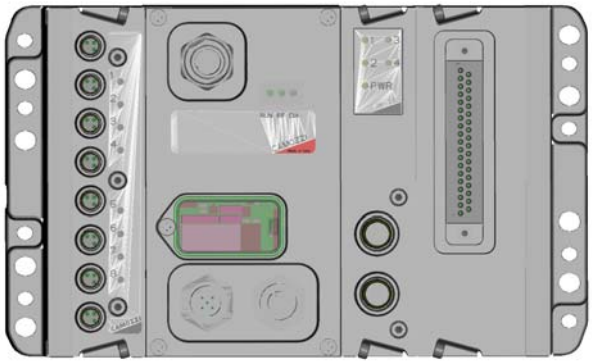
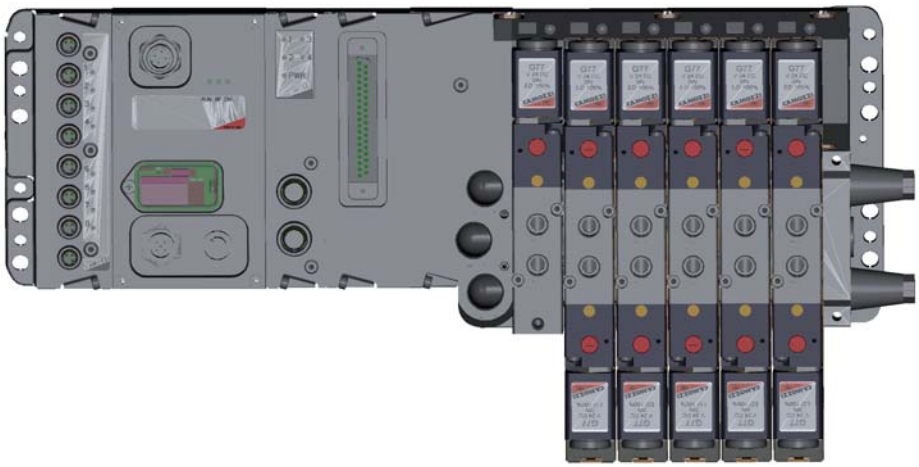
CC2 Series

Electric functioning manual

CANOPEN Fieldbus Node

Conforming to normative
ISO 11898-1





SAFETY INSTRUCTIONS

To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (ISO 4414 *1 JIS B 8370 *2).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

This since this product is used in a vast range of applications and therefore not possible for us to have full knowledge in all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to properly use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents please **read this operation manual carefully for proper operation.**

Please observe the cautions on handling described in this manual, as well as the following instructions: Additionally, the caution is classified into the following three groups, “CAUTION”, “WARNING”, and “DANGER”, in order to identify the degree of the danger it presents and possible hazard.

DANGER: Failure to pay attention to DANGER notices in extreme conditions may cause a situation that results in serious injury or loss of life.

WARNING: Failure to pay attention to WARNING notices may result in serious injury or loss of life.

CAUTION: Failure to pay attention to CAUTION notices may result in injury or equipment damage.

*1) ISO 4414 : Pneumatic fluid power ••• Recommendations for the application of equipment to transmission and control systems.

*2) JIS B 8370: General rule for pneumatic systems

Normative

Safety
CEI EN 61131-2 CEI EN 61010-1
EMC
CEI EN 61000-6-2 CEI EN 61000-6-4
RoHS
2002/95/CE

Disposal

Dispose of the packing and device in accordance with the currently applicable regulations in your country

Contents:

1. CC2 SERIES SYSTEM OVERALL DESCRIPTION

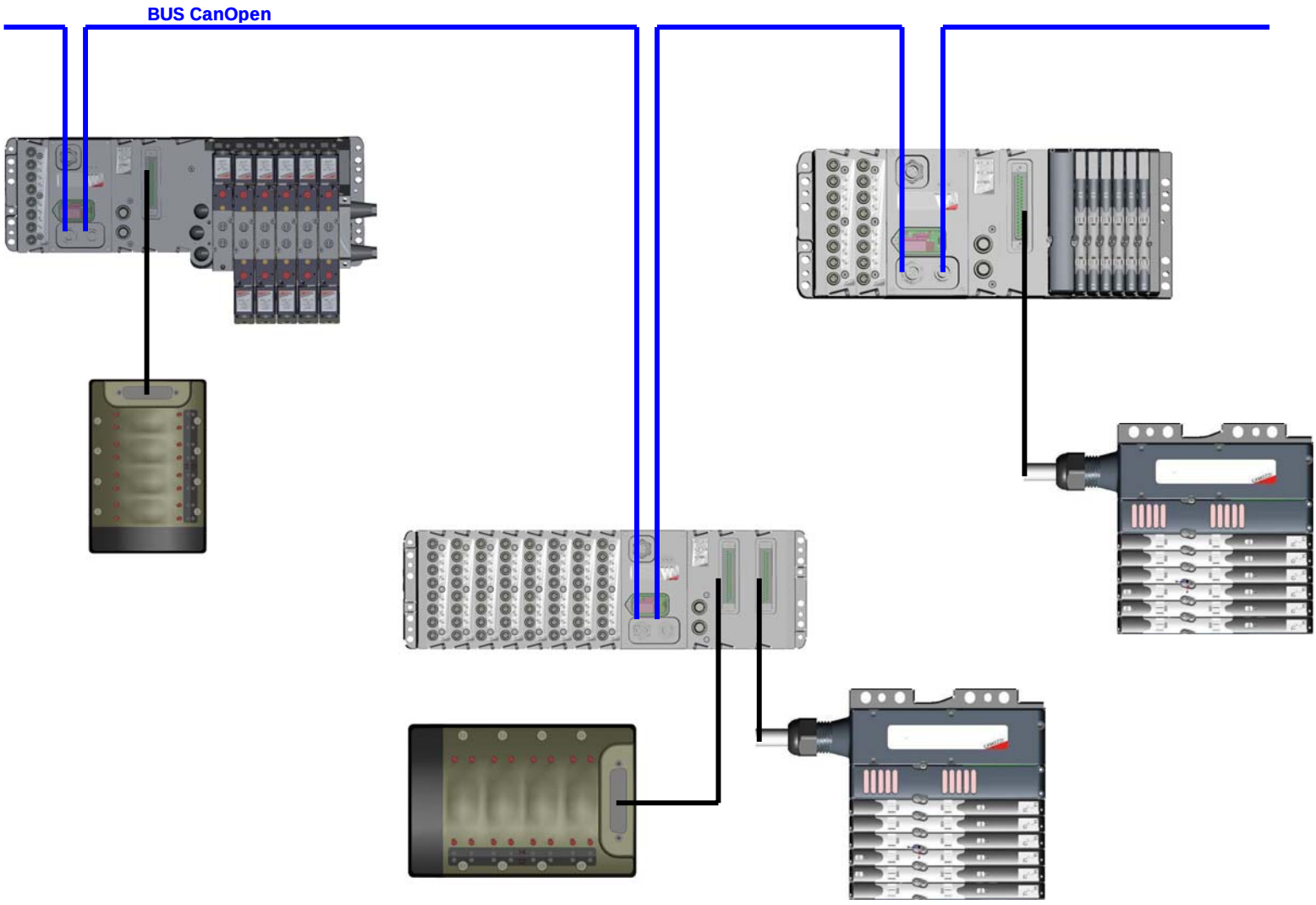
The CC2 series system allows piloting and handling the actuation of outputs according to impulses received through the external CanOpen bus and to transfer back to the external bus the information diagnostically provided for by system and the digital inputs.

The system is made up by an Initial Module (CanOpen slave device) communicating with a CanOpen Master through bus up to 1 Mb/s (manually speed setting).

On the right hand side of the initial module is possible to connect some “output SPI modules” and some “adapter SPI modules”; with this kind of modules will be possible to connect directly to the island some valves series. In any case this modules will be powered directly from the initial module.

On the left hand side of the only initial module is possible to connect some “input SPI modules” that will be powered directly from the initial module.

1.1 Example of the CC2 Series system



In the figure is represented an example of the CC2 Series constituted by:

- Initial Module with a Digital IN Modules, a Generic Output Module, a Sub-D 37 poles Module, a Series 3 Plug-IN Adapter Module and a Series 3 Plug-IN valves Island. To the Sub-D 37 poles Module is linked a Series Y Multipolar valves island.
- Initial Module with 8 Digital IN Modules, a Generic Output Module, two Sub-D 37 poles Module. To the Sub-D 37 poles Modules is linked a Series Y Multipolar valves island and a Series H Multipolar valves island.
- Initial Module with 2 Digital IN Modules, a Generic Output Module, a Sub-D 37 poles Module, a Series H Adapter Module and a Series H valves Island. To the Sub-D 37 poles Module is linked a Series H Multipolar valves island.

The initial modules are connected to the CanOpen serial.

2. MODULES DESCRIPTION:

Contents:

2.1 General technical characteristics:

POWER SUPPLY VOLTAGE:		24 V DC
MAXIMUM ABSORPTION:	Output	3,0 A (limited by fuse)
	Input + Logical	1,5 A (limited by fuse)
	Total	3,5 A
PROTECTION DEGREE:		IP65
FUNCTIONING TEMPERATURE:		0 ÷ 50 °C
RELATIVE HUMIDITY:		30 ÷ 90 % @ 25 °C 30 ÷ 50 % @ 50 °C
OUTPUT MAXIMUM NUMBER:	SPI	64
INPUT MAXIMUM NUMBER:	SPI	64

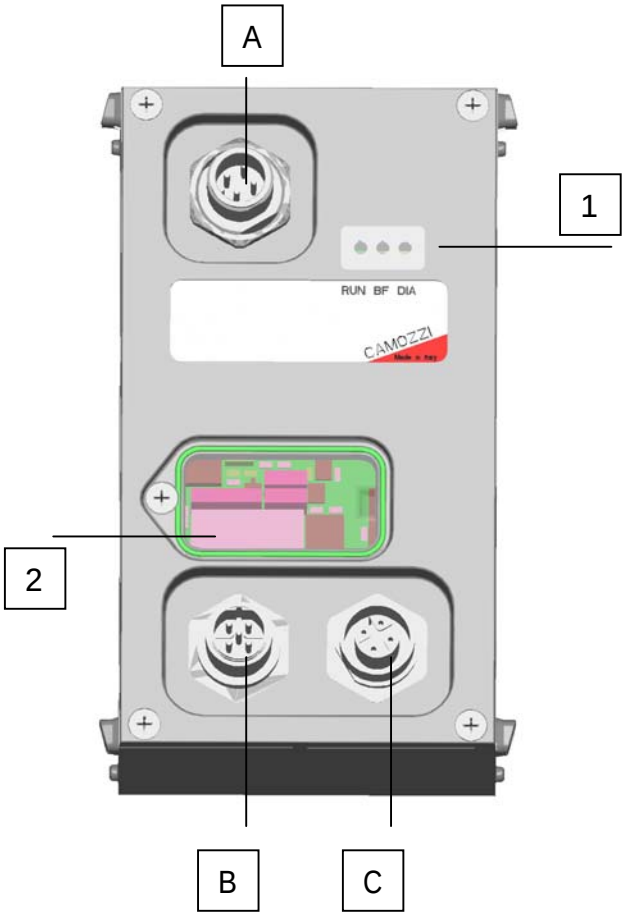
2.2 CC2 Series initial module

2.2.1 Characteristics e functionalities

The CC2 Series initial module has the following characteristics:

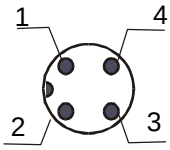
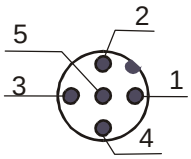
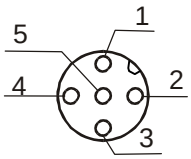
- it communicates through CanOpen protocol with the Master CanOpen
- it communicates through RS 232 with an external PC to updated the FW on the initial module itself
- it handles through an SPI sub-serial a maximum of 64 outputs
- it receives the power supply for the output from a 24 Vdc source with an earth connection (of Vcc power)
- it handles through an SPI sub-serial a maximum of 64 digital inputs
- it receives the power supply for the electronics and the from a 24 Vdc source with an earth connection (of Vcc logic)

2.2.2 Connecting and signaling elements of the CC2 Series initial module



- 1: LED BUS state
- 2: Rotary switches for setting up the CanOpen address and dip-switch for setting the baud rate
- A: Power supply connector (M12 Male 4 poles)
- B: Connector to link the bus in input to the node (M12 Male 5 poles)
- C: Connector to link the bus in output from the node (M12 Female 5 poles)

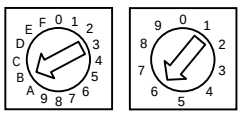
2.2.3 Pinout connectors CC2 Series Initial Modules

Connection	Type of connector	Drawing	Pinout
POWER SUPPLY (A)	M12 Male 4 poles		1: L24V Logics 2: P24V Output 3: GND (voltage reference on pins 1 and 2) 4: Earth
BUS IN (B)	M12 Male 5 poles		1: Shield (Connect this pin to the CanOpen cable shield) 2: V+ (24V power supply from CanOpen bus) 3: GND (Reference (0V) of the voltage supplied on pin 2) 4: CAN-H (CAN-H line of the CanOpen bus) 5: CAN-L (CAN-L line of the CanOpen bus)
BUS OUT (C)	M12 Female 5 poles		1: Shield (Connect this pin to the CanOpen cable shield) 2: V+ (24V power supply from CanOpen bus) 3: GND (Reference (0V) of the voltage supplied on pin 2) 4: CAN-H (CAN-H line of the CanOpen bus) 5: CAN-L (CAN-L line of the CanOpen bus)

CAUTION: The CanOpen bus must be always supplied, must be always present 24 V between the pin 2 and 3 of the connectors (B) and (C)

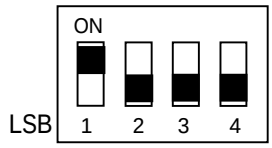
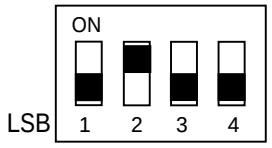
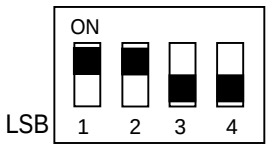
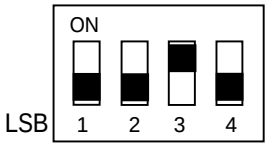
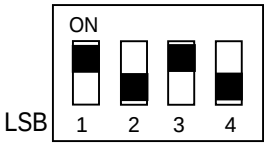
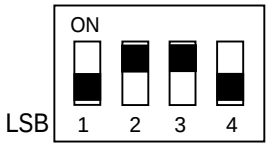
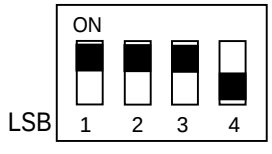
2.2.4 Initial module rotary switch setting up for CanOpen address:

By intervening on the rotary switches under the cover, the node CanOpen address must be set up.

Couple of rotating selectors	Drawing	Meaning:
Bus Address: the CanOpen address on the CC2 Series island is set by using the selectors under the transparent cover.	 x10 x1	The rotary switch on the right indicates the units, the rotary switch on the left indicates the tens of the address to set up. A hexadecimal rotary switch is used for the tens, in this way it is possible to set-up up to 127 profibus addresses A = 10; B = 11; C = 12; D, E, F = not used The rotary switches shown in the figure are set up on the 116 (B6) CanOpen address

2.2.5 Set the baud rate

By intervening on the 4 position dip-switch under the cover, the CanOpen baud rate must be set

	Switch position			Baud rate
	1	2	3	
	OFF	OFF	OFF	20 Kbaud
	ON	OFF	OFF	20 Kbaud
	OFF	ON	OFF	50 Kbaud
	ON	ON	OFF	125 Kbaud
	OFF	OFF	ON	250 Kbaud
	ON	OFF	ON	500 Kbaud
	OFF	ON	ON	800 Kbaud
	ON	ON	ON	1 Mbaud

N.B. Switch n° 4 isn't used

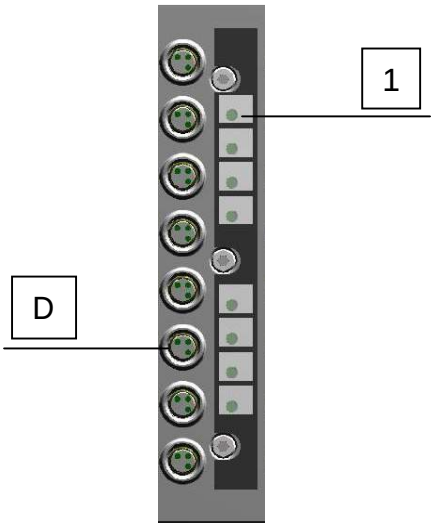
2.3 DIGITAL IN SPI module

2.3.1 Characteristics of the DIGITAL IN SPI module

The modules inputs DIGITAL IN SPI have the following characteristics:

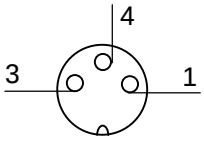
- connection through SPI to the left of the initial module and to the successive intermediate modules
- 8 digital inputs for module with an M8 female 3 poles connector for each input
- yellow signalling led for each input
- maximum number of connectable modules 8 (up to reaching 64 SPI digital inputs)
- powered from the 24V logics of the CP2 Series node
- protection against short circuit to groups of 4 inputs

2.3.2 Connecting and signaling elements of the DIGITAL IN SPI module



- 1: Yellow signally led for each input
- D: M8 female 3 poles connector for inputs connecting

2.3.3 Pinout M8 connectors of the DIGITAL IN SPI module

Connection	Type of connector	Drawing	Pinout
Digital input (D)	M8 Female 3 poles		1: VCC 3: GND 4: INPUT

2.3.4 Connection example of the DIGITAL IN SPI module

If you use a 2 wired sensor (es. CSH-221), link the brown cable to pin 1 (VCC) and the blue cable to pin 4 (INPUT); if you use a 3 wired sensor (es. CSH-223), link the brown cable to pin 1 (VCC), the blue cable to pin 3 (GND) and the black cable to pin 4 (INPUT); if you use a sensor with M8 connector (es. CSH-263), connect it to the D connector.

2.3.5 Accessory of the DIGITAL IN SPI module

Description	Code
M8 PLUG	CS-DFTP

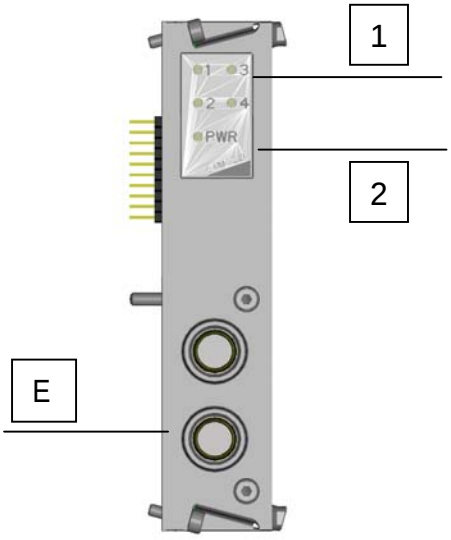
2.4 GENERIC DIGITAL OUTPUT SPI module

2.4.1 Characteristics of the GENERIC DIGITAL OUTPUT SPI module

The GENERIC DIGITAL OUTPUT SPI module have the following characteristics:

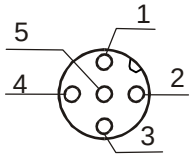
- connection through SPI to the right of the initial module or to the right of an output SPI module
- 4 digital outputs PNP 24V for module with an M12 female 5 poles connector for two output
- provides on every connector a 24V voltage for to power external device
- yellow signaling led for each output
- green signaling led for power supply presence
- powered from the 24V power of the initial module
- Only one 900 mA protection (4 outputs and 2 power supply) against short circuit. The protection against short circuit is automatically reset
- protection against overload voltage on the single output (clamping diode)

2.4.2 Connecting and signaling elements of the GENERIC DIGITAL OUTPUT SPI module



- 1: Yellow signally led for each output
- 2: green signaling led for power supply presence
- E: M12 female 5 poles connector for to connect two output

2.4.3 Pinout M12 connectors of the GENERIC DIGITAL OUTPUT SPI module

Connection	Type of connector	Drawing	Pinout
Digital Output (E)	M12 Female 5 poles		1: P24V (24V power supply provided to external devices) 2: Out X+1 (second output) 3: GND (negative reference for pin 1, 2 e 4) 4: Out X (first output) 5: Earth (Connect this pin to the cable screen)

2.4.4 Connection example of the GENERIC DIGITAL OUTPUT SPI module

For vacuum compact ejector VEC-20A2-VD, link the brown cable (V+) to the pin 1 (P24V), the green cable (Aspiration Command) to the pin 2 (Out X+1), the gray cable (V-) to the pin 3 (GND), the yellow cable (Blow down Command) to the pin 4 (Out X).

2.4.5 Accessory of the DIGITAL OUT SPI GENERIC OUTPUT modules

Description	Code
M12 PLUG	CS-LFTP
CONNECTOR DUO M12 5 POLES MALE STRAIGHT	CS-LD05HF
CONNECTOR DUO M12 5 POLES MALE 90°	CS-LH05HF
CONNECTOR M12 5 POLES MALE STRAIGHT	CS-LM05HC

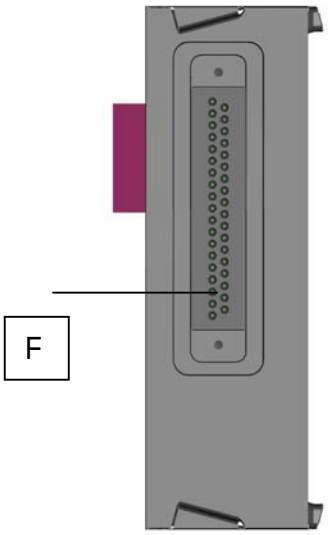
2.5 SUB-D 37 POLES DIGITAL OUT SPI module

2.5.1 Characteristics of the SUB-D 37 POLES DIGITAL OUT SPI module

The SUB-D 37 POLES DIGITAL OUT SPI module have the following characteristics:

- connection through SPI to the right of the initial module or to the right of an output SPI module
- from 8 to 32 digital outputs PNP 24V for module with a Sub-D female 37 poles connector
- powered from the 24V power of the initial module
- 1A protection against short circuit every 8 output. The protection against short circuit is automatically reset
- protection against overload voltage on the single output (clamping diode)

2.5.2 Connecting and signaling elements of the SUB-D 37 POLES DIGITAL OUT SPI module



- F: Sub-D female 37 poles connector for to connect the outputs

2.5.3 Pinout SUB-D 37 poles connectors of the SUB-D 37 POLES DIGITAL OUT SPI module

Connection	Type of connector	Pinout
Digital Output (F)	Sub-D female 37 poles	1: Output n° 1 2: Output n° 2 .... 32: Output n° 32 33: Not Connected from 34 to 37: GND (negative reference for the outputs)

2.5.4 Configuration of the actived output number on the SUB-D 37 POLES DIGITAL OUT SPI module

It's possible to select the actived output number on every single module by 4 jumper on the right side of the module. Follow the 4 possible configurations:

Jumper Configuration	Actived output
	Output from 1 to 8.
	Output from 1 to 16.
	Output from 1 to 24.
	Output from 1 to 32.

2.5.5 Protection against short circuit on the SUB-D 37 POLES DIGITAL OUT SPI module

Every module have 4 short circuit protections. Every protection restrict the maximum current to 1A total for the 8 output protected. Follow the output covered from every protection:

Protection circuit	Protected output
1	1, 2, 3, 4, 5, 6, 31, 32.
2	7, 8, 9, 10, 11, 12, 29, 30.
3	13, 14, 15, 16, 17, 18, 27, 28.
4	19, 20, 21, 22, 23, 24, 25, 26.

2.5.6 Connection example of the SUB-D 37 POLES DIGITAL OUT SPI module

If you want to link a valves island **Series Y 4 places**, you must activate by jumper the output from 1 to 8 and use the accessory G4X1-G9W1 or G4X-G9W.
If you want to link a valves island **Series Y 8 places**, you must activate by jumper the output from 1 to 16 and use the accessory G4X1-G9W1 or G4X-G9W.
If you want to link a valves island **Series 3 Plug-In**, you must activate by jumper the necessary amount of output (you must to consider that every valve place required always two output) and use the accessory G4X1-G9W1 or G4X-G9W.
If you want to link a valves island **Series H**, you must activate by jumper the necessary amount of output and use the accessory G4X1-H-G9W1 (maximum 22 output), G9X1-H-G9W1 (maximum 32 output), G4X1-H-G9W (maximum 22 output), G9X1-H-G9W (maximum 32 output).

2.5.7 Accessory of the SUB-D 37 POLES DIGITAL OUT SPI module

Description	Code
Cabling with 90° Sub-D 25 poles and Sub-D 37 poles	G4X1-G9W1
Cabling with 90° Sub-D 37 poles and Sub-D 37 poles	G9X1-G9W1
Cabling with straight Sub-D 25 poles and Sub-D 37 poles	G4X-G9W
Cabling with straight Sub-D 37 poles and Sub-D 37 poles	G9X-G9W
Cabling with Series H 25 poles and Sub-D 37 poles 90°	G4X1-H-G9W1
Cabling with Series H 37 poles and Sub-D 37 poles 90°	G9X1-H-G9W1
Cabling with Series H 25 poles and Sub-D 37 poles straight	G4X1-H-G9W
Cabling with Series H 37 poles and Sub-D 37 poles straight	G9X1-H-G9W

2.6 H SERIES ADAPTER SPI module

2.6.1 Characteristics of the H SERIES ADAPTER SPI module

The H SERIES ADAPTER SPI module have the following characteristics:

- connection through SPI to the right of the initial module or to the right of an output SPI module
- allows to connect directly a serial valve island H Series
- powered from the 24V power of the initial module
- no protection (protection against short circuit and protection against overload voltage are present on the intermediate module of H Series)

2.7 3 PLUG-IN SERIES ADAPTER SPI module

2.7.1 Characteristics of the 3 PLUG-IN SERIES ADAPTER SPI module

The 3 PLUG-IN SERIES ADAPTER SPI module have the following characteristics:

- connection through SPI to the right of the initial module or to the right of an output SPI module
- allows to connect directly a valve island 3 PLUG-IN Series with maximum 9 valves (monostable and/or bistable with maximum 18 coils)
- powered from the 24V power of the initial module
- 1A protection against short circuit every 6 output. The protection against short circuit is automatically reset
- protection against overload voltage on the single output (clamping diode)

3. INSTALLATION

The CC2 Series electrical installation is carried out by following step by step the instruction listed hereunder that are also detailed in the following chapters:

- CC2 Series System configuration through the rotating selectors
- Connection to Fieldbus CanOpen
- Power supply connection to the initial module

Contents:

3.1 CC2 Series System Configuration through rotary switches.

After having assembled the mechanical parts making up the CC2 Series it is necessary to proceed to the system configuration by using the rotary switches on the initial module.

3.1.1 Setting up CanOpen address

The CanOpen address, that is indispensable for the CC2 Series and bus CanOpen correct functioning, is set by using the initial module rotary switches (see par. 2.2.4)
To set the address are used:

- A decimal rotary switch (0..9) for the unit
- An hexadecimal rotary switch (0..F) for the tens. So it is possible set the tens up to 12 and select 127 CanOpen Address. The letters of hexadecimal rotary switch corresponds to the following number:

A	**10**
B	**11**
C	**12**
D	Not Used
E	Not Used
F	Not Used

3.2 Fieldbus CanOpen connection

For the CC2 Series connection to bus CanOpen use a screened quadripole twisted cable.
With this cable the CanOpen interface is supplied.

3.2.2 CanOpen line baud rate and length

The baud rate (transmission speed) must be set using the dip-switch under the cover (see par. 2.2.5 Set the baud rate)
The maximum length of the fieldbus line depends on the baud-rate (transmission speed) used.

Baud rate (Kbaud)	**Segment maximum length**
20	2500
50	1000
125	500
250	250
500	100
800	50
1000	25

3.2.3 CanOpen interface

For the connection to the bus CanOpen, the CC2 Series initial module have two M12 circular connectors, one male connector for the connection of the input bus to the node (BUS-IN, connector B of the initial module) and a female connectors for the connection to the output bus from the node (BUS-OUT, connector C of the initial module)

For the connection to the bus CanOpen Camozzi puts at disposal the following M12 connectors to be wired up on the CanOpen cable:

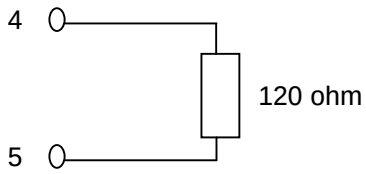
Connector's function	Description	Commercial code
BUS IN	Connector to be wired up on the CanOpen cable, M12 female 5 poles	CS-LF05HC
BUS OUT	Connector to be wired up on CanOpen cable, M12 male 5 poles	CS-LM05HC

For the connectors Pinout please refer to paragraph "2.2.3 Table with the Pinout of the initial module connectors".

3.2.4 CanOpen termination

In case in which the valves island were the last node of the CanOpen line, it's necessary assemble on initial module the resistance for the termination of the bus: for the CC2 Series valves island is provided the connector "cod. CS-LP05H0" that it already has internally the resistances necessary. It must be assembly on the connector BUS OUT (8).

Resistances' connection scheme that constitute the termination, the numbers refer to the connector BUS OUT (8) pin.



3.3 Power supply

The CC2 Series system nominal voltage is 24 Vdc -15%/+20% (in according with CEI EN 61131-2). If the outputs connected to the initial module required tolerance more hard about voltage, the tolerance about the power supply for the outputs must to respect these tolerance. If the inputs connected to the initial module required tolerance more hard about voltage, the tolerance about the logical power supply must to respect these tolerance
For example, if you connect some valves H Series, the tolerance about power voltage must to be ±10%. If you connect some sensors Series CSH with a power range 10-30V (-58%/+25%), , the tolerance about logical voltage remain -15%/+20%.

Is necessary to connect the logical voltage (pin 1), otherwise the initial module will be turn off.
For a correct working of the system is necessary to connect the initial module to the logical voltage (pin 1), to the power voltage (pin2), to the GND (pin 3) and to Earth (pin 4).

3.3.1 Signaling absence of voltage power or lower than the limit as set

The CC2 Series initial module is able to monitor the presence and the level of output power supply voltage.
In case of a total power supply failure the RUN green led would flash and the DIA red led would permanently switch-on on the initial module.

In case the output voltage were lower than the set minimum level (see par 4.4.1 System parameters, cap 5 Diagnostic) then the initial module inhibits the sending of controls to the outputs connected and the error is signalled through the permanent switching on of the RUN green led and of the DIA red led.

Both the errors are signalled not only through a particular behaviour of the led but also through the "diagnostics byte". (see chapter 5 Diagnostics).

3.3.2 Feeding cable and formula to determine initial module feeding cable lengths

A voltage drop generates on the power supply cables of a group of valves that depends on the load. This ensures that both the power supply of logic and of output do not fall within the allowed tolerance.

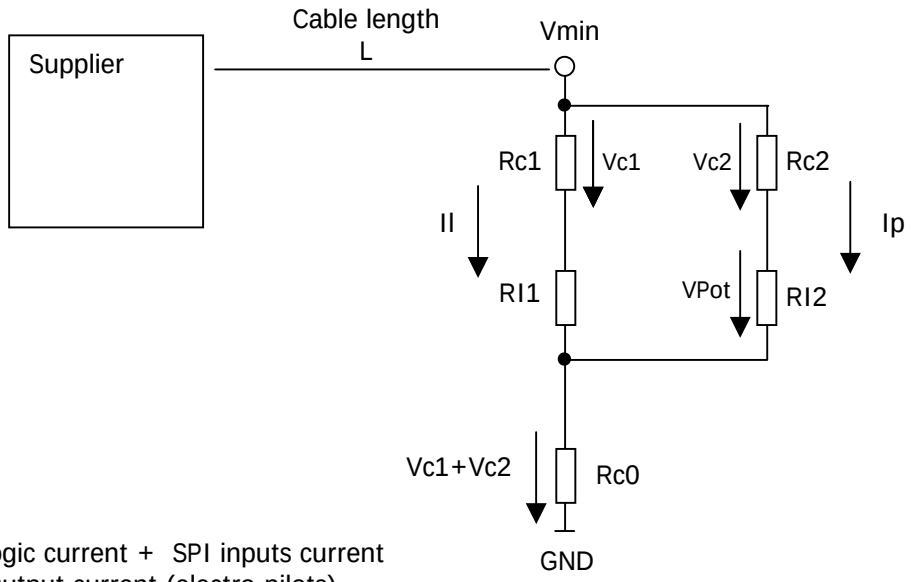
If the cable section for output power supply and for logic power supply is the same, it is possible to apply the following formula to determine its length:

To calculate the power supply cables length it is first necessary to calculate:

- The logics + Input maximum absorption (I1), the output maximum absorption (I2) (valves on the initial module + valves on the expansions)
- The minimum voltage set on the supplier during functioning (Vmin), taking into account that it depends on the load connected and that the voltage could be subjected to oscillations

The resulting values must be reported in the formula hereunder that is explained by the electrical diagram and in the example reported hereunder s.

Electric diagram that substitutes an CC2 Series node:



- Il = Logic current + SPI inputs current
- Ip = Output current (electro-pilots)
- Rc1 + Rc2 = Cables resistance in input
- Rc0 = Resistance of the common
- L = Cable length

Formula to calculate the cables length:

$$L \leq \frac{\left[\left(V\min - Vp\min\right) \times S \times Kcu\right]}{\left(2Ip + Il\right)}$$

Meaning of the terms:

- Vp min: minimum voltage that must arrive at the output
- V min: expected minimum voltage that the supplier can supply
- Il: current for the logics and the sensors
- Ip: current for the outputs
- S: cables section
- K: cables conductance (copper conductance Kcu = 56 m/(mm² * Ω))

Example:

Vmin = 24 V
Vp min = 21.6 V
Il = 1 A
Ip = 1 A (40 Series H electro-pilots)
S = 0,75 mm²
Kcu = 56 m/(mm² * Ω)

$$L \leq \frac{\left[(24-21{,}6)\times 0{,}75\times 56\right]}{(2+1)} = 33{,}6m$$

3.3.3 Fuses

The CC2 Series Initial Module is provided of fuses under the cover to avoid damage to the electronic board:

- 1,5 A SMT Fuse: protection for the logic power supply circuit and SPI input (the fuse fixes the maximum current for SPI input)
- 3 A SMT Fuse: protection for the output power supply circuit

4. PLC CONFIGURATION, PARAMETERISATION AND START UP

Contents:

4.1 General information

This chapter deals with the CC2 Series valves island configuration for the connection to a Master.
For a correct outcome of the HW configuration operations it is necessary to have set the CanOpen address (see par 3.1.1) through the rotary switch and the baud rate (see par 3.3.2) through the dip-switch.
The outputs numbering (constituted by the valves connected to the right of the initial module and expansions) goes from the left towards the right, it starts on the initial module and continues on the expansions.
The SPI inputs numbering (connected to the left of the initial module) goes from right to left.
In the following chapter, therefore, will be described:

- EDS file
- Configuration
- Start up

4.2 EDS File

To configured a Series CC2 CanOpen slave it is necessary the EDS file, it contains all the slave characteristic data (ID Number, revision, etc...).

The EDS CC2 Series can be downloaded from the internet web site Camozzi (www.camozzi.com).

For the graphic representation of the CC2 Series in the configuration file it is possible to find the following icon files:

- SerieCX2.bmp

4.3 Configuration

Each CanOpen slave receives and transfers on the network, packages of data called PDO.
Each slave can receive or transfer multiple PDOs (each PDO can contain up to 8 byte of data).
The CC2 Series initial module receives a PDO which contains the output (PDO1 rx) and transmits two PDOs:

- one which contains the diagnostic inputs of the module (PDO1 Tx)

- one which contains the values of the SPI digital inputs (PDO2 Tx)

Furthermore it guarantees other kinds of packages foreseen by the protocol (ex. SDO).

To each PDO which runs on the net, an identification code is given (COB-ID), it indicates the kind of message and who has transmitted it. In particular, it is added to the value which indicates the kind of message, also the address value of the node which has transmitted the same message.
The association between the PDO and the related COB-ID can be found in the EDS file.

The list of the PDO handled by each slave can be found in the related EDS file and the group of the handled PDO and their structure make part of the module's object dictionary.
To each element of the dictionary an address is connected.
For the slave and the master the association between the addresses and the different kinds of objects is fixed and determined by the CanOpen specification.

The PDO mapping objects' content must be set, for the slave it is defined in the EDS file, for the master it is sometimes automatically generated by the master (if it makes a net scan), while in other cases it must be calculated using the required tables and manually formulated in its parameters.
In the CC2 Series node CanOpen the reception PDO occupy the objects' dictionary addresses starting from 1400_h an up (PDO1 -> 1400_h; PDO2 -> 1401_h; ...), the transmission ones occupy the objects' dictionary addresses starting from 1800h and up (PDO1 -> 1800_h; PDO2 -> 1801_h; ...).
Of course, the PDOs Tx transmitted from the slave (input) must be configured as received PDO Rx in the master and the PDO Rx received from the slave (output) must be configured as transmitted PDO Tx in the master.

Reference table (Conform CanOpen specifics)

OBJECT	COB-ID	OBJECTS' DICTIONARY ADDRESSES
PDO1 Rx	0x200 + NODEID	1400_h
PDO2 Rx	0x300 + NODEID	1401_h
PDO3 Rx	0x400 + NODEID	1402_h
PDO4 Rx	0x500 + NODEID	1403_h
....		
PDO7 Rx	0x800 + NODEID	1406_h
....		
PDO1 Tx	0x180 + NODEID	1800_h
PDO2 Tx	0x280 + NODEID	1801_h
PDO3 Tx	0x380 + NODEID	1802_h
PDO4 Tx	0x480 + NODEID	1803_h
...		
PDO7 Tx	0x780 + NODEID	1806_h
....		

4.3.1 PDO CC2 Series: Correspondence between COB-ID, OBJECTS' DICTIONARY and I/O

OBJECT	COB-ID	OBJECTS' DICTIONARY ADDRESSES	I/O
PDO1 Tx	0x180 + NODEID	1800_h	Diagnostics input (1 byte)
PDO2 Tx	0x280 + NODEID	1801_h	SPI input (8 byte)
PDO1 Rx	0x200 + NODEID	1400_h	Output (8 byte)

4.3.2 Configuration example

System with two CC2 Series slave (all the available PDOs are configured on master)

- NODE 1: CanOpen address 4

OBJECT	COB-ID	OBJECTS' DICTIONARY ADDRESSES	I/O
PDO1 **Rx**	0x204	1400_h	Output Node 4
PDO1 **Tx**	0x184	1800_h	Diagnostics input Node 4
PDO2 **Tx**	0x284	1801_h	SPI input Node 4

- NODE 2: CanOpen address 6

OBJECT	COB-ID	OBJECTS' DICTIONARY ADDRESSES	I/O
PDO1 **Rx**	0x206	1400_h	Output Node 6
PDO1 **Tx**	0x186	1800_h	Diagnostics input Node 6
PDO2 **Tx**	0x286	1801_h	SPI input Node 6

- The master should manage 6 PDO (3 for each slave)

OBJECT	COB-ID	OBJECTS' DICTIONARY ADDRESSES	I/O
PDO1 **Tx**	0x204	1800_h	Output Node 4
PDO2 **Tx**	0x206	1801_h	Output Node 6
PDO1 **Rx**	0x184	1400_h	Diagnostics input Node 4
PDO2 **Rx**	0x284	1401_h	SPI input Node 4
PDO4 **Rx**	0x186	1403_h	Diagnostics input Node 6
PDO5 **Rx**	0x286	1404_h	SPI input Node 6

It isn't necessary follow a specific order in the connection between the slave's PDOs and the master's PDOs. Moreover it isn't necessary connect to the master all the PDOs that the slave can transmit o receive.
The COB-ID of the Master objects is the one calculated for the relative PDO slave.

4.3.3 Data Format

The outputs PDO coming from the Master CanOpen (PDOX Tx, $18XX_h$) and directed to the CC2 Series Initial Module (PDO1 Rx, 1400_h), is formed by 8 bytes and the 64 outputs are disposed as follows:

Master Output	Byte 0								Byte 1								Byte 2								Byte 3							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Series CC2 output (load)	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9	24	23	22	21	20	19	18	17	32	31	30	29	28	27	26	25

Master Output	Byte 4								Byte 5								Byte 6								Byte 7							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Series CC2 output (load)	40	39	38	37	36	35	34	33	48	47	46	45	44	43	42	41	56	55	54	53	52	51	50	49	64	63	62	61	60	59	58	57

For example: bit 0 of byte 0 corresponds with the output 1
bit 2 of byte 1 corresponds with the output 11
bit 7 of byte 3 corresponds with the output 32
bit 5 of byte 6 corresponds with the output 54

The diagnostics inputs PDO coming from the CC2 Series slave (PDO1 Tx, 1800_h) and directed to the Master CanOpen (PDOX Rx, $14XX_h$), is formed by 1 byte:

Master Input	Byte 0							
	7	6	5	4	3	2	1	0

With the diagnostics byte the CC2 Series initial module can find the absence of the output power supply and if the output power supply goes below 19 V.

The SPI inputs PDO coming from the CC2 Series slave (PDO2 Tx, 1802_h) and directed to the Master CanOpen (PDOX Rx, $14XX_h$), is formed by 8 bytes and the 64 inputs are disposed as follows:

Master Input	Byte 0								Byte 1								Byte 2								Byte 3							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Series CC2 SPI Input	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9	24	23	22	21	20	19	18	17	32	31	30	29	28	27	26	25

Master Input	Byte 4								Byte 5								Byte 6								Byte 7							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Series CC2 SPI Input	40	39	38	37	36	35	34	33	48	47	46	45	44	43	42	41	56	55	54	53	52	51	50	49	64	63	62	61	60	59	58	57

For example: bit 4 of byte 0 corresponds to the state of Caminet digital input 5
bit 5 of byte 1 corresponds to the state of Caminet digital input 14
bit 6 of byte 3 corresponds to the state of Caminet digital input 31
bit 3 of byte 7 corresponds to the state of Caminet digital input 60

4.4 Starting up the CC2 Series node

To install the System CanOpen CC2 Series, remove the packaging and follow the operations listed hereunder in their sequence referring to what has been reported in the previous pages:

1. Set the rotary switch of the initial module
2. Connect the CC2 Series initial module to the CanOpen net through the bus-in (B) connectors and the bus-out (C) connectors and, if necessary, the CanOpen termination resistance.
3. Connect the power supply cable (24 Vdc ± 10%) to connector (A) of the initial module, verifying that both the logic voltage and the output voltage one have been connected.

Having completed the connections is possible to supply voltage to the system in way that the master starts the configuration procedure.

If the island has been correctly configured only the “RUN” green led will remain on fixed and the “BF” red led blinking depend on data exchanged from Master and slave.

Suggestion: if the plant/machine where the CC2 Series is mounted will allow it, verify first the CC2 Series functioning without supplying compressed air in a way to avoid any accidental reactions.

5. DIAGNOSTICS

Contents:

5.1 Diagnostics possibilities

The CC2 Series is fitted with 2 types of diagnostics with which it is possible to find errors that could cause an incorrect system functioning.

The CC2 Series system put at disposal the following types of diagnostics:

- Diagnostics with leds
- Diagnostics with an input byte (PDO1 Tx of the node)

The following are the errors that can be found:

- Vcc outputs voltage absent: The CC2 Series system signals if there is an outputs power supply failure that must supplier the outputs
- Vcc outputs power supply lower than the set limit: the CC2 Series signals if the outputs voltage goes below the set value of 19 V

⚠ **CAUTION: Upon switching on, the CC2 Series does not highlight the outputs power supply error, (absent or being below the set limit)**
The errors are found only after the outputs power supply has been correctly supplied to the initial module.

5.2 Diagnostics with led (Trouble Shooting)

Legend:


Fixed led on


Flashing Led


Led off

LED COMBINATION			PROBLEM	PROBLEM SOLUTION
RUN **Green**	**BF** **Red**	**DIA** **Red**		
 Fixed on	 Off	 Off	No errors present, there aren't messages on bus	-
 Fixed on	 Flash.	Off	No errors present, there are messages on bus	-
 Off	 Off	 Off	The logics power supply voltage is not present	Check the supplier connector Check the 1,5 A fuse under the cover. It could be broken because of an excessive SPI input's current
 Fixed on	 Off	 Fixed on	The outputs (valves) power supply voltage is below than 19 V	Verify on the supplier connector the power voltage value
 Flash.	 Off	 Fixed on	The output (valves) power supply voltage is absent.	Check the supplier connector verifying that the outputs power supply voltage arrives Check the 3 A fuse under the cover, it could be broken because of an excessive output's current
 Fixed on	 Fixed on	 Off	Connection anomaly to bus CanOpen, possible causes: 1 Incorrect CanOpen node address 2 Physical interruption of the CanOpen net (broken cable) or connector's wiring error 3 Incorrect Baud rate 4 Incorrect configuration Master - Slave 5 Termination Resistance absent	1 Check the correspondence between the address set on the initial module and the HW configuration in the PLC 2 Check that the CanOpen cable is not interrupted, verify that the cable are correctly wired in the connector and that they have not been inverted by mistake 3 Check that the baud rate set with the Dip-switch on the H series node is the same set on the master 4 Check the configuration CanOpen Master – Slave 5 Check the termination resistance on the ends of the CanOpen segment
 Off	 Fixed on	 Off	Bus CanOpen power supply absent	Check the CanOpen connector and verify the presence of the 24 V between the pin 2 (V+) and 3 (GND) of the connector

5.3 Diagnosis Byte

The PDO1 Tx of the CC2 Series CanOpen node corresponding to address 1800_h of the object dictionary is composed of only one input byte with general diagnostic information.

The table shows the errors which can be found with the CC2 Series and the corresponding bit on the diagnostic byte. If all the bits of the diagnostics show a zero logic value, then it means that there are no errors. If thee are some errors, the corresponding bit shows a one logic value

BITS OF THE DIAGNOSTICS INPUTS	ERROR
0	Vcc output voltage absent
1	Vcc output voltage lower than the set limit (19 V)
2	-
3	-
4	-
5	-
6	-
7	-

6. ACCESSORI

CS-LF04HB	CONNECTOR M12 4 POLE FEMALE (FOR POWER SUPPLY)
CS-LF05HC	CONNECTOR M12 5 POLE FEMALE (FOR BUS-IN CANOPEN)
CS-LM05HC	CONNETTOR M12 5 POLE MALE (FOR BUS-OUT CANOPEN)
CS-LP05H0	CONNECTOR M12 5 POLE MALE+TERMINAL RESISTANCE (FOR CANOPEN)