

INSTRUCTION MANUAL

TU 7685

TURBIDITY METER

MICROPROCESSOR BASED

Valid for the 091.3713 option

Scales: 0/4/40/400 NTU
 0/40/400/4000 NTU
 0/99/999 ppm – mg/l
 0/99/999/9999 ppm – mg/l

OPTION _____
S/N _____
REP N° _____

Power supply: 110/220 Vac
Software: R2.0x



Index

1	PRODUCT PRESENTATION	3
1.1	Principle of operation	3
1.2	Sensors and accessories	4
2	FEATURES	5
3	SPECIFICATIONS	6
3.1	Functional specifications	6
3.2	Technical specifications	9
3.3	Turbidity flow cell and probes specifications	13
3.4	Physical specifications	13
4	SOFTWARE DESCRIPTION	14
4.1	Readout sequences	15
4.2	Calibration sequences	20
4.2.1	Automatic/manual mode	20
4.2.2	Zero and Sensitivity adjustment	21
4.2.3	Check signal calibration	24
4.2.4	Set-point A/B calibration	26
4.2.5	Alarm calibration	27
4.2.6	Cleaning function calibration	29
4.3	Visualizations	31
4.4	Configuration	32
4.4.1	Keyboard locked/unlocked	32
4.4.2	LCD display contrast	32
4.4.3	Access number	33
4.4.4	Measuring unit	33
4.4.5	Measuring range	33
4.4.6	Measuring scale	33
4.4.7	Autorange	33
4.4.8	Software filter large	33
4.4.9	Software filter small	33
4.4.10	Check signal	34
4.4.11	Analog output n°1 range	34
4.4.12	Analog output n°2 range (only for option 091.3713)	34
4.4.13	Set-point A function	35
4.4.14	Set-point B function	35
4.4.15	Set-point A alarm	35
4.4.16	Set-point B alarm	35
4.4.17	Alarm for external light too high	36
4.4.18	C relay contacts	36
4.4.19	Cleaning function	36
4.4.20	New access number	37

5	INSTALLATION	38
5.1	Hydraulic installation.....	38
5.2	Turbidity probe installation	38
5.3	Controller installation.....	39
5.4	Electrical installation	39
6	OPERATING THE SYSTEM	41
7	CALIBRATION.....	44
7.1	Calibration with formazine	45
7.2	Calibration with compariosn method.....	45
8	PREVENTIVE MAiNTENANCE	46
	WARRANTY CERTIFICATE	50
	REPAIR	50
	TECHNICAL SUPPORT	51

1 PRODUCT PRESENTATION

The turbidity system is composed by:

In flow application

- Turbidity monitor TU 7685
- Turbidity probe TU 810 (ISO 7027 – EN 27027)
- Flow cell TU 910

Immersion application

- Turbidity monitor TU 7685
- Turbidity probe TU 8182 (ISO 7027 – EN 27027)

The monitor will perform the following functions:

- 1) Turbidity readout
- 2) Messages/alarm in case of dirty lens, dry cell, external light too high
- 3) Dual control relay
- 4) Min/max alarm
- 5) Analog output
- 6) RS232 output (option)

1.1 PRINCIPLE OF OPERATION

The turbidity and suspended solid measurement follows the nephelometric method.

A light beam is sent in the sample through an optical lens.

The 90 degree scattered light by suspended particle is collected by the probe through a second lens, detected and converted in an electric signal proportional to the turbidity of the sample.

The probes TU 810, TU 8105 and TU 8182 use an infrared light and the measuring is not effected by the color of the sample.

The turbidity probes include:

- IR light source (ISO version),
- detector of the light diffused by suspended particles,
- detector of the control signal from the surface of the lens,
- preamplifier that allows the monitor connection up to 100 m distance.

1.2 SENSORS AND ACCESSORIES

To be ordered separately:

Turbidity probes



TU 810
TU 8105

*turbidity probe for in flow measuring. PVC body
turbidity probe for in flow measuring. PVDF body*



TU 8182

immersion turbidity probe with autoclean nozzle

Accessoires for TU 810 and TU 8105



TU 910

flow cell for TU810 - TU8105

SZ 9481
SZ 9483

*10 m cable + 2231520 connector
30 m cable + 2231520 connector*



1892702
1892706
2713118

*PVC adapter for in-line installation
PDF adapter for in-line installation
O.R. for 1892702 and 1892706*

Accessories suitable for TU 8182

0012.450043
0012.000624
0012.440040

*adapter for extension pipe 1" NPT
swivel mounting + adapter 0012.450043
33 m plastic tubing for pressure air*

Various



BC 931.2
BC 931.3

*IP65 enclosure for one unit
IP65 enclosure for two units*

2 FEATURES

- * Input from amplified probe TU810 – TU8105 or TU8182
- * Selectable scales: 0/4/40/400 NTU
0/40/400/4000 NTU
0/99/999 ppm – mg/l
0/99/999/9999 ppm – mg/l
- * Autoranging
- * Automatic zeroing during the dark cycle
- * Automatic zero calibration
- * Sensitivity calibration
- * Check signal of the lens operating conditions
- * Alphanumeric back-lighted LCD
- * Dual software filter on the readout
- * Automatic, manual operating mode
- * 0/20 mA or 4/20 mA programmable isolated output
- * Output span programmable
- * Dual set-points with hysteresis, delay and min/max programmable functions
- * Alarms relay continuous or flashing for:
Min/max values
Set-points timing
Dirty probe
No liquid on the cell
Ambient light too high
- * Autoclean relay with holding function
- * Software:
 - 3 access levels
 - user friendly
 - keyboard lock
 - watch-dog
- * EEPROM parameter storage
- * Automatic overload protection and reset
- * Extractable terminal blocks
- * 96X96 (1/4" DIN) housing

3 SPECIFICATIONS

3.1 FUNCTIONAL SPECIFICATIONS

Input

The monitor is designed to operate with infrared light probes TU 810 – TU 8105 – TU 8182. The light is pulsed and the unit makes an automatic zero in each dark cycle. The above probes include a preamplifier that allows an installation up to 100 meter distance.

Selectable scales

0/4/40/400 NTU or 0/40/400/4000 NTU
0/99/999 ppm – mg/l or 0/99/999/9999 ppm – mg/l

The autorange function can be activated.

Software filter

The unit is provided with a dual programmable software filter, to be inserted when the readout is not stable. The user may select different filter values for small and large signal fluctuations, in order to maintain a steady reading and a fast response to the process measuring variations.

Calibration

The unit recognizes automatically the turbidity standard solutions. The operator may calibrate at any turbidity value. The zero calibration is performed in automatic mode

Analog output

Either a 0/20 mA or 4/20 mA programmable and isolated output may be selected, for use as an interface with computers or data loggers. The input range corresponding to the output is programmable. The user can adjust the analog output in order to match the PLC input specifications.

Control relays

The monitor is equipped with two SPDT control relays. Each control relay may be programmed for set-point, high/low, hysteresis or delay time actuation. The main display indicates the current settings and current status of each relay.

Alarm relay

The unit contains a SPST relay designated as an alarm relay. This relay may be used to warn of conditions that may indicate operational problems.

The relay will activate on either high/low value conditions, or on failure of the control relays to maintain proper control.

In addition this relay may be activated for dirty probe, lack of water in the cell and external light too high.

The relay action can be programmed for continuous or flashing operation.

The flashing frequency be selected high/medium/low.

Check signal

The operator may activate the check signal which detects the surface condition of the lens.

This signal should be calibrated at 100% when the probe is clean.

In general the signal decreases with the increasing of the dirt on the lens surface and it increases when the cell is dry or with air bubble inside.

The operator may set min/max values in order to get an alarm for the above conditions.

Operating mode

The instrument is provided with 3 programmable modes of operation.

- Automatic operation (AUTO):

The Automatic mode is the normal operation mode of the unit.

- Manual operation (MAN.):

The relays action is activated by pressing the key  or  assigned to the specific relay.

The measuring, alarm, analog output and calibration functions are active.

Cleaning function

The unit contains a SPST relay designated as an autoclean relay.

This relay may be used to start a manual or automatic autoclean cycle.

The user may select:

- the cleaning time
- the waiting time to turn to the normal operation
- the repetition time of the cycle

During the cleaning and waiting the unit will provide:

- flashing messages
- analog outputs in hold
- control and alarm relays deactivated

Configuration

A number of programming functions are provided in the configuration menu and are protected by a selectable access number, which must be entered to allow changes in this setting.

The keys on the front panel of the monitor can be used for both changing the display and for calibrations and set-point adjustments.

When the monitor is shipped, all functions are accessible.

However, the adjustment and calibration functions may be locked in order to prevent unauthorized adjustments to the instrument.

Options

091.3711 Dual isolated and programmable output.
Two outputs may be configured for concentration or temperature.

091.701 RS232 isolated output.
The output sends the data to the serial port of the computer.

091.404 24 VAC power supply.

091.4141 9/36 VDC power supply

3.2 TECHNICAL SPECIFICATIONS

The *Default* values are correspondent to the factory calibration values.
 Parameters marked by " * " can be modified in the Configuration procedures.

OPERATING MODE	<i>Default</i>
Automatic/Manual	Auto
TURBIDITY READOUT	<i>Default</i>
* Measuring unit: NTU - mg/l - ppm	NTU
* Range: Range LO : 4/400 NTU - Range LO : 9/999 ppm - Range LO : 9/999 mg/l	4/400 9/999 9/999
Range HI : 40/4000 NTU - Range HI : 99/9999 ppm - Range HI : 99/9999 mg/l	40/4000 99/9999 99/9999
* Input scales (depending of selected range): Range 4/400 NTU - 9/999 ppm - 9/999 mg/l 0/4.000 - 0/40.00 - 0/400.0 NTU 0/9.999 - 0/99.99 - 0/999.9 ppm SiO ₂ 0/9.999 - 0/99.99 - 0/999.9 mg/l SiO ₂ Range 40/4000 NTU - 99/9999 ppm SiO ₂ - 99/9999 mg/l SiO ₂ 0/40.00 - 0/400.0 - 0/4000 NTU 0/99.99 - 0/999.9 - 0/9999 ppm SiO ₂ 0/99.99 - 0/999.9 - 0/9999 mg/l SiO ₂	4.000 NTU 9.999 ppm 9.999 mg/l 4000 NTU 9999 ppm 9999 mg/l
Resolution: 0.05% of scale	
* Auto ranging: Off/On	On
Software filter 90% RT: * Large signals: 5/220 seconds * Small signals: 5/220 seconds	40 s 120 s
Automatic zero of the probe: 0.0/10.0% f.s.	0.0%
Sensitivity of the Range 4/400 NTU: 80.0%/120.0% Sensitivity of the Range 40/4000 NTU: 80.0%/120.0%	100 % 100 %
Standard solutions recognized by the unit: 2.000NTU - 20.00 NTU - 200.0 NTU - 2000 NTU 5.000PPM - 50.00 PPM - 500.0 PPM - 5000 PPM 5.000mg/l- 50.00 mg/l- 500.0 mg/l- 5000 mg/l SiO ₂	

CHECK SIGNAL	<i>Default</i>
* Check signal readout: On/off	On
Measuring value: 0.0%/220.0%	
Sensitivity: 50.0%/200.0%	100.0%
Alarm for dirty probe: 0.0%/100.0%	10.0%
Alarm for lack of liquid in the cell: 100.0%/200.0%	200.0%
Delay: 0.0/99.9 sec.	10.0 sec.
Alarm conditions: in OR on relay C	
SET POINT A/B(relays A and B)	<i>Default</i>
Action: ON-OFF	
Set point value: 0 to full scale as selected (NTU, ppm, mg/l)	0 NTU
Hysteresis: 0/10 % of the scale (NTU, ppm, mg/l)	0.010 NTU
Relay delay: 0.0/99.9 sec.	0.0 sec.
* Function: HI/LO (Max/min)	LO
Relay contacts: SPDT 220 V 5 Amps resistive load	
ALARM (relay C)	<i>Default</i>
Low value: from 0 to full scale	0.000 NTU
High value: from 0 to full scale	4.000 NTU
* Alarm on max. SA: ON/OFF	OFF
* Max. time SA: 0/60 minutes	60 m
* Alarm on max. SB: ON/OFF	OFF
* Max. time SB: 0/60 minutes	60 m
* Alarm on external light too high: ON/OFF	OFF
Delay: 0.0/99.9 seconds	0.0 s
* Contact type: ACT/DEA (DEA needs an internal jumper)	ACT
Relay contacts: SPDT 220 Vac 5 Amps resistive load	
AUTOCLEAN (relay D)	<i>Default</i>
* Action: Off/Manual Clean/Auto+Manual Clean	Off
Auto Clean (Manual):	
Repetition of cycle: 0.1/24.0h (only for Auto)	24.0h
* Cleaning time: 0.5/60.0 sec.	15.0 sec.
* Holding time: 0.1'/20.0' (to be added to the cleaning time) (analog output in holding, A,B,C relays deactivated)	3'
Relay contacts: SPST (N.O.)	
ANALOG OUTPUT Nr. 1	<i>Default</i>
* Range: 0-20/4-20 mA	0-20 mA
* Point 1 (out 0 or 4 mA): 0 to full scale (NTU, ppm, mg/l)	0.000 NTU
* Point 2 (out 20 mA): 0 to full scale (NTU, ppm, mg/l)	4.000 NTU
Response time: 10 sec. for 98%	
Isolation: 250 Vac	
R max: 600 Ω	

ANALOG OUTPUT Nr. 2 (option 091.3711)	Default
* Range: 0-20/4-20 mA	0-20 mA
Fine adjustment of 0/4 mA: +/- 0.30 mA	0.0 mA
* Point 1 (out 0 or 4 mA): 0 to full scale (NTU, ppm, mg/l)	0.000 NTU
* Point 2 (out 20 mA): 0 to full scale (NTU, ppm, mg/l)	4.000 NTU
Response time: 10 sec. for 98%	
Isolation: 250 Vac	
R max: 600 ohm	

SERIAL COMMUNICATION (option 091.701)

Baud Rate: 4800 bit/s
Bit length: 8 bit
Nr. of Stop bit: 1
Parity: none
Isolated from measure circuits
Data frequency: at each readout update

Data format:

$\pm x.xxx$ NTU $\pm xxxx.x$ % If check signal is ON

If check signal is OFF

followed by characters CR LF.

24 VAC POWER SUPPLY (option 091.404)

Voltage: 24 Vdc +/-10 % 50/60 Hz
Power: 5 VA max

9/36 VDC POWER SUPPLY (option 091.4141)

Voltage: da 9 a 36 Vcc
Power.: 4 W max
Current max: 320 mA a 12 Vcc
160 mA a 24 Vcc
Isolation I/O: 1500 Vcc

CONFIGURATION (*)	<i>Default</i>
Free calibration (Access code not required):	
Keyboard locked/unlocked	unlocked
LCD contrast (0/7)	4
Access code number required for:	0
Measuring unit: NTU, ppm, mg/l SiO ₂	NTU
Range: 4/400 NTU, 40/4000 NTU	4/400 NTU
Scales: 4.000/40.00/400.0/4000	4.000 NTU
Autorange: On/Off	On
Large signal RT filter SW: 5/220 seconds	40 s
Small signal RT filter SW: 5/220 seconds	120 s
Check signal: on/off	On
Output Nr.1 range: 0/20 4/20 mA	0/20 mA
Point 1 (for 0 or 4 mA): 0 to full scale	0.000 NTU
Point 2 (for 20 mA): 0 to full scale	4.000 NTU
Output Nr.2 range: 0/20 4/20 mA (option 091.3711)	0/20 mA
Point 1 (for 0 or 4 mA): 0 to full scale	0.000 NTU
Point 2 (for 20 mA): 0 to full scale	4.000 NTU
Relay A function: LO/HI	LO
Relay B function: LO/HI	LO
Alarm on max. operating time of SA: ON/OFF	OFF
Max. operating time of SA: 0/60 minutes	60 min
Alarm on max. operating time of SB: ON/OFF	OFF
Max. operating time of SB: 0/60 minutes	60 min
Alarm on external light too high: (ON/OFF)	OFF
Delay: 0/99 seconds	10.0 s
Alarm relay status: ACT/DEA	ACT
Cleaning function: Auto/Manual/Disabled	Disabled
Cleaning time: 0.5/60.0 seconds	15.0 s
Holding time: 0.1/20.0 minutes	3.0 min
Access number: 0/999	0

GENERAL SPECIFICATIONS

Alphanumeric display: 1 line x 16 characters
 Acquisition time: 0/50°C
 Temperature: 0/50 °C
 Humidity: 95% without condensation
 Power supply: 110/220 Vac +/- 10 % 50/60 Hz
 Isolation: 4000 V between primary and secondary (IEC 348)
 Power: 5 VA max.
 Terminal block: extractable
 Enclosure: aluminum IP 54, panel mounting
 Weight: 850 g
 Dimensions: 96 x 96 x 155 mm. (DIN 43700)

3.3 TURBIDITY FLOW CELL AND PROBES SPECIFICATIONS

See the specific instruction manual delivered with the flow cell and the turbidity probes.

3.4 PHYSICAL SPECIFICATIONS

The controller enclosure is designed for surface or panel mounting.

It consists of an anodized aluminum case built according to the standard DIN 43700, with an aluminum panel coated with scratch-proof and non-corrosive polycarbonate membrane.

Signal and power cable connections are made by using two special extractable terminal blocks placed in the back of the instrument.

The package is supplied complete with fixing clamps for panel-mounting.
A transparent front door SZ 7601 can be added to protect the unit.

4 SOFTWARE DESCRIPTION

KEY	FUNCTION
	<ul style="list-style-type: none"> - It allows the operator to go to the next Display - It allows to go back to the main Display. The eventual new parameter values will not be memorized
	<ul style="list-style-type: none"> - It allows the access of calibration sequences
	<ul style="list-style-type: none"> - It allows to increase the displayed parameters - It allows to choose between different functions
	<ul style="list-style-type: none"> - It allows to decrease the displayed parameters - It allows to choose between different functions
	<ul style="list-style-type: none"> - It allows to enter the selected data and to return to the main Display D0

4.1 READOUT SEQUENCES

Applying the power to the instrument the display will show the Ion selected for approximately 3 seconds, then will show the main display (DO).

Turbidity meter

MODE
DISP

Press **MODE** to visualize the following Display:

D0	xx.xxNTU <input type="checkbox"/> AL <input checked="" type="checkbox"/> BL	Main display, relay status/functions
D1	xx.xxNTU	Turbidity value
D2	CHECK C.: xxx.x%	Check signal value
D3	SA xx.xxNTU * <input checked="" type="checkbox"/> LO	Set-point A parameters
D4	SB xx.xxNTU * <input type="checkbox"/> HI	Set-point B parameters
D5	AL x.x/xx.xNTU	Alarm parameters
D6	CLEANING OFF	Cleaning parameters
D7	01 xx.xmA/x.xxx	Analog output Nr.1/input values
D8	02 xx.xmA/x.xxx	Analog output Nr.2/input values
D9	Configuration	Configuration display
D10	TU7685 R2.0x	Instrument P/N and software release

(D0)

concentration value,
set-point status/functions

xxx.xNTU: turbidity value

□: relay A deactivated

■: relay A delayed

■: relay A activated

B: relay B status

L: minimum function (LO)
H: maximum function (HI)MESSAGE(">>>>)
(M flashing)
"CLEANING"
"HOLDING "FUNCTIONover range
manual operating mode
cleaning cycle in duty
unit in holding(flashing values)
"ALARM: MEASURE"
"ALARM: SET A"
"ALARM: SET B"
"ALARM: DRY CELL"
"ALARM: FOULING"
"ALARM: EXT.LIGHT"alarm condition
measuring in alarm
set point A in alarm
set point B in alarm
dry cell
dirty probe
external light too high

press to go to the next alarm message if the unit is in alarm



to activate the procedure of the manual/automatic mode selection



to go to

(D1)



turbidity display

xx.xx NTU: turbidity value and measuring unit



to activate the calibration sequence



to go to

 (D2) **CHECK C. : xxx.x%**

check signal display

CHECK C.: check control signal
 xxx.x%: check signal value in %

CAL

to activate the check signal calibration sequence

**MODE
DISP**

to go to

(D3) **SA xx.xxNTU *■ LO**

set-point A display

SA: set-point A parameters
 xxx.xNTU: set-point value
 ■: set-point A status (relay activated)
 LO: selected function (minimum)
 *: alarm function on set-point A is activated

CAL

to activate the set-point value, hysteresis and delay time programming sequences

**MODE
DISP**

to go to

(D4) **SB xx.xxNTU *□ HI**

set-point B parameters

SB: set-point B parameters
 xxx.xNTU: set-point value
 □: set-point B status (relay activated)
 HI: selected function (maximum)
 *: alarm function on set-point B is activated

CAL

to activate the set-point value, hysteresis and delay time programming sequences

**MODE
DISP**

to go to

(D5) **AL x.x/xx.xNTU** Alarm parameters display

AL: turbidity values alarm (NTU)
 x.x: low alarm value
 xx.x: actual high alarm value

CAL

to activate the alarm values programming sequences

**MODE
DISP**

to go to

(D6) **CLEANING OFF** auto clean parameters display

OFF: auto clean disabled
 (MANUAL CLEAN): manual cleaning
 (AUTO CLEAN): automatic cleaning

CAL

to activate the parameters calibration

**MODE
DISP**

to go to

(D7) **01 xx.xmA/x.xxx** analog output Nr.1/input values

01: analog output Nr.1
 xx.xmA: analog output value (mA)
 x.xx: input measuring value

**MODE
DISP**

to go to

(D8) **02 xx.xmA/x.xxx** analog output Nr.2/input values
 (only option 091.3711)

02: analog output Nr.2
 xx.xmA: analog output value (mA)
 x.xx: input measuring value



to go to

(D9)



configuration display



to activate the programming sequences of keyboard lock/unlock, display contrast, visualization and modification of the instrument configuration parameters



to go to

(D10)



instrument P/N and software release



to go back to the main display (D0).

4.2 CALIBRATION SEQUENCES

The following procedures will be active whenever the instrument is not in the keyboard lock condition.

To unlock the keyboard follow the procedures mentioned in the "Configuration" chapter.

The following procedures allow the sensor calibration, the set-point and alarm parameters programming.

The sequence (1, 2,) helps the operator to perform the regular calibration sequence.

IMPORTANT NOTE: during the calibration procedure the microprocessor turn the unit to the main display if no keys have been pressed within 5 minutes.

4.2.1 AUTOMATIC/MANUAL MODE

Normally the instrument works in automatic mode.

Follow this procedure to change operating mode.

1.  to go to

(D0)

xx.xxNTU □AL ■BH
2.  to access the operating mode selection
3.  to select the operating mode

CAL MODE: AUTO

CAL MODE: MANUAL
4.  to go back to (DO)
4.  to confirm the selected operating mode and to go back to (DO)

The unit will send the message:

UPDATE

If MANUAL has been selected, the unit will maintain active the analog output and the alarm relay.



press to activate the A relay



press to activate the B relay

4.2.2 ZERO AND SENSITIVITY ADJUSTMENT

Perform this calibration periodically and during the installation.

The unit will adjust the zero on the 3 scales of the selected range. The operator must confirm the calibration value for each scale.

The sensitivity adjustment is done by changing the turbidity value on the display.

Notes:

- Press to access the calibration sequence and the previous visualization of the value to be adjusted.
- Press again to access the parameter adjustment.
- Press to exit from the procedure and to turn to (D1).

Zero adjustment

1. to go to



(D1)

xx.xx: actual turbidity value

2. to access the calibration sequence

ZERO C. : xx.x %

zero visualization

xx.x %: zero value in % of the scale

3. to access to the zero calibration

CAL ZEROx: xx.x%

x: actual scale (1, 2, 3)

xx.x%: zero value in % of the scale

The instruments is ready to perform the zero calibration of the 3 scales verifying the readout stability.

4. Choose one of the following options:



to exit from the procedure and to turn to ·D1·



to go to the next scale



press the 3 keys to turn to the factory calibration

MESSAGE

UPDATE

data are memorized

$z > 10\% \text{ ON } x$

zero > 10% of range x (1 to 3)

The unit turn to the sensitivity calibration sequence.

Sensitivity adjustment

SENS: xxx.x %

sensitivity visualization

SENS: sensitivity calibration sequence

xxx.x %: sensitivity value of the probe



to exit from the procedure and to turn to (D1)



to enter the value and to turn to (D1)

1.



to access the sensitivity calibration

CAL SENS: xxx.x %

CAL S: sensitivity calibration

xx.xxNTU: turbidity value

(xx.xxSTD): standard solution values as recognized by the unit.

Notes

The unit try to recognize the value of the Standard solution in order to perform the calibration. If the solution is recognized the display will show the value followed by the message STD.

Standard solution automatically recognized by the unit:

2.000 NTU - 20.00 NTU - 200.0 NTU - 2000 NTU

5.000 PPM - 50.00 PPM - 500.0 PPM - 5000 PPM

5.000 mg/l - 50.00 mg/l - 500.0 mg/l - 5000 mg/l



to exit from the procedure and to turn to (D2)



press 3 keys to turn to the Factory calibration

2. insert the value if it is different of the recognized value



3 to enter the new value and to turn to (D2)

MESSAGE

UPDATE

Data are memorized

SENS > 120.0%

Sensitivity > 120.0%

SENS < 80.0%

Sensitivity < 80.0%

NO UPDATE

Data are not memorized

4.2.3 CHECK SIGNAL CALIBRATION

After the cleaning of the lens of the probe, we suggest to adjust the check signal at the value 100%.

1.  to go to

(D2)

CHECK C.: xxx.x%

2..  to access the calibration sequence

CAL C.: xxx.x%

CAL C.: check signal calibration sequence
xxx.x%: sensitivity value of the check signal

 to exit from the procedure and to go to (D2)

 +  +  press 3 keys to turn to Factory calibration

3.  to turn to 100 % the Sensitivity

4.  to enter the new value and to go to next step

MESSAGE

UPDATE

Data are memorized

SENS > 200.0%

Sensitivity > 200.0%

SENS < 50.0%

Sensitivity < 50.0%

NO UPDATE

Data are not memorized

The unit will turn to this display:

FOULING: xx.x%

FOULING: dirt level

xx.x%: minimum alarm value for dirty probe



to exit from the procedure and turn to (D2)



5. to modify the alarm value



6. to enter the new value and to turn to next step

The unit will turn to this display:

DRY CELL: xxx.x%

DRY CELL: cell without liquid

xxx.x%: maximum alarm value for the dry cell



to exit from the procedure and turn to (D2)



7. to modify the alarm value



8. to enter the new value and to turn to next step

The unit will turn to this display:

DELAY: xx.x S

DELAY: delay adjustment

xx.x S: actual value of the delay of the alarm



to exit from the procedure and turn to (D2)

9.  to modify the delay value

10.  to enter the new value and to turn to (D2).

4.2.4 SET-POINT A/B CALIBRATION

For each A or B set-point it is possible:

- to insert the set-point
- to insert the hysteresis
- to insert the delay time

1.  to go to

(D3) 

(D4) 

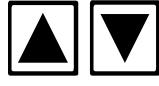
Set-point value

2.  to access the calibration sequences



CAL SA S: set-point A calibration
xx.xx: set-point value

 to exit from the procedure and to go back to (D3)/(D4)

3.  to insert the set-point value

4.  to confirm and to go to the next step



CAL SA I: hysteresis calibration of set-point A
x.xx: actual hysteresis value



to exit from the procedure and to go to (D3)/(D4)

5. to insert the hysteresis value

6. to confirm and to go to the delay time insertion



x.xs: actual delay time value



to exit from the procedure and to go to (D3)/(D4)

7. to insert the delay time value

8. to confirm and to go back to (D3)/(D4)

UPDATE

The calibration is accepted

4.2.5 ALARM CALIBRATION

The following operations are possible:

- to select the min/max alarm value
- to select the delay time value

1. to go to

(D5)

AL x.x/xx.xNTU

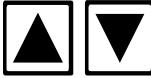
2.  to access the calibration sequences

CAL AL L: xx.xx

CAL AL L: low alarm calibration
xx.xx: actual low alarm value



to exit from the procedure and to go to (D5)

3.  to insert the alarm value



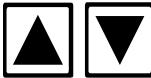
4. to confirm and to go to the high alarm insertion

CAL AL H: xx.xx

CAL AL H: high alarm calibration
xx.xx: high alarm value



to exit from the procedure and to go to (D5)

5.  to insert the alarm value



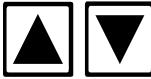
6. to confirm and to go to the delay time selection

CAL AL D: xx.xs

CAL AL D: delay alarm calibration
xx.xs: delay time value



to exit from the procedure and to go to (D5)

7.  to insert the delay value



8. to confirm and to go back to (D5)

“ UPDATE “

Data are memorized

4.2.6 CLEANING FUNCTION CALIBRATION

1.  to go to

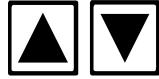
(D6)
CLEANING OFF
Cleaning function display
2.  to access to the following configuration parameters

MANUAL CLEAN

The following display will be shown:

CLEAN C. :WAITING

CLEAN C: cleaning function calibration
WAITING: the unit is waiting for the new cycle
(START): the unit is ready to start a manual cleaning cycle

1.  to exit from the procedure and turn to (D6)
2.  select START or WAITING
- 3A.  to enter the new parameter
 - by confirming WAITING the unit will turn to (D6)
 - by confirming START the unit will turn to (D0) and a cleaning cycle will start.

AUTO CLEAN

The following display will be shown:

NEXT CYCLE:xx.xh

NEXT CYCLE: next cleaning cycle
xx.xh: time to go to next cycle (hours)

1.  to exit from the procedure and to turn to (D6)



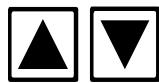
press 3 keys to reset the waiting time to next cycle

3B.  to visualize the waiting time to next cycle

CLEAN C.:WAITING

WAITING: the unit is waiting for the new cleaning cycle
(START): the unit is ready to start a new cleaning cycle

4B.  to exit from the procedure and to turn to (D6)



select START or WAITING

5B.  to enter the new parameter

- by confirming START the unit will turn to (D0) and a manual cleaning cycle will start.

- by confirming WAITING the unit will turn to the insertion of the repetition time of the cycle.

REPETITION:xx.xh

REPETITION: repetition of the cycle
xx.xh: repetition time (hours)



to exit from the procedure and to turn to (D6)

6B.  to insert the repetition time

7B.  to enter the new value and to turn to (D6)

UPDATE

The calibration is accepted

Note

If during any calibration procedure any key is not pressed within 5 minutes, the unit will turn to the previous display.

Eventual changing will not be memorized.

4.3 VISUALIZATIONS

The D7, and D8 display allows the analog output current visualization.

The D9 display allows the configuration parameter visualization and the access to modify.

The D10 display visualizes the software release and the p/n of the instrument.



press the key 7 times from display D0 to go to D7

·D7·

01 xx.xmA/x.xxx

Output N°1/ NTU value

01: data are referred to the output N° 1

xx.xmA : actual current value

x.xxx: actual measuring value



press the key 8 times to go to D8

·D8·

02 xx.xmA/x.xxx

Output N°2/ NTU value (091.3713 only)

01: data are referred to the output N° 2

xx.xmA : actual current value

x.xxx: actual measuring value



press the key 9 times from D0 to go to D9

·D9·

Configuration

Configuration display



attiva le sequenze di selezione del blocco/sblocco tastiera, del contrasto

del display, di visualizzazione e modifica della configurazione



press the key 10 times from D0 to go to D10

·D10·

TU7685 R2.ox

p/n and software release



to turn to ·D0·



to turn to ·D0·

4.4 CONFIGURATION

The following operations are possible:

- keyboard locked/unlocked selection
- display contrast selection
- access number insertion

1.  to go to
(D9) 
Configuration
2.  to access the configuration sequences

Note: Inside the Configuration menu, it is possible to use the following keys and functions.

3.  to go back to (D9)
3.  to select one of the possible choices
4.  to confirm the desired choice.

After showing the following display, the controller moves to the next step.



4.4.1 KEYBOARD LOCKED/UNLOCKED



UNLOCKED: keyboard unlocked
LOCKED: keyboard locked

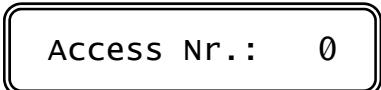
4.4.2 LCD DISPLAY CONTRAST



x: contrast level

This procedure allows You to select up to 7 different levels of display contrast.

4.4.3 ACCESS NUMBER

Access Nr.: 0

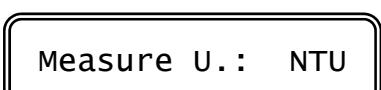
0: access number request

IMPORTANT NOTE:

Any number, different from the correct access code, will allow the visualization of the parameters but not the modification of the same. In this case, the following message will appear.

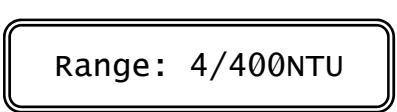
cal inhibition

4.4.4 MEASURING UNIT

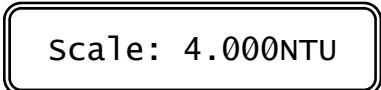
Measure U.: NTU

NTU/ppm/mg/l

4.4.5 MEASURING RANGE

Range: 4/400NTU4/400 or 40/4000 NTU
9/999 or 99/9999 ppm
9/999 or 99/9999 mg/l

4.4.6 MEASURING SCALE

Scale: 4.000NTU

4.000NTU: selected measuring scale

4.4.7 AUTORANGE

Autoranging: ON

(OFF)

4.4.8 SOFTWARE FILTER LARGE

Large s RT: 2.0s

Response time of LARGE filter

4.4.9 SOFTWARE FILTER SMALL

Small s RT: 10.0s

Response time of SMALL filter

4.4.10 CHECK SIGNAL

CHECK SIGNAL: ON

(OFF): check signal activation

4.4.11 ANALOG OUTPUT N°1 RANGE

CAL OUT1: 0/20mA

(4/20mA): input range

CAL P1: x.xx

CAL P1: beginning of the output range

x.xx: measuring value corresponding to 0 or 4 mA

CAL P2: xx.xx

CAL P2: end of the output range

xx.xx: measuring value corresponding to 20 mA

Note: If the turbidity value corresponding to P1 is higher than P2, the output will be reverse.

4.4.12 ANALOG OUTPUT N°2 RANGE (ONLY FOR OPTION 091.3713)

CAL OUT2: 0/20mA

(4/20mA): input range

CAL P1: x.xx

CAL P1: beginning of the output range

x.xx: measuring value corresponding to 0 or 4 mA

CAL P2: xx.xx

CAL P2: end of the output range

xx.xx: measuring value corresponding to 20 mA

Note: If the turbidity value corresponding to P1 is higher than P2, the output will be reverse.

4.4.13 SET-POINT A FUNCTION

SET A F. : LO	LO: minimum HI: maximum
---------------	----------------------------

4.4.14 SET-POINT B FUNCTION

SET B F. : LO	LO: minimum HI: maximum
---------------	----------------------------

4.4.15 SET-POINT A ALARM

AL SET A: ON

Two alternatives:

- by selecting **OFF** the alarm function is not activated.
The unit goes to the next parameter calibration.
- by selecting **ON** the alarm function is activated.
At this point, the program will ask You to insert the activation time.

TIME SET A: xx m

TIME SET A: activation time of the Set-point A
xx m: actual time value in minutes

4.4.16 SET-POINT B ALARM

AL SET B: ON	LO: minimum HI: maximum
--------------	----------------------------

Two alternatives:

- by selecting **OFF** the alarm function is not activated.
The unit goes to the next parameter calibration.
- by selecting **ON** the alarm function is activated.
At this point, the program will ask You to insert the activation time.

TIME SET B: xx m

TIME SET B: activation time of the Set-point B
xx m: actual time value in minutes

4.4.17 ALARM FOR EXTERNAL LIGHT TOO HIGH

EXT. LIGHT AL: ON

Two alternatives

- OFF The alarm is not active, and the unit will turn to the C relay contact.
- ON. The alarm is active and the unit will turn to the delay insertion time.

DELAY: xx.xs

DELAY: delay before relay activation
xx.xs: delay time in seconds

4.4.18 C RELAY CONTACTS

AL RELAY: ACT

ACT: active alarm = activated relay
DEA: active alarm = deactivated relay

Note: by selecting DEA it is necessary to modify an internal jumper.

4.4.19 CLEANING FUNCTION

CAL CF: DISABLED

DISABLED: Cleaning function is Off
MANUAL: Manual clean
AUTO: Auto clean

If manual or auto clean has been selected, the unit will turn to the following steps:

Cleaning time

CLEANING T:xx.x"

CLEANING T: cleaning time
xx.x": actual time in seconds

Holding time


HOLDING T.: holding time
x.x': actual time in minutes

4.4.20 NEW ACCESS NUMBER



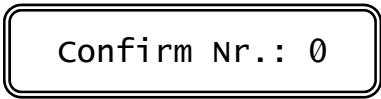
Change Nr.: NO

- by selecting NO the unit will go to the configuration display
- by selecting YES the unit will go to the following display:



New Nr.: 0

Insert a new access number



Confirm Nr.: 0

The instrument ask the operator to confirm the new access number.

The double insertion of the new access number avoid mistakes of the new code.
As soon as the new number is entered the message “**UPDATE**” will appear.
Should the operator insert two different numbers, the instrument will not modify the access number and the message “**NO UPDATE**” will be shown.



press several time the key to verify the selected parameters before leaving the configuration menu.



press to exit from the configuration menu.

5 INSTALLATION

5.1 HYDRAULIC INSTALLATION

Sample line

Run the sample line with the short dark tubing enclosed into the TU 910-TU810 package, to minimize the flow time to the instrument and the algae growth.

Take the sample from the middle of the process pipe line.

Sample taken from the bottom might ingest sediment from the pipe line.

Sample taken from the top might ingest air bubble from the pipe line.

The turbidity probe and cell are both rated 6 bar at 20 °C.

Measuring cell

The TU 910 measuring cell is suitable for the TU 810 – TU 8105 turbidity probe.

It is provided with two hose barb fittings for use with plastic tubing and with a wall fixing clamp.

A sample shutoff-flow control valve is provided with the outlet fitting, in order to control the flow rate from 0.1 to 3 lt/min.

Install the cell in horizontal position with the outlet fitting turned up, to avoid air bubble growth close to the probe.

Turbidity measurements at very low value need an installation with total absence of air bubble.

Note

The air bubble growth happens when the sample is under pressure and the flow cell discharges at atmospheric pressure.

To avoid this effect the user must maintain the cell pressurized by reducing the output by the small tap of the cell.



WARNINGS:

Do not open completely the tap if the cell is under pressure to avoid the discharge of the liquid through the tap.

5.2 TURBIDITY PROBE INSTALLATION

Refer to the specific manual of the installed probe.

5.3 CONTROLLER INSTALLATION

The controller may be installed close to the points being monitored, or it may be located some distance away in a control area.

The enclosure is designed for panel-mounting.

It should be mounted on a rigid surface, in a position protected from the possibility of damage or excessive moisture or corrosive fumes.

The reflection of the internal pipe may be compensated by adjusting the zero.

5.4 ELECTRICAL INSTALLATION

Connections within the controller are made on detachable terminal strips located on the rear side (Fig. 2).

Power and output-recorder connections are made at the 13 pin terminal strip, while input signal connections are made at the 12 pin terminal strip.

Connecting the power

- terminal 4 connect to the ground
- terminals 1-2 connect to the ac power (if power is 110 V)
- terminals 1-3 connect to the ac power (if power is 220 V)

(If 091.404 option is installed, connect 24 VAC to 1-3 terminals)



WARNINGS:

- power the device by means of an isolation transformer if the mains voltage is taken from a branch point with heavy inductive loads
- avoid mains-voltage from an auto-transformer
- separate power supply wires from signal wires
- control the mains voltage value

An internal device protects the unit against power overloads.

Disconnect the power and wait few minutes before powering again.

Connecting the probe

Connect the probe to the instrument by means of the built-in cable or the cable SZ 9481 / SZ9483 with marked wires from 0 to 7.

Cable Wire Nbr	TU 7685 Terminal Nbr.	Description
0	23	Shield
1	22	HI Turbidity signal
2	25	LO Turbidity signal
3	24	Check signal
4	19	Control LED
5	21	0
6	18	+ 12 V
7	17	- 12 V

Do not interrupt the cable. If necessary use only junction box with high isolation terminals.

Connecting a recorder

Connect to terminals 14-16 for the 1st channel output

Connect to terminals 15-16 for the 2nd channel output (091.3711 option)

- terminal 14 connect to the terminal (+) of the recorder N°1
- terminal 15 connect to the terminal (+) of the recorder N°2
- terminal 16 connect to the terminal (-) of the two recorder

Series connection is required for driving more loads with a total input resistance lower than $600\ \Omega$ for each channel.

Connecting control relays

The output connections referred to set-point SA and set-point SB are made at terminal strip and they consist of two independent SPDT relays corresponding to regulator A and regulator B.

RELAY "A" SET-POINT "SA"

terminal <u>6</u> marked <u>C</u>	common contact
terminal <u>5</u> marked <u>NO</u>	normal open contact
terminal <u>7</u> marked <u>NC</u>	normal closed contact

RELAY "B" SET-POINT "SB"

terminal <u>9</u> marked <u>C</u>	common contact
terminal <u>8</u> marked <u>NO</u>	normal open contact
terminal <u>10</u> marked <u>NC</u>	normal closed contact

Connecting alarm relay

The output connection referred to alarm consists of SPST relay C.

RELAY "C" ALARM

terminal <u>12</u> marked <u>C</u>	common contact
terminal <u>11</u> marked <u>NO</u>	normal open contact

Connecting auto clean relay

The output connection referred to autoclean function consists of SPST relay D.

RELAY "D" AUTOCLEAN

terminal <u>12</u> marked <u>C</u>	common contact
terminal <u>13</u> marked <u>NO</u>	normal open contact

Arc suppressor

Install a suitable snubber between relay terminals if the relay activation causes interferences on the display. (B&C Electronics snubber SX101).

6 OPERATING THE SYSTEM

Checking

Before connecting the system to the power supply:

- check that all cables are properly fastened to prevent strain on the connections;
- check that all terminal-strip connections are mechanically and electrically sound;
- check that power voltage is correct.

Pre-operation check

The system's controls and indicators are all located on the front panel (Fig.1).

The meter has a LCD display 1 indicating that the unit is on.

If Probe has been connected correctly, as described in the above sections, the system should function correctly needing only the start up and the parameters calibrations as described in the following section.

Quick start guide

The unit may be installed for the following purposes:

- measuring;
- measuring and regulation;
- measuring, regulation and recording.

The instrument is shipped with factory calibration and configuration suitable for the most popular applications.

For this reason the operation may require just the following steps:

Measuring

1. Connect the probe to the meter.
2. Switching-on the meter will assume the factory calibration.
The display will go to (D0) display.
3. The meter is configured for 4/400 NTU range and 0/4.000 NTU scale.
Go to the configuration menu in order to select other range/scale.
From (D0) press 9 times  to start the configuration sequence.

Measuring and regulation

Add the following to the preceding operations:

1. Press    to go to the manual operation.
If the automatic mode is selected, go to the step 2.

2. A and B relay are configured as LOW (Minimum). Select HIGH (Maximum) if necessary.
3. Select the Set-point, the hysteresis and the delay of A and B relay.

From (D0) press 3 times  to start the set-point A selection sequence.

From (D0) press 4 times  to start the set-point B selection sequence.
4. The alarm on the activation time of A and B relay is deactivated. Activate this kind of alarm if necessary.
5. Select alarm values of min/max and delay if necessary.

From (D0) press 5 times  to start the alarm selection sequence.

Measuring, regulation and recording

Add the following to the preceding operations:

1. Analog output is configured as NTU at 0/20 mA corresponding to the input scale. Select 4/20 mA and a suitable input span if necessary.
2. If option 091.3711 is installed, follow the step 1. for the second output.

Manual operation

When the instrument is programmed for the manual operation (see Calibration sequences) the flashing "M" will appear on the display.

Analog outputs and alarm relay will remain activated.



while pressing the key, A relay will be activated.



while pressing the key, B relay will be activated.

Check signal

Check signal is activated as default.

If the operator doesn't use this signal, must be deactivated into the configuration.

From display (D0) press 2 times  to start the sequence of the sensitivity and alarm calibration of the check signal.

It is possible to calibrate the following:

- sensitivity calibration at 100%.
It is suggested to calibrate 100% after the probe and cell cleaning;
- minimum alarm setting in order to detect the dirt on the lens of the probe;
- maximum alarm setting in order to detect the lack of water into the cell.

Auto clean function

The unit may activate a manual or automatic cleaning cycle of the probe by external device.

This function must be activated into the configuration together with the cleaning time and the holding time of the analog outputs.

The operator may also activate a manual cycle and select the repetition time of the automatic cleaning cycle during 24 hours.

From display (D0) press 6 times  to start the manual cleaning sequence or to change the repetition time of the auto clean cycle.

Alarm of too high external light

The unit may activate an alarm if too high external light condition occurs.

This function must be activated into the configuration together with the delay of the alarm relay.

When this function is activated, the C alarm relay will consider this condition in addition. Main display will send the message "**ALARM: EXT. LIGHT**" when this condition will occur.

The unit might go to the next scale if the auto range is activated.

7 CALIBRATION

The instrument and the probe are factory calibrated individually.
So the accuracy of the system is independent of the coupling between probe and unit.

Perform the following calibration procedure periodically in order to maintain the requested accuracy.

Zero calibration

The unit measures continuously the ambient light, giving an alarm when it is too high.

Therefore the zero calibration is not necessary for measuring values higher than 40 NTU.

When using the scale 4.000 NTU with readout smaller than 0.1 NTU, the operator may effect the zero calibration to compensate the residual Turbidity value due to the light diffusion by water free of particles.

This residual value, by using the TU 910 cell is estimated 0.015 NTU.

The operator may use the instrument without calibrating the zero and by taking in account this residual value or he may perform the zero calibration.

Sensitivity calibration

It is suggested to check this calibration every month and to calibrate the unit every three months, depending of the requested accuracy.

The checking and the calibration may be effected in two ways:

- by means of formazine standard solutions
- by means of grab sample analysis with a properly calibrated laboratory turbidity meter

7.1 CALIBRATION WITH FORMAZINE

Before calibrating with formazine standard solutions it is suggested to clean the cell and the optical window of the probe.

- 1) Position the cell in vertically.
- 2) Close or interconnect with a short pipe the two hose fittings.
- 3) Gently stir the formazine bottle and pour slowly the solution into the cell, avoiding air bubble production.
- 4) Insert the probe into the cell.
- 5) Allow to stand until the reading stabilizes.
- 6) Calibrate the unit by following the procedure of the chapter "Calibration sequences".
- 7) Clean the cell with pure water.
- 8) Reinstall the cell and the probe in the process.

Notes:

Calibrate by using Formazine standards not lower than 20 NTU because of the difficulty to achieve the accuracy required to prepare a low turbidity standard.

Because of the linearity of the instrument, accuracy even at very low turbidity levels is assured by calibrating at 20 NTU.

7.2 CALIBRATION WITH COMPARISON METHOD

This method transfers the calibration of a laboratory instrument to the on-line unit.

Before performing this calibration, make sure the laboratory turbidity meter to be used is properly calibrated.

Do not use this method when the sample turbidity is less than 2 NTU.

Take a grab sample and immediately measure with the turbidity meter.

Go back to the unit and calibrate the readout according to the laboratory result.

8 PREVENTIVE MAINTENANCE

Controller

Quality components are used to give the controller a high reliability.

The frequency of such maintenance depends on the nature of each particular application.

As in any electronic equipment, the mechanical components, such as switches, relays and connectors, are the most subject to damage.

Probe

The measuring window of the probe must be inspected and cleaned periodically.

The frequency is depending of the application and the accuracy requested for the system.

Clean the probe before the calibration, by removing the dirt from the body with a soft paper filter, avoiding to scratch the window surface.

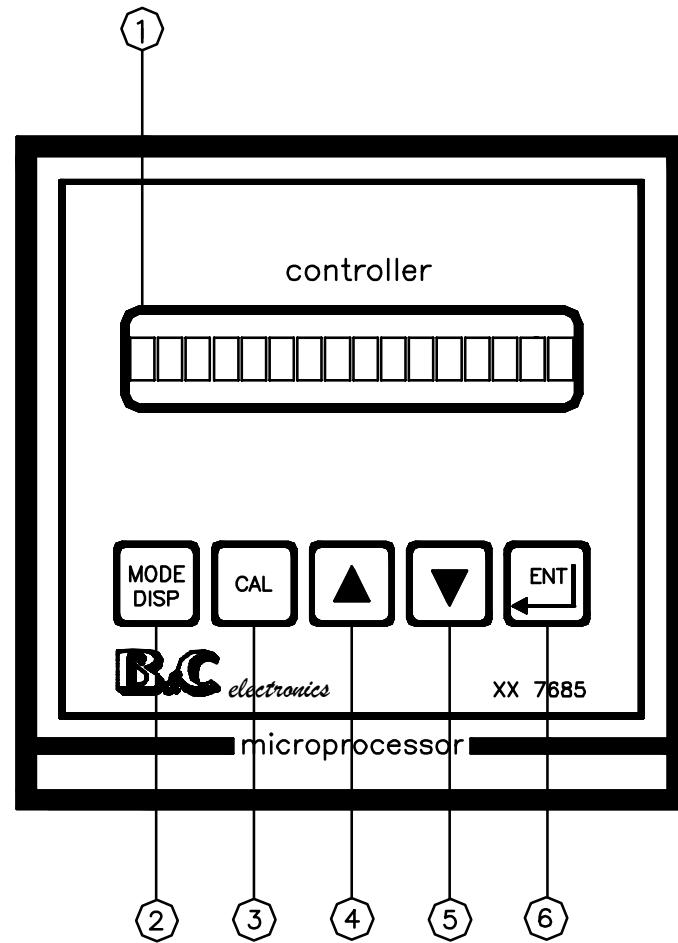
It is possible to install an auto clean system by using the cleaning function of the controller.

Cell

Clean the cell in the same way as the probe.

In order to clean properly, remove the disk from the bottom of the cell and clean carefully the internal part of the cell.

FRONT PANEL

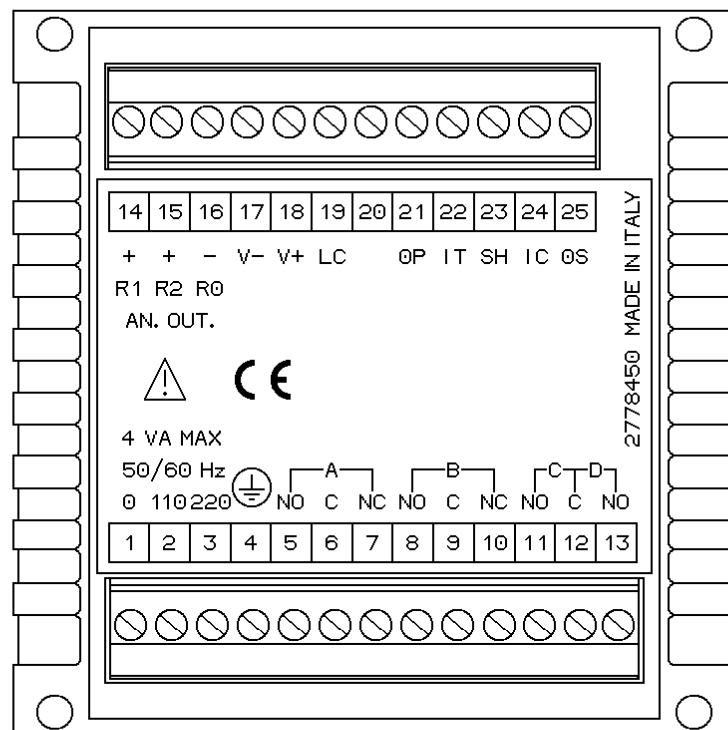


PANFRONT7685 - A4 - 1:1

1. Display
2. Mode-display key
3. Calibration key
4. Increase key
5. Decrease key
6. Enter key

Fig. 1

REAR PANEL CONNECTIONS

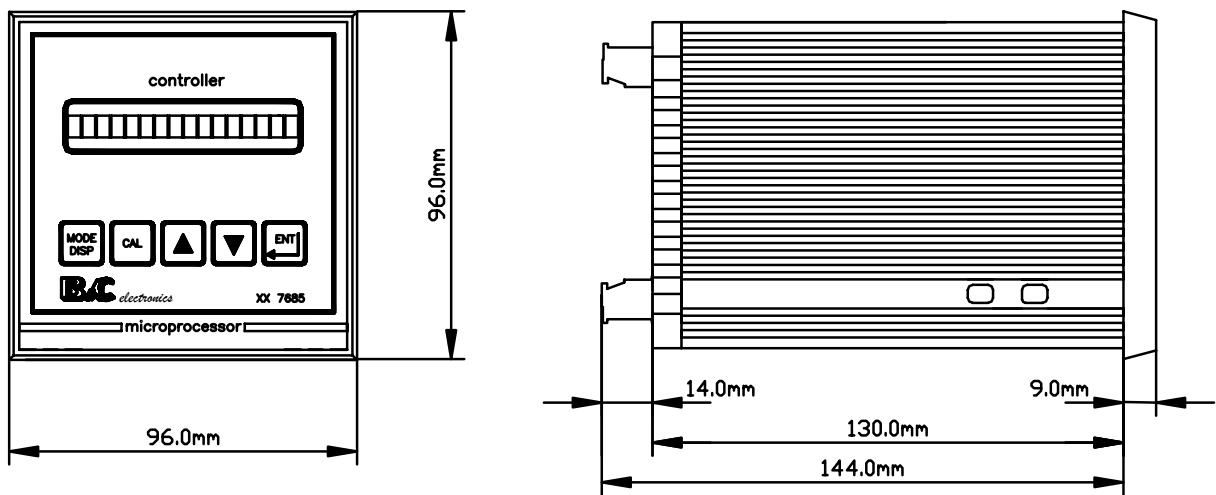


TU7685 rev.A - A4 - 1:1

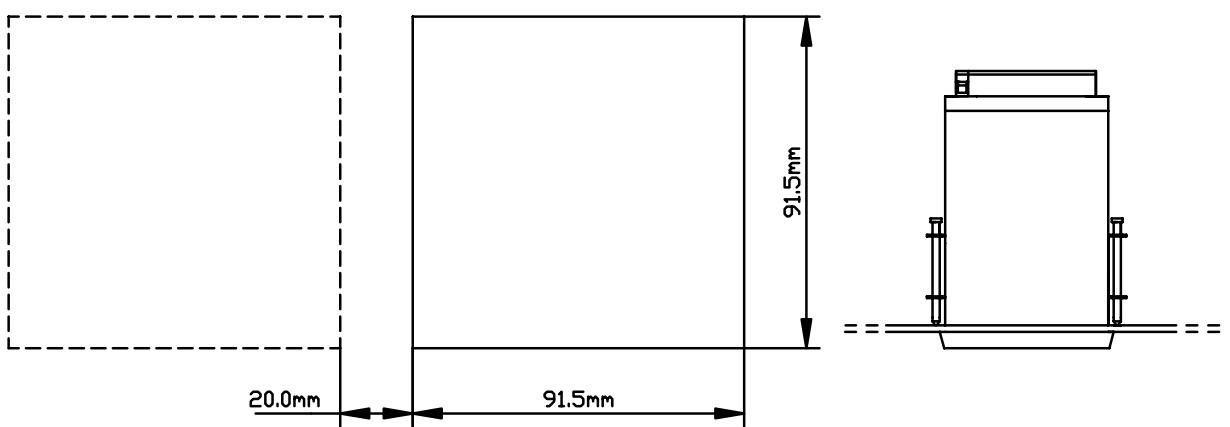
1.2.	110 V. Power supply
1.3.	220 V. Power supply
4.	Ground (power)
5.6.	A Relay N.O. contacts
6.7.	B Relay N.C. contacts
8.9	B Relay N.O. contacts
9.10.	B Relay N.C. contacts
11.12.	C Relay N.O. contacts (alarm)
12.13.	D Relay N.O. contacts (cleaning)
14.	Analog output Nr1 (+)
15.	Analog output Nr2 (+) (option)
16.	Analog output Nr1 and Nr2 (-)
17.18.19.21.	Connection to TU 810 – TU 8105 – TU 8182
22.23.24.25.	Connection to TU 810 – TU 8105 – TU 8182

Fig. 2

DIMENSIONS



DRILL PLAN



INGOMBRO7685 - A4 -1:2

A4 -1:4

Fig. 3

WARRANTY CERTIFICATE

- 1) Your product is covered by B&C Electronics Warranty for 5 years from the date of shipment. In order for this Warranty to be valid, the Manufacturer must determine that the instrument failed due to defective materials or workmanship.
- 2) The Warranty is void if the product has been subject to misuse and abuse, or if the damage is caused by a faulty installation or maintenance.
- 3) The Warranty includes the repair of the instrument at no charge. All repairs will be completed at the Manufacturer's facilities in Carnate, Italy.
- 4) B&C Electronics assumes no liability for consequential damages of any kind, and the buyer by accepting this equipment will assume all liability for the consequences of its use by the Customer, his employees, or others.

REPAIRS

- 1) In order to efficiently solve your problem, we suggest You to ship the instrument along with the Technical Support's Data Sheet (following page) and a Repair Order.
- 2) The estimate, if requested by the Customer, is free of charge when it is followed by the Customer confirmation for repair. As opposite, if the Customer shall not decide to have the instrument repaired, he will be charged to cover labor and other expenses needed.
- 3) All instruments that need to be repaired must be shipped pre-paid to B&C Electronics. All other expenses that have not been previously discussed will be charged to Customer.
- 4) Our Sales Dept. will contact You to inform You about the estimate or to offer you an alternative, in particular when:
 - the repairing cost is too high compared to the cost of a new instrument,
 - the repairing results being technically impossible or unreliable
- 5) In order to quickly return the repaired instrument, unless differently required by the Customer, the shipment will be freight collect and through the Customer's usual forwarder.

*B&C Electronics Srl - Via per Villanova 3 - 20040 Carnate (Mi) - P.IVA 00729030965
Tel (+39) 039 63 1721 - Fax (+39) 039 607 6099 - info@bc-electronics.it - www.bc-electronics.it*

TECHNICAL SUPPORT

Data sheet

In case of damage, we suggest You to contact our Technical Support by email or phone. If it is necessary for the instrument to be repaired, we recommend to photocopy and fill out this data sheet to be sent along with the instrument, so to help us identifying the problem and therefore accelerate the repairing process.

ESTIMATE

REPAIR

COMPANY NAME

ADDRESS

ZIP

CITY

REFER TO MR./MISS.

PHONE

MODEL

S/N

DATE

Please check the operator's manual to better identify the area where the problem seems to be and please provide a brief description of the damage:

<input type="checkbox"/> SENSOR	<input type="checkbox"/> ANALOG OUTPUT
<input type="checkbox"/> POWER SUPPLY	<input type="checkbox"/> SET POINT
<input type="checkbox"/> CALIBRATION	<input type="checkbox"/> RELAY CONTACTS
<input type="checkbox"/> DISPLAY	<input type="checkbox"/> PERIODICAL MALFUNCTIONING

➤ *DESCRIPTION*

.....

.....

.....

.....

.....

.....

NOTES