

USER'S MANUAL



Bravo Pump
Plus / Basic

2019.03.18	2a	All	Modification into CDL
2017.04.24	2	All	New presentation + add timer GRASSLIN
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1 Introduction

1.1 Warranty Conditions and Installation

Warning: when you receive the instrument and the accessories from the packaging and verify their integrity, otherwise contact Tecora or your distributor immediately.

Test

The instruments are tested in our laboratories at Villebon sur Yvette ZI La Prairie, and a test certificate is released.

Warranty

The warranty cover the instruments for 12 months from the test passed date.

The warranty doesn't cover the following:

- damages to the instruments occurred during the transport
- damages to the instruments due to negligence or wrong use
- wearable parts (batteries, motors, filters)

The technical service on the instruments is intended in our Service Department.

Email: customer.service@tecora.com

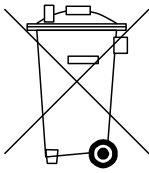
1.2 Installation

The Bravo sampler is a portable instrument suitable for outdoor ambient samplings.
The protection rate isn't enough to allow outdoor operations with rain presence.

1.2.1 Waste disposal

Packaging: all the packaging materials are to be considered as non-toxic and non-hazardous special waste and as such must be disposed of in accordance with current legislation.

Equipment



The crossed-out wheeled bin means that in European Union the product is to be considered AEE (electrical and electronic equipment) and must be taken to separate collection at the product end-of life.
This applies to your device but also to any enhancements marked with this symbol.
Do not dispose this product as unsorted municipal waste.

1.3 Power Supply and Precautions

For safety reasons and for the optimal operations, a good power supply with the ground and no disturbs is needed. In case you use an extension cable for the power supply, it's necessary that you connect only the ECHO PM to this power supply cable.

On the power supply line of the ECHO PM there is an anti-disturb filter.

The socket type is a two phases plus the ground, with protection fuse on each phase and a bipolar ON/OFF switch with "ON" LED.

Power Supply:

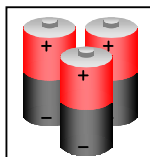
220 Vac 50 Hz: from 202 to 253 Vac 50 Hz;

115 Vac 50/60 Hz: from 106 to 132 Vac 50/60 Hz;

For the power, absorption and fuses used, please refer to the Chapter Technical Characteristics

Power Losses



The instrument is equipped with an internal battery and electronic circuits that protects the sampling from power losses, anyway, disturbs caused by bad electrical contacts may create critical situations and compromise the good operation.






Attention

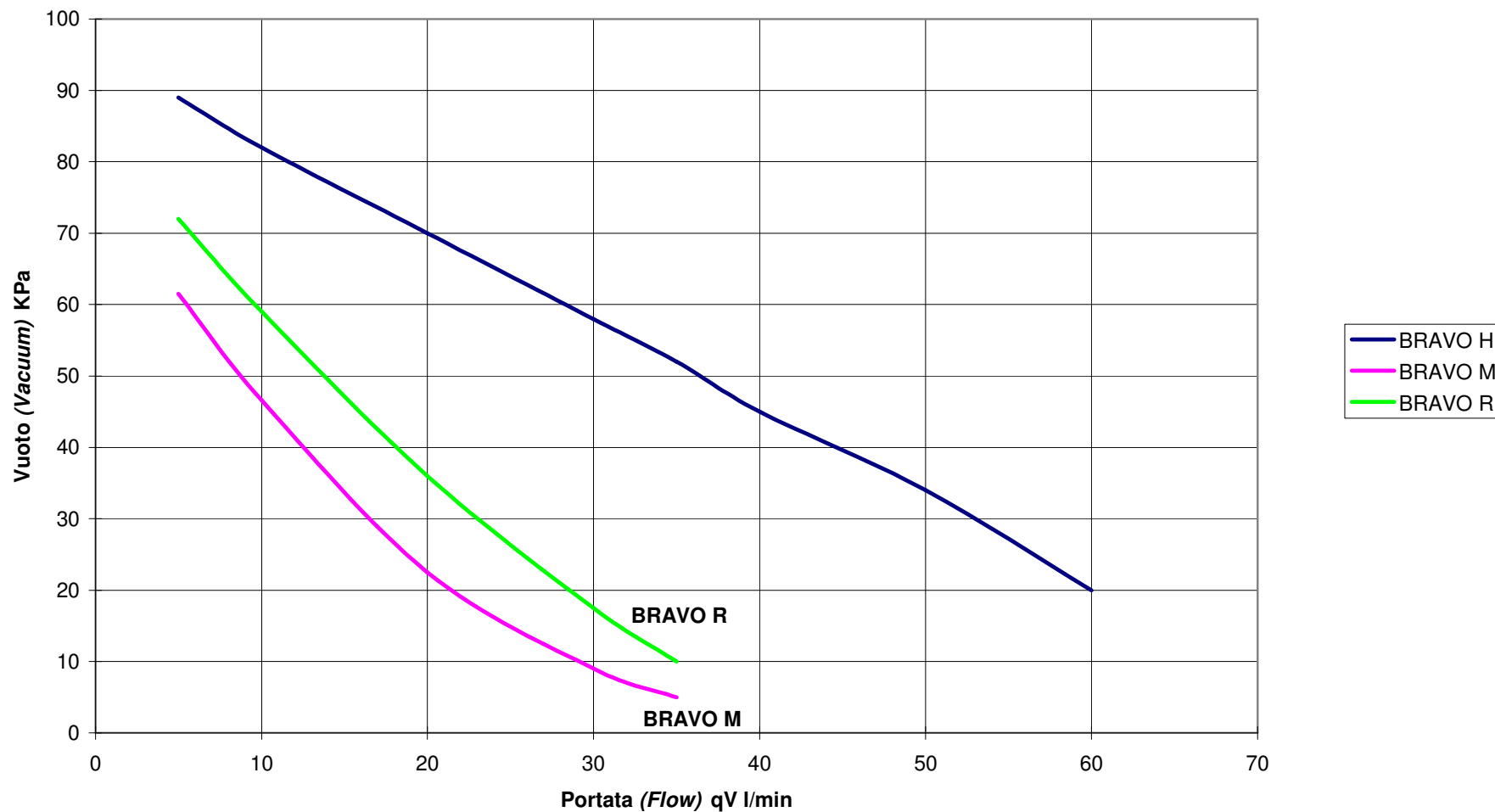
To maintain the efficiency of the Ni-Cd internal battery, it's necessary to recharge it periodically even if the sampler is not used.
It's recommended to charge the battery every two months if the instrument is not used connecting it to the power supply for at least 24 hours.

1.4 Models and Main Characteristics

BRAVO M <i>plus</i>	BRAVO H <i>plus</i>
	
Diaphragm Pump Range : 0.15 – 35 l/min New Controller for samplings program, display data and logger <i>Sequential Interface : Optional</i>	Piston Pump Range : 1 – 60 l/min New Controller for samplings program, display data and logger <i>Sequential Interface : Optional</i>

BRAVO M <i>Basic</i>	BRAVO R <i>Basic</i>	BRAVO H <i>Basic</i>
		
Diaphragm Pump Range : 0.15 – 35 l/min weekly based programmer Digital Thermometer	3 m ³ /h Rotary vane Pump Range : 0.2 – 35 l/min weekly based programmer Digital Thermometer	6 m ³ /h Rotary vane Pump Range : 1 – 60 l/min weekly based programmer Digital Thermometer

Bravo curve characteristics (Performance curves)



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2 BRAVO Plus

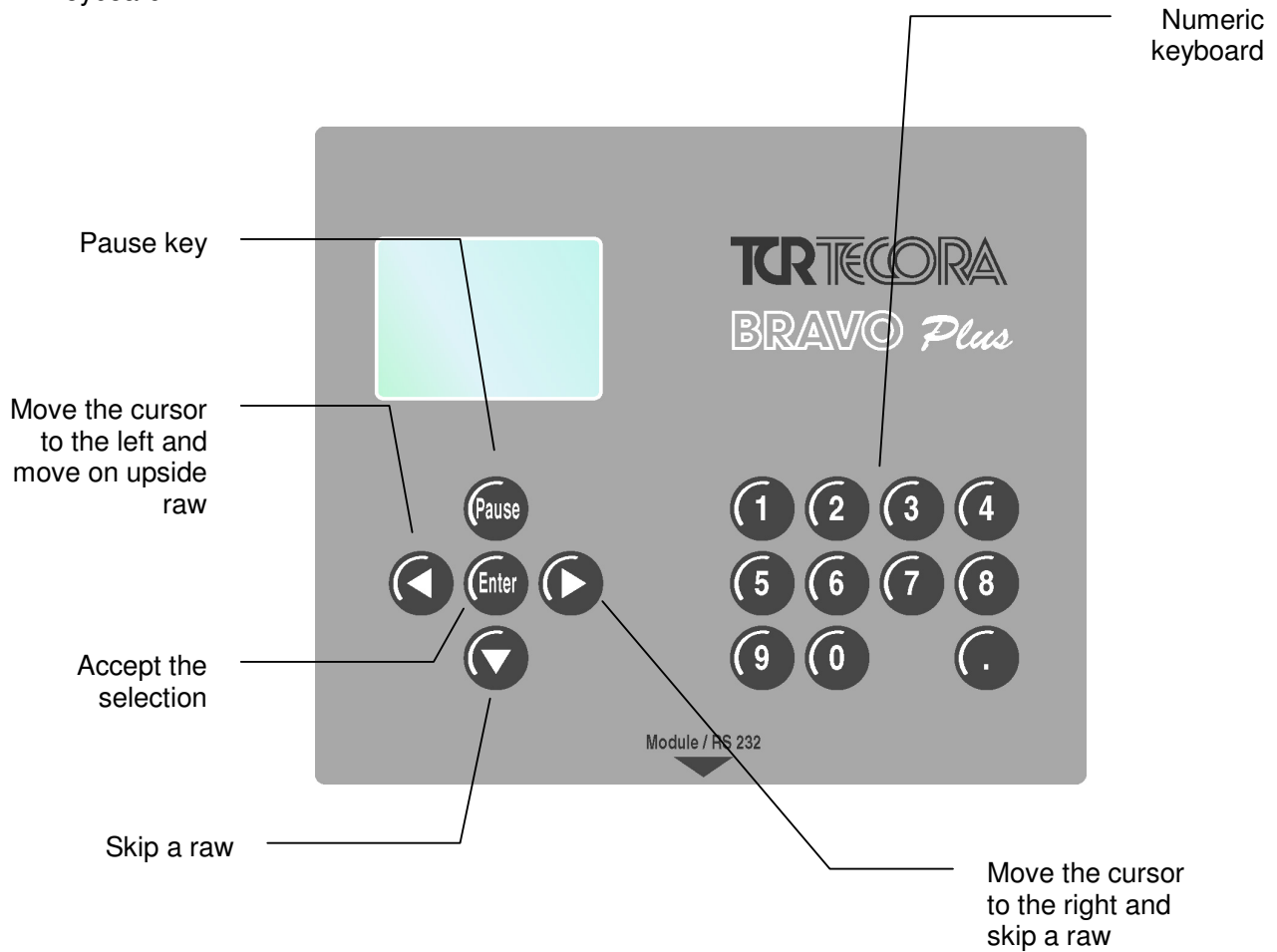
2.1 Description



1. Membrane keypad and back-lighted display
2. Cover with key-lock
3. Inlet quick connector
4. Vacuum meter in line with the sampler gas
5. Dry Gas Meter
6. Flow rate regulators
7. RS 232 Interface
8. Flow Meters
9. Sequential interface connector (Optional)
10. Power supply socket with lighted switch and protection fuse

2.1.1 Keyboard and Display

Keyboard



2.2 Standard delivery

Note: when you receive the instrument, unpack it and all the accessories and verify their integrity, if any damage is found, contact immediately CDL-Tecora or your local dealer.

The standard supply includes:

1. BRAVO Plus
2. Power cord
3. 3 mt Rauclair tube
4. Quick connector
5. 2 spare fuses
6. Calibration certificate
7. User Manual

2.3 Accessories

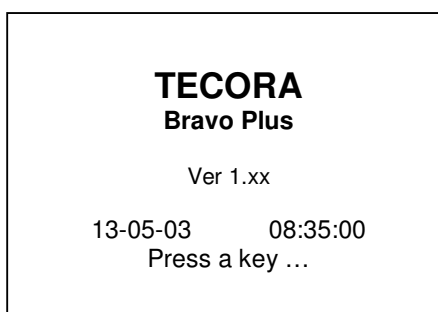
The Instrument can be equipped with the following accessories and spare parts:

<i>Accessories and Spare Parts</i>	<i>P/N</i>
Sequential Sampling Interface	AA99-000-9903SP
Serial Cable	999NI012
Software data acquisition Downloader + Serial cable	AA99-009-9900SP
Remote connection Kit with GSM modem (included)	888

3 Quick Sampling Guide

3.1 Program the sampling..

Turn on the sampler and wait for some seconds



- message appear when you turn on the instrument
- Enter the main menu pressing a key

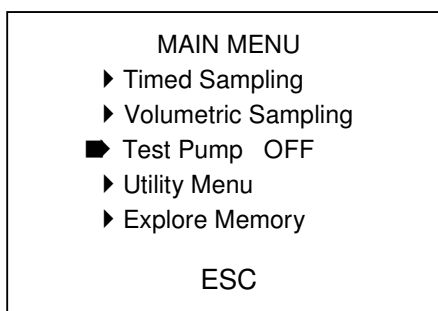


Verify the date and hour are correct (date format is dd-mm-yy) otherwise go to the Chapter 4 - Utility Menu

3.1.1 Flowrate Setting



Before to program the sampling, set the flowrate to the desired value

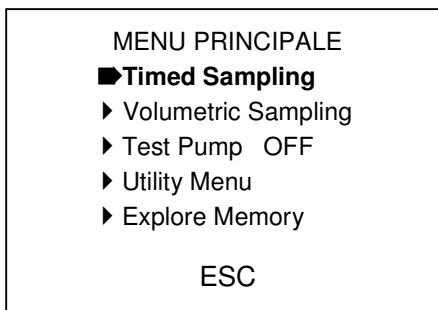


- Move the cursor using the arrows and select "Test Pump OFF" and press Enter.
- ✓ *The pump will turn on and will be possible to set the flowrate using the flow regulators (pos. 6) and reading the value on the flow meters placed on the front of the instrument. .*

- Once set the flowrate, go back with the cursor on "Test Pump ON" and press Enter

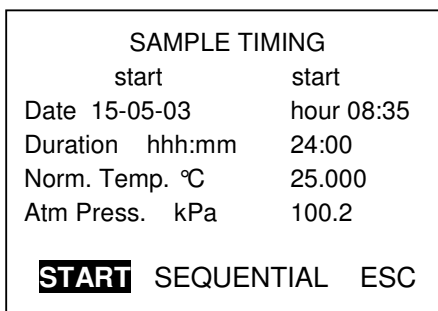
✓ *To move the cursor up use the "◀" key*

3.1.2 Timed Sampling, set the sampling Start and Duration



- Move the cursor using the arrows and select “**Timed Sampling**” and then press the Enter key.

The sampling program mask is displayed



- **Date and Hour** are the effective sampling start date and hour. When you enter this screen, the date and are the current ones.
- ✓ *In case you want to start immediately, you can skip those settings.*
- **Duration** is the sampling time in hours and minutes.

✓ *The minimum sampling time should be not less than 5 minutes while the maximum is 99 hours and 59 minutes.*

✓

- **Norm. Temp** is the used temperature, expressed in °C, to normalize the volumes. The default value is 25°C.

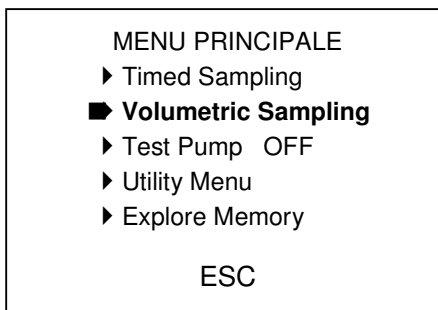
- **Press. Atm.** is atmospheric pressure, expressed in kPa, used from the instrument. The default value is 101.3 kPa.

Note: Atm Press. Isn't the normalizing pressure (which is always defined as 101.3 kPa) but the atmospheric pressure at which the instrument operates .

To start the samplings, move the cursor on START and press the Enter key.

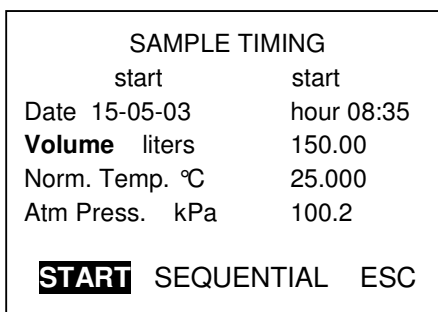
- ✓ More information about the sequential and intermittent sampling see the **Chapter 6 – Sequential Sampling -**

3.1.3 Volumetric Sampling, set the sampling Start and volume to realize



- Move the cursor using the arrows and select “**Volumetric Sampling**” and then press the Enter key.

The sampling program mask is displayed



- **Date and Hour** are the effective sampling start date and hour. When you enter this screen, the date and are the current ones.
- ✓ *In case you want to start immediately, you can skip those settings.*
- **Volume** is the volume in liters to realize during the sampling.

- ✓ *The minimum sampling time should be not less than 5 minutes while the maximum is 99 hours and 59 minutes.*

- ✓
- **Norm. Temp** is the used temperature, expressed in °C, to normalize the volumes. The default value is 25°C.

- **Press. Atm.** is atmospheric pressure, expressed in kPa, used from the instrument. The default value is 101.3 kPa.

Note: Atm Press. Isn't the normalizing pressure (which is always defined as 101.3 kPa) but the atmospheric pressure at which the instrument operates .

To start the samplings, move the cursor on START and press the Enter key.

- ✓ More information about the sequential and intermittent sampling see the **Chapter 6 – Sequential Sampling -**

3.2 Data displayed during the sampling

When the programmed start time arrives, the instrument turn on and display the following parameters:

Sample n°	1 of 1
Cycle 24:00	Duration 24:00
Elapsed time	00:12:06
Volume C.V. m ³	0.06376
Volume std. m ³	0.06459
Temp C.V. °C	27.11
PAUSE	TO STOP

- **Sample 1 of 1** see chapter 6 Sequential Sampling
- Programmed **Cycle** chapter 6 Sequential Sampling
- Programmed Sampling **Duration**
- **Elapsed Time** is the effective sampling time (pump ON) from the start
- **Volume C.V.** is the volume expressed in m³ sampled until this moment and referred to the dry gas meter conditions.

- **Volume std** is the volume expressed in m³ sampled until this moment and referred to the normalized conditions (temperature and pressure) where the temperature is the one selected during the sampling program and the pressure is 101.3 kPa.
- **Temp C.V.** is the gas temperature inside the dry gas meter expressed in °C

3.3 Pause during the sampling.

During the sampling it's possible to pause the operation and perform some operations on the instrument.

During the pause all the measures are stopped.

- ✓ *Attention: If the instrument is left in pause, the programmed samplings will not take place and the instrument will stay in pause for an indefinite time.*

- Pressing the **Pause** key the following display appears :

3.3.1 Timed Sampling

SAMPLING PAUSE	
NEW DURATION	24:00
NEW CYCLE	24:00
STOP SAMPLING	
RESTART	

In this menu it's possible to modify the sampling Duration and the Cycle (for sequential samplings).

Selecting STOP SAMPLING, the operation will be interrupted manually.

3.3.2 Volumetric sampling

SAMPLING PAUSE	
NEW VOLUME	150.00
NEW CYCLE	00:03
STOP SAMPLING	
RESTART	

In this menu it's possible to modify the Volume and the Cycle (for sequential samplings).

Selecting STOP SAMPLING, the operation will be interrupted manually.

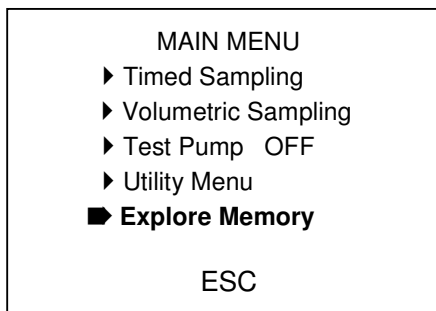


! ATTENTION! The instrument manages the power losses, turning off the instrument will not stop a sampling since when turned on again it will restart the last sampling, it's necessary to select STOP SAMPLING from the PAUSE menu.

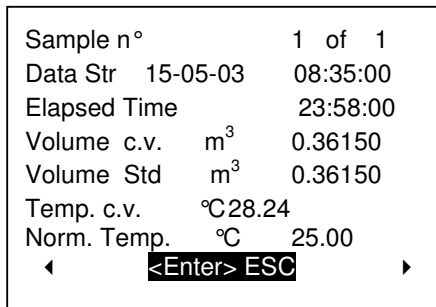
3.4 Sampling Final Report

At the end of the sampling the instrument prepares a report of the measures.
It's possible to show directly this report on the display of the instrument or transfer it using the RS232 port to a PC.
The displayed report contains only the essential data while the logged one include all the information such as power losses etc.

To display the report proceed as follows:



- From the main menu select **Explore Memory**



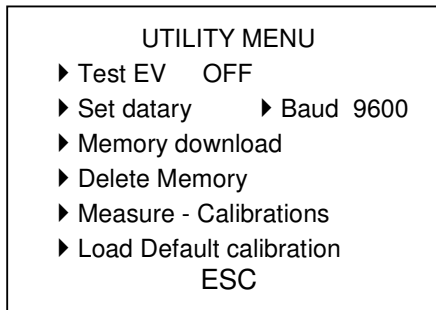
- The first displayed data are the ones related to the last sampling. Pressing the arrow keys (◀ ▶) the other memorized reports are displayed. Pressing the Enter key you will go back to the main menu.

Displayed data:

- **Sample 1 of 1** identify the sequential samplings
- **Data Str** is the sampling starting date/time
- **Elapsed time** is the effective sampling time
- **Volume c.v.** is the total volume measured by the dry gas meter
- **Volume Std** is the volume reported to the set normalizing conditions
- **Temp. c.v.** is the average temperature at the dry gas meter
- **Norm. temp.** Is the set normalization temperature

4 Utility Menu

The Utility Menu can be accessed from the main menu and has the following options:

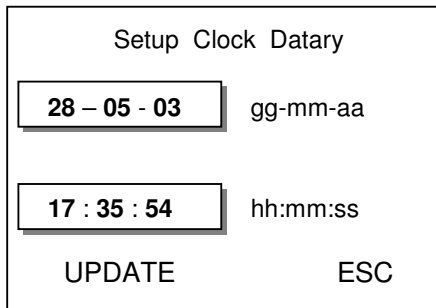


4.1 Test EV

If the instrument is equipped with the sequential interface (optional) selecting the option **Test EV** the **ON** status will be displayed and a scan of the sequential ways (open and close) will be done.

4.2 Set datary

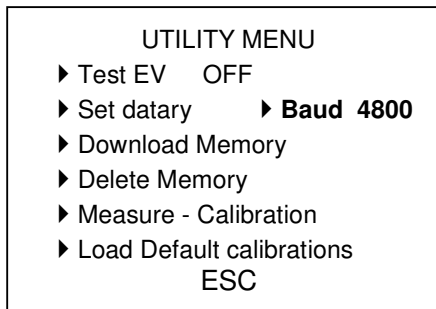
The instrument is equipped with a permanent clock/datary with a backup battery. To modify the settings, select "Set Datary" from the Utility Menu and press Enter. The following display will appear:



- Use the arrow key to select the desired field
- Use the keyboard to edit the date and clock.
- To memorize the new date and exit select UPDATE and press Enter

4.3 Set the Baud Rate

To modify the RS232 port Baud Rate:



- Select "Baud" from the option menu.
- Press the **Enter** key to display the available transfer rates which are :
 - 38400
 - 19200
 - 9800
 - 4800

4.4 Download the memory using the RS232

- ✓ To access to the logged data it's necessary to have a PC equipped with a RS232 serial port and a communication software such as Microsoft Windows® Hyper Terminal.
If the PC has only USB ports, it's necessary to purchase an USB to Serial adapter available in most of the computer shops
- ✓ Software named **Downloader** is now available to download and managing memory data, it's supplied with a serial cable, the **P/N is AA99-099-9900SP**.

4.4.1 Measure final report

Selecting **RS232 Mem** in the Utility menu the logged data are sent to the RS 232 port.
The format is the following:

- **Date Start hour**
- **Date Stop hour**
- **Cycle ; Duration ; Sample n° of n°**
- Effective sampling time **ET** (hhh:mm:ss)

A string followed by ";" with the following data:

- Programmed Ambient Pressure **Pam (kPa)**
- *Parameter not used in this version*
- Normalization Temperature **Tn (°C)**
- Dry Gas Meter Avg Temp. **Tcv (°C)**
- Dry Gas Meter Volume **Vcv (m³)**
- Normalized Volume **Vn (m³)**
- *Parameter not used in this version*
- *Parameter not used in this version*
- *Parameter not used in this version*

Are then reported eventual power losses events.
Up to 10 power losses are logged.

- Power Loss gg/mm/aa hh:mm:ss

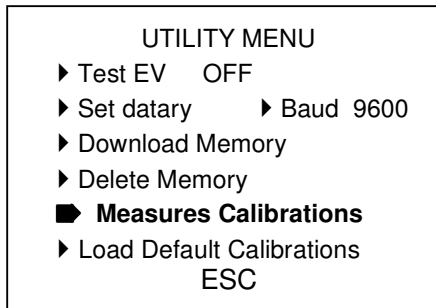
-
- Power return

gg/mm/aa hh:mm:ss

4.5 Delete Memory

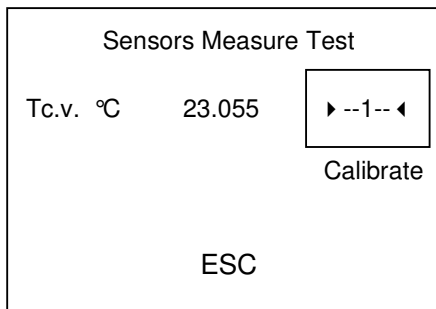
Selecting “Delete Memory” from the Utility Menu, all the measure data and flow records are permanently erased from the memory.

4.6 Measure Test and Calibrations



- From the Utility Menu, selecting Measures Calibrations a clock glass and a message asking you to wait will appear on the display.

The temperature values displayed are the temperature sensor readings.

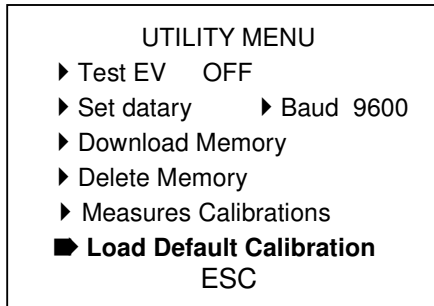


- Tc.v. = Dry Gas Meter Temperature
- Pressing the **1** key, it's possible to enter the temperature value measured by the reference instrument.
- Pressing **ENTER** you'll go back to the previous menu.

- ✓ **The calibration of those parameters requires specific equipment (temperature calibrators and tools).**
- ✓ **Attention: if the calibrator reported value differs a lot (more than 20%) from the instrument value, do not proceed with the calibration and contact the CDL-Tecora Service or your local dealer.**

4.7 Load Default Calibration

In case a wrong calibration value is entered, or before to proceed with a new calibration, it's possible to load the default calibration values.



- Selecting Load Default Calibration, the default factory values are automatically restored.

5 Sequential and Intermittent Sampling

The sequential sampling it's possible if the instrument is equipped with the sequential interface (optional).

If this interface is not installed, it's still possible to program sequential samplings which will be executed on the single available line.

5.1 Programming a sequential sampling.

The sequential sampling program basically needs two parameters:

- The number of samplings to do
- The time interval between one sampling and the next, called **Cycle**

The first part of the program is similar to the one already discussed in the chapter **3.2 Program a sampling**.

SAMPLE TIMING	
start	start
Data 15-05-03	Hour 08:35
Duration hhh:mm	24:00
norm. Temp. °C	25.000
Atm Press. kPa	100.2
START SEQUENTIAL ESC	

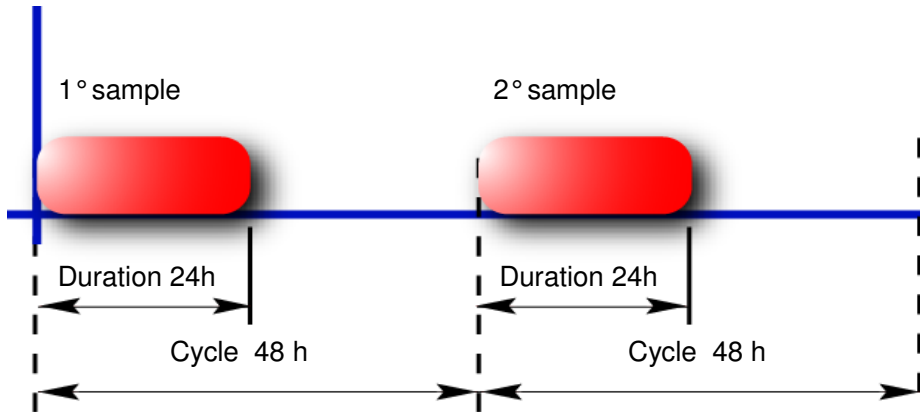
In this example we want to program a daily sampling of 24 hours to be executed on alternate days.

- Once edited the data, press **SEQUENTIAL** to enter in the sequential program section

SAMPLE TIMING	
Sample N°	02
Cycle	48:00
Intermittent pump ON	00:00
Intermittent pump OFF	00:00
START PREVIOUS ESC	

- **Sample n°** is the sequential sampler programmed (2).
- **Cycle** is the interval between the start of the first sample and the second one. The figure here below shows how the sequential sampling we have programmed is done.

The Cycle value must be necessarily equal or greater than the Duration



5.2 Program an intermittent sampling.

The intermittent sampling is used to avoid the sampling media saturation over a long period .

✓ *Example*

We want to evaluate the incidence of a particular compound in the particulate matter, heavy metals for instance.

The survey do not require the daily determination of the particulate matter and the samples analysis is complex and expensive, then the solution is having the minimum samples amount extending the campaign over longer times.

In this case the intermittent option allows extending the sampling period over more days limiting the effective sampling time to the effective sampling media capacity.

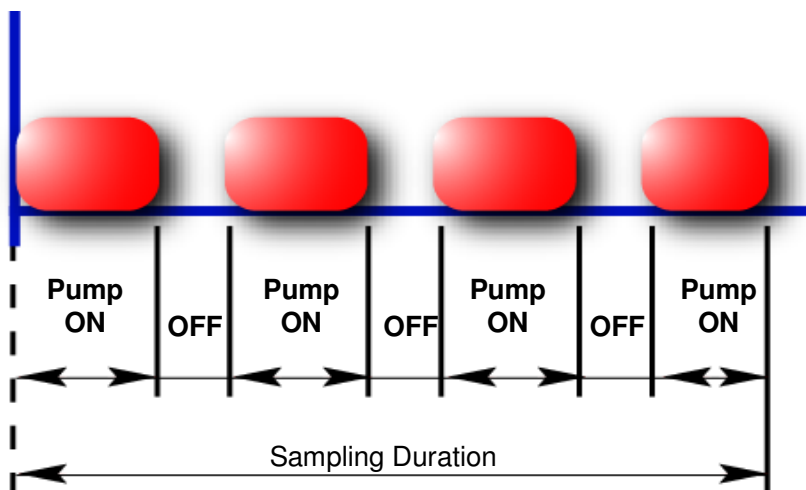
Practically the **Duration** of the sample can be set to **96h**, 4 days, but the effective sampling time is limited to 24 hours.

To do this:

- Set the duration to 96 hours and then select the sequential option.

SAMPLE TIMING	
Sample n°	1
Cycle	96:00
Intermittent pump ON	01:00
Intermittent pump OFF	07:00
START PREVIOUS ESC	

- The **Cycle** is automatically set equal to the **Duration**.
- **Intermittent pump ON** is the period in which the instrument sample.
- **Intermittent pump OFF** is the period in which the instrument is in pause.



6 Alarm messages and anomalies

Here below are reported the alarm/anomalies messages given by the instrument.

Available memory 20%	The available memory space is low.	<ul style="list-style-type: none"> Delete the memory
Change the Battery	Indicates that the backup battery has to be charged.	<ul style="list-style-type: none"> Leave the instrument under charge

7 Measuring sensors Characteristics

Temperature Sensors

Pt 100 Thermo resistors

Range

Norm	DIN IEC 751 Class B 1983
------	--------------------------

Range	-30 ÷ +500 °C
-------	---------------

Precision	0.5 °C (-30 ÷ +50 °C)
	0.8 °C (+50 ÷ +100 °C)
	1.2 °C (> 100 °C)

8 Remote control functions via SMS

The Bravo Plus can be equipped with a GSM modem for the remote control.
The GSM cellular modem must be the model supplied by CDL Tecora, other models can be used after the verification done by the CDL Tecora.

To use the modem you must have a phone contract with the relative SIM card, (not supplied by CDL Tecora with the modem)

The contract do not require particular characteristics, for this type of communication, a normal "voice" contract is enough.

The data transmission feature is not necessary for this operation.

The instrument control take place through the send of SMS messages from any GSM portable phone.

8.1 SMS Commands

Each command must have a particular syntax. The syntax will be described here below.
Different formats or syntax errors will be acknowledged as wrong messages.

It's possible that messages with the correct syntax but containing wrong characters or numbers could create operational anomalies in the instrument.

8.1.1 Start the sampling

The start sampling command launches immediately the sampling.

To use this command, the instrument must be in the stand-by condition (no sampling).

The instrument will start the sampling immediately, it's not possible to set any delay.

The message format is the following:

START;cycle;duration;samplings number;#

Cycle = format, 00:00 hh:mm , selectable minimum time 00:01 (1 minute) max 99:59

Duration = format, 00:00 hh:mm , selectable minimum time 00:01 (1 minute) max 99:59

Samplings number = format nn ; minimum number 1 max 24

Example:

Sampling cycle 24 hours and duration 23 hours and 30 minutes, samplings number 8.

START;24:00;23:30;08;#

Answer message

If the sent message is correct and the sampler has started the operation, after some minutes, you'll receive a confirmation message with the following message :

```
>"03/09/11, 11,17:20:55+08  date and hour of the command message
"START;24:00;23:30;08;# :  commando sent to the sampler
START Ok                  command acknowledged and relative start
```

8.1.2 Sampler actual status

The “status” command allows receiving a sms message from the instrument with its actual condition

The conditions are:

- | | |
|-------------------|--------------------|
| • sampling | SAMPLING ON |
| • pause | STAND BY |
| • alarm | ALARM |

The sms message to send must have the following format:

STATUS#

Example:

If the message is sent to an instrument which is sampling, the sms you will receive in answer will be:

>"03/09/11, 11,17:20:55+08	<i>sms message date and hour of the received command</i>
"STATUS :	<i>command sent to the sampler</i>
SAMPLING ON	<i>status of the instrument</i>

8.2 Anomalies in the SMS transmission.

Messages arriving from the phone card provider or from other portable phones could cause the block of the message receiving on the sampler.

This possibility could lead to a block if the frequency of those messages is very high and the instrument is not able to delete them.

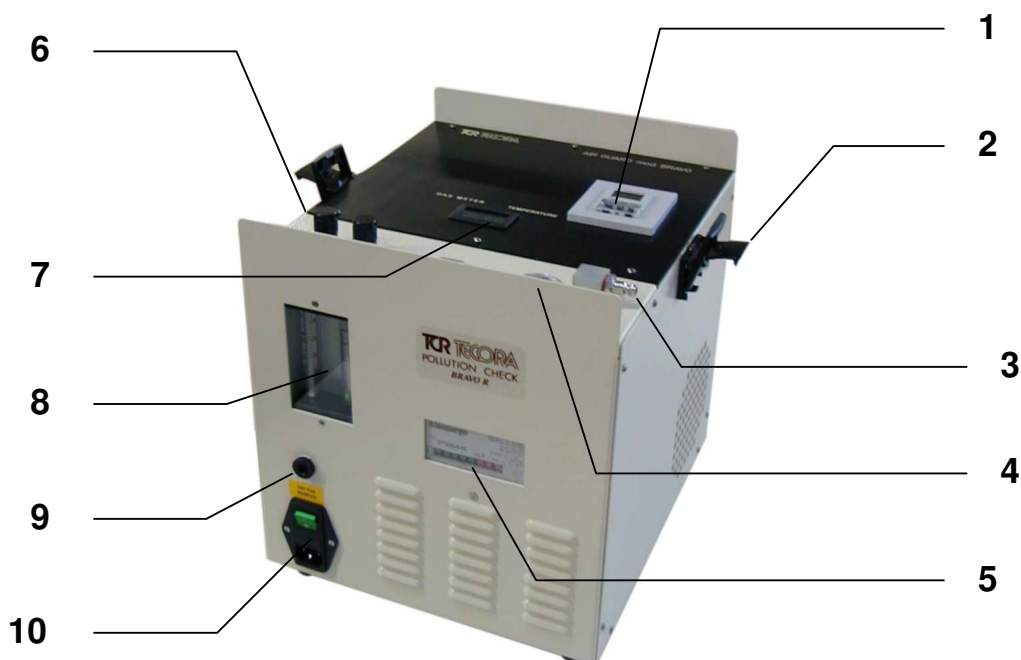
In this case the instrument could have problems in answering to the sms sent by the operator.

In this case you should proceed as follows:

- turn off the modem
- turn off the sampler (if a sampling is on the run, it will be interrupted and then reprised when turned on)
- Wait some minutes to allow to the instrument to erase the messages in the memory.

9. BRAVO Basic

9.1 Instrument Description



1. Timer Keyboard and LCD Display
2. Cover with key lock
3. Sample Inlet with quick connector
4. Vacuum meter
5. Dry Gas Meter counter
6. Flow regulator knobs
7. Temperature indicator
8. Rotameters
9. Sampled gas outlet
10. Power supply switch with protection fuse

9.2 Operation Instructions

9.2.1 Power

Connect the power cord to the socket on the front of the instrument (pos. 10) and to the power supply (220 Vac 50Hz or 110 Vac 50 60 Hz depending on the model).

9.2.2 Power On

Connect the suction tube with the quick connector to the sampler (pos. 3); press the ON/OFF key on the timer (for further information about the timer programming see paragraph 9.3) to start the pump and proceed with the flowrate regulation.

9.2.3 Flowrate Setting

There are two flowrate regulators on the sampler, one is high flowrates (dust, asbestos, lead samplings) and one for low flowrates (gas, solvents etc.), with the exception of the BRAVO H Basic which has two flowrate regulators both for high flowrates. Normally the operator will proceed with the flowrate setting following the norms or standards indication of interest.

9.3 Timer Programming

(for timer GRASSLIN see p34)

9.3.1 Timer Description

Display

- 1) **“hours/minutes” (HH:MM)** indication, “summer hour icon“, “winter hour icon“, **“Random** program icon”
- 2) **“year/month/day”** indication (**YYYY.MM.DD**)
- 3) Relè status indication
- 4) **“Days of the week”** indication and **“PRG”** program status indication

Keyboard

- 5) Clock setting and program quick exit “⌚”
- 6) Data confirm and program progress **“OK”**
- 7) Increase/modify/selection of a value and relè manual command “①”
- 8) Decrease/modify/selection of a value and relè manual command “②”
- 9) Reset “Ⓜ”
- 10) Program **“PRG”**

9.3.2 First Program

Before to make any setting, proceed with the instrument cold reset

General notes about the programming

To quickly exit from the program in any moment, just press the “⌚” key.

If any key is pressed for 30 seconds, automatically the timer will return to the normal operation.

Reset

Partial Reset

with this function:

- the date is set to the default 2000.01.01
- the hour is set to the default 00:00
- the RANDOM program, if active, is set to OFF. To execute the partial reset, press the “Ⓜ”; the display will display 00:00 blinking in the hour field (zone 1) and will be possible to set the hour.

Full Reset

with this function, moreover all the partial reset functions, all the programs will be erased and the hour counter will be zeroed.

To execute the full reset, press the “Ⓜ” and, within 3 seconds, press the **“PRG”** key; the indication **“CLEAR”** will be displayed and then the hour field will blink on the screen.

At this point will be possible to set up the clock.

9.3.3 Normal Operation

During the normal operation, the device will execute the program and will display the following information:

- Relè operation status (zone 3)
- **RANDOM** program execution, if active. (Zone 1)
- Hour and solar/legal time indication (zone 1)
- Day of the week (zones 4)
- Full date in the format “year-month-day” (zone 2)

9.3.4 Date/Hour Settings

For the correct operation, the internal clock should be synchronized with the current date/hour:

- 1) Press the “⌚” key: the display will show the clock with the seconds blinking
- 2) Press the “①” key to zero the seconds and increase of a unit the minutes; pressing the “②” key will zero the seconds without increasing the minutes.
- 3) Press the “OK” key to skip and set the minutes, hour, year, month and day number :
 - the value under modification will blink on the display.
 - Use the “①” and “②” key to set the values
 - Use the “OK” key to confirm the selection and skip to the next field
(in cycle : MINUTES⇒HOUR⇒YEAR⇒MONTH⇒DAY⇒SECONDS)

Note: The indication for the day of the week (zone 4) will be updated automatically.

- 4) To memorize the values and go back to the normal operation, press again “⌚”

9.3.5 Programming the device

The timer can be programmed for Turn on (**ON**) and Turn Off (**OFF**) events. The maximum events number is 25.

- 1) Press the “PRG” to enter in program mode.

At the first program, the symbols **ON** and **OFF** will blink on the display.

If the timer was already programmed, the first program will be displayed; pressing the “OK” key more times all the memorized program will be show on the display and, at last, the screen for a new program.

Note: If the maximum number of program is reached, the message “FULL” will appear.

- 2) Pressing again the “OK” key will cause the exit from the programming: on the display will be shown the available programs.
- 3) To select the event type, use the “①” and “②”.
On the display will blink:
 - **ON1** for a turn on event
 - **OFF1** for a turn off event

Turn on (Turn off)

Define, in relation to the selected program (daily, weekly, monthly, yearly or prefixed date) the hour and parameters for the ON/OFF state activation

Daily/Weekly program

The events are repeated in the selected days, every week.

- a) Confirm the selected event pressing "OK": on the display two dashes will blink (--).
- b) Press "①" to access to the minutes/hour setting: 00:00 is displayed.
- c) Use the "①" and "②" key to set the values, press "OK" to confirm and go to the next field
- d) After the time, the day/s of the week must be set: the day symbol **Monday (MO)** will blink

Note: The slow blink indicates that the day is activated; a fast blink indicates that the day is deactivated.

- e) Use "①" to activate the day and pass to the next one, use "②" to deactivate the day and pass to the next one. In this way the day of the week are considered in sequence. In the zone 4 of the display are present only the symbols of the activated days. Press "OK" to memorize the parameters.
- f) Press "OK" again to go to the program of another event; use "⌚" to go back to the normal operation.

Monthly program

Repeat one or more events in a certain date of a month of a year for all the years (once per month, for all the months of a year)

- Follow the indications **a) ... d)** of the "daily/weekly program"
- Press "OK" to skip the days selection and go directly to the day number selection.
- The parameter under selection is indicated by blinking dashes : since it's not needed to specify the month and year, press "OK" twice and go to the day number setting.
- To set the day, use the key "①" and "②"; to confirm the selection press "OK"
- Press again "OK" to go to another event program. Press "⌚" to return to the normal operation.

Yearly Program

Repeat one or more events of a certain day of certain month every year (same day of the same month, every year).

- Follow the indications **a) ... d)** of the "daily/weekly program"
- Press "OK" to skip the day's selection and go directly to the month and day selection.
- The parameter under selection is indicated by blinking dashes : since it's not needed to specify the year, press "OK" twice and go to the month and day selection (keys "①" and "②" to select, "OK" to confirm).
- Press again "OK" to go to another event program. Press "⌚" to return to the normal operation.

"Fixed date" Program

Consist of one or more events to be activated on a precise date (year, month, and day).

- For this program, just follow the same procedure of the "**yearly program**" specifying the year.

Display and modify the programs

Press the "PRG" key to access the "**Program Mode**".

Press "OK" to display in sequence the various programs. When all the programs has been displayed, the screen for a new program will appear; if the max program number is reached, the "**FULL**".

To modify the displayed program, press **"PRG"**. The program modification is similar to the program setup (in general: "①" and "②" to select, **"OK"** to confirm). When all the fields have been filled press again **"OK"** to go to the next program (if present) or to a new one. Press "⌚" to return to the normal operation.

Note: It's not possible to modify the type of an event (it's not possible to change a "turn on" event in "turn off").

Deleting a program

Press **"PRG"** to access to the **"program mode"**.

Select the program to be deleted using the **"OK"** key.

To permanently delete the program press and keep pressed the **"PRG"** key for about 5 seconds: to confirm the successful deletion, the message **"CLEAR"** will be displayed.

Once deleted a program, the next program (if present) or a new one is displayed.

Press **"OK"** to return to the normal operation (in this case the available programs number is displayed. Press **"OK"** or "⌚" to exit.

For further and detailed about the programming and use of the Timer, refer to the user manual included with the Bravo Basic.

Timer programming type GRASSLIN



20 memories time switches



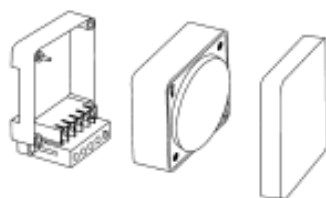
Safety precautions

- The connection and installation of electrical devices may only be carried out by a qualified electrician.
- Interventions in and changes to the device result in the voiding of the warranty claim.
- Observe your national regulations and the respective safety provisions.
- Switch-off commands have priority over switch-on commands.

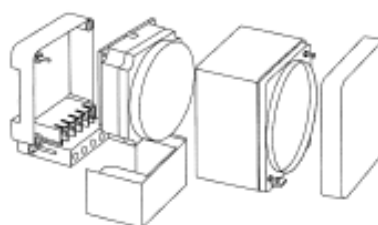


Assembly

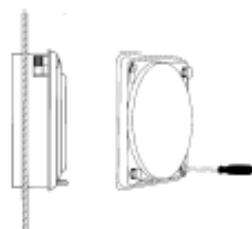
MIL 72 D120



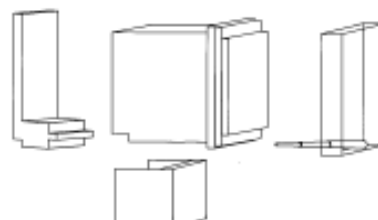
MIL 72A D120



MIL 72E D120

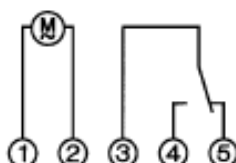


MIL 72 D220

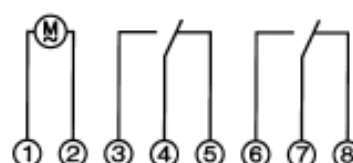


Connection

MIL 72 D120
MIL 72A D120
MIL 72E D120
FMD 120



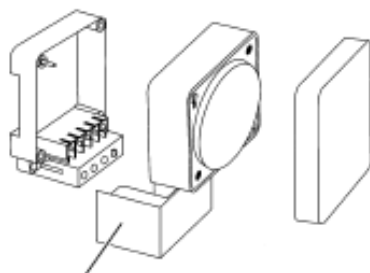
MIL 72 D220





Accessory

MIL 72 D120

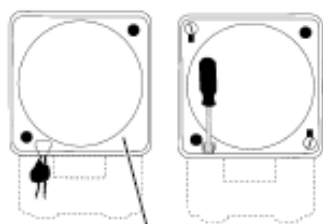


Terminal cover
01.78.0004.6

MIL 72E D120



Flush mounting base
01.79.0002.2



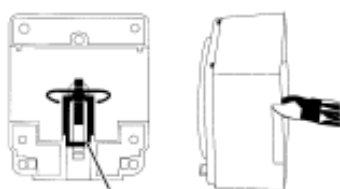
Sealing glass - IP40
01.78.0021.6

MIL 72 D220



Sealing glass

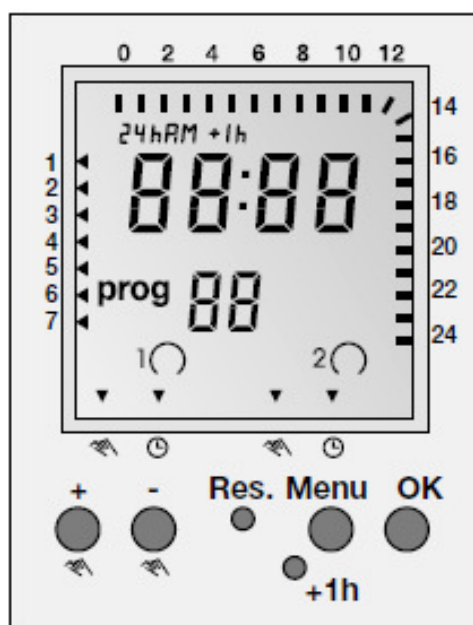
Sealing screw
16.10.0011.8



Multi-terminal busbar, latch
01.78.0036.6

OK
 reset

- : Overview of daily switching program
- 24hRM : Setting of 24h or am/pm
- +1h : Summer/winter clock changes
- ◀ : Weekday display
- ⊙ : Switching status display ON/OFF
- ☞ : Manual operation / fixed ON / fixed OFF
- ⌚ : Automatic operation



- +/- : Adjustment keys: By pressing the key longer than 2 sec. you can adjust the timer in steps of 5 units
- Res. : Reset
- Menu : By pressing the menu key programming is terminated and the system reverts to automatic operation
- OK : Confirmation of programming



Setting of this programmable timer is depending of the user preference to use pre-set programs or defining own programming.

Using Pre-set programs (first time installation)



Using **Reset** key you can adjust the following values:

24h or am/pm:	see pg 22
Time (hour and minutes):	see pg 23
Week day:	see pg 23
Pre-set programs P01 to P03:	see pg 24

User defined programming by Menu mode

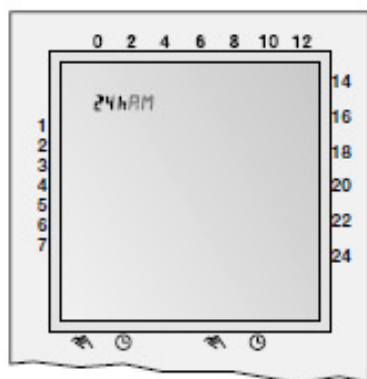


Using **Menu** key you can adjust / review the following values:

24h or am/pm:	see pg 22
Time (hour and minutes):	see pg 23
Week day:	see pg 23
Programs P--:	see pg 24



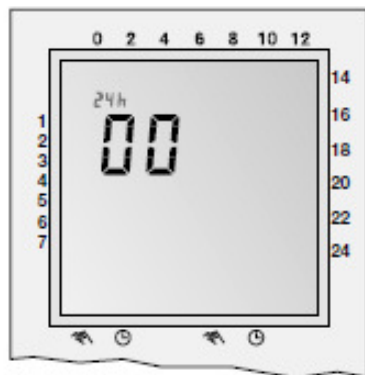
Sequence to follow after selecting programming by pre-set programs or Menu mode.



Set display format 24h or am/pm



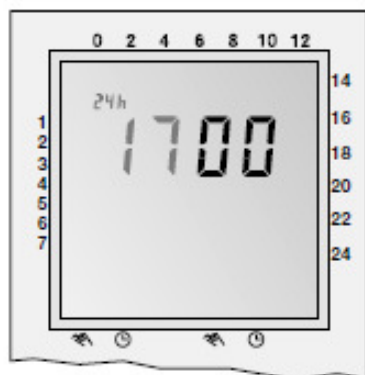
Select 24h or am/pm (+/-) and confirm with **OK**.



Set hour



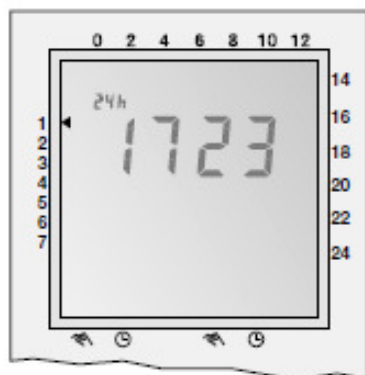
Select hour (+/-) and confirm with **OK**.



Set minutes



Select minutes (+/-) and confirm with **OK**.



Set week day

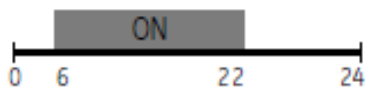


Select week day (+/-) and confirm with **OK**.

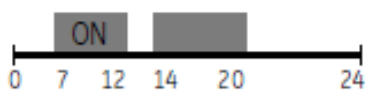
- | | |
|---------------|--------------|
| 1 = Monday | 5 = Friday |
| 2 = Tuesday | 6 = Saturday |
| 3 = Wednesday | 7 = Sunday |
| 4 = Thursday | |



P01: Mo - Su, 1 x ON/OFF



P01: Mo - Su, 2 x ON/OFF



P01: Mo - Su, 3 x ON/OFF



Programs P01-03

The switching on and off times for programs P01 to P03 are preset (pre).

The user can change these programs.

Individual program, P--

Under the menu option P-- you have the option of creating a user-defined program.

This program can be changed at any time. There are up to 20 memory locations available for 10 OFF and 10 ON commands.

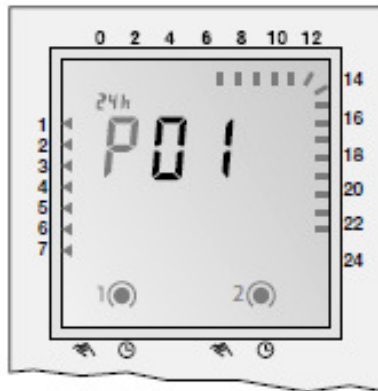
You can allocate a corresponding weekday or week block to each memory location.

Note:

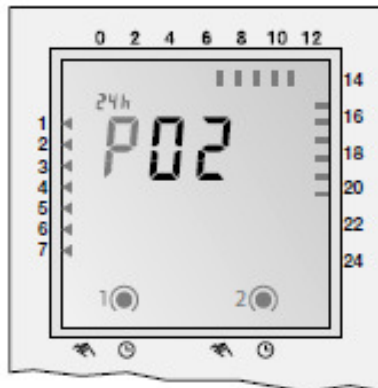
For two channels version pre-set program is established in the two channels.

P0x prog

Sequence to follow after setting time in the Reset mode.



Select pre-set program (+/-).



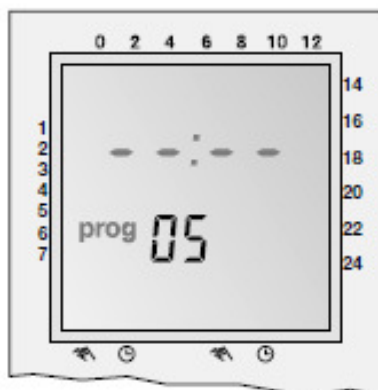
Once selected the program desired there are following options:

Menu: terminate programming

OK: Going through pre-set programs to modify selection (any program ON or OFF can be modified by using "+" or "-" keys and confirming with **OK**) or accept it with **OK** key to go the next free memory location in order to add new user defined programs (see pg 30).

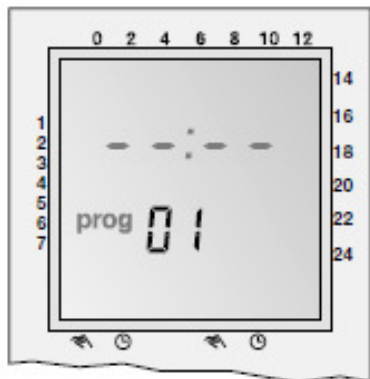
e.g. after selecting P02 you should also program:

Sa-Su 22:30 ON (prog05)
23:00 OFF (prog06)



p--
prog

Sequence to follow after setting time and week day while running Menu mode or adding programs to the pre-set P01 to P03.



Select program ON



and confirm with **OK**.



Set hour ON



Select hour (+/-) and confirm with **OK**.



Set minutes ON



Select minutes (+/-) and confirm with **OK**.

p--
prog



Set week day ON



Select week day (+/-) and confirm with OK.

Possible week blocks and individual days

	1	2	3	4	5	6	7
1	◀	◀	◀				▶
2	◀	◀	◀				▶
3	◀	◀	◀				▶
4	◀	◀	◀				▶
5	◀	◀	◀				▶
6	◀	◀			▶		▶
7	◀				▶		▶



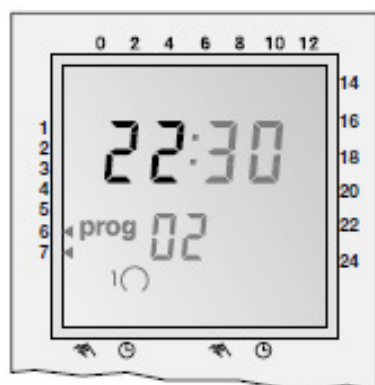
Set Channel

(only for 2 Channel version)



Select Ch1 or Ch2 (+/-) and confirm with OK.

P--
prog



Set hour OFF



Select hour (+/-) and confirm with **OK**.



Set minutes OFF



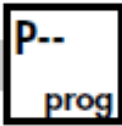
Select minutes (+/-) and confirm with **OK**.



Set week day OFF



Should the OFF command be the same day of ON command then select **Menu** to terminate programming or select **OK** to go to a new program ON setting.



Shift

Should the OFF command be the following day of ON command then select "+" key then select **Menu** or **OK**.

Example:

Mo-Fr

20:00 p.m. - 03:00 a.m. ON

03:00 a.m. - 20:00 p.m. OFF

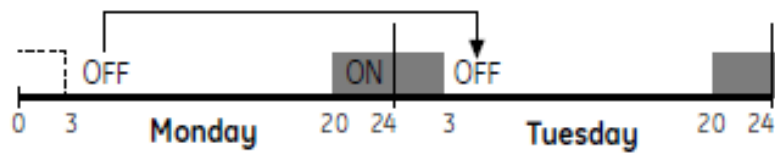


Mo-Fr

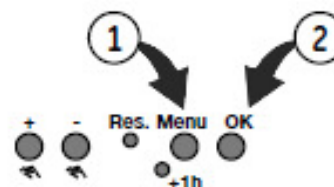
20:00 p.m. - 03:00 a.m. ON

Tu-Sa

03:00 a.m. - 20:00 p.m. OFF



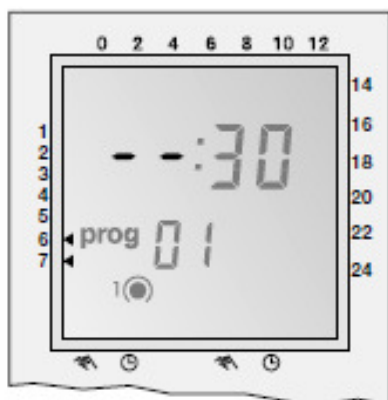
del



Select **Menu**, then select **OK** key until getting onto the ON time of the program you want to delete.



Select **"-"** with (+/-) key and confirm with **OK**.



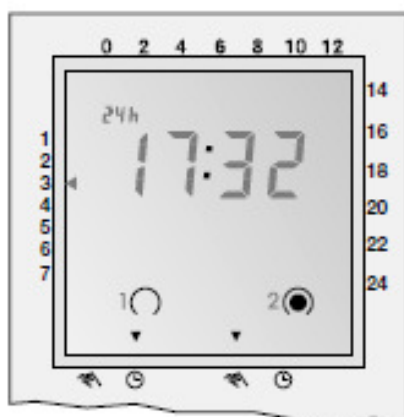
Note:
Switching programmes are deleted in ON-OFF pairs. If you delete a single ON instruction, the corresponding OFF instruction is also deleted.

+1h



The **+1h** key is for the changeover from summer to winter time.

- By pressing the **+1h** key 1 hour is added to the current time.
- **+1h** is shown on the display.
- By pressing **+1h** again 1 hour is subtracted from the current time.



The **+** key serves to change over between automatic ☾, fixed ON ☀ and fixed OFF operations (Ch1).

The **-** key serves to change over between automatic ☾, fixed ON ☀ and fixed OFF operations (Ch2).



COMBUSTION / ÉMISSION DEPARTMENT



INDUSTRIAL CONTROL DEPARTMENT



HYGIENE HEALTH AND ENVIRONMENT DEPARTMENT



SERVICE AND LOGISTIC DEPARTMENT