Installation, use and service manual

Digital Refractometer
model UR-24

Manual n° 01246C0011
For instrument n°

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THIS MANUAL SHOWS THE INSTRUMENT'S MAIN FEATURES. IT INCLUDES IMPORTANT INDICATION AND INSTRUCTIONS ON THE SAFETY OF USE, PROGRAMMING AND MAINTENANCE, THEREFORE IT MUST BE KEPT WITH CARE THIS MANUAL SHOWS THE INSTRUMENT'S MAIN FEATURES. IT INCLUDES IMPORTANT INDICATION AND INSTRUCTIONS ON THE SAFETY OF USE, PROGRAMMING AND MAINTENANCE, THEREFORE IT MUST BE KEPT WITH CARE NEAR THE INSTRUMENT, INSIDE A PROPER HOLDER, HOWEVER WELL PROTECTED FROM LIQUIDS AND OTHER THAT COULD COMPROMISE THE READING CONDITION.
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TABLE OF CONTENTS

1. APPLICATIONS AND USE 1-1
1.1 APPLICATIONS 1-1
1.2 ALLOWED USE, EXPECTED USE, USE NOT PERMITTED 1-2
1.2.1 ALLOWED USE 1-2
1.2.2 EXPECTED USE 1-2
1.2.3 USE NOT PERMITTED 1-2

2. GENERAL INFORMATION AND SAFETY 2-1
2.1 GENERAL INFORMATION 2-1
2.2 SAFETY 2-1
2.2.1 GENERAL PRECAUTIONS 2-1
2.3 ASSIGNED PERSONNEL 2-1
2.4 EMERGENCY OPERATIONS IN CASE OF EXPLOSION 2-2
2.5 EMERGENCY OPERATIONS IN CASE OF FIRE 2-2

3. TECHNICAL DATA 3-1
3.1 PERFORMANCE SPECIFICATIONS 3-1
3.2 CONSTRUCTION CHARACTERISTICS 3-1
3.3 MATERIAL CONTACTING THE PRODUCT 3-2
3.4 CONFORMITY TO DIRECTIVES AND SPECIFICATIONS 3-2

4. WORKING PRINCIPLE 4-1
4.1 WORKING PRINCIPLE 4-1

5. CONSTRUCTION 5-1
5.1 CONSTRUCTION 5-1
5.2 IDENTIFICATION 5-3

6. PACKING 6-1
6.1 PACKING 6-1

7. INSTALLATION 7-1
7.1 INSTALLATION 7-1
7.2 INSTALLATION ACCESSORIES 7-3

8. ELECTRICAL CONNECTIONS 8-1
8.1 ELECTRICAL CONNECTIONS 8-1
8.2 “INPUT” CONTACT CONNECTION 8-2
8.3 ALARM/CLEANING DEVICE CONTACT CONNECTION 8-2
8.4 SERIAL CONNECTION AND ANALOG SIGNAL 8-2

9. PROGRAMMING 9-1
9.1 GENERAL 9-1
9.2 DISPLAY KEYBOARD FUNCTIONS 9-1
9.3 PROGRAMMING LEVEL STRUCTURE 9-5
9.4 LEVEL 1 9-6
9.4.1 CALIBRATION 1 (User Calibration) 9-7
9.4.2 ALARMS (Alarm Setpoints) 9-8
9.4.3 WASHING (Washing Parameters) 9-9
9.5 LEVEL 2 9-10
9.5.1 CALIBRATION 2 (Operator Calibration) 9-10
9.5.2 SERIAL PORT (Serial Port Settings) 9-11
9.5.3 SETUP 2 (Level 2 setup parameters) 9-12
9.5.4 SERVICE (Service) 9-15
9.5.5 DISPLAY (Display setting) 9-16
9.6 LEVEL 3 9-17
9.6.1 CCD CALIBRATION (CCD Calibration) 9-18
9.6.2 TEMPERATURE CALIBRATION (Pt100 Calibration) 9-20
9.6.3 mA CALIBRATION 9-21
9.6.4 MOISTURE CALIBRATION (Humidity Sensor Calibration) 9-22
9.6.5 SYSTEM DIAGNOSTICS (Test Functions) 9-23
9.6.6 CCD ALIGNMENT (CCD Alignment) 9-24
9.6.7 MEASUREMENT UNIT 9-25
9.6.8 SCALE SELECTION 9-25
9.6.9 USER RANGE (USER Range personalization). 9-26
9.6.10 PASSWORD 9-27
9.6.11 NEW CODE (Access code modification) 9-27

10. START-UP 10-1

10.1 START-UP 10-1

11. DESICCANT CARTRIDGE 11-1
11.1 DESICCANT CARTRIDGE 11-1

12. CALIBRATION 12-1
12.1 CALIBRATION 12-1

13. MAINTENANCE 13-1
13.1 MAINTENANCE 13-1

14. CIRCUIT BOARD REPLACEMENT 14-1
14.1 GENERAL INFORMATION 14-1
14.2 GRAPHIC DISPLAY 14-2
14.3 CARD “CPU” 14-3
14.4 “CCD” SENSOR 14-5
14.5 MEASUREMENT LED 14-5
14.5.1 TEMPERATURE SENSOR 14-5

15. TROUBLE-SHOOTING GUIDE 15-1
15.1 TROUBLE-SHOOTING GUIDE 15-1
15.1.1 CHECKING “OUTPUT SECTION” 15-3
15.1.2 CHECKING “INPUT SECTION” 15-3
15.1.3 CHECKING “TEMPERATURE SECTION” 15-4
15.1.4 CHECKING “mA OUTPUT SECTION” 15-4

16. SPARE PARTS 16-1
16.1 SPARE PARTS 16-1

17. GENERAL INFORMATION 17-1
17.1 GENERAL INFORMATION 17-1
17.2 CORRELATION °C/°F/Ohms (Pt100) 17-1
17.3 SCRAPPING AND DISPOSAL 17-1
17.4 SAFETY REGULATIONS 17-2

18. DATA ACQUISITION 18-1
18.1 DATA ACQUISITION 18-1
18.2 SERIAL CONNECTION 18-1
18.3 “OPTOMUX” PROTOCOL 18-3
18.3.1 ADDRESS/PAGE 18-3
18.3.2 VARIABLES ADDRESSING 18-4
18.3.3 ANALOG VALUE REQUESTS 18-6
18.3.4 DIGITAL PAGE VALUE REQUESTS 18-11
18.3.5 “OPTOMUX” TYPE IDENTIFICATION 18-12
18.3.6 POWER UP CLEAR COMMAND 18-13
18.3.7 RESET COMMAND 18-14
18.3.8 OPTOMUX AVAILABLE COMMANDS GENERAL PROSPECT 18-15
18.3.9 ERROR MESSAGES AND CONCLUSION 18-15
18.4 “LABTECH” PROTOCOL 18-16
18.5 MAS, MR01; USER PROTOCOL 18-16
18.6 US#1 MODALITY 18-20

1. APPLICATIONS AND USE

1.1 APPLICATIONS

The **UR-24 Digital Refractometer** is used to continuously measure the "Refractive Index", and therefore the concentration, of a liquid flowing in the process line. Every other use is improper.

This particular technology can measure different types of products, even if opaque, thick, or having suspended solids. Likewise, the measurement is independent of the pressure and the speed of the product at the point of measurement.

The **UR-24** Digital Refractometer is equipped with a precise sensor that directly measures the temperature of the product in the process line. Since the refractive index is also a function of the product's temperature, the temperature is automatically compensated using special algorithms.

The most common applications are concentrating, diluting, blending or reconstituting liquids in industries such as food, chemical, petrochemical and textile, both in continuous and batch processes.

The fundamental characteristics that differentiate the UR-24 from other Maselli digital process refractometers are:

- The special design allows it to be used with higher temperature products.
- The optimization and simplification of the functions, as well as the special construction, make the UR-24 the most economical model of the series of Maselli digital refractometers.

1.2 ALLOWED USE, EXPECTED USE, USE NOT PERMITTED

1.2.1 ALLOWED USE

Maselli Misure informs the user of the special rules defined by the authorities concerned to safeguard the operators' health in the work areas. Access to the instrument's work area depends on the use of proper protections and will be limited to trained personnel, who are aware of the several risks to which they may be exposed and potentially subjected both near the equipment and during its use or service. Strictly abide by the legislation applicable in the country of use.

1.2.2 EXPECTED USE

Maselli Misure cannot foresee all the possible events that may cause potential risks, however remote, during the actual equipment operating conditions and use. For this reason the warnings included in this text and also indicated on the unit may not include all the eventual situations of potential danger. The unit is designed to measure a specific product in specific conditions, so it is not suitable for other purposes; every other use is to be considered as improper. Use the instrument according to its technical features, referring to the indications above for the operative specifications. ***Maselli Misure*** recommends that all the indications provided and the safety rules in this use and maintenance manual are strictly followed.

1.2.3 USE NOT PERMITTED

Only the uses specified in paragraphs 1.3.1 and 1.3.2 are permitted; also:

- Before activating the instrument, make sure that all the electric hookups have been done according to state-of-the-art techniques, and that the equipment piping is not under pressure or with process phases enabled during the installation.
- Do not connect the instrument mounting fitting to production lines having fluids other than those indicated for type and flow rate in the Tables in this Manual.
- Do not replace the unit's safety devices with elements other than those indicated and suggested.

2. GENERAL INFORMATION AND SAFETY

2.1 GENERAL INFORMATION

The model **UR-24** microprocessor-based Digital Refractometer is mechanically built by an enbloc with pressed cover in stainless steel, thermal insulation flange, and AISI 316 stainless steel prism holder. It mounts directly onto the process line with 3" Tri-Clamp® fitting.
The instrument makes a continuous, temperature compensated measurement of the product's concentration and displays it on a backlighted "LCD" (liquid crystal display) 128x64 pixels.

The electrical output, proportional to the reading, can be analog, configurable through the setup menu, or digital by RS422 or RS485 serial connection.

In addition to simplifying the operator interface, the microprocessor offers the following advantages:

- Simplified programming of the parameters,
- Customized measuring range,
- Easy system calibration,
- Service utilities.

The special design of the UR-24 optical measuring system makes the instrument insensitive to variations, in the internal LED light source intensity, to minor coating or opaqueness of the measuring prism, and to aging of the electronic components.

2.2 SAFETY

2.2.1 GENERAL PRECAUTIONS

The personnel assigned to work on the instrument must carefully read the information given in this manual, with special attention to the safety precautions listed in this chapter. The operator must also follow the instructions below:

1) All the washing, inspection, removal or other operations carried out on the Analysis Unit must be done STRICTLY with the LINE STOPPED AND NOT PRESSURIZED and THE ELECTRIC POWER SUPPLY DISCONNECTED.
2) Keep the instrument and the work areas tidy and clean.
3) Wear suitable clothing to avoid impediment and/or dangerous tangling with the instrument.
4) Use the personal protection devices recommended by the instruction manual depending on the operations.
5) Do not remove or change the labels affixed on the instrument by the manufacturer.

2.3 ASSIGNED PERSONNEL

The instrument is designed for use by a number of operators.
The personnel assigned to operate on the unit must have (or acquire by proper training and practice) the requirements indicated below and sound knowledge of the contents of this manual and of all the information concerning safety:

1) Sufficient General and technical knowledge to understand the contents of the instruction manual and to correctly interpret Drawings and Schematics.
2) Knowledge of the main hygiene, work safety and technological regulations.
3) General knowledge of the production line and of the factory where the instrument is used.
4) Ability to maintain appropriate behavior in case of emergency, find personal protection devices and use them correctly.

In addition to the above-mentioned characteristics, the maintenance staff must have sufficient technical, electrical and mechanical skill.

2.4 EMERGENCY OPERATIONS IN CASE OF EXPLOSION

The system is not designed, built or tested for use with explosive fluids and is not suitable for operating in explosive environments. In case of an explosion, refer to the safety standards in force in the work area.
There are no pressurized components in the instrument except for the hydraulic circuit through which the product flows at the process pressure when connected to the production line.

ATTENTION: Use in explosive or partially explosive atmospheres is forbidden.

2.5 EMERGENCY OPERATIONS IN CASE OF FIRE

In the **Digital Refractometer UR-24**, the causes of fire may be limited exclusively to the electric devices, and these are very remote, as the operating current and voltage used are extremely low.
In case of fire, operate, if possible, on the main sectioning switch that must be provided up line on the unit and extinguish the fire using powder extinguishers.
All the electric devices in the system are of the self-extinguishing, fireproof type.

ATTENTION: The client must provide for a suitable fire fighting system after evaluating the internal situation and in compliance with the laws applicable.

ATTENTION: In the event of a fire, turn off the main switch immediately to cut off the electricity.

3. TECHNICAL DATA

3.1 PERFORMANCE SPECIFICATIONS

ONLY FOR UR-24 HA (High Accuracy Version)

Measurement Range	:	1.3170...1.5318 nD (0...95 Brix).
Scale Amplitude	:	minimum 0.0387 nD – maximum 0.2148 nD minimum 15 Brix – maximum 95 Brix
Accuracy	:	0.3% of the full scale max. accuracy ±0.00007 nD (±0.05 15 Brix).

ONLY FOR UR-24 ST (Standard Version)

Measurement Range	:	1.3170...1.5318 nD 0...95 Brix.
Scale Amplitude	:	minimum 0.0642 nD – maximum 0.2148 nD minimum 30 Brix – maximum 95 Brix
Accuracy	:	0.5% of the full scale max. accuracy ±0.0002 nD (±0.15Brix).

COMMON FOR ALL UR-24 MODELS

Product Temperature	:	Automatic compensation from -5...+105 °C (23...221 °F) Special version for temperature up to 140 °C (284 °F).
System's temperature	:	max.150 °C (302 °F).
Line Pressure	:	-1...+10 bar (-14,5...+145psi) at 20 °C (68 °F). -1…+8 bar (-14,5...+116psi) at 100 °C (212 °F).
Ambient Characteristics	:	-10...+45 °C (14...113 °F), 5%...95% RH non-condensing.
Stock Characteristics	:	-20...+70 °C (-4...+158 °F), 5%...95% RH non-condensing.
		**********
Power Supply	:	AC 18V (12...24V), 50...60Hz, 0.6A DC 24V (18...36V), 0.6A. With optional Interconnection box: AC 115/230V ±10%, 50...60Hz, 25VA.
Interface	:	• Analog output configurable 0...20mA or 4...20mA on 470Ω. • Serial output RS422/RS485. • PROFIBUS output through Module (optional) for Profibus-DP net, supplied to DC24V.
Input/Output	:	• One line "HOLD" input . • One n°1 relay output with 24V/500mA-DC/AC load.

3.2 CONSTRUCTION CHARACTERISTICS

Overall Dimensions	:	Standard version ∅176 (w) x 192.5 (253.5) (h) x 132.5 (d). LP version ∅176 (w) x 192.5 (253.5) (h) x 214.5 (d).
Weight	:	Standard version ~3.3 kg (7.28lb), LP version ~5.0 kg (11lb).
Protection	:	IP67 according to EN 60529.
		**********
Line Connection	:	3" Tri-Clamp® or Varivent® type "N".
Light Source	:	Electronically compensated "LED".
Prism	:	Synthetic Sapphire or optical glass.
Measurement Element	:	"CCD".
		**********
Command keyboard	:	Non-scratch Polyester with dome-shaped keys.
Visualization	:	LCD Graphic Display, 128x64 pixels, backlighted.
Temperature Sensor	:	Class "B" AISI 316 st. Pt100, for IEC 751.

3.3 MATERIAL CONTACTING THE PRODUCT

Prism	:	Synthetic Sapphire or optical glass.
Prism Holder	:	AISI 316 Stainless Steel.
Gaskets	:	Viton (on request EPDM, Silicone, Kalrez, sanitary rubber).

3.4 CONFORMITY TO DIRECTIVES AND SPECIFICATIONS

EMC	:	CEE 89/336, 93/68 and following modifications: EN 50081-2 (1994); EN 50082-2 (1995); EN 61000-3-2 (1998); EN 61000-3-3 (1995); EN 61000-4-2 (1996); EN 61000-4-3 (1996); EN 61000-4-4 (1996); EN 61000-4-5 (1995); EN 61000-4-6 (1996); EN 61000-4-11 (1995).
3A	:	"3A" Sanitary Standards (upon request).
RAEE	:	CEE 2002/96 and following modifications: EN 50419 (2005).

All the components that come into contact with food substances are made of suitable materials as required by Directive 89/109/CEE and subsequent modifications.

4. WORKING PRINCIPLE

4.1 WORKING PRINCIPLE

The working principle of the UR-24 is based on the physical phenomena of total reflection and refraction of light. It is known that a ray of light that passes from one medium "A" to another medium "B," each with a different refractive index, does not proceed in a straight line, but will deflect at the interface of the two media. The extent of the deflection is a function of the nD (refractive index) of medium "B." The angle at which the light ray passing through medium "A" strikes the interface is called the "angle of incidence" and is a fundamental parameter in the study of refraction. This is defined as the angle formed between the light ray and the axis perpendicular to the interface plane.

Referring to Figure 4.1.a, the optical section of the digital refractometer includes:

- LED light source,
- Optical condenser lens,
- Image entrance lens,
- Measuring prism (medium "A"),
- Image exit lens,
- CCD assembly for image detection.

Referring to Figure 4.1.a below, if we imagine a series of rays with different angles of incidence, we notice that, progressing from light source ray 1 to rays 2,3,4 and so on, we encounter a condition in which the incident ray does not enter medium "B" (product) but deflects parallel to the surface of the measuring prism (ray 3').

The angle of incidence at which this phenomenon occurs is called the "critical angle," and is a characteristic of the two media "A" (measuring prism) and "B" (product).

This value can be computed from the equation:

$$\frac{nDB}{nDA} = \sin \alpha_L$$

where α_L = the critical angle

Continuing to decrease the angle of incidence beyond the critical angle, upon reaching medium "B" the rays (1, 2, 3) are reflected as if the surface of medium "B" were a mirror. The deflection of the incident rays no longer follows the law of refraction, but rather the law of reflection. That is, the angle of reflection is the same as the angle of incidence.

If a beam of light rays with different incidence angles reaches the "A/B" (prism/product) interface, we will observe that those rays with angles of incidence less than the critical angle will refract and enter medium "B," while those rays having an angle of incidence greater than the critical angle, as determined by media "A" and "B," will reflect back into medium "A".

This phenomenon can therefore be used to determine the refractive index of one of the media. If we consider that the nD of "A" (the measuring prism) is a known constant, and we vary the concentration of medium "B" (the product to be analyzed), it is possible to calculate the refractive index of the product for any concentration by simply measuring the critical angle at which reflection first occurs (the reflected ray 3 that is associated with the infinitesimally close incident rays 3 and 3').

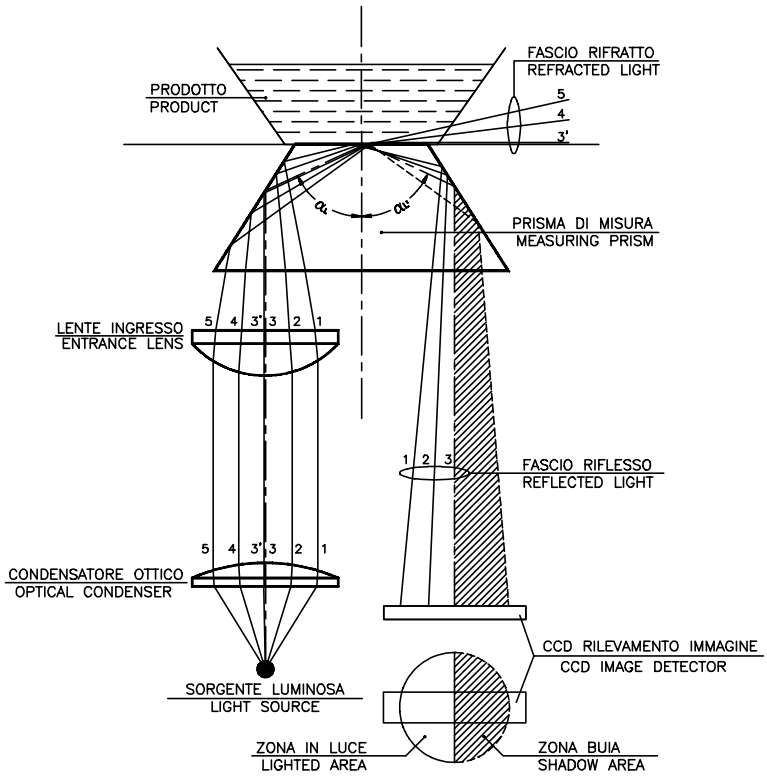


Figure 4.1.a - UR-24 Refractometer principle

Referring to the previous formula, if the nD of "A" (the prism) is a constant, we can conclude that A = K. Therefore:

$$\frac{nDB}{K} = sin\ \alpha_L \qquad nDB = K * \sin \alpha_L$$

By measuring the critical angle, we can determine the refractive index of the analyzed product, nD of "B".

In the **UR-24 Digital Refractometer**, a carefully-selected electronic component (LED) creates a beam of light which, using a special optical system, passes through the measurement prism, where it comes into contact with the product to be analyzed. The interface between the prism and liquid is where the phenomenon of refraction occurs. The beam of light is split into two parts: one part refracts into the sample, dispersing, and is absorbed by the product. The other part of the beam reflects at the product surface as if it were a mirror, following the laws previously described. This light then falls upon the optical image detection sensor (CCD) inside the instrument. Analyzing the resulting image of the light beam at this point, one can observe that it is divided into two parts; one part is bright, while the other part is practically dark. The position of the separation line between light and shadow is directly proportional to the refractive index of the product. A very accurate measurement of the position of this separation line is made using the optical CCD sensor, composed of a series of 2048 individual image sensors (pixels) spaced 14 micron apart.

5. CONSTRUCTION

5.1 CONSTRUCTION

The **UR-24 Digital Refractometer** offers a compact design which can be economically installed on any process equipment. To accommodate different product temperatures and installation requirements, the **UR-24** is available in both the standard in-line version and one specially modified for tank mounting. The front of the instrument includes an LCD graphical display and an input polyester keypad with dome-shaped keys, which allow the user to view the measurement value and operating functions, as well as to program the instrument.
The UR-24 basically consist of three parts:

- ***Principal Body:*** A cylindrical housing with a removable cover, containing the central microprocessor central unit (CPU), wiring connection and the desiccant cartridge. The particular finned shape and its material (pressed stainless steel) allow to have a good internal temperature's dissipation and, as a consequence, the possibility to measure high temperature products too.

- ***Isolation Flange:*** A cylindrical block made from low thermal conductivity plastic, which exibits strong mechanical properties even at high temperatures.
  It supports the optical assembly while thermally insulating the prism holder (in contact with the product) from the instrument's electronic components.

- ***Prism Holder*** A cylindrical assembly with the double function of supporting the measure prism and mounting the instrument onto the process. It is made of AISI 316 stainless steel, with other materials available upon request.

As can be easily seen, the technology of construction has been conceived in order to enhance the two principle characteristics of the instrument:

- The reduced number of components allows easy assembly and disassembly, while insuring high reliability.
- The isolation between prism holder and main body, together with superior heat dissipation while insuring high reliability, allow the electronics to remain in their thermal range of operation even in applications that will require measurement of a high temperature product.

The **UR-24 Digital Refractometer,** therefore, has been designed and built for industrial environments, including protection classification IP67 (EN 60529).

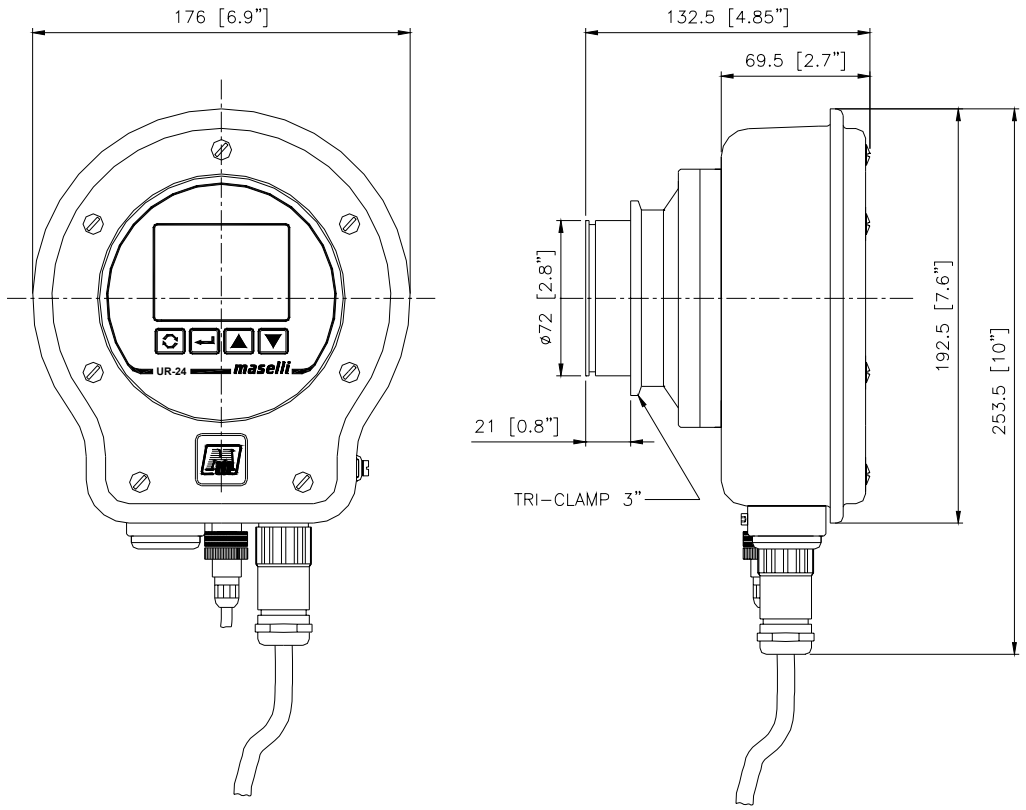


Figure 5.1.a - Overall dimensions of the standard UR-24

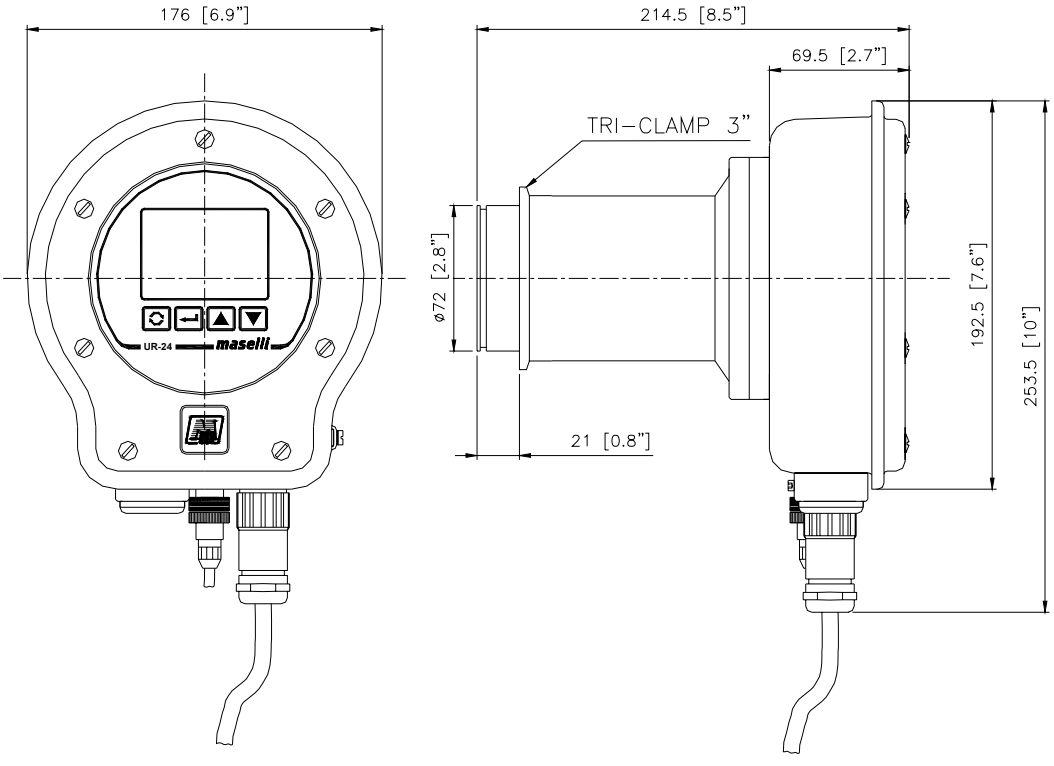


Figure 5.1.b - Overall dimensions of the tank-mounted UR-24 with 21mm fitting

5.2 IDENTIFICATION

The instrument's identification label is situated behind the main structure.
It indicates:

- The unit's serial number that must always be communicated to Maselli's service department in case of technical intervention or spare parts order.
- The scale range with min. and max. measurement values.
- The maximum measurement temperature.
- The electrical supply values and general technical features.
- "CE" mark and in case "3A".

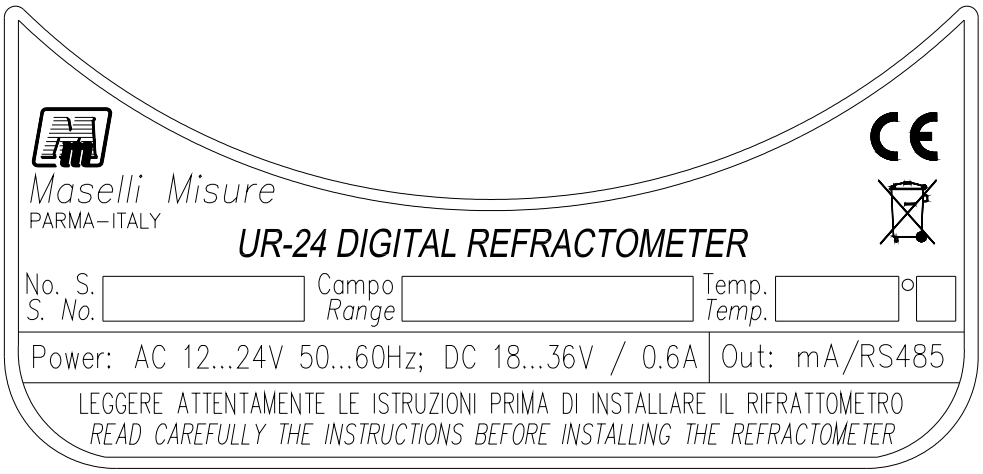


Figure 5.2.a - UR-24 identification label

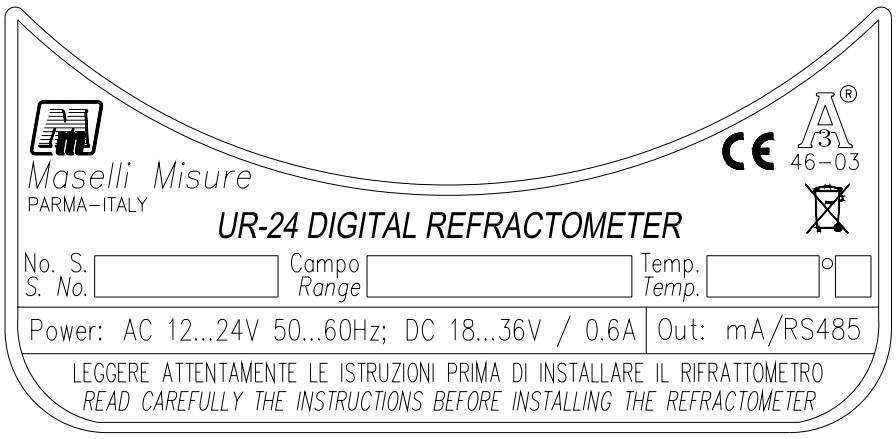


Figure 5.2.b - UR-24 identification label - "3A" sanitary version

6. PACKING

6.1 PACKING

The **UR-24 Digital Refractometer** is packed in a sealed expanded polystyrene container which protects the instrument during transport and maintains its warranty. When the instrument is unpacked, make sure that the unit is complete and undamaged. On the contrary, do not use the instrument and call the supplier.

Please retain the original packing container, to be used in case it becomes necessary to return the instrument to the manufacturer or to the local agent for service.

In any case it's recommended to not throw the protection packaging materials used for transport in domestic litter, but to give them to proper collecting centers.

Some accessories and spare parts are enclosed with the UR-24 refractometer.
Normally the packing contains the following items:

1. **UR-24 Digital Refractometer** with the connection cable and connector (only if the interconnection box is not provided).
2. Sealed polyethylene envelope containing the "Pt100 Temperature Sensor" with connector and gasket, envelopes 6-7.
3. Calibration basin.
4. AISI 316 stainless steel 3" Tri-Clamp® cap to seal the opening of the mounting fitting after removing the UR-24.
5. (Optional) Stainless steel mounting fitting (1", 1½", 2", 3" or 4" line size), including plug with supports and clamps, or flange for tank assembly. (See Note 1).
6. Sealed polyethylene envelope containing one set of metric hex keys for TCEI M3 and M4 screws and trimmer adjustment screwdriver (in envelope 2).
7. Sealed polyethylene envelope containing two screws, complete with O-ring, for the cover, and one AISI 304 ¼" st. plug with gasket to close the Pt100 hole on the line (inside envelope 2).
8. Sealed polyethylene envelope containing:
   - 8.1 Use and Maintenance Manual.
   - 8.2 Packing list.
   - 8.3 Startup Certification.
   - 8.4 3½" Utilities Diskette for PC.
9. (Optional) Tri-Clamp® short-weld ferrules to adapt the T.C. version mounting fitting to the product line.

(Note 1) For dimensional reasons, the mounting fitting may need to be shipped in a separate container.

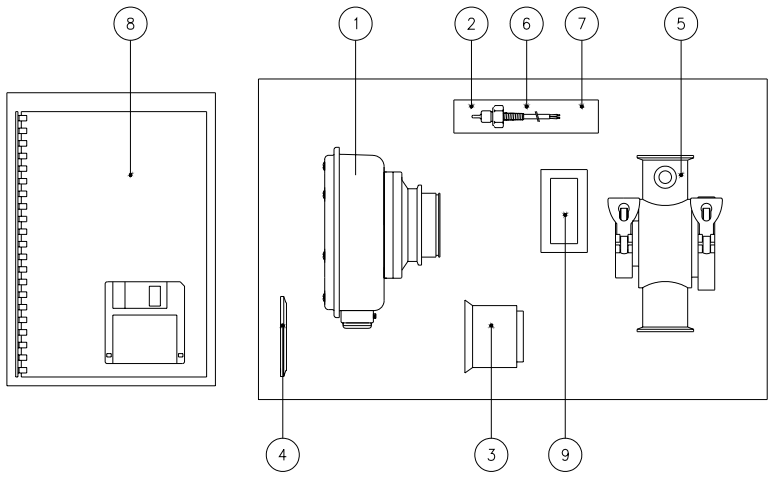


Figure. 6.1.a - Example of the packaging in polystyrene packing container

7. INSTALLATION

7.1 INSTALLATION

Since the **UR-24 Digital Refractometer** has no moving parts, and a high degree of protection against external elements, it can be installed in almost any location in the plant. However, to avoid inconveniences and to obtain the best performance, please observe the following suggestions:

- **Avoid** installing close to large pumps or turbines which might create a vacuum pressure or high turbulence in the product in front of the prism, which can compromise the stability of the measurement.
- **Avoid** installing in locations with strong vibrations, which can eventually damage the electronic or optical parts.
- **Avoid** external supports mounted directly on the UR-24 body, which can create torsion forces on the instrument.
- **Avoid** mounting the UR-24 in direct sunlight. The sun's rays can create higher internal temperatures, which tend to reduce the life of an instrument. Where possible, install the instrument in areas where it will not be affected by ventilation.
- **Provide** the minimum access clearances shown in Figure 7.2.b, to facilitate future servicing or calibration.
- **Ensure** that the prism remains flooded with product even during pauses in production. Otherwise, the residual liquid in contact with the prism can dry and form a film deposit not easily removed afterwards without cleaning manually.

The **UR-24** can be installed in essentially four different ways:

a. Directly on the main product line.

b. In a by-pass piping on the main product line, using a throttling valve or other restriction on the main line to insure that a portion of the product flows past the instrument.

c. In a by-pass piping on the main product line piping, or on a tank, using a circulation pump.

d. Directly mounted on the side of a tank or evaporator boule.

Remember that the instrument must be installed by skilled personnel under safe conditions, avoiding any potentially dangerous situations for the installer or others.

In particular, it is necessary to:

* avoid working in unstable or uncertain equilibrium;
* use adequate clothes and protection if the equipment's temperature could be a potential danger;
* use protective glasses and anti-slip rubber shoes;
* avoid spilling in the environment any contaminating, toxic or other injurious substances.

For anything not specifically indicated, refer to the safety rules in force in the Country of use.

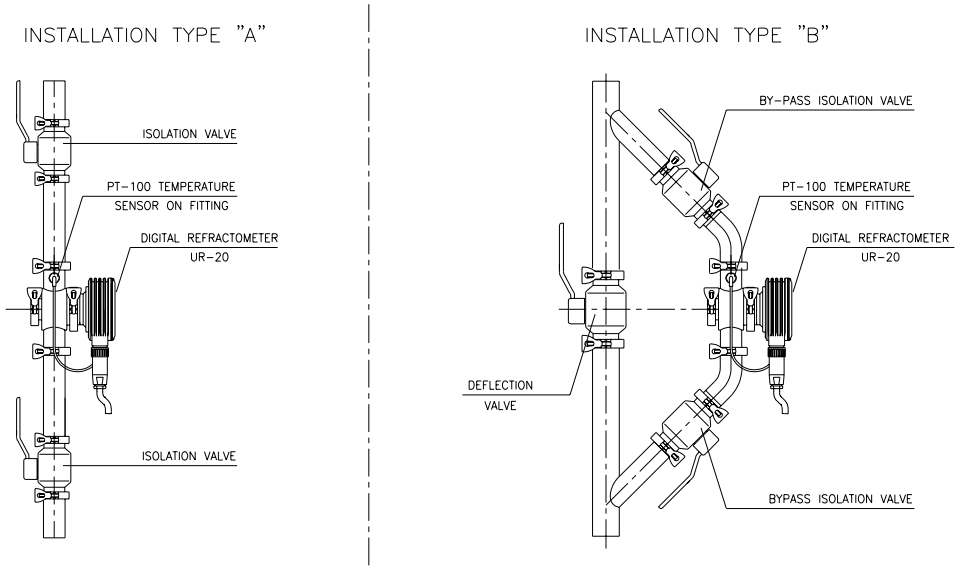


Figure 7.1.a - Examples of UR-20/24 installations

***NOTE**: the following UR-24 installation examples assume that the mounting of the UR-24 on piping or on a tank is made using the proper mounting hardware described in the following paragraph 7.2, "Installation Accessories".*

a. Mounting the UR-24 directly on the main product line is not normally recommended. Even though it may be less expensive initially, it makes servicing more difficult later. If service is needed, or even if simple prism cleaning is necessary, the production process must be temporarily stopped while the product line is open for service. This mounting method normally requires two valves to isolate the UR-24 from the production line during servicing.

b. The by-pass mounting configuration, without a circulation pump, is acceptable when the process can support the pressure drop created by the orifice or throttling valve needed to insure an optimum flow of product in the by-pass piping past the refractometer. This mounting method also requires two shut-off valves to isolate the refractometer from the line, to allow servicing without interrupting production.

c. The by-pass mounting configuration using a circulation pump is undoubtedly best, because it provides a known, constant product flowrate and velocity past the refractometer prism. This mounting method is considered best when accuracy is most important. It also requires the two by-pass isolation valves.

d. The tank or boule mounting method requires a continuous movement of the product in the tank in contact with the prism, in order to avoid product buildup on the prism surface. Ensure also that scraper blades or stirrers do not damage the measuring prism surface. For direct mounting the UR-24 onto a tank or boule, use the supporting adapter flange mounting.

In order to avoid product's stagnation, in the "3A" version it's needed to install the device in vertical position; the display has never to be addressed upward.

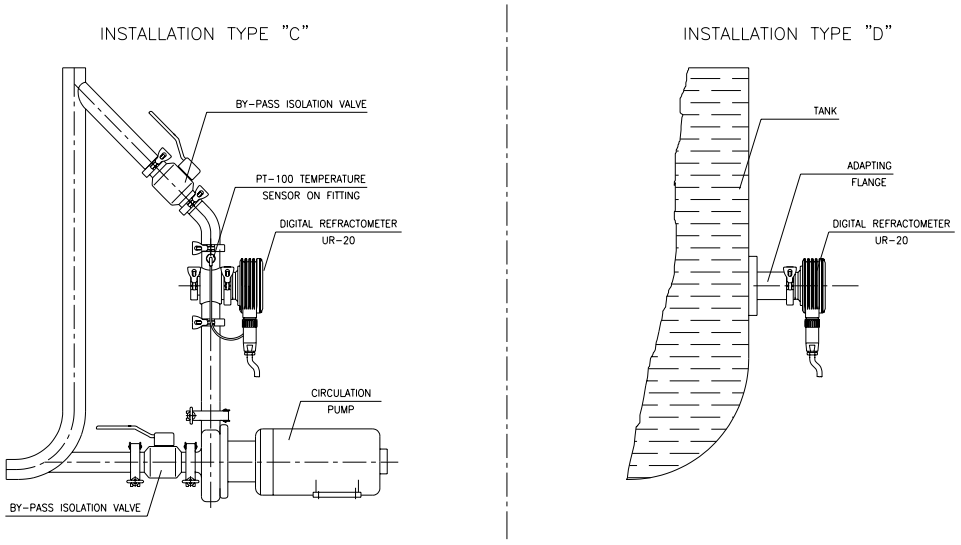


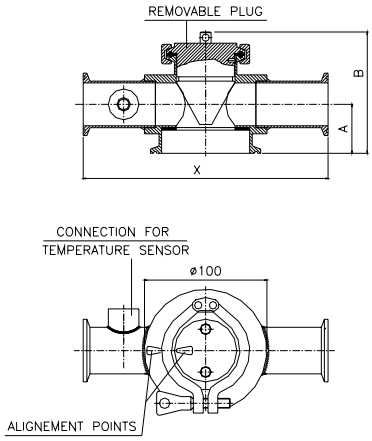
Figure 7.1.b - Examples of UR-20/24 installations

7.2 INSTALLATION ACCESSORIES

The installation of the UR-24 digital refractometer requires a special mounting adapter. When installing the adapter fitting directly on the process piping, either directly or in by-pass, the mounting fitting is furnished with a removable “deflector” plug. When installing on a tank or a boule, the appropriate fitting is called a tank-mounting flange.
The “deflector” mounting fitting serves three purposes: it adapts the UR-24 to the process line; it provides an easy way to control the velocity of the product across the prism for self-cleaning; and it allows easy access to the prism surface for inspection and manual cleaning if required with the instrument still on-line.
For ease of installation, mounting fittings are readily available in 1", 1½" or 2" product line sizes with either "Tri-Clamp®" ferrules, "butt-weld" ends or per customer’s request at time of order. The product flow cross-sectional area at the prism is determined by the existing clearance between the end of the removable plug and the prism. If the customer advises the product and flowrate information at the time of order, the plug can be accurately selected to allow the product to flow past the prism at optimum speed. This optimum clearance is also a function of the viscosity of the product. With fluid products such as water, this speed might be 5 m/sec. For viscous products such as fruit concentrates, a speed of 2 m/sec can be sufficient.

WARNING: ***Exchanging the original mounting fitting plug with other plugs might create different, undesirable flow characteristics.***

NOTE: The overall length of the “defector” mounting fitting with either butt-weld ends or Tri-Clamp® ferrule connections is 200mm (250mm for the 3-A version).
Tri-Clamp® ferrules and the adjacent tubing connecting them to the body of the fitting are normally provided in AISI 316 stainless steel.



DIMENSIONS WITH TRI-CLAMP 1" FITTINGS:
A=33.5mm B=86.5mm

DIMENSIONS WITH TRI-CLAMP 1"1/2 FITTINGS:
A=40mm B=100mm

DIMENSIONS WITH TRI-CLAMP 2" AND 2"1/2 FITTINGS:
A=46mm B=112mm

DIMENSIONS WITH TRI-CLAMP 3" FITTINGS:
A=58.4mm B=136.5mm

DEFLECTOR LENGHT
X=200mm STANDARD VERSION
X=250mm "3A" SANITARY VERSION

Figure 7.2.a - Overall dimensions of the UR-24 mounting fitting with “Tri-Clamp” ferrules.

DIMENSIONI D'INGOMBRO:

DIMENSIONI VARIABILI CON DEFLETTORE 1":
A=198.5 B=72.5

DIMENSIONI VARIABILI CON DEFLETTORE 1"1/2:
A=212 B=79

DIMENSIONI VARIABILI CON DEFLETTORE 2" E 2"1/2:
A=224 B=85

DIMENSIONI VARIABILI CON DEFLETTORE 3":
A=247 B=99

DISTANZE MINIME DI AGIBILITA':

FRONTALE: X=0.8mt.

LATERALE: Y=Z=0.25mt.

OVERALL DIMENSIONS:

VARIABLE DIMENSIONS WITH FITTING 1":
A=198.5 B=72.5

VARIABLE DIMENSIONS WITH FITTING 1"1/2:
A=212 B=79

VARIABLE DIMENSIONS WITH FITTING 2" E 2"1/2:
A=224 B=85

VARIABLE DIMENSIONS WITH FITTING 3":
A=247 B=99

MINIMUM OPERATING CLEARANCES:

FRONT: X=0.8mt.

SIDE: Y=Z=0.25mt.

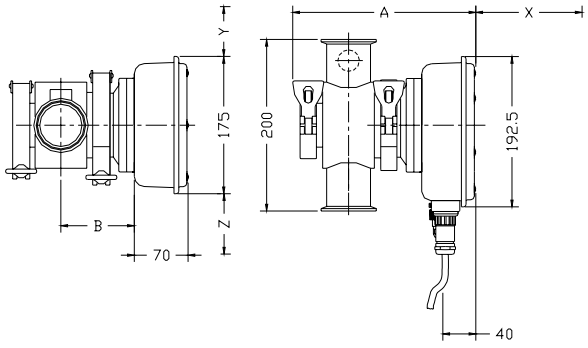


Figure 7.2.b - Overall and minimum clearance dimensions with “Tri-Clamp” version mounting fitting.

As previously mentioned, installation of the UR-24 Digital Refractometer on a tank or on a boule requires the use of a tank mounting flange, which positions the prism at the inside surface of the tank.
The flange, to be welded to the tank, can be furnished with the correct final dimensions if specified by the customer (see Fig. 7.2.d). Otherwise, it can be supplied with standard dimensions for final modification, if necessary, by the customer.

It is possible to replace the earlier Maselli Refractometers model “**UR/1-W-Al**” and “**UR/6-W-AL**” with the new **UR-24 Digital Refractometer** without special problems or modifications to the existing production line.
A special adapter flange is available to install the new refractometer directly onto the original mounting fitting of the previous refractometer unit.
Model **UR-24**, **UR-20** and **UR-15** Digital Refractometers are interchangeable on the mounting fittings and flanges.

Please note the minimum recommended clearances indicated in Figure 7.2,b to allow proper access space for use and service. Also, except for tank installations where the temperature sensor is included inside the refractometer, remember to mount the Pt100 temperature sensor and gasket into the coupling provided for this purpose on the mounting fitting.

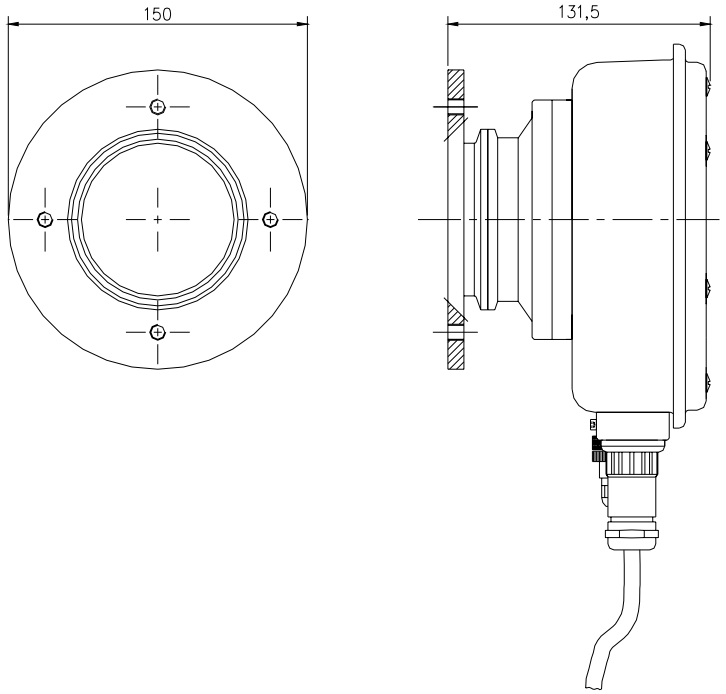


Figure7.2.c - UR-24 with adapter flange for UR-1/UR-6 version mounting fitting

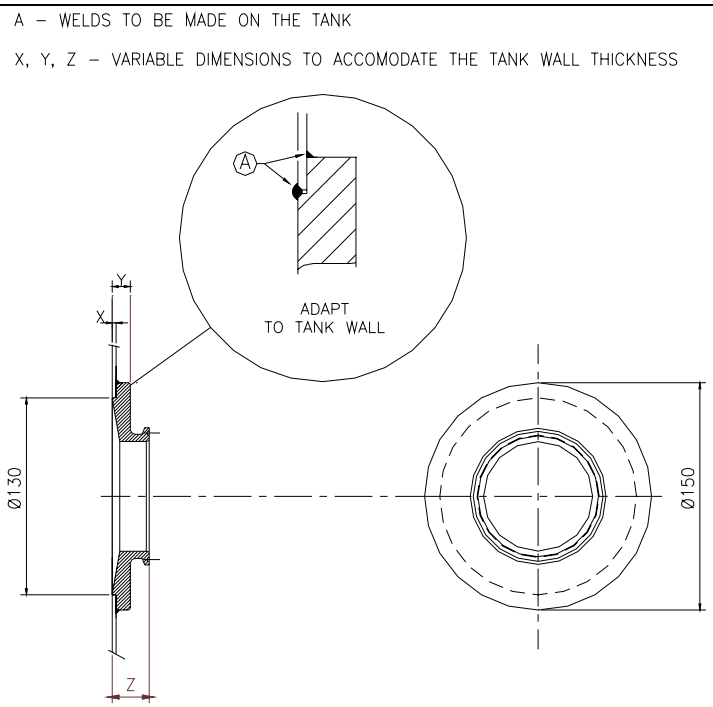


Figure 7.2.d - Tank mounting flange dimensions

8. ELECTRICAL CONNECTIONS

8.1 ELECTRICAL CONNECTIONS

Electrical connections to the **UR-24 Digital Refractometer** are made using the 8x2x22AWG multi-conductor cable provided for this purpose. The cable is 5m long, pre-wired with a waterproof metallic connector.
The equipment must be supplied with power using either of the following specifications:

* AC 18V (12...24V), 50...60Hz, 0.6A or
* DC 24V (18...36V), 0.6A.

We recommend to use only the supplied cable, and to connect it to an interconnection terminal board as shown by the attached connection schematics.
Optionally, Maselli can supply a waterproof plastic interconnection box, pre-connected to the cable. If needed, the interconnection box can also be supplied including a power supply transformer for the following:

* AC 115/230V ±10%, 50...60Hz, 25VA.

If supplied, it is also absolutely necessary to connect the temperature sensor's special connector to the **UR-24**.

We recommend to correctly insert the connectors, paying careful attention to the orientation tabs and, in order to maintain the proper degree of protection, to tighten them correctly.
To avoid short circuits and/or dangerous electrical discharges that may injure the operator and/or damage to the equipment, do not make connections or touch the terminal blocks with voltage connected to the line.

Electrical connections must always be made by qualified personnel, in accordance with local safety regulations. Refer to the appropriate connection schematic, attached, corresponding to the version supplied.

Before supplying power to the instrument, we recommend that you reconfirm the unit's type, features and supply voltage, as well as the proper wiring per current regulations, in order to avoid an improper installation which might result in serious injury to personnel or equipment damage.

If power supply requirements are not respected, either in overload or short circuit, the cable and/or instrument could be so damaged that an adequate safety can no longer be guaranteed.

To assure the unit's optimal operation and compliance with the rules for radio interference, we recommend the use of shielded cables where it is indicated, and to not exceed the indicated lengths.

It is also recommended to install an overload switch in series with the main supply. If the unit is supplied with more than 50VAC voltage to interconnection box, protection against direct or indirect electrical short circuits is mandatory.

If the Maselli interconnection box is used, install it in a location adequately protected from the weather, and follow these recommendations:

* After making the connections, carefully tighten the cover's screw.
* Properly tighten the cables in their cable strain reliefs.
* Do not remove the original protection plugs from those cable strain reliefs not used.

8.2 "INPUT" CONTACT CONNECTION

The **Digital Refractometer UR-24**, operating software provides for the management of a configurable input contact.
Usually, such input is used to handle the "Hold Measurement".
In the junction box (supplied as optional with the instrument) the Brix "Measurement Stop" contact is indicated on two terminals (refer to the wiring diagram attached to this manual) and by controlling this contact the instrument checks to see if the production line has stopped.
The **Digital Refractometer UR-24** uses the "Measurement Stop" or "Line Stop" signal to keep the last measured Brix value constant till the line restarts. This will lead to a constant reading (constant value) on a data recording or acquisition system, if present, during the line stop and will prevent generation of false alarm signals due to this faulty condition.

The required "Measurement Stop" input signal is simply the closing of a **voltage free contact** having the "line stop with closed contact" logic. Such input, acting on the software's settings, can also be configured to handle the prism's washing, to configure the mA outputs, to switch the measurement scales.

8.3 ALARM/CLEANING DEVICE CONTACT CONNECTION

The **Digital Refractometer UR-24** is provided with a relay output contact which can be connected to indicators or acoustic alarms to warn operators that the Brix reading has exceeded the preset measurement range.
This contact is voltage free and therefore requires a connection which has an external supply (can be supplied as optional on outside junction box). This contact can be used by means of the settings software also for controlling an external prism cleaning device.
For the connections refer to the wiring diagram attached to this manual.

The **Digital Refractometer UR-24** output contact can be used, in addition to activating an acoustic signal or visual alarm condition, also to activate the actual production line stop.

8.4 SERIAL CONNECTION AND ANALOG SIGNAL

A serial output RS422/485 is provided on the **Digital Refractometer UR-24** for communication with a Personal Computer or a remote data acquisition Unit (optional) and a customizable mA output analog channel and on request an external conversion module from RS422/485 signal to Profibus signal.

THE SERIAL CONNECTION CABLES, THE ANALOG (mA) AND DIGITAL (INPUT AND OUTPUT) SIGNAL CABLES, THE LENGTH OF WHICH MUST NOT EXCEED THE MAXIMUM INDICATED ON THE DRAWINGS ATTACHED TO THIS MANUAL, MUST BE OF THE SHIELDED TYPE AND MUST HOWEVER, COMPLY WITH THE RADIO INTERFERENCE RULES; THE CABLE SHIELD MUST BE CONNECTED INSIDE THE JUNCTION BOX IN THE EQUIPOTENTIAL GROUND BAR NODES PROVIDED (YELLOW-GREEN TERMINALS).

9. PROGRAMMING

9.1 GENERAL

One of the principal characteristics of the **UR-24 Digital Refractometer** is the ability of the operator to completely program the various functions. This characteristic offers multiple advantages that range from optimal configuration for a particular process to the possibility to substitute or interchange among different instruments.

9.2 DISPLAY KEYBOARD FUNCTIONS

This chapter describes the information displayed when using the Refractometer.
The display and keyboard command sections of the **UR-24** instrument are accessible from the front side the instrument, on which are mounted the LCD graphical display and the four programming keys.

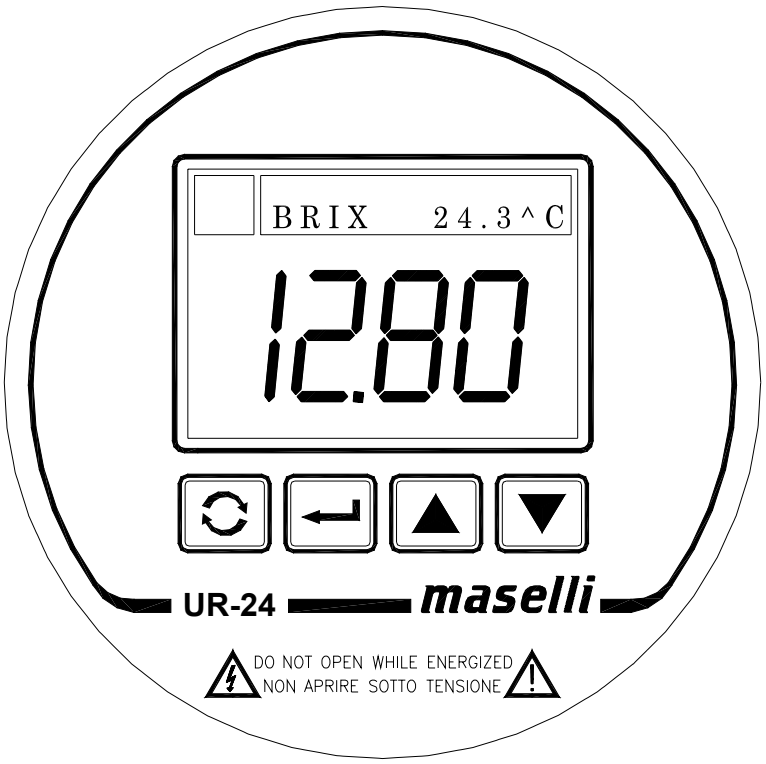


Figure 9.2.a - UR-24 Front Polyester Membrane

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⇒ When first powered up, the graphical display presents the Maselli logo for 5 seconds:

maselli

It then displays the instrument model, the serial number, the version and the date of the firmware. This information may be useful for the Maselli service technician if discussing service problems or questions in the future.

```
--------------------------------
          MASELLI MISURE
              U R 2 4
   Memory Name      : U24xxVxx
   Memory Date      : dd-mm-yy
   Serial Number    xxxxxx
--------------------------------
```

After a few seconds, the instrument then continuously displays the liquid concentration value, using either the standard *"**Brix (Bx)**"* or custom *"**USER**"* scale.

****

On the display, above the measurement's value, there is an informative bar in "*reverse*" which includes some information for the instrument's configuration, such as, the *measurement Unit* (on the bar's left), the *Temperature* value (on the bar's right).

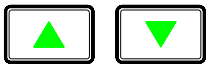
⇒ Before discussing the programming details, it is necessary to describe the keyboard commands.
The **UR-24 Digital Refractometer** is equipped with four membrane keys used to move through and select the menu options. Let's look first in detail at the functions of each key:

- *"SCROLL" Button*

  With this button it is possible to scroll to the various menu functions of the instrument. The graphical display indicates which function is being viewed, displaying it in *"reverse"*, allowing quick and easy programming.

- *"ENTER" Button*

  With this button it is possible to confirm a change just made to the value of a function, or to enter the displayed sub-menu of the instrument.

- *"UP - DOWN" Buttons* 

  These two buttons are used to change a function, or to increase or decrease the displayed value according to what is desired.

****

⇒ The **UR-24 Digital Refractometer** uses special symbols on the display to provide the operator with "diagnostic" information regarding the instrument's status.

- If it is necessary to "Linearize" the CCD, the instrument indicates such condition by displaying the icon:

- If the "HOLD" input contact is detected, the display will show the icon:

- When the measure is held constant during the "Hold Time", the display will indicate the icon:

- If the alarm condition is "silenced", the display will continue to display the following icon until the alarm condition ends:

To "silence" an alarm condition, it is necessary to press *"DOWN"*.

- If the measure is locked on a specific fixed value (set in the Level 2 SERVICE menu), the instrument indicates this condition by displaying the icon:

- During the washing cycle this symbol will be displayed:

- Once the maximum number of washings is reached in the “Smart Washing” cycle, the following symbol will be displayed:

- When the measurement’s integration mode is activated (special function connected to the status of the input contact) the following symbol will be displayed:

- If faulty conditions were detected regarding the internal humidity value of the instrument during normal operations, the display shows the following icon:

- If anomalous measurement conditions are detected during normal operation, the following will appear:

  LO **=** The product’s value is beyond the measurement range and below the low reading limit.

  HI **=** The product’s value is beyond the measurement range and above the high reading limit.

  When one of these messages appears on the display, the current output can be forced to a value set in the “VAL. ALARM mA” function in the *SETTING 2* menu (see paragraph **9.5.3**) if the “FIXED OUTPUT mA = YES” function has been enabled.

  Example:

  - Fixed output mA = YES
  - VAL. alarm mA = 4.00
  - Display = LO/HI
  - Output mA = 4.00mA

  The following messages may alternate with the measurement values:

  LO TEMP. **=** The temperature value is below the low compensation limit.

  HI TEMP. **=** The temperature value is greater than the high compensation limit.

****

⇒ The **UR-24** parameters are gathered according to sub-menu system, as follows:

each line on the display is a separate function, with the active function printed in *“reverse”* for emphasis. Using the *“SCROLL”* button, it is possible to move inside the sub-menu in order to activate the next function.

The **Digital Refractometer UR-24** uses a particular philosophy for the sub-menu management. There are two groups of accessible values:

* **Modifiable Values**
  If a numeric or alphanumeric value is displayed alongside a function, the value can be modified.
  "UP" (Increase) and *"DOWN"* (Decrease) buttons adjust the required value within the limits of the instrument. After the value has been modified, press *"ENTER"* to confirm the new value.
  If *"SCROLL"* is pressed after modifying a value, without first pressing *"ENTER,"* the new value is not saved and the function remains at the original value.

* **Sub-menu**
  If no value is displayed on the line, the function represents another sub-menu.
  It is possible to enter this new sub-menu by pressing *"ENTER."*

Each menu includes the "Exit" function, which allows the operator to return to the previous menu.

At the beginning of each paragraph, before the descriptions of the menu functions, a summary Table is given showing the minimum and maximum limits and the default values of each function. (Attention: the values given may be different from those actually programmed depending on the customized settings, if any); these have certain warning features, such as:

ⓘ	The function is only approximate; the values represented cannot be modified.
☞	The function can be changed by setting a new numeric value.
✔	The function can be changed by setting a new condition.
	Modification of the function value directly influences the calculation of the concentration value; it is advisable to modify the data only if the operation is sure to have been carried out correctly and, in any circumstance, by noting down the set value before making any modification.
	Irregular conduction of the operation shown in the function can lead to severe operating faults in the apparatus.
⊗	Access to the function is reserved for special technicians or qualified personnel on indication by the Maselli assistance service.

9.3 PROGRAMMING LEVEL STRUCTURE

The programming of the **UR-24** uses a 3-level structure to avoid modifying important calibrations, either accidentally or by unauthorized persons.

Level "1" contains the typical functions that the operator can carry out normally, without creating problems in the general function of the instrument. For example, these include the zero adjustment of the displayed value, setting the alarm values and other functional parameters; the access is allowed if: in Level 3 the function PASSWORD is set on YES and only once you have inserted the protection code (which, in the moment you receive the unit, is set to "20"). In order to modify this code, please see the following chapter **9.6.6** (level 3 programming).
If the function PASSWORD is set on NO the access to the level is free.

Level "2" contains other functions that can be set by a reasonably experienced instrument technician employed by the plant but with access protected from accidental changes. These include defining the working parameters, the serial and mA outputs, and the SPAN calibration.

Level "3" functions should be carried out only by a Maselli-trained technician or other highly qualified person. It can be accessed only after entering the protection code. Level 3 operations affect the linearization, resetting and alignment of the CCD; the temperature compensation coefficient, and access to all the high level customizing functions.

For a clearer understanding of the menu functions, refer to the flowrate diagram in the "Enclosures" chapter at the end of the manual.

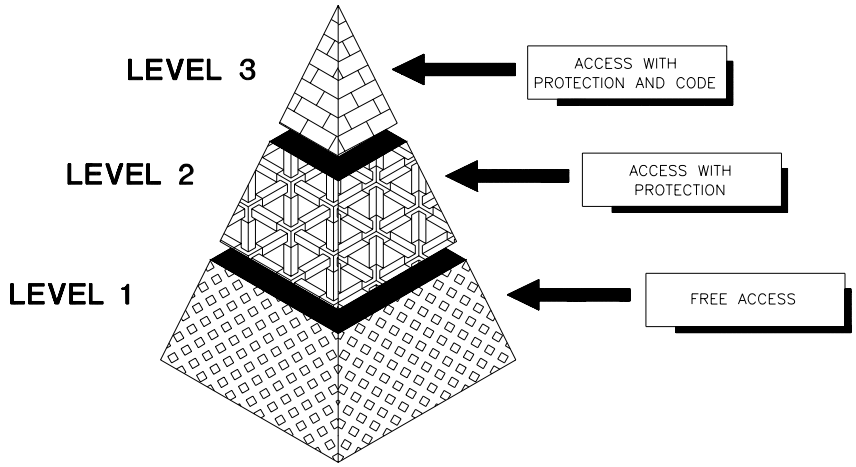


Figure 9.3.a - Programming Levels

Continuously pressing the *"ENTER"* button for 5 seconds at the main menu will enter the "CHECK MENU" sub-menu, which simultaneously displays other measurement parameters such as:

Temperature ^X	Displays the temperature value, either in °C or °F.
Brix value	Displays the concentration value in BRIX units.
User value	Displays the concentration value in the USER scale units.
Compensat. XX	Displays the value, indicated in BRIX or in the USER scale units, of the correction made on the measurement due to the compensation for temperature.
Pixel value	Displays the numerical pixel value corresponding to the shadow/light separation line on the CCD.
Deriv. value	Displays the value of the derivative calculation.

Pressing the *"ENTER"* button, the display changes to the graphical display of the "optical image" detected by the CCD. Pressing *"UP"* at this point will display the "mediate image. Pressing *"UP"* again displays the image representing the calculated "derivative' value." The dashed lines indicate the optimum level for the light.

By pressing the *"ENTER"* key from the graphic "of the optical image" detected by the CCD, it will be visualized instead, a menu informing on the system's configuration which allows to view the set parameters of the system, such as:

Type of UR24	Visualization of the instrument's measurement mode.
Type of prism	Visualization of the type of prism installed on the instrument.
Prism's quality	Visualization of the classification of prism installed on the instrument.
Type of probe	Visualization of the type of the instrument's probe.
Serial number	Visualization of the instrument's serial number.
N. L. values	Visualization of the number of values set in the instrument's measurement linearization

Press the *"ENTER"* key again to exit from the system's configuration informative menu and return to the concentration's visualization one

9.4 LEVEL 1

To enter in the "LEVEL 1" menu, press the *"SCROLL"* button from the main menu.
In this first level of the programming it is possible to enter the 3 sub-menus **"Level 2"** of programming

- **"Level 2"** of programming
- **"Calibration 1"** (user calibration)
- **"Alarms/Washing"** (setting of the alarm parameters or cleaning system)
- **"Contact out"** (output contact setting)
- **"Contact in"** (input contact setting)

Level 2 Access to this programming level is protected.
To enter Level 2, continuously press the *"ENTER"* button for about 7 seconds. It is recommended that unnecessary persons not be informed of this procedure.

Calibration 1 Pressing *"ENTER"* at this function enters the "Calibration 1" sub-menu, where the instrument's OFFSET and the measurement's integration number can be set.

Alarms Pressing *"ENTER"* at this function enters the "Alarms" sub-menu where the alarm setpoints can be defined.
This sub-menu is only seen if the Relay Function is set to Alarm ("Relay Function = Alar.") in Level 2.

Washing Pressing *"ENTER"* at this function enters the "Washing" sub-menu, where the cleaning system's activation time setting can be set.
This sub-menu is only seen if the Relay Function is set to Wash ("Relay Function = Wash") in Level 2.

Contact out This function indicates if the output contact is normally open or normally closed.
Set the desired value with the *"UP"* and *"DOWN"* keys and press *"ENTER"* to confirm.*"*

Contact in This function allows to select the action to perform when the input contact is closed. The following options are available:

- **Hold** = classic "holding" operation of the measurement.
- **Lav.** = Input contact handling in the special "smart washing" available procedures; the closure of the **voltage-free contact** blocks the measurement on the last value displayed and brings about immediate running of the washing cycle (Cleaning Device Output Contact).
- **Integ** = The measurement is continuously averaged for the duration of the contact's closing interval; the visualized value is equal to the sum of all the measurements carried out during such interval, divided by the number of measurements performed.

mA T. = The mA output is calculated with the temperature value (and no longer with the value of the refractometric measurement) with the low limit of the mA range equal to -20.00°C and top limit depending on the type of "probe". 110°C for the standard "probe"; 170°C for the long "probe".

Chg.S = Automatic switch from the Brix measurement rang to the User measurement range, to the contact's closing.

S. mA = The mA output is calculated with the mA range limits of the "scale n. 2" " *I.S scale 2, F.S. scale 2* when the contact closes; with the contact open, refer to the limits of the "mA scale n°1" *I.S scale 1, F.S. scale 1.*

9.4.1 CALIBRATION 1 (User Calibration)

This submenu makes it possible to carry out calibration reserved for the user, in such a manner as align as required the reading obtained with that measured in the laboratory, to set the number of measurement integrations, and display the measured value and the relative measurement scale instantaneously.

Warnings	*Functions*	*Function Description*	*Limits/Options*	*Default Value*
ⓘ	**Current val.**	"CURRENT VALUE"	-----	-----
☞	**Offset value**	"OFFSET VALUE"	-30.00 ÷ +30.00	Calibration
☞	**Integrations**	"MEASUREMENT INTEGRATIONS"	1 ÷ 100	1

Current Val. *"CURRENT VALUE"*
This function displays the currently measured value.

Offset Value *"OFFSET VALUE"*
This function indicates and permits the setting of the "OFFSET" value, that will be added to or subtracted from the measured value. To determine the proper correction, take a sample of product, as near as possible to the UR-24 Digital Refractometer, noting the UR-24's displayed measured value. With a temperature compensated optical refractometer, read the value of the this product sample, calculate the difference between the two measurements, and adjust the existing offset by this new amount using this function.
This parameter's correction value range is between -30 and +30. Set the desired value with the *"UP"* and *"DOWN"* buttons, and press *"ENTER"* to confirm.

Integrations *"MEASUREMENT INTEGRATIONS"*
This function selects the "number of integrations" of the measurement, in order to stabilize the reading of a signal that changes due to miscellaneous variations in the product's concentration. Selecting a value xxx from 1 to 100 will create a more stable value, which is the moving average of the last xxx readings. Select the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Exit *"EXIT "*
Pressing the *"ENTER"* button will exit the CALIBRATION 1 sub-menu and return to the LEVEL 1 menu.

9.4.2 ALARMS (Alarm Setpoints)

This submenu makes it possible to set the high and low alarm values and the typical operating value; the submenu is only displayed if the function, accessible at programming Level 2, is "Relay Function = Alarms".

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
☞	**Low alarm**	"LOW ALARM"	-5.00 ÷ +99.98	0.00
☞	**High alarm**	"HIGH ALARM"	-4.99 ÷ +99.99	0.10
☞	**Target**	"TARGET"	-5.00 ÷ +99.99	0.00

Low alarm *"LOW ALARM"*
This function defines the value below which the measure is to be considered in alarm (minimum accepted concentration). The output relay is activated when the alarm condition occurs (closing contacts with 500mA / 24V max. load).
This parameter may have any value included within the equipment's range. Select the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

High alarm *"HIGH ALARM"*
This function defines the value above which the measure is to be considered in alarm (maximum accepted concentration). The output relay is activated when the alarm condition occurs (closing contacts with 500mA / 24V max. load).
This parameter may have any value included within the equipment's range. Select the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Target *"TARGET"*
This function indicates and allows to set the product's typical working value.
This parameter may have any value included in the equipment's range; set the desired value with the "UP" and "DOWN" keys and press "ENTER" to confirm.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the ALARMS sub-menu and returns to the LEVEL 1 menu.

9.4.3 WASHING (Washing Parameters)

This submenu allows to set the cleaning system (if present) operating parameters; the submenu is only displayed if the function, accessible at programming LEVEL 2, is "Relay Function= Washing".

1) In case "washing = On" and "Smart washing = Off" is set, the washing works according to the standard modes.
2) In case "washing = On" and "Smart washing =On" is set, the washing, further to the standard modes, can start after the instrument, in measurement conditions, has found for at least 15 seconds (that can't be set) the value of the product's derivative under the programmable limit "Derivative lim. = xxxxxx".

At the end of the first washing started "in derivative mode", if the value of the product's derivative is still below the limit, a second washing will start instantly.

a) The "derivative mode" washing consecutively allowed are equal to a maximum of 3; once this limit is reached, the instrument stops ALL the washing modes and it notifies it to the dedicated icon.

b) This alarm condition can be reactivated with a short resetting impulse by means of the LINE STOP input.: a washing cycle is started at the end of such reset.

c) The time values of the Washing Time (s), Measurements time (m), Hold Time and the operation mode of the Washing Type relay, must be set according to the application requirements.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
✔	**Washing**	"TIMED WASHING"	On/Off	Off
☞	**Washing time (s)**	"WASHING TIME"	1 s ÷ 300 s	1 s
☞	**Measure time (m)**	"MEASURE TIME"	1' ÷ 3.000' (50 h)	1'
✔	**Smart washing**	"SMART TYPE WASHING"	On/Off	Off

Washing *"TIMED WASHING"*
This function indicates and enables (**On**) or disables (**Off**) the washing procedure.
Choose the desired status with the "*UP*" and *"DOWN"* keys, and press *"ENTER"* to confirm.

Washing time (s) *"WASHING TIME"*
This function indicates and sets the washing time.
This parameter is indicated in seconds, and may have values from 1 s to 300 s. Choose the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Measure time (m) *"MEASURE TIME"*
This function indicates and sets the measurement phase during the automatic washing cycle.
This parameter is indicated in minutes, and may have values from 1 and 3000 (50 hours). Choose the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Smart washing *"SMART TYPE WASHING"*
This function allows to activate (**On**) or disactivate (**Off**) the *"derivative type"* washing. Set the desired mode with the *"UP" and "DOWN"* keys and press *"ENTER"* to confirm.
This option must be used to activate the washing cycle in untemporized mode. The cycle automatically turns on when the value of the *"derivative"* decreases under the value set in the "Limit Derivate" function (SETTING 2).

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the WASHING sub-menu and returns to the LEVEL 1 menu.

9.5 LEVEL 2

To enter into the “LEVEL 2” menu from Level 1, select the LEVEL 2 function as previously described and press the *“ENTER”* button continuously for about 7 seconds.
In this programming level it is possible to enter the following 6 sub-menus:

- **“Level 3”** of programming
- **“Calibration 2”** (operator calibration)
- **“Serial Port”** (serial port setup parameters)
- **“Setup 2”** (level 2 setup parameters)
- **“Service”**
- **“Display”** (display operation method)

Level 3 Access to this programming level is restricted for technicians familiar with the UR-24 service, or other qualified personnel.
A password is required to prevent accidental access

Calibration 2 Press *“ENTER”* at this function to enter the “Calibration 2” sub-menu, where you can view and change the SPAN value.

Serial Port Press *“ENTER”* at this function, to enter the “Serial Port” sub-menu, where the communications parameters can be set.

Setup 2 Press *“ENTER”* at this function to enter the “Setup 2” sub-menu, where system variables such as language, temperature units and mA output parameters can be defined.

Service Press *“ENTER”* at this function to enter the “Service” sub-menu containing diagnostic functions for the system

Display Press *“ENTER”* at this function to enter the “Display” sub-menu, where operation parameters of the graphic display can be set.

9.5.1 CALIBRATION 2 (Operator Calibration)

This submenu makes it possible to act on the operator calibration parameters, to correct logarithmic measurement errors that may be present on the measurement scale.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
ⓘ	**Current val.**	“CURRENT VALUE”	-----	-----
☞	**Span value**	“SPAN CALIBRATION”	0.50 ÷ 2.00	Calibration

Current val. *“CURRENT VALUE”*
This function displays the current measured value.

Span value *“SPAN CALIBRATION”*
This function sets the “SPAN” coefficient. The measurement value will be multiplied by this value, in order to compensate for proportional errors. This parameter can be set to values between 0.50 and 2.00. Set the desired value with the *“UP”* and *“DOWN”* keys, and press *“ENTER”* to confirm.

Exit *“EXIT ”*
Pressing the *“ENTER”* button exits the CALIBRATION 2 sub-menu and returns to the LEVEL 2 menu.

9.5.2 SERIAL PORT (Serial Port Settings)

*The **Digital Refractometer UR-24** can be interfaced with a data acquisition system (usually an IBM or compatible Personal Computer) by means of a RS422/485 serial port; dialog with the **UR-24** is possible through "LABTECH", "OPTOMUX" or "MASELLI" protocols implemented in the software and selectable using the instrument keyboard.*
This submenu allows to set the serial output standard, the transmission speed and the instrument address. For further information please see "Data Acquisition" chapter.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
✔	**Function**	"FUNCTION SERIAL OUTPUT"	See text	OPTO22
✔	**Baud Rate**	"BAUD RATE"	See text	19200
☞	**Address**	"ADDRESS"	000÷031	001

Function *"FUNCTION SERIAL OUTPUT"*
This sub-menu sets the serial output standard. The following options are available:

OPTO = This option must be used for the connection with a Personal Computer or other that communicates through an OPTO 22 protocol (i.e. DataMas).

CCD = The image detected by the CCD in the protocol used by the Maselli LaboBas program is transmitted on the serial channel. This configuration is normally used as a diagnostic aid by Maselli service technicians.

LABT = This option must be used for the connection with a Personal Computer or other that communicates using the LABTECH parsed string protocol.

MAS. = This option must be used for the connection with a Personal Computer or other that communicates using the Maselli protocol; which allows the acquisition and the remote modification of all of the UR-24's variables.

Us#1 = A string with ASCII characters and including some measured variables, is transmitted on the serial channel. This configuration is normally used by Maselli's service technicians.

MR01 = It is necessary to use this option for the connection to the instrument MR01/MR02.

USER = It is necessary to use this option for the connection to the a Personal Computer or other similar to the Maselli protocol; it allows the acquisition and the remote modification of some of the UR24's variables.

PROFI = It is necessary to use this option for the connection to a system which uses the "PROFIBUS" protocol.

UR12 = A string equivalent to the one transmitted by the UR12 is transmitted on the serial channel.

Set the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Baud rate *"BAUD RATE"*
This function sets the transmission speed (Baud Rate) and the reception of the serial port according to normalized standards.
The available values are: 2400, 4800, 9600, 19200 Baud.
Choose the desired rate with the *"UP"* or *"DOWN"* keys, and press *"ENTER"* to confirm.

Address *"ADDRESS"*
This function sets the address, unique to each UR-24, with which each UR-24 is recognized in a MULTIDROP connection handled by the OPTO 22/MASELLI/USER/MR01 protocols. Set the desired address with the *"UP"* and *"DOWN"* key and press *"ENTER"* to confirm.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the SERIAL PORT sub-menu and returns to the LEVEL 2 menu.

9.5.3 SETUP 2 (Level 2 setup parameters)

This submenu allows to set the messages and menu display language, the temperature measurement units, the output relay operating options, the Hold time, the measurement start and end scale to be aligned with the output in mA or to enable and assign a fixed value to the mA output in the event of a measurement alarm.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
✔	**Language**	"LANGUAGE"	See text	Italian
✔	**Temp. unit**	"TEMPERATURE UNITS"	°C/°F	°C
✔	**Resolution**	"ACCURACY VISUALISATION"	HI/LO	HI
✔	**Relay function**	"RELAY USE CONFIGURATION"	Al./Wash.	Alarm
✔	**Washing type**	"WASHING TYPE"	MP01/Inj./Clean	Cleaning unit
☞	**Hold time**	"MEASUREMENT LOCK TIME"	001 s ÷ 900 s	001 s
✔	**Limit derivative**	"DERIVATIVE LIMIT"	10000 ÷ 100000	50000
✔	**mA range type**	"mA OUTPUT CONFIGURATION"	0-20/4-20mA	4-20mA
☞	**S.R. range 1 / 2**	"mA OUTPUT START RANGE"	-1.99 ÷ +99.89	0.00Bx
☞	**E.R. range 1 / 2**	"mA OUTPUT FULL RANGE"	-1.89 ÷ +99.99	90.00Bx
✔	**mA fixed Output**	"mA FIXED OUTPUT ENABLING"	Yes/No	No
☞	**mA alarm value**	"mA OUTPUT VALUE SETTING"	0.00 ÷ 25.00mA	2.00mA
✔	**mA Output**	"mA OUTPUT MODE"	Est/Lim	Est
☞	**Hysterisis time**	"HYSTERISIS TIME SETTING"	5 s ÷ 30 s	15 s
☞	**Max washings**	"NUMBER OF WASHINGS SETTING"	1 ÷ 10	3

Language *"LANGUAGE"*
This function selects the language displayed in the menus.
The possible options are:

Ita = Italian
Eng = English
Esp = Spanish
Fra = French
Deu = German

Choose the desired option with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Temp. unit *"TEMPERATURE UNITS"*
This function selects the temperature scale of measure.
The available scales are CELSIUS (°C) and FAHRENHEIT (°F).
Set the desired scale with the *"UP"* or *"DOWN"* buttons, and press *"ENTER"* to confirm.

Resolution *"ACCURACY VISUALISATION"*
This function selects the resolution of accuracy that is displayed; press *"UP"* or *"DOWN"* to choose between the **"HI"** mode, displaying also the hundredths place, or the **"LO"** mode, with the visualization rounded up to the tenth of unit.
Press *"ENTER"* to confirm.

Relay Function *"RELAY USE CONFIGURATION"*
This function sets the output relay's operation method according to its use. The possible options are:

Alarm = Alarm Mode

Wash. = Washing Mode

Choose the desired configuration with the *"UP"* and *"DOWN"* buttons, and press *"ENTER"* to confirm.
For information concerning the setting of parameters for the alarm / washing contacts, refer to the previous section describing LEVEL 1 programming.

Washing type *"WASHING TYPE"*
If "Relay Function = Wash." is chosen, this function sets the activation mode of the output relay contact to drive the prism's cleaning system.
Choosing the **"Injec"** option, the relay's contacts are continuously closed during the entire washing time defined in the corresponding WASHING sub-menu in the Level 1 programming.
Choosing the **"Clean"** option, the relay's contacts are alternately closed for 1 second and then opened for 1 second during the entire washing time defined in the corresponding WASHING sub-menu in the Level 1 programming.
By selecting the **"MP01"** option, the relay contact is handled in a totally special way in order to allow the instrument to communicate in bidirectional way with the automatic cleaning system's PLC *"moving probe".*

Hold time *"MEASUREMENT LOCK TIME"*
If **HOLD** is selected in the **"Contact in" (Level 1)**, by closing the input contact the measurement is stopped in order to carry out eventual washing operations.
This function, variable between 1 and 900 (seconds), sets the delay time after reopening of the "HOLD" contacts until the instrument begins again to display the current value. During the waiting time the last measurement is held constant, and the "Hold" icon is displayed.
Choose the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Limit derivative *"DERIVATE LIMIT"*
This function allows to set, according to the analyzed product, the limit value used in the *"derivative mode"* washing cycle, if properly enabled (see the *"Smart washing"* function, paragraph 9.4.3). This parameter can have values included between 10.000 and 100.000 seconds, the default value 50.000 s.
Set the desired value with the "*UP"* and *"DOWN"* keys and press *"ENTER"* to confirm.

mA range type *"mA OUTPUT CONFIGURATION"*
This function selects the type of analog output (mA), according to the following associated scale ranges.
The available ranges are:

0-20 = 0...20 mA Output min 0mA; max 20mA on 470Ω

4-20 = 4...20 mA Output min 0mA; max 20mA on 470Ω

Set the desired scale with the *"UP"* or *"DOWN"* key, and press *"ENTER"* to confirm.

S.R. range 1 *"mA OUTPUT START RANGE"*
S.R. range 2
This function allows to set at which start range value of the measurement range must coincide the start range value in mA. This parameter may assume values included between –1.99 and 99.89 if the "Bx" scale is selected, or included in the equipment's range if it's "USER".
Set the desired value with the "*UP"* and *"DOWN"* keys and press *"ENTER"* to confirm.

E.R. range 1
E.R. range 2

"mA OUTPUT FULL RANGE mA"

This function allows to set at which full range value of the measurement range must coincide the full range value in mA. This parameter may assume values included between –1.89 and 99.99 if the "Bx" scale is selected, or included in the equipment's range if it's "USER".
Set the desired value with the "*UP"* and *"DOWN"* keys and press *"ENTER"* to confirm.

Fixed out mA

"*FIXED OUT mA"*
In this function it is possible to set if, in LOW/HIGH brix range, LOW/HIGH pixel and LOW/HIGH temperature, the mA output has to reach a particular "mA alarm value" settable by the user.

mA alarm value

"MA ALARM VALUE"
In this function set the value that the mA output has to assume if the previous function has been indicated as YES and the unit is in LOW/HIGH range condition.

mA Output

"mA OUTPUT"
With this function it is possible to select 2 operation modes of **"Est"** (EXTENDED) if the measured value is lower than the value set in the "Start Range" function, or higher than the value set in the "Full range" function, the analogue output proportionally overcomes the limits of the values set in the **mA Type output** menu

Example:

mA type output = 4-20
Start range = 25Bx
Full range = 50Bx
Measured value = 20Bx — Measured value = 70Bx
Value at the output = ~3.2mA — Output value = ~22mA

"Lim" (LIMITED) if the measured value is lower than the one set in the "Start Range" or higher than the value set in the "Full Range", the analogue output remains fixed in the limits set in the **mA Type output** menu.

Hysterisis time

"HYSTERISIS TIME SETTING"
In this function it is possible to set (in seconds) the interval of minimum time for which the product's derivative value has to keep itself lower than the limit value *Limit Derivative* so that the washing cycle can be activated in "Smart washing" mode.

Max washings

"MAX NUMBER OF WASHINGS SETTING"
In this function it is possible to set the maximum number of washing unsuccessfully performed in the "Smart washing" mode, that means, without the derivative's value returning above the limit value *Limit Derivative*; such alarm condition is notified by a specific icon.

Exit

"EXIT "
Pressing the *"ENTER"* button exits the SETUP 2 sub-menu and returns to the LEVEL 2 menu.

9.5.4 SERVICE (Service)

This submenu is aimed at improving technical service; it allows to generate a fixed mA output, include or exclude compensation of the temperature measured by the temperature probe, set the operating temperature or display the graphic image detected by the CCD and its Offset level.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
✔	**Fixed Output**	"FIXED OUTPUT SELECTION"	Yes/No	Yes
☞	**Fixed value**	"FIXED VALUE SETTING"	0.00 ÷ 99.99	90.00
✔	**Temp. comp.**	"TEMP. COMPENS. EXC./INC."	Inc./Exc.	Included
☞	**Working temp.**	"WORKING TEMP. SETTING"	-5.00 ÷ +105.00°C -5.00 ÷ +140.00°C	+20.00°C +20.00°C
ⓘ	**CCD Image**	"CCD IMAGE VISUALIZATION"	-----	-----

Fixed Output *"FIXED OUTPUT SELECTION"*
This function selects and locks the measurement value, as well as the mA output corresponding to this concentration value set in the following "Fixed Value" function. The setting is indicated on the display with its corresponding icon.
Set the desired mode with the *"UP"* or *"DOWN"* key, and press *"ENTER"* to confirm.
The selection is reset to the default configuration = "No" when the unit is switched off.

Fixed value *"FIXED VALUE SETTING"*
This function sets and displays a fixed concentration value in order to generate the corresponding mA output. This parameter may be set to value within the equipment's range. Set the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Temp. comp. *"TEMPERATURE COMPENSATION EXC./INC"*
With this function it is possible to exclude the automatic temperature compensation, for example in case the temperature sensor fails or when indication of the uncompensated measurement is required. Set the desired mode with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm. Remember that if the compensation is On, the indication will be "**Inc.**"; and when the compensation is Off, it will show "**Exc.**".

Working temp. *"WORKING TEMPERATURE SETTING"*
In this function it is possible to simulate automatic temperature compensation by setting a temperature value close to the working temperature. This function is valid only when, in the previous function, the automatic temperature compensation is excluded. The range of temperature values for the "Standard" UR-24 is from –20.00 to +110.00°C, or the equivalent in °F. For the "High Temperature" instrument, the range is from –20.00 to +140.00°C, or the equivalent in °F.
Choose the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

CCD Image *"CCD IMAGE VISUALIZATION"*
Pressing *"ENTER"* to select this function switches the display to show a graph of the "optical image" detected by the CCD. By pressing *"UP"* in this condition, the "mediate image" is shown. By pressing *"UP"* again, a graphical image of the calculated derivative's value can be seen.
The two horizontal dashed lines indicate the signal level for the CCD pixels in the light.
Press *"ENTER"* again to exit from the graphic representation and return to the SERVICE sub-menu.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the SERVICE sub-menu and returns to the LEVEL 2 menu.

9.5.5 DISPLAY (Display setting)

This submenu sets the LCD graphic display's operation method, the backlighting with energy-saving function and contrast control.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
✔	**LCD backlight**	"BACKLIGHTING INSPECTION"	On/Off	On
☞	**LCD contrast**	"CONTRAST CONTROL"	5 ÷ 18	11
✔	**LCD saving**	"ENERGY SAVING"	On/Off	On
☞	**LCD Timer**	"LCD BACKLIGHT TIME"	5 s ÷ 3600 s	300 s

LCD Backlight *"BACKLIGHTING INSPECTION"*
This function enables (**On**) or disables (**Off**) the backlight for the LCD graphical display.
Choose the desired state with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

LCD Contrast *"CONTRAST CONTROL"*
This function regulates the contrast of the LCD graphic display.
Select the desired contrast using a value from 5 to 18 with the *"UP"* and *"DOWN"* buttons. Press *"ENTER"* to confirm the value.
When making this adjustment, be careful not to make large changes to the contrast value. The display could become too light or too dark, and thus impossible to read the subsequent menus.

LCD Saving *"ENERGY SAVING"*
This function allows the reduction of power consumption and increases the LCD graphic display's life by switching off backlighting if not used for a set time.

- If this function is enabled (**On**), the display will turn off if none of the 4 programming keys have been pressed for a time period equal to the LCD Backlighting Time function. Pressing any key will turn the display on again.
- If this function is disabled (**Off**), the display always remains on.

Choose the desired state with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

LCD Timer *"LCD BACKLIGHTING TIME"*
This function sets the waiting time before switching off the backlighting and the graphic display.
This parameter is indicated in seconds, with values between 5 and 3600 (60 min.). Choose the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the DISPLAY sub-menu and returns to the LEVEL 2 menu.

9.6 LEVEL 3

Due to the importance of the functions in the third programming level, and since the modification of which may cause the partial or total loss of the equipment's proper operation, **access to this level is restricted to trained technicians or qualified personnel with the guidance of Maselli's Technical Service.**
The description of this programming level is for informational purposes only.
From the previous LEVEL 2 programming choose the "LEVEL3" menu. Using the *"UP"* and *"DOWN"* keys set the secret access code and press *"ENTER"* to confirm the value.
The original access code when shipped from the factory is "20".
In this programming level it is possible to enter the following sub-menus:

- **"CCD calibration"**
- **"Temp. calibrat.** (temperature calibration)
- **"mA calibration"**
- **"Moisture calibration"** (humidity calibration)
- **"System test"**
- **"CCD alignment"**
- **"Measurement unit"**
- **"Scale selection"**
- **"User scale"**
- **"Maselli Setup"**
- **"Measurement linearization"**
- **"Configuration"**
- **"Password"**
- **"New code"** (Modification of the access code at level 3).

CCD calibration	Pressing *"ENTER"* at this function enters the "CCD Calibration" sub-menu, which is for the optical section.
Temper. calibrat.	Pressing *"ENTER"* at this function enters the "Temp. Calibrat." sub-menu, where the temperature correction values can be defined.
mA calibration	Press *"ENTER"* on this function to access the "mA Calibration" to set the configuration of the current output.
Moisture calibrat.	Press *"ENTER"* on this function to access the "Moisture Calibration" submenu to set the correction values of the instrument's internal relative humidity
System test	Pressing *"ENTER"* at this function enters the diagnostics sub-menu.
CCD alignment	Pressing *"ENTER"* at this function enters the "CCD Alignment" sub-menu.
Measurement unit	Pressing *"ENTER"* in this function allows to enter in the submenu of the measurement unit's name.
Scale selection	Pressing *"ENTER"* in this function allows to select either the USER or MASELLI scale. Set the desired data with the *"UP"* and *"DOWN"* keys and press *"ENTER"* to confirm
User scale	Pressing *"ENTER"* in this function allows to enter in the submenu for the **User scale** setting.
Maselli setup	Pressing *"ENTER"* in this function allows to enter in the submenu for the setting of some parameters pertaining to measurement, the access to this menu is reserved for Maselli's technicians.
Measurement linearization	The access to this menu is reserved for Maselli's technicians.
Configuration	The access to this menu is dedicated to Maselli's technicians.
Password	Setting function to access level 1.
New code	Pressing *"ENTER"* at this function enters the "New Code" sub-menu, where the Level 3 access code can be changed.

9.6.1 CCD CALIBRATION (CCD Calibration)

This submenu makes it possible to carry out automatic calibration by reading all the CCD pixels and thereby compensating light differences, or read faults in the measurement prism.

Attention: CCD linearization must only be done after considerable operations on the optical section, carried out by specialist personnel, after ensuring that there is no product, encrustation, dust or other residue which will falsify the reading and that the entire optical route is perfectly clean, as the parameters set act directly on the calculation of the concentration measurement.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
ⓘ	**CCD status**	"CCD STATUS"	-----	-----
⊗ 🔔	**CCD lineariz.**	"CCD LINEARIZATION"	-----	-----
⊗ 🔔	**CCD reset**	"CCD SIGNAL RESET"	-----	-----
ⓘ	**CCD image**	"CCD IMAGE VISUALIZATION"	-----	-----
🔔	**Man. mA LED**	"mA LED MANUAL SETTING"	0.00 ÷ 4.00mA	0.00mA
✔	**LED control**	"LED BRIGHTNESS COMPENSATION"	On/Off	On
ⓘ	**LED perform.%**	"LED PERFORMANCE %"	-----	-----
ⓘ	**Auto. mA LED**	"AUTOMATIC CORRECT. OF LED mA"	-----	-----
ⓘ	**Actual Brix**	"ACTUAL BRIX"	-----	-----
☞	**Zero Pixel**	"ZERO PIXEL VALUE"	-500.00 ÷ 0.00	Calibration
☞	**Span Pixel**	"SPAN PIXEL VALUE"	0.750 ÷ 1.250	Calibration
☞	**Zero Brix**	"ZERO BRIX CALIBRATION"	-30.00 ÷ +30.00	Calibration
☞	**Span Brix**	"SPAN BRIX CALIBRATION"	0.50 ÷ 2.00	Calibration

CCD status *"CCD STATUS"*
This function indicates whether the CCD image can (**Yes**) or cannot (**No**) be linearized. If the "No" message is displayed, it is impossible to complete the linearization. There may be problems in the optical system such as an unclean prism or optical path, or product on the measurement prism. If the "LO" or "HI" messages is displayed, it is impossible to carry out the linearization because the light intensity is not correct.

CCD lineariz. *"CCD LINEARIZATION"*
If the conditions are optimum, this function linearizes the CCD. To do this, assuming that **"Yes"** is displayed in the previous function "CCD Status," continuously press the *"ENTER"* button for about 5 seconds. To confirm that the linearization was successful, the linearized graphic image detected by the CCD, is seen. Press *"ENTER"* again to exit from the graphic representation and return to the CALIBRATION sub-menu.

CCD reset *"CCD SIGNAL RESET"*
Continuously pressing the *"ENTER"* button for 5 seconds will reset the CCD image to the initial condition before linearization, canceling the operation made in the preceding function.
To confirm that the reset was successful, the graphic image detected by the CCD, is displayed.
Press *"ENTER"* again to exit from the graphic representation and return to the CALIBRATION sub-menu.

CCD image *"CCD IMAGE VISUALIZATION"*
Pressing *"ENTER"*, this function displays the graphical "optical image" detected by the CCD. Pressing *"UP"* in this condition, the "mediate image" is displayed, and by pressing *"UP"* again, the image representing the calculated "derivative" value will be shown.

The horizontal dashed lines indicate the light's optimum level. Press *"ENTER"* again to exit from the graphic representation and go back to the CALIBRATION sub-menu.

Man. mA LED *"mA LED MANUAL SETTING"*
This function manually sets the measurement LED's electrical current value, indicated in "mA".
With the *"UP"* and *"DOWN"* keys adjust the value between 0 and 4.00mA, in order to have an optimum light level. The displayed image in the "CCD Image" menu should be included between the two horizontal dashed lines.

LED control *"LED BRIGHTNESS COMPENSATION"*
This function enables (**On**) or disables (**Off**) the automatic compensation of the measurement LED's light level, used to maintain the CCD's image at a constant level.
Choose the desired state with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

LED perform. % *"LED PERFORMANCE %"*
This function displays the measurement LED's performance. The percentage refers to the LED's brightness compared to the optimum value (100%), obtained by supplying it with the current set in the previous "man. mA LED" function.

Auto. mA LED *"AUTOMATIC CORRECTION OF LED mA"*
This function indicates the automatic correction of the measurement LED's current value for the correction of eventual image deviation due to changes in brightness.

Actual Brix *"ACTUAL BRIX"*
This function displays the measured "Brix" value.

Zero Pixel *"ZERO PIXEL VALUE"*
This function changes the measured concentration's value, by adding the set value to the calculated pixels value corresponding to the position of the shadow / light separation line of a 0 Brix sample, at a standard temperature of 20°C (PIXEL function of the "CCD ALIGNMENT" menu that follows).
This parameter always assumes a negative sign and has correction values included between -500 and 0. Set the desired value with the *"UP"* and *"DOWN"* keys and press *"ENTER"* to confirm.

Span Pixel *"SPAN PIXEL VALUE"*
This function changes the measured concentration's value by multiplying by the set value the numerical one of the calculated pixels which pertain to the position of the shadow / light separation line of a sample at 0 Brix, at a temperature of 20°C (PIXEL function of the menu "CCD ALIGNMENT" that follows).
This parameter may assume values between 0.750 and 1.250. Set the desired value with the *"UP"* and *"DOWN"* keys and press *"ENTER"* to confirm.

Zero Brix *"ZERO BRIX CALIBRATION"*
This function allows to set the "OFFSET" value indicated in Brix, that will be added or deducted from the measured value.
To be able to carry out this correction, it is suggested to take from the equipment, the nearest possible to the UR-24 Digital Refractometer, a sample of product and to note the indication provided by the instrument; with a temperature compensated optical refractometer, read the value of the previously taken product, calculate the eventual difference between the two measurements and set it through this function.
This parameter may assume values included between –30.00 and +30.00; set the desired value with the *"UP"* and *"DOWN"*, and press *"ENTER"* to confirm.

Span Brix *"SPAN BRIX CALIBRATION"*
This function indicates and allows to set the value of the "SPAN" multiplicative coefficient. Such factor will be multiplied to the measurement for the correction of eventual errors proportionally present in the top part of the scale.
This parameter may assume values included between 0.50 and 2.00; set the desired value with the *"UP"* and *"DOWN"*, and press *"ENTER"* to confirm.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the CCD CALIBRATION sub-menu and returns to the LEVEL 3 menu.

9.6.2 TEMPERATURE CALIBRATION (Pt100 Calibration)

This submenu allows calibration of the Temperature Sensors for measuring the product and prism temperature, thereby compensating differences, if any, in the values measured.

Attention: temperature calibration must be done after replacement, if necessary, of the temperature sensor by specialist personnel, as the preset parameters act directly on the calculation of the concentration measurement.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
ⓘ	**Temperature**	"TEMPERATURE VISUALIZATION"	-----	-----
☞	**PT100 A/D Zero**	"PT100 A/D ZERO"	-50.00 ÷ +50.00°C	Calibration
☞	**PT100 A/D Span**	"PT100 A/D SPAN"	0.750 ÷ 1.250	Calibration
☞	**T. coefficient**	"TEMPER. COMPENSATION COEFF."	0.00 ÷ 2.00	1.00
ⓘ	**Comp. value**	"TEMPER. COMPENSATION VALUE"	-----	-----

Temperature *"TEMPERATURE VISUALIZATION"*
This function displays the temperature value measured by the Pt100 temperature sensor.

PT100 A/D Zero *"PT100 A/D ZERO"*
This function displays and changes the "OFFSET TEMPERATURE" value, indicated in °C, which will be added or subtracted from the measured temperature value.
For this correction it is suggested to first measure the product's temperature with approved equipment as close as possible to the UR-24 Digital Refractometer. Calculate the difference vs. the indication from the instrument in the previous function, and correct the measurement by entering this difference.
This parameter permits correction values between -50 and +50 °C. Set the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

PT100 A/D Span *"PT100 A/D SPAN"*
This function displays and changes the "SPAN TEMPERATURE" multiplying coefficient's value. This factor will be multiplied by the temperature measurement for the correction of eventual errors proportionally present in the top part of the range.
This parameter may assume values between 0.750 and 1.250. Set the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

T. Coefficient *"TEMPERATURE COMPENSATION COEFFICIENT"*
This function displays and sets the multiplying coefficient of the temperature compensation value, before being added to the concentration value.
This parameter is used to optimize the automatic temperature compensation, adapting it to the actual working point. It can assume values between 0.0 and 2.0. Set the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Comp. value *"TEMPERATURE COMPENSATION VALUE"*
This function displays the value, in BRIX or in USER units, of the correction made to the measurement due to the temperature compensation.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the TEMPERATURE CALIBRATION sub-menu and returns to the LEVEL 3 menu.

9.6.3 mA CALIBRATION

This submenu permits the calibration of the mA section of the UR-24 Digital Refractometer in the case in which you have linearity errors in the output.

Warmings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
☞	**mA Output**	"mA OUTPUT"	0.00 mA ÷ 25.00mA	-----
☞	**Zero mA**	"ZERO mA"	-2.00mA ÷ +2.00mA	Calibration
☞	**Span mA**	"SPAN mA"	0.750 ÷ 1.250	Calibration

mA Output *"mA OUTPUT"*
This function sets a fixed value for the analog output and consequently can be used to check the proper functioning of a connected device.
This parameter is shown in mA, with allowable values between 0 and 25. Choose the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Zero mA *"ZERO mA"*
This function indicates and allows to set the value of the "ZERO mA": this value expressed in mA will be added or subtracted to the mA measured value.
In order to perform this adjustment, we suggest to measure the current output with a certified equipment as close as possible to the Digital Refractometer UR-24 and afterwards, to calculate the difference between the value indicated by the UR-24 and the value indicate by the certified equipment consequently adjusting the Zero value.
This parameter may assume values included between -2.00mA and 2.00mA; set the desired value with the *"UP"* and *"DOWN"*, and press *"ENTER"* to confirm.

Span mA *"SPAN mA"*
This function indicates and allows to set the value of the "SPAN mA"; multiplicative coefficient. Such factor will be multiplied to the measurement for the correction of eventual errors proportionally present in the top part of the scale.
This parameter may assume values included between 0.750 and 1.250; set the desired value with the *"UP"* and *"DOWN"*, and press *"ENTER"* to confirm.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the CCD CALIBRATION sub-menu and returns to the LEVEL 3 menu.

9.6.4 MOISTURE CALIBRATION (Humidity Sensor Calibration)

This submenu allows to calibrate the Humidity measurement Sensor inside the instrument, thereby compensating differences, if any, in humidity measurements, to set the relative alarm value, or its exclusion.

Attention: humidity calibration must be done after replacement of the Humidity Sensor, if necessary, and it must be done by specialist personnel, since, although the parameter does not directly affect the measurement, incorrect calibration can lead to reading errors in the event of problems in the dehydrating sections of the instrument.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
ⓘ	**Moisture val.**	"HUMIDITY DISPLAY"	000.0 ÷ 100.0%	-----
☞	**Zero moisture**	"HUMIDITY ZERO CALIBRATION"	-15 ÷ +15%	Calibration
☞	**Alarm value**	"HUMIDITY ALARM VALUE"	0.1 ÷ 100.0%	65%
ⓘ	**Inside temp.**	"INSIDE TEMPERATURE VALUE"	-----	-----
ⓘ	**Dew**	"DEW POINT VALUE"	-----	-----
✔	**Moist. reading**	"MEASUREMENT ENABLING"	On/Off	On

Moisture val. *"HUMIDITY VALUE DISPLAY"*
This function displays the value of the relative humidity inside the instrument, expressed in %, measured by the Humidity Sensor present on the electronic section.

Zero moisture *"HUMIDITY ZERO CALIBRATION"*
This function indicates and allows to set the 'INTERNAL HUMIDITY OFFSET" value expressed in %, which will be added to or deducted from the humidity measured, to align the humidity measured by the instrument with that measured by a sample hygrometer.
This parameter has correction values between "–15 and +15%"; set the required value using the *"UP"* and *"DOWN"* keys and press *"ENTER"* to confirm. The procedure described automatically updates the value of the previous function "Moisture Val.".

Alarm value *"HUMIDITY ALARM VALUE"*
This function allows to set the relative humidity value expressed in %, beyond which there is a humidity alarm signal; in the event of an alarm condition, if the display mode is included in the "MOISTURE AL." function, the relative icon appears on the display.
This parameter can assume values between "0.1 and 100.0%"; set the required value using the *"UP"* and *"DOWN"* keys and press *"ENTER"* to confirm.

Inside temp. *"INSIDE TEMPERATURE VALUE"*
This function displays the value of the temperature inside the unit.

Dew *"DEW POINT VALUE"*
This function displays the dew point inside the unit, that means the temperature at which the saturated air chills and forms steam (with relative humidity at 100 per cent).

Moist. reading *"MEASUREMENT ENABLING"*
In this function it is possible to include or exclude the reading of the relative humidity inside the unit.
Use the *"UP"* o *"DOWN"* key and press *"ENTER"* to confirm, bearing in mind that by enabling the function, the indication will be **"On."** and by disabling the function the indication will be **"Off."**.

Exit *"EXIT"*
It is possible to press *"ENTER"* to exit the MOISTURE CALIBR. submenu and return to the LEVEL 3 menu.

9.6.5 SYSTEM DIAGNOSTICS (Test Functions)

This submenu allows to carry out a functional check of some of the interfaces such as:

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
✔	**Relay Output**	"ALARM/WASHING CONTACT"	On/Off	-----
ⓘ	**Hold Input**	"HOLD INPUT"	On/Off	-----
☞	**Serial port**	"SERIAL PORT"	-----	-----
☞	**Work. param.**	"OPERATING PARAMETERS"	-----	-----
ⓘ	**A/D converter**	"A/D CONVERTER"	-----	-----
☞	**mA Output**	"mA OUTPUT"	0.00÷25.00	-----

Relay Output *"ALARM/WASHING CONTACT"*
This function checks the alarm / washing relay's operation and, consequently, the proper operation of the associated outside circuit.
Acting on the *"UP"* and *"DOWN" keys,* it is possible to open (**On**) and close (**Off**) the relay contacts.

Hold Input *"HOLD INPUT"*
This function checks the HOLD input's operation and, consequently, the proper operation of the associated outside circuit.
With open-circuit input the **"Off"** status is displayed. By short-circuiting the input externally, the function changes the status to **"On"**.

Serial port *"SERIAL PORT"*
This function, by pressing *"ENTER"*, sends a "test String" to the serial port.
Connect the instrument's serial output to an RS422/232 converter, connect to the RS232 port of a PC with a communications software installed, set the PC's software to the same parameters as configured on the **UR-24** and check the correct serial communication.

Work. param. *"OPERATING PARAMETERS"*
This function, by pressing *"ENTER"*, sends a "Data String" which contains a list of the system's variables to the serial port. Connect the instrument's serial output to an RS422/232 converter, connect to the RS232 port of a PC provided with a communications software or a printer and set the PC's software to the same parameters as configured on the UR-24 to acquire or print the operation parameters.

A/D converter *"A/D CONVERTER"*
This (exclusively technical) function displays the value at the A/D converter's input, indicated in points.

mA Output *"mA OUTPUT"*
This function sets a fixed value for the analog output and consequently can be used to check the proper functioning of a connected device.
This parameter is shown in mA, with allowable values between 0 and 25. Choose the desired value with the *"UP"* and *"DOWN"* keys, and press *"ENTER"* to confirm.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the SYSTEM DIAGNOSTIC sub-menu and returns to the LEVEL 3 menu.

9.6.6 CCD ALIGNMENT (CCD Alignment)

This submenu allows to check or carry out mechanical alignment of the CCD, by centring the CPU card and carry out electronic alignment using a product with known refractive index.

Attention: CCD alignment must only be done after considerable operations carried out by specialist personnel, after ensuring that there is no product, encrustation, dust or other residue on the measuring prism which will falsify the reading, and that the entire optical route is perfectly clean, as the parameters set act directly on the calculation of the concentration measurement.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default Value*
⊗	**Pixel**	"PIXEL VISUALIZATION"	-----	-----
⊗	**Zero Pixel**	"ELECTRONIC PIXEL ALIGNMENT"	0.00 ÷ -500.00	Calibration
ⓘ	**Brix Value**	"BRIX VALUE VISUALIZATION"	-----	-----

Pixel *"PIXEL VISUALISATION"*
This function continuously indicates the numerical value of the pixel corresponding to the position of the shadow / light separation line on the CCD.
For an optimum adjustment it is necessary to place the prism on a piece of blotting paper soaked with distilled water at a temperature of 20°C. Move the CPU card lengthwise until a value of about ~300 pixels is indicated.
Keeping the *"ENTER"* key pressed for 5 seconds, the indicated value will be reset to zero.
For this calibration it is necessary for the working area to be as dark as possible, and that no external light reaches the detecting circuit which can affect the alignment operation.

Zero Pixel *"ELECTRONIC PIXEL ALIGNMENT"*
This function permits the manual modification of the "Zero Pixel" value by means of the *"UP"* and *"DOWN"* keys.
This value always assumes a negative sign since it is algebraically added to the pixel value read by the CCD sensor, in order to have a 00.00 pixel value when a 0 Brix sample, at a temperature of 20°C, is in contact with the prism.

Brix value *"Bx VALUE VISUALISATION"*
This function displays the concentration value in the BRIX range.

Exit *"EXIT "*
Pressing the *"ENTER"* button exits the CCD ALIGNMENT sub-menu and returns to the LEVEL 3 menu.

9.6.7 MEASUREMENT UNIT

This submenu allows to set the measurement unit which will be displayed in the main menu.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default value*
☞	**Maselli M.U.**	"MASELLI MEASUREMENT UNIT SETTING"	-----	-----
☞	**User M.U.**	"USER MEASUREMENT UNIT SETTING"	-----	-----

M.U Maselli *"MASELLI SCALE SETTING"*
This function allows to set the measurement unit **M.U. Maselli**. To set the measurement unit it is necessary to use the *"UP"* or *"DOWN"* keys to select the desired character. Press the *"ENTER"* key to confirm.

M.U. User *"MASELLI SCALE SETTING"*
This function allows to set the measurement unit **M.U. User**. To set the measurement unit it is necessary to use the *"UP"* or *"DOWN"* keys to select the desired character. Press the *"ENTER"* key to confirm.

Exit *"EXIT"*
It allows, by pressing the *"ENTER"* key, to exit from the submenu MEASUREMENT UNIT and to return to the LEVEL 3 menu.

9.6.8 SCALE SELECTION

This submenu allows to select the measurement scale which displays the value of Refraction index.

Warnings	*Function*	*Function Description*	*Limits/Options*	*Default/value*
☞	**MAS.**	"MASELLI SCALE SELECTION"	-----	-----
☞	**USER**	"USER SCALE SELECTION"	-----	-----
☞	**ZEISS**	"ZEISS SCALE SELECTION"	-----	-----

MAS. *"MASELLI SCALE SELECTION"*
This function allows to select the **MASELLI** measurement scale; the value of the refraction index is converted into a Brix measurement scale, referred to a matching base curve nD/Brix at 20°C, resident in the memory. Select the desired measurement scale with the "UP" or "DOWN" keys and press *"ENTER"* to confirm the visualization scale's choice.

USER *"MASELLI SCALE SELECTION"*
This function allows to select the **USER** measurement scale; it is possible to personalize the measurement scale by setting, referring to calibration curves indicated on specialized bibliographies or experimentally derived, seven pairs of items which indicate the correlation between the Refraction Index and the value in concentration in the desired scale. Select the desired measurement scale with the "UP" or "DOWN" buttons and press *"ENTER"* to confirm the visualization scale's choice.

ZEISS *"MASELLI SCALE SELECTION"*
This function allows to select the **ZEISS** measurement scale; the value of the refraction index is converted into a Zeiss measurement scale, referred to a matching base curve nD/Zeiss at 20°C, resident in the memory. Select the desired measurement scale with the "UP" and "DOWN" key and press the *"ENTER"* to confirm the choice of the visualization scale.

Exit *"EXIT"*
It allows, by pressing the *"ENTER"* key, to exit from the submenu SCALE SELECTING and to return to the LEVEL 3 menu.

9.6.9 USER RANGE (USER Range personalization).

This submenu allows to personalize the equipment's measurement scale in particular, it is possible to set a range which is completely configurable by means of the assignment of an nd/% table, and the compilation of a matrix for the calculation of the temperature compensation.

Decim. Point *"DECIMAL POINT SETTING"*
This function indicates and allows to choose the position of the decimal point in the visualization of the concentration and in all those parameters where the same can be in variable position.
By means of the "UP" or "DOWN" keys, 4 **"X"** characters, alternated by the character **"."**, are displayed in a different position according to the number of decimals chosen.

Value nD1÷nD7 *"nD VALUE SETTING"*
This function indicates and allows to set 7 decimal values, included between 1,30000÷1,54000, corresponding to the refraction index of the product in the desired range; the visualization doesn't show the fixed number "1" of the nD value, since it's already programmed in the memory.
With the "UP" and "DOWN" keys, chose the desired **"nD1"** value, confirm with the "ENTER" key and carry on till all the variables are memorized.

Val. USER 1÷7 *"CONCENTRATION VALUE SETTING"*
This function indicates and allows to set the 7values, included between 0000000 ÷ 9999999 (decimal point configured in the previously described "Punto Decim." function) which correspond to the concentration value of the product in the desired range and the pertaining previously set values in nD.

With the "UP" and "DOWN" keys, chose the desired **"USER 1"** value, confirm with the "ENTER" key and carry on till all the variables are memorized.
Note: the nD1÷nD7 and USER 1÷USER 7 values must be selected in order to be equally distributed along all the instrument's range and they will have to be inserted in ascending order.

Further the personalization of the measurement range, it is possible and suggested, when using a "USER" range, to also personalize the temperature's compensation. To be more familiar with the following functions, make a table like the following one indicated in the example:

	C1	**C2**	**C3**
T1	E1	E2	E3
T2	E4	E5	E6
T3	E7	E8	E9

where:

Tn = Temperature value;
Cn = Concentration value;
En = Compensation value, nothing the data:

a) of the temperature, where:
T1 = product "minimum" temperature
T2 = product "medium" temperature
T3 = product "maximum" temperature

b) of the concentrations, where:
C1 = product "minimum" concentration
C2 = product "medium" concentration
C3 = product "maximum" concentration

c) of the temperature compensation, where:
E1 = compensation at point T1/C1
E2 = compensation at point T1/C2
E3 = compensation at point T1/C3
E4 = compensation at point T2/C1
E5 = compensation at point T2/C2
E6 = compensation at point T2/C3
E7 = compensation at point T3/C1
E8 = compensation at point T3/C2
E9 = compensation at punt T3/C3

Carrying on with the functions' visualization, the value of all 15 will be subsequently required.

Value Temp1÷3 *"TEMPERATURE VALUE SETTING"*
This function indicates and allows to set the 3 previously defined temperature values, included between -20.00 ÷110.00°C or (140.00°C) corresponding °F,
With the "UP" and "DOWN" keys, chose the desired **"Temp1"** value, confirm with the "ENTER" key and carry on with the memorization of all the variables.

Val. Prod 1÷3 *"CONCENTRATION VALUE SETTING"*
This function indicates and allows to set the 3 previously defined concentration values included between 0000000÷9999999 (decimal point configured in the previously described function "Punto Decim.") which correspond to the product's concentration value in the desired scale.
With the "UP" and "DOWN" keys, chose the desired **"Prod1"** value, confirm with the "ENTER" key and carry on with the memorization of all the variables.

Val. Comp1÷9 *"COMPENSATION VALUE SETTING"*
This function indicates and allows to set the 9 previously defined values, corresponding to the temperature compensation value.
With the "UP" and "DOWN" keys, chose the desired **"Comp.1"** value, confirm with the "ENTER" key and carry on with the memorization of all the variables.

Exit *"EXIT"*
It allows, by pressing the "ENTER" key, to exit from the USER RANGE submenu and to return to the LEVEL 2 menu.

9.6.10 PASSWORD

This function let you define the access to level 1 programming; if it's set on YES, the access to level 1 is allowed only inserting the access code if it's set on NO, the access to level 1 is free.

9.6.11 NEW CODE (Access code modification)

This sub-menu allows the user to set a new access code for Level 3. With the "UP" and "DOWN" keys set the new code value between 0 and 9999, and confirm by pressing "ENTER".
Attention: This code is not displayed. Since it is the only code that allows access to the Level 3 programming level, it is recommended to record any changes to the access code value in a safe location.

10. START-UP

10.1 START-UP

All Maselli instruments are assembled, carefully tested and calibrated by highly trained personnel, according to a "Quality Standard" conforming to ***"ISO 9001-VISION 2000"***, Certification and do not require any special procedures for the start-up. If specific working characteristics of the instrument are required at the time of order, they will be pre-programmed and tested at the factory and documented on the "Calibration Specification" sheet supplied with the instrument.

Always verify the following before starting up the instrument:

- The electrical connections listed in Chapter 8 were made correctly.
- The power supply voltage is within the specified range:
  AC 18V (12...24V), 50-60Hz, 0.6A or alternatively
  DC24V (18...36V), 0.6A or alternatively
  AC 115 or 230V ± 10%, 50-60Hz, 10VA with Interconnection box.

In any case check that the voltage corresponds to the one indicated on the identification label on the instrument or on the interconnection box.

- The removable plug on the mounting fitting is installed in the proper orientation. The plug reference arrow should be aligned with the reference arrow on the mounting fitting body.
- The product flows continuously across the prism surface.
- The product velocity across the prism is sufficient to continuously keep the prism surface clean.
- The prism remains flooded with product or water at all times, even during a pause in production.
- The Tri-Clamp and temperature sensor connections are tight enough to prevent product leaks.

Referring to Chapter 9 Programming, also verify that:

- The "Relay Function", as described in Level 2 **(9.5.3)** mode is set properly as desired.
- The "Alarm Settings", as described in Level 1 **(9.4.2)** are correctly set.
- If using the prism wash timer described in Level 1 **(9.4.3)**, define the wash time **(Washing Time)** and the pause time **(Measure Time)**, and activate the prism wash function **(Washing)**.
- If using the "HOLD" contacts described in Level 2 **(9.5.3)**, the hold time **(Hold Time)** is set.
- The temperature compensation **(Temp. Comp.)**, described in Level 2 **(9.5.4)** is included and the displayed value is correct.
- In case of product instability or gas bubbles, a value for averaging of the measure **(Integrations)** is programmed, described in Level 1 **(9.4.1)**, sufficient to make the reading stable.
- If using the serial output, the relative communication parameters **(Function, Baud Rate, Address)**, as described in Level 2 **(9.5.2)** are properly set.
- The desired temperature units are displayed **(Temperat. Unit)** as described in Level 2 **(9.5.3)**.
- The desired accuracy is displayed **(Resolution)**, as described in Level 2 **(9.5.3)**.
- The proper menu display language **(Language)** is defined as described in Level 2 **(9.5.3)**.
- If the mA output is used, the desired configuration **(mA Range Type)** and the defined scale range **(Start Range and END Range)** are set in Level 2 **(9.5.3)**.
- The display functions **(LCD Backlight, LCD Saving, LCD Timer)** are set and that the contrast **(LCD Contrast)** is adjusted as described in Level 2 **(9.5.5).**

11. DESICCANT CARTRIDGE

11.1 DESICCANT CARTRIDGE

The **UR-24 Digital Refractometer** is equipped with a “molecular sieve” desiccant cartridge ***(2)*** that maintains the internal relative humidity less than 40%. This eliminates internal moisture the problems that can occur when the product temperature is less than ambient, or about 20°C, which might cause condensation to form inside the unit.
In the event that service is needed on the optical or electronic components inside the instrument, it is necessary to take a few simple but fundamental precautions since the cartridge is also sensitive to ambient humidity.

1) Before removing the front cover ***(1)***, it is necessary to unscrew the cartridge ***(2)*** from its mounting position at the side of the electrical connectors, and to screw it into the clear plastic protective case supplied for this purpose.

NOTE: This must be done as quickly as possible, making sure that the cartridge is tightened securely into the airtight cover. Use the ridge on the bottom of the specially-designed plastic cover as a tool when removing and replacing the cartridge in the UR-24.

2) It is now possible to work on the instrument without problems.

3) Once the service is complete, carefully re-seal the instrument’s cover.

4) After the previous steps 1-2-3 have been completed it is possible to reinstall the desiccant cartridge ***(2)*** after removing the clear protective cover.

The desiccant cartridge may require from 24 to 36 hours to absorb the humidity inside the instrument, depending on the amount of moisture present. It is possible to reduce the time required by purging the inside of the instrument with a moisture-free gas (e.g. dry CO2 gas) just before installing the cartridge. Finally, you will note that the cartridge includes an indicator window which displays a blue color when the cartridge is new. This color changes to pink when it has lost most of its absorption capability and should be replaced; normally the cartridge lasts one year.

The desiccant material provides rapid absorption of humidity inside the UR-24 digital refractometer, so that the unit is ready for use as quickly as possible. Note, however, that once its absorption capacity has been exhausted, **there is no possibility to recharge it.**

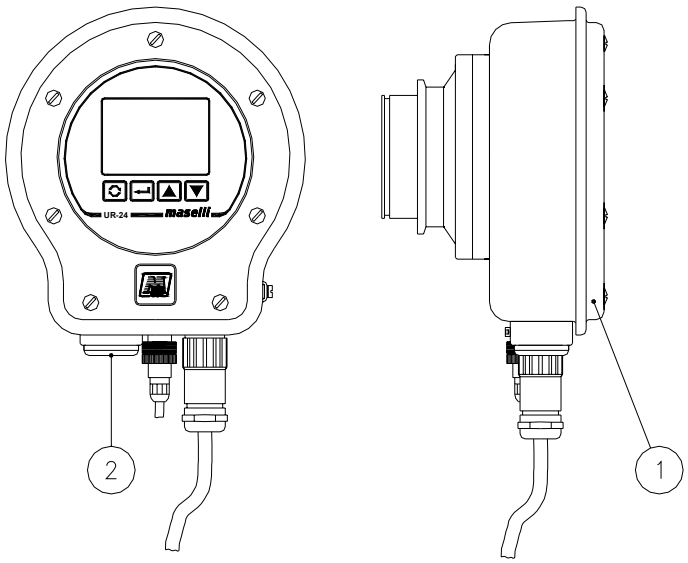


Figure 11.1.a - UR-24 with desiccant cartridge

12. CALIBRATION

12.1 CALIBRATION

The **UR-24 Digital Refractometer** is rigorously calibrated and tested and normally does not require additional calibration. Nevertheless, because of possible differences between the calibration solutions used and the actual final products, or for different methods of analysis, a final zero adjustment by the user may be necessary to match the instrument's readings to those from the laboratory.

Depending on the importance of the measurement it is advisable to carry out periodic checks.

The zero calibration can be accomplished two different ways. Calibration can be performed by mounting the refractometer directly on the process line, or on a benchtop using the calibration basin included with the instrument.

With the refractometer mounted directly on the line and a known product concentration flowing past the unit, the **UR-24** will display the measured value. The difference, if any, between the measured value and the value determined in the laboratory represents the zero calibration adjustment needed. The Zero calibration can be performed as previously discussed in Level 1(Chapter 9, User Calibration), using the **"Offset Value."**

A benchtop calibration can be performed if it is not possible to calibrate the **UR-24** while in-line. Remove the temperature sensor from the mounting fitting coupling and remove the **UR-24** from the mounting fitting or adapting flange. Seal the sensor coupling opening and the 3" TC opening with the proper covers that were provided with the instrument.

Warning: Insure that there is no product circulating past the refractometer and that the isolation valves are closed before attempting to remove the UR-24 or temperature sensor from the mounting fitting.

Screw the temperature sensor into the threaded opening on the calibration basin and secure the basin onto the UR-24. Fill the basin with a product sample with a known concentration value close to the starting range of the instrument and read the measured value on the display. The difference between the known value and the measured value will be the zero calibration needed. Perform the zero calibration as described above for the on-line calibration.

The Zero calibration adjustment shifts the entire measuring range of the instrument by the same amount. If a proportional calibration adjustment is needed, introduce a new product sample with a known value close to the ending range of the instrument and read the measured value on the display.
A difference between the known value and the measured value at the high end of the range, after the instrument has been zero-calibrated at the low end of the range, indicates that a span calibration is needed. The span calibration is described in Level 2, (Chapter 9, Operator Calibration), using the **"Span Value."**

Note: In the majority of cases it is sufficient to make only the above Zero calibration to obtain the correct calibration.

13. MAINTENANCE

13.1 MAINTENANCE

The **UR-24 Digital Refractometer** does not normally require regular maintenance. However, periodically or if the performance degrades, check the following:

- The cover screws are tight, insuring a good seal of the instrument.
- The “Desiccant Cartridge” has not expired (see Chapter 11). However, it is suggested to change it at least once a year.
- The “External Gaskets” and “O-Rings” are in good condition.
- The "Measurement Prism” is clean.
- Check the removable plug for the correct orientation in the mounting fitting.
- Use only a damp cloth to clean the exterior of the unit. Avoid using solvents or detergents that could damage the aluminum surfaces or the polystyrene frontal.

According to the measurement’s detection, it is advisable to periodically check the Zero (see charter 12-Calibration).

We remind that such interventions must, however, be carried out by qualified personnel on switched off equipments, disconnected from the power supply line, insulated from the production line (if not in other way indicated), under safety conditions and areas, avoiding any potential dangerous situation for oneself and others.

In particular it will be necessary to:

* avoid operating in unstable equilibrium conditions and however insecure;
* use suitable clothes and protection if the equipment’s temperature could be a potential danger;
* eventually use protection glasses and gloves, and nonslip rubber shoes.
* Avoid dispersion in the ambient of polluting, tossic or noxious substnaces.

For all what unspecified, follow the working safety standards/Rules in force in the Country of use.

14. CIRCUIT BOARD REPLACEMENT

14.1 GENERAL INFORMATION

Certain extraordinary maintenance operations may be necessary on the **UR-24 Digital Refractometer** following minor faults or wear of components.
The scope of this chapter is to provide the necessary instructions so that at the end of the warrantee period, the final user can carry out these simple urgent operations to make the appliance operative.

These operations must however be performed by specialist Personnel, with the appliance switched off, disconnected from the power supply, isolated from the production line, in safety conditions to avoid all potential risk situations for self and for others.

In particular, it is necessary to:

- avoid operating in conditions of unstable or precarious equilibrium;
- use suitable clothing and protection if there is possibility of risk due to the plant temperature;
- use safety goggles and gloves and anti-slip rubber footwear;
- avoid dispersal of polluting, toxic and harmful substances in the environment.

Unless otherwise specified, follow the workplace safety Standards/Laws applicable in the country of use.
For repair operations not described or described only partly in this text which require special skills regarding the product, please contact the Maselli Customer Technical Assistance or authorized centres; however, only the extraordinary maintenance operations described below must be carried out.
In case of operations on the optical or electronic parts of the instrument, or if it is necessary to open the instrument and access the internal parts, take the precautions described in Chapter 11 which describes maintainment of the dehydrating device.

NOTE: to guarantee complete safety and working of the appliance, in compliance with the Law on product responsibility, Maselli Misure recommends the use of original or similar components authorized by us for carrying out minor repairs.
Refer to the list of these components in the relevant chapter in this Manual and contact our Customer Technical Assistance for further clarification.
Maselli Misure shall not be responsible for damage that may be caused by undue repairs or the use of non-original or unauthorized spare parts.

The electronics section of the **UR-24 Digital Refractometer** consists of the “CPU” printed circuit card and a graphic display, connected as described in Figure 14.1.a.

The following reference numbers refer to the spare parts list described in chapter 16.

To access the equipment, unscrew the mounting screws (14) and remove the cover (2), paying attention not to lose the O-Rings (42),

Opening the analysis unit may require replacement of the molecular sieve dehydrating device; check daily at least for one week to ensure that the operation is necessary, by examining the indicator disk. If the problem persists after replacement contact the Maselli Customer Service indicating the operations performed.

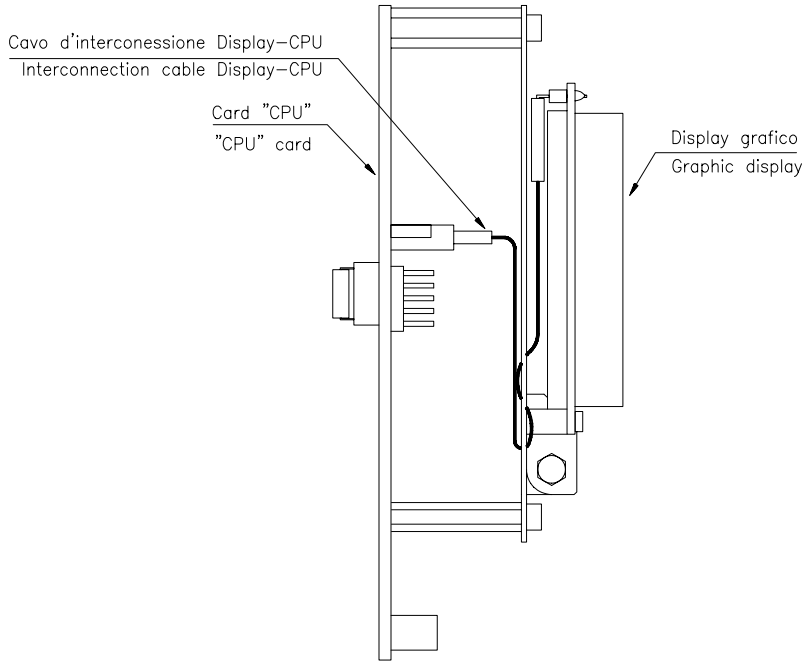


Figure 14.1.a - Connection between “CPU” card and display card

14.2 GRAPHIC DISPLAY

The **UR-24 Digital Refractometer** is equipped with a backlit liquid crystal graphical “DISPLAY” (LCD). This display permits a complete viewing of all the variables, with optimum visibility even in poorly-lit work areas.

During the normal operation, the LCD Graphical Display indicates the concentration value of the measured product.

The Display (28) is attached to the CPU Card (23) by a special supporting plate (12, 13).
To replace the display, it is necessary to remove the 3 fixing screws (53), disconnect the flat ribbon cable (24) and carry out the following procedures on a bench.
Disassemble the display from its support by removing the 4 mounting screws (52) and disconnect the ribbon cable’s connector from the display.

14.3 CARD "CPU"

The "**CPU**" card, or "Central Processing Unit," is the heart of the **UR-24 Digital Refractometer**, which controls all of the internal functions of the system.

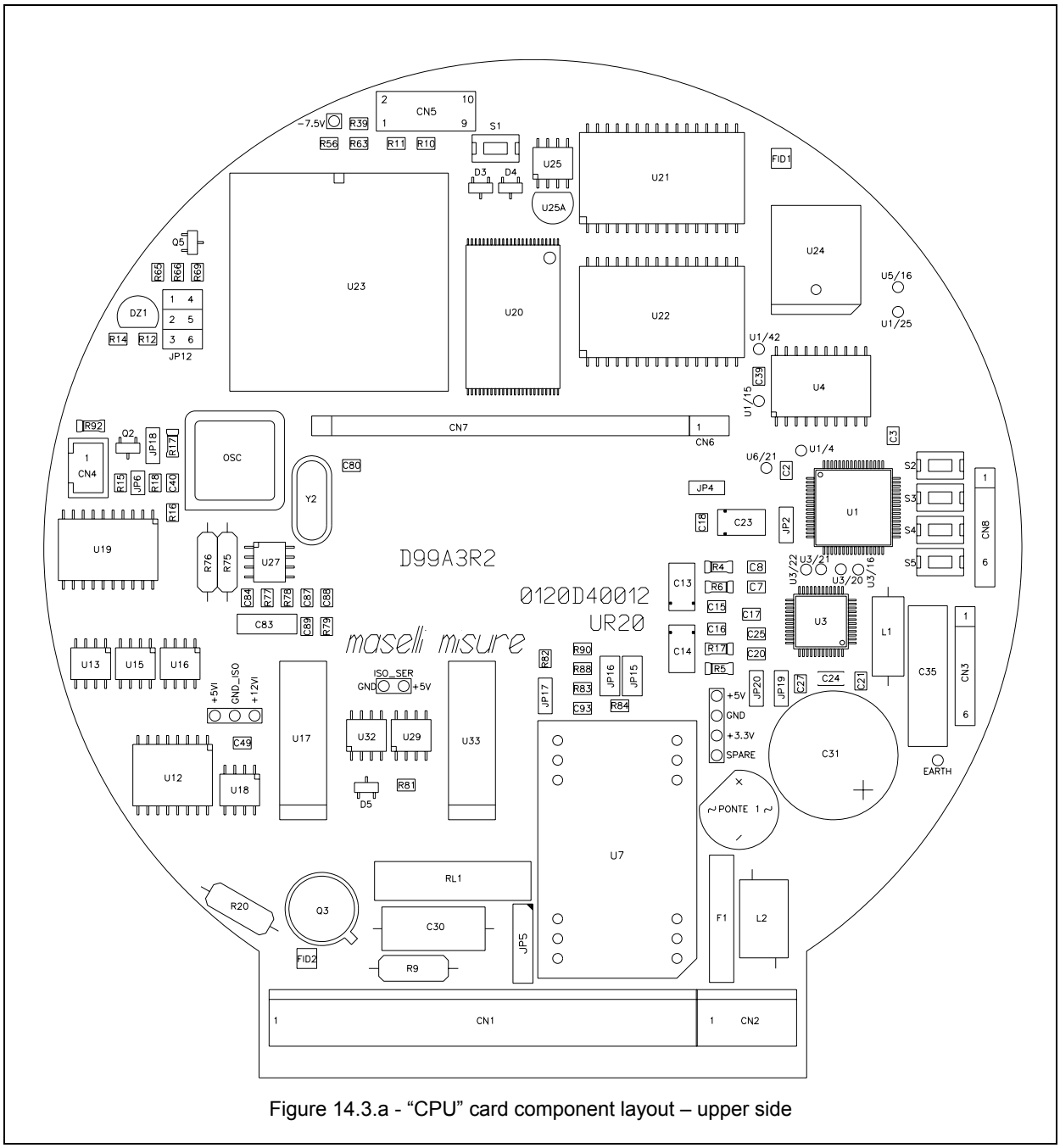


Figure 14.3.a - "CPU" card component layout – upper side

<u>ATTENTION</u>: This card should only be replaced at the request of a Maselli technician. All of the parameters of Level 3 programming, previously described, will be automatically reset to their "default" settings.
In particular, the previous values for functions such as the "CCD LINEARIZATION", the "ZERO" and "SPAN" calibrations, and the "ALARM" setpoints will be lost.

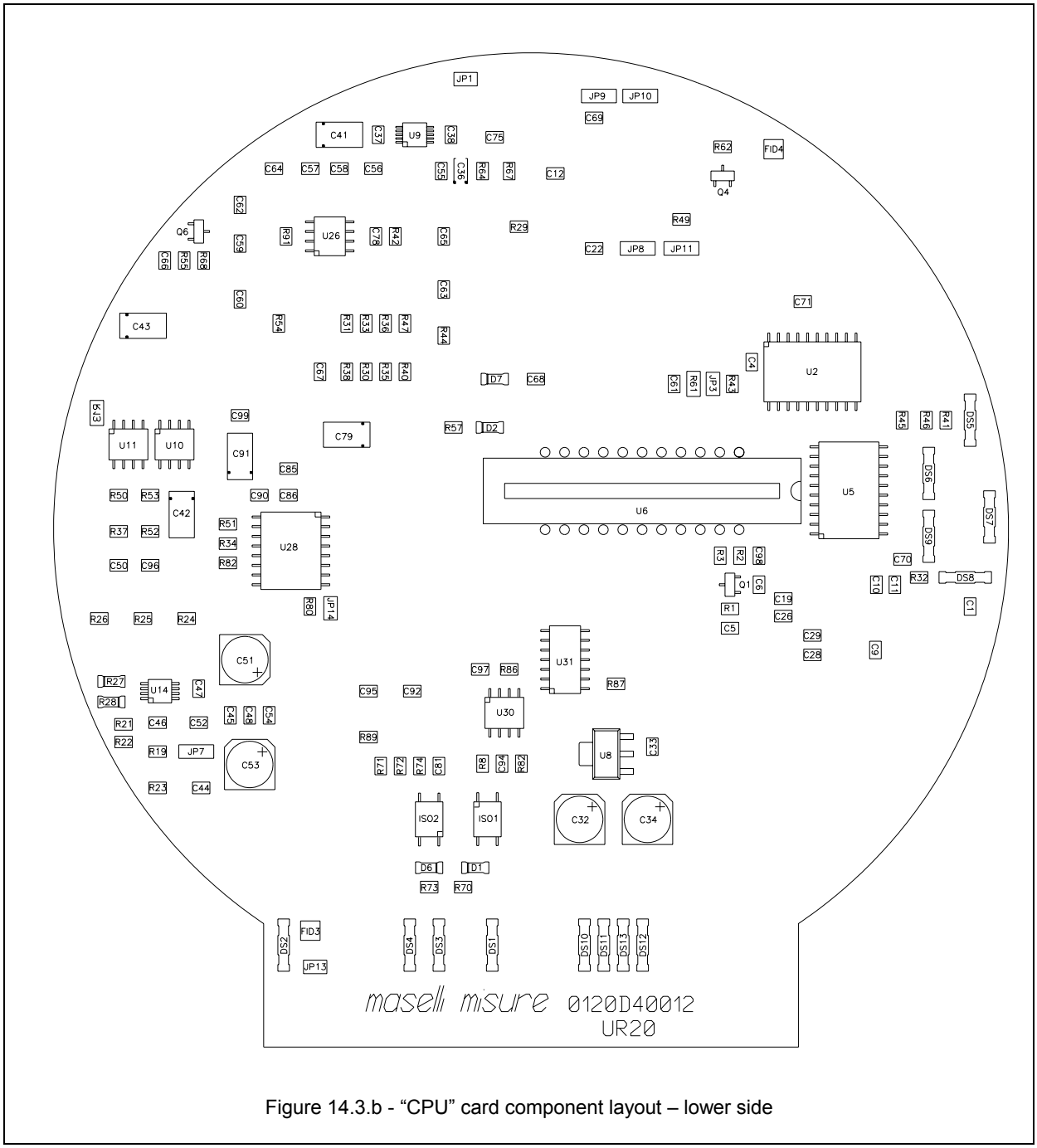


Figure 14.3.b - “CPU” card component layout – lower side

To access the “CPU” card for normal maintenance, it is not necessary to remove the card. Simply remove the top mounting screw (53) for the display support.

If it is necessary to replace the “CPU” card, proceed as follows:

- Remove the 3 mounting screws (53) on the display support (12).
- Disconnect the CPU-Display interconnection cable (24).
- Remove the 3 stand-offs (11) posts from the display support.
- Remove the 2 “CPU” card’s stand-offs (11).

14.4 "CCD" SENSOR

To replace the CCD (30), remove the CPU as indicated in the previous paragraph and on a bench, with a small screwdriver, carefully pry between the socket and the component itself to lift and remove it.
Carefully perform this operation without bending the pins. Pay close attention that the new CCD orientation is the same as before.

Incorrect installation of the "CCD" optical sensor can cause irreparable damage to the "CCD" component.

14.5 MEASUREMENT LED

The special "LED" used in the **UR-24 Digital Refractometer** creates the optical light beam for the measurement.

ATTENTION: The substitution of this part must be done only if suggested by a Maselli technician. The LED components supplied as replacement parts have been inspected and standardized. Nevertheless, if the LED is replaced, it is necessary to control and adjust the intensity of the LED, and repeat the "CCD LINEARIZATION" operation.

It is not necessary to remove the CPU card in order to replace the measurement LED (29). Disconnect the LED's connector on the CPU and unscrew the fixing nut (15).

14.5.1 TEMPERATURE SENSOR

The temperature sensor fitted on the **Digital Refractometer UR-24** deflector allows measurement of the line temperature and consequent compensation of concentration due to its variation.

REPLACEMENT:

1) Unscrew and disconnect the connector provided at the end of the cable from the relative connector fitted on Digital Refractometer UR-24.
2) Using a hex wrench unscrew the temperature sensor from the web fitted on the deflector flange.

While carrying out the operation, it is advisable to make sure the instrument is disconnected from the line and that there are no pressurized products. If corrosive, toxic or hot products are present in the line, take the necessary precautions in conformity with the existing regulations concerning work safety.

3) Replace the Probe and relative gaskets and carry out the operations listed at points 2 and 1 in reverse order.

Circulate product through the instrument and after checking for leaks from the hydraulic circuit, wait for the temperature measured to become stable. Using the "CHECK MENU" function, display the temperature measured and make sure it is equal to the actual line temperature with a tolerance of ±0.3°C. If this is not the case, after making sure the reference temperature is exact, access the "Temperature calibration" menu at programming level 3 and correct the value measured by means of function "Zero T Prod".

15. TROUBLE-SHOOTING GUIDE

15.1 TROUBLE-SHOOTING GUIDE

Production of the **UR-24 Digital Refractometer** follows years of research and experimentation in different branches of industry. Its design utilizes carefully selected components. The high level of quality maintained during the various stages of production and various stages of inspection and calibration insure optimum reliability and long operating life.

A statistical review of reports of unsatisfactory performance confirms that in most cases the problem was actually caused by external problems. For example:

- Is the optical prism clean?
- Is there good product circulation through the refractometer's mounting fitting, and therefore across the prism itself?
- Were the electrical and product piping connections made correctly, for the drawings?
- Have all configuration parameters been programmed properly?

If checking for the above common problems does not identify and resolve the problem, refer to the following trouble-shooting table which describes possible problems, their probable causes and how to resolve them.

Problem	Possible Cause	Solution
Refractometer not working, with the display blank.	☐ No electrical power. ✹ Wrong electrical connections.	☐ Check the voltage of the power supplied. ✹ Make the correct connections.
Displays messages **"HI TEMP"** or **"LOW TEMP"**	☐ Product's temperature is out of range. ✹ Temperature sensor is not working properly.	☐ Measure the product's temperature and, if necessary, exclude the temperature compensation. ✹ Check the resistance of the temperature sensor, and replace if necessary. ✹ Check the connections for the temperature sensor and correct if necessary.
Displays messages **"HI"** or **"LO"**	☐ Product's concentration is out of range. ✹ Not enough product in the mounting fitting. ◆ Prism is dirty. ❖ Prism is cloudy.	☐ Verify the concentration value. ✹ Verify the circulation of the product through the mounting fitting. ◆ Remove the fitting plug and clean the prism. ❖ Check the desiccant cartridge and replace if necessary. ❖ Remove the fitting plug and clean the prism. ❖ Read information regarding saturated "Desiccant Cartridge".
Displays message **"FAIL"**	☐ Memory data lost.	☐ Reprogram all functional parameters of the digital refractometer. ☐ Contact Maselli technical customer support.
The indication of concentration varies quickly.	☐ Large air bubbles in the product. ✹ Large disturbances in the production line. ◆ Product too thick.	☐ Improper mounting position of the refractometer. ☐ Defective Circulation pump. ✹ Check and correct process control. ◆ Increase the number of integrations of the measurement.
The indication of the concentration varies slowly.	☐ Variations in the process. ✹ Temperature compensation error. ◆ Temperature sensor is not sensitive enough. ❖ Number of integrations set too high. ♣ Wrong orientation of the fitting's plug.	☐ Verify and correct the process control parameters. ✹ Verify the temperature compensation and its BRIX or USER parameters. ◆ Check the temperature sensor, and replace if necessary. ❖ Decrease the number of integrations for the measurement. ♣ Align the reference marks on fitting and plug.
The measurement value drifts slowly in only one direction.	☐ Prism is dirty. ✹ Prism is cloudy.	☐ Remove the fitting plug and clean the prism. ✹ Check the desiccant cartridge and replace if necessary. ✹ Remove the fitting plug and clean the prism. ✹ Refer to "Desiccant Cartridge" chapter.

Correct value indicated, but wrong analog output.	☐ Parameters Start Range and End Range incorrectly set.	☐ Verify and correct
RS422/RS485 communication not working.	☐ Wrong wiring connections. ✹ Wrong communication parameters.	☐ Verify and correct. ✹ Verify and correct.
The desiccant cartridge saturated in less than one year. ***Note:*** To determine if the desiccant cartridge is saturated, check the color of the inspection window. Initially it is blue, when saturated it changes to pink or white.	☐ Degraded instrument seals.	☐ Verify and repair or replace. Contact Maselli if necessary.

15.1.1 CHECKING “OUTPUT SECTION”

☞ Access the “Level 1 Function” menu as described in the relative flow diagram attached.

☞ Select the “Level 2” menu and continuously press ENTER for approx. 7sec.

☞ Select the “Level 2” menu and continuously press ENTER for approx. 7sec.

Select the “Level 3” menu, set code “20” using the INCREASE (UP) and DECREASE (DOWN) buttons and press ENTER to confirm the value. In “Level 3 Functions” it is possible to access 14 menus: "CCD Calibration”, “Temperature Calibration”, “mA Calibration", “Moisture Calibration”, “System Test”, “CCD Alignment”, “Measurement Unit”, “Scale selection”; “User scale”; “Maselli setup”; “Measurement linearization”; “Configuration”; “Password”; “New Code”.

☞ Press ENTER on “System Test”.

☞ Access the “RELAY OUTPUT” function and check to see if pressing the UP or DOWN keys causes switching over from OFF to ON or vice versa of the relative relay and if its status on the display changes. Using Multimeter for a resistive measurement on the corresponding terminals of the Junction box, or on the connecting cable conductors, check the actual variation of the relay contact and its rest condition.

15.1.2 CHECKING “INPUT SECTION”

Access the “HOLD INPUT” function of the Level 3 menu, short-circuiting the Junction box or the relative conductors of the connecting cables between the common input and the input to be checked and check the variation of its status on the display. With the input open the status displayed is “OFF” while short-circuiting the function causes the status to change to “On”.

15.1.3 CHECKING “TEMPERATURE SECTION”

- ☞ Using the “CHECK MENU” function, display the temperature measured and check to ensure that it is equal to the actual line temperature value with a tolerance of ±0.3°C. If this is not the case, after ensuring that the reference temperature is exact, access the “Temperature Calibration” menu at programming Level 3 and correct the measurement by means of the “Zero A/D PT100”.
- ☞ To ensure the working of the probe without any product present in the line, use a hex wrench to unscrew the temperature probe from the web fitted on the deflector flange. *While carrying out the operation, it is advisable to make sure the instrument is isolated from the line and that there is no pressurized product in the line. If corrosive, toxic or hot product is present in the line, it is necessary to adopt the necessary protective measures in accordance with the regulations concerning work safety.*
- ☞ Access the “CHECK MENU” function and check to make sure the temperature measured by the Pt100 is that of the room, after waiting for stabilization of the measurement; warm it by touching it with the hand to check its working. The test consists in checking the optimum working of the circuit and not in calibrating the channel; consequently reading precision is not necessary.

15.1.4 CHECKING “mA OUTPUT SECTION”

- ☞ Connect a “Digital Multimeter set in the “mADc scale” to the relative terminals of the “Junction Box” or in the relative cable conductors.
- ☞ Using the SCROLL key within the “System Diagnostics” menu select the “mA Output” function, press the UP or DOWN key to change the value of the output current and confirm the required data by pressing ENTER.

Verify that the value measured corresponds to the value set on the display with a tolerance of ±0.05mA. Carry out the operation on at least three different values, included in the 0...20mA scale.

16. SPARE PARTS

16.1 SPARE PARTS

When ordering spare parts for the **Digital Refractometer UR-24** refer to Figure 16.1.a and order the part/s specifying the exact description, the quantity and reference number; also communicate the Serial number of the Instrument and the identification number of this manual. The parts marked with a "*" are present on a Digital Refractometer UR-24 fitted with all accessories (also optional) and therefore subject, as regards quantity and type, to the model of the Unit marketed. The parts classified with the same letter in column "Sm." can be supplied in kit form.

ATTENTION: to guarantee safety and perfect working of the instrument, in compliance with the laws regarding product responsibility, no responsibility shall be accepted for damage if caused due to undue repairs, by use of spare parts that are not original Maselli Misure spare parts or have not been authorized by Maselli Customer Assistance Service, and it the repairs have not been carried out by authorized Technical Assistance.
Maselli Misure guarantees perfect working of the instrument only if original accessories or spare parts are used.

NOTE: THIS MANUAL DOES NOT INCLUDE ALL THE INSTRUMENT SPARE PARTS COMPONENTS, BUT ONLY THE MAIN PARTS.
PLEASE CONTACT MASELLI MISURE TO REQUEST FOR REFERENCES OF COMPONENTS, WHICH HAVE NOT BEEN INCLUDED IN THE LIST IN THIS TEXT.

It is likewise possible to order one or more accessories of the **Digital Refractometer UR-24** (already included with the instrument in the supply), by specifying the exact description, quantity and reference as described below:

Ref.	*Qty.*	*Description*
A01	1	Deflector
A02	1	Flange for installation on tank
A03	1	Flange for installation on Angular Union
A04	1	"Vint" junction box (with transformer)
A05	1	"Vext" junction box (without transformer)
A06	1	Calibration bowl
A07	1	AISI 316 St. Steel 3" plug for closing refractometer hole on deflector
A08	1	316 AISI stainless steel ¼" plug for closing Pt100 hole on line
A09	1	Prism protective cap
A10	1	Hex wrenches set
A11	1	Operating manual (specify handbook number)
A12	1	3½" utilities diskette (5¼" on request) for PC
A13	1	Pre-moulded polystyrene packing

Ref.	*Sm.*	*Qty.*	*Description (figure 16.1.a)*
1	**D**	1	PRESSED EXT. STRUCTURE
2	**A**	1	PRESSED FRONT COVER
3	**L**	1	STRUCTURE INSULATING FLANGE
4*	**H**	1	316 AISI STD PRISM HOLDER T-C/21
5*	**H**	1	PRISM FIXING FLANGE
6		1	RING FOR MOLECULAR SIEVE CARTRIDGE
7	**E**	1	FILTERS CARD WIRES KIT
8	**L**	1	LENSES SPACER
9		1	EARTH TERMINAL
10		5	CPU CARD STUD SCREWS FIXING NUT
11		5	SPACER FOR DISPLAY FIXING PLATE
12	**L**	1	LENSES LOCKING RING
14	**A**	7	FRONT COVER SCREW
15	**C**	1	MEASUREMENT LEDs LOCKING RING
16		1	BOTTOM FLANGE
17*	**L**	1	LED HOLDER BUSH
18	**I**	1	INTERNAL PT100 SUPPORT (2004)
19*	**H**	1	SAPPHIRE OR GLASS PRISM
20*		1	PT100 TEFLON SEAL
21	**L**	1	LENS D=22 R=15.4 W/FRINGE DESIGN
22	**L**	1	LENS D=22 R=20 W/FRINGE DESIGN
23		1	CPU WIRED CARD
24	**B**	1	DISPLAY-CPU CABLE
25		1	UR22; UC05; UR24 INTERCONNECTION CABLE
26	**A**	1	POLYESTER DOME KEYPAD PANEL.
27	**A**	1	MM NAMEPLATE IN POLYESTER
28	**B**	4	NUT M2.5 H=2.5 UNI-5588-A2 STAINLESS STEEL
29	**C**	1	MEASUREMENT LEDs
30		1	CCD SENSOR
31*	**F**	1	Pt100 SENSOR PROT. 316 AISI CABLE L=650
32	**E/G**	1	IP68 BRADHAR 4-PIN CONNECTOR (M)
33	**H**	1	HYGROSCOPIC INSULATION FOR PRISM
34*		1	MOLECULAR SIEVE CARTRIDGE
37*	**H**	1	O-RING 3212 øCORD = 2.62 øINT = 53.65 VITON
38	**H**	1	O-RING 2062 ØCORD = 1.78 ØINT = 15.60 VITON
39		1	O-RING 2287 ØCORD = 1.78 ØINT = 72.75 VITON
40		1	O-RING 2350 ØCORD = 1.78 ØINT = 88.62 VITON
41		1	COVER SEAL
42	**A**	7	O-RING 2015 ØCORD = 1.78 ØINT = 53.65 VITON
43	**E**	1	FILTERS WIRED CARD
44	**B/A**	5	PLAIN WASHER M3 UNI-6592-A2 STAINLESS STEEL
45	**A**	3	HEX NUT M3 H=3 UNI-5587-A2 STAINLESS STEEL
46	**I**	3	O-RING 2007 ØCORD = 1.78 ØINT = 1.78 VITON
47*	**H**	4-6	SCREW M4x12 CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
48		1	PLAIN WASHER M4 UNI-6592-A2 STAINLESS STEEL
49*		4	SCREW M4x45 CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
50		5	GRUB SCREW M3x16 EI-PP UNI-5923-A2 STAINLESS STEEL
51	**D**	4	COVER FIXING FLANGE
52	**D**	7	COVER FIXING STUD
53		1-7	SCREW M3X6 CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
54		1	LED HOLDER LOCKING RING
55	**E**	1	16-PIN RESIN-CONNECTOR
56	**A**	1	DISPLAY INTERNAL PROTECTION
57	**H**	4	CIRCLIP M4 UNI-1751 -A2 STAINLESS STEEL
58	**E/G**	1	O-RING 115 VITON
59		1	IDENTIFICATION DATAPLATE
60		1	CONNECTOR CAP
61*	**I**	1	INTERNAL PT100 SENSOR

62	**E/G**	1	14-PIN CONNECTOR (F) MC-1.5/14-ST-3.81
63		1	EARTH CLAMP BASE
64*	**F/F1**	1	4-PIN CONNECTOR (F) IP68 0912041KF02000
66		1	O-RING 2125 ØCORD = 1.78 ØINT = 31.47 VITON
67*		10-7	CIRCLIP M4 UNI-1751-A2 STAINLESS STEEL
68	**C**	1	MEASUREMENT LED CABLE
69		1	CONNECTOR CAP
70		1	O-RING 2037 ØCORD = 1.78 ØINT = 9.25 NBR
71	**L**	1	SPRING WASHER Dxd= 21x16
72		1	O-RING 2450 ØCORD = 1.78 ØINT = 114.02 VITON
73		3	UNDER-COVER SEAL
74*		1	EARTH PIN
75*		1	EARTH BUSH
76		6	SCREW M4X6 CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
77		1	EARTH SYMBOL PLATE
78		1	SCREW M4x8 CHEESEHEAD UNI-6107-A2 STAINLESS STEEL
79		1	COVER BONDING CABLE
80		1	O-RING 2375 ØCORD = 1.78 ØINT = 94.97 VITON
81	**A**	2	SCREW M3x10 CHEESEHEAD HEX SOCKET UNI-6109-A2 ST. ST.
82*	**A/B**	1-11	CIRCLIP M3 UNI-1751-A2 STAINLESS STEEL
83	**B**	1	DISPLAY SUPPORT PLATE
84*	**H**	1	O-RING 2062 EPDM
85*	**H**	1	SAPPHIRE PRISM SANITARY SEAL
86	**B**	1	DISPLAY ^T EXTENDED MGLS12864THTL4M
87	**B**	4	SCREW M2.5x12 PAN-HEAD C-SUNK UNI-6109-A2 ST. STEEL
88	**B**	4	DISPLAY FIXING SPACER
90*	**H**	1	SILICONE O-RING 2062 (OPAQUE)
91*	**H**	1	TESTED PRISM ANG 57^ 30' D16 BALF
92*	**H**	1	TESTED PRISM ANG 57^ 30' D16 CROWN
93*	**H**	1	O-RING 3212 EPDM
94*	**H**	1	SILICONE O-RING 3212
95	**H**	1	PLUG FOR PACKING AND CALIBRATION
98	**M**	1	INTERCONNECTION CONNECTOR KIT (A0206213+219+220+221)
100	**M**	5m	BELDEN CABLE 8308 8x2x22 AWG
101*	**F**	1	SEALING WASHER PTFE FOR PT100
102*	**F**	1	PT100 SENSOR TRC-B 1/8" GAS + CONNECTOR
105	**B**	18/40	STRIP (M) 40PIN 1F/Au-90^ APS2.54-SRA740T
106	**B**	1	INSULATING DISC FOR CONDENSER
107	**E/G**	1	3-PIN CONNECTOR (F) MC-1.5/3-ST-3.81
108		1	DATAPLATE (OPTICAL UNIT)
109		0/1	MOLECULAR SIEVE CARTRIDGE
110		0/1	COVER FOR MOLECULAR SIEVE CARTRIDGE
111	**H**	1	OMR 0600-30 VITON (FDA) 930-171
112	**H**	1	VARIVENT PRISM HOLDER PRESSED FLANGE
113		0/1	OR3093 VITON
114		0/1	RING FOR MOLECULAR SIEVE CARTRIDGE

Sanitary version “3A” (figure 16.1.a – difference with respect to standard instrument)

Ref.	*Sm.*	*Qty.*	*Description (figure 16.1.a)*
4*	**H**	1	Sanitary version prism holder
13*	**G**	1	Seal for T-C ¾” EPDM
103*	**G**	1	pt100 sensor class “B” ¾” T-C
104*		1	Identification dataplate-sanitary version
35*	**G**	1	Clamp ¾” 13MHHS
36*		2	Eyebolts for plug removal
65*		2	Washer D=10x6.2 Thkns=1 neutral nylon
89*		1	Plug for deflector 2”/3”-sanitary version
96*		1	2" clamp
97*		1	Seal for T-C 2” buna/N white
109*	**N**	1	Blind connection T-C 1”-1”1/2-2”-2”1/2-3” - sanitary version
110*	**N**	1	Fitting for 1pt100 ¾” T-C - sanitary version
111*	**N**	1	Thru connection T-C 1”-1”1/2-2”-2”1/2-3” - sanitary version
112*	**N**	1	2" flange
113*		1	Sanitary version prism-holder seal
114*		1	Spacer for sanitary deflector T-C 3”
115*		1	3" clamp

”Application Varivent” (figure 16.a – difference with respect to standard instrument)

Ref.	*Sm.*	*Qty.*	*Description (figure 16.1.a)*
119*	**L**	1	Structure Insulating Flange
110*	**H**	1	Prism holder for Flange
111*	**H**	1	ORM 0600-30 VITON Alim. (FDA) 930-171
112*	**H**	1	Prism holder Pressed Flange

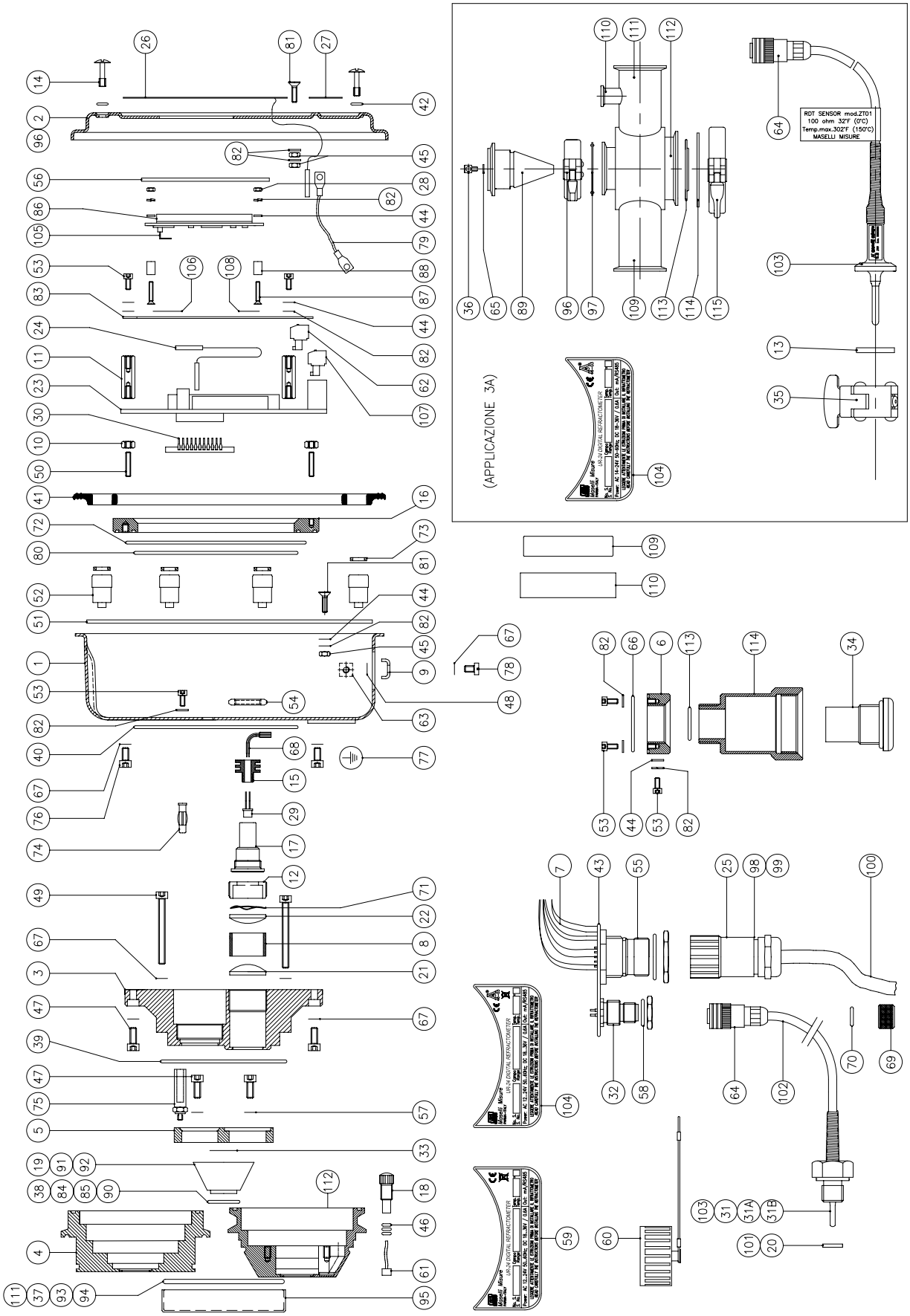


Figure 16.1.a – Exploded view of UR-24 Digital Refractometer

"LP" Version (figure 16.1.b)

Ref.	*Sm.*	*Qty.*	*Description (figure 16.1.b)*
1	**L**	1	PRESSED EXT. STRUCTURE
2	**A**	1	PRESSED FRONT COVER
3		1	STRUCTURE INSULATING FLANGE
4*	**H**	1	PRISM HOLDER
	H	1	SANITARY VERSION "3A" PRISM HOLDER
5	**H**	1	PRISM FIXING FLANGE
6		1	RING FOR MOLECULAR SIEVE CARTRIDGE
7	**E**	1	FILTERS CARD WIRES KIT
8		1	LENS=22 R=39.9 W/FRINGE DESIGN
9		1	EARTH TERMINAL
10		5	CPU CARD STUD SCREWS FIXING NUT
11		5	SPACER FOR DISPLAY FIXING PLATE
12		1	LENSES LOCKING RING
13		1	LENS HOLDER FOR "ON" LENS
14	**A**	7	FRONT COVER SCREW
15	**C**	1	MEASUREMENT LEDs LOCKING RING
16		1	BOTTOM FLANGE
17		1	LED HOLDER BUSH
18*	**H**	1	TESTED PRISM ANG 63° 15' D16 SAPPHIRE
	H		TESTED PRISM ANG 63° 15' D16 CROWN
	H		TESTED PRISM ANG 63° 15' D16 BALF
19*		1	PT100 TEFLON SEAL
20		1	LENS D=22 R=15.4 W/FRINGE DESIGN
21		1	LENS D=22 R=20 W/FRINGE DESIGN
22		1	CPU WIRED CARD
23	**B**	1	DISPLAY-CPU CABLE
24	**L**	1	EARTH CLAMP BASE
25	**A**	1	POLYESTER DOME KEYPAD PANEL
26	**A**	1	MM NAMEPLATE IN POLYESTER
27	**B**	4	NUT M2.5 H=2.5 UNI-5588-A2 STAINLESS STEEL
28	**C**	1	MEASUREMENT LEDs
29		1	CCD SENSOR CELL TCD 1201D
30*	**F**	1	Pt100 SENSOR PROT. 316 AISI CABLE L=650
	F	1	Pt100 SENSOR TRI-CLAMP ¾ +CABLE
31	**E**	1	IP68 BRADHAR 4-PIN CONNECTOR (M)
32	**H**	1	HYGROSCOPIC INSULATION FOR PRISM
33		1	MOLECULAR SIEVE CARTRIDGE
34		1	LOCKING LENS "ON" TUBE
35		1/0	PCX RING FOR LENS "ON" LENS HOLDER
36*		1	O-RING 3212 ØCORD = 2.62 ØINT = 53.65 VITON
		1	O-RING 3212 EPDM
			O-RING 3212 SILICONE
37*	**H**	1	O-RING 2062 ØCORD = 1.78 ØINT = 15.60 VITON
	H	1	O-RING 2062 ØCORD = 1.78 ØINT = 15.60 EPDM
	H	1	O-RING 2062 ØCORD = 1.78 ØINT = 72.75 SILICONE (OPAQUE)
	H	1	SAPPHIRE PRISM SANITARY SEAL
38		2	O-RING 2375ØCORD = 1.78 ØINT = 94.97N
39		1	O-RING 2350 ØCORD = 1.78 ØINT = 88.62 VITON
40		1	COVER SEAL
41	**A**	7	O-RING 2015 ØCORD = 1.78 ØINT = 53.65 VITON
42	**E**	1	FILTERS WIRED CARD
43	**B/A**	4	PLAIN WASHER M3 UNI-6592-A2 STAINLESS STEEL
		6	PLAIN WASHER M3 UNI-6592-A2 STAINLESS STEEL
44	**A**	2	HEX NUT M3 H=3 UNI-5587-A2 STAINLESS STEEL
		1	HEX NUT M3 H=3 UNI-5587-A2 STAINLESS STEEL
45	**H**	4	SCREW M4x12 CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
46		1	PLAIN WASHER M4 UNI-6592-A2 STAINLESS STEEL

47		4	SCREW M4x35CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
48		5	GRUB SCREW M3x16 EI-PP UNI-5923-A2 STAINLESS STEEL
49	**L**	1	COVER FIXING FLANGE
50	**L**	7	COVER FIXING STUD
51		8	SCREW M3x6CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
52		1	LED HOLDER LOCKING RING
53	**E**	1	16-PIN RESIN-CONNECTOR
54	**A**	1	DISPLAY INTERNAL PROTECTION
55		1	O-RING 2250 ØCORD = 1.78 ØINT = 63.22 VITON
56*	**E**	1	O-RING 115 VITON
57*		1	IDENTIFICATION DATAPLATE
		1	VERSION “3A” IDENTIFICATION DATAPLATE
58		1	CONNECTOR CAP
59	**E**	1	14-PIN CONNECTOR (F) MC-1.5/3-ST-3.81
60	**E**	1	3-PIN CONNECTOR (F) MC-1.5/3-ST-3.81
61*	**F**	1	4-PIN CONNECTOR (F) IP68 0912041KF02000
62	**0/1**	1	LENS PCX D=25 R49.72 W/FRINGE DESIGN
63		1	O-RING 2125 ØCORD = 1.78 ØINT = 31,47
64	**H**	4	CIRCLIP M4 UNI-1751 A2 STAINLESS STEL
		17	CIRCLIP M4 UNI-1751 A2 STAINLESS STEL
65	**C**	1	MEASUREMENT LED CABLE
66*		1	CONNECTOR CAP
67*		1	O-RING 2037 ØCORD = 1.78 ØINT 31.47 NBR
68		1	ELASTIC WASHERØ=21X16 541621440
69		1	OR 2450 ØCORD =1,78 ØINT =114.02
70		7	UNDER-COVER SEAL
71*		1	EXTENSION WITH CONNECTION T-C A 21mm
		1	EXTENSION WITH CONNECTION T-C A 70mm
72		6	SCREW M4X22 CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
73		6	SCREW M4X6 CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
74		1	EARTH SYMBOL PLATE
75		1	SCREW M4X8 CHEESEHEAD HEX SOCKET UNI-5931-A2 ST. ST.
76		1	COVER BONDING CABLE
77		1	PLUG FOR PACKING AND CALIBRATION
78	**A**	1	SCREW M3x10 CHEESEHEAD UNI-6109-A2 STAINLESS STEEL
		1	SCREW M3x10 CHEESEHEAD UNI-6109-A2 STAINLESS STEEL
79	**A**	2	CIRCLIP M3 UNI-1751-A2 STAINLESS STEEL
		10	CIRCLIP M3 UNI-1751-A2 STAINLESS STEEL
	B	4	CIRCLIP M3 UNI-1751-A2 STAINLESS STEEL
80	**B**	1	DISPLAY SUPPORT PLATE
81	**B**	20/40	STRIP (M) 40PIN 1F/Au-90^ APS2.54-SRA740T
82	**B**	1	INSULATING DISC FOR CONDENSER
		1	INSULATING DISC FOR CONDENSER
83	**B**	1	DISPLAY ^T EXTENDED MGLS12864THTL4M
84	**B**	4	SCREW M2.5x16 CHEESEHEAD UNI-6109-A2 STAINLESS STEEL
85	**B**	4	DISPLAY FIXING SPACER
86		1	DATAPLATE (OPTICAL UNIT)
88		1	INTERCONNECTION CONNECTOR KIT (A0206213+219+220+221)
89		5M	BELDEN CABLE 8308 8x2x22 AWG
90			UR22; UC05; UR24 INTERCONNECTION CABLE
91*	**G**	1	INTERNAL PT100 SUPPORT
92*	**G**	3	OR 2007 ØCORD =1,78 ØINT =1.78 VITON
93*	**G**	1	INTERNAL PT100 SUPPORT (2004)
94*	**G**	1	CABLE GUIDE TUBE FOR INTERNAL PT100
95		0/1	OR 3093 VITON
96		0/1	RING FOR MOLECULAR SIEVE CARTRIDGE
97		0/1	MOLECULAR SIEVE CARTRIDGE
9*		0/1	ADAPTER FOR LED HOLDER
99		0/1	COVER FOR SUPPORT MOLECULAR SIEVE CARTRIDGE

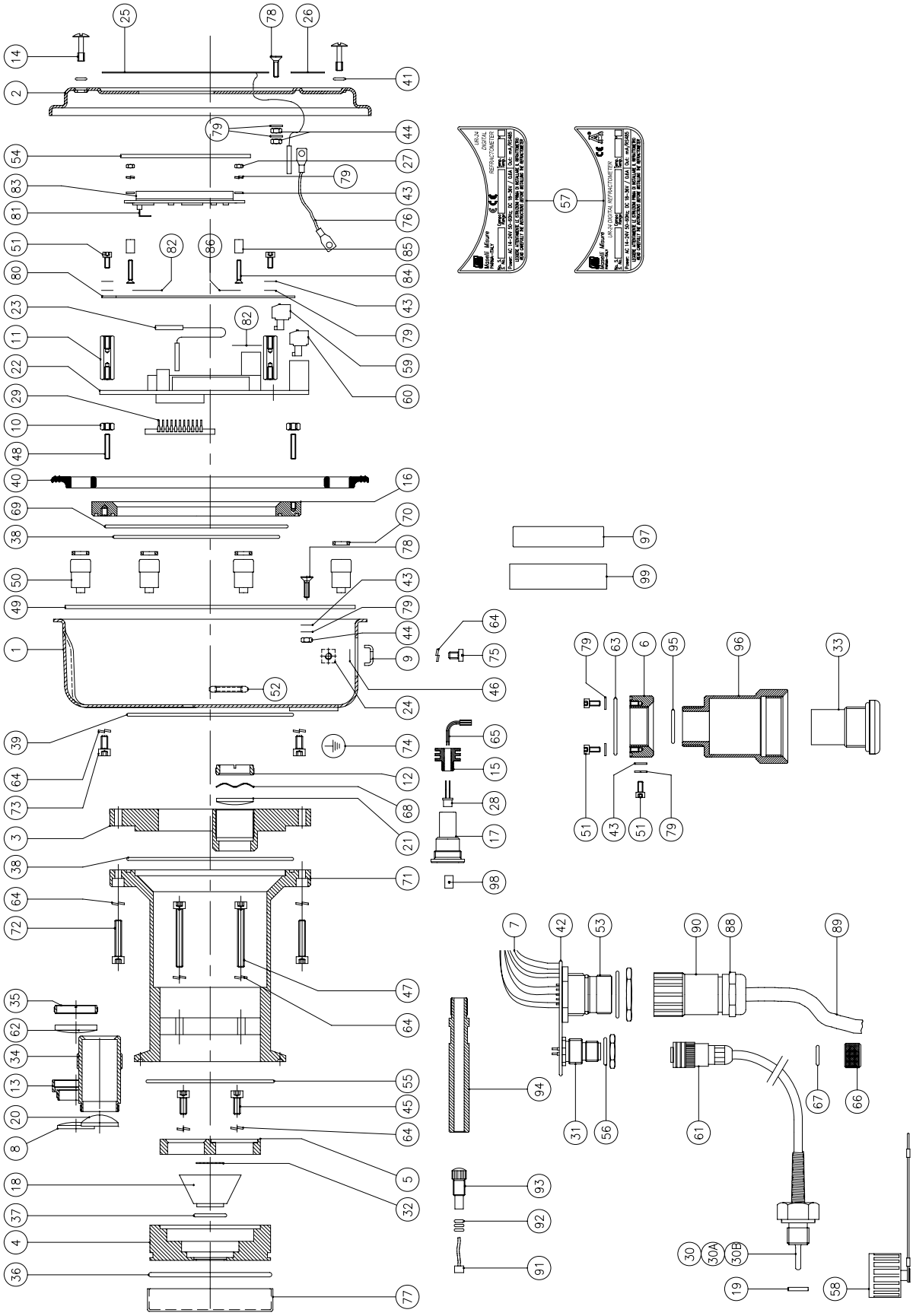


Figure 16.1.b – Exploded view of UR-24 LP Digital Refractometer

17. GENERAL INFORMATION

17.1 GENERAL INFORMATION

The **UR-24 Digital Refractometer** can be stored without problems.
For best results follow these suggested procedures:

- If possible, store the instrument and all accessories in the original polystyrene packaging.
- If the refractometer has been used, remove it from the fitting and clean both parts completely.
- Install the protective cover end cap for the prism, removing it only when ready to install the instrument.
- Protect the refractometer from humidity (the value should not exceed 95% relative humidity).
- Ambient storage temperature for the refractometer in its container should be between -10°C and +45°C *(+14°F and +113°F).*

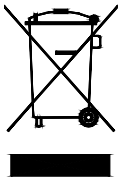
17.2 CORRELATION °C/°F/OHMS (PT100)

To check the proper performance of the Pt100 temperature sensor, use the following table which lists the resistance value of the sensor at various temperatures, expressed in both °C and °F.

°C	°F	Ohm	°C	°F	Ohm
-10	14	96.07	60	140	123.24
-5	23	98.04	65	149	125.16
0	32	100.00	70	158	127.07
5	41	101.95	75	167	128.98
10	50	103.90	80	176	130.89
15	59	105.85	85	185	132.80
20	68	107.79	90	194	134.70
25	77	109.73	95	203	136.60
30	86	111.67	100	212	138.50
35	95	113.61	105	221	140.39
40	104	115.54	110	230	142.28
45	113	117.47	115	239	144.17
50	122	119.40	120	248	146.06
55	131	121.32	125	257	147.95

17.3 SCRAPPING AND DISPOSAL

We'd like to remind that in case the equipment is no longer used, it is important to make it inoperative by removing the power supply cable.
If wanting to scrap it, being the equipment a special waste, it will be necessary to disassemble it, putting together all the homogeneous parts for the disposal according to the laws in force.



INFORMATION FOR USERS IN EUROPEAN COMMUNITY COUNTRIES

In accordance with art. 13 of the Government Decree no. 152 of 25th July 2005, "Implementation of Directives 2002/95/CE, 2002/96/CE and 2003/108/CE, relating to the reduction of hazardous substances in electrical and electronic equipment, as well as waste disposal" or equivalent Decrees implemented in European countries.

The crossed-out refuse container pictogram found on the equipment indicates that at the end of the product's life-cycle it must be disposed of separately from other refuse.
The User must therefore consign the discarded equipment to a differential refuse collection centre for electronic and electrotechnical waste, otherwise the User may return the discarded equipment to the retailer on purchasing new equipment of a similar type, on a one-to-one ratio basis.
Suitable differential refuse collection of the equipment, in view of successive recycling and environmentally friendly disposal, contributes to avoiding possible negative effects on man or the environment and favours the recycling of the materials from which the equipment is made.
Illegal disposal of the product will lead to the application of administrative sanctions-Government Decree no. 22/1997 (article 50 onwards of Government Decree. n. 22/1997) or success or equivalent legislation.
Do not use these dismantled parts as spares.
As the instrument is considered as special waste, for scrapping, it must be dismantled and the similar parts must be separated for disposal in accordance with existing legislation.
Scrap deriving from demolition of the instrument must be disposed off in accordance with safeguarding the environment, without polluting the ground, air and water.
During demolition, separate the parts according to the materials used for construction.
General indications for proper disposal of machinery are given below.

Metals (Steel, Copper, Aluminum etc.) *To be sent to special authorized centers.*	**Recycle**
Plastics (PVC, Nylon, resins, etc.) *To be sent to special authorized centers.*	**Recycle**
Lubricants (Oil, Grease, Solvents, etc.)	**Disposal**
Other	**Disposal**

Urban wastes can be disposed off at dumps.

17.4 SAFETY REGULATIONS

Unqualified personnel must not be allowed to carry out maintenance operations on the instrument; make sure the personnel involved are familiar with all the instructions to be followed and the precautions to be adopted for maintenance of the instrument concerned, and have read and understood the contents of the Manual.
Only specialist personnel must be allowed to carry out electrical maintenance.
While carrying out maintenance operations, use safety clothing, including gloves, safety footwear or other equipment necessary for personal protection to prevent injury.

18. DATA ACQUISITION

18.1 DATA ACQUISITION

The UR-24 Digital Refractometer can be interfaced with a data acquisition system (usually an IBM PC or compatible computer) trough the RS422/485 serial port.
The communication with the **UR-24** must occur by means of the “LABTECH”, “PROFIBUS” "OPTOMUX" or “MASELLI” protocols which are implemented in the software and are selectable by means of the equipment’s keyboard.
In this chapter only the “OPTOMUX” and “LABTECH” protocols will be described since they are the most common and therefore are a standard for industrial controls.
For what concerns the “MASELLI” protocol, technical specifications may be required directly to Maselli Misure S.p.A.
The communication with the **UR-24** is made using a subset of the “OPTOMUX” protocol, a reliable standard for data acquisition and control of analog and/or digital systems in industrial applications. The base address (Ad.), which must be unique for each instrument on the network, can be set to any value within the range from 0 to 1FH (hexadecimal values corresponding to decimal values 0-31). The address is selected in the **“Serial port”** configuration sub-menu found on Level 2 of programming (**9.4.2**). 7 pages of values have been reserved for each instrument, 5 analog and 2 digital. This type of data paging allows up to 32 separate instruments to be connected together and interrogated over a single RS422 or RS485 serial port of the Personal Computer. Logically, the address assigned to each different **UR-24** refractometer must be unique to allow unambiguous communication with each connected instrument and the value set for the Baud Rate must be the same for each connected instrument.

18.2 SERIAL CONNECTION

The serial electrical connection among different digital refractometers must be made as show in figures 18.2.a or 18.2.b it can be configured for RS422 (4 wires) or RS485 (2 wires).
IMPORTANT: in case more 8 units are connected, it is necessary to remove, by means of a jumper inside the **UR-24**, the termination resistor insert by default on the RS and RB wires. Please contact the technical service Maselli Misure before carrying out the operation.

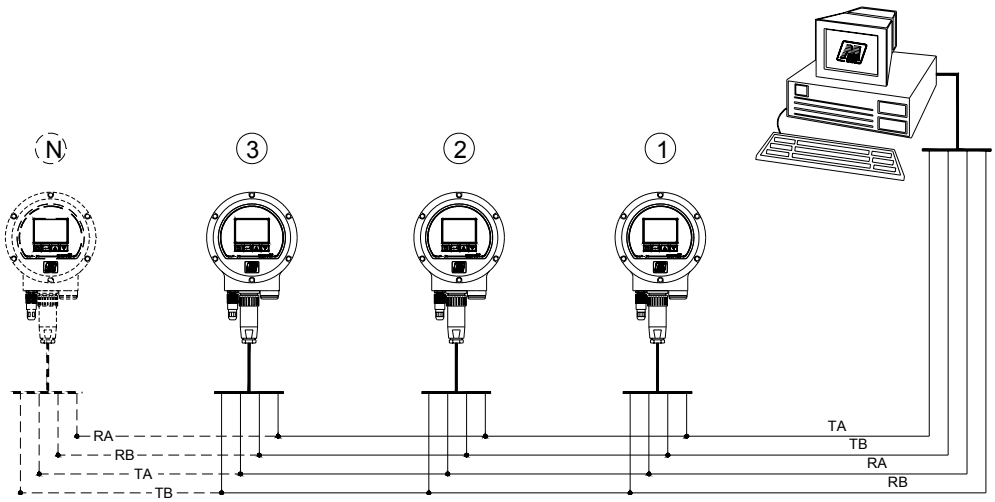


Fig. 18.2.a –Connection sketch of n. UR-24 in Standard RS422

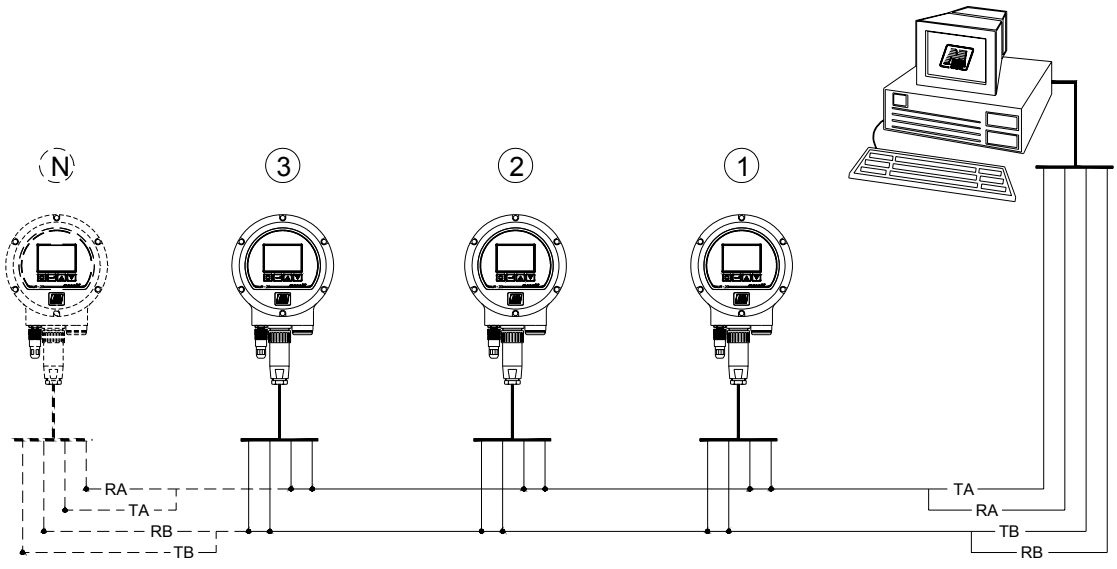


Fig. 18.2.b –Connection sketch of n. UR-24 in Standard RS485

18.3 "OPTOMUX" PROTOCOL

18.3.1 ADDRESS/PAGE

The assignment of the **UR-24** digital refractometers' base addresses is indicated in hexadecimal mode in the following table, such as the addresses of the pages which concern the various units.

Indir.	Pag.1 ANA	Pag.2 ANA	Pag.3 ANA	Pag.4 ANA	Pag.5 ANA	Pag.6 DIG	Pag.7 ANA
00	80	A0	C0	E0	20	40	60
01	81	A1	C1	E1	21	41	61
02	82	A2	C2	E2	22	42	62
03	83	A3	C3	E3	23	43	63
04	84	A4	C4	E4	24	44	64
05	85	A5	C5	E5	25	45	65
06	86	A6	C6	E6	26	46	66
07	87	A7	C7	E7	27	47	67
08	88	A8	C8	E8	28	48	68
09	89	A9	C9	E9	29	49	69
0A	8A	AA	CA	EA	2A	4A	6A
0B	8B	AB	CB	EB	2B	4B	6B
0C	8C	AC	CC	EC	2C	4C	6C
0D	8D	AD	CD	ED	2D	4D	6D
0E	8E	AE	CE	EE	2E	4E	6E
0F	8F	AF	CF	EF	2F	4F	6F
10	90	B0	D0	F0	30	50	70
11	91	B1	D1	F1	31	51	71
12	92	B2	D2	F2	32	52	72
13	93	B3	D3	F3	33	53	73
14	94	B4	D4	F4	34	54	74
15	95	B5	D5	F5	35	55	75
16	96	B6	D6	F6	36	56	76
17	97	B7	D7	F7	37	57	77
18	98	B8	D8	F8	38	58	78
19	99	B9	D9	F9	39	59	79
1A	9A	BA	DA	FA	3A	5A	7A
1B	9B	BB	DB	FB	3B	5B	7B
1C	9C	BC	DC	FC	3C	5C	7C
1D	9D	BD	DD	FD	3D	5D	7D
1E	9E	BE	DE	FE	3E	5E	7E
1F	9F	BF	DF	FF	3F	5F	7F

This type of data paging allows to have up to 32 units connected together and interrogated by a single Personal Computer by means of a single serial line in RS422/485 standard; logically the addresses assigned to the various digital refractometers **UR-24**, must be different among each other to allow a univocal communication with each unit.

18.3.2 VARIABLES ADDRESSING

The **UR-24** unit is able to decode a set of Optomux command that allow to read inside the unit a single or a set of variables. The variables that can be required can be either analog and digital, and are indicated in the tables below:

PAGE 01 -- ANALOG

Measure	Pos.	Start range	End range
Start range	15	+0000	+9999
End range	14	+0000	+9999
Not comp. value	13	Start range	End range
Comp. value	12	Start range	End range
Target	11	+0000	+9999
Not assigned	10	+0000	+1
Not assigned	9	+0000	+1
Alarm low	8	+0000	+9999
Alarm high	7	+0000	+9999
Not assigned	6	+0000	+1
Not assigned	5	+0000	+1
Zero Calibration	4	-30.00	+30.00
Zero Pixel	3	-0.500	+0.000
Span Coefficient	2	+0.50	+2.00
ND value	1	+1.310	+1.540
Pixel value	0	+0.0	+2048.0

PAGE 02 -- ANALOG

Various	Pos.	Start range	End range
°C. Temperature	15	-5.0	+105.0
°C. Work Temp.	14	-5.0	+105.0
Temp. coeff.	13	+0.000	+2.000
Temp. compens.	12	-30.0	+30.0
Code level 3	11	+0	+9999
Integration N.	10	+1	+100
Hold time	9	+0	+900
Decimal. point	8	+0	+6
OUT mA type	7	+0	+4
Not assigned	6	+0	+1
Not assigned	5	+0	+1
Alarm type	4	+0	+5
Wash time	3	+0	+300
Pause time	2	+0	+3000
Output mA	1	+00.00	+25.00
Serial Funct	0	+0	+3

PAGE 03 -- ANALOG

Personaliz. Range	Pos.	Start range	End range
X1 User	15	+1.300	+1.540
X2 User	14	+1.300	+1.540
X3 User	13	+1.300	+1.540
X4 User	12	+1.300	+1.540
X5 User	11	+1.300	+1.540
X6 User	10	+1.300	+1.540
X7 User	9	+1.300	+1.540
Y1 User	8	+0.000	+9999
Y2 User	7	+0.000	+9999
Y3 User	6	+0.000	+9999
Y4 User	5	+0.000	+9999
Y5 User	4	+0.000	+9999
Y6 User	3	+0.000	+9999
Y7 User	2	+0.000	+9999
(future use)	1	+0	+1
(future use)	0	+0	+1.540

PAGE 04 -- ANALOG

Personaliz. Range	Pos.	Start range	End range
T1 User	15	-5	+105
T2 User	14	-5	+105
T3 User	13	-5	+105
C1 User	12	+0.000	+9999
C2 User	11	+0.000	+9999
C3 User	10	+0.000	+9999
E1 User	9	-9999	+9999
E2 User	8	-9999	+9999
E3 User	7	-9999	+9999
E4 User	6	-9999	+9999
E5 User	5	-9999	+9999
E6 User	4	-9999	+9999
E7 User	3	-9999	+9999
E8 User	2	-9999	+9999
E9 User	1	-9999	+9999
(future use)	0	+0	+1

PAGE 05 -- ANALOG

Various	Pos.	Start range	End range
Not assigned	15	+0	+1
Not assigned	14	+0	+1
Fixed value	13	+0	+999
Not assigned	12	+0	+1
Not assigned	11	+0	+1
Not assigned	10	+000.0	+1
Light performance	9	+0	+200
Not assigned	8	+0	+1
Not assigned	7	+0	+1
Input Type	6	+0	+3
Not assigned	5	+0	+1
Not assigned	4	+0	+1
Not assigned	3	+0	+1
Not assigned	2	+0	+1
Not assigned	1	+0	+1
Not assigned	0	+0	+1

PAGE 06 -- ANALOG

Various	Pos.	"1"	"0"
Range type	15	USER	Bx
Not assigned	14	-	-
Temp. unit	13	°F	°C
Temp. compens.	12	On	Off
Accuracy	11	Hi	Low
Relay 1	10	On	Off
Not assigned	9	-	-
Not assigned	8	-	-
Not assigned	7	-	-
Not assigned	6	-	-
Not assigned	5	-	-
Hold status	4	On	Off
Washing	3	On	Off
Alarm led	2	On	Off
Fixed value	1	Yes	No
LED Control	0	Yes	No

PAGE 07 -- DIGITAL

Not assigned	Pos.	"1"	"0"

**********for future use**********

18.3.3 ANALOG VALUE REQUESTS

The **L** or **K** are used to read one or more values from an analog page.
If the PC requires one or more analog values from the **UR-24**, it is necessary to transmit to the **UR-24** the command string:

>ppLbbbbkk<cr>

where:

> Start request character (ASCII 62).

pp Number of the mapped page of values of interest (to be found in the "Address/page" table in previous section **18.3**).

L Request character for analog value(s) (ASCII 76).

bbbb Special hexadecimal number which represents the positions of the values requested in the selected page.

kk Checksum value of the string which start with the first character of **pp** and ends with the last character of **bbbb** (to be computed following the example given in the "Checksum calculation table " below).

<cr> "Carriage return" character (ASCII 13).

The example characters string below is a request for the analog value in position 15 (T1 User) of the fourth page of values of the **UR-24** with address 01 (mapped page address 0 E1H):

>E1L80008A<cr>

where:

> Start request character.

E1 Number of the corresponding values page (see "Address/page" table in section **18.3** where it is possible to see that the analog page 4 of the **UR-24** unit, identified by the address 01, is mapped at the addressed E1H).

L Analog value request character.

8000 Hexadecimal number which represents the position of the requested value in the selected page (position 15 corresponds to bit 15 of the binary number 1000000000000000, and therefore to the equivalent hexadecimal number indicates the request of the corresponding variable in the pertaining page. The variable's position requested in the example is position 15; putting to one bit 15, a value of 1000 0000 0000 0000 is obtained. This value transformed into hexadecimal gives 8000H).

8A String's checksum calculated starting from the string's second character (> character excluded) and ending with the last character before the checksum itself (E1L8000). The checksum value is obtained by summing the ASCII values of the several characters module 256 (value of the division's remainder by 256 of the obtained sum). For the checksum's calculation, see the following example.

<cr> "Carriage return" character (ASCII13).

Checksum calculation table
E1L8000
Character E = ASCII 69 Character 1 = ASCII 49 Character L = ASCII 76 Character 8 = ASCII 56 Character 0 = ASCII 48 Character 0 = ASCII 48 Character 0 = ASCII 48
ASCII characters sum: 69+49+76+56+48+48+48=394
394 MODULE 256 = 138 = 8A EXADECIMAL

Note: if, in the string to be sent to the **UR-24** the characters **??** are sent instead of the checksum values, the checksum is not checked by the **UR-24**.
Although this option has been included, it is always advisable to use the checksum as it guarantees greater control of the data transmitted and received by the **UR-24**.

The **UR-24** digital refractometer's answer will have the following format:

Axxxxyyyywwww .... nnnnkk<cr>

where:

A Start answer character.

xxxx First required value (in case more values are required, the values' order is the one indicated in the page, starting from the top of the table).

yyyy Second value if required.

wwww Third value if required

nnnn Umpteenth value in the page if required (max. 16 values each page).

kk String's checksum calculated starting from the string's second character (excluding character A) and ending with the last character before the checksum itself

<cr> "Carriage return" character (ASCII 13).

In the specific case of the previous example, in which the request for the analog value in position 15 of the fourth page of values of the **UR-24** with address 01 is effected, the answer string might be the following one:

A1000C1<cr>

where:

A Start answer character (ASCII 65).

1000 Hexadecimal data value answer to the request.

C1 Checksum of the string starting from the first character after letter A (character 1) and ending with the last character of the last transmitted value (the last 0).

<cr> "Carriage return" character (ASCII 13).

On the received string it is necessary to convert the values according to their start and full range as indicated in the previous tables, by using the formula:

$$converted_value = \frac{(value - 4096) * (EndRange - StartRange)}{4095} + StartRange$$

where:

value Received value converted into decimal.

End range Variable's end range value.

Start range Variable's end range value.

In the specific case of the previously mentioned example, replacing the proper values in the formula, it is obtained that:

$$value = \frac{(4096 - 4096) * (+105. - (-5.0))}{4095} - 5.0 = -5.0°C.$$

Note: considering that OPTOMUX divides the span of analog values into 4096 points and that the values inserted in the data string can vary from 1000 to 1FFF hexadecimal, these two parameters have been programmed in a variable way in order to optimize the resolution.

It is important to note that, in case the **"compensated value"** and **"uncompensated value"** parameters (analog page 01, item 12-13, section **18.2** are required, since they have a dynamic and not a fixed start and end range, which means, values that the user can set in the **"Setup 2"** menu at the previously described programming level 2 **(9.4.3)**, for the correct interpretation of the answering string it is necessary to know the start and end range values or, on the contrary, send a request to the refractometer for these too.

In fact, in the following example, to have the Brix compensated value (bit12=1) from the digital refractometer **UR-24**, the string must also include the request for the start (bit15=1) and end range (bit14=1) values:

>80LD00088<cr>

where:

> Start range character.

80 Number of the page which includes the required values (see the previously shown "Address/Page" where it is possible to see that analog page 1 is mapped at 80).

L Analog value request character.

D000 Hexadecimal number which represents the position of the required values in the selected page.

88 String's checksum.

<cr> "Carriage return" character (ASCII 13).

In this example's specific case where the values at item 15,14,12 of analog page 1 are required, the answering string is the following:

>A1333199916C888<cr>

where:

A Start answer character.

1333 Start range value.

1999 End range value.

16C8 Compensated Brix value.

88 String's checksum.

<cr> "Carriage return" character (ASCII 13).

After the string is decoded, it is necessary to calculate the real value of the received variables, of the start range before, of the end range after, and of the compensated Brix value then, using the generic formula:

$$value = \frac{(datum - 4096) * (span - zero)}{4095} + zero$$

where:

datum Received value converted into decimal.

span Variable's end range value.

zero Variable's star range value.

The start range value is calculated using the 1333 hexadecimal value received from the **UR-24**, that converted into decimal gives 4915:

$$StartRange = \frac{(4915 - 4096) * (99.99 - 00.00)}{4095} + 00.00 = 20.00Bx$$

Let's now calculate the end range value using the hexadecimal value 1999 received from the **UR-24**, that converted into decimals gives 6553:

$$EndRange = \frac{(6553 - 4096) * (99.99 - 00.00)}{4095} + 00.00 = 60.00Bx$$

Now using the previously obtained start and end range values, the compensated Brix value is calculated starting from the value obtained from the **UR-24**, 16C8 hexadecimal that corresponds to 5832:

The following example shows the request of three analog values of a **UR-24** having a 01H address and pertaining to the measured temperature, to the working temperature when the unit is working with excluded temperature probe compensation and to the temperature corrective coefficient:

$$CompensatedBx = \frac{(5832 - 4096) * (60.00 - 20.00)}{4095} + 20.00 = 36.95Bx$$

>A1LE00093<cr>

where:

> Start request character.

A1 The address of the values' page where the required values are located (page 2 of the unit having address 01).

L Analog value request character.

E000 Hexadecimal number which represents the position of the requested values in the selected page: by setting to 1 bits 15,14, 13, and to zero all the others, 1110 0000 0000 0000 is obtained that translated into hexadecimal gives value E000.

93 Checksum of the string (for the calculation see the previous example).

<cr> "Carriage return" character (ASCII 13).

In the specific case of this example, in which the request for the analog values in the position 15, 14 and 13 of the first page of values of the **UR-24** is effected, the answer string will be the following:

A13F81333180075<cr>

where:

A Start answer character.

13F8 Value of the measured temperature.

1333 Value of the temperature in excluded.

1800 Value of the temperature's corrective coefficient.

75 Checksum of the string starting from the first character after letter A (character 1) and ending with the last character of the last transmitted value.

<cr> "Carriage return" character (ASCII 13).

From which, by applying the previously described formula, like the following real values:

Temperature = 22.29 °C
Temperature in excluded mode = 17.03 °C
Correction coefficient= 1.000

18.3.4 DIGITAL PAGE VALUE REQUESTS

The command's format for the request of a page of digital values from a PC to the **UR-24** digital refractometer is the following:

>ppMkk<cr>

where:

> Start request character (ASCII62).

pp Number of the values page to which one needs to refer (to be found in the "Address/Page" table in previous section **18.3**).

M Request character for a page of digital values (ASCII 77).

kk Checksum value of the string ppM.

<cr> "Carriage return" character (ASCII 13).

The digital values' request is made for all those values inserted in the page of digital values since it's impossible to require them singularly.

The following practical example requests the digital values of "Page 6 –Digital" values from the **UR-24** with address 01 (mapped address = 41H):

>41MB2<cr>

Before analyzing the answer that the digital refractometer will give, consider the generic answer to a request for a page of digital values:

Axxxxkk<cr>

where:

A Start answer character.

xxxx Status of the digital values present in the values' page to which the request refer to. The bits to 1 in the received value xxxx mean that the value is active while the bit at zero indicate that the digital variable's status is deactivated. Refer to the digital values tables for the meaning linked to the various bits.

kk String's checksum calculated starting from the string's second character excluding character A, and ending with the last character before the checksum itself an the carriage return.

<cr> "Carriage return" character (ASCII 13).

In the specific case of the previous example, which requested the digital values of "Page 6" of the **UR-24** with address 01, the answer string might be the following:

A18040E<cr>

Where 1BA4 represents four hexadecimal numbers whose binary equivalents are:

1H = 0001
BH = 1011
AH = 1010
4H = 0100

Therefore chaining the four together we have:

1804H =	**0**001	1000	0000	010**0**
	pos.15			pos.0

After the conversion into the binary form, the received bits must be interpreted:

Range type	: Bx
Not used	-
Temperature unit:	: °C
Temper: compens.	: On
Accuracy	: Hi
Relay 1 status	: Off
Not used	-
Not used	-
Not used	-
Not used	-
Not used	-
Hold status	: Off
Washing status	: Off
Alarm led status	: On
Fixed value Y/N	: Off
LED control Y/N	: Off

18.3.5 "OPTOMUX" TYPE IDENTIFICATION

The PC sends to the **UR-24** refractometer this command in order to know if at that particular address there is a page of analog or digital values.
The format of the command sent to the PC is the following:

>ppFkk<cr>

where:

> Start request character.

pp Number of the mapped page of values for which the identification command is transmitted (to be found in the "Address/Page" table in previous section **18.3**).

F Optomux type identification command character.

kk Checksum value of the string (see previous paragraphs for the checksum's calculation checksum).

<cr> "Carriage return" character (ASCII 13).

In the following example a Optomux type identification command is transmitted to the **UR-24** for analog page with address 81:

>81FAA<cr>

where:

> Start request character.

81 Number of the mapped page of values for which the identification command is transmitted (see "Address/Page" table in section **18.3**).

F Optomux type identification command character.

AA Checksum value of the string.

<cr> "Carriage return" character (ASCII 13).

The answer string is the following one:

A0161<cr>

Where:

A Start answer character.

01 Digital page identification characters.

61 Checksum value of the string.

<cr> "Carriage return" character (ASCII 13).

If instead the command string is transmitted for an address which maps a digital page, the answer string of the **UR-24** will be the following one:

A0060<cr>

where:

A Start request character.

00 Digital page identification characters.

60 Checksum value of the string.

<cr> "Carriage return" character (ASCII 13).

18.3.6 POWER UP CLEAR COMMAND

For compatibility reasons with the Optomux protocol, the system is provided with the control of the **Power Up Clear command**.
If this command is sent, the **UR-24** refractometer answer only with a data string which confirms the command's reception.
The format of the sent command is the following:

>ppAkk<cr>

where:

> Start request character.

pp Number of the mapped page of values (to be found in the "Address/Page" table in previous section **18.3**).

A Power Up Clear command character.

kk Checksum value of the string.

<cr> "Carriage return" character (ASCII 13).

In the following example a Power Up Clear command is transmitted to the **UR-24** for the analog page with address 81:

>81AAA<cr>

where:

> Start request character.

81 Number of the mapped page of values (see "Address/Page" table in section **18.3**).

A Power Up Clear command character.

AA Checksum of the string.

<cr> "Carriage return" character (ASCII 13).

The answer string is the following one:

A<cr>

where:

A Start answer character.

<cr> "Carriage return" (ASCII 13).

18.3.7 RESET COMMAND

For compatibility reasons with the Optomux protocol, the system is provided with the control of the Reset command.
If this command is sent, the **UR-24** refractometer replies only with a data string to confirm the command's reception.
The format of the sent command to the PC is the following:

>ppBkk<cr>

where:

> Start request character.

pp Number of the mapped page of values (to be found in the "Address/Page" table in previous section **18.3**).

B Reset command character.

kk Checksum value of the string.

<cr> "Carriage return" character (ASCII 13).

In the following example a Reset command is transmitted to the **UR-24** for the analog page with address 81:

>81BAB<cr>

where:

> Start request character.

81 Number of the mapped page of values (see "Address/Page" **18.3**).

B Reset command character.

AB Checksum della stringa.

<cr> "Carriage return" character (ASCII 13).

The answer string is the following one:

A<cr>

where:

A Start answer character.

<cr> "Carriage return" character (ASCII 13).

18.3.8 OPTOMUX AVAILABLE COMMANDS GENERAL PROSPECT

Optomux Available Commando General Prospect			
Tag	**Byte Length**	**Type**	**Description**
K	11	Ana.	Analog Value Requests (Outputs)
L	11	Ana.	Analog Value Requests (Inputs)
M	7	Dig.	Digital Value Requests
A	7		Power Up Clear Command
B	7		Reset Command
F	7		Optomux type Identification

18.3.9 ERROR MESSAGES AND CONCLUSION

Under some conditions, such as with data reception or transmission errors or when unrecognized commands are sent, the instrument can respond with the following error message:

A<cr> A command has been received that was not available:

The unit answers with this message without making any operations.

NO2<cr> Wrong checksum received.

This condition can happen when there are line disturbances which distort the data string transmitted to the digital refractometer. In this case the **UR-24** doesn't accept the command, so you need to transmit the string again.

For more detailed information concerning the complete OPTOMUX standard, contact Maselli Technical service, or refer to the following manual published by the American company "OPTO 22"

OPTOMUX B1 AND B2
Digital and Analog Brain Boards
Operations Manual
(Part#1927)
Form 203.1 April 1989

18.4 "LABTECH" PROTOCOL

To receive data from the **UR-24** when the Labtech serial protocol is selected, it is necessary to transmit on the serial line the ASCII "R" character followed by **<cr>** (carriage return).

NOTE. It isn't necessary to set a specific address such as for the "OPTOMUX" protocol. The format and meaning of the data present in the reply string is the following:

	Brix									Temp.									Compens.									Low Brix								
	+	-	-	-	-	.	-	-		+	-	-	-	-	.	-	-		+	-	-	-	-	.	-	-		+	-	-	-	-	.	-	-
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

	High Brix									Pixel									mA								
	+	-	-	-	-	.	-	-		+	-	-	-	-	.	-	-		+	-	-	-	-	.	-	-	
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64

meas. scale		Temp. scale		Line stop	CR	LF
65	66	67	68	69	70	71

Measure scale	:'b' = Brix	; 'u' = user (only if required)
Temperature scale	:'C' = Celsius;	; 'F' = Fahrenheit
Line stop	:'S' = Line Stop	; '_' = Walking Line
CR	**= Carriage Return (ASCII 13)**	
LF	**= Line Feed (ASCII 10)**	

Note: The string's characters are progressively numbered from 1 to 71.

18.5 MAS, MR01; USER PROTOCOL

The Digital Refractometer mod. UR-24 is an equipment designed for the serial connection with a personal computer, for the reception of the measured variables or for the setting and variation of the operating parameters (alarm values, etc.).
The units must be seen by the PC as "Slave Units", that means, as devices which **answer** to the commands received from the PC and not vice versa.
The communication between the Personal Computer and the unit occurs by means of the "Maselli Protocol" included in the pertaining software. The protocol, by means of some controls which are hereunder indicated, supervises the "variables requirement" procedures and the variables/functions modification inside the Unit.
Following are indicated the description of the several commands available and included in the Maselli protocol. For the complete list of the varables and of their formats, contact the Maselli misure service Department. The commands are exclusively composed by ASCII characters:

V COMMAND - Variables/Functions Requirement

It allows to receive all the values of the variables included in the relative variables Table of the Analytical Unit located in a specific address.

>LLLLAAV;kk<cr>

where:

> initial string character

LLLL total length of the string (including the initial string character, the checksums and the <cr>); values from 0000 to 9999

AA analytical unit's address 00 to 31

V variables/functions requirement control

; separator

kk checksum (255 module sum of the ASCII values of all the string's characters up to the checksum excluded) from 00 to FF (MSB-LSB)

<cr> carriage return (ASCII 13)

To this request, the analytical unit will be able to answer, in case of problems found on the received string, with an error message as explained in the succeeding "Error Message" section or, in case the command was positively inspected, with the following string:

>LLLLAAV;NNN<VARIABLE1>;NNN<VARIABLE2>;NNN<VARIABLEn>;kk<cr>

where:

> initial string character

LLLL total length of the string (including the initial string character, the checksums and the <cr>); values from 0000 to 9999

AA analytical unit's address 00 to 31

V variables/functions requirement control

; separator

NNN variable number (position in the Variables Table)

<VARIABLEn>

value of the umpteenth variable with free format but compulsory sign; if the variable is an ASCII string, this won't have the sign, but it will be defined by the double tips (ASCII 34)

kk checksum (255 module sum of the ASCII values of all the string's characters up to the checksum excluded) from 00 to FF (MSB-LSB)

<cr> carriage return (ASCII 13)

M COMMAND - Function Modification

It allows to change one single variable/function in the unit's Variables Table.
Note: it is necessary to remind that the M control for the modification of the variable/function acts only on the variables that can be changed (see suffix assigned to each function in the "Variables Table" which must be ReadWrite).

>LLLLAAM;NNN<VARIABLEn>;kk<cr>

where:

> initial string character

LLLL total length of the string (including the initial string character, the checksums and the <cr>); values from 0000 to 9999

AA analytical unit's address 00 to 31

M function modification control

; variables separator

NNN variable number (position in the Variables Table)

<VARIABLEn>

value of the umpteenth variable with free format but compulsory sign; in case the variable is an ASCII string, this won't have the sign, but it will be defined by the double tips (ASCII 34)

kk checksum (255 module sum of the ASCII values of all the string's characters up to the checksum excluded) from 00 to FF (MSB-LSB)

<cr> carriage return (ASCII 13)

To this request, the analytical unit will be able to answer, in case of problems found on the received string, with an error message as explained in the succeeding "Error

Message" section or, in case the command was positively inspected, with the following string:

M<cr>

where:

M function modification command performed

<cr> carriage return (ASCII 13)

R CONTROL - Multiple reception of the variables/Functions (Recipe)

It allows to change, at the same time, a certain number of variables/functions in the analytical unit's Variables Table.
Note: it is necessary to remind that the **R** control for the multiple modification of the variables/functions acts only on the variables that can be changed (see suffix assigned to each function in the "Variables Table" which must be ReadWrite). In case the variable/function cannot be changed, the command will be stopped with an error message answer "NO03".
In the same way, the attempt to modify the variables/functions not included in the analytical unit's Variables Table isn't allowed and it causes an error message answer (NO03).

>LLLLAAR;NNN<VARIABLE>;NNN<Variable>;NNN<VARIABLE;kk<cr>

where:

> initial string character

LLLL total length of the string (including the initial string character, the checksums and the <cr>); values from 0000 to 9999

AA analytical unit's address 00 to 31

R variables/function multiple reception command (recipe)

; variables separator

NNN variable number (position in the Variables Table)

<VARIABLE>
value of the umpteenth variable with free format but compulsory sign; in case the variable is an ASCII string, this won't have the sign, but it will be defined by the double tips (ASCII 34)

kk checksum (255 module sum of the ASCII values of all the string's characters up to the checksum excluded) from 00 to FF (MSB-LSB)

<cr> carriage return (ASCII 13)

In case of problems found on the string, the analytical unit will be able to answer to this requirement with an error message as explained in the following "Error Message" section, or with the following string if the command was positively inspected:

R<cr>

where:

R variables/functions modification command performed

<cr> carriage return (ASCII 13)

Error Messages

List of error messages answering to incorrect commands or commands which can't be performed from the analytical unit.

NO02<cr>

Checksum error

NO03<cr>

Function not present or unchangeable (ReadOnly)

Other commands are defined in the communication protocol that, for preciseness, aren't indicated in the present document, such as the list of system's variables. Please contact the Maselli technicians for a complete description of all the implemented commands.

Since the above indicated commando are correctly interpreted and carried out by the analytical unit, it is necessary that the PC connected to the serial channel, formulates the commands and sends them, respecting the said above formats and that the control checksum is calculated correctly.

For such purpose hereunder is given the example for the checksum calculation on the "**V**" control.

Example of how the **"V"** variables request command is formulated to an analytical unit located at the address "01".

>001201V;F3cr

0012 it's the length of the string, number of all the sent characters

01 it's the address of the analytical unit

V it's the type of command (variables request)

; it's the separator character.

F3 it's the checksum calculated on the string's characters excluding cr

cr it's the carriage return, hexadecimal 0D (13)

The checksum is calculated in the following way up to the separator character included:

ascii code	hex value
>	3E
0	30
0	30
1	31
2	32
0	30
1	31
V	56
;	

1F3 sum, the checksum is the low byte of the sum (module 256 sum)

It is therefore necessary to include, for the first, the ascii 'F' character (Most significant byte) then the ascii '3' character (Least significant byte), 'F' hex in the example.

The string that has to be sent for the variables request to the analytical unit located at the 01 address is the following:

3E 30 30 31 32 30 31 56 3B 46 33 0D

18.6 US#1 MODALITY

If the 'USER' option is selected, the string characteristics and format are as follows:

- Transmission characteristics:
  Baud Rate can be selected in the following function '*Baud Rate*';
  1 byte of data; 1 bit *stop*; *no parity*.
- String format:
  1. measurement value (float type) with format 8.4 value depending on the selected scale BRIX / ZEISS.
  2. space
  3. temperature value (float type) with format 7.2 *Celsius* scale .
  4. space
  5. Brix/temperature compensation value
  6. user value (float type) with format 14.5.
  7. space
  8. user compensation value (float type) with format 14.5.
  9. space
  10. nD value (float type) with format 8.5
  11. space
  12. Max Pix value (float type) with format 8.3
  13. space
  14. calculated maximum derivative value.
  15. space
  16. measurement scale indication; b / Z / u (Brix , Zeiss, user)

- Example of string with measurement scale selected in **Brix**, temperature scale in **°C**:

Compensated Brix/Zeiss value								**Space**	**Temperature value in °C**						
±	x	x	.	x	x	x	x	SP	±	x	x	x	.	x	x

Space	**Uncompensated Brix value**								**Space**	**Brix/temp. compensation value**						
SP	±	X	X	.	X	X	X	X	SP	±	X	X	.	X	X	X

Space	**User value**														**Space**	**User compensation**														
SP	±		X	X	X	X	X	X	.	X	X	X	X	X	SP	±		X	X	X	X	X	X	.	X	X	X	X	X

Space	**nD**									**Space**	**Pix Max**						
SP	±	X	X	.	X	X	X	X	X	SP	±	X	X	.	X	X	X

Space	**Maximum derivative**								**Space**	**Measurement scale**	**C. R.**	**L. F.**
SP	±	X	X	X	X	X	X	X	SP	b / Z / u		

The numerical values are always aligned to the right, if they do not occupy all the dedicated characters, with spaces to the left.

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E-MAIL:info@masellimisure.com
Internet:www.masellimisure.com

Ufficio vendite "Enologia"
"Oenology" sales department
20124 MILANO-ITALY
Via Cornalia, 19
Tel. +39-02-6702432 02-6702493
Fax +39-02-66981993
E-MAIL: enoit@masellimisure.com
E-MAIL: enoexport@masellimisure.com

SCHEDA DI SICUREZZA N° 90032X0010

Secondo CEE/91/155 E ISO 11014-1
MATERIAL SAFETY DATA SHEET
According to 91/155/EECC

PRODUTTORE (contattare Maselli Misure)
PRODUCER (please contact Maselli Misure)

COMPOSIZIONE/INFORMAZIONI SUGLI INGREDIENTI
COMPOSITION/DATA ON COMPONENTS

Descrizione chimica:
Chemical characterization:

Ossido di zinco, ZnO C.I. Pigment White 4 CAS No. 1314-13-2 EINECS No. 215-222-5.
Zinc. Oxide ZnO C.I. Pigment White 4 CAS No. 1314-13-2 EINECS No. 215-222-5.

Sostanze pericolose: nessuna.
Dangerous components: none.

IDENTIFICAZIONE DEI PERICOLI
HAZARDS IDENTIFICATION

Nessun pericolo specifico è riscontrabile nel normale utilizzo.
No hazardous effects known.

L'ossido di zinco non è un materiale soggetto ad etichettatura obbligatoria secondo la Direttiva 67/548/CEE e successivi adeguamenti.
Zinc oxide is not a substance subjected to mandatory marking in accordance with the EEC Directive 67/548/EEC or amendments.

MISURE DI PRIMO SOCCORSO
FIRST AID MEASURES

Inalazione: portare all'aria fresca.
After inhalating: Supply fresh air.

Contatto con gli occhi: lavare con abbondante acqua corrente per 15 minuti, alzando le palpebre ogni tanto.
After eye contact: Flush with plenty of pressure water for 15 mins, occasionally raising eye lids.

Contatto con la pelle: lavarsi con acqua e sapone neutro.
After skin contact: Wash skin with mild soap and water.

MISURE ANTINCENDIO
FIRE FIGHTING MEASURES

Estintori raccomandati: nessuna restrizione.
Suitable extinguishing media: no restriction.

Pericoli speciali causati dal materiale, dai suoi prodotti di combustione o gas derivanti: nessuno.
Special hazards caused by the material, its combustion products or resultant gases: none.

Speciali mezzi di protezione personale: nessuno.
Special personal protection equipment: none.

MISURE IN CASO DI FUORI USCITA ACCIDENTALE
ACCIDENTAL RELEASE

Precauzioni ambientali: evitare che il prodotto entri nella rete fognaria o nei corsi di acqua. Raccogliere il prodotto con materiale inerte ed evitare di sollevare le polveri.
Environmental protection conduct: Do not sweep or wash into public stretches of water, sewers or sites of unknown discharge paths.
After spillage/leakage/gas leakage: Clean up immediately with wetting or absorbent material avoiding dusting.

MANIPOLAZIONE E STOCCAGGIO
HANDLING AND STORAGE

Precauzioni manipolazione: solite per evitare le polveri.
Usual precautions for nuisance dust should be observed.

Precauzioni contro l'incendio e le esplosioni: il prodotto non è infiammabile.
Protection against fire and explosion: the product is not flammable.

Condizioni di stoccaggio: tenere sotto una tettoia, a temperatura ambiente.
Storage: Store in roofed places at room temperature. Keep containers tightly sealed.

Classe infiammabilità: non applicabile.
Flammability Class: not applicable.

CONTROLLO DELL'ESPOSIZIONE/PROTEZIONE INDIVIDUALE
EXPOSURE CONTROLS/PERSONAL PROTECTION

Ulteriori note per l'impianto: nessuna nota. Componenti con limiti da monitorare:
Additional notes for design of plant equipment: No further details . Components with workplace-related limits to be monitored:

Identificazione / **Designation**	**%**	**Tipo di dati** / **Type of data**	**Unità** / **Unit**
Polveri moleste / **Nuisance dust**	**100**	**MAK**	**6mg/m^3**
		TLV/TWA (USA)	**10mg/m^3**

Protezione personale: usare respiratore con filtro polveri se viene liberata della polvere respirabile.
Personal protection equipment: Respiratory protection an appropriate dust filter has to be used should a breathable dust occur.

PROPRIETA' FISICHE E CHIMICHE
PHYSICAL AND CHEMICAL PROPERTIES

Aspetto: polvere/granuli
Form: powder/ granule

Colore: bianco
Colour: white

Odore: nessun odore
Odour: odourless

		Valore/Area *Value/Area*	**Unità** *Unit*	**Metodo** *Method*
Cambiamenti nello stato fisico *Change in physical state*				
Punto di fusione: *Melting point/Melting area:*		**1970**	**°C**	**Lit.**
Punto d'infiammabilità: non infiammabile *Flash point: not flammable*				
Rischi di esplosione: il materiale non è esplosivo *Explosion risks: The material is not explosive*				
Pressione di vapore *Vapour pressure:*		**n.a.**	**mbar**	
Densità *Density*	**(20°C)**	**5,6**	**cm^3**	**DIN/ISO 787 parte10B**
Solubilità in acqua *Solubility in water*	**(20°C)**	**< 0,03**	**%**	**DIN/ISO 787 parte 8**
pH *pH Value*	**(20°C)**	**7 - 8**		**DIN/ISO 787 parte 9**

STABILITA' E REATTIVITA'
STABILITY AND REACTIVITY

Pericoli da decomposizione: nessuna decomposizione se stoccato correttamente. Solubile in acidi e alcali.
Hazardous and reactivity products: No decomposition at proper storage and application conditions soluble in acids and alkalis.

INFORMAZIONI TOSSICOLOGICHE
TOXICOLOGICAL INFORMATION

Il prodotto non è tossico. LD50 orale ratto > 10.000 mg/kg. La febbre da zinco, come menzionato in certa documentazione, è causata dai vapori dell'ossido di zinco fresco, ma non dall'ossido di zinco imballato, normalmente venduto.
The product is not toxic. LD50 oral, rat > 10.000 mg/kg. Zinc fever, as often quoted in literature, is caused by fresh zinc oxide fume, which may be probably formed during manufacturing of zinc oxides, but not by commonly sold, packed zinc oxide.

INFORMAZIONI ECOLOGICHE
ECOLOGICAL INFORMATION

Evitare che il prodotto defluisca in corsi d'acqua, nella rete fognaria o contamini il suolo.
Details for elimination: Avoid infiltration into sewers waste water drainings, or soil.

CONSIDERAZIONI SULLO SMALTIMENTO
DISPOSAL CONSIDERATIONS

Operare secondo le vigenti disposizioni locali e nazionali.
Dispose in accordance with federal, state and local regulations.
Codice acque reflue No. 51301 (Germania).
Waste Code No.: 51301 (Germany).
Controllare riutilizzo come alternativa.
Check re-use as alternative.
Imballi e contenitori contaminati: gli imballaggi e i contenitori contaminati, ma vuoti, possono essere riciclati.
Contaminated packages and containers: Emptied, but contaminated packages and containers may be recycled.
Codice per smaltimento 18715 (Germania).
Waste Code No.: 18715 (Germany).

INFORMAZIONI SUL TRASPORTO
TRANSPORT INFORMATION

Merce non pericolosa ai sensi delle Normative vigenti sul trasporto.
No declaration for transport required.

INFORMAZIONI SULLA REGOLAMENTAZIONE
REGULATORY INFORMATION

L'ossido di zinco non è un materiale soggetto ad etichettatura obbligatoria ai sensi della Direttiva 67/548/CEE e successivi aggiornamenti. Classe di rischio per le acque: WGK 0 (auto valutazione secondo il No. 7a, 19, 19a-1 del German Water Utilization Act (WHG). Si devono rispettare i limiti locali o nazionali relativi allo Zn nell'acqua, Zn essendo incluso nella Tabella II delle Direttive 80/68/ CEE e 76/464/CEE. (Risoluzioni UE sulla qualità dell'acqua).
Zinc oxide is not a substance subjected to mandatory marking in accordance with the EEC Directive 67/548/EEC or amendments.
Water risk class: WGK 0 (Self-assessment, acc. To 7a, 19, 19a-1 of German Water Utilization Act (WHG).
Federal or local limits for Zn in water have to be observed, Zn being, Table II listed by 80/68/EEC and 76/464/EEC (EU water quality resolutions).

ALTRE INFORMAZIONI
FURTHER INFORMATION
Le informazioni contenute nella presente scheda si basano sulle conoscenze alla data sopra riportata. Sono riferite unicamente al prodotto indicato e non costituiscono garanzia di particolari qualità.
The information contained herein is based on the present state of our knowledge, but without liability. Department issuing this data sheet: Product safety department. It only refers to the indicated product and does not guarantee particular quality.

Doc. n° 01242V0010 / 08-10-2004

Certificato di Origine
Certificate of Origin
Attestation de Origine
Ursprungszeugnis
Certificado de Orígen

Maselli Misure S.p.A., Via Baganza 4/3 Parma (Italy)

dichiara sotto la propria esclusiva responsabilità che il prodotto:
hereby declares on its own responsibility that the product:
déclare sous sa propre exclusive responsabilité que le produit:
erklärt eigenverantwortlich, dass das Gerät:
declara bajo su propia y exclusiva responsabilidad que el producto:

RIFRATTOMETRO DIGITALE *DIGITAL REFRACTOMETER* *RÉFRACTOMÈTRE DIGITAL* *DIGITALES REFRAKTOMETER* *REFRACTOMÉTRO* DIGITAL	**UR-24**	**S.N.** _____

Identificato nel presente certificato / *Identified in this certificate* / *Identifié dans le présent certifié* / *Hiermit identifiziert* / *Identificado en el presente certificado*

È stato costruito nel nostro stabilimento con materiali della migliore qualità, che tutta la fornitura e la conseguente lavorazione corrisponde ai nostri Standard Qualitativi Aziendali certificati **ISO 9001**, che in vari stadi di lavorazione sono stati eseguiti test di rilevamento e controllo, che tutti i materiali della fornitura sono nuovi di fabbrica ed utilizzati unicamente per le fasi di controllo e di test.

*It was manufactured in our factory with high quality material, that all the equipment and consequently its production corresponds to our Factory's Quality Standards certified **ISO 9001**, that detecting and control tests were performed in several working phase, that all the equipment's materials are new and used only for control and testing phases.*

*Il a été construit dans notre usine avec de matériaux de la meilleure qualité, que toute la fourniture y le suivant travail correspondent à nos Standards de qualité de la Maison certifiés **ISO 9001**, que dans cértaines phases de travail ont été réalisés des essais de relèvement et contrôle, que tous les matériaux de la fourniture sont neuves de fabrique et utilisés uniquement pour les phases de contrôle et essai.*

*Es wurde in unserem Werk mit Werkstoffen bester Qualität hergestellt, dass die ganze Lieferung und deren Bearbeitung mit den **ISO-9001** Qualitätsvorschriften übereinstimmen, dass in einigen Bearbeitungsstufen Messungs- und Kontrolleprüfungen ausgeführt wurden, dass alle Werkstoffe neu sind und ausschließlich für die Kontrolle und Prüfungsstufe verwendet wurden.*

*Fue construído en nuestro establicimiento con materiales de la mejor calidad, que todo el suministro y el siguiente trabajo corresponde a nuestros Standard de calidad de empresa certificados **ISO 9001**, que en algunos estadios de trabajo son realizables pruebas de relevación y control, que todos los materiales del suministro son nuevos de fábrica y usados sólamente para las fases de control y prueba.*

MASELLI MISURE S.p.A.
(Il Legale Rappresentante)
(Legal Representative) - (Le représentant légal)
(Der gesetzliche Vertreter) - (Representante juridíco)
P.I. Antonio Maselli

UFFICIO VENDITE ENOLOGIA / *OENOLOGY SALES DEPARTMEN / SERVICECOMMERCIAL POUR L'OENOLOGIE / DEPARTAMENTO DE VENTAS ENOLOGIA / VERKAUFSABTEILUNG FÜR WEINBAUKUNDE*
20124 Milano - Italy - Via Cornalia, 19 - Tel.+39 02.6702432 r.a.; Telefax +39 02.66981993
E-Mail: enoit@masellimisure.com; E-Mail: enoexport@masellimisure.com

STABILIMENTO ED UFFICI AMMINISTRATIVI */ PRODUCTION, ADMINISTRATION, EXPORT SALES DEPARTMENT / USINE ET SERVICES ADMINISTRATIVES / PRODUKTION UND VERWALTUNG / PRODUCCIÓN, ADMINISTRACIÓN, DEPARTAMENTO DE EXPORTACIONES Y VENTAS:*
43100 Parma - Italy - Via Baganza 4/3 - Tel. +39 0521.257411 r.a.; Telefax +39 0521.250484
E-Mail: info@masellimisure.com
Internet:www.masellimisure.com

Doc. n° 01242P0011 / 16-05-2006

CE

Dichiarazione di Conformità

(AI SENSI DELLA DIRETTIVA 89/336/CEE)

Statement of Compliance

(IN ACCORDANCE WITH DIRECTIVE 89/336/CEE)

Déclaration de Conformité

(AUX TERMES DE LA DIRECTIVE 89/336/CEE)

Konformitätserklärung

(NACH DEM GRUNDSATZ 89/336/CEE)

Declaración de conformidad

(SEGÚN LA DIRECTIVA 89/336/CEE)

Maselli Misure S.p.A., Via Baganza 4/3 Parma (Italy)

dichiara sotto la propria esclusiva responsabilità che il prodotto:
hereby declares on its own responsibility that the product:
déclare sous sa propre exclusive responsabilité que le produit:
erklärt eigenverantwortlich, dass das Gerät:
declara bajo su propia y exclusiva responsabilidad que el producto:

RIFRATTOMETRO DIGITALE *DIGITAL REFRACTOMETER* *RÉFRACTOMÈTRE DIGITAL* *DIGITALES REFRAKTOMETER* *REFRACTOMÉTRO DIGITAL*	**UR-24**	**S.N.** _____

E' conforme in ogni sua parte alle Direttive *Complies in its every part with Directives* *Est conforme en chaque su partie aux* *Entspricht in jedem Teil den Grundsätzen* *Es conforme en cada su parte a las directivas*	**- 89/336/CEE** **- 93/68/CEE**	**ed alle successive modificazioni.** *and with their next modifications.* *et aux suivantes modifications.* *und nachträglichen Änderungen.* *y a las sucesivas modificaciónes.*

L' apparecchiatura è stata progettata e costruita secondo le norme armonizzate:
The device was designed and manufactured in accordance with harmonised rules:
La machine a été projetée et réalizée aux termes des normes Harmonisée:
Das Gerät wurde nach den Grundsätzen geplant und herstellt:
La máquina ha sido projectada y construída según las normas armonizadas:

EN 50081-2; EN 50082-2; EN 61000-3-2; EN 61000-3-3; EN 61000-4-2; EN 61000-4-3
EN 61000-4-4; EN 61000-4-5; EN 61000-4-6; EN 61000-4-11

MASELLI MISURE S.p.A.
(Direttore Tecnico)
(Technical Director) - (Directeur technique)
(Technischer Leiter) - (Director Técnico)
P.I. Giovanni Maselli

UFFICIO VENDITE ENOLOGIA / *OENOLOGY SALES DEPARTMEN / SERVICECOMMERCIAL POUR L'OENOLOGIE / DEPARTAMENTO DE VENTAS ENOLOGIA / VERKAUFSABTEILUNG FÜR WEINBAUKUNDE*
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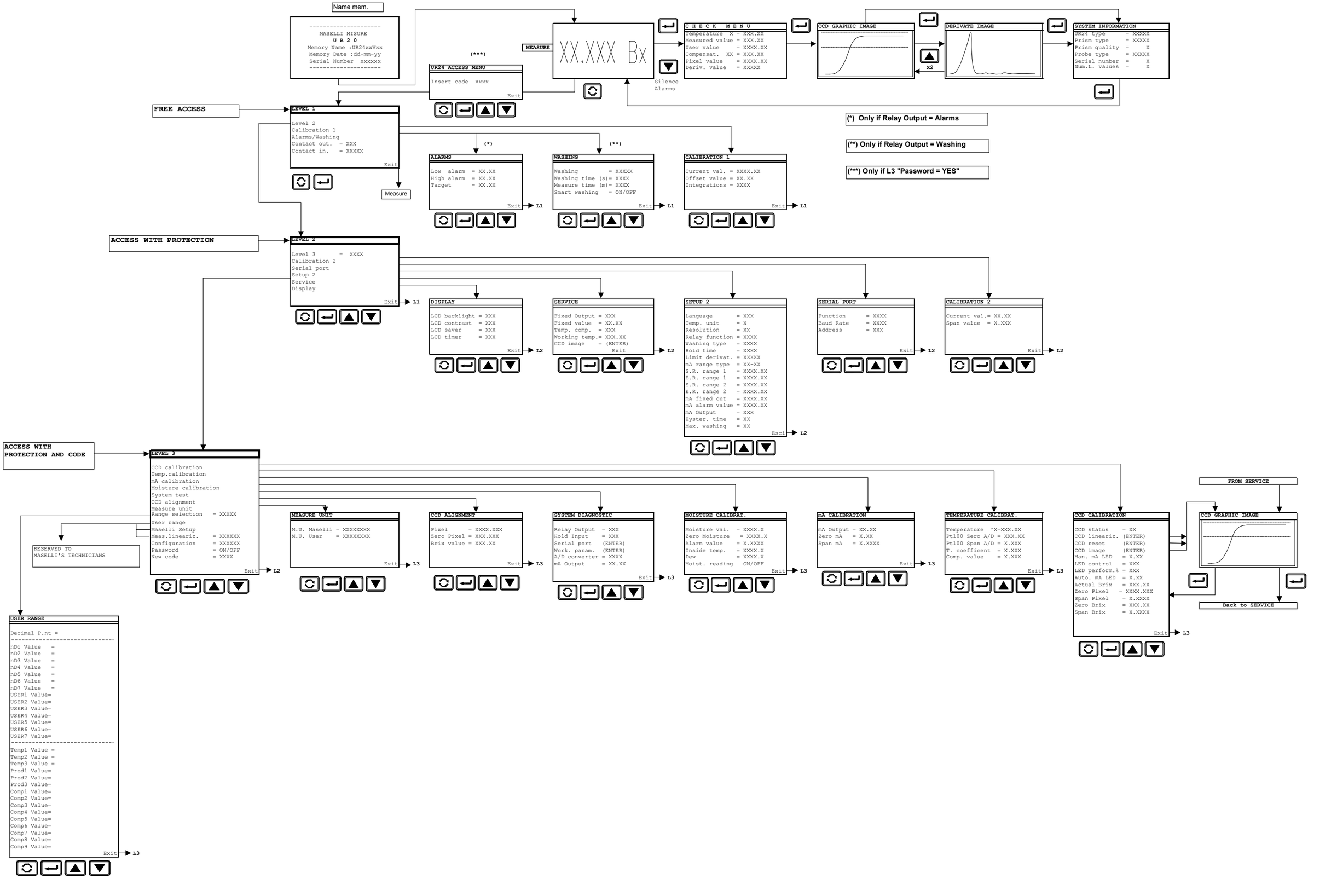
E-Mail: info@masellimisure.com
Internet: www.masellimisure.com

UR24 FUNCTION SCROLL



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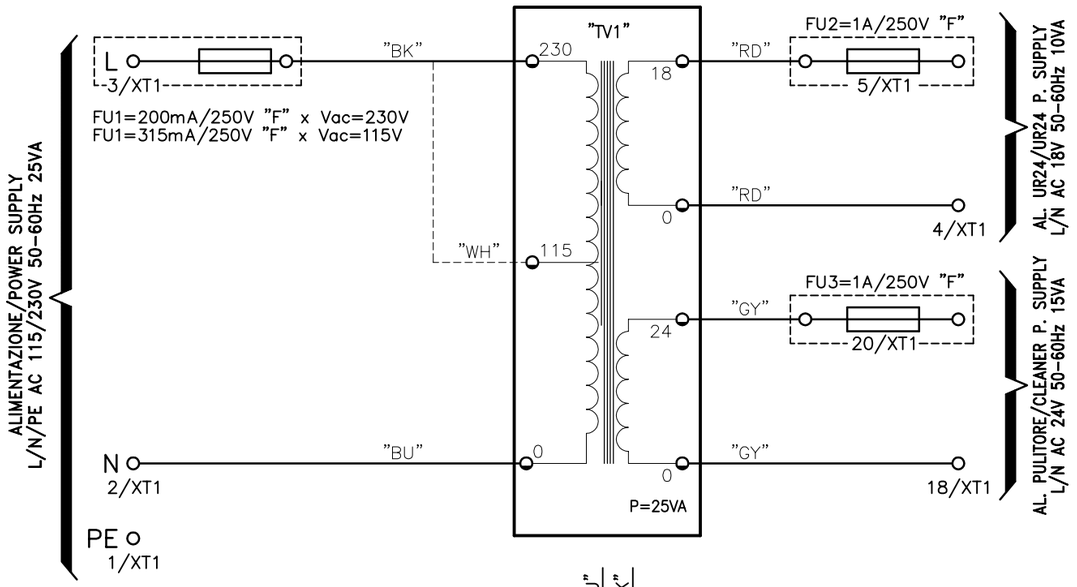
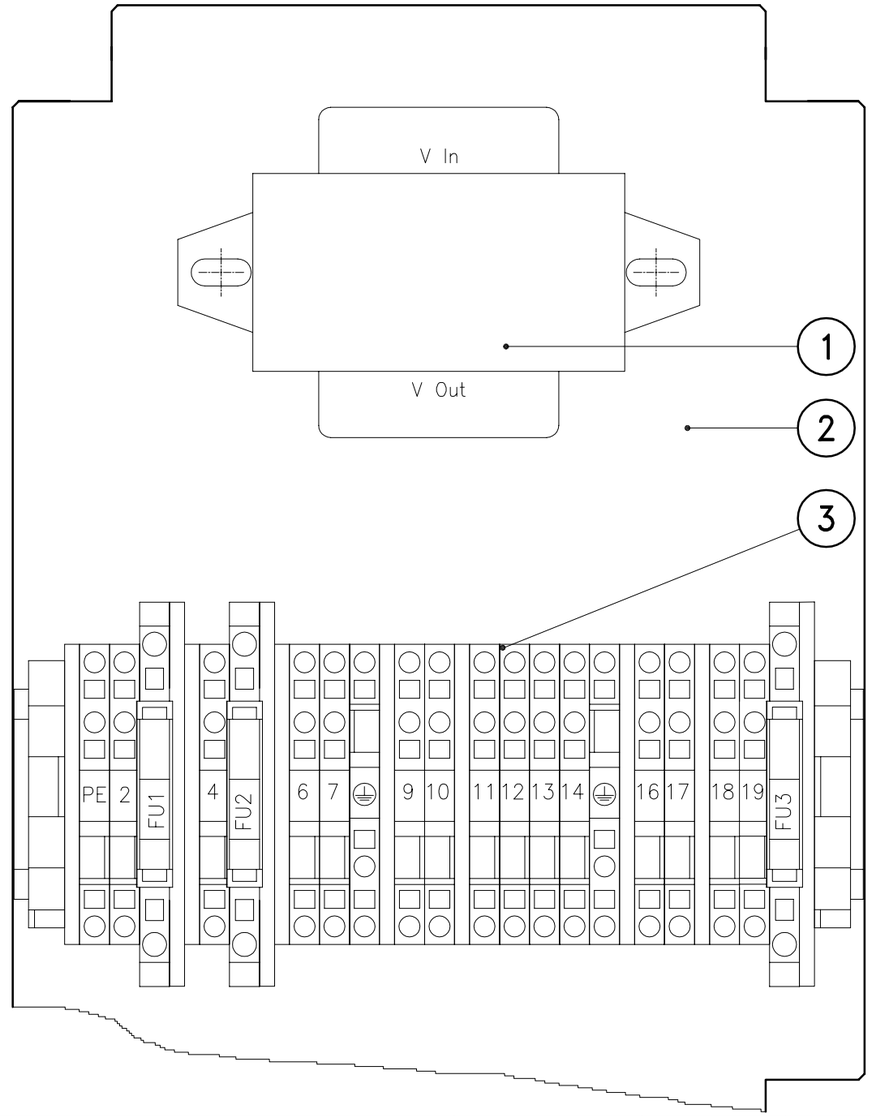
A3





N.	DESCRIZIONE/DESCRIPTION	MATR./CODE	DIS/DES.	Q.TA/Q.TY
1	Trasformatore 0-115-230 P=25VA	A0301050	2601C4004_	1
2	Piastra di fondo "Cassetta d'interconnes."	A0547008-Z0	0119M3001_	1
3	Gruppo Ass. "Morsettiera d'interconnessione"	A0812102	0120P5001_	1

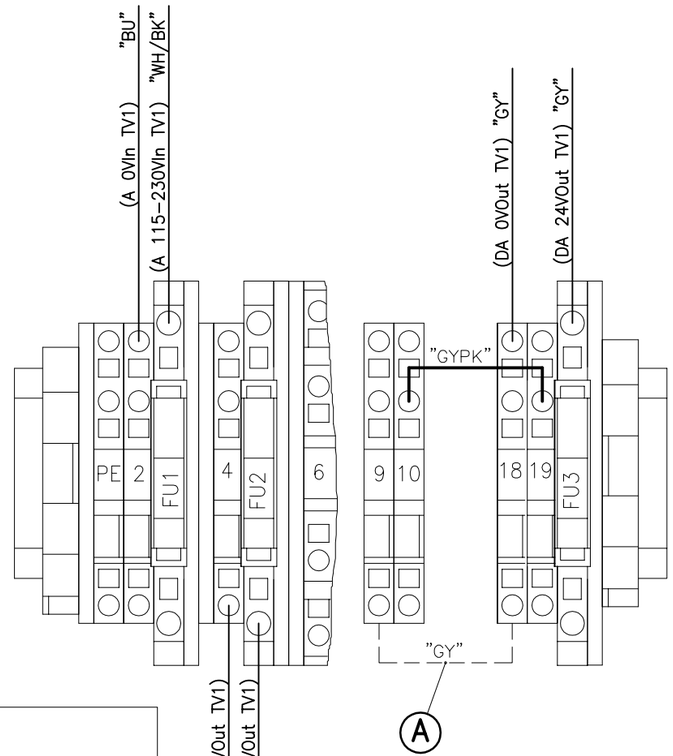
Viti ed accessori per il fissaggio e l'identificazione dei componenti, conduttori ed accessori di cablaggio, non sono riportati.

Screws and accessories for components identification and fixing, conductors and wirings accessories, are not shown.

Ⓐ

PONTICELLO DA EFFETTUARE SOLO IN CASO DI UTILIZZO DEL CONTATTO PULITORE "IN TENSIONE" (24Vac).

WIRING TO EFFECT ONLY IN CASE OF USE OF CLEANER CONTACT "IN VOLTAGE" (24Vac).



NOTE PER I COLLEGAMENTI:
CONNECTION NOTES:

CONDUTTORI NON CONTRASSEGNATI, SEZ:1mm2 (N07V-K 450/750V)
CONDUTTORI CONTRASSEGNATI DA "*", SEZ:0,5mm2
CONDUTTORI CONTRASSEGNATI DA "**", SEZ:1,5mm2 (N07V-K 450/750V)
CONDUTTORI CONTRASSEGNATI DA "***", SEZ:2,5mm2 (N07V-K 450/750V)

NO MARKED CONDUCTORS, SECTION:1mm2 (N07V-K 450/750V)
MARKED CONDUCTORS BY "", SECTION:0.5mm2*
*MARKED CONDUCTORS BY "**", SECTION:1.5mm2 (N07V-K 450/750V)*
*MARKED CONDUCTORS BY "***", SECTION:2.5mm2 (N07V-K 450/750V)*

"XT1" = MORSETTIERA GENERALE — *"XT1" = MAIN TERMINAL BOARD*
"TV1" = TRASFORMATORE — *"TV1" = TRANSFORMER*

CODICE COLORI "CEI 16-6" (IEC 757)
COLOUR CODE "CEI 16-6" (IEC 757)

"BK" = NERO = BLACK
"BN" = MARRONE = BROWN
"RD" = ROSSO = RED
"OG" = ARANCIO = ORANGE
"YE" = GIALLO = YELLOW
"GN" = VERDE = GREEN
"BU" = BLU = BLU
"VT" = VIOLA = VIOLET
"GY" = GRIGIO = GREY
"WH" = BIANCO = WHITE
"PK" = ROSA = PINK
"TQ" = TURCHESE = TURQUOISE

MOD.	DESCRIZIONE MODIFICA – MODIFICATION DESCRIPTION	DATA – DATE	MOD. DA – MOD. BY	CONTR. – INSPECTION

PAGINA N° / PAGE N° — DI N° / OF N°
NOTE Italiano/Inglese
NOTE Italian/English

SERIE: UNITA' ANALITICA RIFRATTOMETRICA UR-24/UR-20
DENOMINAZIONE: Schema elettrico e Disp. componenti "Sezione Potenza" Cassetta d'Interconnessione-115/230Vac
DESIGNATION: Electrical schematic and Components layout "Power Section" Interconnection Box-115/230Vac

MATRICOLA / *PART NUMBER*: A0812104
DISEGNATO DA / *DRAWN BY*: *A. Mordonini*
CONTROLLATO / *INSPECTED BY*: *G. Spagnoli*

maselli misure *process analyzers* PARMA – MILANO ITALY

DATA / *DATE*: 08/11/2004 — SCALA / *SCALE*
SOST. DIS. N° / *SUBS. DWG N°*

Cod. N°: **0124P1002** — Mod.: **0**

MM 99/A3 ELETT. NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE – *THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT*

A3

ALIMENTAZIONE (ALTERNATIVA 1)
POWER SUPPLY (ALTERNATIVE 1)
L/N/PE AC 115V/230V 50-60Hz 50VA

FU1=1A/250V "F"
L 3/XT1 "BK"
N 2/XT1 "BU"
PE 1/XT1 "YEGN"

"GS1" Vin=100...240 Vac P=25W (S-25-24) MEAN WELL
ACL(1)
ACN(2)
T(3) ⏚
+V(4) "RD1*"
-V(5)

"BK1*"

"SB1" ANYBUS (HMS)
1
2
6 (Rx+)
7 (Rx-)
8 (Tx+)
9 (Tx-)

CAVO 2x2x0,25mm2 Schermato a coppie
15/XT1 ⏚
"WHBK" 12/XT1 (Rb)
"WH" 11/XT1 (Ra)
"RDBK" 14/XT1 (Tb)
"RD" 13/XT1 (Ta)

"TV1"
"BK" 230
"WH" 115
"BU" 0
0 "GY"
P=25VA

FU2=1A/250V "F"
"RD" 18 → 5/XT1
"RD" 0 → 4/XT1
AL. UR24/UR24 P. SUPPLY L/N AC 18V 50-60Hz 10VA

FU3=1A/250V "F"
"GY" 24 → 20/XT1
AL. PULITORE/CLEANER P. SUPPLY L/N AC 24V 50-60Hz 15VA
18/XT1

TRASFORMATORE
Disegno: 2601C4004_
Codice: A0301050

ALIMENTAZIONE (ALTERNATIVA 2)
POWER SUPPLY (ALTERNATIVE 2)
+/- DC 24V 10W

FU1=1A/250V "F"
+ 3/XT1 "RD1*"
- 2/XT1 "BK1*"
PE 1/XT1

ALIMENTAZIONE (ALTERNATIVA 2)
POWER SUPPLY (ALTERNATIVE 2)
L/N/PE AC 24V 50-60Hz 25VA

FU2=1A/250V "F"
L 5/XT1
N 4/XT1
PE 1/XT1

CODICE COLORI "CEI 16-6" (IEC 757)
COLOUR CODE "CEI 16-6" (IEC 757)

"BK" = NERO = BLACK
"BN" = MARRONE = BROWN
"RD" = ROSSO = RED
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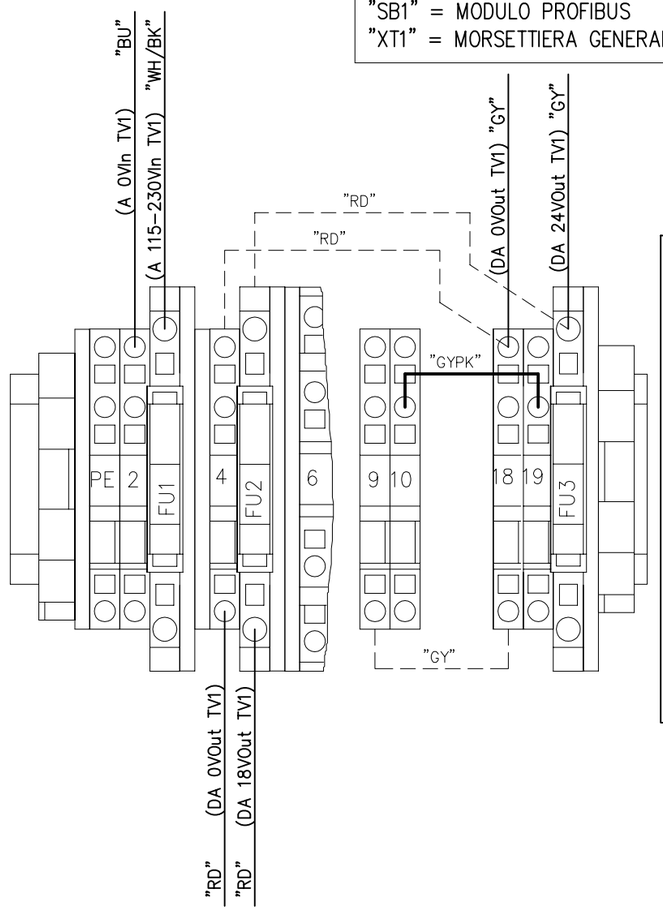
"GY" = GRIGIO = GREY
"WH" = BIANCO = WHITE
"PK" = ROSA = PINK
"TQ" = TURCHESE = TURQUOISE

NOTE PER I COLLEGAMENTI:
CONNECTION NOTES:

CONDUTTORI NON CONTRASSEGNATI, SEZ: 1mm2 (N07V-K 450/750V)
CONDUTTORI CONTRASSEGNATI DA "*", SEZ: 0,5mm2
CONDUTTORI CONTRASSEGNATI DA "**", SEZ: 1,5mm2 (N07V-K 450/750V)
CONDUTTORI CONTRASSEGNATI DA "***", SEZ: 2,5mm2 (N07V-K 450/750V)

NO MARKED CONDUCTORS, SECTION: 1mm2 (N07V-K 450/750V)
MARKED CONDUCTORS BY "", SECTION: 0.5mm2*
*MARKED CONDUCTORS BY "**", SECTION: 1.5mm2 (N07V-K 450/750V)*
*MARKED CONDUCTORS BY "***", SECTION: 2.5mm2 (N07V-K 450/750V)*

"GS1" = ALIMENTATORE — *"GS1" = FEEDER*
"TV1" = TRASFORMATORE — *"TV1" = TRANSFORMER*
"SB1" = MODULO PROFIBUS — *"SB1" = PROFIBUS MODULE*
"XT1" = MORSETTIERA GENERALE — *"XT1" = MAIN TERMINAL BOARD*



In caso di utilizzo della connessione Pulitore (in tensione) (24Vac).

(Alternativa2): eseguire tutti e tre i collegamenti tratteggiati.

(Alternativa1): eseguire solamente il collegamento tratteggiato (9-18).

In case of Cleaner connection use (in voltage) (24Vac).

(Alternative2): effect all the three dashed connections.

(Alternative1): effect only the dashed connection (9-18).

MOD.	DESCRIZIONE MODIFICA – MODIFICATION DESCRIPTION	DATA – DATE	MOD. DA – MOD. BY	CONTR. – INSPECTION

PAGINA N° / PAGE N° — DI N° / OF N°
NOTE Italiano/Inglese / Italian/English

SERIE: UNITA' ANALITICA RIFRATTOMETRICA UR-24/UR-20
MATRICOLA / PART NUMBER
DENOMINAZIONE: Schema elettrico — Cassetta d'Interconnessione (Modulo Profibus)
DESIGNATION: Electrical schematic — Interconnection box (Profibus Module)
DISEGNATO DA / DRAWN BY: A. Mordonini
CONTROLLATO / INSPECTED BY: G. Spagnoli

maselli misure
process analyzers
PARMA – MILANO ITALY

DATA / DATE: 29/09/2004
SCALA / SCALE
SOST. DIS. N° / SUBS. DWG N°

Cod. N°: 0124P1001
Mod.: 0

MM 99/A3 ELETT. NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE - THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT

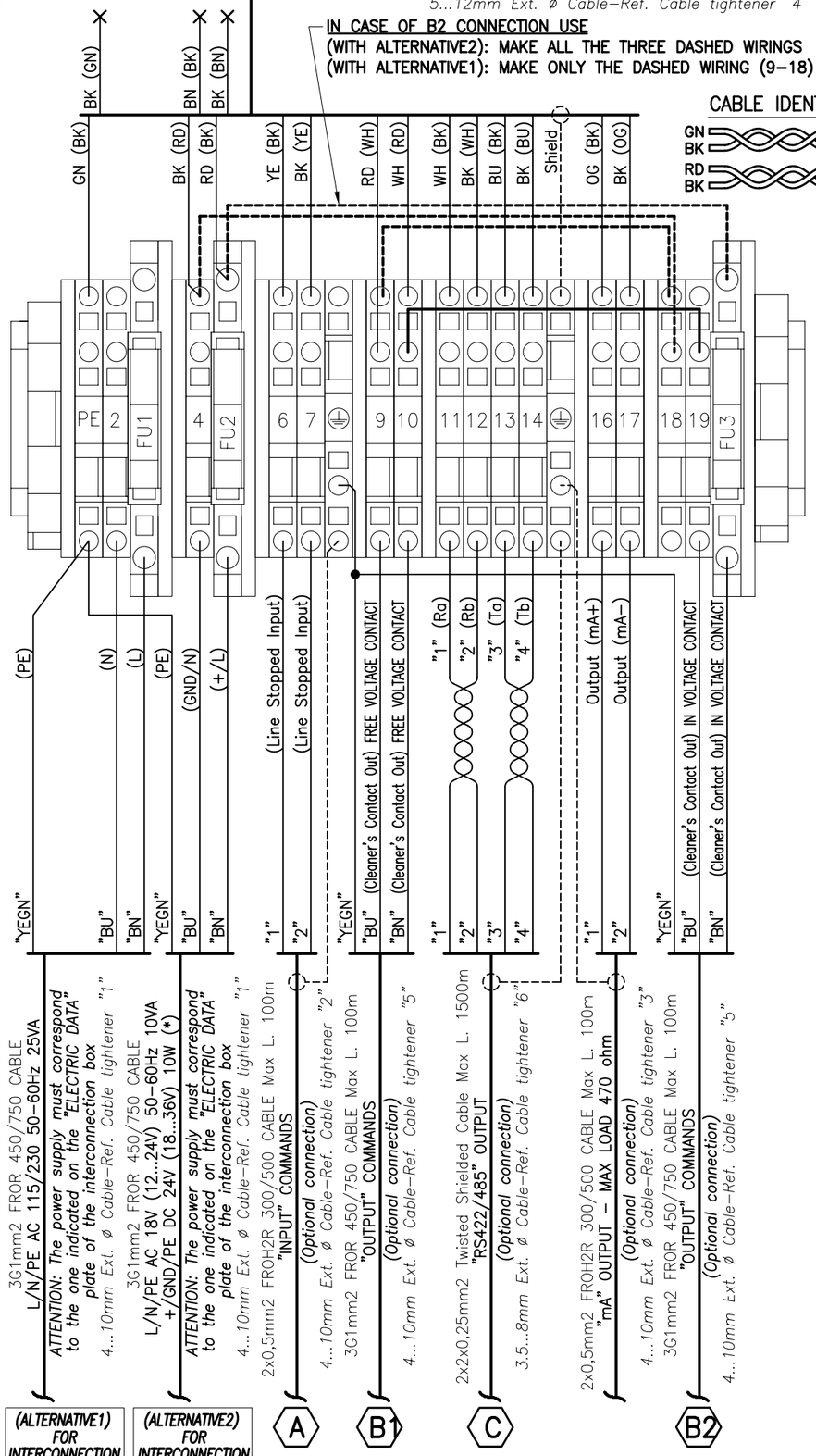
A3

INTERCONNECTION TERMINAL BOARD (Optional)

8x2x22 AWG SHIELDED CABLE (BELDEN 8308) L=5m

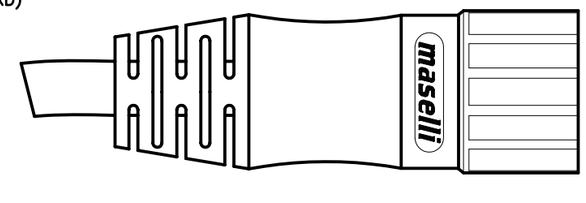
5...12mm Ext. ø Cable–Ref. Cable tightener "4"

IN CASE OF B2 CONNECTION USE
(WITH ALTERNATIVE2): MAKE ALL THE THREE DASHED WIRINGS
(WITH ALTERNATIVE1): MAKE ONLY THE DASHED WIRING (9–18)



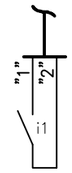
CABLE IDENTIFICATION EXAMPLE

CONNECTIONS ON CIRCULAR CONNECTOR UR–24 DIGITAL REFRACTOMETER



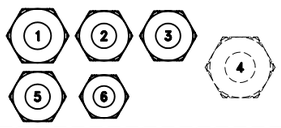
WH	Ra	8/XS2	RS422/485
BK	Rb	9/XS2	
BU	Ta	10/XS2	
BK	Tb	16/XS2	
OG	Output (mA+)	11/XS2	"mA" Output
BK	Output (mA–)	1/XS2	
RD	24Vdc/18Vac	4/XS2	Power Supply
BK	GND/N	5/XS2	
GN	PE	3/XS2	
BK		12/XS2	
YE	Input	6/XS2	Input
BK	Input	14/XS2	
RD	Output (C)	13/XS2	Output
WH	Output (NO)	2/XS2	
BN		7/XS2	
BK		15/XS2	

(A) "LINE STOPPED" INPUT (HOLD) CONNECTION EXAMPLE

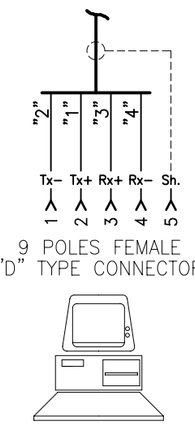


i1 = "Line Stopped" Input
Connect a normally opened, status indication contact "line operation"; the contact must close with line stopped.
When the contact is closed, the measurement is stopped on the last visualized value.

CABLE TIGHTENERS LAYOUT

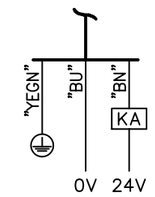


(C) RS422/485 CONNECTION EXAMPLE ON A PC



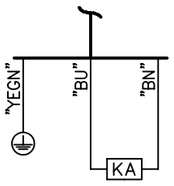
9 POLES FEMALE
"D" TYPE CONNECTOR

(B1) CLEANER'S COMMAND OUTPUT (FREE VOLTAGE CONTACT) CONNECTION EXAMPLE



KA = Cleaning system
THE "CLEANER'S COMMAND" CONTACT MAXIMUM CAPACITY IS 500mA/24V.

(B2) CLEANER'S COMMAND OUTPUT (IN VOLTAGE CONTACT) CONNECTION EXAMPLE



KA = Cleaning system
THE "CLEANER'S COMMAND" CONTACT MAXIMUM CAPACITY IS 500mA/24V.

EXTERNAL CONNECTIONS EXAMPLE

CONNECTION NOTES:

ATTENTION: THE CONNECTION CABLES INDICATED ON THE DRAWING ARE "APPROXIMATELY SUGGESTED".
FOR THE CONDUCTORS' CHOICE IT IS NECESSARY TO CHECK THE INSTRUMENT'S MODEL AND FEATURES, ITS PROCESS VOLTAGE, THE AMBIENT, THE TYPE OF MOUNTING AND THE CURRENT STANDARDS IN ORDER TO AVOID AN IMPROPER USE OF THE SAME, WITH HEAVY DAMAGES TO THE PERSONS AND THINGS SECURITY.
IF THE CONDITIONS AREN'T RESPECTED IN CONTINUOUS SERVICE, IN OVERLOAD AND SHORT–CIRCUIT, THE CABLE CAN APPEAR TO BE DAMAGED IN SUCH A WAY TO NOT BE ABLE TO GUARANTEE AN ADEQUATE SECURITY.
TO ASSURE THE UNIT'S OPTIMAL OPERATION AND COMPLIANCE TO THE RADIO INTERFERENCE STANDARDS, IT IS SUGGESTED TO USE SHIELDED CABLES WHERE IT IS INDICATED, AND TO NOT EXCEED THE INDICATED LENGHTS.
IT IS ALSO SUGGESTED TO POWER SUPPLY THE UNIT BY MEANS OF A SECTIONING SWITCH.
FOR EARTH AND SCREEN CONNECTIONS USE YELLOW–GREEN TERMINAL BLOCKS APPROVED FOR SUCH FUNCTION BEING SURE OF THEIR PERFECT UNIPOTENTIALITY (TERMINAL BLOCKS: PE; 8; 15).

3G1mm2 FROR 450/750 CABLE L/N/PE AC 115/230 50–60Hz 25VA	*ATTENTION: The power supply must correspond to the one indicated on the "ELECTRIC DATA" plate of the interconnection box*	*4...10mm Ext. ø Cable–Ref. Cable tightener "1"*	(ALTERNATIVE1) FOR INTERCONNECTION BOX WITH TRANSF.
3G1mm2 FROR 450/750 CABLE L/N/PE AC 18V (12...24V) 50–60Hz 10VA +/GND/PE DC 24V (18...36V) 10W (*)	*ATTENTION: The power supply must correspond to the one indicated on the "ELECTRIC DATA" plate of the interconnection box*	*4...10mm Ext. ø Cable–Ref. Cable tightener "1"*	(ALTERNATIVE2) FOR INTERCONNECTION BOX WITHOUT TRANSF.
2x0,5mm2 FROH2R 300/500 CABLE Max L. 100m "INPUT" COMMANDS	(Optional connection)	*4...10mm Ext. ø Cable–Ref. Cable tightener "2"*	(A)
3G1mm2 FROR 450/750 CABLE Max L. 100m "OUTPUT" COMMANDS	(Optional connection)	*4...10mm Ext. ø Cable–Ref. Cable tightener "5"*	(B1)
2x2x0,25mm2 Twisted Shielded Cable Max L. 1500m "RS422/485" OUTPUT	(Optional connection)	*3.5...8mm Ext. ø Cable–Ref. Cable tightener "6"*	(C)
2x0,5mm2 FROH2R 300/500 CABLE Max L. 100m "mA" OUTPUT – MAX LOAD 470 ohm	(Optional connection)	*4...10mm Ext. ø Cable–Ref. Cable tightener "3"*	
3G1mm2 FROR 450/750 CABLE Max L. 100m "OUTPUT" COMMANDS	(Optional connection)	*4...10mm Ext. ø Cable–Ref. Cable tightener "5"*	(B2)

(*) NOTE: IN CASE OF B2 CONNECTION USE THE 24V 50–60Hz 20W AC POWER SUPPLY ONLY.

COLOURS DESIGNATION
CODE "CEI 16–6" (IEC 757)

"BK"	= NERO	= BLACK
"BN"	= MARRONE	= BROWN
"RD"	= ROSSO	= RED
"OG"	= ARANCIO	= ORANGE
"BU"	= BLU	= BLUE
"VT"	= VIOLA	= VIOLET
"GY"	= GRIGIO	= GREY
"WH"	= BIANCO	= WHITE
"PK"	= ROSA	= PINK
"YE"	= GIALLO	= YELLOW
"GN"	= VERDE	= GREEN

MOD.	DESCRIZIONE MODIFICA – MODIFICATION DESCRIPTION	DATA – DATE	MOD. DA – MOD. BY	CONTR. – INSPECTION

PAGINA N° / PAGE N° | DI N° / OF N°
NOTE Versione in inglese
NOTE English version

SERIE: UR–24 ANALYTICAL REFRACTOMETRIC UNIT
DENOMINAZIONE: General connection schematic
STANDARD Interconnection box
DESIGNATION

MATRICOLA / PART NUMBER
DISEGNATO DA / DRAWN BY: A. Mordonini
CONTROLLATO / INSPECTED BY: G. Spagnoli

maselli misure
process analyzers
PARMA – MILANO ITALY

DATA / DATE: 02/11/2004
SCALA / SCALE
SOST. DIS. N° / SUBS. DWG N°

Cod. N°: 0124C0005
Mod.: 0

MM 99/A3 ELETT.

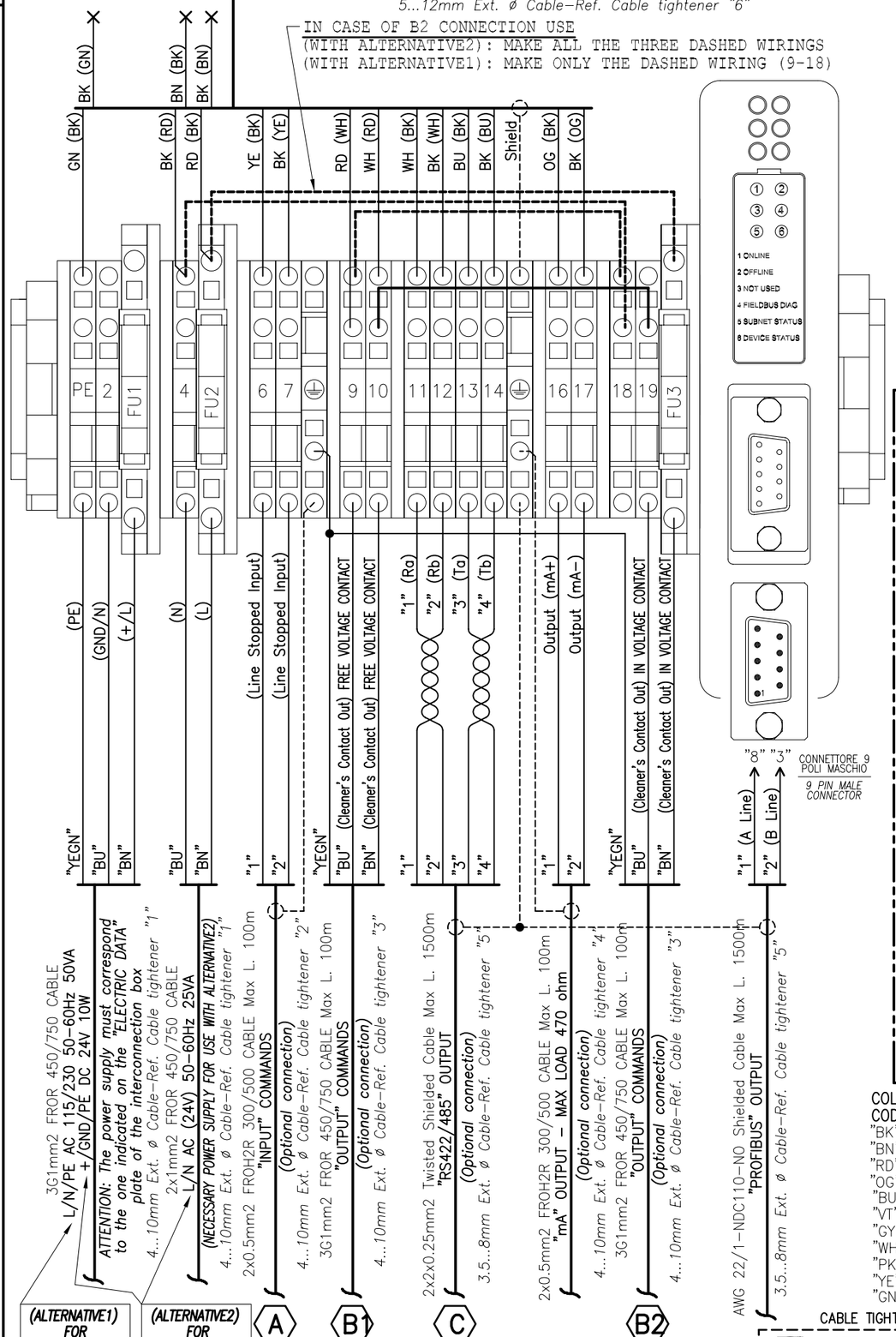
NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE – THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT

A3

INTERCONNECTION TERMINAL BOARD
(Optional)

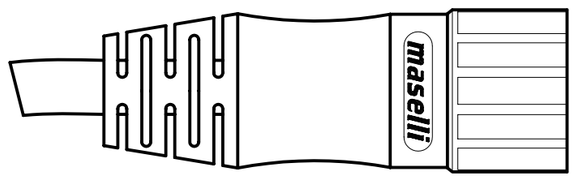
8x2x22 AWG SHIELDED CABLE (BELDEN 8308) L=5m
5...12mm Ext. ø Cable–Ref. Cable tightener "6"

IN CASE OF B2 CONNECTION USE
(WITH ALTERNATIVE2): MAKE ALL THE THREE DASHED WIRINGS
(WITH ALTERNATIVE1): MAKE ONLY THE DASHED WIRING (9-18)

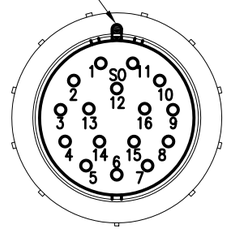


CABLE IDENTIFICATION EXAMPLE

REFERENCE HEEL (EXTERNAL VIEW)



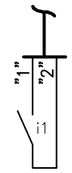
CONNECTOR CASING



CONNECTIONS ON CIRCULAR CONNECTOR
UR–24 DIGITAL REFRACTOMETER

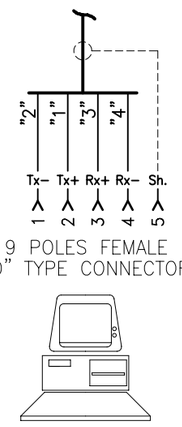
WH	Ra	8/XS2	RS422/485
BK	Rb	9/XS2	
BU	Ta	10/XS2	
BK	Tb	16/XS2	
OG	Output (mA+)	11/XS2	"mA" Output
BK	Output (mA–)	1/XS2	
RD	24Vdc/18Vac	4/XS2	Power Supply
BK	GND/N	5/XS2	
GN	PE	3/XS2	
BK		12/XS2	
YE	Input	6/XS2	Input
BK	Input	14/XS2	
RD	Output (C)	13/XS2	Output
WH	Output (NO)	2/XS2	
BN		7/XS2	
BK		15/XS2	

A — "LINE STOPPED" INPUT (HOLD) CONNECTION EXAMPLE



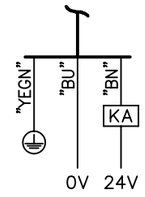
i1 = "Line Stopped" Input
Connect a normally opened, status indication contact "line operation"; the contact must close with line stopped.
When the contact is closed, the measurement is stopped on the last visualized value.

C — RS422/485 CONNECTION EXAMPLE ON A PC



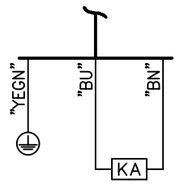
9 POLES FEMALE "D" TYPE CONNECTOR

B1 — CLEANER'S COMMAND OUTPUT (FREE VOLTAGE CONTACT) CONNECTION EXAMPLE



KA = Cleaning system
THE "CLEANER'S COMMAND" CONTACT MAXIMUM CAPACITY IS 500mA/24V.

B2 — CLEANER'S COMMAND OUTPUT (IN VOLTAGE CONTACT) CONNECTION EXAMPLE



KA = Cleaning system
THE "CLEANER'S COMMAND" CONTACT MAXIMUM CAPACITY IS 500mA/24V.

EXTERNAL CONNECTIONS EXAMPLE

CONNECTION NOTES:

ATTENTION: THE CONNECTION CABLES INDICATED ON THE DRAWING ARE "APPROXIMATELY SUGGESTED". FOR THE CONDUCTORS' CHOICE IT IS NECESSARY TO CHECK THE INSTRUMENT'S MODEL AND FEATURES, ITS PROCESS VOLTAGE, THE AMBIENT, THE TYPE OF MOUNTING AND THE CURRENT STANDARDS IN ORDER TO AVOID AN IMPROPER USE OF THE SAME, WITH HEAVY DAMAGES TO THE PERSONS AND THINGS SECURITY. IF THE CONDITIONS AREN'T RESPECTED IN CONTINUOUS SERVICE, IN OVERLOAD AND SHORT–CIRCUIT, THE CABLE CAN APPEAR TO BE DAMAGED IN SUCH A WAY TO NOT BE ABLE TO GUARANTEE AN ADEQUATE SECURITY. TO ASSURE THE UNIT'S OPTIMAL OPERATION AND COMPLIANCE TO THE RADIO INTERFERENCE STANDARDS, IT IS SUGGESTED TO USE SHIELDED CABLES WHERE IT IS INDICATED, AND TO NOT EXCEED THE INDICATED LENGHTS. IT IS ALSO SUGGESTED TO POWER SUPPLY THE UNIT BY MEANS OF A SECTIONING SWITCH. FOR EARTH AND SCREEN CONNECTIONS USE YELLOW–GREEN TERMINAL BLOCKS APPROVED FOR SUCH FUNCTION BEING SURE OF THEIR PERFECT UNIPOTENTIALITY (TERMINAL BLOCKS: PE; 8; 15).

COLOURS DESIGNATION
CODE "CEI 16–6" (IEC 757)

"BK"	NERO	BLACK
"BN"	MARRONE	BROWN
"RD"	ROSSO	RED
"OG"	ARANCIO	ORANGE
"BU"	BLU	BLUE
"VT"	VIOLA	VIOLET
"GY"	GRIGIO	GREY
"WH"	BIANCO	WHITE
"PK"	ROSA	PINK
"YE"	GIALLO	YELLOW
"GN"	VERDE	GREEN

CABLE TIGHTENERS LAYOUT (BOX)

MOD.	DESCRIZIONE MODIFICA – MODIFICATION DESCRIPTION	DATA – DATE	MOD. DA – MOD. BY	CONTR. – INSPECTION

PAGINA N° / PAGE N°	DI N° / OF N°	SERIE	UR–24 ANALYTICAL REFRACTOMETRIC UNIT	MATRICOLA / PART NUMBER
NOTE Versione in inglese / NOTE English version		DENOMINAZIONE	General connection schematic Interconnection Box (Profibus Module)	DISEGNATO DA / DRAWN BY: A. Mordonini
		DESIGNATION		CONTROLLATO / INSPECTED BY: G. Spagnoli

maselli misure
process analyzers
PARMA – MILANO ITALY

DATA / DATE: 29/11/2004 — SCALA / SCALE
SOST. DIS. N° / SUBS. DWG N°

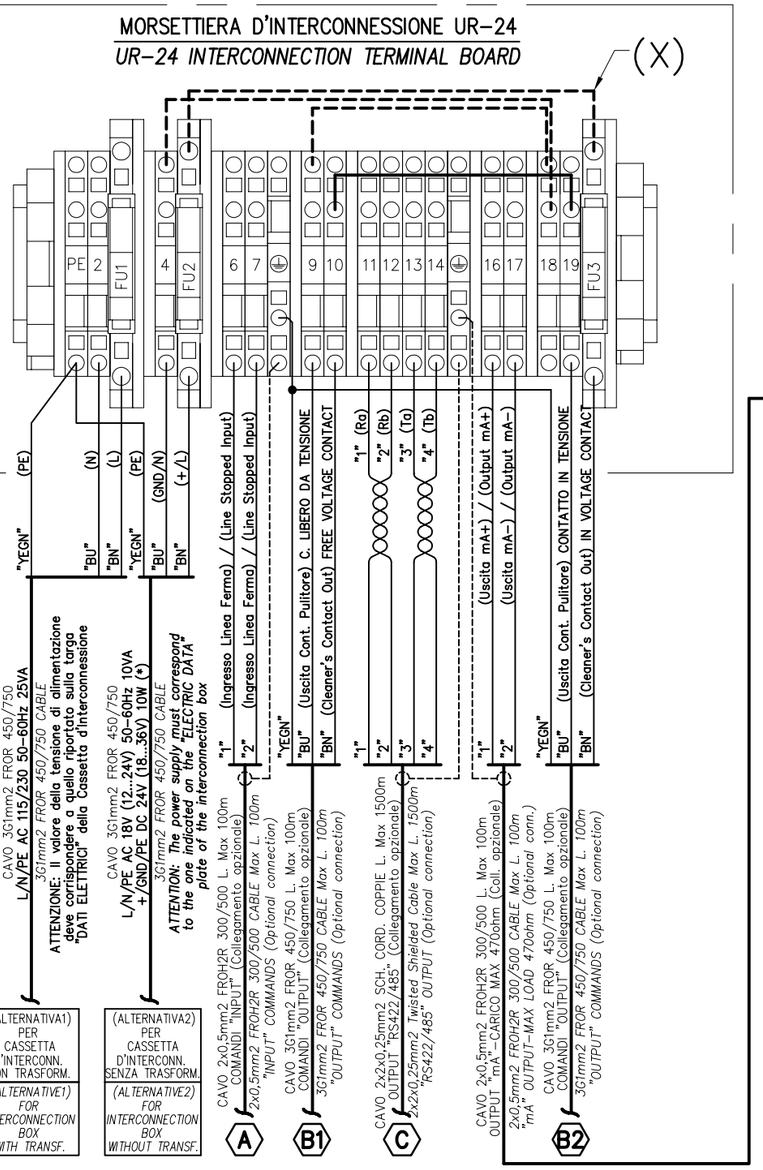
Cod. N° 0124C0017 — Mod. 0

MM 99/A3 ELETT.

NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE – THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT

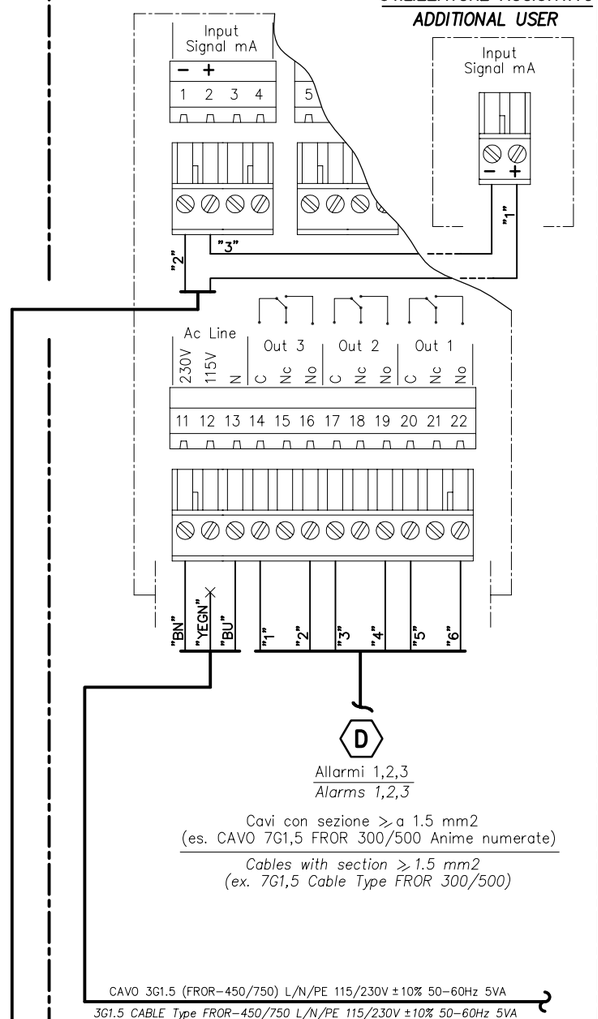
A3

MORSETTIERA D'INTERCONNESSIONE UR-24
UR-24 INTERCONNECTION TERMINAL BOARD



INDICATORE DIGITALE PA-22 CON ALLARMI
PA-22 DIGITAL INDICATOR WITH ALLARMS

UTILIZZATORE AGGIUNTIVO
ADDITIONAL USER



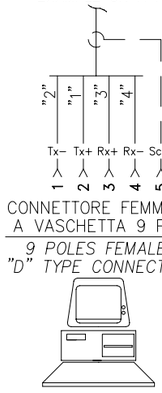
ESEMPIO CONNESSIONI ESTERNE
EXTERNAL CONNECTIONS EXAMPLE

A ESEMPIO DI COLLEGAMENTO INGRESSO "LINEA FERMA" (HOLD)
"LINE STOPPED" INPUT (HOLD) CONNECTION EXAMPLE

i1 = Ingresso "Linea Ferma"
Collegare un contatto n.o. di segnalazione stato "Funzionamento linea"; il contatto si deve chiudere con linea ferma.
La chiusura del contatto provoca il blocco della misura sull'ultimo valore visualizzato.

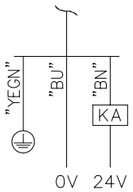
i1 = "Line Stopped" Input
Connect a normally opened, status indication contact "line operation"; the contact must close with line stopped.
When the contact is closed, the measurement is stopped on the last visualized value.

C ESEMPIO DI COLLEGAMENTO RS422/485 SU PC
RS422/485 CONNECTION EXAMPLE ON A PC

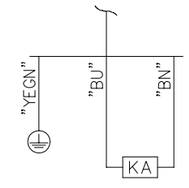


CONNETTORE FEMMINA A VASCHETTA 9 POLI
9 POLES FEMALE "D" TYPE CONNECTOR

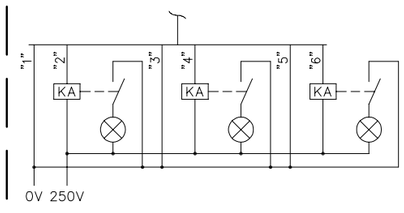
B1 ESEMPI DI COLLEGAMENTO USCITA COMANDO "PULITORE"
CLEANER'S COMMAND OUTPUT CONNECTION EXAMPLES



B2



D ESEMPIO DI COLLEGAMENTO DELLE USCITE
OUTPUTS CONNECTION EXAMPLE



KA = Sistema di pulizia
LA PORTATA MASSIMA DEL CONTATTO "COMANDO PULITORE" E' DI 500mA/24V.

KA = Cleaning system
THE "CLEANER'S COMMAND" CONTACT MAXIMUM CAPACITY IS 500mA/24V.

PER UNA CORRETTA RIPETIZIONE DELL'INDICAZIONE DI ALLARME ATTENERSI AGLI SCHEMI RIPORTATI.
LA PORTATA MASSIMA DEI CONTATTI DI "SEGNALAZIONE ALLARME" E' DI 8A/250V.

FOR A CORRECT REPETITION OF THE ALARM INDICATION, FOLLOW THE INDICATED DRAWINGS.
THE "ALARM INDICATION" CONTACT'S MAXIMUM CAPACITY IS 8A/250V.

NOTE PER I COLLEGAMENTI:

ATTENZIONE: I CAVI DI ALLACCIAMENTO RIPORTATI NELLO SCHEMA SONO "CONSIGLIATI A TITOLO INDICATIVO".
SI RACCOMANDA DI VERIFICARE IL TIPO E LE CARATTERISTICHE DELL'IMPIANTO, LE TENSIONI D'ESERCIZIO, L'AMBIENTE, IL TIPO DI POSA E LE NORMATIVE VIGENTI PER LA SCELTA DEI CONDUTTORI, AL FINE DI EVITARE UN USO IMPROPRIO DEGLI STESSI CON GRAVE PREGIUDIZIO DELLA SICUREZZA DI PERSONE E COSE.
QUALORA NON VENGANO RISPETTATE LE CONDIZIONI IN SERVIZIO CONTINUO, IN SOVRACCARICO E IN CORTOCIRCUITO IL CAVO PUO' RISULTARNE DANNEGGIATO IN MODO TALE DA NON GARANTIRE UN'ADEGUATA SICUREZZA.
PER ASSICURARE L'OTTIMALE FUNZIONAMENTO DELL'APPARECCHIATURA E LA CONFORMITA' ALLE NORME RELATIVE AI RADIODISTURBI, SI RACCOMANDA DI UTILIZZARE, DOVE SPECIFICATO, CAVI SCHERMATI E DI NON SUPERARE LE LUNGHEZZE RIPORTATE.
SI CONSIGLIA INOLTRE DI PREDISPORRE IN SERIE ALL'ALIMENTAZIONE GENERALE UN'INTERRUTTORE DI SEZIONAMENTO.
UTILIZZARE PER I COLLEGAMENTI DI TERRA E DI SCHERMO MORSETTI GIALLO-VERDE OMOLOGATI PER TAL FUNZIONE ASSICURANDOSI DELLA PERFETTA EQUIPOTENZIALITA' (MORSETTI: PE; 8; 15).

CONNECTION NOTES:

ATTENTION: THE CONNECTION CABLES INDICATED ON THE DRAWING ARE "APPROXIMATELY SUGGESTED".
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IT IS ALSO SUGGESTED TO POWER SUPPLY THE UNIT BY MEANS OF A SECTIONING SWITCH.
FOR EARTH AND SCREEN CONNECTIONS USE YELLOW-GREEN TERMINAL BLOCKS APPROVED FOR SUCH FUNCTION BEING SURE OF THEIR PERFECT UNIPOTENTIALITY (TERMINAL BLOCKS: PE; 8; 15).

(*) NOTA: IN CASO DI UTILIZZO DELLA CONNESSIONE B2 USARE SOLO ALIMENTAZIONE AC 24V 50-60Hz 20W.

(*) NOTE: IN CASE OF B2 CONNECTION USE THE 24V 50-60Hz 20W AC POWER SUPPLY ONLY.

(X) "IN CASO DI UTILIZZO DELLA CONNESSIONE B2"
(CON ALTERNATIVA2): ESEGUIRE TUTTI E TRE I COLLEGAMENTI TRATTEGGIATI
(CON ALTERNATIVA1): ESEGUIRE SOLO IL COLLEGAMENTO TRATTEGGIATO (9-18)

"IN CASE OF B2 CONNECTION USE"
(WITH ALTERNATIVE2): MAKE ALL THE THREE DASHED WIRINGS
(WITH ALTERNATIVE1): MAKE ONLY THE DASHED WIRING (9-18)

CODICE COLORI "CEI 16-6" (IEC 757)
COLOURS CODE "CEI 16-6" (IEC 757)

"BK"	= NERO	= BLACK
"BN"	= MARRONE	= BROWN
"RD"	= ROSSO	= RED
"OG"	= ARANCIO	= ORANGE
"BU"	= BLU	= BLUE
"VT"	= VIOLA	= VIOLET
"GY"	= GRIGIO	= GREY
"WH"	= BIANCO	= WHITE
"PK"	= ROSA	= PINK
"YE"	= GIALLO	= YELLOW
"GN"	= VERDE	= GREEN

MOD.	DESCRIZIONE MODIFICA – MODIFICATION DESCRIPTION	DATA – DATE	MOD. DA – MOD. BY	CONTR. – INSPECTION

PAGINA N° / PAGE N° — DI N° / OF N°
NOTE Italiano/Inglese
NOTE Italian/English

SERIE: UNITA' ANALITICA RIFRATTOMETRICA UR-24
DENOMINAZIONE: Schema di allacciamento con Indicatore Digitale PA-22 ed utilizzatore aggiuntivo
DESIGNATION: *Connection Schematic with PA-22 Digital Indicator and additional user*

MATRICOLA / PART NUMBER
DISEGNATO DA / DRAWN BY: *A. Mordonini*
CONTROLLATO / INSPECTED BY: *G. Spagnoli*

maselli misure
process analyzers
PARMA – MILANO ITALY

DATA / DATE 10/11/2004 — SCALA / SCALE
SOST. DIS. N° / SUBS. DWG N°

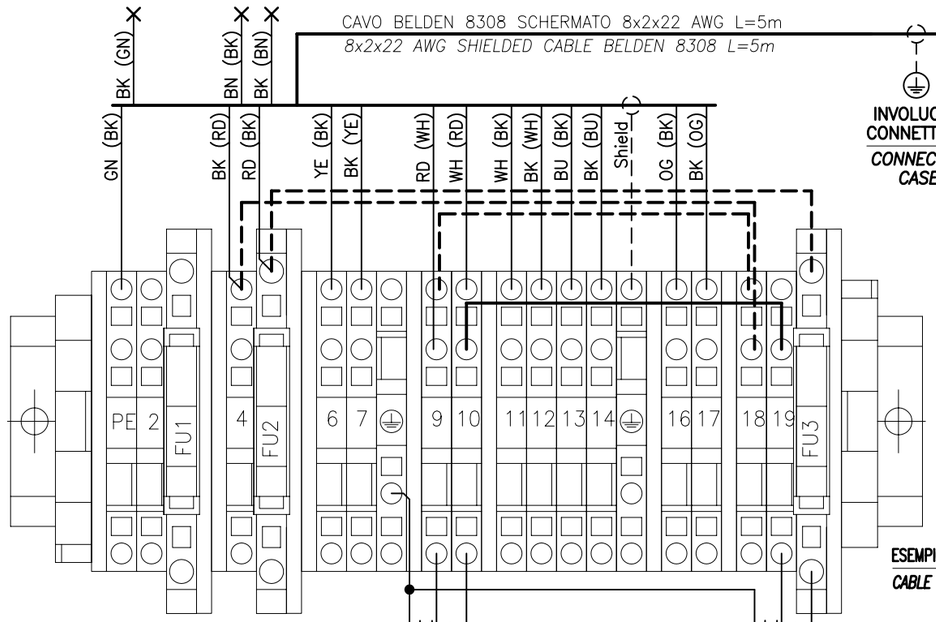
Cod. N° 0124C0010 — Mod. 0

MM 99/A3 ELETT.

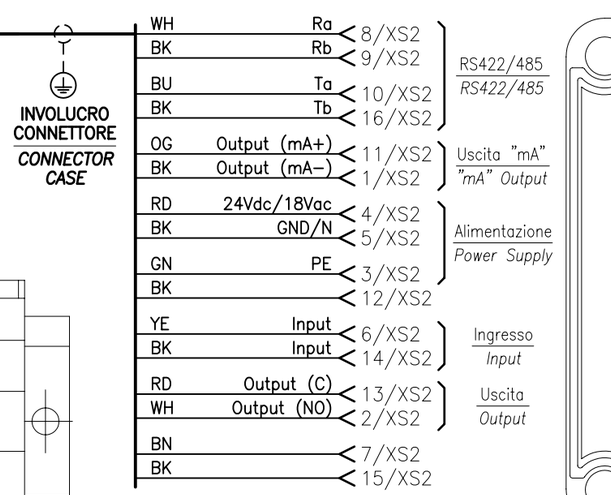
NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE – THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT

A3

MORSETTIERA D'INTERCONNESSIONE UR–24
UR–24 INTERCONNECTION TERMINAL BOARD



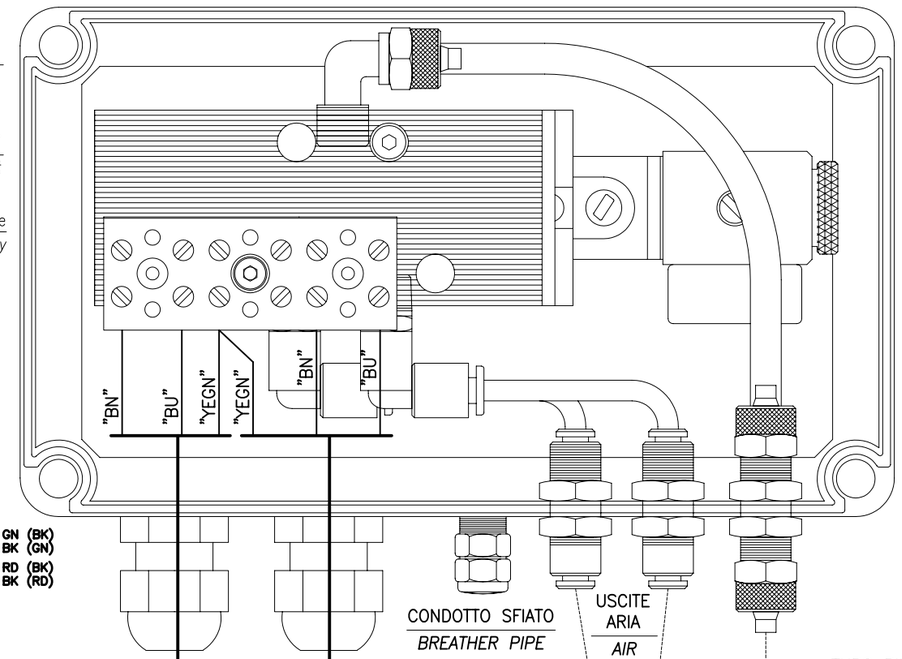
CONNESSIONI SU CONNETTORE CIRCOLARE UR–24
CONNECTIONS ON UR–24 CIRCULAR CONNECTOR



ESEMPIO IDENTIFICAZIONE CAVO (BELDEN) GN BK → GN (BK) BK (GN)

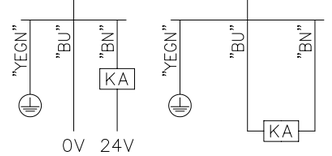
CABLE IDENTIFICATION EXAMPLE (BELDEN) RD BK → RD (BK) BK (RD)

QUADRO CONTROLLO PULITORE PNEUMATICO
PNEUMATIC CLEANER CONTROL PANEL



B1 ESEMPI DI COLLEGAMENTO USCITA COMANDO "PULITORE" B2

CLEANER'S COMMAND OUTPUT CONNECTION EXAMPLES



KA = Sistema di pulizia

LA PORTATA MASSIMA DEL CONTATTO "COMANDO PULITORE" E' DI 500mA/24V.

KA = Cleaning system

THE "CLEANER'S COMMAND" CONTACT MAXIMUM CAPACITY IS 500mA/24V.

(ALTERNATIVA1) PER CASSETTA D'INTERCONN. CON TRASFORM.	(ALTERNATIVA2) PER CASSETTA D'INTERCONN. SENZA TRASFORM.
(ALTERNATIVE1) FOR INTERCONNECTION BOX WITH TRANSF.	*(ALTERNATIVE2) FOR INTERCONNECTION BOX WITHOUT TRANSF.*

"IN CASO DI UTILIZZO DELLA CONNESSIONE B2"
(CON ALTERNATIVA2): ESEGUIRE TUTTI E TRE I COLLEGAMENTI TRATTEGGIATI
(CON ALTERNATIVA1): ESEGUIRE SOLO IL COLLEGAMENTO TRATTEGGIATO (9–18)

"IN CASE OF B2 CONNECTION USE"
(WITH ALTERNATIVE2): MAKE ALL THE THREE DASHED WIRINGS
(WITH ALTERNATIVE1): MAKE ONLY THE DASHED WIRING (9–18)

A CAVO 3G1.5mmq FROR 450/750 (*)
3G1.5mm2 FROR 450/750 CABLE (*)

A Alimentazione: 24 VAC 50 Hz 10 VA (*) [SOLO USANDO CONNESSIONE B1]
Power Supply: 24 VAC 50 Hz 10 VA (*) [ONLY USING B1 CONNECTION]

"YEGN" "BU" (Uscita Cont. Pulitore) CONTATTO IN TENSIONE "BN" *(Cleaner's Contact Out) IN VOLTAGE CONTACT*

CAVO 3G1mm2 FROR 450/750 L. Max 100m
COMANDI "OUTPUT" (Collegamento opzionale) B2
3G1mm2 FROR 450/750 CABLE Max L. 100m
"OUTPUT" COMMAND (Optional connection)

CAVO 3G1mm2 FROR 450/750 L. Max 100m
COMANDI "OUTPUT" (Collegamento opzionale) B1
3G1mm2 FROR 450/750 CABLE Max L. 100m
"OUTPUT" COMMAND (Optional connection)

"YEGN" "BU" (Uscita Cont. Pulitore) CON. LIBERO DA TENSIONE "BN" *(Cleaner's Contact Out) FREE VOLTAGE CONTACT*

B2 B1

PRODOTTO DI LAVAGGIO
WASHING PRODUCT

VALVOLA PNEUMATICA NORMALMENTE CHIUSA
NORMALLY CLOSED PNEUMATIC VALVE

DISPOSITIVO PNEUMATICO DI PULIZIA
PNEUMATIC CLEANER DEVICE

NOTE PER I COLLEGAMENTI:

ATTENZIONE: I CAVI DI ALLACCIAMENTO RIPORTATI NELLO SCHEMA SONO "CONSIGLIATI A TITOLO INDICATIVO".
SI RACCOMANDA DI VERIFICARE IL TIPO E LE CARATTERISTICHE DELL'IMPIANTO, LE TENSIONI D'ESERCIZIO, L'AMBIENTE, IL TIPO DI POSA E LE NORMATIVE VIGENTI PER LA SCELTA DEI CONDUTTORI, AL FINE DI EVITARE UN USO IMPROPRIO DEGLI STESSI CON GRAVE PREGIUDIZIO DELLA SICUREZZA DI PERSONE E COSE.
QUALORA NON VENGANO RISPETTATE LE CONDIZIONI IN SERVIZIO CONTINUO, IN SOVRACCARICO E IN CORTOCIRCUITO IL CAVO PUO' RISULTARNE DANNEGGIATO IN MODO TALE DA NON GARANTIRE UN'ADEGUATA SICUREZZA.
PER ASSICURARE L'OTTIMALE FUNZIONAMENTO DELL'APPARECCHIATURA E LA CONFORMITA' ALLE NORME RELATIVE AI RADIODISTURBI, SI RACCOMANDA DI UTILIZZARE, DOVE SPECIFICATO, CAVI SCHERMATI E DI NON SUPERARE LE LUNGHEZZE RIPORTATE.
SI CONSIGLIA INOLTRE DI PREDISPORRE IN SERIE ALL'ALIMENTAZIONE GENERALE UN'INTERRUTTORE DI SEZIONAMENTO.
UTILIZZARE PER I COLLEGAMENTI DI TERRA E DI SCHERMO MORSETTI GIALLO–VERDE OMOLOGATI PER TAL FUNZIONE ASSICURANDOSI DELLA PERFETTA EQUIPOTENZIALITA' (MORSETTI: PE; 8; 15).

CONNECTION NOTES:

ATTENTION: THE CONNECTION CABLES INDICATED ON THE DRAWING ARE "APPROXIMATELY SUGGESTED".
FOR THE CONDUCTORS' CHOICE IT IS NECESSARY TO CHECK THE INSTRUMENT'S MODEL AND FEATURES, ITS PROCESS VOLTAGE, THE AMBIENT, THE TYPE OF MOUNTING AND THE CURRENT STANDARDS IN ORDER TO AVOID AN IMPROPER USE OF THE SAME, WITH HEAVY DAMAGES TO THE PERSONS AND THINGS SECURITY.
IF THE CONDITIONS AREN'T RESPECTED IN CONTINUOUS SERVICE, IN OVERLOAD AND SHORT–CIRCUIT, THE CABLE CAN APPEAR TO BE DAMAGED IN SUCH A WAY TO NOT BE ABLE TO GUARANTEE AN ADEQUATE SECURITY.
TO ASSURE THE UNIT'S OPTIMAL OPERATION AND COMPLIANCE TO THE RADIO INTERFERENCE STANDARDS, IT IS SUGGESTED TO USE SHIELDED CABLES WHERE IT IS INDICATED, AND TO NOT EXCEED THE INDICATED LENGHTS.
IT IS ALSO SUGGESTED TO POWER SUPPLY THE UNIT BY MEANS OF A SECTIONING SWITCH.
FOR EARTH AND SCREEN CONNECTIONS USE YELLOW–GREEN TERMINAL BLOCKS APPROVED FOR SUCH FUNCTION BEING SURE OF THEIR PERFECT UNIPOTENTIALITY (TERMINAL BLOCKS: PE; 8; 15).

CODICE COLORI "CEI 16–6" (IEC 757)
COLOURS CODE "CEI 16–6" (IEC 757)

"BK"	= NERO	= BLACK
"BN"	= MARRONE	= BROWN
"RD"	= ROSSO	= RED
"OG"	= ARANCIO	= ORANGE
"BU"	= BLU	= BLUE
"VT"	= VIOLA	= VIOLET
"GY"	= GRIGIO	= GREY
"WH"	= BIANCO	= WHITE
"PK"	= ROSA	= PINK
"YE"	= GIALLO	= YELLOW
"GN"	= VERDE	= GREEN

MOD.	DESCRIZIONE MODIFICA – MODIFICATION DESCRIPTION	DATA – DATE	MOD. DA – MOD. BY	CONTR. – INSPECTION

PAGINA N° / PAGE N° — DI N° / OF N°
NOTE Italiano/Inglese
NOTE Italian/English

SERIE: UNITA' ANALITICA RIFRATTOMETRICA UR–24
DENOMINAZIONE: Schema di allacciamento a dispositivo pneumatico di pulizia
DESIGNATION: Connection schematic to pneumatic cleaner device

MATRICOLA / *PART NUMBER*
DISEGNATO DA / *DRAWN BY*: *A. Mordonini*
CONTROLLATO / *INSPECTED BY*: *G. Spagnoli*

maselli misure
process analyzers
PARMA – MILANO ITALY

DATA / *DATE*: 09/11/2004
SCALA / *SCALE*
SOST. DIS. N° / *SUBS. DWG N°*

Cod. N°: 0124C0009
Mod.: 0

MM 99/A3 ELETT.

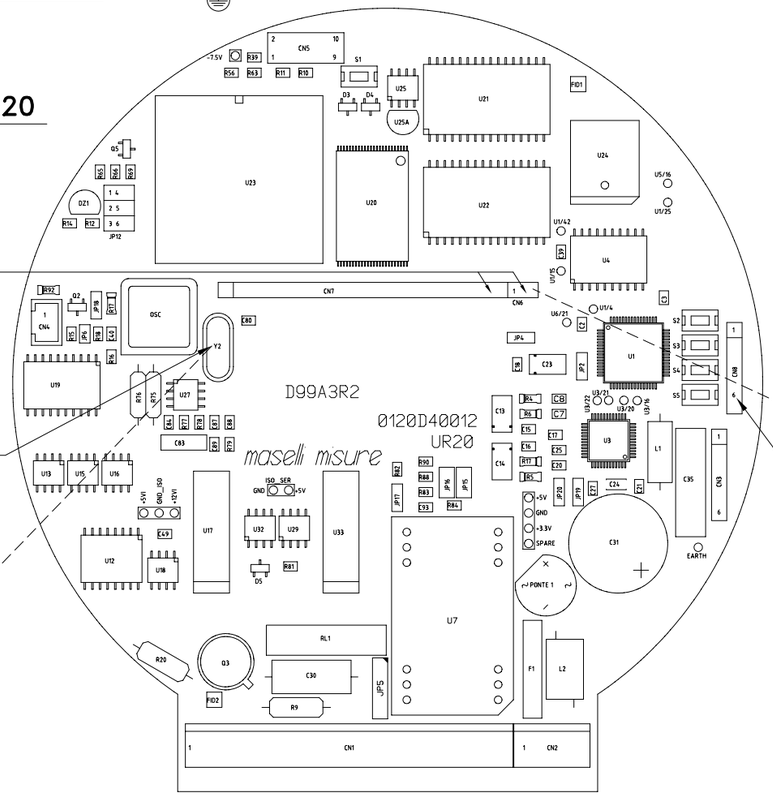
NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE – THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT

A3

CODICE DI DESIGNAZIONE DEI COLORI "CEI 16-6" (IEC 757)
COLOUR DESIGNATION CODE "CEI 16-6" (IEC 757)

"BK"	= NERO	= BLACK		"GY"	= GRIGIO	= GREY
"BN"	= MARRONE	= BROWN		"WH"	= BIANCO	= WHITE
"RD"	= ROSSO	= RED		"PK"	= ROSA	= PINK
"OG"	= ARANCIO	= ORANGE		"YE"	= GIALLO	= YELLOW
"BU"	= BLU	= BLUE		"GN"	= VERDE	= GREEN
"VT"	= VIOLA	= VIOLET				

CARD "CPU" UR-20



8x2x22 SCH. AWG BELDEN CABLE

CAVO (CPU-DISPLAY)
Al Display
CABLE (CPU-DISPLAY)
To the Display

CAVO (CPU-LED)
Alla "Sorgente Luminosa"
CABLE (CPU-LED)
To the "Light source"

CN4
1=+/A
2=-/k

CN6
1=+/A
2=-/K

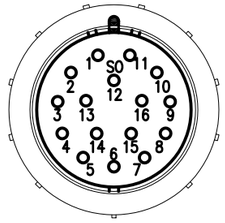
FLAT (TASTIERA)
Dalla "Tastiera" in Poliestere
FLAT (KEYBOARD)
From "Keyboard" in polyester

CN1 16 PIN
FEMALE CONNECTOR

"GN (BK)"	⏚	
"BK (GN)"	"IN+2"	3
"RD (BK)"	"24VIN_1"	12
"BK (RD)"	"24VIN_2"	4
"YE (BK)"	"IN-"	5
"BK (YE)"	"IN+"	6
"BN (BK)"	"AI+"	14
"BK (BN)"	"AI-"	7
"WH (BK)"	"Ra"	15
"BK (WH)"	"Rb"	8
"BU (BK)"	"Ta"	9
"BK (BU)"	"Tb"	10
"OG (BK)"	"mA+"	16
"BK (OG)"	"mA-"	11
"WH (RD)"	"RELE_NO"	1
"RD (WH)"	"RELE_C"	2
		13

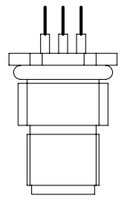
CARCASSA CONNETTORE
CONNECTOR CASING

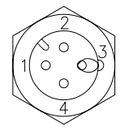
PIEDINATURA "PLUG/RECEPTACLE"
CONNETTORE "CN1"
"PLUG/RECEPTACLE" PINS ASSIGNMENT
"CN1" CONNECTOR



VISTA SALDATURE/SOLDERING VIEW "PLUG"
CONN. (F) 16 P "CN1"

PIEDINATURA "PLUG"
CONNETTORE "CN2"
"PLUG" PINS ASSIGNMENT
"CN2" CONNECTOR



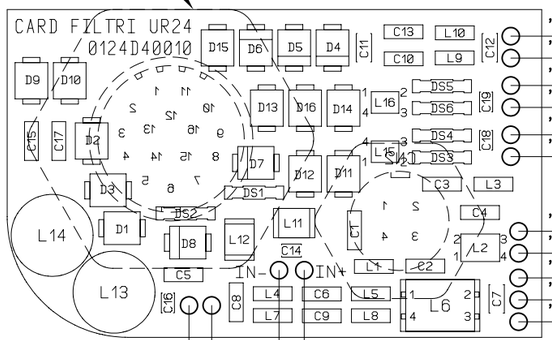


VISTA SALDATURE/SOLDERING VIEW
CONN. (M) 4 P "CN2"

* NEL CASO DI PT100 INTERNA CABLARE I CONDUTTORI DELLA Pt AI PIN 1 E 3 DEL CONNETTORE(M)14P

Pt100				In		Out		mA		RS485				SUPPLY		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3
T1	T2	T3	T4	In+	In-	C	NO	+	-	Ra	Rb	Ta	Tb	GND	+	⏚
1	3	5	6	7	8	9	10	11	12	13	14	15	16	17		
"RD"	"RD"	"WH"	"WH"	"RD"	"RD"	"YE"	"YE"	"GN"	"GN"	"GN"	"GN"	"BK"	"BK"	"YE"		

CARD FILTRI/FILTERS CARD



"YE"	"MA-"
"YE"	"MA+"
"GN"	"Tb"
"GN"	"Ta"
"GN"	"Ra"
"GN"	"Rb"
"RD"	"T3"
"RD"	"T1"
"BK"	"24VIN_2"
"BK"	"24VIN_1"
"YE"	⏚
"WH"	"IN+"
"WH"	"IN-"
"RD"	"RELE_C"
"RD"	"RELE_NO"

MOD.	DESCRIZIONE MODIFICA - MODIFICATION DESCRIPTION	DATA - DATE	MOD. DA - MOD. BY	CONTR. - INSPECTION

PAGINA N° / *PAGE N°* | DI N° / *OF N°*
NOTE Italiano/Inglese
NOTE *Italian/English*

SERIE: UNITA' ANALITICA RIFRATTOMETRICA UR-24
DENOMINAZIONE: Schema Generale di Cablaggio ed Allacciamenti Interni
DESIGNATION: Connections General Schematic

MATRICOLA / *PART NUMBER* -
DISEGNATO DA / *DRAWN BY* *V. Verdoliva*
CONTROLLATO / *INSPECTED BY* *G. Spagnoli*

maselli misure
process analyzers
PARMA - MILANO ITALY

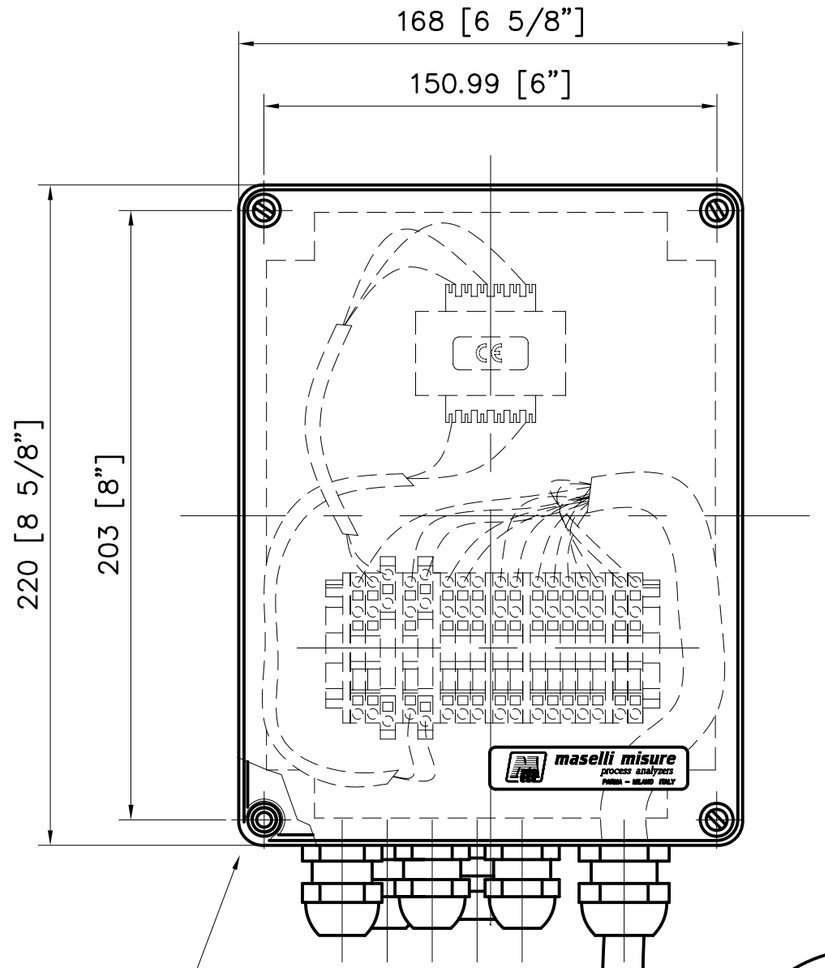
DATA / *DATE* 06/10/2004 | SCALA / *SCALE* -
SOST. DIS. N° / *SUBS. DWG N°* -

Cod. N° 0124C0002 | Mod. 0

MM 99/A3 ELETT.

NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE - *THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT*

A3



DIAMETRO FORO UTILIZZABILE PER IL FISSAGGIO = ø5

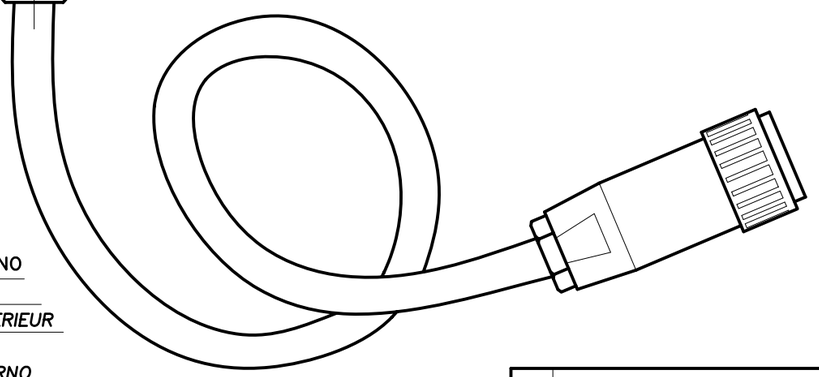
FIXING HOLE DIAMETER = 5

DIAMETRE TROU UTILISABLE POUR LA FIXATION Ø=5

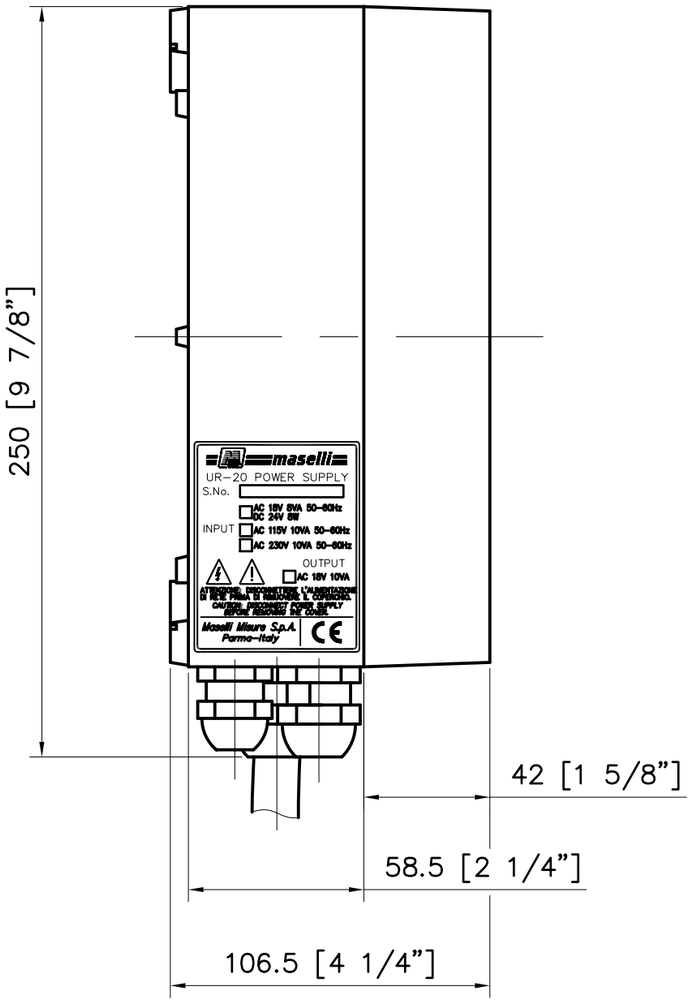
BENUTZBAR ZUR FIXIERUNG LOCH–DURCHMESSER = Ø 5

DIÁMETRO DEL AGUJERO A UTILIZAR PARA LA FIJACIÓN=ø5

CONNETTORE MULTIPOLARE
MULTIPOLAR CONNECTOR
MEHRPOLIGER VERBINDER
CONNECTEUR MULTIPOLAIRE
CONECTOR MULTIPOLAR



CAVO m5 ø13 ESTERNO
m5 ø13 O.D. CABLE
CABLE m5 Ø 13 EXTERIEUR
m5 ø13 O.D. CABLE
CABLE 5m. ø13 EXTERNO



ABMESSUNGEN DES SCHNITTSTELLEKASTENS VAC 115/230V.

DIMENSIONS D' ENCOMBREMENT BOITIER D' INTERCONNEXION VAC 115/230V

DIMENSIONES CAJA DE INTERCONEXIÓN VERSIÓN VAC 115/230V

23/05/2006

MOD.	DESCRIZIONE MODIFICA – MODIFICATION DESCRIPTION	DATA – DATE	MOD. DA – MOD. BY	CONTR. – INSPECTION
1	Aggiunta ai testi traduzione in lingua tedesca francese, spagnola	26/09/2001	*Papini Luca*	*Spagnoli G.*

PAGINA N° *PAGE N°* | DI N° *OF N°*

NOTE *NOTE*

SERIE: RIFRATTOMETRO DIGITALE UR–20

MATRICOLA *PART NUMBER*: ––

DENOMINAZIONE: DIMENSIONI DI INGOMBRO CASSETTA D'INTERCONNESSIONE VERSIONE VAC 115/230V

DESIGNATION: *INTERCONNECTION BOX VAC 115/230V VERSION – OVERALL DIMENSIONS*

DISEGNATO DA *DRAWN BY*: *Osmini Luigi*

CONTROLLATO *INSPECTED BY*: *Benassi C.*

maselli misure
process analyzers
PARMA – MILANO ITALY

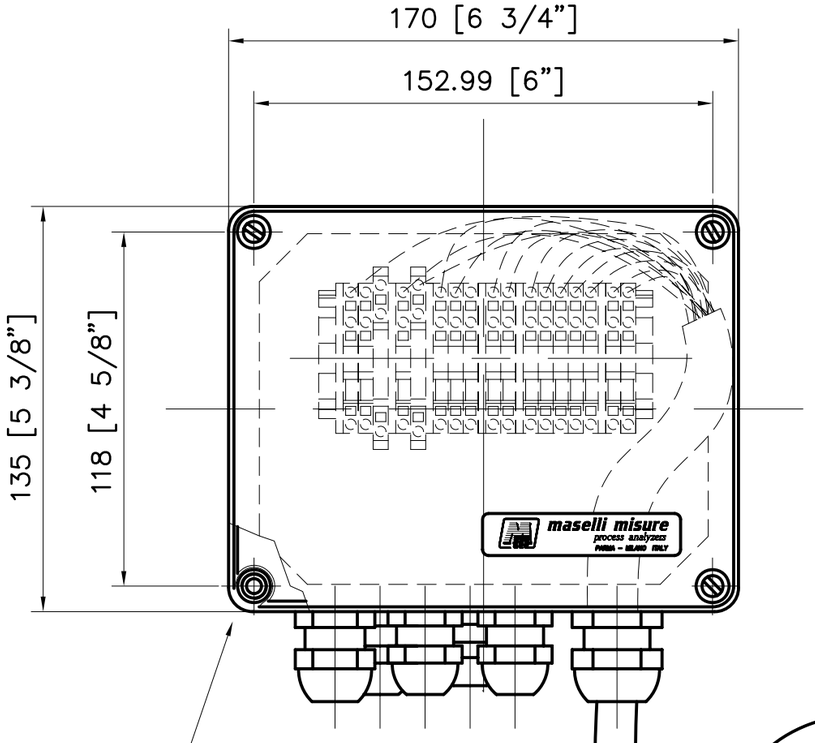
DATA *DATE* 20/06/2000 | SCALA *SCALE* 1:2

SOST. DIS. N° *SUBS. DWG N°* 0120M20010

Cod. N° 0120M2001 | Mod. 1

MM 99/A3 ELETT. NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE – *THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT*

A3



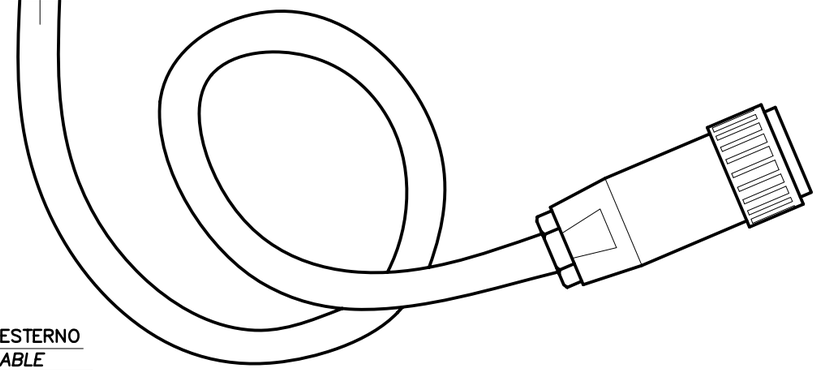
DIAMETRO FORO UTILIZZABILE PER IL FISSAGGIO = ø4.5

FIXING HOLE DIAMETER = 4.5

BENUTZBAR ZUR FIXIERUNG LOCH-DURCHMESSER = Ø 4.5

DIAMETRE TROU UTILISABLE POUR LA FIXATION= ø 4.5

DIÁMETRO DEL AGUJERO A UTILIZAR PARA LA FIJACIÓN = ø4.5



CAVO m5 ø13 ESTERNO

m5 ø13 O.D. CABLE

KABEL m5 Außen. Ø 13

CABLE m5 ø13 EXTERIEUR

CABLE m5 ø13 EXTERNO

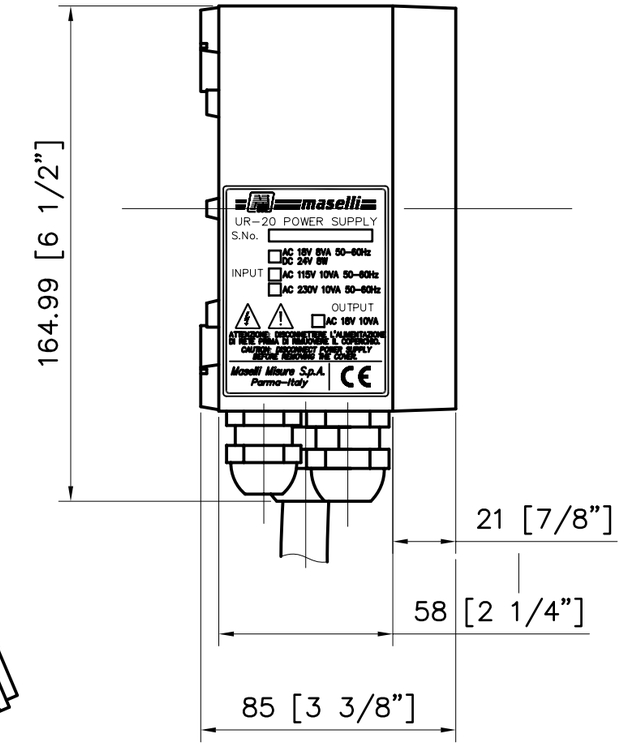
CONNETTORE MULTIPOLARE

MULTIPOLAR CONNECTOR

MEHRPOLIGER VERBINDER

CONNECTEUR MULTIPOLAIRE

CONECTOR MULTIPOLAR



ABMESSUNGEN DES SCHNITTSTELLEKASTENS VDC/VAC EXT.

DIMENSIONS D' ENCOMBREMENT BOITIER D' INTERCONNEXION VDC/VAC EXT.

DIMENSIONES CAJA DE INTERCONEXIÓN VERSIÓN VDC/VAC EXT.

23/05/2006

MOD.	DESCRIZIONE MODIFICA – MODIFICATION DESCRIPTION	DATA – DATE	MOD. DA – MOD. BY	CONTR. – INSPECTION
1	Aggiunta ai testi traduzione in lingua tedesca francese, spagnola	26/09/2001	Papini Luca	Spagnoli G.

PAGINA N° / *PAGE N°* | DI N° / *OF N°*

NOTE / *NOTE*

SERIE

RIFRATTOMETRO DIGITALE UR-20

DENOMINAZIONE – *DESIGNATION*

DIMENSIONI DI INGOMBRO CASSETTA D'INTERCONNESSIONE VERSIONE VDC/VAC EXT.

INTERCONNECTION BOX VDC/VAC EXT. VERSION – OVERALL DIMENSIONS

MATRICOLA / *PART NUMBER* ––

DISEGNATO DA / *DRAWN BY* Osmini Luigi

CONTROLLATO / *INSPECTED BY* Benassi C.

maselli misure
process analyzers
PARMA – MILANO ITALY

DATA / *DATE* 20/06/2000 | SCALA / *SCALE* 1:2

SOST. DIS. N° / *SUBS. DWG N°* 0120M20020

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MM 99/A3 ELETT. NEI TERMINI SANCITI DALLA LEGGE E' VIETATA LA RIPRODUZIONE O COMUNICAZIONE A TERZI SENZA NOSTRA APPROVAZIONE – *THE LAW FORBIDS PARTIAL OR COMPLETE REPRODUCTION OR COMMUNICATION TO THIRD PARTIES WITHOUT OUR CONSENT*