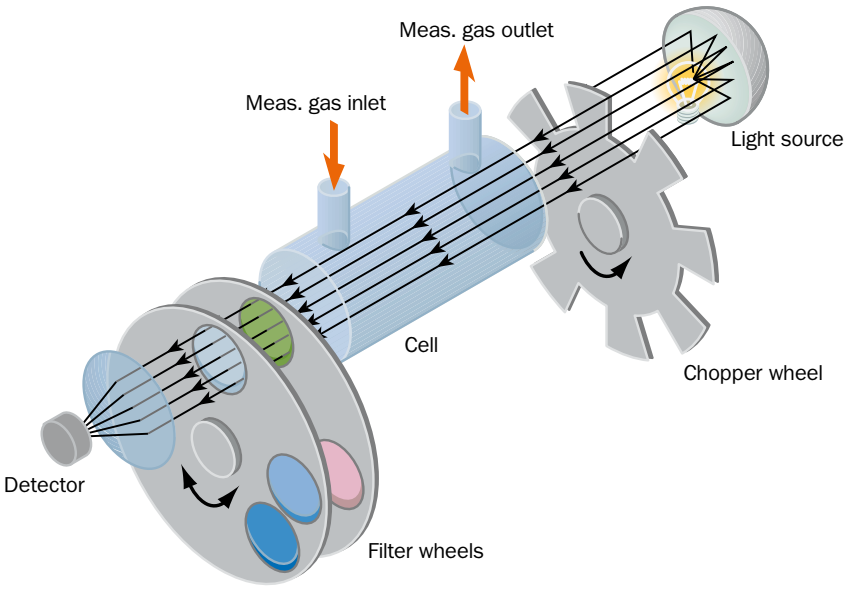
Flexibility and Safety

The MCS 100 is available in the UV-, the NIR-, and the IR version. A high degree of flexibility of its mechanics as well as data processing is an integral part of the design. It is therefore easy to adjust the MCS 100 for a diversity of applications . The robust design and the effective auto-check ensures high reliability and long servicing intervals.

The Analyzer

The process photometer MCS 100 is a single-beam photometer that employs simultaneously the Single Beam Dual Wavelength rate and gas filter correlation methods. It has an integral time/ event guided program.

It's advanced programmable control system enables the monitoring and guidance of the system periphery. This is done via a key panel or a PC, which must be compatible for industrial use. Other technical standards of the MCS 100 are the auto check, the counterbalancing of disturbing signals and the linearization of measuring values.



Composition of the MCS 100

The MCS 100 incorporates:

- **Light source unit** with light source and a chopper wheel. The choice of light source depends on the range of the wavelength.
- **Cells** – a range of cells which are adaptable to each application.
- **Detector unit** including filter wheels and a detector. Filter wheels are equipped, depending on the measuring method being used, with an inference and/or gas filter. The physics unit and the electronics unit are, depending on the type of equipment, connected either optically or electrical. The type of equipment determines whether the connection between the physics and the electronics unit is via electric or optical means.
- **19"-electronics unit design:** The relay- and analog output points are integrated in the electronics or lead over light wave conductor into special interference (fail) safe transfer units (opto box)

Measuring principle

The light is modulated by a chopper. After exiting the cell it passes through two filter wheels which are aligned one in front of the other. Stepper-motors rotate the filters, which are designed for single beam dual wavelength- or gas filter correlation method, into the beam path. The measurement of the light intensity is determined by a detector. A variety of detectors are used for monitoring the range of the wavelength.

Single-Beam Dual-Wavelength method

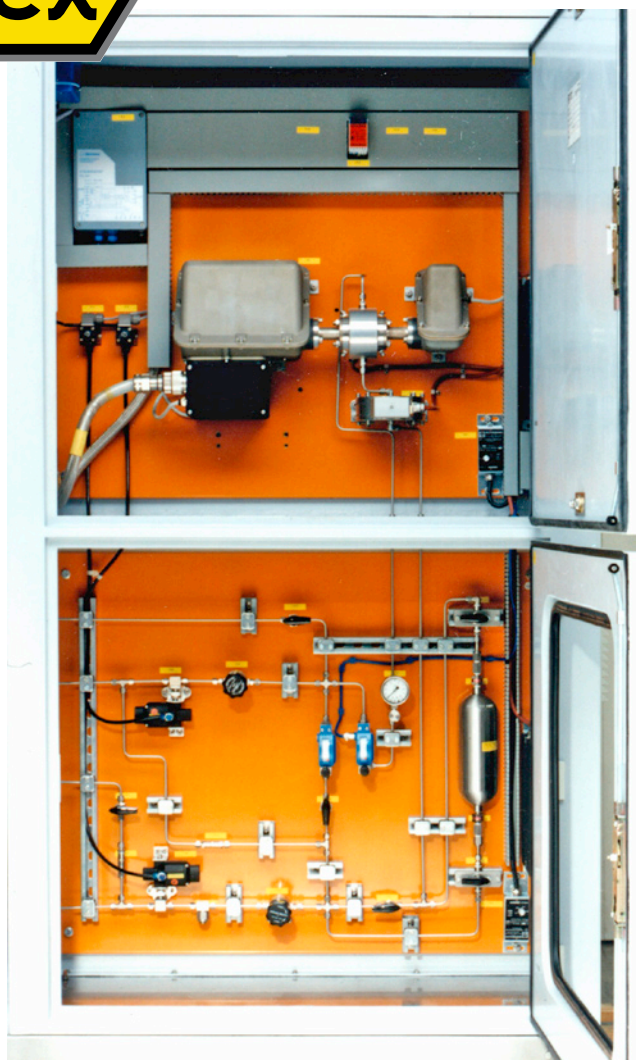
An interference filter is employed, which principally consists of one measuring- and one reference filter per component. The measuring filter selects the spectral range from the absorption strip of the measured substance, whereas the reference filter selects the spectral range, in which no absorption occurs , either through measuring components or due to noise components.
In using a pivoted measured filter the signal received correlates with the concentration of the measured substance inside the measuring cell. The signal is independent of the concentration with a pivoted reference filter. The measurand of Extinction is determined by first creating a ratio and then a logarithm of the two signals. It is largely unrelated to changes in the optical characteristics of the photometer and enables a long term stability and reproduction of the measured values. Possible interfering noises affecting the extinction value are rectified during the following course of calculation. the linearization function transfers the signal to the concentration display or output.

Gas Filter Correlation Method

Using the Gas Filter Correlation Method the reference signal, which is generated by a pivoted gas filter, is independent of the concentration. This gas filter is a miniature cell filled with the measuring component under high partial pressure. The measuring gas spectrum of the light coming from the beam source is eliminated by the gas filter. The measuring signal ,that is correlated to the concentration, is obtained by pivoting a vacant filter wheel aperture into the beam path. Pivoting an additional interference filter on the second filter during both measurements enables the restriction of the spectral range on the absorption band of the measuring component. Calculation of extinction and other signal processes are carried out by the Single-Beam Dual-Wavelength method.

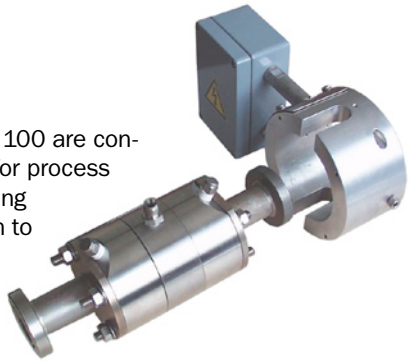
Process related System Engineering

High quality sampling and signal processing techniques play a central role in analysis. SICK MAIHAK has an extensive experience in dealing with different process conditions and offer the suitable accessory – especially for corrosive and reactive trial flows. Moreover, we develop and produce custom-made system solutions – from the analyzer on mounting plates to system solutions for operating in explosive atmospheres.



A typical configuration of an applications in an Ex area. The sample conditioning is located in the lower cabinet part – accessible within explosions harzadous conditions.

Cells



The cells of the MCS 100 are constructed specifically for process requirements. Following features are common to all cells:

- Thermostatting
- Corrosion proof
- Customized materials

Cells for liquids

Cells designed for liquids, distinguish themselves through their high pressure- and temperature resistance. The optical thickness of the layer is adaptable to the application. Protective windows allow for the flushing of the optical dead storage capacity.

Short-length cell for gases

The short-length cells are usually used in conditions with high concentration or high absorption rates. Typical thickness of layers are 10 to 75 cm. Versions with the ability to flush optical dead storage capacity are available for particularly critical gases.

Detailed Information

We provide extensive information on the subject “Process cells” in a separate product information brochure; order no.: 8 009042.

EMV and Ex

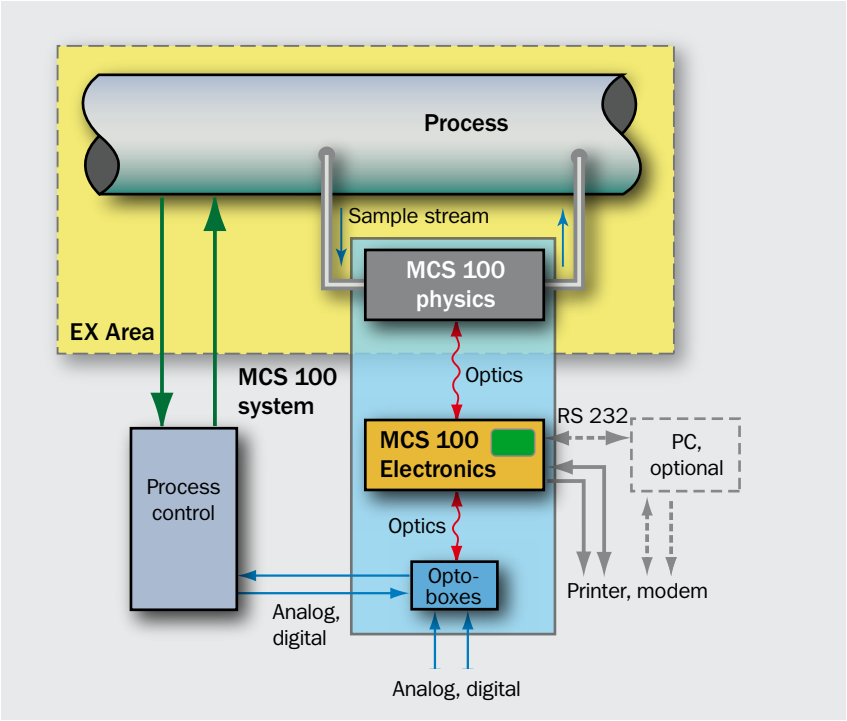
The MCS 100 fulfills the specific demand of the chemical industry for higher protection against electromagnetic noise. Modifications to suit applications in explosive atmospheres are available.

SystemEngineering

In addition to pure analysis SICK MAIHAK offers the support for solutions for user specific measurements. Our comprehensive experience in the field enables SICK MAIHAK to supply complex systems that monitor in corrosive, reactive and explosive atmospheres.

MCS 100 and Data processing

SICK MAIHAK provides equipment to deliver precise measurement and to make the data processing user friendly. The programming is kept simple and additional interfaces are offered optionally. The data processing is done via PC and a remote servicing or bus connection is available on request.



MCS 100 data flow

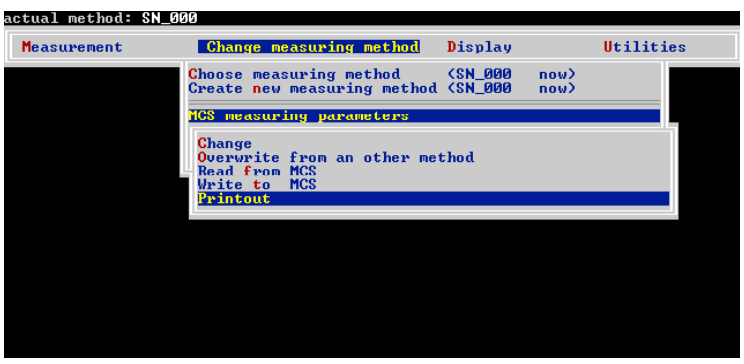
Stand-Alone-Operation

After the calibration and installation the MCS 100 is designed to operate totally independend. The measuring values are displayed on screen and are released via optical fibre. Connected to the optical fibre is an opto box that represents the digital and analog interface to the process. Relay outputs serve e.g. to signal limit values and the automatic alarm. External digital- and analog values may be read in as well via the opto boxes. This allows external control of the system, the reaction to sensors placed on the outside and process measuring values from external devices.

Data processing via PC

The MCS 100 has an RS 323 interface, offering the option of control via a PC. This facilitates effortless program sequences changes of the MCS 100. In addition, it enables comprehensive processing of measuring values with the option to display the output graphically as well as allowing the output of relay- and analog exit points and storing data onto hard disk.

Menue of the PC software



Realised applications

Application (gas component)	Chemical formula	Measuring range			Gases	
		ppm	ppm/ vol.%	vol.%	IR	UV
Acetylaldehyde in Air	C_2H_4O	●			■	
Acetylene in Methane/Ethane	C_2H_2			●	■	
Ammonia in Air	NH_3		●		■	
Ammonia in Flue gas	NH_3	●			■	
Benzaldehyde in water vapour	C_7H_6O			●	■	
Bromine	Br_2	●				■
Butene in Ethylene/Hydrogen	C_4H_8	●			■	
Butene in Ethylene/Ethane	C_4H_8	●			■	
1-Butene in Hydrogen and Nitrogen	C_4H_8			●	■	
Butylamine 4N in Ammonia	$C_4H_{13}N$			●	■	
Chlorine	Cl_2	●	●	●		■
Chlorine dioxide in Air	ClO_2	●			■	
Chloroform in Air	$CHCl_3$	●			■	
Hydrocyanic acid in Air	HCN	●			■	
Dichlorobenzene in Air	$C_6H_4Cl_2$		●		■	
Dichchloromethane in Air	CH_2Cl_2	●			■	
1.2- Dichchloroethane in Air	$C_2H_4Cl_2$	●			■	
Dinitrogen Oxide in Air	N_2O	●			■	
Dinitrogen Oxide in Nitrogen	N_2O		●		■	
Ethane in Hydrogen and Nitrogen	C_2H_6			●	■	
Ethyl Alcohol in Air	C_2H_6O			●	■	
Ethrane in Air	C_3F_5ClOH	●			■	
Ethylene in Hydrogen and Nitrogen	C_2H_4			●	■	
Hydroflouric Acid in $He/H_2/UF_6$	HF	●			■	
Hydroflouric Acid in SiF_4	HF			●	■	
Freon 12 in Hexaflouropropene	CCl_2F_2			●	■	
Freon in Air		●			■	
Frigen in $He/H_2/UF_6$	CCl_2F_2	●			■	
Frigen in Hexaflourpropylen	CCl_2F_2		●		■	
Frigen in Frigen mixture	F_{22}, $CHClF_2$			●	■	
Halothane in Air	$CF_3CHBrCl$, C_2F_3HBrCl	●			■	
Hexaflourpropane	HFP, C_3F6			●	■	
Hexaflourpropaneoxyde	HFPO, C_3F_6O			●	■	
Isopropanol in Air	C_3H_8O		●		■	
Carbonyl sulphide in Air	COS	●			■	
Carbon monoxide in Phosgene	CO			●	■	
Carbon dioxide in Air	CO_2			●	■	
Carbon dioxide in Helium	CO_2	●			■	
Methane in AIr	CH_4		●		■	
Nitobenzene in Air	$C_6H_5NO_2$	●			■	
Perchlorethylene in Air	C_2Cl_4	●	●		■	
Phosgene in CO	$COCl_2$			●	■	
Phosgene in Air	$COCl_2$	●	●	●	■	
Propane in Air	C_3H_6			●	■	
Salt acid in $SiCl_4$	HCl			●	■	
Salt acid in Silane	HCl			●	■	
Sulfure dioxide in Air	SO_2	●			■	

Application (gas component)	Chemical formula	Measuring range			Gases	
		ppm	ppm/ vol.%	vol.%	IR	UV
Sulfur Hexaflouride in HE or H_2	SF_6		●		■	
Carbon disulfide in Air	CS_2	●			■	
Silane in Salt acid (HCl)				●	■	
Silicontetraflouride in HCl	SiF_4			●	■	
Sulfan	H_2S_2		●			■
Sulfur dioxide	SO_2	●				■
Hydrogen sulfide	H_2S	●				■
Tetrachlorethylene in Air	C_2Cl_4	●			■	
Tetrachloromethane in Air	CCl_4	●			■	
Trichlorethylen in Luft	C_2HCl_3	●			■	
Triethylamine in Air	$C_6H_{15}N$	●			■	
Trimethylchlorinsilane in Air	C_3H_9ClSi	●			■	
Uranium Hexaflouride in HE or H_2	UF_6		●		■	
Vinyl acetate in Ethylenes (C_2H_4)	$C_4H_6O_2$			●	■	
Vinyle chloride	C_2H_3Cl		●		■	
Water in Air	H_2O	●			■	
Water in Helium	H_2O		●		■	
Water in SiF_4, HF, HCl	H_2O			●	■	

Application (liquid components)	Chemical formula	Measuring range		
		ppm	ppm/ vol%	vol%
1-Propylenglycol-2-monomethylether				●
Acetone (Dimethylketone) in water	C_3H_6O	●		
Benzene in water	C_6H_6	●		
Hydrocyanic in acetone cyanhydrine	HCN	●	●	●
Acetic acid/Acetic acid anhydride	$C_2H_4O_2/C_4H_6O_3$			●
Ethyl alcohol in water	C_2H_6O			●
Glycerine in water	$C_3H_8O_3$			●
Isocyanate in MCB/ODB	NCO	●		
Carbon dioxide in H_2O/NH_3	CO_2	●		
Methanol in water	CH_4O			●
Methylchloride in Dimethylether	CH_3Cl			●
Nitroluene in Cyclohexane	$C_7H_7NO_2$		●	
Phosgene in MCB/ODB	$COCl_2$			●
Toluene in Triethylamine	C_7H_8	●		
Water in Acetone (C_3H_6O)	H_2O		●	
Water in Ammonia (NH_3)	H_2O	●		
Water in Benzene (C_6H_6)	H_2O	●		
Water in Dimethylacetamide ($C_2H_2Cl_2$)	H_2O	●		
Wasser in Dimethylacetamid (C_4H_9NO)	H_2O	●		●
Water in ε-caprolactam	H_2O	●		
Water in Acetic Acid ($C_2H_4O_2$)	H_2O			●
Water in Methanol (CH_4O)	H_2O	●		
Water in Methylethylketon (C_4H_8O)	H_2O	●		
Water in Methylchloride (CH_2Cl_2)	H_2O	●		
Water in Monochloroacetic Acid	H_2O			●
Water in Vinylchloride (C_2H_3Cl)	H_2O	●		

Many other applications on request

Technical Data of the MCS 100

Technical Data	MCS 100 UV/NIR/IR		
	UV version	**NIR version**	**IR version**
Spectral range	appr. 200…500 nm	appr. 1,0…3,0 µm	appr. 1,5…17,0 µm
■ Light source	Deuterium lamp	IR beamer	IR beamer
■ Detector	SiliziumSilicon diodediode	PbS	pyroelectric
Analyzer	**General**		
Measuring principle	Infrared photometer, single-beam dual-wavelength method, gas filter correlation procedure		
No. of meas. components	max. 8		
Measuring ranges	2 measurement ranges in each case with automatic switchover; freely programmable		
Response time T_{90}	appr. 30…120 s adjustable > 2 s (plant and component specific)		
Detection range	<2% of the relevant measurement range end value		
Limit values	2 limit values for each component; freely adjustable as “Open” and “Close” contact		
Zero and span calibration	Automatic control via Remote Control or internal clock		
Cross sensitivity	Provision for up to 4 interference varaibles, external varaibles also possible		
Barometric correction	Range from 70...120 kPa atmospheric pressure (optional)		
Peripheral system control	By integrated, freely programmable run-off control via relay interfaces		
Interface	Serial : RS 232, 5 m (16.5 ft) max. distance without amplifier		
Signal outputs	Digital: max 64 channels (Opto box via optical fibre) Analog: max 64 channels (Opto box via optical fibre)		
Signal inputs	Digital: max 64 channels (Opto box via optical fibre) Analog: max 8 channels (Opto box via optical fibre)		
Standards	EN 61010-1; EN 61326		
Elektronic unit	19” cabinet with window		
Dimensions (H x W x D)	200 mm x 550 mm 380 mm (8 in x 22 in x 15 in) (width plus electr. connectors)		
Weigth	appr. 23 kg (50 lb)		
Power supply	230/115 V, ±10…15%; 50/60 Hz; 125 VA consumption		
Ambient temperature	Temperature: 0…40 °C (32 … 104 °F)		
Protection class	IP 65; special designs available on request		
Display	1 x LED Display, 4.5 digits, 1 x 20 characters, alphanumericical display		
Operation	Via membrane keyboard or PC		

AT HOME IN THE INDUSTRIAL SECTOR

We can build on years of experience in the field of Analyzers and Process Instrumentation. That is why we are at home in the world of cement and power plants as well as in the chemical and petrochemical sector. Be it emission control at the waste treatment or process optimization for steel manufacturing, SICK MAIHAK offers tailor-made solutions.

WE OFFER YOU A CHOICE

SICK MAIHAK offers a number of sensor-based techniques for analysis, ranging from the continuous gas and dust measurement to specialized applications for water and liquid analysis. Within the process measurement technology SICK MAIHAK products play a central role in determining volume flow of gases and level of bulk materials.

AROUND THE WORLD TO YOUR SERVICE

Where ever you are, our global network of subsidiaries and representatives is able to supply qualified support when you need it. We deliver the equipment for your measuring tasks, provide documentation and training. Our highly skilled service staff offers support during installation, commissioning and maintenance of the appliances.

SICK GROUP

SICK MAIHAK represents the process automation segment of the SICK group, one of the worlds leading manufacturer of intelligent sensors and sensor solutions. With its 4,000 employees, SICK is able to offer an extensive portfolio of products and services on the market of factory automation.
www.sick.com

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SICK MAIHAK GmbH | Analyzers and Process Instrumentation
Nimburger Str. 11 | 79276 Reute | Germany | www.sick-maihak.com
Phone +49 7641 469-0 | Fax +49 7641 469-1149 | info.sick-maihak@sick.de

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