



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Technical Information

# Stamolys CA71MN

## Manganese Analyser

Compact photometric analysis system for manganese measurement in drinking water and wastewater



### Application

In soil, manganese is often found as brownstone. With changing ground water level, water-soluble manganese compounds are formed due to microbial processes.

- Manganese monitoring in drinking water treatment plants
- Precipitant monitoring after aeration and filtration processes in drinking water and wastewater treatment plants

### Your benefits

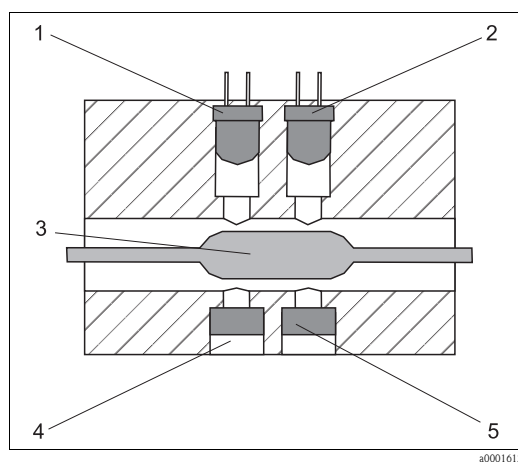
- Stainless steel or glass-fibre reinforced carbon housing available
- Two channel version available
- Measured value storage using integrated data logger
- Automatic calibration and self-cleaning
- Free selectable measuring, cleaning and calibration intervals

## Function and system design

### Measuring principle

After sample conditioning, the analyser sample pump conveys a part of the filtrate to a mixing vessel. The reagent pump adds reagent at a specific ratio. As a result of the reaction, the sample turns a characteristic colour. The photometer determines the sample's absorption of an emitted light at a specific wavelength (s. Fig., Pos. 2). The wavelength is parameter specific. The absorbance is proportional to the concentration of the specified parameter in the sample (Pos. 3). Additionally, the absorption of a reference light is determined to receive a genuine measuring result. The reference signal is subtracted from the measuring signal to prevent any effects due to turbidity, contamination and ageing of the LEDs.

The temperature in the photometer is controlled thermostatically so that the reaction is reproducible and takes place within a short period of time.



- 1 Reference LED
- 2 Emitter LED
- 3 Sample
- 4 Reference detector
- 5 Measuring detector

Photometric principle

### Manganese

Manganese is the second most common heavy metal in the earth's crust after iron. It is also contained in many iron ores.

Manganese is often present in the ground as manganese ore. The manganese ore becomes water soluble through the action of air as the ground water level varies.

Manganese, in normal concentrations as found in water, is not damaging to the health. It is an important trace element for plants.

There are no limit values in wastewater while for drinking water there is the limit value of 0.05 mg/litre, since higher concentrations in water lead to odour, colouring, turbidity and fine grained build-up. Dairies require manganese-free water.

### Photometric manganese determination

#### Leuco malachite method

In the presence of manganese, the reagent indicator turns the sample colour to green-blue .

The absorption is determined at a wavelength of 565 nm. The absorption intensity is proportional to the manganese concentration in the sample.

The reference wavelength is 880 nm.

### Interferences

No interferences up to the given concentration:

Concentration [mg/l]	Interference
100,000	Mg <sup>2+</sup>
70,000	Cl <sup>-</sup>
1,000	SO <sub>4</sub> <sup>2-</sup>
700	Ca <sup>2+</sup> (as CaCO <sub>3</sub> )
10	Zn <sup>2+</sup>
5	Fe <sup>2+</sup> , Fe <sup>3+</sup>



Caution!

- Amines, aldehydes and alcohols interfere in any concentration.
- Strongly buffered samples or extreme pH values may exceed the buffer capacity of the reagent.

**Sample conditioning****Micro/ultrafiltration (Stamoclean CAT430, optional)**

A membrane filter element is suspended directly into the wastewater basin or channel. A hose pump is located in a pump box on the basin rim. The pump creates a vacuum between the membrane and the carrier plate of the filter element. This vacuum makes the filtrate pass through the filter membrane. Suspended materials, particles, algae and bacteria are collected on the surface of the membrane.

Due to alternating pumping and pause, intervals of more than one month are achieved between cleaning cycles. Parallel connection of two or four filter elements increases the sampling quantity up to approx. 1 l/h. The hose pump pressure transports the sample to a collecting vessel near the analyzer over a distance of 20 m. For distances up to 100 m the sample is transported to the collecting vessel by means of compressed air. The analyzers suck the needed sample volume from the collecting vessel.

**Membrane filtration (Stamoclean CAT411, optional)**

A sample flow of 0.8 to 1.8 m<sup>3</sup>/h is continuously conducted through the micro filter via a pressure pipe. A part of the sample passes the filter membrane and is then conveyed to the measuring device as filtrate.

Sampling is based on the cross flow filtration principle. The PTFE filter membrane separates particles with sizes > 0.45 µm from the filtrate. These particles are collected in front of the membrane and are washed away with the sample flow.

The medium is conducted in a meander-like channel through the filter element. This results in a constantly high flow rate. The high flow rate generates the self cleaning effect. Therefore, mechanical drives for the generation of a flow at the filter surface are not necessary.

**Backwash filter (Stamoclean CAT221, optional)**

A sample flow of 1 to 2.5 m<sup>3</sup>/h is permanently conveyed through the backwash filter by means of a sampling pump or compressed air or rinse water. The filtrate passes through the wedge wire sieve and is then transported to the measuring device.

Clogging is minimised by the flow at the wedge wire sieve. Automatic backwashing results in a filter operating time of several weeks.

The automatic backwashing and a small compressor or compressed air resp. rinse water supply guarantee low-maintenance and low-energy operation.

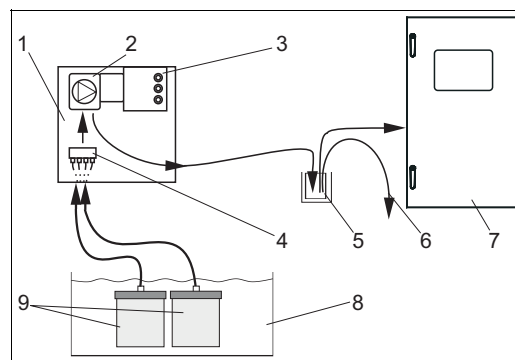
**Customer specific solution**

Before analysis, the sample has to be conditioned and to be transported to an external or to the delivered collecting vessel.

**Measuring system**

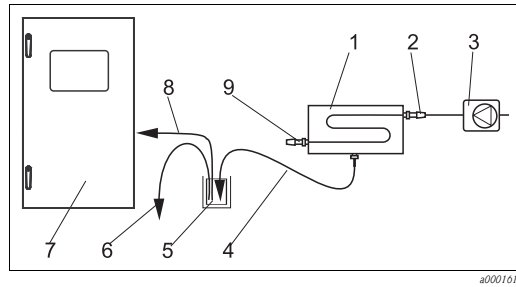
A complete measuring system comprises:

- An analyser
- A sample conditioning system (optionally):
  - Micro filtration / ultra filtration Stamoclean CAT430 or Stamoclean CAT411
  - Backwash filter Stamoclean CAT221
  - Customer specific solution
- Collecting vessel (see product structure)

**Micro / ultra filtration**

Measuring system with Stamoclean CAT430

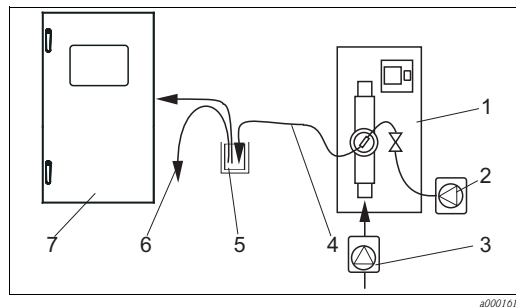
- 1 Control box
- 2 Pump
- 3 Control unit
- 4 Collecting unit (optional)
- 5 Collecting vessel
- 6 Overflow
- 7 Analyser
- 8 Aeration basin
- 9 Membrane filter



Measuring system with Stamoclean CAT411

- 1 Stamoclean CAT411
- 2 Inlet
- 3 Sample pump or hydraulic main
- 4 Filtrate line
- 5 Collecting vessel
- 6 Overflow
- 7 Analyser
- 8 Analyser sample line
- 9 Outlet

### Backwash filter



Measuring system with Stamoclean CAT221

- 1 Stamoclean CAT221
- 2 Compressor or compressed air
- 3 Sample pump or hydraulic main
- 4 Sample outlet
- 5 Collecting vessel
- 6 Overflow
- 7 Analyser

### Standard applications

#### Drinking water quality monitoring at the outlet of the water treatment plant

Sampling from hydraulic main, pressureless collecting vessel with level monitoring:

- Analyser with collecting vessel, Stamolys CA71MN-A1xC2A1

#### Outlet monitoring in the water treatment plant

Sampling from hydraulic main, pressureless collecting vessel with level monitoring:

- Backwash filter Stamoclean CAT221 (order no. CAT221-Axxx)
- Compressor for CAT221 (order no. 51511143)
- Analyser with collecting vessel, Stamolys CA71MN-B1xB2A1

## Input

Measured variable Mn [ $\mu\text{g/l}$ ]

Measuring ranges 1 ... 150  $\mu\text{g/l}$  (MN-A)  
10 ... 2000  $\mu\text{g/l}$  (MN-B)

Wavelength 565 nm (MN-A)  
502 nm (MN-B)

Reference wavelength 880 nm

## Output

Output signal 0/4 ... 20 mA

Signal on alarm Contacts: 2 limit contacts (per channel), 1 system alarm contact  
optional: end of measurement (with two channel version display of channel no. available)

Load max. 500  $\Omega$


<b>Data interface</b>	RS 232 C
<b>Data logger</b>	1024 data pairs per channel with date, time and measured value 100 data pairs with date, time and measured value for calibration factor determination (diagnostic tool)
<b>Load capacity</b>	230 V / 115 V AC max. 2 A, 30 V DC max. 1 A


## Power supply

### Electrical connection



Caution!

The following figure (→ ) shows the connection department sticker as an example. Terminal assignment and cable core colours can be different to the originals.

For connecting your analyser only use the terminal assignment of the connection department sticker **in the device** (→ )!

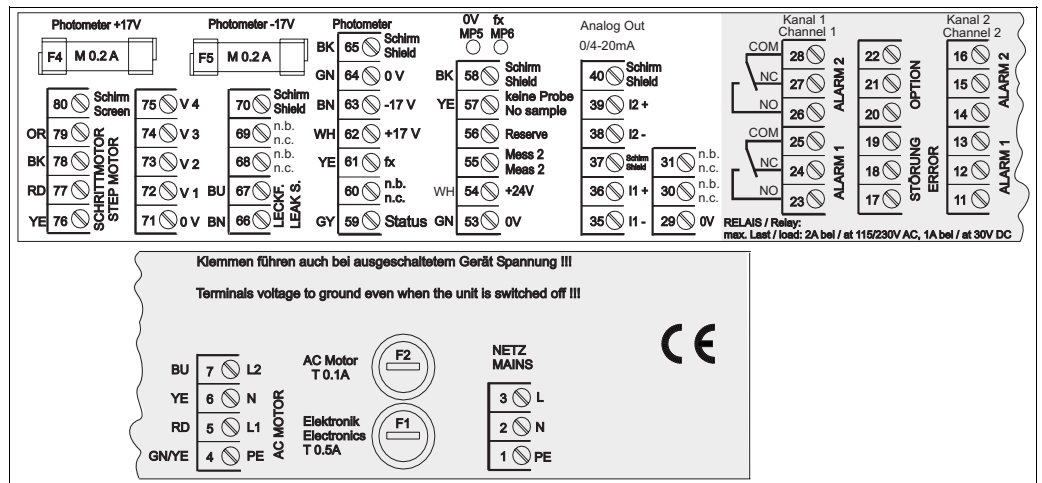


Fig. 1: Example of the connection sticker

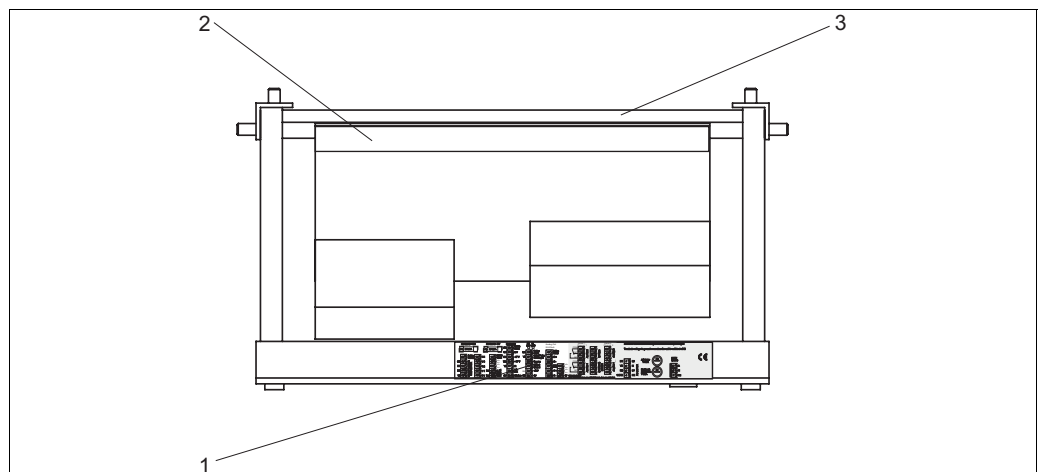


Fig. 2: Analyser from top (open version resp. swung out)

- 1 Connection department sticker
- 2 Printed circuit board with terminal strip
- 3 Backside of the analyser

<b>Supply voltage</b>	115 V AC / 230 V AC $\pm 10\%$ , 50/60 Hz
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<b>Power consumption</b>	approx. 50 VA
<b>Current consumption</b>	approx. 0.2 A at 230 V approx. 0.5 A at 115 V
<b>Fuses</b>	1 x time-lag 0.5 A for electronics 2 x medium time-lag 0.2 A for photometer 1 x time-lag 0.5 A for motors

## Performance characteristics

<b>Time between two measurements</b>	$t_{mes}$ = reaction time + rinse time + waiting time + rinse again time + filling time + sampling time + reagent refusal time (min. waiting time = 0 min)
<b>Maximum measured error</b>	±2 % of measuring range end
<b>Measuring interval</b>	$t_{mes}$ to 120 min
<b>Reaction time</b>	5 minutes
<b>Sample requirement</b>	15 ml (0.004 US.gal.) per measurement
<b>Reagent requirement</b>	<b>MN-A:</b> 2 x 0.28 ml (0.000074 US.gal) 1.21 l (0.319 US.gal) per reagent per month with 10 minute measuring interval <b>MN-B:</b> 2 x 0.45 ml (0.00012 US.gal) 1.94 l (0.512 US.gal) per reagent per month with 10 minute measuring interval
<b>Calibration interval</b>	0 to 720 h
<b>Rinse interval</b>	0 to 720 h
<b>Rinse time</b>	selectable from 20 to 300 s (standard = 60 s)
<b>Rinse again time</b>	30 s
<b>Filling time</b>	25 s (MN-A) 45 s (MN-B)
<b>Maintenance interval</b>	6 months (typical)
<b>Servicing requirement</b>	15 minutes per week (typical)

## Environment

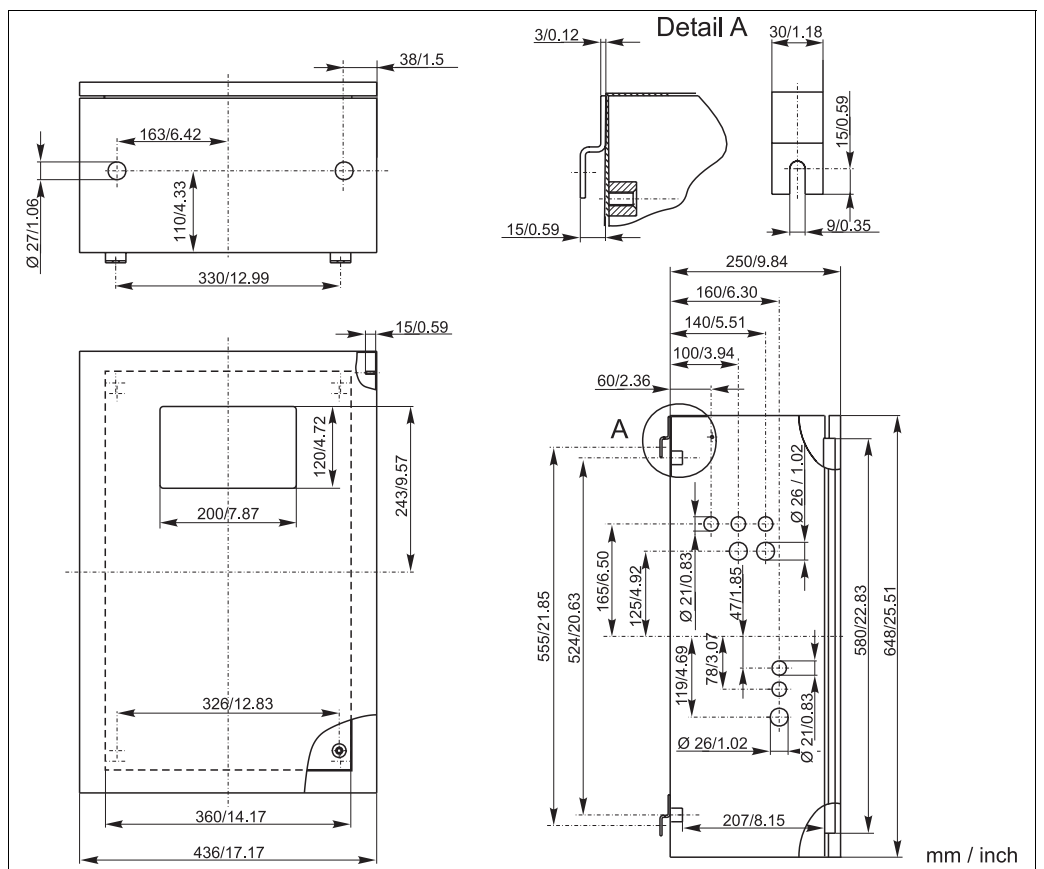
<b>Ambient temperature</b>	5 ... 40 °C (41... 104 °F), avoid strong fluctuations
<b>Humidity</b>	below the condensation limit, installation in usual, clean rooms outdoor installation only possible with protective devices (customer supplied)
<b>Ingress protection</b>	IP 43

## Process

Sample temperature	5 to 40 °C (41 to 104 °F)
Sample flow rate	min. 5 ml (0.0013 US.gal.) per min
Consistence of the sample	low solid content (< 50 ppm)
Sample inlet	pressureless

## Mechanical construction

Design, dimensions **Stainless steel housing**



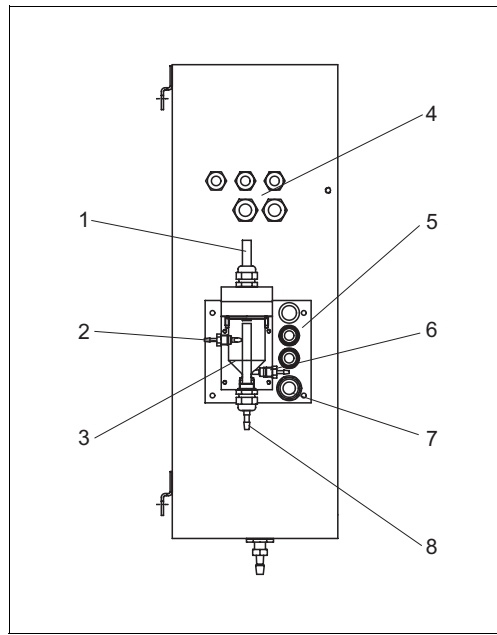
Stainless steel version

a0001361-en



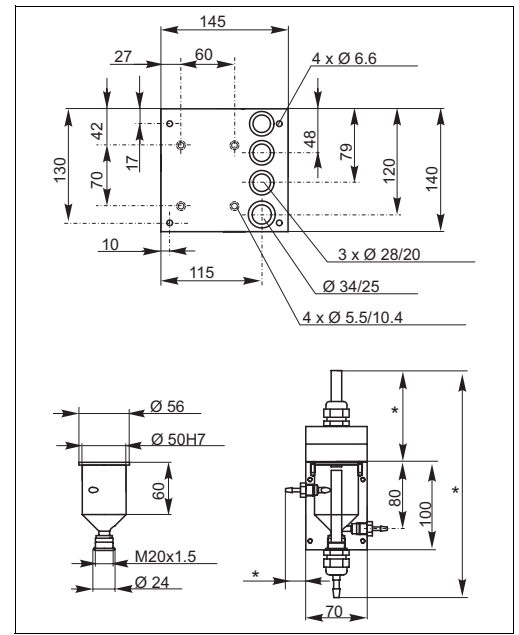


**Collecting vessel**



*Collecting vessel at analyser (optional)*

- 1 Ventilation
- 2 Sample inlet from sampling
- 3 Collecting vessel
- 4 Electrical connections
- 5 Analyser sample inlet



*Collecting vessel dimensions*

- \* variable, freely adjustable dimensions
- 6 Sampling for analyser
- 7 analyser outlet
- 8 Sample overflow

<b>Weight</b>	GFR housing	approx. 28 kg (61.7 lb)
	Stainless steel housing	approx. 33 kg (72.8 lb)
	Without housing	approx. 23 kg (50.6 lb)

<b>Material</b>	Housing:	Stainless steel 1.4301 (AISI 304) or glass-fibre reinforced carbon(GFR)
	Front windows:	Polycarbonate®
	Endless hose:	C-Flex®, Norprene®
	Pump hose:	Tygon®, Viton®
	Valves:	Tygon®, silicone

**Connecting the sample line**

**One channel version**

*Collecting vessel* (at analyser, with or without level measurement)

Connection hose ID 3.2 mm (0.13")

*Customer collecting vessel*

Connection hose ID 1.6 mm (0.06")

Max. distance from collecting vessel to analyser 1 m (3.28 ft)

Max. height difference from collecting vessel to analyser 0.5 m (1.64 ft)

**Two channel version**

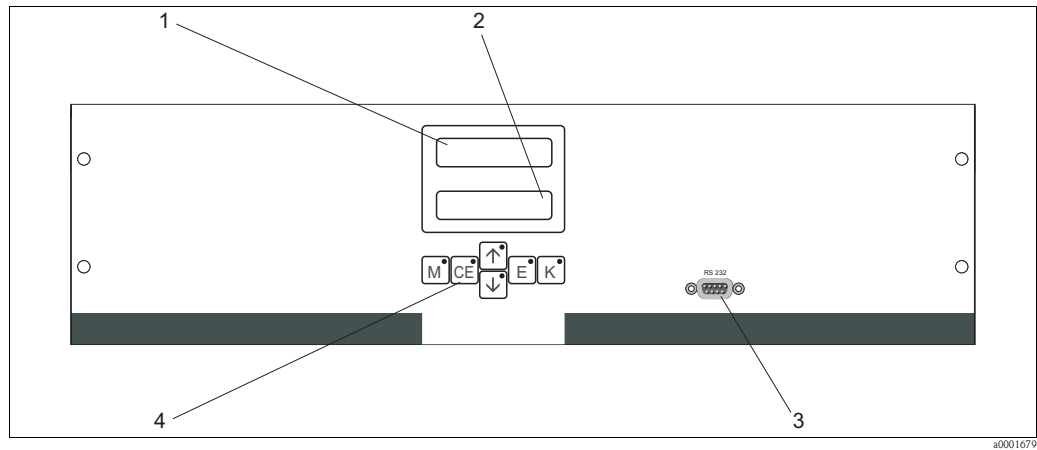
- Depending on the ordered version, one or two collecting vessels (with or without level measurement) are included in the scope of delivery.
- Level measurement is only possible for one channel.
- Only one collecting vessel can be mounted at the housing. The second is to be placed nearby the analyser.

**Sample outlet**

Connection	Hose ID 6.4 mm (0.25")
	– Max. length of closed loop: 1 m (3.28 ft)
	– Open outlet downgrade installed
	– No combination of several devices to a closed-loop system
Min. volume per measurement	20 ml (0.005 US.gal.)

## Human Interface

### Display and operating elements



Display and operating elements

- 1 LED (measured value)
- 2 LC display (measured value and status)
- 3 Serial interface RS 232
- 4 Operating keys and control LEDs

## Ordering information

### Product structure

Measuring range	
A	Measuring range 1 ... 150 µg/l Mn
B	Measuring range 10 ... 2000 µg/l Mn
Y	Special version acc. to customer's specification
Sample transfer	
1	Sample transfer from one measuring point (one-channel version)
2	Sample transfer from two measuring points (two-channel version)
Power supply	
0	230 V AC / 50 Hz
1	115 V AC / 60 Hz
2	115 V AC / 50 Hz
3	230 V AC / 60 Hz
Collecting vessel for up to 3 analysers	
A	Without collecting vessel
B	With collecting vessel without level measurement
C	With collecting vessel with level measurement (one-channel version only)
D	With two collecting vessels without level measurement (two-channel version)
Housing version	
1	Without housing
2	With GFK housing
3	With stainless steel 1.4301 (AISI 304) housing
Communication	
A	0/4 ... 20 mA, RS 232
Additional equipment	
1	Quality certificate
2	Quality certificate + set of inactive reagents
3	Quality certificate + three sets of inactive reagents
CA71MN -	<b>complete order code</b>

### Scope of delivery

The scope of delivery comprises:

- an analyser with mains plug
- a cleaning injector
- a tin of silicone spray
- a Norprene hose, length 2.5 m (8.2 ft), ID 1.6 mm (0.06")

- a C-flex hose, length 2.5 m (8.2 ft), ID 6.4 mm (0.25")
- a C-flex hose, length 2.5 m (8.2 ft), ID 3.2 mm (0.12")
- two hose fittings of each size:
  - 1.6 mm x 1.6 mm (0.06" x 0.06")
  - 1.6 mm x 3.2 mm (0.06" x 0.12")
  - 6.4 mm x 3.2 mm (0.25" x 0.12")
- two T-hose fittings of each size:
  - 1.6 mm x 1.6 mm x 1.6 mm (0.06" x 0.06" x 0.06")
  - 3.2 mm x 3.2 mm x 3.2 mm (0.12" x 0.12" x 0.12")
- an interference suppressor for the current output
- 4 edge covers
- a quality certificate
- Operating Instructions (English).

**Note!**

Please, order reagents separately with analyser version CA71XX-XXXXXX1.

With all other versions, inactive reagents are included in the scope of delivery. You have to mix the reagents before using them. Please, read the instructions attached to the reagents.

## Certificates and approvals

### CE approval

#### Declaration of conformity

The product meets the legal requirements of the harmonised European standards. The manufacturer confirms compliance with the standards by affixing the CE symbol.

### Test reports

#### Quality certificate

Depending on the order code, you receive a quality certificate.

With the certificate the manufacturer confirms compliance with all technical regulations and the successful individual testing of your product.

## Accessories

### Reagents and standard solutions

- Reagent set, 1 l MN1+MN2+MN3 each; order no. CAY843-V10AAE
- Reagent set, inactive, 1 l MN1+MN2+MN3 each; order no. CAY843-V10AAH
- Cleaning agent, 1 l; order no. CAY844-V10AAE
- Standard solution 0.1 mg/1 Mn; order no. CAY845-V10C10AAE
- Standard solution 0.5 mg/1 Mn; order no. CAY845-V10C50AAE

### Cleaner for hoses

- Cleaning agent, alkaline, 100 ml; order no. CAY746-V01AAE
- Cleaning agent, acidic, 100 ml; order no. CAY747-V01AAE

### Collecting vessel

- for sampling from pressurised systems
- results in an unpressurised continuous sample stream
- Collecting vessel without level measurement; order no. 51512088
- Collecting vessel with level measurement (conductive); order no. 51512089

### Maintenance kit

- Maintenance kit CAV 740:
  - 1 set pump hoses yellow/blue
  - 1 set pump hoses black/black
  - 1 set hose connectors per hose set
 order no. CAV 740-1A

### Additional accessories

- Interference suppressor for control, power and signal lines  
order no. 51512800
- Silicon spray  
order no. 51504155
- Valve set, 2 pieces, for two-channel version  
order no. 51512234

- Upgrade kit for upgrading from one-channel to two-channel version  
order no. 51512640

## Documentation

- Technical Information Stamoclean CAT430, TI 338C/07/en
- Technical Information Stamoclean CAT411, TI 349C/07/en
- Technical Information Stamoclean CAT221, TI 384C/07/en

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