

# ENC\_RISC

## Magnetic Encoder and Printer

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### TECHNICAL MANUAL

PRODUCED BY

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## **REVISION**

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## **1 GENERALITIES**

The treatment module for magnetic titles ENC\_RISC is part of a family of modules designed for evolved applications in which it is necessary to deal with titles of various nature at the same time, different for both support and/or magnetic codes.

Besides magnetic validation, it allows to validated the title also visually through impact printing of alphanumeric characters on the paper ticket.

ENC\_RISC is a sturdy device, simple and compact for magnetic title treatment of variable thickness from 0,18 mm. to 0,8 mm..

With a complete equipment the module can supply following performances:

- Read and write up to four ISO standard (75 and 210 BpI as per norms).
- Read and write up to Transac tracks
- Print one longitudinal line with impact technology
- Handle microchip cards with contacts according to ISO 7816 standard.
- Handle microchip contactless cards according to ISO 14443A MIFARE standards

The base version of the device allows the single R/W management of one ISO track at 75 BpI in low coercitivity (LoCo); other performances are optional and need the following additional devices:

- Multiple magnetic head groups, for high (HiCo) and low coercitivity (LoCo).
- Single line impact longitudinal printer
- Microchip card managing unit
- Contactless card managing unit
- Shutter unit for opening on command of the front opening for titles insertion.

The ENC\_RISC module can be combined easily with the Feeder family modules for ticket feeding and cutting from roll or fan-fold, allowing the realization of compact and economic issuing devices, that hold the ability to accept also titles introduced directly from the front opening and to swallow titles that need to be withheld in the module.

## **2 ELECTRICAL AND MECHANICAL SPECIFICATIONS**

### **2.1 DIMENSIONS AND WEIGHT**

Base version:	Printer version:	Version with shutter:	
Length:	230.5 mm.	230.5 mm.	230.5 mm.
Width:	104.4 mm.	104.4 mm.	104.4 mm.
Height:	95 mm.	125.3 mm.	125.3 mm.
Weight:	1.7 Kg.	2 Kg.	2.1 Kg.

### **2.2 ELETRICAL SPECIFICATION**

Voltage:	24 VDC + / - 10%.		
Current:	at rest < 200 mA		
In activity	vers. LoCo 2,4 A max.	vers. HiCo 3.6A max	

### **2.3 SYSTEM INTERFACE**

Standard: EIA RS232C (optional EIA RS485C).

Speed: default 19.200 bps - up to 115.200 bps.

Format: 7 bits, 1 stop, equal parity (odd).

## **2.4 PERFORMANCES**

Operating speed: up to 800 mm./sec.  
Printing: impact, one line of max 40 characters, 2.47 mm. high

When module ENC\_RISC is coupled with the feeder modules issuing speed, including encoding and verifying of the encoded information, printing of the ticket and communications with host not included are:

ENC\_RISC with single magnetic R/W head

With feeding and cutting	less than 3.2 sec.
With ticket already fed to be cut	less than 2.2 sec.
With ticket already fed and cut	less than 1.8 sec.

The printing of the ticket requires in any case 350 ms

ENC\_RISC with double magnetic head

With feeding and cutting	less than 2.8 sec.
With ticket already fed to be cut	less than 2.0 sec.
With ticket already fed and cut	less than 1.5 sec.

## **2.5 AVERAGE LIFE**

Magnetic head:	> 1 000 000 of tickets.
Impact printer head	> 10 000 000 of characters.
Inked ribbon cartridge:	> 1.000 000 characters.
Mechanical parts subject to usury:	> 1.000 000 cycles.

## **2.6 ENVIRONMENT CONDITIONS**

Working temperature:	from + 5 °C to + 50 °C.
Storage temperature:	from - 10 °C to + 60 °C.
Relative humidity:	from 10 % to 85 %. not condensing RH

## **3 DESCRIPTION MODULE**

### **3.1 MECHANICAL STRUCTURE**

The module is made of the following mechanical subgroups:

- Flanks in metallic sheet for the guiding of the titles
- Main transport of the titles with rubberized roller
- Roller counterparts highly deformable for magnetic title transport
- Magnetic heads, with support and counterpart
- Printer group with lifting device
- Device for I/C card R/W
- Front opening with shutter

In the below paragraphs follows a detailed description of each subgroup, with functional specifications and possible structure alternatives.

### **3.1.1 Flanks for guide of the titles**

The right flank supports all the electromechanical groups, while the electronic control board is fixed on left flank and holds the photo sensors to check the title position.

The two flanks are assembled at the right distance from each other by the means of metal spacers; this solution allows a simple and fast opening of the module, an easy maintenance and operating when working on the inner parts.

### **3.1.2 Main motorized transport of titles**

Counterpart rollers push with suitable strength against the motion rollers, so that, in case a title is stuck between rollers surface and counterpart rollers, it is forced to move towards the external surface of the belt with regular and controlled movement within the module.

The feeding device (engine pulley, support rollers, counterpart rollers) is fixed to right flank; the distance between right flank and feeding device is enough to guarantee hold of titles in the central area in order to avoid both, magnetic tracks and thickness present on credit cards.

### **3.1.3 Counter part roller**

The counterpart rollers of the main feeding are made of a highly deformable and elastic material. The pressure with which the rollers keep the title against the feeding belt is produced by the elastic deformation that the counter part roller bears while the title is between rollers and belt; with this technical solution the pressure grows accordingly to the thickness of the title introduced in the module, and compensates the breaking contrast made by the magnetic heads always accordingly to increase of thickness.

Due to the special material, elastic and deformable of the active part of the rollers, the perfect movement of titles is independent from the thickness of these, that can be variable between 0,18 and 0,8 mm. (maximum thickness for ISO norms).

### **3.1.4 Magnetic head, with support and counterpart roller**

The base version of the module is equipped with a magnetic head for the reading and encoding of magnetic ISO 2 track at 75 BpI in standard or central position; it is also possible to install up to four magnetic heads, in according to ISO and Transac specifications.

Every magnetic channel can be set to read and encode in F2F mode or Transac mode. The density of encoding in F2F mode can be set track by track to 75 or 210 bpi or intermediate values

It's possible to place the magnetic head in lateral position on the right flank and/or on the left flank, in central position, in lower and/or upper position.

For all the configurations the encoding can be made both, at low coercitivity (LoCo) and high coercitivity (HiCo).

### **3.1.5 Impact printer group**

The optional printer group is a nine dots impact printer to print alphanumeric characters with 5x5 5x7 and 7x9 dot matrix.

The print line is printed on the title in longitudinal mode

At rest the upper position of the printer group is assured by a spiral spring.

An electromagnet is activated before needles start printing to set the print head at the print position to guarantee the optimal printing quality.

### **3.1.6 Thermal printer unit**

Alternatively to the impact printer unit it is possible to install a printing unit with thermal print head for one single line printing of alphanumerical characters with matrix 5x5 5x7 o 7x9 in forward or reverse mode.

Normally the printing unit is lifted and allows the passing of plastic cards and tickets.

During printing operation the unit is lowered by the solenoid present on the internal flank of the ENC899 module.

### **3.1.7 Contact chip card managing device**

This electromechanical subgroup is a accessory on request, and is fitted between s the mouth of the front opening and the magnetic head.

It is an electromagnet to which is fixed a small printed circuit that supports one standard connector for microchip cards ISO 7816 standard; the connection to the control card is by the means of a flexible cable.

In rest conditions, the connector is raised and it does not obstacle the transit of the titles into the module; the lowering of the contactor is activated only when it needs to work on a chip card and when this is correctly positioned and stopped under the connector.

The firmware procedures that control the operations of reading and writing guarantee that the connector has been lifted before resuming the transport of the chip card.

### **3.1.8 Front opening**

This device allows a easy front insertion of titles to manage.

The two possible alternatives described below are currently available.

#### ***3.1.8.1 Simple front opening***

It is the simpler version of the device and realized of one only mechanical particular directly fixed to the two internal flanks of the module and allows a easy introduction of the titles by the user.

#### ***3.1.8.2 Front opening with shutter***

It is the more complex version, equipped with a electromagnetic mechanism of closing of the front opening (shutter) and pre-head magnetic head.

## **4 ELECTRONIC CONTROL**

The electronics of the module is made by the microprocessor CPU RISC cards:

In the below paragraphs follows a detailed description of every card with the equipment specifications previewed and the alternative structures and functions available.

### **4.1 CPU CARD**

The CPU card is prearranged in order to host circuits used only for versions that require them and that are the following:

- Read/encode interfaces for the magnetic head
- Control interface for feeding module of tickets from roll or fanfold
- Chip card management module interface I/O optocoupled interface (3 In + 3 Out)
- Alphanumeric LCD display guiding interface

The base circuital modules are the following:

- Local power source +5 Volt starting from +24 Volt
- 32 bit CPU RISC microprocessor complete with Flash memory for updatable through serial line and RAM memory.
- Magnetic head read/encode interface
- Set of optical photo sensors to check the position of the titles in the module
- Serial Interface (RS232 or RS485 at your choice) for the connection with the management host
- Driving circuit of stepper motor.

## **4.2 PRINTER INTERFACE**

This small card contains the drivers for the needles of the printer head, of the positioning solenoid of the printing group and of the inked ribbon and relative protection circuits.

The card is installed directly on the printer group with appropriate supports

## **4.3 MANAGEMANT FIRMWARE**

The management firmware controls all the operations carried by the module as:

- Management of the communication with host through serial line and high level protocol
- Magnetic titles movement in the module control
- Data encoding and verifying, with the possibility to operate simultaneously on all three tracks and, if present also on the Transac track at relative writing densities.
- Print of the ticket
- Command and control of ticket swallowing operations
- Monitoring of all the operations, recovery of the malfunctions and management of alarms. Optionally it is possible to implement operative functions different from specific ones of a

## **4.4 CONTACTLESS CARD DEVICE**

The reading and the writing of contactless MIFARE card device used in he ENC899 module complies with the standards ISO 14443-A, ISO 15693 and on demand, with the standard ISO 14443-B. This device is installed between the two flanks immediately after the front opening at a height that allows the communication with the card but doesn't interfere with it's passage inside the module ENC899. The device is connected to the CPU board through the connector CN9 with the addition of an interconnection integrated circuit placed on U30. The device is managed by the firmware of the CPU board through a proper protocol encapsulated in the ENC899 protocol.

**NOTE: During the manufacturing the device is tested and calibrated for an optimal operation; the alteration of this calibration could compromise the right operation of the device**

## 5 ELECTRICAL CONNECTIONS AND SETUP

### 5.1 POWER CONNECTOR

The power is supplied through CN1 (AMP 178496-1 to 3 poles) with the following pin layout:

Pin 1 +24v  
 Pin 2 Earth  
 Pin 3 Gnd

### 5.2 RS232 RS485 SERIAL INTERFACE CONNECTOR

The serial interface for the connection to the host is available in connector CN2 (JST PHD 5x2 PM 90°), with the following pin layout:

Pin 1 Nc	Pin 2 Tx- Rs485
Pin 3 Tx Rs232	Pin 4 Tx+ Rs485
Pin 5 Rx Rs232	Pin 6 Gnd
Pin 7 Nc	Pin 8 Rx- Rs485
Pin 9 Gnd	Pin 10 Rx+ Rs485

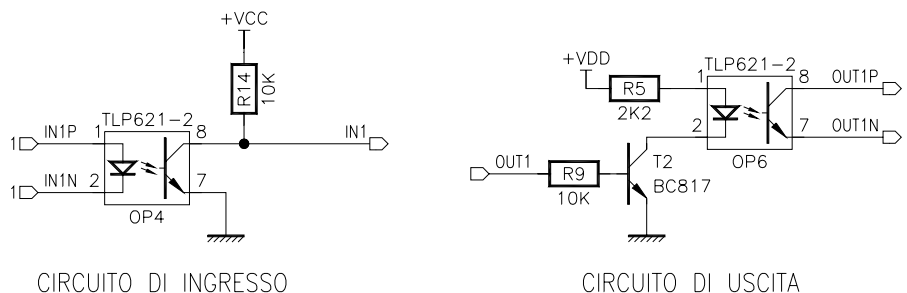
### 5.3 OPTOCOUPLED I/O CONNECTOR

It is possible to connect to the ENC 899 module three Input and three Output optocoupled signals. The pin layout of connector CN3 (JST PHD 6x2 PM 90°) is:

Pin 1 Out1p	Pin 2 Out1n
Pin 3 Out2p	Pin 4 Out2n
Pin 5 Out3p	Pin 6 Out3n
Pin 7 In1p	Pin 8 In1n
Pin 9 In2p	Pin 10 In2n
Pin 11 In3p	Pin 12 In3n

Follows the I/O circuit scheme.

The current of the Input circuit must be of 10 mA (max 20 mA) the typical current of the Output circuit is of 10 mA at 50V



Schematic of the I/O circuits

#### **5.4 AUXILIARY/FED899 RS232 INT. CONNECTOR**

A serial interface is present in the connector CN4 (JST PHD 4 PM 90°)  
The pin layout is as follows:

Pin 1 GND  
Pin 2 Tx RS232  
Pin 3 GND  
Pin 4 Rx- RS232

When the module is used as issuing unit, this interface is used to send commands to the module FED899.

#### **5.5 PARKING SOLENOID CONNECTOR / BUZZER**

This connector gives the possibility for a auxiliary electromagnet or acoustic buzzer  
The CN5 (JST PHD 2 PM 90°) is used to connect a auxiliary solenoid. The pin layout is:

Pin 1 VDD  
Pin 2 Park coil

#### **5.6 FED899 – F\_CARD PARALLEL INTERFACE CONNECTOR**

It is possible to connect to the ENC899 module, the FED899 module or the F-CARD module  
The connector CN6 (JST PHD 5x2 PM 90°) pin layout is as follows:

Pin 1 FD0	Pin 2 FD1
Pin 3 FD2	Pin 4 FD3
Pin 5 VCC	Pin 6 VCC
Pin 7 GND	Pin 8 GND
Pin 9 VDD	Pin 10 VDD

#### **5.7 PRINTER INTERFACE CONNECTOR**

The CN7 connector allows to connect to control card of the ENC899 module the printer interface.  
The pin layout is

Pin 1 PR6	Pin 2 PR7
Pin 3 PR4	Pin 4 PR5
Pin 5 PR2	Pin 6 PR3
Pin 7 PR0	Pin 8 PR1
Pin 9 PRMOT	Pin 10 PRON
Pin 11 VCC	Pin 12 PRCOIL*
Pin 13 PWRGND	Pin 14 VDD

#### **5.8 LCD DISPLAY CONNECTOR**

The CPU card by the means of the CN8 connector (14 flat male poles) can drive a LCD display. In this connector there is a 8 bit port, control signals and power supply of +5V and contrast adjustment (P1 trimmer)  
The CPU can drive display from 1 up to 2 lines and from 8 up to 40 characters.

The pin layout is

Pin 1 GND	Pin 2 Vcc
Pin 3 REG_CONTR	Pin 4 DISPRS
Pin 5 DISPWR	Pin 6 DISPEN
Pin 7 DISPO	Pin 8 DISP1
Pin 9 DISP2	Pin 10 DISP3
Pin 11 DISP4	Pin 12 DISP5
Pin 13 DISP6	Pin 14 DISP7

**5.9 MICROCHIP AND CONTACTLESS CARD INTERFACE CONNECTOR**

The CN9 connector (JST 5x2 PM 90°) allows to connect to the contact board for chip and contactless card reading.

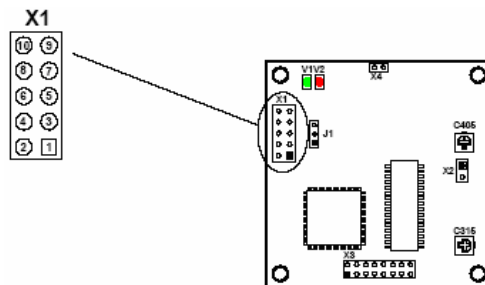
The pin layout for contact chip card is as follow:

Pin 1 VCC	Pin 2 RESET_CARD
Pin 3 CLOCK_CARD	Pin 4 FUSE
Pin 5 GND_CARD	Pin 6 RESERVED
Pin 7 DATA_I/O	Pin 8 PROGRAM
Pin 9 COILMC	Pin 10 VDD

The pin-layout for contactless card is as follow:

Pin 1 VCC	Pin 2 TX TTL
Pin 3 NC	Pin 4 RX TTL
Pin 5 NC	Pin 6 NC
Pin 7 GND	Pin 8 GND
Pin 9 NC	Pin 10 NC

Picture and table that follow show the pin-layout of the connector to insert in the contactless device



X1 Pin N°	Funzione	Descrizione
		ID CPR.M02 –B/-BA
3	TxD	RS232 TTL –Transmit data
4	GND	GND
5	RxD	RS232 TTL –Receive Data
8	VCC	+5V DC
9	GND	GND

### **5.10 STEPPER MOTOR CONNECTOR**

The connection to the feeding motor is through the CN10 connector (AMP MODII 4 PM 90°)  
The pin layout is:

Pin 1 OUT 1  
Pin 2 OUT 2  
Pin 3 OUT 3  
Pin 4 OUT 4

### **5.11 SHUTTER ELECTROMAGNET CONNECTOR**

The activation of the opening electromagnet is through the CN 11 connector (JST 2 PM 90°)  
The pin layout is:

Pin 1 VDD  
Pin 2 SOL\_SHUTTER

### **5.12 MAG. HEAD CONNECTOR CH1**

The first magnetic read/write channel is connected to CN 12 (MOLEX SPOX 5 PMD).  
The pin layout is:

Pin 1 WRHD1A  
Pin 2 WRHD1B  
Pin 3 GND  
Pin 4 RDHD1A  
Pin 5 RDHD1B

### **5.13 MAG. HEAD CONNECTOR CH2**

The second magnetic read/write channel is connected to CN 13 (MOLEX SPOX 5 PMD).  
The pin layout is:

Pin 1 WRHD2A  
Pin 2 WRHD2B  
Pin 3 GND  
Pin 4 RDHD2A  
Pin 5 RDHD2B

### **5.14 MAG. HEAD CONNECTOR CH3**

The third magnetic read/write channel is connected to CN 14 (MOLEX SPOX 5 PMD).  
The pin layout is:

Pin 1 WRHD3A  
Pin 2 WRHD3B  
Pin 3 GND  
Pin 4 RDHD3A  
Pin 5 RDHD3B

### **5.15 MAG. HEAD CONNECTOR CH4**

The fourth magnetic read/write channel is connected to CN 15 (MOLEX SPOX 5 PMD).  
The pin layout is:

Pin 1 WRHD4A  
Pin 2 WRHD4B  
Pin 3 GND  
Pin 4 RDHD4A  
Pin 5 RDHD4B

### **5.16 PRE-HEAD CONNECTOR**

The magnetic pre-head is connected to CN 16 (MOLEX SPOX 5 PMD).  
The pin layout is:

Pin 1 P\_RDA  
Pin 2 GND  
Pin 3 NC  
Pin 4 P\_RDA  
Pin 5 GND

### **5.17 MICROSWITCH-SHUTTER CONNECTOR**

A micro switch controls the shutter opening and is connected to the CPU board via the CN 17 (JST 2 PM 90°) connector  
The pin layout is:

Pin 1 SW\_SHUTTER  
Pin 2 GND

### **5.18 I/O CONNECTOR**

The CN18 connector is used to connect optional devices and I/O signals are present. Mainly this connector is used for the 90à printing unit and the module PRK B/T

### **5.19 JUMPERS**

JP1 RESERVED  
JP2 RESERVED  
JP3 RESERVED  
J4 RESERVED  
J5 RESERVED

JP6-1 Perif. Address 0 (LSB)  
JP6-2 Perif. Address 1  
JP6-3 Perif. Address 2  
JP6-4 Perif. Address 3  
JP6-5 Perif. Address 4 (MSB)

The peripheric address is the binary code of the address set through J JP6+20Hex

JP7-1 RESERVED  
JP7-2 RESERVED  
JP7-3 RESERVED  
JP7-4 RESERVED  
JP7-5 configuration with polling protocol (open=RS232 closed=RS485)

JP8-1 RESERVED  
JP8-2 RESERVED  
JP8-3 RESERVED  
JP8-4 RESERVED  
JP8-5 RESERVED

## **5.20 SW2 BUTTON**

The SW2 button allows to reset the card without disconnection of power supply

## **5.21 LED**

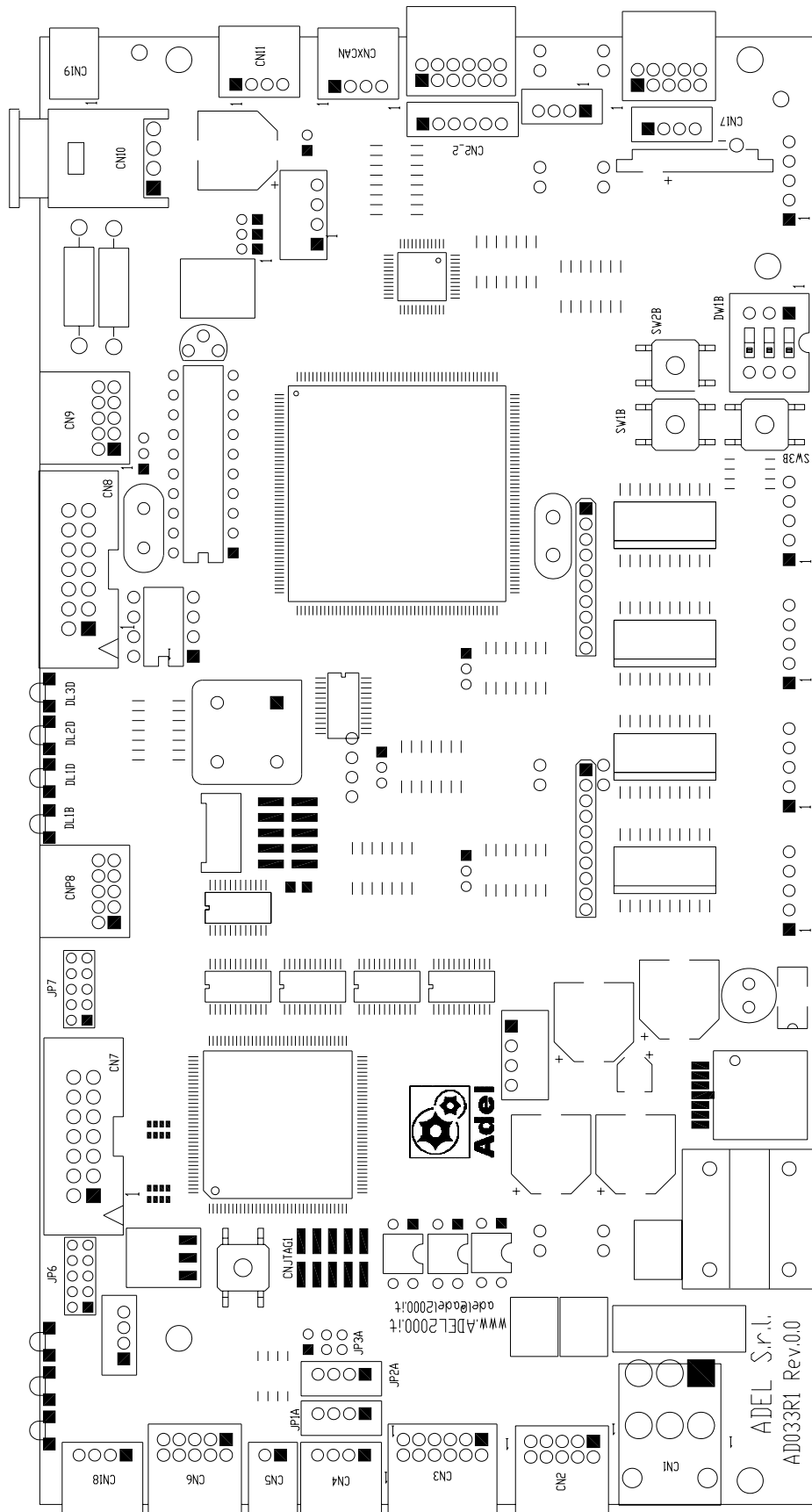
DL1 led show the status of the unit trough light flashes

Fixed "ON"	Status OK
1 Flash	Command in execution
2 Flash	Command not executed for ticket not present in the module
3 Flash	Command not executed for ticket already present in the module
4 Flash	Command not executed for automatic read already on
5 Flash	Position error
6 Flash	Shutter malfunction
7 Flash	Ticket jammed
8 Flash	Non valid configuration
9 Flash	Incorrect hardware configuration

DL2 Photo sensor OP1 status  
DL3 Photo sensor OP2 status  
DL4 Photo sensor OP3 status  
DL5 Photo sensor OP4 status

DL6 Microchip status

## 5.22 CPU LAYOUT



## 6 ENC\_RISC CONFIGURATION

To configure the ENC\_RISC there are rules to follow for management of each field that is part of composition code:

ENC\_RISC – xxxx -x - x - x - x - xx

The first field xxxx of four characters identifies the magnetic head configuration

The full configuration has up to 4 tracks, 3 ISO tracks and 1 Transac track.

Tracks from 1 up to 3 are ISO, the track 4 is Transac

Example: 0234 means that the module is equipped with ISO 2, ISO 3, and T1 Transac track

0 = track not present

The second field x specifies the position of the ISO 2 track, that can be set on ISO standard position or centrally

The character I means standard ISO2

The character C means central ISO2

The third field specifies the coercitivity

The character L means “LoCo“, low coercitivity

The character H means “HiCo“, high coercitivity

The fourth field I s for the **Printer group**

The character P means that a fixed single line impact printer is installed

The fifth field x stands for **Microchip**

The character M means that the chip card reader group is installed

The sixth field xx if for the **Shutter**

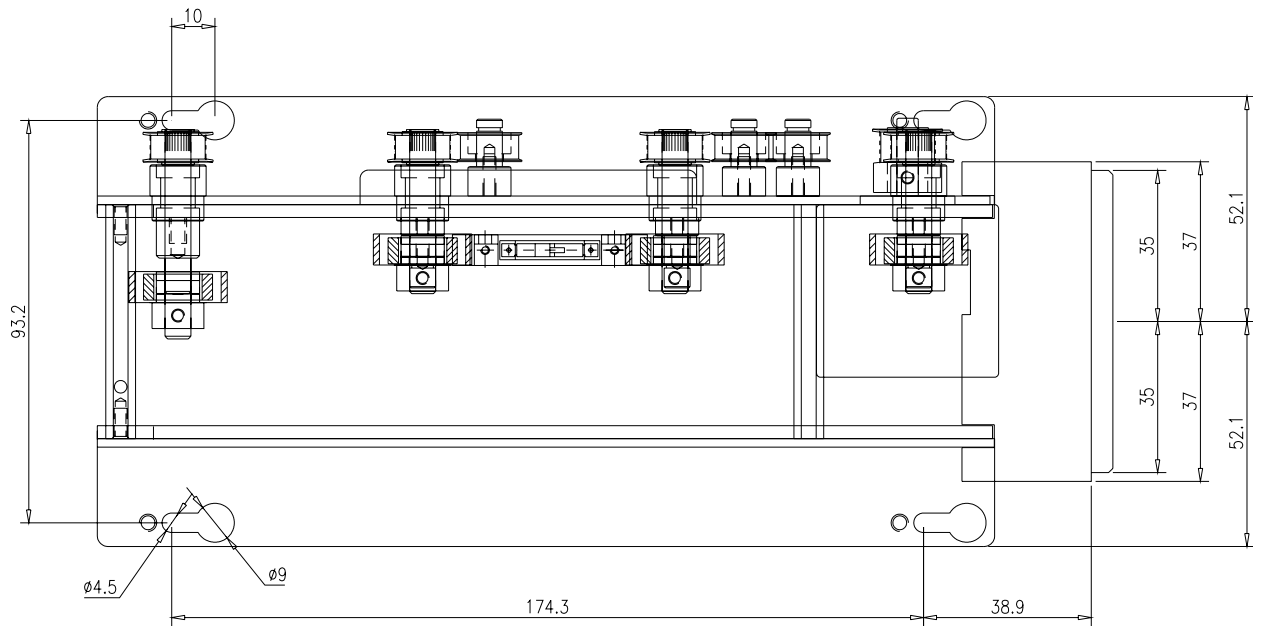
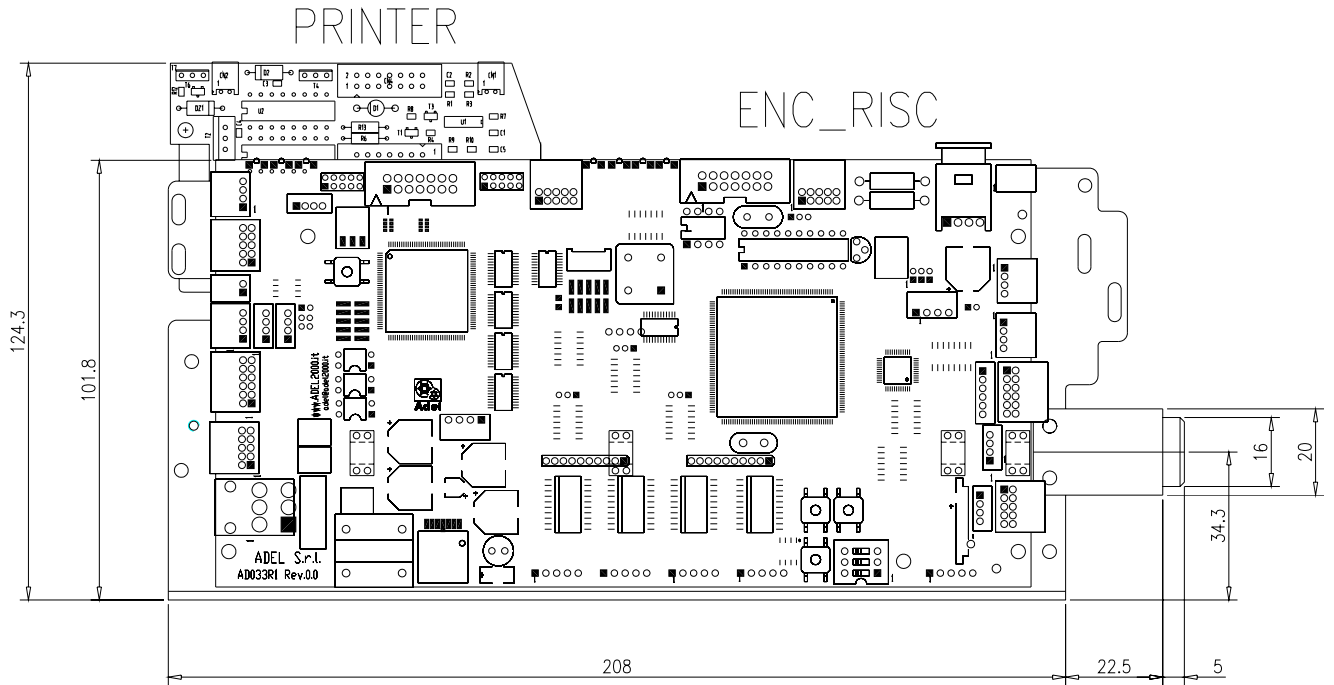
The characters S0 means shutter not present

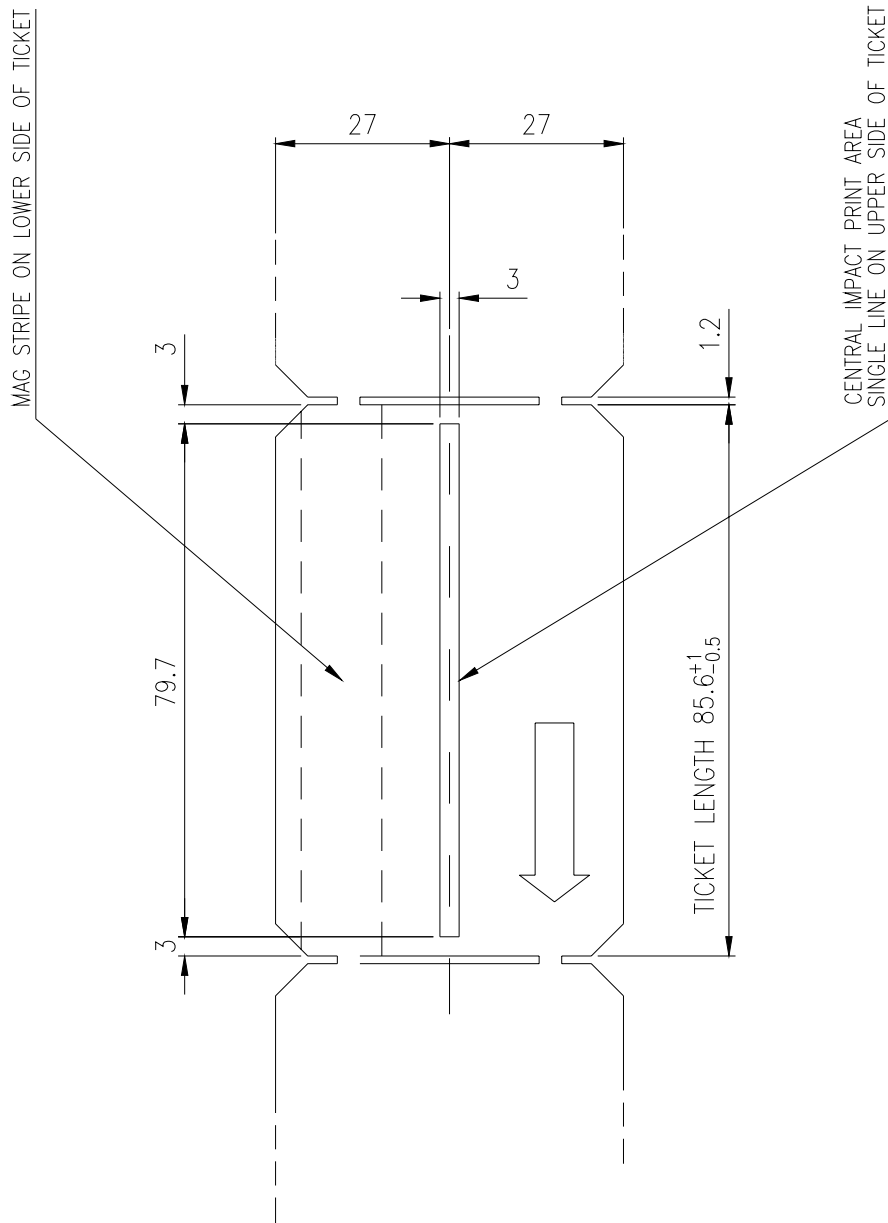
The characters S1 means shutter closed with pre-head

The characters S2 means shutter closed, direct activation from host

N.B. The magnetic pre-head is positioned on ISO2 or ISO2/3 lateral tracks

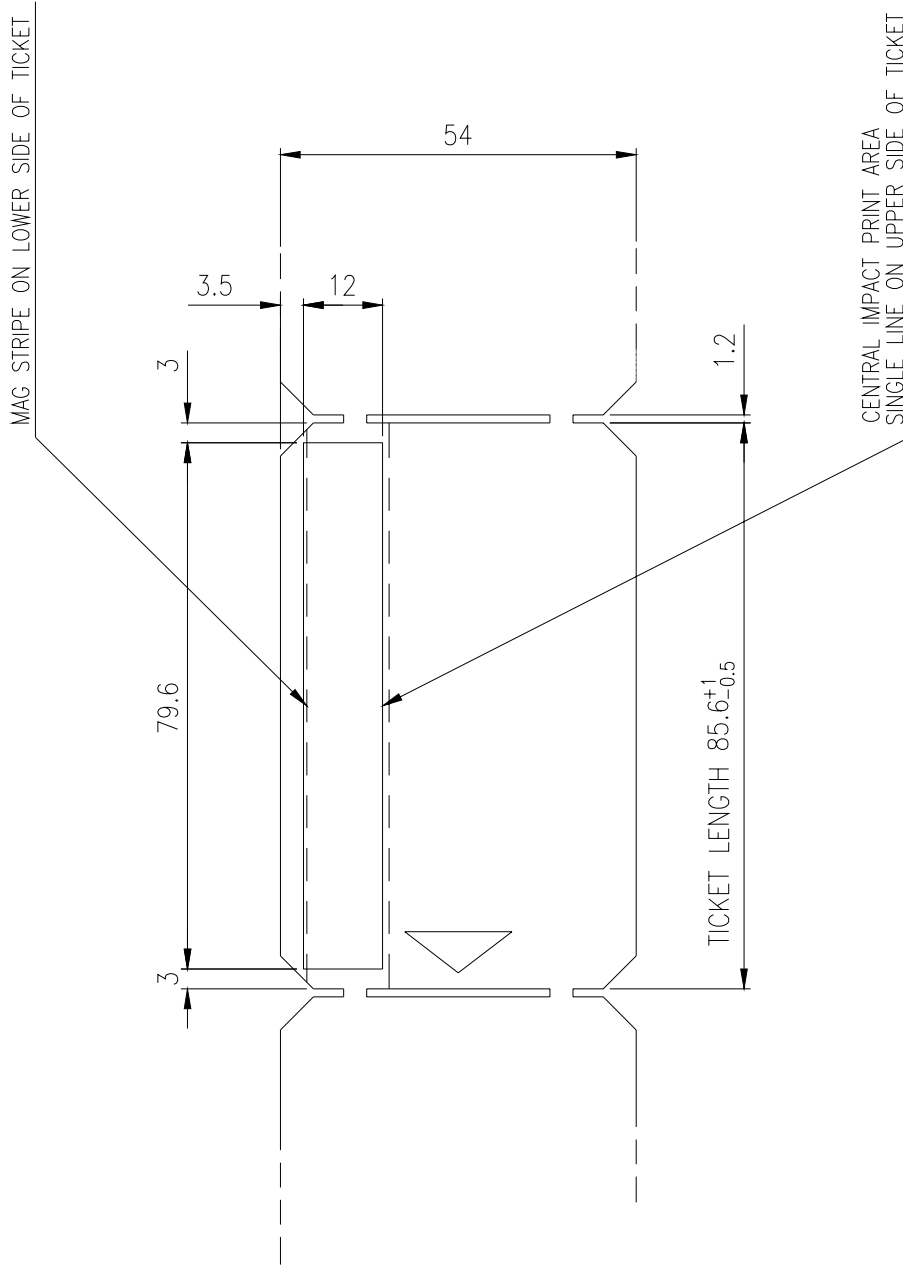
## 7 DIMENSIONS





NOTE E MODIFICHE

<p><b>ADEL S.r.l.</b>                  Sede legale: v. Saffi, 58 - 41100 MODENA                  Sede operativa: v. Nonantolana, 970/1 - 41100 MODENA                  TEL. 059/2550137 - FAX 059-2551207                  e-mail: adel@adel2000.it</p>	GRUPPO	ENC899		N. PEZZI	SCALA	FORM
	SOTTOGRUPPO			DISEGNATO		
IL PRESENTE DISEGNO NON PUO' ESSERE IN ALCUN MODO UTILIZZATO NE' RIPRODOTTO O RESO NOTO A TERZI SENZA L' AUTORIZZAZIONE DELLA ADEL S.r.l.	DENOMINAZIONE	CENTRAL PRINT AREA		DATA	20/04/2001	
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	SOTTOGRUPPO			DISEGNATO	1:1	A4	
<p>IL PRESENTE DISEGNO NON PUO' ESSERE IN ALCUN MODO UTILIZZATO NE' RIPRODOTTO O RESO NOTO A TERZI SENZA L' AUTORIZZAZIONE DELLA ADEL S.r.l.</p>	DENOMINAZIONE	LATERAL PRINT AREA		DATA	20/04/2001		
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