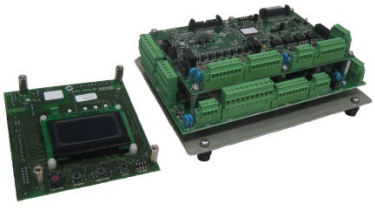
DTDE 326

ECU 1000

INSTALLATION and MAINTENANCE MANUAL

ECU1000 electronic cards



ECU1000 cabinets

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REV.	DATE	PREPARED	APPROVED	NOTES
0	**30/07/2013**	**M. Giuliani**	**A. Affaticati**	**Issue**
1	**09/06/2014**	**M. Giuliani**	**A. Battaglia**	

1 Introduction

The documents DTDE326, DTDE327 and DTDE328 are the **I**nstallation, **O**peration and **M**aintenance manuals of the **ECU1000**, **Electronic Control Unit** for electro-hydraulic actuators.
The **DTDE326** "Installation and Maintenance", provides the instructions for the installation and maintenance of cabinet with ECU1000. The **DTDE327** "Control functions and Local Operator Interface" provides the instructions to use the Local Operator Interface, the Positioner and the additional functions to control and monitor the actuator. The **DTDE328** "Functions description, Input characterization-Recorder-Graph-Logger-PST-HPU-On/Off control-Optional local lamps-PWM module" provides detailed instructions relevant to further ECU1000 functions as Input characterization, Recorder, Graph, Logger, PST, HPU, On/Off control and Optional local lamps. The manuals DTDE326, DTE327 and DTDE328 provide the instructions relevant to the complete set of ECU1000 functions. Only functions requested by the application and needed to allow the correct actuator control and operation will be activated in the factory setting. The warnings reported in this manual consider the risk analysis of the document DTDE331.

2 Reference documents

DTDE 327 "Control functions and Local Operator Interface" of ECU1000
DTDE328 "Functions description", Input characterization-Recorder-Graph-Logger-PST-HPU-On/Off control-Optional local lamps-PWM module"
DTDE300 ECU1000 "Product description"
DTDE330 "ECU1000 BIFFI-Assistant User Manual"
DTDE331 ECU1000 "Cabinet data and risk assessment"
Electrical diagram of cabinet with ECU1000 device code 193AR000xxx
Factory test procedure of cabinet with ECU1000 device code 193AR000xxx
Hydraulic diagram and installation and operation manuals of mechanical and hydraulic equipment controlled by the ECU1000 cabinet 193AR000xxx

3 General Safety Instructions

3.1 Manufacturer

Manufacturer with respect to Machinery Directive 2006/42/EC is BIFFI Italia, as specified on the machinery label.

3.2 Intended Use

The ECU1000 electronic device described in the reference documents is designed to control an electro-hydraulic actuator for process valves. The main functions are:

- to acquire the feedbacks from sensors of **HA** (**H**ydraulic **A**ctuator), **HCU** (**H**ydraulic **C**ontrol **U**nit), **HPU** (**H**ydraulic **P**ower **U**nit)
- to acquire the setpoints from control room
- to process the acquired data and send operational commands to HA, HCU, integral HPU
- to monitor the complete system
- to send to control room signals relevant to status and alarms of complete system
- to log events, alarms and failures

BIFFI Italia will not be liable for any possible damage or physical injury resulting from use in other than the designated applications or by lack of care during installation, operation, adjustment and maintenance of the machine. Such risks lie entirely with the user. Depending on the specific working conditions, additional precautions may be requested. Considering that Biffi Italia has no direct control over particular applications, operation or maintenance conditions, it is the operator's responsibility to comply with all applicable safety rules. Please inform Biffi Italia urgently if you face unsafe situations not described in the mentioned IOM's. It is the sole responsibility of the operator to ensure that the local health and safety regulations are adhered to.

Warning: 	• **It is assumed that the installation, the setting, the commissioning, the maintenance and repair works are carried out by qualified personnel and checked by responsible Specialists.** • **The door of cabinet must be kept "closed" by the key (or equivalent tool). Operating the unit or working on the Electronics with the cabinet door "open" could cause personal injury and damage the equipment**

Warning: 	**The ECU1000 controls the actuator, it could control the HPU, it could drive generic electric, mechanic, pneumatic and hydraulic devices. To avoid unwanted movement of mechanic parts or leakage of pressurized fluids and risk injury of people and damage of equipment and ambient, any mechanic, electric, hydraulic and pneumatic device controlled by the ECU1000 device should be placed in safe condition before executing any installation, commissioning or maintenance operation (see relevant instruction manuals of actuator, HPU, etc.)**

Warning: 	**The end user shall provide circuit-breakers and fuses in the marshalling cabinet of control room, to switch off the Mains and any other voltage applied to ECU1000 cabinet. Before opening the door of the ECU1000 cabinet it is mandatory to check that any voltage (Mains or Control voltage) is off.** **Breakers, fuses, differential breakers, in general any disconnecting device** • **shall be in accordance with the local national standards and plant rules.** • **shall be sized to be in accordance to the power required by the ECU1000 cabinet and the connected electrical loads with a maximum of 10A.** • **shall be suitable located and easily reached** • **shall be marked as the disconnecting device for the equipment** • **shall not interrupt the protective earth conductor**

Warning: 	**Any repair work other than the operations outlines in the mentioned IOM's will be strictly reserved to qualified BIFFI ITALIA personnel or to personnel directly authorised by the Company itself.**

Warning: 	**The electronic parts of the ECU1000 and all the options can be damaged by a discharge of static electricity. Before you start, touch a grounded metal surface to discharge any static electricity.**

Warning: 	**If the device is located in hazardous area a ''hot permit'' must be obtained before opening the explosion proof enclosures. Moreover the area must be cleaned from explosive mixture since time keeper battery and residual capacitor charge could generate electrical spark and cause explosion. The installation must be carried out in accordance to the applicable Ex-d Standards regarding the electrical installations in hazardous areas and any other applicable national standard and rule.**

ECU1000 devices are designed in accordance with the applicable International Rules and Specifications, but the following Regulations must be observed in any case:

- the general and safety regulations
- the plant specific regulations and requirements
- the proper use of personal and protective devices (glasses, clothing, gloves, etc)
- the proper use of tools, lifting and transport equipment.

3.3 Terms and conditions

Biffi Italia guarantees each single product to be free from defects and to conform to current goods specifications. The warranty period is one year from the date of installation by the first user, or eighteen months from the date of shipment to the first user, whichever occurs first. No warranty is given for products which have been subject to improper storage, improper installation, misuse, or corrosion, or which have been modified or repaired by unauthorised personnel. Repair work due to improper use will be charged at standard rates.

3.4 Manufacturer's Liability

Biffi Italia declines all liability in the event of:

- use of the device in contravention of local safety at work legislation
- incorrect installation, disregard or incorrect application of the instructions provided on the device nameplate and in this manual
- modifications without Biffi's authorisation
- work done on the unit by unqualified or unsuitable persons

3.5 Applicable Standards and Regulations

EN ISO 12100-1: Safety of machinery - Basic concepts, general principles for design. Part 1-Basic terminology, methodology.
EN ISO 12100-1: Safety of machinery - Basic concepts, general principles for design. Part 2-Technical principles and specification.
EN 60204/1: Electrical equipment of industrial machines. Part 1- General requirements.
2006/42/EC: Machinery directive.
2004/108/EC: EMC Directive
94/9/EC: ATEX Directive (if used in hazardous area)
2006/95/EC: Low Voltage Directive
IEC 60068-2-6, IEC 60068-2-57: Vibration Test
IEC 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use

4 Storage

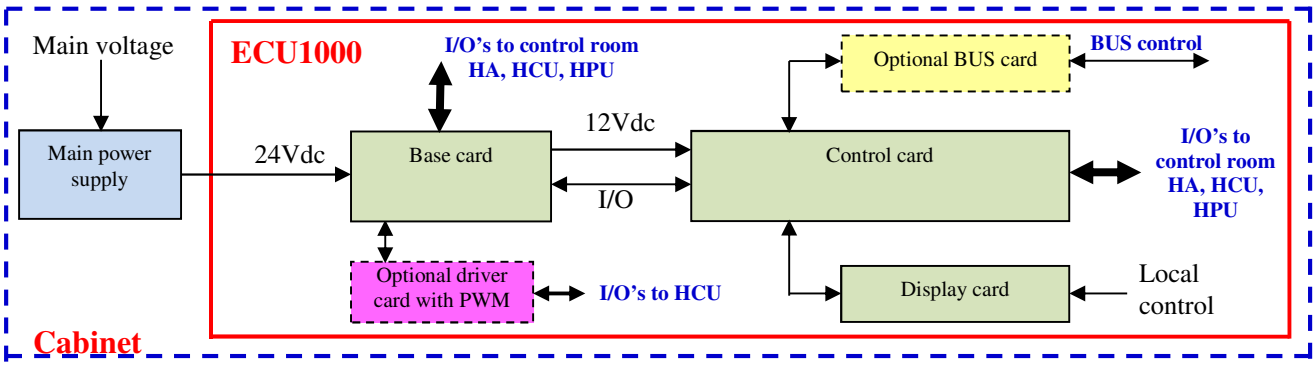
Important: 	**Not performing the following instructions will invalidate the product guarantee.**

All ECU1000 cabinets leave the factory in perfect condition. When mounted together with the actuator they are guaranteed by the actuator test certificate; in other cases they are guaranteed by an individual certificate. In order to maintain these characteristics until the ECU1000 is installed on site, proper attention must be observed for preservation during the storage period.
The standard plastic plugs used to protect the cable entries during the transport are not waterproof; they just prevent the entry of undesired objects during transport: during the storage it is recommended to replace them with waterproof version.
In any case storage is recommended in close ambient without excessive humidity.

5 Device Description

This paragraph summarizes only the main important functions of cabinet with ECU1000. Detailed description of functions is available in the manuals DTDE327 and DTDE328.

5.1 Block diagram



The ECU1000 is supplied at 24VDC. A power supply module should be provided in the cabinet to generate the requested 24 VDC. The optional driver card is requested to drive proportional valves by PWM signals.

5.2 General features

- Control of any BIFFI hydraulic actuator (OLGA-H, OLGAS-H, HLA, HLA-S, single acting spring return or double acting, modulating and on-off service)
- Standard functions:
  1. *Positioning of modulating actuator (heavy duty, low drain-heavy duty, stepping)*
  2. *Control of integral HPU with single or dual pump. Automatic switch of electrical pumps*
  3. *Control of on-off actuator*
  4. *Partial Stroke Test*
  5. *Input characterization*
  6. *Failsafe function*
  7. *ESD function*
  8. *Interlock function*
  9. *Stay in position by dedicated SOV*
  10. *Outputs to control Servovalves, Proportional Valves, on-off **S**olenoid **O**perated **V**alves (SOV's), contactors of Electrical Motor of hydraulic pumps*
  11. *Inputs to read 4-20mA transmitters and switches*
  12. *Optional module to drive proportional valves by PWM signals*
- Hardwired and BUS remote control
- Local control
- Local Operator Interface with graphic OLED display and pushbuttons, visible from -40°C
- User friendly navigation in the menu. English language menu.
- Diagnostic function
- Full local parameterization.
- Access to parameter protected by four levels of password
- Configuration data saved in 3 separated permanent memories
- 2 Watch-dog timer working in parallel
- Real Time Clock and battery to maintain date and time
- CRC function to validate communication messages and memory content
- Bluetooth wireless communication
- Temperature, humidity and acceleration sensors of electronic cards
- Electronic NAME PLATE of electronic cards
- Failure, Alarm, Event, Connection loggers, graph and recorder
- BIFFI-Assistant, SW tool for PC for connection to actuator via Bluetooth or RS232

- Operating temperature of electronics from -40 °C to +75 °C
- Electronics suitable to "On-field" operation inside an IP65 or Ex-d cabinet containing:
  - ECU1000 electronic cards
  - Power supply module
  - Line filter, fuses, surge arrester, optional magnetothermal switch
  - DIN RAIL terminals for connection with control room, HA, HPU and HCU
  - Optional Heater

5.3 Inputs and Outputs

Each input and output is configurable and can be associated either to signals to/from control room and HA, HCU, HPU.

- **Analogue inputs**

4 x 4-20mA analogue inputs, insulating amplifiers and surge arresters. Max voltage drop at 20mA=9V
1 x 4-20mA analogue input, insulating amplifier and surge arresters. Jumper (J6) to select High/Low impedance mode. Impedance in High impedance mode >100Kohm. Impedance in Low impedance mode <250ohm.

- **Analogue output**

1 x 4-20mA analogue output, insulating amplifier and surge arresters. Max resistive load 250 ohm, active or passive current loop, max voltage 24V.

- **Digital inputs**

10 x digital inputs, optocoupled, max voltage 30Vdc, surge arresters. Max absorbed current 7mA. Logical_0 < 5V, Logical_1 >15V

- **Digital output**

1 x digital outputs, optocoupled, surge arresters, max 24V

- **Servovalve / proportional valve control**

1 x analogue output configurable by jumpers, insulating amplifier and surge arresters
  - +-10V, +-10mA, +-15mA, +-50mA, +-100mA

1 x digital output, optocoupled, surge arrester
  - enable control to servovalve / proportional valve or general output

1 x digital input, optocoupled, surge arrester
  - fault status of servovalve / proportional valve or general input

The Servovalve/Proportional Valve stage is supplied at 24VDC and is protected by a 4A T fuse in the ECU1000 cabinet.

- **Output relays**

4 x single side stable, SPDT contact, voltage free, max 30Vdc/230Vac/1A
5 x single side stable, SPST NO contact, voltage free, max 30Vdc/230Vac/1A
2 x single side stable, SPST NO contact, voltage free, max 30Vdc/230Vac/1A (on demand latching relay)
According to user request, to the application and to the electrical diagram, some contact is available to the end user as remote signalling and the remaining contacts are available to control the electrical components of HA, HCU and HPU. The set of condition to switch each relay is configurable.

Important: 	**The contacts of the output relays are available on the connectors CN39, CN40 and CN41 (see par.5.7, RL0 to RL10). If the voltages through the contacts are different (e.g. 230Vac and 24Vdc), it is suggested to group the contacts with the same voltage in the same connector. Each contact should be protected by 1AT fuse, not provided in the ECU1000 cabinet. If the contacts work as control of an external load, the fuse should be provided in the cabinet containing the electrical load. If the contacts work as signalling to control room, the fuse should be installed in the marshalling cabinets of the control room at customer care. Reinforced insulation is provided between each group of relays connected to connectors CN39, CN40, CN41; basic insulation is provided between each relay connected to the same connector; the end user shall provide the same insulation in the external load.**

5.3.1 Digital inputs up to 110Vdc

It is necessary to add a resistor in series to each input that works at more than 30Vdc, to limit the input current. The additional resistors can be mounted by the end user in the marshalling cabinet of the control room or by Biffi in the ECU1000 cabinet. The following table provides the values of resistors.

Voltage	Value
48Vdc	2W-6800 Ohm

Voltage	Value
110Vdc	2W-22000 Ohm

5.3.2 Extension connector

It allows increasing the number of I/O lines to connect an optional driver card card with 2 PWM channel e 2 analog inputs or a generic proportional valve with PWM control input

5.3.3 Service voltages

1 x out: 24Vdc/100mA isolated to supply the Position transmitter
1 x out: optional 24Vdc/100mA isolated to supply remote controls

5.4 Bus interface

Upon request the ECU1000 can be provided with Modbus RTU bus.

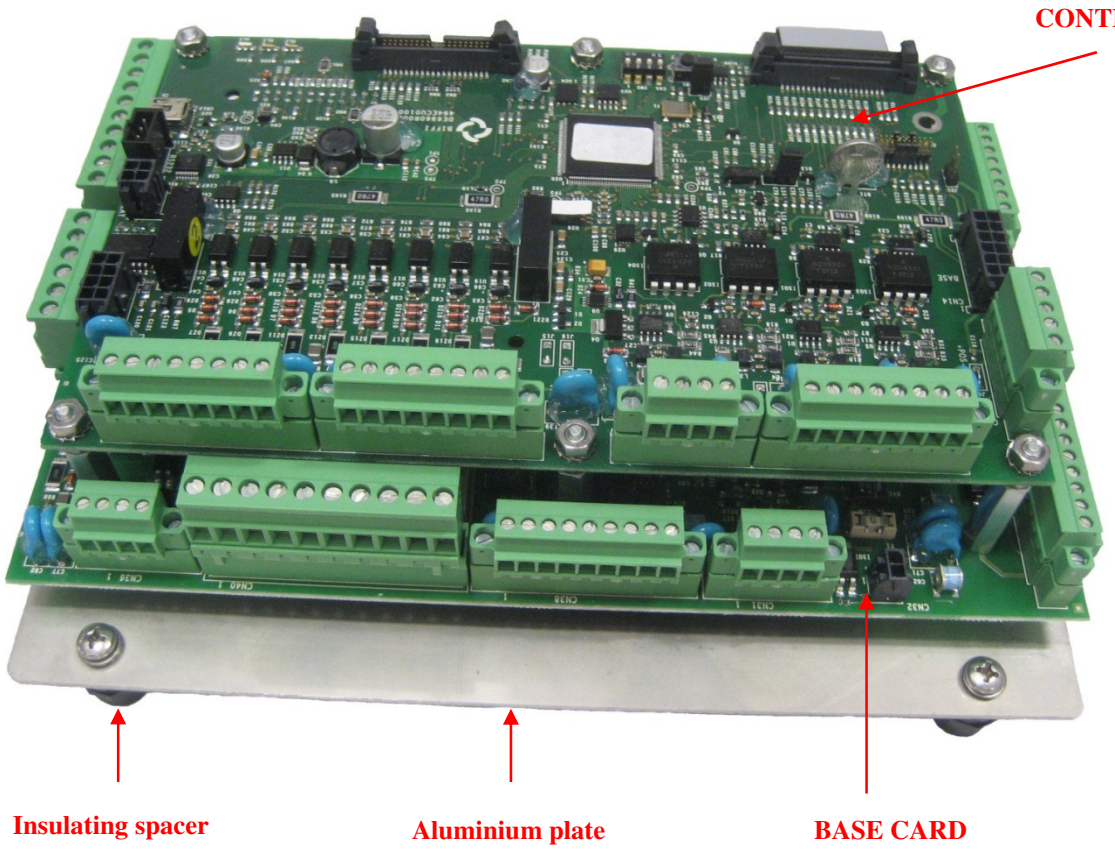
5.5 ECU1000 power supply module

The following power supply modules can be provided in the ECU1000 cabinet:

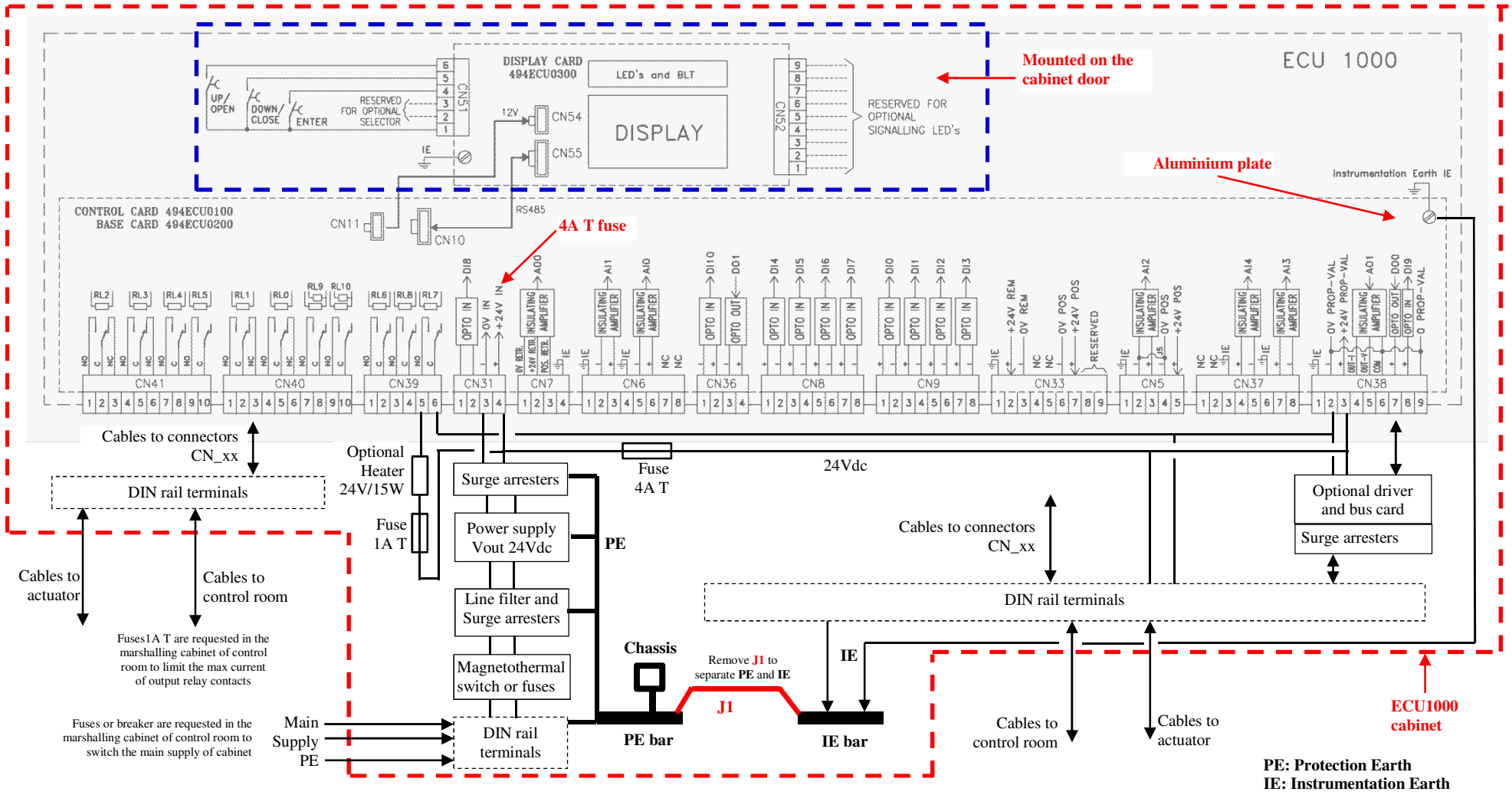
- Vin=24 Vdc , Vout=24Vdc/max 10A
- Vin=110Vdc, Vout=24Vdc/max 10A
- Vin=110Vac/50 or 60 Hz, Vout=24Vdc/max 10A
- Vin=230Vac/50 or 60 Hz, Vout=24Vdc/max 10A

The power supply module depends on the type of main supply provided by the end user, and is protected by fuses (or magnetothermal switch), line filter, surge arresters, and reversed polarity (only in case of DC supply).

5.6 ECU1000 Electronic cards



5.7 ECU1000 cabinet block diagram



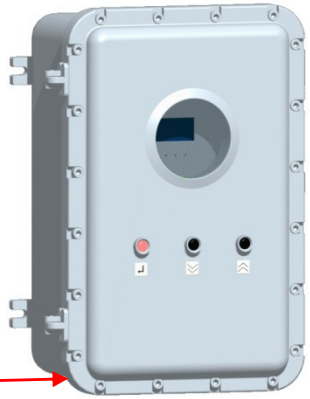
5.8 ECU1000 cabinet

The ECU1000 cabinet is suitable to be used outdoor. The cabinet is provided with glass windows to allow viewing the display and 3 pushbuttons to move in menu of ECU1000 or for local command.
Two types of cabinet are available:

- Cabinet AISI 316, IP65 to be used in standard environment. The cabinet door needs a tool to be open. (type CP456025, manufacturer MP Gamma, or equivalent)
- Cabinet Ex-d IIB T5 to be used in hazardous area. The cabinet door needs an appropriate key to be open. (type EJB 51, manufacturer Nuova ASP, or equivalent)

Different types of cabinets can be provided on request.

Cable entry



Cabinet for standard outdoor environment

Cabinet for hazardous environment

Warning: 	• **The door of cabinet must be kept always closed by key (or tool), to avoid damage of Electronics due to wet or pollution or personal injury of people. The key to open the door (or the alternative tool) must be kept by authorized and qualified personnel** • **The cabinet must be connected to "earth"**

5.9 Installation

The standard ECU1000 is suitable to work in the temperature range -40°C +75°C. Special version can be done in case of different temperature range.
The ECU1000 cabinet can be supplied as part of the actuator or separately. If ordered as part of an actuator, the factory mounts the ECU1000 cabinet together with the actuator, makes the connections (pneumatic, hydraulic and electrical) to the actuator, sets up and calibrates the instrument. In both cases the mounting bracket shall **withstand a force of four times the weight of the ECU1000 cabinet.** The following general instructions should be observed.

Important: 	**Check that the working temperature range is correct. If the temperature is higher than the rated values it needs to add a sunshine shield to the ECU1000 cabinet**

Warning: 	**The ECU1000 cabinet is not provided with specific means for lifting and transporting. Manually move the cabinet according to the effective rules of health and safety of the installation country.**

Warning: 	**It is assumed that the installation, the setting, the commissioning, the maintenance and repair works are carried out by qualified personnel and checked by responsible Specialists.**

Warning: 	**Avoid personal injury or property damage due to handling of mechanical parts. Before proceeding with any installation operation, the following precautions should be used** • **Always wear protective clothing, gloves, and protection glasses to prevent personal injury.** • **If installation is in hazardous area, personal injury or property damage may result from fire or explosion. Preventive measures may include: remote venting of the unit, re-evaluating the hazardous area classification, ensuring adequate ventilation, and the removal of any ignition sources. Require hot permit before any operation.** • **Check with process or safety engineer for any additional measures that must be taken to protect against process media.**

Important: 	**If the installation is in hazardous area, it must be carried out in accordance to the applicable standards IEC/EN 60079-14 and IEC/EN 60079-17 regarding the electrical installations in Hazardous Areas (other than mines) classified as Zones 1, 2 (gas) and Zones 21, 22 (dust) following IEC/EN 60079-10-1 and IEC/EN 60079-10-2 and any other applicable national standards and rules.**

5.9.1 Installation in hazardous area

Special attention should be paid to the following:

- before any assembly operation the joint surfaces must be greased.
- the cable glands must have a protection degree at minimum IP66/68 (EN/IEC 60529).
- periodically verify the quantity of dust deposited on the enclosure and clean it in the case the quantity becoming more than 5 mm.

5.10 Checks to be performed before installation

Warning: 	**Before the installation it is mandatory to check if the nameplate associated to the extension for additional entry specifies the appropriate degree of protection and ambient temperature limits as requested by the Rules applicable to the plant/location where units are installed.**

1) The electrical supply cables must be suitable for the power rating
2) Gather the necessary tools for the assembly and setting of the ECU1000 controls;
3) Verify that the fixing elements (screws, nuts etc.) used for fastening the ECU1000 cabinet can sustain at least four times the weight of the ECU1000
4) If a long storage period has occurred, before installing the ECU1000:
   - Check the installation of the plugs or cable glands on the cable entries.
   - Check whether the enclosure covers of the ECU1000 cabinet are cracked or broken.

5.11 Cables and Electrical Connections

5.11.1 Cables connection

The sealing of cables and/or conduit entries must be carried out in accordance with National Standards or the Regulatory Authorities. Method of sealing and cable glands must be approved and separately certified for use in hazardous areas.

Warning: 	**The end user shall provide circuit-breakers and fuses in the marshalling cabinet of control room, to switch off the Mains and any other voltage applied to ECU1000 cabinet. Before opening the door of the ECU1000 cabinet it is mandatory to check that any voltage (Mains or Control voltage) is off.** **Breakers, fuses, differential breakers, in general any disconnecting device** • **shall be in accordance with the local national standards and plant rules.** • **shall be sized to be in accordance to the power required by the ECU1000 cabinet and the connected electrical loads with a maximum of 10A.** • **shall be suitable located and easily reached** • **shall be marked as the disconnecting device for the equipment** • **shall not interrupt the protective earth conductor**

Important: 	**To prevent any water infiltration through the line cable conduits, be sure the cable glands have the minimum degree of protection required by the plant. The cable glands shall be selected in accordance to the cables section** **If rigid conduits make the connection, place a flexible pipe connection between the conduit and the terminal board.**

To guarantee weatherproof and explosion-proof fit, screw the cable glands tightly (at least 5 turns) and block them with a thread sealant. The use of a thread sealant is necessary in case of explosion-proof capability.
If some parts of the cable glands have been removed during work on the cable entries put them back into place now to avoid losing the dismantled parts.

Important:	**The cables MUST be selected considering as maximum working temperature of cables the maximum working temperature of ECU1000 device.**

Cables should be connected to DIN RAIL terminals provided inside the ECU1000 cabinet.

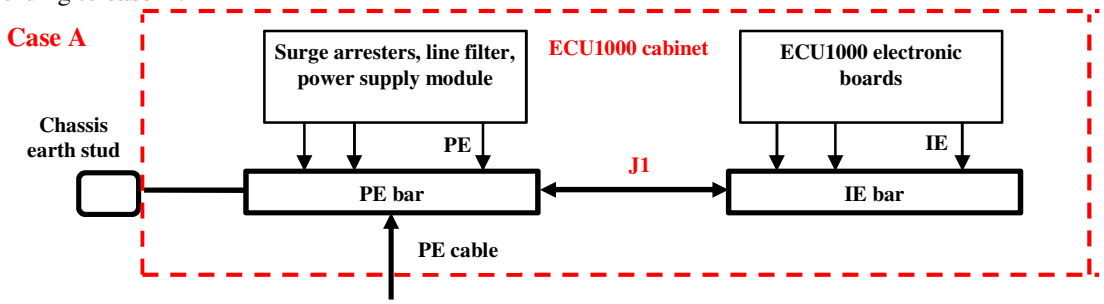
Important:	**The avoid malfunction and electromagnetic interferences due to cables coupling, it is recommended to use separated cables for power and signals and if it is possible also separated conduits. Use of shielded cables for analogue or data signals is requested.**

5.11.2 Earth connection

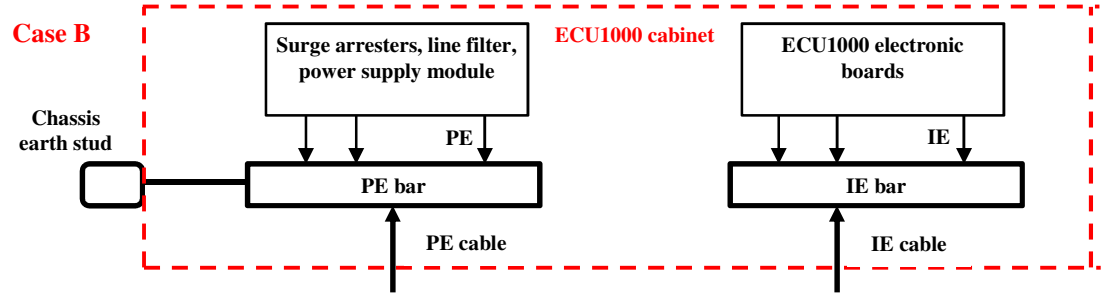
The ECU1000 cabinet must be connected to EARTH trough the External EARTH stud. The wire section shall be at least equal to the section of power supply wires.

For the earth connection of the cables dedicated DIN RAIL terminals or EARTH bar are provided.

The chassis is connected to PE (Protection Earth). Power supply module, line filter and surge arresters are connected to PE. The electronics of ECU1000 and shield of cable for signals are connected to IE (Instrumentation Earth). PE and IE are isolated. According to plant requirement the end user should use **case A** or **B**. The ECU1000 cabinet is supplied according to **case A**.



If the end user uses the case **B** the jumper **J1** should be removed



5.11.3 Cables requirements – EMC protection

The table below resumes the specifications of cables for connecting the ECU1000 cabinet.

CONNECTION TYPE	CABLES REQUIREMENT
External Power Supply	Not shielded
Relay output	Multicore, not shielded
Digital Input	Multicore, not shielded
Digital Output	Multicore, not shielded
Analogue Output	Pair, Shielded
Analogue Input	Pair, Shielded

Note: "Shielded" must be considered as a more strict condition than "Armoured".

It is possible to use a shielded cable instead of a required armoured cable but it is not possible to use an armoured cable instead of a required shielded cable.

5.11.4 Wire dimension and type

Before making any connection to ECU1000 cabinet, checks the electrical parameters present (voltage and current limits) on the nameplate and in this manual. The connections are available on DIN RAIL TERMINALS.
Max dimension of the wires: 2.5 mm^2 for the standard DIN Rail Terminals.
The dimension and type of the wires must respect the current regulations of the installation country.

5.11.5 Unused entries

Warning: 	**Replace the plastic plugs with new plugs that guarantee the protection IP degree required.** **If the cabinet is in hazardous area use only certified explosion-proof plugs and block with a thread sealant to guarantee the tightening. Not performing the above prescription will invalidate the safety protection in case of presence of hazardous atmospheres.**

5.12 Start-up Procedure

In this section is described a step-by-step procedure to start-up the ECU1000.
All the points must be performed in the order they appears.

Warning: 	**If the device is located in hazardous area a ''hot permit'' must be obtained before opening the explosion proof enclosures. Moreover the area must be cleaned from explosive mixture since time keeper battery and residual capacitor charge could generate electrical spark and cause explosion.**

Warning: 	**Electrical start-up should be done when the mechanical setting of the actuator which is connected to ECU1000 is completed. Refers to instruction manuals of Hydraulic Actuator, Hydraulic Power Unit, Hydraulic Control Unit.**

Warning: 	**Check that the breaker of the main electrical power in the marshalling cabinet of control room is off** **Check that any control voltage applied to cabinet is off**

- Check that the cables coming from control room and actuator are connected to the cabinet terminals according to electrical diagram. Check that the screws of terminals are correctly tighten
- Check that earth connections are reliable and according to the instructions in the previous paragraphs
- Switch on the main switch inside the ECU1000 cabinet
- Close the door of the ECU1000 cabinet

- Check that the actuator is in safe position and no mechanical damage or undesired movement of actuator can occur. Check that no leakage or dangerous pressure (oil or air) is present in the mechanics and hydraulic controlled by the ECU1000. Check that hydraulic piping is correctly connected.

- Switch on the breaker of the main electrical power in the marshalling cabinet of control room is off. In general the ECU1000 is supplied already with the configuration requested by the application. No special configuration operations are required except the setting of travel limits and tuning of positioner function.

- Check the Local Operator interface of the ECU1000. The manuals **DTDE 327** and **DTDE328** contain the instructions to use the Local Operator Interface and detailed description of each ECU1000 function

.

- Check the Failure and Alarm. Remove the conditions that cause Failure and Alarm. Refer to manuals DTDE 327 and DTDE328 to see the Failure and Alarm description and conditions.

- Apply the control signals to the ECU1000 cabinet. If the actuator is for modulating service, it starts in AUTOMATIC mode. Apply a control signal (4-20mA) that keeps the actuator in safe position (closed or open)
- When hydraulic pressure is correct set the actuator travel limits (see DTDE 327 and DTDE328)
- Switch to local control mode and move the actuator by pushbuttons the Up/Open and Down/Close.
- Check that output and input signals to control room and actuator are correct
- Tune the actuator response by means of the Local Operator Interface facilities
- Check the variables as follows:
    - From HOME VIEW
    - Press Up/Open to wake up the display
    - Press Up/Open to scroll the list of variables
    - Press Enter and see the value
        - POSITION%: it shows the % of opening of the valve. Check that the value is according to real valve position
        - POSITION DEMAND%: if the positioning function is on, this variable shows the valve requested position.
        - POSITION ERROR%: if the positioning function is on, this variable shows the difference between POSITION DEMAND% and POSITION%. It is used to calculate the output signal (by the parameters GAIN K1 and K2), visible in AO1 OUT %
        - IN-POS DEMAND%: if the positioning function is on, this variable shows the input signal of the valve requested position. The values of IN-POS DEMAND% and POSITION DEMAND% are equals if the Input Characterization function is off
        - TEMPERATURE °C: it shows the temperature inside the ECU1000 cabinet
        - HUMIDITY %: it shows the humidity inside the ECU1000 cabinet
        - ACCELERATION-g: it shows the acceleration level
        - AO1 OUT %: if the positioning function is on and the hydraulic valve is analogue, this variable shows the output control signal %
        - OIL PRESSURE bar: if the actuator is provided with integral HPU controlled by the ECU1000, this variable shows the HPU oil pressure
        - NEXT PST: if PST function is on, this variable shows the date of the next PST cycle
        - PUMPS SWITCH: if the actuator is provided with integral HPU, dual pump, controlled by the ECU1000, this variable shows the time before the next pump switch
- Return to HOME VIEW

•

6 DECOMMISSIONING

Disposal and recycling

At the end of the life the ECU1000 cabinet must be disassembled.

Warning: 	**Do not dump non-biodegradable products, lubricants and non-ferrous (rubber, PVC, resins, etc.) into the environment. Dispose of all such materials as indicated in the following table:**

Subject	Hazardous	Recyclable	Disposal
Electrical and electronic equipment	Yes	Yes	Use specialist recyclers.
Glass	No	Yes	Use specialist recyclers.
Metals	No	Yes	Use licensed recyclers.
Plastics	No	Yes	Use specialist recyclers.
Rubber (seals and o-rings)	Yes	No	May require special treatment before disposal, use specialist waste disposal companies
Battery	Yes	No	May require special treatment before disposal, use specialist waste disposal companies.

Warning: 	**Do not re-use parts or components which appear to be in good condition after they have been checked or replaced by qualified personnel and declared unsuitable for use.**

Important: 	**In all cases check local authority regulation before disposal**

7 TROUBLE SHOOTING

7.1 Local Operator Interface of ECU1000 off

Warning: 	• **Switch off the main power from ECU1000 cabinet by the breaker in the marshalling cabinet of control room** • **Switch off any control voltage from ECU1000 cabinet**

Warning: 	**If the device is located in hazardous area a ''hot permit'' must be obtained before opening the explosion proof enclosures. Moreover the area must be cleaned from explosive mixture since time keeper battery and residual capacitor charge could generate electrical spark and cause explosion.**

Open the ECU1000 cabinet door.
With reference to the dedicated **electrical diagram of the ECU1000 cabinet 193AR000xxx**

- Perform the visual inspection of electronics, cables and terminals. No component should be damaged, no wires should be disconnected from terminal and the screws of terminals should be well tightened.
- Check the fuses and the main switch of the ECU1000 cabinet
- Check that the surge arresters are not damaged, by a multimeter measure the continuity between the input and output terminals
- If none of the above test solve the problem it needs to check the power supply module and then the ECU1000 cards

7.2 Local Operator Interface of ECU1000 available

7.2.1 Trouble-shooting by Local Operator Interface

The manuals DTDE327 and DTDE328 provide detailed instructions on the Local Operator Interface of ECU1000 and on the Actuator malfunctions. Here below is described only the procedure to see the list of alarm and failure.

7.2.1.1 Failure, Alarm and Maintenance Request

See the display in the HOME VIEW.

- If it signals **Failure**
  - Press Up/Open to wake up the display
  - Press Up/Open until the display shows Failure
  - Press Enter
  - Press Up/Open and Down/Close to scroll the list of Failure
  - See the manual DTDE327, Actuator Malfunction tables to find the description and the reset condition
- If it signals **Alarm**
  - Press Up/Open to wake up the display
  - Press Up/Open until the display shows Alarm
  - Press Enter
  - Press Up/Open and Down/Close to scroll the list of Alarms
  - See the manual DTDE327, Actuator Malfunction tables to find the description and the reset condition
- If it signals **Maintenance Request**
  - See the manual DTDE327, Actuator Malfunction tables to find the description and the reset condition
  - Press Up/Open to wake up the display
  - Enter in the menu of the Local Operator Interface
  - Check the Current Date and the Next Maintenance Date
  - If necessary enter new dates

7.2.1.2 I/O check

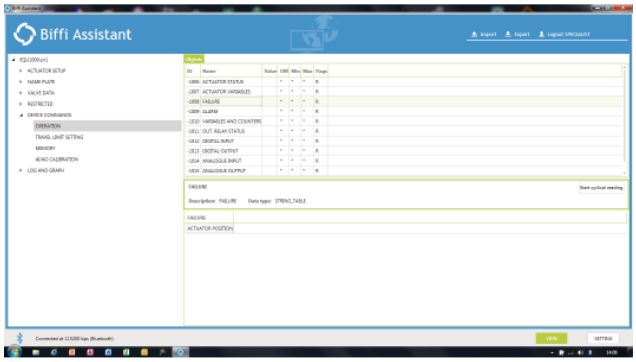
- From HOME VIEW
  - Press Up/Open to wake up the display
  - Press Up/Open until the display shows Out Relay
  - Press Enter
  - Check that each output contact is according to the required application (see electrical and mechanical diagrams). If an output is in wrong state check the condition associated to relay in the parameter table
  - Return to HOME VIEW
- From HOME VIEW
  - Press Up/Open to wake up the display
  - Press Up/Open until the display shows Digital Inputs
  - Press Enter
  - Check that each digital input is according to the required application and change status when the connected hardware input changes (see electrical and mechanical diagrams). If an input does not change check the hardware connected to the input
  - Return to HOME VIEW
- From HOME VIEW
  - Press Up/Open to wake up the display
  - Press Up/Open until the display shows Analog Inputs
  - Press Enter
  - Check that each analog input is according to the required application and changes when the connected hardware 4-20mA changes. The value of each input is shown in bits, from 0 to 4096 (see electrical and mechanical diagrams). If an input does not change check the hardware connected to the input
  - Return to HOME VIEW

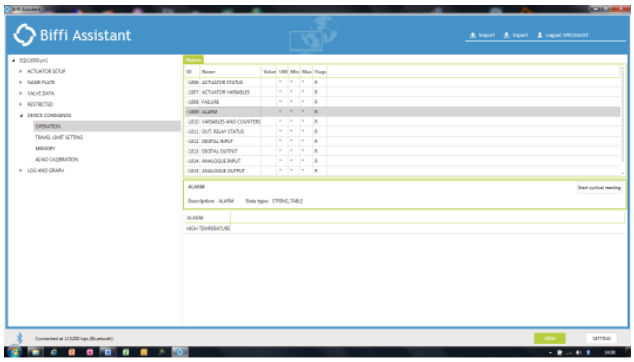
7.2.2 Trouble-shooting by BIFFI-Assistant SW tool

The manuals DTDE330, DTDE327 and DTDE328 provide detailed instructions on the BIFFI-Assistant SW tool of ECU1000.
Here below is described only the procedure to see the list of alarm and failure.

- Connect BIFFI-Assistant to actuator
- Select DEVICE COMMANDS
- Select LOG and GRAPH
- Select LOGGER
- Select FAILURE and see the list of failure
- Select ALARM and see the list of alarms

See the manual DTDE327, Actuator Malfunction tables to find the description and the reset condition. Remove Failures and Alarms.





8 ECU1000 cabinet code

The ECU1000 cabinet is identified by an eleven characters code "**1 9 3 A R 0 0 0 x x x".** The final 3 characters identify the options of each cabinet. Refer to the dedicated electrical wiring of cabinet to see the installed options
The electrical wiring of cabinet "**1 9 3 A R 0 0 0 x x x"** includes the bill of main components inside the cabinet. Below is an example of bill of material. Refer to this document to require spare parts.

Tag.	Description	Code	Constructur
ECU1000	ECU 1000	494ECU1000	BIFFI ITALIA by TECNO ELETTRONICA
BOX	Cassa in Acciaio Inox	310C201328	MP Gamma
M	Morsetti terminali a molla doppio conduttore	ZDK2.5 - 167430	WEIDMULLER
P.S.	Morsetti singoli 4mmq a 2 collegamenti + morsetto PE	WDU4 + WPE4	WEIDMULLER
Q1	Interuttore Magnetotermico	5SY6-204-7	SIEMENS
B01	Barriera di tensione 230V AC	DGM - TT 2P 275	DEHN
FR1	Filtro monofase antidisturbo Ph+N 4 A	FN 2030-4-06 RS: 292-582	SCHAFFNER
G1	Alimentatore Stabilizzato Mi PS	QUINT PS/1AC/24DC/10	PHOENIX CONTACT
B02	Barriera di protezione 24VDC	BVT-AD 24	DEHN
F1	Portafusibile Unipolare	BCH 1x38 + FUSIBILE 4 A gg	ITALWEBER
F2	Portafusibile Unipolare	BCH 1x38 + FUSIBILE 1 A gg	ITALWEBER
H1	Scaldiglia anticondensa 15W	299-5714	RS COMPONENTS

REV.	DATE	DRAWN	CHECK	DESCRIPTION
0	24-03-2013	M.N.	A.A.	ISSUE

BIFFI

DENOMINATION: 193AR000285L1
PART LIST

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DATE: 24/03/2013
DRAWN: M.N. CHECK: C.D.

9 Routine test of ECU1000 cabinet

The factory performs a routine insulation test on the ECU1000 cabinet before shipping it. The complete test procedure is described in the document "Factory test procedure of cabinet with ECU1000 device code 193AR000xxx"; it includes insulation, functional, communication and PEarth continuity test. Here below are described only the insulation and PE continuity tests. Refer to the dedicated electrical wiring of cabinet"**1 9 3 A R 0 0 0 x x x"** to identify the cabinet terminals.
PEarth continuity test: the test checks the resistance between the earth stud and metallic parts of the cabinet (on the screw). The resistance should be less than 0.1 ohm.
Insulation test of MAINS: test voltage= 840Vac (MAINS< 150V) or 1400Vac (MAINS >150V and <300V) between the terminals with MAINS and Earth
Insulation test of IEarth: test voltage= 500 Vac between the IEarth (Instrumentation/Functional Earth) and PEarth (Protection Earth). (to perform the test it needs to remove the jumper J1, see par. Earth connection)
Insulation test of signal I/O's: test voltage= 500Vac between each I/O signal and PEarth.
To avoid damaging the Electronics the connectors of ECU1000 cards are disconnected (except CN39, CN40 and CN41), the surge arresters device mounted on socket are removed or disconnected, the external loads are disconnected.
The test is done on the following terminals:

- Main supply terminals and PEarth
- Terminals connected to connectors CN39, CN40, CN41 and PEarth
- IEarth and PEarth
- Each analogue or digital input and output and PEarth

No flashover shall occur; no failure of Electronics shall be detected.

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R.E.A. di Piacenza n. 121628 - Meccanografico PC 002799