Your vision, automated

mcom® TECHNOLOGY

# MCOM100MPA

## MULTI PARAMETER ANALYSER


## ➢ SPECIFICATIONS

The MCOM100MPA series IOT based water analyser is used to measure concentration of the constituents in quantity for characterization of water for different uses.

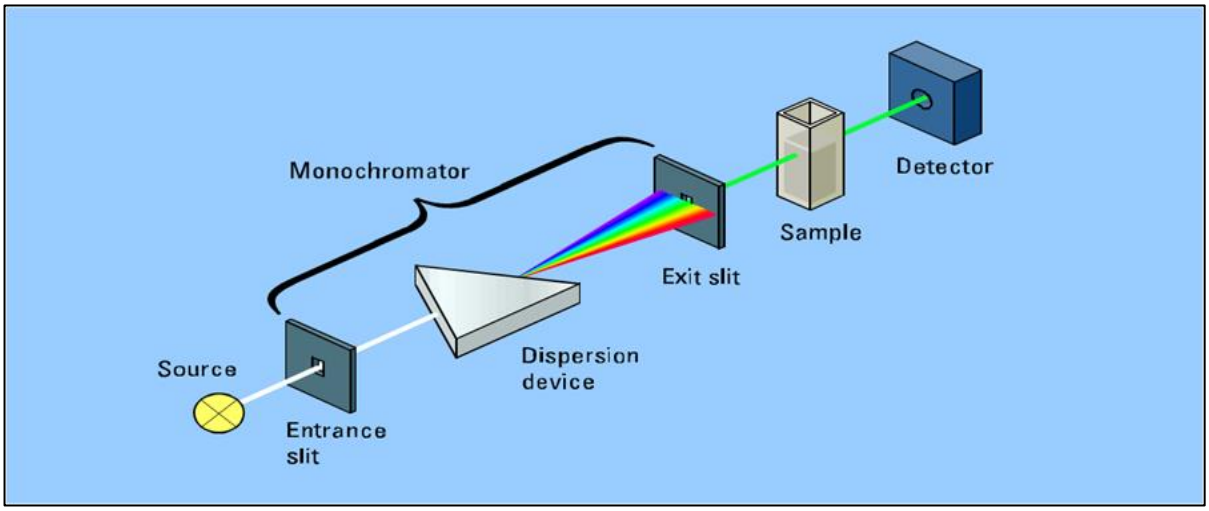
MCOM100MPA series COD BOD sensor is a new generation of environmentally friendly COD BOD sensor launched by our company. It requires no reagents, no pollution and more economical. Small size and easy installation and water quality monitoring is available online. Automatic compensation for turbidity disturbances with automatic cleaning for stability even long-term monitoring.

Water Monitoring itself includes a monitoring of lots of parameters like viscosity, flow, pressure difference, and many more. But we would like to mainly give focus on the three most important parameters of water like COD, BOD and TSS. These three parameters of water give the information about the dirtiness of water. So, measurement of these parameters is very important.

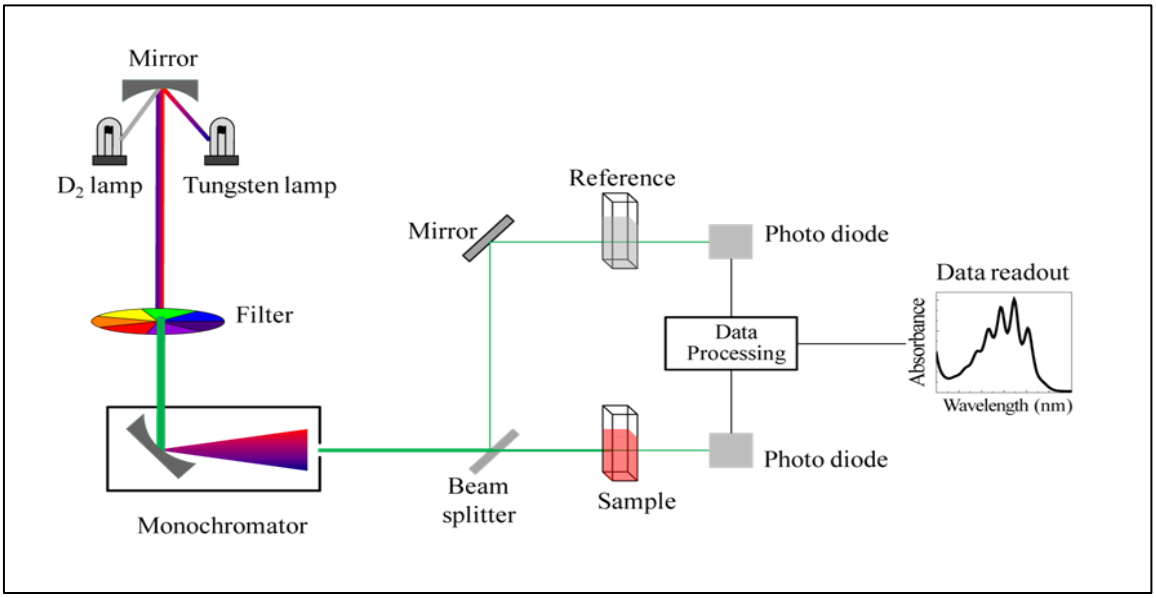
UV–VIS Spectrophotometer techniques is basically a measurement of the absorption corresponding to wavelength of UV & VIS ranges of electromagnetic spectrum .In this technique the absorbance value is correlated with the concentration of organic consumed, bacteria, & suspended solids present in a water sample, which is denoted by COD, BOD and TSS.

It has been researched that, UV–VIS spectrophotometer technology found to be one of the best possible technology for the measurement of the water parameters. Because of its low maintenance routine check-up, low cost, available for online monitoring purpose, No use of reagents, easy to install and understand & the most important thing is that result is almost correctly correlated with the actual results.

# MCOM100MPA




- Light path: 1mm
- TOC 1.5 to 410 mg/l equiv KHP
- COD 2.5 to 2000 mg/l equiv. KHP
- SAC 1.5 to 700 1/m
- BOD 0~500mg/L
- TSS 0~1000mg/L
- +5~45 °C; IP68 protection level,
- RS-485; MODBUS protocol compatible
- 1 or 2 point user calibration
- UV LED light source



## ➢ SAFETY INSTRUCTIONS

- **Earthing Connection**
  Instrument must be grounded properly. Main cable shields shall be grounded at one place I.e. control system end instrument earth bar isolated type.
- **Door keep locked**
  In normal condition panel door should be locked only trained qualified people may open this instrument. Ensure that the system has been disconnected from power before servicing or replacing any items inside thus instruments.

## ➢ PANEL INSTALLATION

- The analyser enclosure should be mounted on the wall.
- Enclosure dimension: Height × Length × Width: 200 × 160 × 100mm
- Panel weight: <25 kg
- Protection class: IP65

# ➢ SENSOR CHARACTERISTICS

MCOM100MPA Series COD BOD TSS & TEMPERATURE sensor is a new generation of environmentally friendly sensor launched by our company.

It requires no reagents, no pollution, and is more economical and environmentally friendly. Small size and easy installation, water quality monitoring is available online.

Automatic compensation for turbidity disturbances with automatic cleaning for stability even for long-term monitoring.

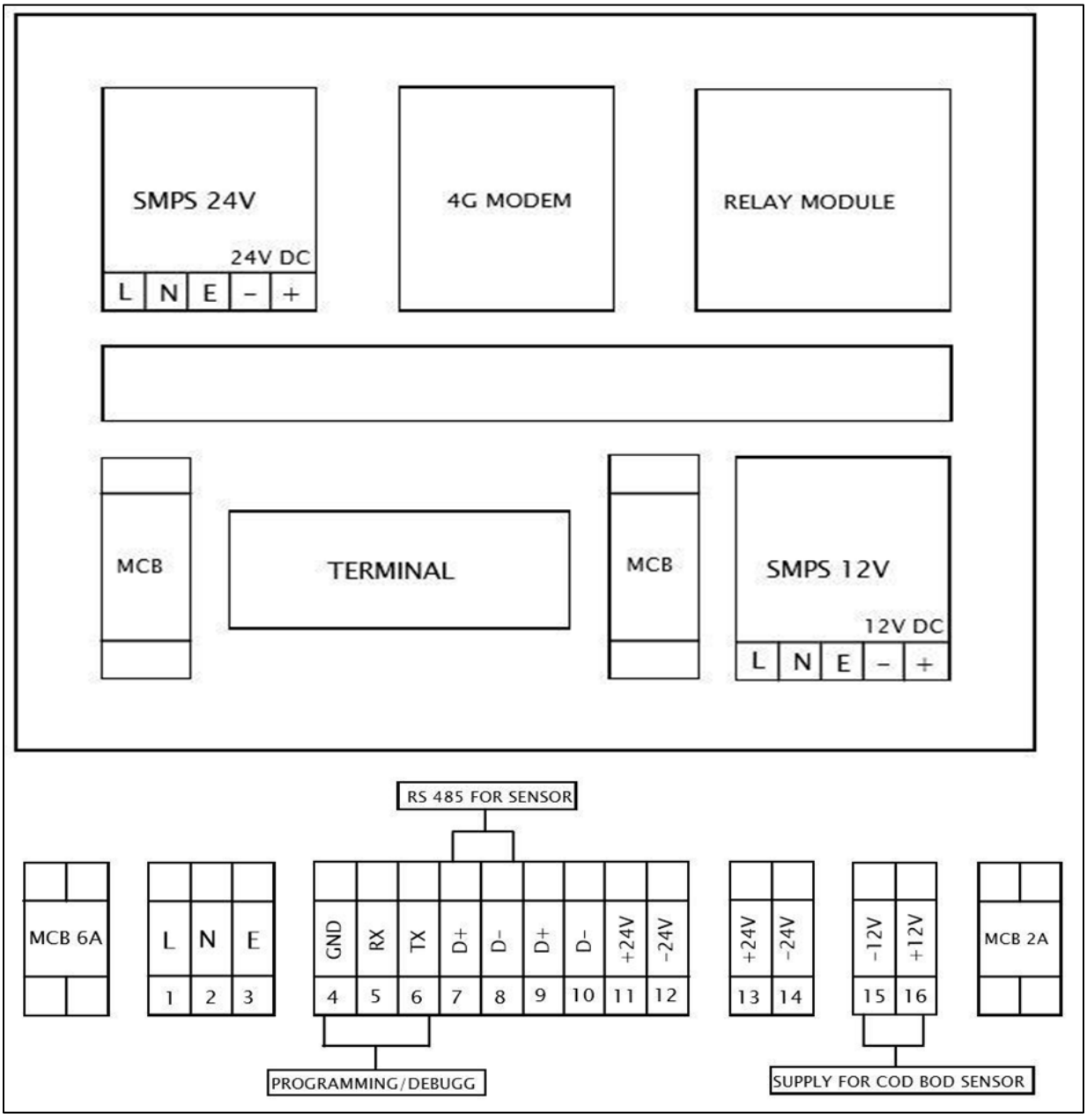
- **PRINCIPLE**

Many organic substances dissolved in water absorb ultraviolet light. Therefore, thetotal amount of organic pollutants in water can be measured by measuring the absorption of these organic substances by ultraviolet light at a wavelength of 254nm. MCOM100MPA series sensors use two light sources, one 254nm ultraviolet light and one 850nm infrared light, which can automatically compensate the optical path attenuation and turbidity effects, thus achieving more stable and reliable measurement values.

- **FEATURES**

1. Digital sensor, RS-485 output, supports MODBUS.
2. No reagents, no pollution, more economical and environmentally friendly.
3. Can measure COD, BOD, TSS, TOC, SAC and other parameters.
4. Automatic compensation for turbidity interference for excellent test performance.

## ➢ INSTRUMENT ELECTRICAL CONNECTION



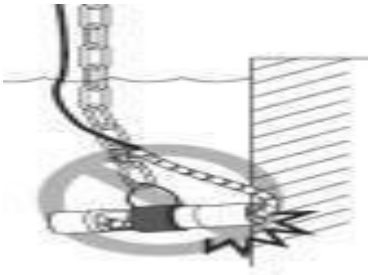

- Power supply for panel: 230V AC, 50/60 Hz and panel must be grounded.
- Power supply for sensor: 12V +/-5%, current <50mA

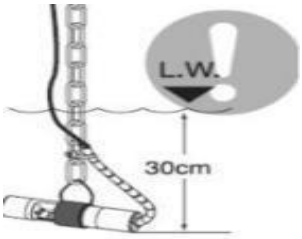
## ➢ SENSOR INSTALLATION

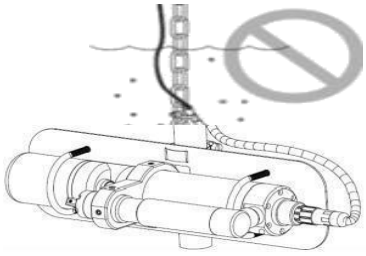
Spread the cables before handling. When the sensor is suspended, the sensor caused by water flow should be prevented from hitting the wall or other water conservancy facilities. If the water flow is very urgent, please fix the sensor when installing the sensor, the depth from the water surface should not exceed 2 meter.

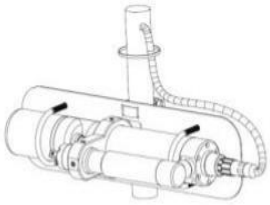
Considering the fluctuation of water level, submerge the sensor below the lowest possible water level of 30CM. The sensor is placed in a position where there are no bubbles in the water.

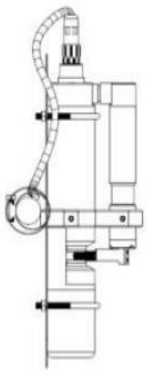
- Install a cable cover on the outside of the sensor cable.
- Fix the sensor as shown below
- Fixed firmly. The sensor needs to be placed horizontally.







## ➢ WARNING

- Please install the cable cover correctly. Otherwise, the cable may be damaged due to damage during maintenance.
- Do not use the sensor cable to lift the sensor.
- Do not cover the measuring surface with the lifting attachment.

## ➢ TECHNICAL PARAMETER

| Sr. No | ITEM | PARAMETER |
|---|---|---|
| 1 | Output Signal | Support RS-485, MODBUS protocol |
| 2 | Range | TOC 1.5 to 410mg/l equiv KHP, COD 2.5 to 2000 mg/l equiv. KHP |
| 3 | Accuracy | 0.01mg/L COD |
| 4 | Temperature Range | +5 ~ 45°C |
| 5 | IP Grade | IP68 |
| 6 | Maximum Pressure | 1 bar |
| 7 | Calibration | 1 or 2 point COD calibration |
| 8 | Power Supply | DC 12V +/-5%, current < 50mA (When there is no cleaning brush) |
| 9 | Sensor Size | 54*325.5 mm |
| 10 | Cable Length | 10m (default) |
| 11 | Housing Material | POM/SS316L |

## ➢ SENSOR CABLE

- Wire AWG-24 or AWG-26 shielded wire. OD=5mm
- Red - power cord (VCC)
- White - 485 data line _B (485_B)
- Yellow - 485 data line _A (485_A)
- Black - ground (GND)
- Bare Wire - shielded wire

# ➢ MEASURMENT PRINCIPLE OF COD, BOD, TSS.

MCOM100MPA UV254/COD sensor software (see modbus user manual for details) Provides 1- or 2-point COD calibration options in mg/L. KHP (potassium hydrogen phthalate, C8H5KO4), CAS# 877-24-7, is a commonly used stain for environmental studies and can be used for COD calibration.

## 1. COD

The chemical oxygen demand (COD) test is commonly used to indirectly measure the amount of organic compounds in water. Most applications of COD determine the amount of organic pollutants found in surface water (e.g. lakes and rivers) or wastewater, making COD a useful measure of water quality. It is expressed in milligrams per litre (mg/L), which indicates the mass of oxygen consumed per litre of solution. The basis for the COD test is that nearly all organic compounds can be fully oxidized to carbon dioxide with a strong oxidizing agent under acidic conditions. The amount of oxygen required to oxidize an organic compound to carbon dioxide, ammonia, and water denotes a COD value as shown by below equation:

$$C_nH_aO_bN_c + \left(n + \frac{a}{4} - \frac{b}{2} - \frac{3}{4}c\right) O_2 \rightarrow nCO_2 + \left(\frac{a}{2} - \frac{3}{2}c\right) H_2O + cNH_3$$

The conversion formula for COD254nm and TOC254nm is as follows:

c (TOC) = 0.4705 * c (KHP)

c (COD) = 1.176 * c (KHP)

## 2. BOD

Biochemical oxygen demand (BOD) (also called biological oxygen demand) is the amount of dissolved oxygen needed (i. e., demanded) by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period. The BOD value is most commonly expressed in milligrams of oxygen consumed per litre of sample during 5 days of incubation at 20 °C and is often used as a surrogate of the degree of organic pollution of water. BOD is similar in function to chemical oxygen demand (COD), in that both measure the amount of organic compounds in water. However, COD is less specific, since it measures everything that can be chemically oxidized, rather than just levels of biodegradable organic matter.

## 3. TSS

Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration. These solids include anything drifting or floating in the water, from sediment, silt, and sand to plankton and algae. Organic particles from decomposing materials can also contribute to the TSS concentration. Asalgae plants and animals decay, the decomposition process allows small organic particles to break away and enter the water column as suspended solids. Even chemical precipitates are considered a form of suspended solids. Total suspended solids are a significant factor in observing water clarity. The more solids present in the water, the less clear the water will be.

By using principle of spectrophotometry based on the Principle of Beer Lambert's Law. The Beer-Lambert law relates the attenuation of light to the properties of the material through which the light is travelling. For each wavelength of light passing through the spectrometer, the intensity of the light passing through the reference cell is measured. This is usually referred to as Io . The Beer-Lambert law is the linear relationship between absorbance and concentration of an absorber of electromagnetic radiation. The general Beer-Lambert law is usually written as: $A = a\lambda \cdot b \cdot c$ , (where A is the measured absorbance, $a\lambda$ is a wavelength-dependent absorptivity coefficient, b is the path length, and c is the analyte concentration). If multiple species that absorb light at a given wavelength are present in a sample, the total absorbance at that wavelength is the sum due to all absorbers is: $A = (\varepsilon 1 \cdot b \cdot c1) + (e2 \cdot b \cdot c2) + \ldots$ , where the subscripts refer to the molar absorptivity and concentration of the different absorbing species that are present. Experimental measurements are usually made in terms of transmittance (T), which is defined as: T = P/Po where P is the power of light after it passes through the sample and Po is the initial light power(passed through any kind of reference medium). The relation between A and T is:

$$\mathbf{A = -\log(T) = -\log(P/Po)}$$

# ➢ MAINTENANCE SCHEDULE & METHOD

- **MAINTENANCE SCHEDULE**

  Cleaning is important to ensure accurate measurements.

| Maintenance work | Maintenance frequency |
|---|---|
| Calibration (if required by the agent) | Calibration required to the schedule |
| Maintain and check the self-cleaning brush | Every 18 months (see wiper doc for details.) |

- **MAINTENANCE METHOD**

❖ **ROUTINE MAINTENANCE**

1) Surface: Flush the outer surface of the sensor. If any dirt remains, wipe it with a soft, damp cloth. For some dirt that is difficult to clean, add household detergent to the water and rinse it clean.
2) Check the cable: Do not tighten the cable during normal operation, otherwise the internal conductor will be broken and the sensor will not work properly. Check the sensor's measurement window for dirt and confirm that the cleaning brush is working properly.
3) Check the sensor surface for damage.

Note: There are precision optics and electronics inside the sensor, so please avoid severe mechanical shock.

# ➢ COMMON PROBLEM

| Error | Possible causes | Solutions |
|---|---|---|
| Unstable reading | Connection failure | Reconnect the controller & cables. |
| | Cable failure | Please contact us |
| Measured values are too high, too low, or the values remain unstable | The sensor measurement window is blocked | Cleaning surface |

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