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## Operating Manual

Conductivity meter

M2436

M2436si



M2436



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## Warranty

Mostec warrants this product to be free of manufacturing defects for a 2-year period after the original date of purchase. Within this period, defective products will be repaired free of charge provided that the defect occurred during normal operation. This warranty does not cover damage to the product resulting from ordinary usage such as front panel scratches, broken control elements and corrosion, etc. The customer is responsible for shipping and packing charges for products returned under warranty to Mostec. Mostec warrants this product beyond the 2-year warranty period for an additional 2 years in case of long term damages due to improper manufacturing. Such damages as poorly soldered joints or other assembly problems are also covered by the warranty. Transportation damages are not covered by the warranty and should be referred to the respective delivery service.

## Technical description

The M2436 conductivity meter is mounted in +/-180° turnable, water resistant, stainless steel case. Any commercially available conductivity cell's, K-factor 0.01, 0.1 and 1.0, which cover a dynamic range from 0.01 $\mu$ S to 20mS full scale can be used. The cell is simply assembled to the desired measuring unit and directly attached to the M2436.

The conductivity meter is suitable for water, waste water or ultrapure water conditioning in continuous or batch-type operating modes, for liquid chromatography or for general chemical process monitoring.

Temperature coefficient of the cell is compensated either manually or automatically by a Pt-100 platinum probe within the range of 0°C to 130°C.

The 8x2 LCD character display shows the currently measured conductivity and the process temperature.

These values are available at two galvanic isolated outputs of 0...20mA or 4...20mA.

The M2436 is powered by either 24VAC or DC.

Optionally, all measuring ranges are externally selectable with digital control wires during the measurement process. Two isolated, free limit contacts are also optionally available to control valves or other control elements.

Supply lines and all other lines, either from or to the conductivity meter, are protected by internal noise filters against HF-noise. A cable of either 2m or 5m is used to connect the M2436si signals and power supply.

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<b>Index:</b>	<b>Page</b>
A. Front panel controls	4
B. How to change the cell's K-factor	4
C. How to change the measurement range by menu	4/5
D. How to change the measurement range by external control **	5
E. How to change the temperature compensation to Pt100	6
F. How to change the temperature compensation to manual	6
G. How to change the temperature slope %/°C	6
H. How to change the cell correction factor	7
J. How to change the current output for conductivity	7
K. How to change the current output for temperature	7
L. How to adjust the limit contacts **	8
M. Menu protection with access code	8
N. Error codes	9
O. Technical data	10
P. Dimensions	11

\*\* Note: This function is an option

### A. Font panel controls



### B. How to change the cell's K-factor

Manual setting of the cell's K-factor. Possible factors are C=0.01, C=0.1 and C=1.0 for conductive cell's and C=ind for inductive cell's. The cell's K-factor has higher priority than the measurement range. Depending on the cell's K-factor, only corresponding measurement ranges are available. If the cell's K-factor has changed, the instrument will be set to the smallest possible measurement range automatically.

1. Push and hold the button **ENT**.
  - ⇒ The display is flashing between the actual value and **MENU**.
  - ⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Change to menu **K-FACTOR** by the button **+** or **-**, then press **ENT**.
  - ⇒ The display shows the actual value of the cell's K-factor.
3. Change the value for the cell's K-factor by the button **+** or **-**, then press **ENT**.
4. Press button **ESC** twice.
  - ⇒ the display shows the actual value.

### C. How to change the measurement range by menu

Manual setting of the cell's K-factor. The cell's factor has a higher priority than the measurement range. Depending on the cell's K-factor, only corresponding measurement ranges are available. If the cell's K-factor has changed, the instrument will be set to the smallest possible measurement range automatically.

Available measurement ranges depending on the cell's K-factor:

C=1.0	C=0.1	C=0.01	C=ind
---	2μS	2μS	---
20μS	20μS	20μS	---
200μS	200μS	---	---
2mS	---	---	2mS
20mS	---	---	20mS
---	---	---	200mS
---	---	---	2S

1. Push and hold the button **EN**.
  - ⇒ The display is flashing between the actual value and **MENU**.
  - ⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. press **EN**.
  - ⇒ The display shows the actual value of the measurement range.
3. Change the value for the measurement range by the button **+** or **-**, then press **EN**.
4. Press button **ESC** twice.
  - ⇒ the display shows the actual value.

#### D. How to change the measurement range with externally control wires

Optionally, all measuring ranges are externally selectable with digital control wires during the measuring process.

The measurement range will be set by signals on the connector St2 with external 24V supply and digital control wires.

Depending on the cell's K-factor, only corresponding measurement ranges are available. If the selected cell's K-factor is not possible, the instrument indicates an error code (see chapter M, page 9). If no digital control wires are connected, the instrument select's the internal measurement range automatically.

Available measurement ranges set by external control wires:

St2 (white)	St2 (brown)	St2 (yellow)	St2 (blue)	Range kond.	Range ind.
GND	0V	0V	0V	intern	intern
GND	+24V	+24V	+24V	2uS	2mS
GND	0V	+24V	+24V	20uS	20mS
GND	+24V	0V	+24V	200uS	200mS
GND	0V	0V	+24V	2mS	2S
GND	+24V	+24V	0V	20mS	---

Available measurement ranges depending on the cell's K-factor:

C=1.0	C=0.1	C=0.01	C=ind
---	2μS	2μS	---
20μS	20μS	20μS	---
200μS	200μS	---	---
2mS	---	---	2mS
20mS	---	---	20mS
---	---	---	200mS
---	---	---	2S

### E. How to change the temperature compensation to Pt100

If the M2436 is set to Pt100 and the Pt100 sensor is not connected, damaged, or the temperature is higher than 135°C, the processor internally uses a temperature value of 135°C and the display value is flashing. If the temperature is lower than -10°C, the processor internally uses a temperature value of -10°C and the display value is flashing.

If a inductive cell is used and the temperature is higher than 125°C, the instrument indicates an error code (see chapter M, page 9). Because no correct signals are possible at this high temperature.

1. Push and hold the button **ENT**.
  - ⇒ The display is flashing between the actual value and **MENU**.
  - ⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Change to menu **MAN/AUTO** by the button **+** or **-**, then press **ENT**.
3. Change the value to **AUTO** by the button **+** or **-**, then press **ENT**.
4. Press button **ESC**.
  - ⇒ the display shows the actual value.

### F. How to change the temperature compensation to manual

1. Push and hold the button **ENT**.
  - ⇒ The display is flashing between the actual value and **MENU**.
  - ⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Change to menu **TEMP.MAN** by the button **+** or **-**, then press **ENT**.
  - ⇒ The display shows the actual value of the manual temperature.
3. Change the value for the temperature by the button **+** or **-**, then press **ENT**.
4. Change to menu **MAN/AUTO** by the button **+** or **-**, then press **ENT**.
3. Change the value to **MAN** by the button **+** or **-**, then press **ENT**.
4. Press button **ESC**.
  - ⇒ the display shows the actual value.

### G. How to change the temperature slope %/°C

All liquids have a positive temperature coefficient, expressed in %/°C conductivity change. The higher the temperature the lower the electrical resistance which is equal to higher siemens values. Water has a slope of about 2.25%/°C. The temperature slope should be set in such a way, to display a constant conductivity value when the temperature only changes.

#### *Example:*

The conductivity is 15.5µS at a temperature of 20°C. Now increase the temperature to 30°C, without chemically changing the medium. The conductivity must still show 15.5µS. When the displayed conductivity value changes, the temperature slope requires readjustment.

#### *Measuring the absolute conductivity at 25°C:*

You may switch off the temperature compensation by simply selecting slope 0.0%/°C. The indicated values are now not temperature compensated.

1. Push and hold the button **ENT**.
  - ⇒ The display is flashing between the actual value and **MENU**.
  - ⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Change to menu **SLOPE** by the button **+** or **-**, then press **ENT**.
  - ⇒ The display shows the actual value of the temperature slope.
3. Change the value for the temperature slope by the button **+** or **-**, then press **ENT**.
4. Press button **ESC**.
  - ⇒ the display shows the actual value.

## H. How to change the cell correction factor

If the conductivity cell has a special K-factor outside of K=1.0, K=0.1 and K=0.01, the value can be adjusted with the cell correction factor.

**Factory set value of K is 1.000. If you have to change this value, the calibration of the M2136 is maintained, but the displayed conductivity value is no longer the standard calibration.**

1. Push and hold the button **EN**.  
⇒ The display is flashing between the actual value and **MENU**.  
⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Change to menu **GAIN** by the button **+** or **-**, then press **EN**.  
⇒ The display shows the actual value of cell correction factor.
3. Change the value for the correction factor by the button **+** or **-**, then press **EN**.
4. Press button **ESC**.  
⇒ the display shows the actual value.

## J. How to change the current output for conductivity

The current output relates to the selected measurement range and can be set in the range of 0...20mA.

1. Push and hold the button **EN**.  
⇒ The display is flashing between the actual value and **MENU**.  
⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Change to menu **OUT-LW** by the button **+** or **-**, then press **EN**.
3. Change **ZERO** for the lower current value, or **GAIN** for the upper value by the button **+** or **-**, then press **EN**.
4. Change the value for the current output by the button **+** or **-**, then press **EN**.
5. Press button **ESC** twice.  
⇒ the display shows the actual value.

## K. How to change the current output for temperature

The current output relates to the measurement range of 0...130°C and can be set in the range of 0...20mA.

1. Push and hold the button **EN**.  
⇒ The display is flashing between the actual value and **MENU**.  
⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Change to menu **OUT-TEMP** by the button **+** or **-**, then press **EN**.
3. Change **ZERO** for the lower current value, or **GAIN** for the upper value by the button **+** or **-**, then press **EN**.
4. Change the value for the current output by the button **+** or **-**, then press **EN**.
5. Press button **ESC** twice.  
⇒ the display shows the actual value.

## L. How to adjust the limit contacts

The instrument is available with 2 limit contacts. They can be set over the entire measurement range. If the measurement range changes, the limit contacts for all other measurement ranges will be set to the new value automatically.

⇒ E.g. the measurement range is set to 20.00  $\mu\text{S}$  and the limit contact is set to 10.00  $\mu\text{S}$ . If the measurement range changes to 200.0  $\mu\text{S}$ , the limit contact will be set to 100.0  $\mu\text{S}$ .

1. Push and hold the button **ENT**.
  - ⇒ The display is flashing between the actual value and **MENU**.
  - ⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Change to menu **SP1** for limit contact 1 or **SP2** for limit contact 2 by the button **+** or **-**, then press **ENT**. ⇒ the display shows the actual value.
3. Change the value for the limit contact by the button **+** or **-**, then press **ENT**.
4. Change to menu **HYS1** for limit contact 1 or **HYS2** for limit contact 2 by the button **+** or **-**, then press **ENT**. ⇒ the display shows the actual value.
5. Change the value for the hysteresis by the button **+** or **-**, then press **ENT**.
6. Change to menu **REL1** for limit contact 1 or **REL2** for limit contact 2 by the button **+** or **-**, then press **ENT**. ⇒ the display shows the actual value.
7. Change the value for the switching method of the relays by the button **+** or **-**, then press **ENT**.
  - "**NOR**": Relays ON, when input > limit contact value (normally open)
  - "**INV**": Relays ON, when input < limit contact value (normally closed)
8. Press button **ESC** twice.
  - ⇒ the display shows the actual value.

## M. Menu protection with access code

The contents in the user menus can be protected from unintended access, using an access code. After activating the access code, menu values can be displayed but no longer modified. To modify setpoints and other parameters, the access code has to be set to the value 0. If the code has a value different from 0, writing to the user menu is suppressed. Call Mostec if the access code is lost or unavailable.

Set the access code:

1. Press and hold both buttons **ENT** & **ESC**.
  - ⇒ The display is flashing between the actual value and **MENU**.
  - ⇒ After 3 seconds, the display will show up the program menu **MENU**.
2. Now navigate to the **CODE** menu item with the button **-**, then press **ENT**.
  - a) *A code has already been entered:* The display shows **CODE ON**. Enter now the valid access code with the buttons **+** and **-** and confirm with the **ENT** key. If the code is wrong, the display shows **WRONG!**. If the code is correct, the display shows **CODE OFF** and **0**. It can be modified with the keys **+** and **-**, or in order to make changes to the user menu, set to **0**, then confirm with the **ENT** key.
  - b) *No code has been entered:* The display shows **0**. A code can be entered with the keys **+** and **-**, then confirm with the **ENT** key. If you do not need the user menu protection, leave the value **0** unchanged and quit the menu with the **ESC** key. The entered code should be placed on a safe place to have access to it long time periods later.

## N. Error codes

Error codes with conductive cell and external range control:

With the external range control, the range can be set to a impossible range.

LCD Display:



Reason:

- The range is too low for the corresponding programmed cell's K-factor.

→ current output conductivity = <4, (<0) mA



- The range is too high for the corresponding programmed cell's K-factor.

→ current output conductivity > 22mA

**Select range between 20.00µS and 20.00mS**

Error codes with inductive cell and external range control:

With the external range control, the range can be set to an impossible range. At a measured temperature higher than 125.0°C, no accurate measurement is possible anymore.

LCD Display:



Reason

- The range is not possible for the corresponding programmed cell's K-factor.

→ current output conductivity > 22mA

**Select range with digital control wires!**

**Lower or cool down the medium temperature!**

## O. Technical Data

Measuring ranges:	0...2.000 $\mu$ S (K=0.1, K=0.01) 0...20.00 $\mu$ S (K=1.0, K=0.1, K=0.01) 0...200.0 $\mu$ S (K=1.0, K=0.1) 0...2.000mS (K=1.0) 0...20.00mS (K=1.0)
Display:	8x2 character LCD display with grey characters and a yellow back light Viewing area: 36.0mm x16.00mm, character size: 2.945mm x5.545mm
Working temperature range:	-5 to +45°C
Accuracy:	0.5%
Reproducibility:	<0.2%
Measuring frequency:	80Hz and 7kHz
Measuring amplitude:	70/150mV, conductive cell only
Step response:	Time between a conductivity change from 0% to 100% or reverse measured between 10% and 90% = 4 seconds
Input protection:	virtual zero, protected by diodes
Temperature compensation:	manual from 0 to 130°C, automatic by an external Pt-100 platinum sensor, 2 or 3-wire
Temperature slope:	0.00%/°C (=without compensation) to 8.00%/°C. Selectable in all measuring ranges
Conductivity of water:	The self conductivity of ultra pure water is measured and temperature compensated
Reference temperature:	25°C
Cell connection:	The cell is directly assembled to the M2436 over a temperature restraining, +/-180° turnable polyamide tube.
Option current output:	2 x 0/4...20mA, galvanically isolated
Max. load:	500 $\Omega$
Output impedance:	>1M $\Omega$ typical
Device settings:	with push buttons, see operating manual
options:	measuring ranges, cells K-factor, temperature slope, current outputs
Power supply:	24VAC/DC
Power supply load:	1.5 to 2.5W at 24VDC
CE-conformity:	fulfilled
Connection cable:	90° angle plug with PVC cable length: 2m, 5m or other sizes on request
Thread:	3/4" cylindrical gas, with O-ring, adapters on request
Case:	splash water proof, in stainless steel 1.4301
Weight:	500g
Warranty:	2 years
Compatible coils:	type M8836s and M8836si, others on request
Options:	- customer specified functions - customer specified cells - other power supply - other output signal - 2 limit contacts - externally configurable measuring range

### Terminal description standard version (without limit contacts and externally configurable measurement range):

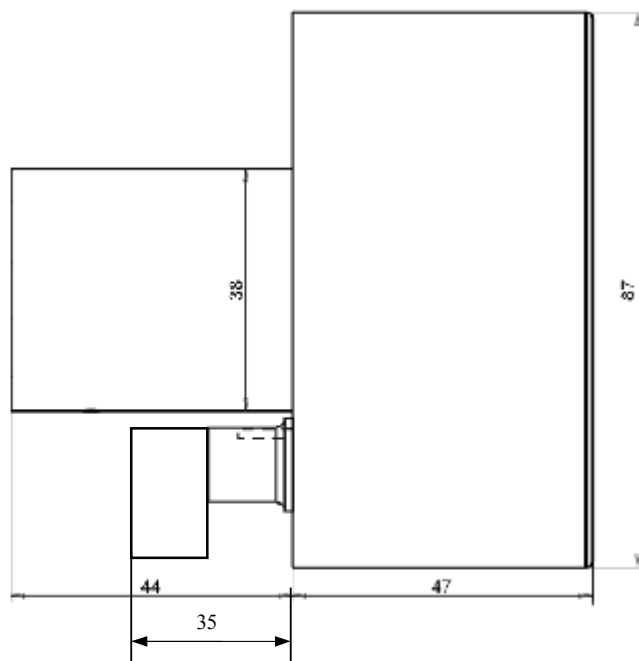
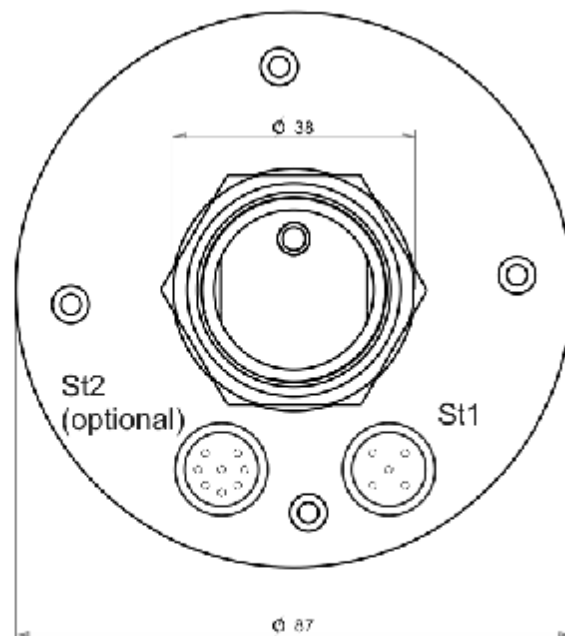
Waterproof 5-pin connector St1:	1 = current output (-) for pin 2 and 3 (brown)
	2 = conductivity current output (+) (white)
	3 = temperature current output (+) (blue)
	4 = supply voltage: AC~/DC(-) (black)
	5 = supply voltage: AC~/DC(+) (grey)

### Terminal description for version with 2 limit contacts and externally configurable measurement range:

Waterproof 8-pin connector St1:	1 = conductivity current output (+) (white)	5 = supply voltage: AC~/DC(+) (grey)
	2 = current output (-) for pin 1 and 7 (brown)	6 = limit contact 1 c.o. (red)
	3 = limit contact 1 n.o. (green)	7 = temperature current output (+) (blue)
	4 = supply voltage: AC~/DC(+) (yellow)	8 = limit contact 1 n.c. (pink)
c.o. = change over		
n.o. = normally open		
n.c. = normally closed		
Waterproof 8-pin connector St2:	1 = range configuration (GND) (white)	2 = range configuration (+24V) (brown)
	3 = limit contact 2 n.o. (green)	4 = range configuration (+24V) (yellow)
	5 = n.c. (gray)	6 = limit contact 2 c.o. (red)
	7 = range configuration (+24V) (blue)	8 = limit contact 2 n.c. (pink)

### Setting the range by external control wires:

St2(white)	St2(brown)	St2(yellow)	St2(blue)	range, inductive
GND	0V	0V	0V	internal
GND	+24V	+24V	+24V	2 $\mu$ S
GND	0V	+24V	+24V	20 $\mu$ S
GND	+24V	0V	+24V	200 $\mu$ S
GND	0V	0V	+24V	2mS
GND	+24V	+24V	0V	20mS

**K. Dimensions (mm)***Side view**Bottom view*