Digital Labelling Application Software c0404 V1.6

SILVER

Codes (version + configuration) utilisable drives and firmware		
Version	**Configuration**	**Firmware**
SDMWx170 VB231	C0404	WPW05_404
SDMWx180 VA133	C0404	WPW04_404
SDMWx130 VA133	C0404	WPW06_404
MDFxxxxxx	C0404	WPW06_404

Ever ELETTRONICA

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Issues			
Date	**Ver.**	**Ed.**	**Description**
2-03-2004	1.0	A. Moro	First version issued
6-07-2004	1.1	G. Lacchini	Update
28-07-2004	1.2	A. Moro	Update for firmware version 1.1
03-09-2004	1.3	A. Moro	Update for firmware version 1.2
03-09-2004	1.4	A. Moro	Update for firmware version 1.3
18-10-2004	1.5	A. Moro	Update for firmware version 1.5
25-08-2005	1.6	G.Lacchini	Update english version

GENERAL INDEX

1.0 Main features

Ever Elettronica has designed, using fully digital technology, a control system for labelling heads with stepper motor which, notwithstanding the low cost, characterises the labelling machines with high productivity in terms of the number of labels applied per minute or in other words the unwinding speed of the label reel.
The main features of this system are:

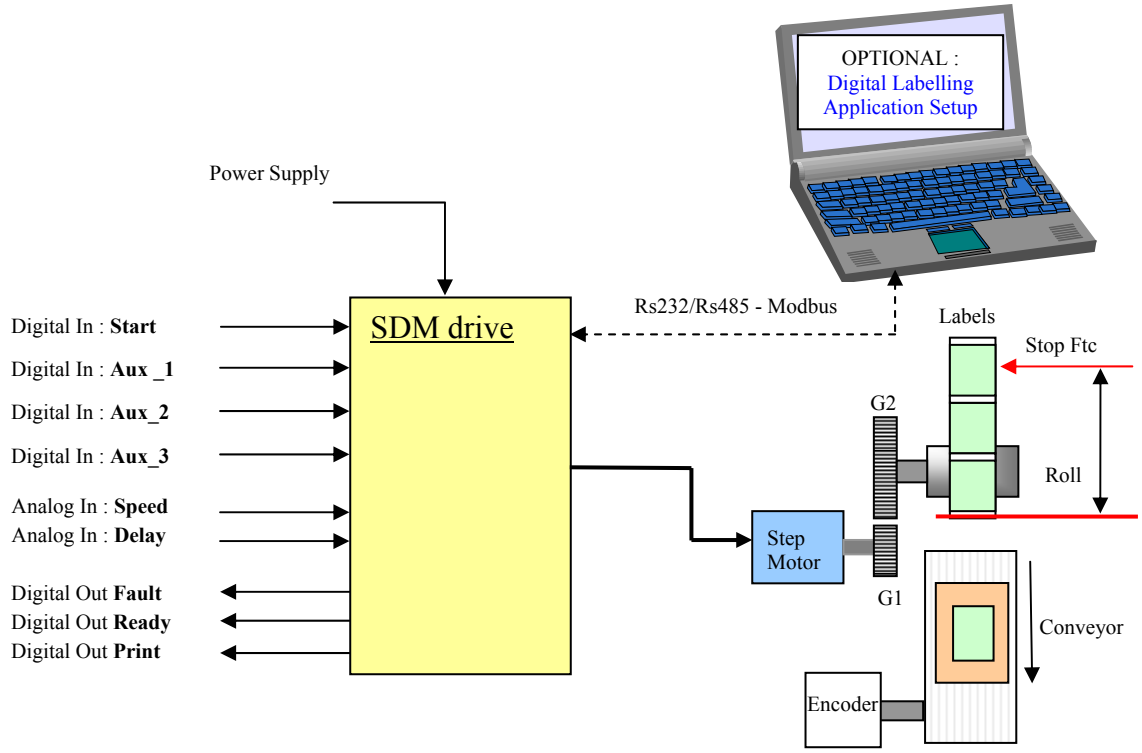
- response times to the label Start and Stop commands precisely defined and independent from the labelling speed in order to guarantee accurate label positioning;
- the space (course) covered by the label after acquisition of the label Stop signal, programmable and independent from the labelling speed variations;
- it is possible to synchronise in real-time the label application speed with the speed of the product to be labelled by means of an encoder, in order to guarantee labelling accuracy also during the machine's acceleration and deceleration phases;
- easy to configure with various user functions and it is possible to store various parameters of the machine cycle relating to different label shapes: speed, start delay, stop delay, length of the label pre-display, etc;
- numerous optional functions available such as interfacing with standard HMI terminals, label roll end detection, automatic label length acquisition, print control;
- less motor noise and vibrations at all the positioning speeds by means of the high switching frequency of the drive's power stages;
- operation modularity thanks to FieldBus connection;
- high torque rate per volume unit of the stepper motor and maximum integration scale of the electronics deriving benefit from control system's small dimensions.

1.1 Generality

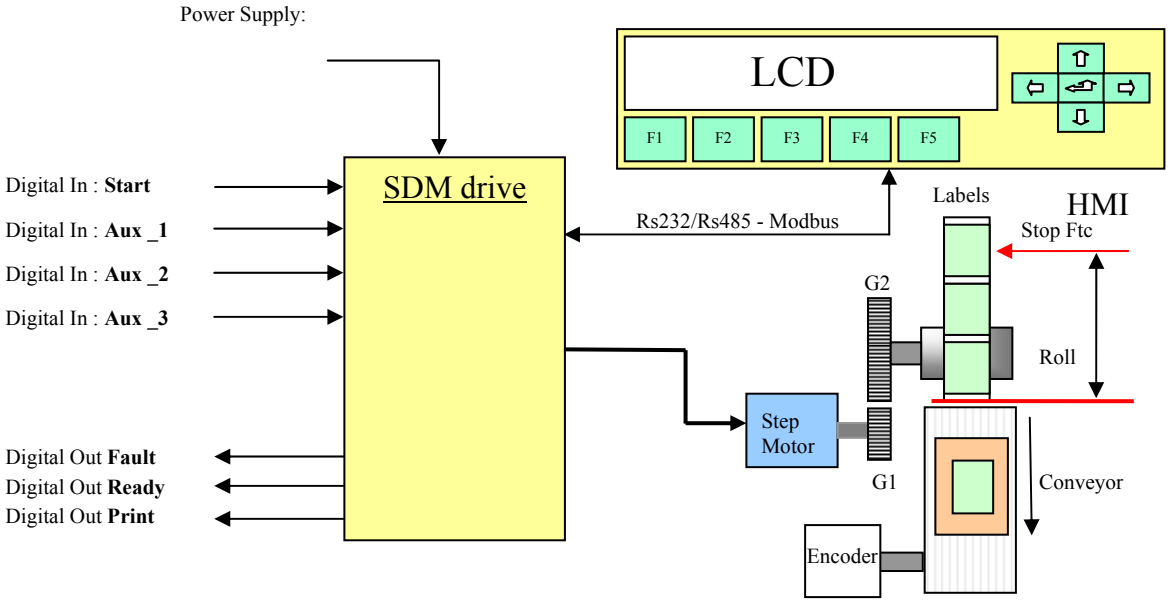
This manual provides a description of the operation and use characteristics of the ***C404*** software package to control labelling heads by means of the SDMWAxxxx and SDMWDxxxx range of drives manufactured by EVER Elettronica.
The software can be configured directly by the user by means of a Personal Computer using the EVER configuration software ***Digital_Labelling_Application_Setup*** for Windows environment, or by means of an RS232 or RS485 serial interface according to the standard MODBUS RTU protocol. Easily adapted to different types of labelling operations using two hardware versions, which on the whole can be described as a basic type (DIGITAL BASIC), without HMI interfaces, or an advanced type (DIGITAL ENHANCED) equipped with HMI local control devices.

The diagrams of these system versions illustrated in the following two sections in which the inputs denominated Aux_n have functions dependent on the configuration chosen by the user.

1.2 Diagram of the DIGITAL BASIC labelling control system



1.3 Diagram of the DIGITAL ENHANCED labelling control system



1.4 Main mechanical parameters that can be configured in the labelling application

- Label roll diameter => dia. roll (mm)
- Motor gear => G1 (No. teeth)
- Roll gear => G2 (No. teeth)
- Max. label length => max_label_length (mm)
- Min. label length => min_label_length (mm)
- Max. label ejection speed => max_label_speed (m/min)
- Max. torque requested by motor => max_motor_torque (N/m)

1.5 Selection criteria of devices based on the application

The following indications refer to the maximum performances obtainable using labelling heads with good quality mechanics.

For ejection speed up to 40m/min.

- Drive: SDMWx180VA133**C404**
- Drive connector kit: SDMWx180VA133C
- Motor: MT34FN31042M8 (maximum bipolar torque 4.5 Nm)
- Configuration software: Digital_labelling_application_set-up

For DIGITAL BASIC configuration

- Keyboard VT20N
- Keyboard software

For high ejection speeds (maximum up to 80m/min.)

- Drive: SDMWx170VB231**C404**
- Drive connector kit: SDMWx170VB231C
- Motor: MT34FN47060M8 (maximum bipolar torque 8.5 Nm)
- Configuration software: Digital_labelling_application_set-up

For DIGITAL ENHANCED configuration

- Keyboard VT20N
- Keyboard software

1.6 Hardware and software characteristics of the drives

With reference to documentation indicated in the tables below for the general practicable characteristics of the hardware and software and the instructions of the drives

Drive codes and user manuals		
Drive	**User Manual**	**Generic software manual**
SDMWx170 VB231 C0404	SDMWx170V____	MODBUS RTU protocol specification for SDM series drives
SDMWx180 VA133 C0404	SDMWx180V____	MODBUS RTU protocol specification for SDM series drives
SDMWA130 VA136 C0404	SDMWA130V____	MODBUS RTU protocol specification for SDM series drives
MDxx C0404	MDxx_____	MODBUS RTU protocol specification for MD series drives

Drive codes and user manuals files		
Drive code	**User manual files**	**Generic software manual file**
SDMWx170 VB231 C0404	Manuale_SDMWx170Vxxx_rxxx_it	Manual_software_sdm_modbus_rxxx_gb
SDMWx180 VA133 C0404	Manuale_SDMWx180Vxxx_rxxx_it	Manual_software_sdm_modbus_rxxx_gb
SDMWA130 VA136 C0404	Manuale_SDMWA130Vxxx_rxxx_it	Manual_software_sdm_modbus_rxxx_gb
MDxx C0404	Manuale_MDxx_rxxx_it	Manual_software_sdm_modbus_rxxx_gb

the following pages contain information regarding the use and functionality of the specific hardware and software resources of the application.

1.7 Functionality of the digital inputs

For definition of the user configuration, please refer to section 3 "**System configuration**" of this manual.

Pin *		Input	Description			
5 V	24 V		Inputs Config =0	Inputs Config =1	Inputs Config =2	Inputs Config =3
+	+	+B0_IN0	START PHOTOCELL (start on rising edge)	START/STOP (rising edge = start , falling edge = stop)	START PHOTOCELL (start on rising edge)	START PHOTOCELL (start on rising edge)
-		-B0_IN0				
+	+	+B0_IN1	STOP PHOTOCELL (stop on rising edge)		STOP PHOTOCELL (stop on rising edge)	STOP PHOTOCELL (stop on rising edge)
-		-B0_IN1				
+	+	+B0_IN2	LABELS END	LABELS END	LABELS_END	TEST/ AUTO_LEARNING_LL
-		-B0_IN2				
+	+	+B0_IN3	ENCODER	ENCODER	TEST LABEL (start on rising edge)	ENCODER
-		-B0_IN3				
	-	COM_IN				

* For the connector pin-outs please refer to the drive hardware manuals.

Description of functionality:

START_PHOTOCELL

Label start command. The label ejection is enabled by the rising edge (passage from "off" to "on" status) of the input.

The start is not enabled if the input defined as LABELS_END is closed.

STOP_PHOTOCELL

Label stop command. The label stop is enabled by the rising edge (passage from "off" to "on" status) of the enabled input, for example by a photoelectric cell, at the start of the next label.

START_STOP

Label start/stop command. Normally controlled by a PLC or analog controller, if the input is closed it advances at the set label speed, if open it stops the motor.

LABELS_END

Label roll end command. When the input is closed, the label start command is disabled and the FAULT output is opened.

TEST_LABEL

Label test command. Enables the ejection of a single label for each rising edge (passage from "off" to "on" status) of the input. The command is also enabled if the LABELS_END input is closed.

ENCODER

Input for synchronisation of the label ejection speed with the product speed generally measured by a phase with an encoder on the conveyor belt.
Frequency and number of switching of the input are used to synchronise the speed and position of the label ejection.

TEST/AUTO_LEARNING_LL

This input assumes different functions.
If the input is closed for less than 1 sec., the Step_By_Step_Mode function is enabled (ejection of a single label).
If the input is closed for at least 5 sec., the GET_LL function is enabled.
If the system is in alarm condition, by closing the input a Reset_Alarms is carried out.

1.8 Functionality of the analog inputs

For definition of the user configuration, please refer to section 3 "**System configuration**" of this manual.

Pin *	Input	Description			
		Layout Conf =0	Layout Conf =1	Layout Conf =2 **	Layout Conf =3
	+5Vdc				
	AGND				
	+IN_AN0		VELOCITY	VELOCITY	SELECT GEAR
	-IN_AN0				
**	+IN_AN1			DELAY	
**	-IN_AN1				

* For the connector pin-outs please refer to the drive hardware manuals

** Input only available with the SDMWx180 drive

Description of functionality:

VELOCITY

Analog input to set a labelling speed included between a min. and max. value. The user defines the speed regulation interval by setting the ***Speed_Min_Scale*** and ***Speed_Max_Scale*** parameters, which define the permitted minimum and maximum speed values respectively (see section 3).

DELAY

Analog input to set the response delay of the label Start command between a minimum space and a maximum space defined by the user respectively, setting the ***Delay_Min_Scale*** and ***Delay_Max_Scale*** parameters.
This delay starts after the validation time of the enabled status of the input (see timing table in section 3.4 of this manual).

SELECT_GEAR

Analog input to select an element from the Encoder_Dev_Table []. Based on the analog input value, the value of the Encoder_Dev_Index object will vary from 0 to 7.

1.9 Functionality of the digital outputs

SDMWx170 & SDMWx180		
Pin *	**Output**	**Description**
	+24Vdc	
	VSS	
	B0_OUT0	**FAULT**
	B0_OUT1	**READY**
	B0_OUT2	**PRINT**
SDMWx130 & MDxx		
Pin *	**Output**	**Description**
	+24Vdc	
	VSS	
	B0_OUT0	**FAULT**
	B0_OUT1	**PRINT**
SDMWx170Vx242 driver version, there are B0_IN4 ÷B0_IN7 e B0_OUT4÷B0_OUT7 digital I/Os. The I/Os function depends on firmware version, see Section C		

* For the connector pin-outs, please refer to the drive hardware manuals

Description of functionality:

FAULT

Alarm output: normally ON (closed output), it will open when the drive is not capable of responding to the commands;

READY

Output normally OFF (open) with motor rotating, ON (closed) with motor stopped;

PRINT

Output used to control an optional printing device. The output, normally OFF (open) is switched ON (closed) after a delay defined by the ***Print_Delay*** parameter by the stopped motor for a time defined by the ***Print_Time*** parameter.

1.10 Motor connections

Pin *	**Functions**	**Motor Connection Type**		
		MT34FNxxxxxx Parallelo	MT34FNxxxxxx Serie	
	Motor Phase(A)	Black & Org/Wht	Black	
	Motor Phase(A/)	Orange & Blk/Wht	Orange	
	Motor Earth Ground(MEG)			
	Motor Phase(B)	Red & Yel/Wht	Red	
	Motor Phase(B/)	Yellow & Red/Wht	Yellow	
			Blk/Wht & Org/Wht	
			Red/Wht & Yel/Wht	

* For the connector pin-outs please refer to the drive hardware manuals

2.0 Configuration of system SDMWx1x0

The following table defines the position of the dipswitches to define the transmission speed (baud rate) and the node code (Node Id) of the RS232 and RS485 interfaces respectively.

DIP2				DIP1							
D1	D2	D3	D4	D1	D2	D3	D4	D5	D6	D7	D8
U1	U0	ID6	ID5	ID4	ID3	ID2	ID1	ID0	BD2	BD1	BD0
Free for User settings.		RS485 & RS232 Node Identifier							RS485 & RS232 Baud rate		
OFF	**ON**	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**
Factory Setting : Baudrate 57600, NodeId =1											

2.1 Dipswitch configuration to select the Serial node code

Drive SDMWx170 and SDMWx180

Please refer to the table in the drive hardware or software manual.

Drive SDMWx130 and MDFxxxx

For SDMWx130 and MDFxxxx drives, cause there are not dip switches, the Node ID is done through ***Digital_Labelling_Setup*** by the menu *Tools/Scan & Configure Service*

2.2 Dipswitch configuration to select the Baud rate

Drive SDMWx170 and SDMWx180

Rs232 and RS485 Baud Rate table

BD2	BD1	BD0	Baud Rate (Kbit/s)
OFF	OFF	OFF	Reserved
OFF	OFF	ON	57600
OFF	ON	OFF	38400
OFF	ON	ON	19200
ON	OFF	OFF	9600
ON	OFF	ON	4800
ON	ON	OFF	2400
ON	ON	ON	1200

Drive SDMWx130 and MDFxxxx

For SDMWx130 and MDFxxxx drives, cause there are not dip switches, the Node ID is done through ***Digital_Labelling_Setup*** by the menu *Tools/Scan & Configure Service*

2.3 Dipswitch configuration to select the user mode

Drive SDMWx170 and SDMWx180

U1	U0	Description
OFF	OFF	Basic Slave
OFF	**ON**	**Digital_Labelling_Application**
ON	OFF	Reserved
ON	ON	Reserved

Drive SDMWx130 e MDFxxxx

SDMWx130 and MDFxxxx drives is not necessary the user selection because the modality Digital_Labelling_Application is already ON

3.0 System configuration

The configuration of the labelling application parameters in the SDM drive is carried out by means of the "***Digital_Labelling Application Setup***" program for a Windows environment installed on a PC connected to the drive through serial port RS232. Hereafter are described the parameters that can be configured. The Set up can be carried out also using a keyboard or PLC, which have an RS232 or RS485 serial port operational according to the Modbus RTU protocol.

3.1 Settable parameters and relevant measurement units and default values

SDM Drive Object	User Parameter Name	Type Var.	Unit	Default Value	Modbus Adreess Word h,l	Description
Configuration Parameters						
Step_Angle		UINT	--	1	1026h	
Min_Profile_Velocity		UINT	Hz	200	1014h	
Max_Profile_Velocity		UDINT	Hz	1000	1015h,1016h	
Profile_Velocity		UDINT	Hz	1000	1017h,1018h	
Profile_Acceleration		UINT	ms	500	1019h	
Profile_Deceleration		UINT	ms	500	101Ah	
Min_Current		UINT	mA	0	1010h	
Max_Current		UINT	mA	0	1011h	
Boost_Current		UINT	mA	0	1012h	
Nominal_Current		UINT	mA	0	1013h	
Mechanical Parameters						
User_Long_Var[0]	G1_Pulley	UDINT	--	0	0000h,0001h	Pulley G1
User_Long_Var[1]	G2_Pulley	UDINT	--	0	0002h,0003h	Pulley G2
User_Long_Var[2]	Roll_Diameter	UDINT	dmm	0	0004h,0005h	Labels Roll Diameter
User_Long_Var[3]	Encoder_PPR	UDINT	--	0	0006h,0007h	Encoder Pulse Per Revolution
User_Long_Var[4]	Encoder_Development	UDINT	dmm	0	0008h,0009h	Linear Encoder Development Per Revolution
User_Long_Var[5]	D_Stop				000Ah,000Bh	Distance between stop photocell and Label Out
Workin Parameters						
User_Long_Var[6]	Speed_Min_Scale	DINT	mm/1'	0	000Ch,000Dh	Potentiometer Speed Min Value
User_Long_Var[7]	Speed_Max_Scale	DINT	mm/1'	0	000Eh,000Fh	Potentiometer Speed Max Value
User_Long_Var[8]	Delay_Min_Scale	UDINT	dmm	0	0010h,0011h	Potentiometer Delay Min Value
User_Long_Var[9]	Delay_Max_Scale	UDINT	dmm	0	0012h,0013h	Potentiometer Delay Max Value
Modality Configuration Parameters						

User_Long_Var[10]	Key_Stored				0014h,0015h	Compare Key for Key Insert
User_Long_Var[11]	Labels_Counter_Tot_S				0016h,0017h	Label Counter
User_Long_Var[12]	Inputs_Conf	UDINT	--	0	0018h,0019h	0= Start,Stop,Label_end,Encoder 1 = Start-Stop,Label_end,Encoder ; 2 = Start,Stop,Label_end, Test_Label 3 = Start,Stop,Test/Auto_Learning,Encoder
User_Long_Var[13]	Layout Conf	UDINT	--	0	001Ah,001Bh	0 = keyboard 1 = Speed from potentiometer 2 = Speed and start from potentiometer 3 = Select gear from potenziometer
User_Long_Var[14]	Special_Functions	UDINT	--	0	001Ch,001Dh	0 = OFF 1 = Auto_Learning_LL = ON
Run time parameters change						
User_Long_Var[16]	Recipe_#	UDINT	--	0	0020h,0021h	Number recipe
User_Long_Var[17]	Working Speed	UDINT	Mm/1'	0	0022h,0023h	Label working speed referance
User_Long_Var[18]	Step_by_Step Speed	UDINT	Mm/1'	0	0024h,0025h	Label Speed Step by Step
User_Long_Var[19]	Start_Delay	UDINT	dmm	0	0026h,0027h	Start Delay
User_Long_Var[20]	Stop Course	UDINT	dmm	0	0028h,0029h	Stop Course: 0 = not specified, stop with ramp
User_Long_Var[21]	Print_Delay	UDINT	ms	0	002Ah,002Bh	Delay before setting print output
User_Long_Var[22]	Print_Time	UDINT	ms	0	002Ch,002Dh	Time that print output is on
User_Long_Var[23]	Max_Label_Length	UDINT	dmm	0	002Eh,002Fh	0 = Max Label Length nto specified
User_Long_Var[24]	Gear_Ratio_Adj	DINT	%		0030h,0031h	Gear ratio adjust %
User_Long_Var[25]	C_ALARM	UDINT	--		0032h,0033h	Counter Alarm Label End (0=off)
User_Long_Var[26]						
User_Long_Var[27]						
User_Long_Var[28]						
User_Long_Var[31]	Electric_Gear_Conf	UDINT	--	0	003Eh,003Fh	0=off; 1=on; 2=auto
User_Long_Var[32]	**Encoder_Dev_Table[0]**	UDINT	--		0040h,0041h	Encoder_Development table value. The value selection is made by analog input with modality 3.
User_Long_Var[33]	**Encoder_Dev_Table[1]**	UDINT	--		0042h,0043h	
User_Long_Var[34]	**Encoder_Dev_Table[2]**	UDINT	--		0044h,0045h	
User_Long_Var[35]	**Encoder_Dev_Table[3]**	UDINT	--		0046h,0047h	
User_Long_Var[36]	**Encoder_Dev_Table[4]**	UDINT	--		0048h,0049h	
User_Long_Var[37]	**Encoder_Dev_Table[5]**	UDINT	--		004Ah,004Bh	
User_Long_Var[38]	**Encoder_Dev_Table[6]**	UDINT	--		004Ch,004Dh	
User_Long_Var[39]	**Encoder_Dev_Table[7]**	UDINT	--		004Eh,004Fh	
User_Long_Var[40]	**Encoder_Dev_Index**	UDINT	--		0050h,0051h	Encoder_Development Index
Counters						
User_Long_Stored_Vars[1]	Labels_Counter_Tot	UDINT	--		3808h,3809h	Tot. Labels Counter
User_Long_Stored_Vars[2]	Labels_Counter	UDINT	--		380Ah,380Bh	Labels Counter by day
User_Long_Stored_Vars[3]	Label_Lengh_Detected	UDINT	steps		380Ch,380Dh	Label length detected
HMI Parameter's control						
Key_Insert		UDINT			3002h,3003h	Key to access drive parameters
Command		INT			3004h	Command execution (STEP_BY_STEP,GET_LL.ecc)
Reset Alarm		INT			3005h	Reset Alarm
Alarm_Code		INT			3006h	Alarm Code
VT20N_TX		UDINT			8000h,8001h	Keyboard area exchange data
VT20N_RX		DOMAIN			8100h-8104h	
Store / Restore Parameters						
Store_Parameters		UDINT	--		2300h,2301h	Stores the actual objects value to NVRAM
Restore_Parameter		UDINT			2302h,2303h	Stores in NVRAM the object factory default values

3.2 Description of the functionality of settable parameters

3.2.1 Drive configuration parameters

These parameters define the step angle, phase current, speed and the acceleration and deceleration ramp of the motor. With reference to the ***MODBUS RTU Protocol Specification for SDM Series Driver*** manual, for the detailed description of the operation of these objects we specify the following:

- the object: Max_Profile_Velocity is automatically redefined by the drive based on the ***Speed_Max_Scale*** parameter.
- the object: ***Profile_Velocity*** is automatically redefined by the drive based on the label ejection speed defined by means of the ***Working Speed*** parameter or measured by the potentiometer used to regulate the speed or by operation in electric shaft mode.
- the object: Profile_Acceleration defines the time used by the motor to reach the Max_Profile_Velocity. Since the space the label must cover before it reaches the set speed also depends on this parameter. The position of the label Start photoelectric cell must be defined based on the values of the set ***Max_Profile_Velocity*** and ***Profile_Acceleration*** parameters.
- The space covered by the label during acceleration is given by the following formula:
  $space = \frac{Profile\_Acceleration}{2000} * \frac{Working\_Speed}{60}$

3.2.2 Mechanical parameters

Configure the drive in compliance with the mechanical parameters of the labelling head.

G1_Pulley
Number of teeth or diameter of the pulley mounted on the shaft of the stepper motor.

G2_Pulley
Number of teeth or diameter of the pulley mounted on the shaft of the label roll. The velocity ratio between the motor and the roll is therefore G1_Pulley/G2_Pulley.

Roll_Diameter
Diameter of the label roll.

Encoder_PPR
Pulses per revolution of the encoder mounted on the conveyor belt. The parameter is used during tracking in electric shaft mode to synchronise the label application speed with the speed of the product to be labelled.

Encoder_Development

Linear development of an encoder revolution, practically the linear feed of the product per encoder revolution. Should the product rotate during the labelling phase and not advance (label application on cylindrical product) set the linear rotation of the roll, of the cylinder to be labelled, for each encoder revolution. This parameter is used in the electric shaft mode to synchronise the label speed with the speed of the product to be labelled.
In the following configuration Layout_Config = Select_Gear_from_potentiometer (value 3) the value is replaced by one of the values in the table selected by means of the SELECT_GEAR potentiometer.

3.2.3 Fixed work parameters

Speed_Min_Scale

Optional, the parameter defines the minimum speed selectable with the VELOCITY potentiometer if enabled.

Speed_Max_Scale

The parameter must always be defined, even if the potentiometer or the VELOCITY encoder is not used, since it defines the maximum limit obtainable by the actual working speed of the labelling machine.
The speed measured by the potentiometer, if enabled, is given by the following formula:

$$Analog\_Speed = Speed\_Min\_Scale + \frac{Analog\_Value}{FS} * (Speed\_Max\_Scale - Speed\_Min\_Scale)$$

Delay_Min_Scale

Defines the minimum bottom scale of the response delay space to the label start command, which is selected by enabling the DELAY potentiometer.

Delay_Max_Scale

Defines the maximum bottom scale of the response delay space to the label start command, which is selected by enabling the DELAY potentiometer.
The delay space of label start measured by the potentiometer is given by the following formula:

$$Analog\_Start\_Delay = Delay\_Min\_Scale + \frac{Analog\_Value}{FS} * (Delay\_Max\_Scale - Delay\_Min\_Scale)$$

3.2.4 Configuration parameters of the operation mode

Key_Stored

Defines the key for the keyboard used to access the system parameters (currents, ramps, etc). To access system data also in the Digital_Labelling_Setup program it is necessary to insert a key (Key_Insert) equal to Key_Stored.

Label_Counter_Tot_Stored

Defines the number of labels issued after which the “System Stopped call assistance” alarm is enabled. If the set value is zero, the alarm control is disabled. See Labels_Counter_Tot parameter.

Electric_Gear_Conf

Defines the synchronisation mode between the label ejection speed and the product speed.
Value = 0, synchronisation disabled: the label ejection speed is defined by the VELOCITY potentiometer or by the Working_Speed parameter.
The 0 value is the only value permitted if the Inputs_Config parameter = 2.
Value = 1, synchronisation enabled: the label ejection speed is synchronised with the product speed read by the encoder.
Value = 2, synchronisation automatically enabled or disabled: synchronisation is enabled (disabled) in the presence (absence) of a switching frequency of the ENCODER input.
When the Value = 2, to pass from synchronous mode to asynchronous mode, it is necessary to switch off the drive and disconnect the encoder.

Inputs_Conf

Defines the functionality of the inputs of the drive in the application (see paragraph 1.7).

Input	Description			
	Inputs Config =0	Inputs Config =1	Inputs Config =2	Inputs Config =3
B0_IN0	**START FOTOCELL** (start on rising edge)	**START/STOP**(rising edge = start , falling edge = stop)	**START FOTOCELL** (start on rising edge)	**START FOTOCELL** (start on rising edge)
B0_IN1	**STOP FOTOCELL** (stop on rising edge)		**STOP FOTOCELL** (stop on rising edge)	**STOP FOTOCELL** (stop on rising edge)
B0_IN2	**LABELS END**	**LABELS END**	**LABELS_END**	**TEST/AUTO_LEARNING_LL**
B0_IN3	**ENCODER**	**ENCODER**	**TEST LABEL** (start on rising edge)	**ENCODER**

Layout_Conf

Parameter to define the layout of the system's basic operation.
Value = 0, operation with serial port connected to the keyboard to set the operation parameters including the label ejection speed and the label start response delay. In this mode, the speed regulating potentiometers and start delay cannot be utilised.

Value = 1, operation with label ejection speed set with the VELOCITY potentiometer, the only modifiable parameter in the field during absence of the HMI Modbus RTU devices for parameter modification.

Value = 2, operation with label ejection speed set with the VELOCITY potentiometer and with delay of the label start command set with the DELAY potentiometer.
In this mode, VELOCITY and DELAY are the only modifiable parameters in the field, during absence of the HMI Modbus RTU devices for parameter modification.

Value = 3, to be set when using a potentiometer as a pointer to the Encoder_Dev_Table to select one of the pre-programmed values. This function should be enabled on rotary labelling machines to modify the gear ratio based on the diameter of the bottle when a HMI interface is not included.

Special_Functions

Parameter to enable the special functions.

Special_Functions Value	MisLabel	Auto_Learning_LL
0	OFF	OFF
1	OFF	ON

If the Auto_Learning_LL function = OFF, the maximum label length will be that specified by the Max_label_Length parameter.
If the Auto_Learning_LL function = ON, the maximum label length will be that acquired by the GET_LL function (Label_Length_Detected).

3.2.5 Modifiable run time work parameters

Parameters that can be modified by the user run time, by means of the HMI terminal, i.e. during use in the labelling head field are:

Working_Speed

Defines the actual label ejection speed in Layout_Config mode = 0.
The set speed is however limited to the Speed_Max_Scale value.

Step_by_Step_Speed

Defines the ejection speed of a single label (Step_by_Step Mode). The set speed is however limited by the Speed_Max_Scale value.

Start_Delay

Defines the space of the label start delay in Layout_Conf mode = 0 and Layout_Conf mode = 1. This parameter is used to adjust the position in which the label is applied on the product.

Stop_Course

Defines the space (course) covered by the label after acquisition of the stop signal.
By setting the zero value, since the motor stops at the programmed deceleration ramp, the stop path is dependent on the label ejection speed.
By setting a value higher than 0, and compatible with the steps of the stop function of the motor's speed, the drive adapts the deceleration ramp to guarantee the programmed displacement, after label stop, independently from the motor's speed.

Print_Delay

Defines the time delay from the end of the movement, after which the PRINT output, which is normally open, is closed.

Print_Time

Defines the time that the PRINT output will remain closed.

Max_Label_Length

Defines the maximum permitted label length and therefore avoids an excessive ejection of labels by stopping the ejection in the case of a fault of the stop photoelectric cell. Setting a

zero parameter value disables the function, so that the drive can never stop the ejection of a label in the absence of the stop signal.
The parameter is enabled if the Auto_Learning_LL function is disabled (Auto_Learning_LL = 0). If the Auto_Learning function is enabled (Auto_learning_LL = 1), the maximum label length is set equal to the length acquired by the Label_Length_Detected.

Gear_Ratio_Adj

This parameter is used in the electric shaft mode to correct the velocity ratio in % between the product speed and the label ejection speed. When a positive value is set the label is ejected at a speed higher than that of the product, vice versa if a negative value is set the label is ejected at a speed lower than that of the product.

C_Alarm

Defines the number of consecutive times after which if the Stop signal is not detected, the drive issues the Paper End alarm and inhibits any subsequent starts until a Reset_Alarms is given.
If the C_Alarm value = 0, the Paper end Alarm function is disabled.

Encoder_Dev_Table[0÷7]

With these objects, an 8-value table for the ***Encoder_Development*** parameter is defined. This table is enabled if Layout_Config = Select_Gear_from_potentiometer (value 3), since in this type of configuration the value of the Encoder_Development parameter is replaced by one of the values in the table selected by means of the SELECT_GEAR potentiometer.

Encoder_Dev_Index

This parameter indicates the element of the Encoder_Dev_Table[] selected using the SELECT_GEAR potentiometer. The parameter value will be between 0 and 7.

3.2.6 Counters and acquired values

Label_Counter_Tot

Counter of total number of labels issued. If Lable_Counter_Tot_Stored > 0 and if the number of labels issued > Label_Counter_Tot_Stored, the system will stop and signal the "System stopped, call assistance" alarm.

Labels_Counter

Counter of partially issued labels. From HMI, the value can be set to zero.

Labels_Length_Detected

Label length acquired by the GET_LL function.

3.2.7 HMI Communication control parameters

Key_Insert

Key to access the system parameters by means of HMI or Digital_Labelling_Setup. When using HMI, to access the system parameters it is necessary to set the Key_Insert parameter (F2 key) equal to the Key_Stored parameter stored in the drive.

For connection between the drive and the Digital_labelling_Setup, it is also necessary to enter the Key_Insert equal to Key_Stored.

Command

Writing the object the drive carries out one of the commands specified in the list below:

Command List	
Value	**Description**
0	No Command
1	STEP_BY_STEP MODE
2	GET_LL

Reset Alarm

Reset Alarm command enabled by writing value 1. This parameter is set by the HMI to reset any possible alarms.

Alarm_Code

This parameter indicates the type of alarm.

Alarm Code	
Value	**Description**
0	No Alarm
1	Driver Alarm
2	Block Machine Alarm
3	Label End Alarm by Stop sensor
4	Label End Alarm by Label_End input
5	Stop sensor faulty Alarm

In the case of operation with HMI, in the presence of an alarm, the alarm page is forced and to exit it is necessary to press the F6 key (Reset_Alarm) if the alarm has been disabled. In the case of a Machine Stop alarm, with HMI it is possible to release the machine by pressing keys F3, F4, F5 at the same time.

3.2.8 Commands for Store Parameters and Restore Parameters

Store Parameters

Store_Parameters command = 65766173h will save the current work parameters in the drive's non-volatile memory (NVRAM).

Restore Parameters

Restore_Parameters command = 64616F6Ch will reset the set factory values of the parameters used by the application in the NVRAM.

3.3 Procedure

3.3.1 Power up procedure

At power up the drive will read the data stored in the NVRAM and prepare the operation mode defined by this data.

3.3.2 Creating a configuration file

Drive configuration is carried out, as a rule during the machine installation phase, by rolling out the configuration file by means of a PC connected to the drive's serial port, and with the ***Digital_Labelling Application Setup*** program. The configuration parameters can also be configured through a HMI or PLC operating according to the Modbus RTU protocol.

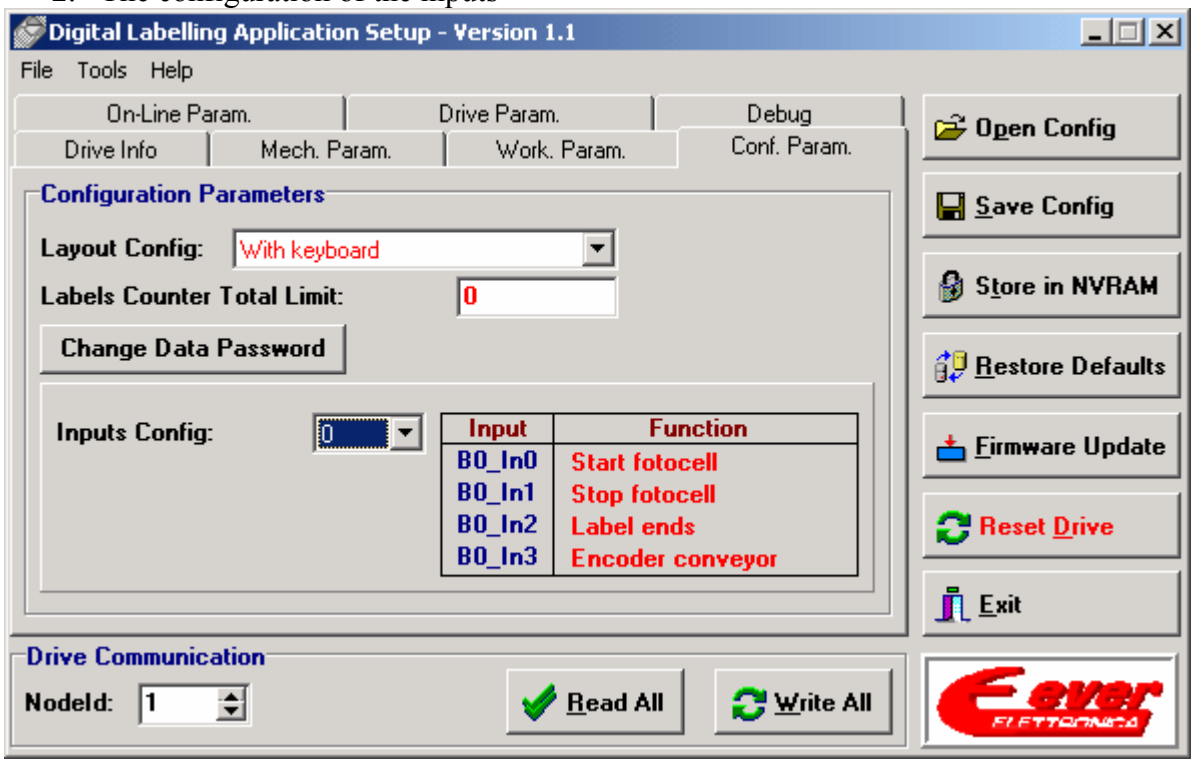
The *Digital_Labelling Application Setup* program is available on floppy disc.

3.3.3 Digital_Labelling Application Setup.

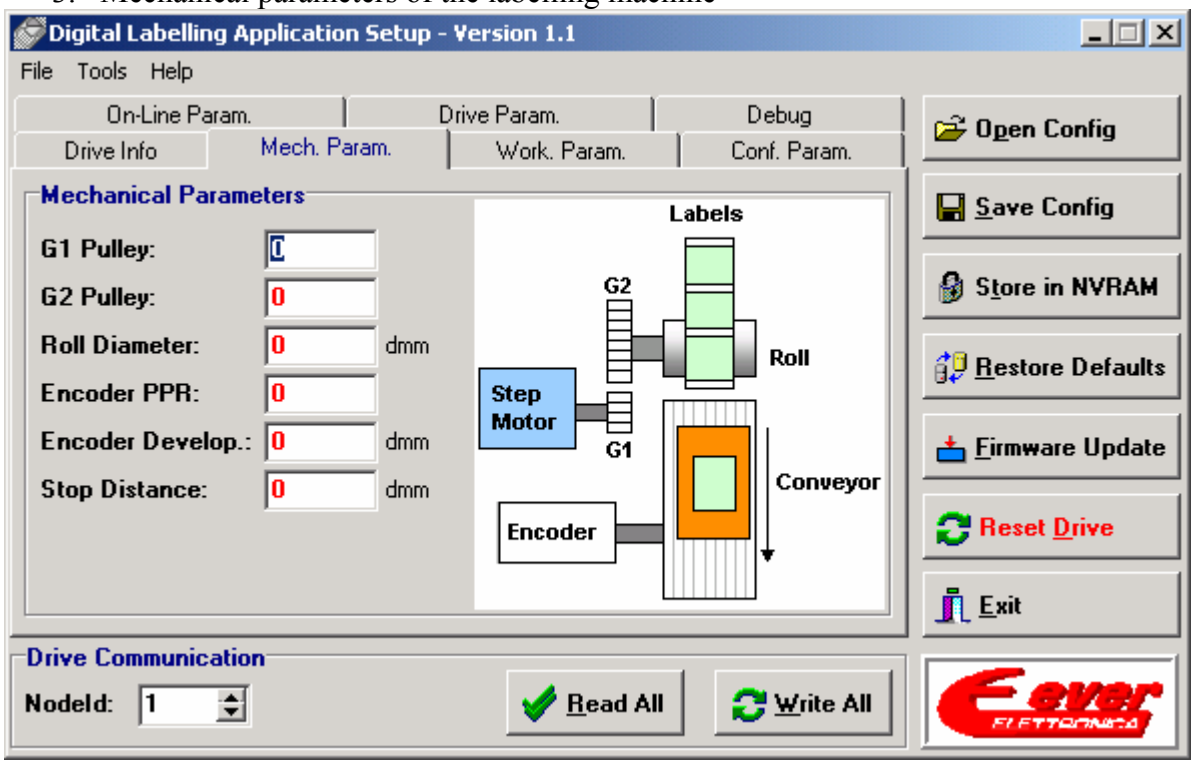
A **configuration file must be created** each time a modification is carried out to a mechanical or electrical component of the labelling machine by means of the ***Digital_Labelling Application Setup*** program.

The configuration file must include the values of the parameters that define:

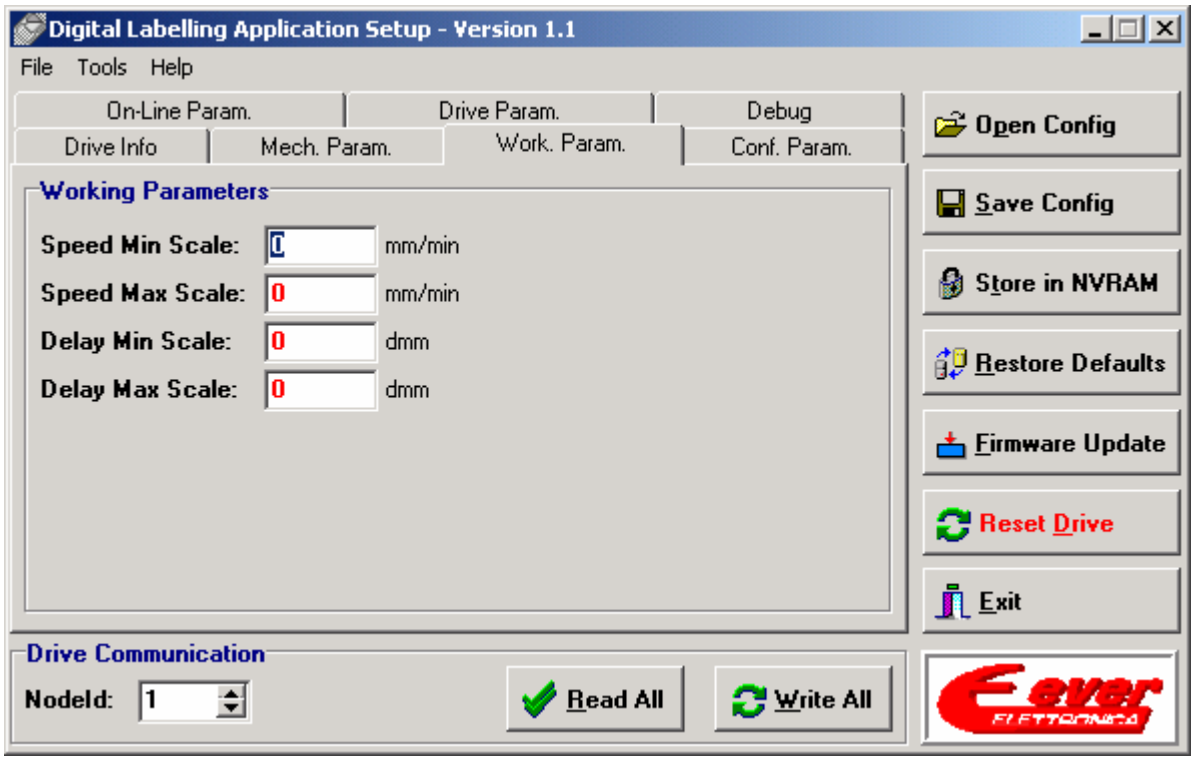
1. The layout of the system
2. The configuration of the inputs



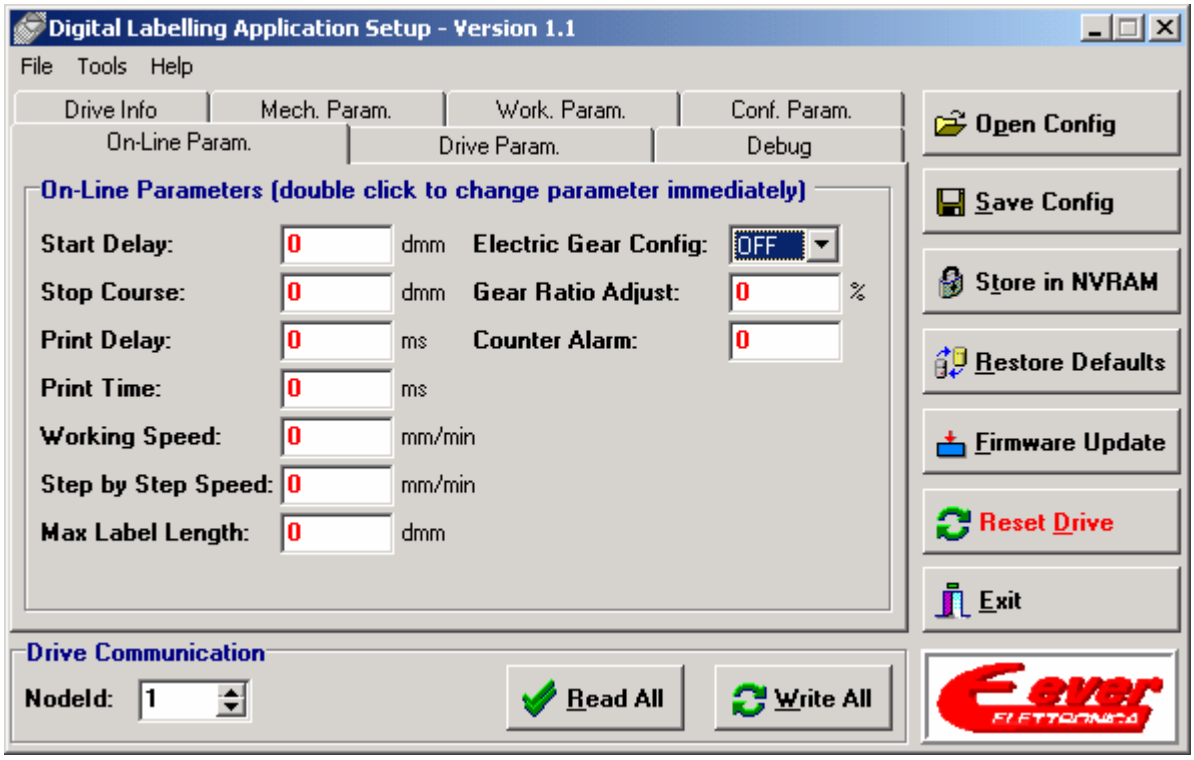
3. Mechanical parameters of the labelling machine



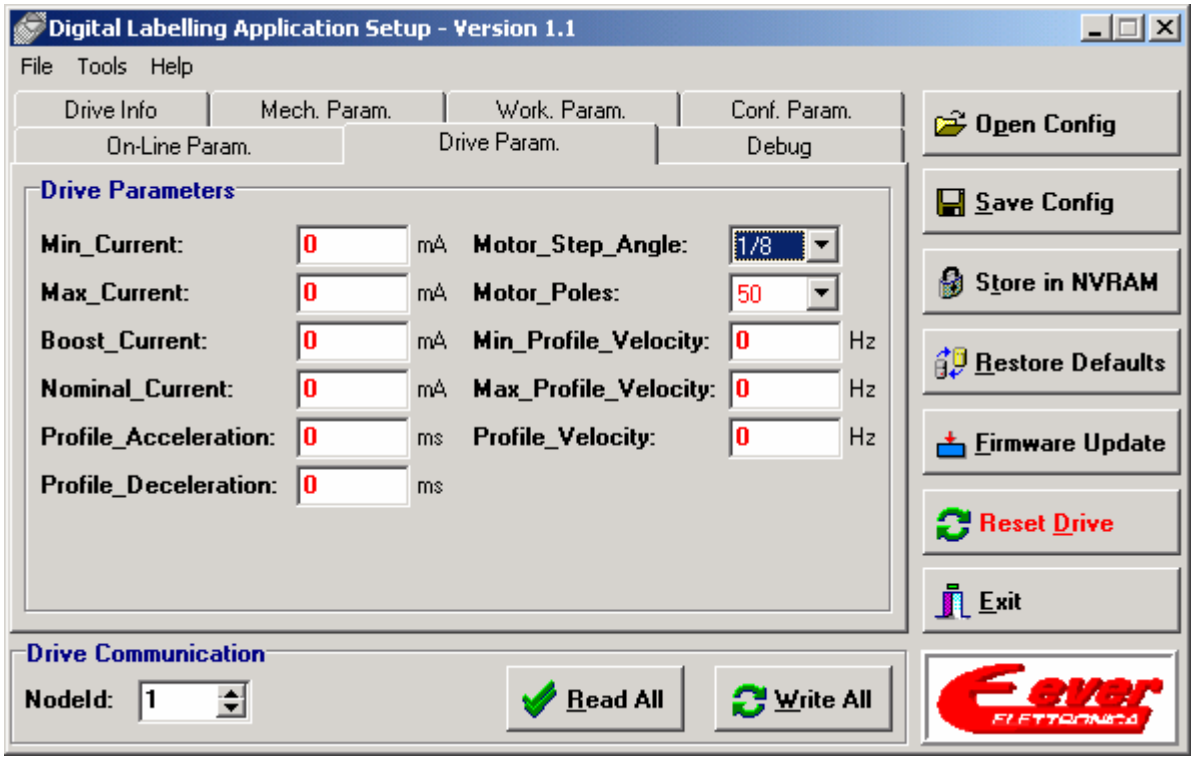
4. Maximum labelling speed



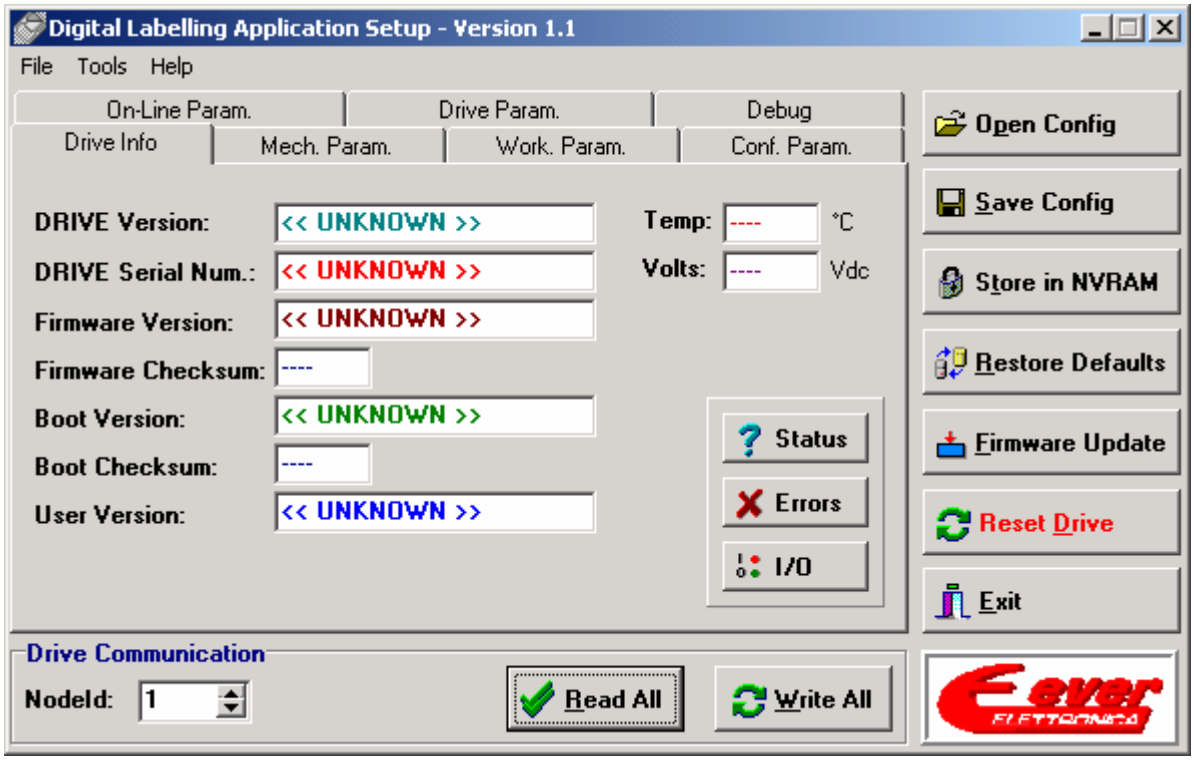
5. The stop course of the label



6. The duration of the acceleration and deceleration ramp of the stepper motor
7. The current of the stepper motor

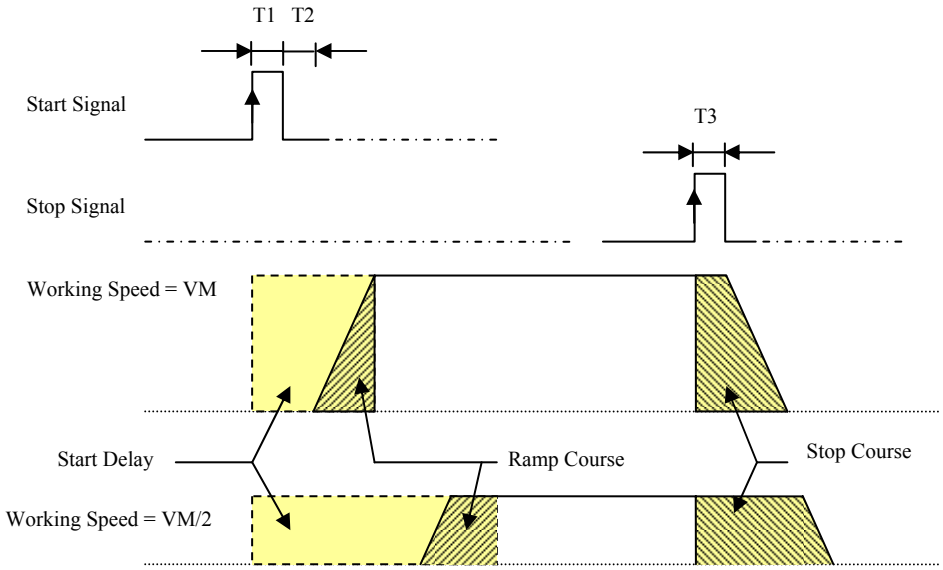


8. To save the values et in a configuration file, select Save Config
9. To send parameters to the drive, press Write All
10. In order that the parameters stored in the drive are also sent to the non-volatile ram, press Store in NVRAM

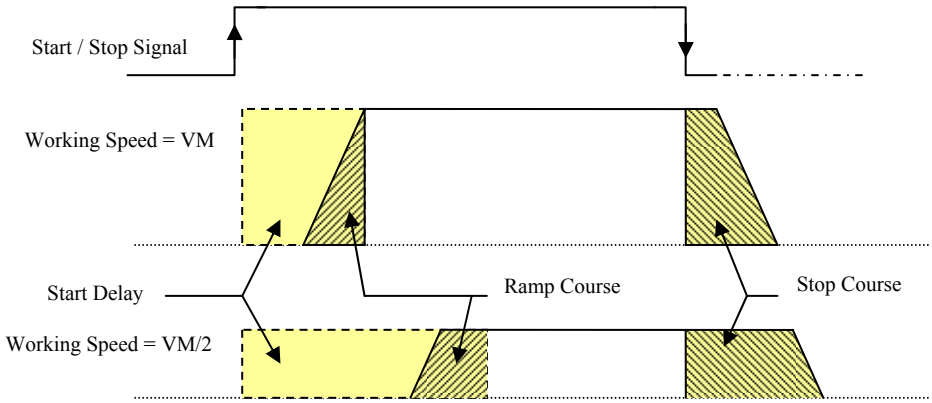


3.4 Generic operation diagram

3.4.1 Labelling mode with separate label start and stop (Inputs_Config = 0)



3.4.2 Labelling mode with start and stop from a single input (Inputs_Config =1)



3.4.3 Operating characteristics of the system

With reference to the graphs of paragraphs 3.4.1 and 3.4.2, the times have the following values:

- T1= time used by the digital filter inside the drive to validate the label Start command only if duration is longer or equal to 150 milliseconds;
- T2= delay, variable from 0 to 240 milliseconds, necessary for the drive to initialise the movement after validating the label Start command;
- T3= time used by the digital filter inside the drive to validate the label Stop command only if duration is longer or equal to 150 milliseconds;

By way of example to evaluate the labelling accuracy, the following table shows several distance values (dn) calculated on the basis of the speed:

d1 = distance covered in time T1 (constant only for constant speed);
d2 = distance covered in time T2 (variable also at constant speed);
d3 = distance covered in time T3 (constant only for constant speed).

Label Speed (m/min)	T1(usec)	d1 Start Position	T2(usec)	d2 Position	T3(usec)	d3 Stop position (mm)
10	150	0,025	0 ÷ 240	0 ÷ 0,04	150	0,025
20	150	0,05	0 ÷ 240	0 ÷ 0,08	150	0,05
50	150	0,125	0 ÷ 240	0 ÷ 0,2	150	0,125
80	150	0,2	0 ÷ 240	0 ÷ 0,32	150	0,2

From the data in the table, the positioning of the label is effectively accurate with the microstep.
It is also important to note how values d1 and d3 compensate each other: d1 is the position covered by the product before the label starts to move, while d3 is the distance covered by the label before it stops.
Distance d2 therefore remains the sole cause of an incorrect label positioning since it is subject to variation with the labelling speed. This distance, as can be seen in the table, remains however a very low value.
The accuracy of this system is guaranteed also by the algorithm that manages the labelling cycle, which automatically adapts based on the speed of the Start_Delay, Ramp_Course and Stop_Course parameters, thus obtaining a continuous *automatic synchronisation of speed and position between the product and label.*
This management, besides avoiding the need to manually adjust the Start/Stop photoelectric cell to vary the labelling speed, also allows for use of the electric shaft function to adapt automatically the labelling speed with the speed of the product to be labelled.

3.5 Special functions

3.5.1 Machine Stop Alarm

The machine stop alarm consists in inhibiting the start signal upon reaching the programmed total number of labels issued.
The control is enabled by means of the ***Label_Counter_Tot_Stored*** parameter.
If Label_Counter_Tot_Stored = 0 control disabled
If Label_Counter_Tot_Stored > 0 control enabled

The alarm will signal if the total number of labels issued (Label_Counter_Tot) becomes equal to the set Label_Counter_Tot_Stored value.
The alarm can only be disabled through the HMI (press keys F3, F4, F5 at the same time in the alarm page) or by means of the ***Digital_Labelling Application Setup*** interface.
(modify the value of the Label_Counter_Tot_Stored or Label_Counter_Tot parameters).

We recommend you enable this control only on machines equipped with HMI.

3.5.2 Paper end alarm

The paper end alarm consists in an alarm that recognises the end of the label roll.
The control is enabled by means of the ***C_Alarm*** parameter.
If C_Alarm = 0 control disabled
If C_Alarm > 0 control enabled

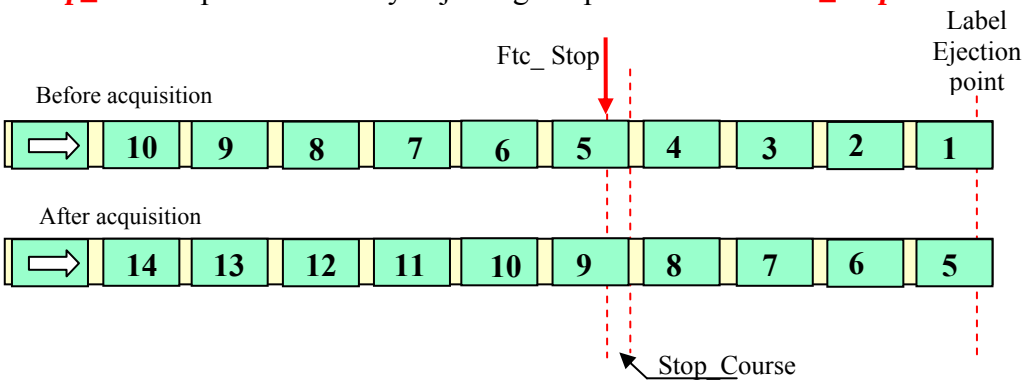
The alarm is issued if for a certain number of times (C_Alarm) the Stop signal is not detected and all subsequent starts are inhibited until a Reset_Alarm is carried out.

3.5.3 Step_By_Step Mode

This function consists in the ejection of a single label at the speed defined by the Step_by_Step_Speed parameter. If the electric shaft is enabled, the label is ejected anyway at the Step_by_Step_Speed independently from the speed of the reference encoder. After the label has been ejected, the PRINT output is managed normally.

3.5.4 Automatic label length acquisition (GET_LL)

The automatic acquisition of the label length (***GET_LL***) consists in the ejection of 5 labels at a programmed constant speed, synchronising the stop with the relevant photoelectric cell. During feed, the length of the labels passing the ***Ftc_Stop*** are measured and in finally the average value of the 5 labels is used as the ***Max_Label_Length.*** The label's final position is adjusted by modifying the ***Stop_Course*** parameter or by adjusting the position of the ***Ftc_Stop***.



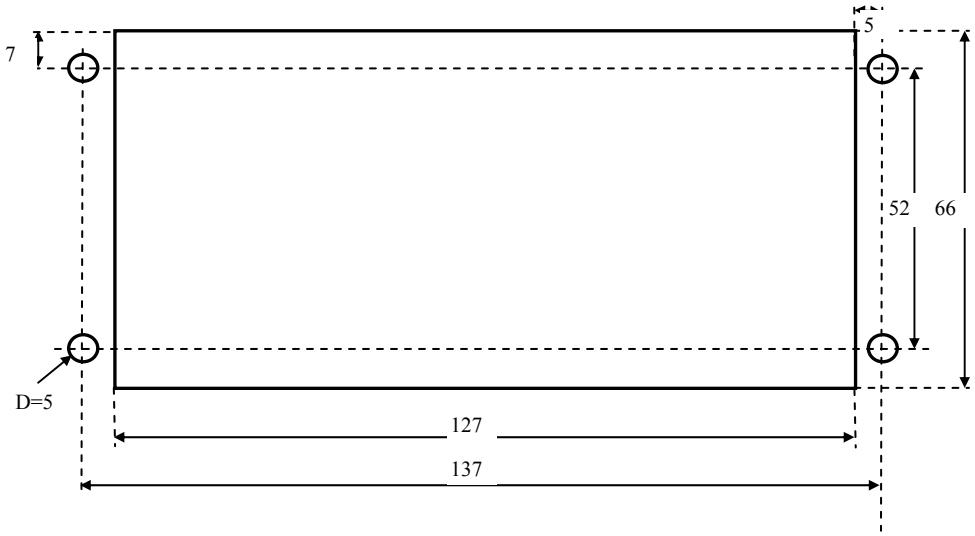
4.0 VT20N Keyboard

4.1 Main technical features

- Display: 20 characters per 2 lines, backlighted;
- Watertight sealing of terminal at panel application;
- Front in polyester IP56 with 10 key membrane keyboard;
- Membrane keys: 6 function keys and 4 data control keys;
- Connection: serial interface RS232, RS485, RS422;
- Power 24Vdc±10% - Absorbed power 3.6W max.;
- User memory: 64 Kbytes of Flash memory per user project and 3 Kbtes of EEPROM memory dedicated to formula entry;
- Operating temperature: 0 ÷ 50 °C;
- Weight: 0.28 Kg
- Dimensions: 150 x 75 x 30mm.

By means of serial interface RS422 (RS485), the HMI device allows a local modification of the run time of several operation parameters of the control system for labelling machines in the DIGITAL ENHANCED version.

4.2 Keyboard installation dimensions



4.3 Connections

Cn1: Conbicon connector, 3 pin, and 5.08mm pitch
Cn2: connector

PIN	**Power Supply connection**
CN1.1	+24Vdc
CN1.2	0 (-)
CN1.3	Terra
PIN	**Communication connection**
CN2.1	GND (RS232 Signal Ground)
CN2.2	RX (RS232)
CN2.3	TX (RS232)
CN2.4	
CN2.5	
CN2.6	+Tx (**RS422**)
CN2.7	+Rx (**RS422**)
CN2.8	
CN2.9	GND (**RS422** Signal Ground)
CN2.10	
CN2.11	
CN2.12	Schermo (Frame)
CN2.13	Schermo (Frame)
CN2.14	-TX (**RS422**)
CN2.15	-RX (**RS422**)

4.4 Keyboard serial connectability

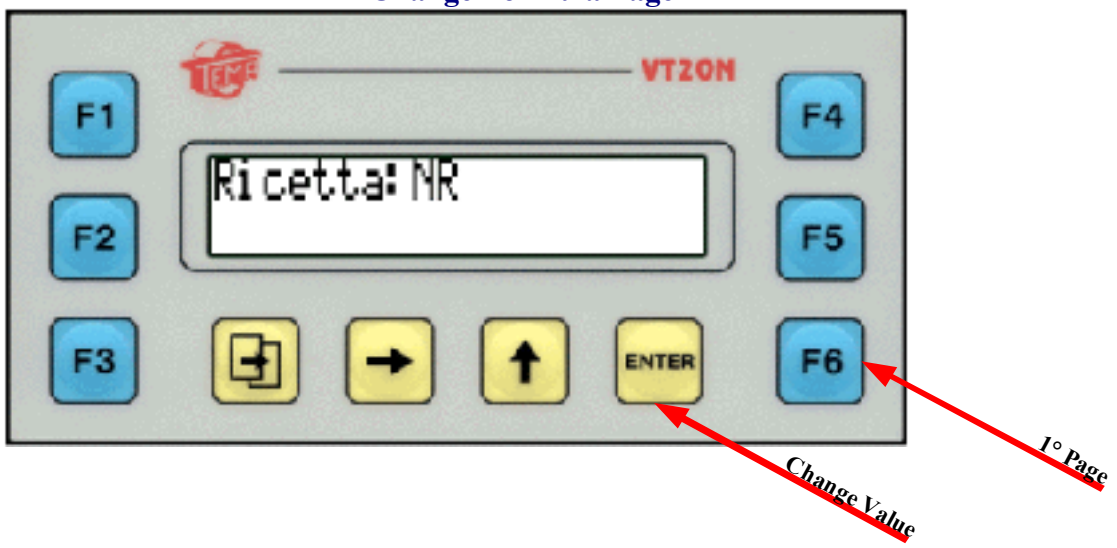
The maximum number of connectable drives; the type and the communication speed are defined by the various versions of the keyboard programming software.
The keyboard, programmed with software C404C, for the Digital Enhanced configuration for labelling machines makes it possible to manage a single drive by means of a connection type RS422 full duplex with 4 wires (RS485) with a 57.6 Kbaud rate.

4.5 Keyboard configuration according to the C404C software

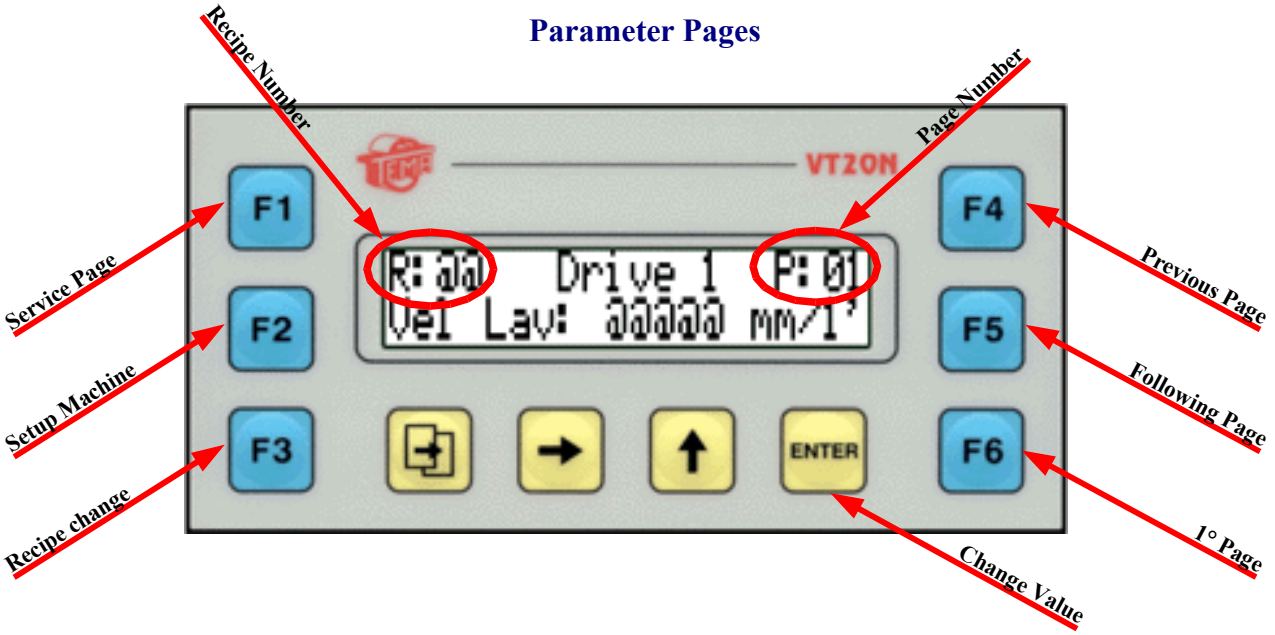
The keyboard is supplied already configured to operate with the drives programmed for the cycle control of labelling machines. Its program is organised in pages displayed on the screen and containing the parameters that can be modified by the user run time.
The following standard pages are those included in the C404C programming software with reference to the work parameters that can be displayed and modified and the functions of the keys operational in these pages.

First Page

Change Formula Page

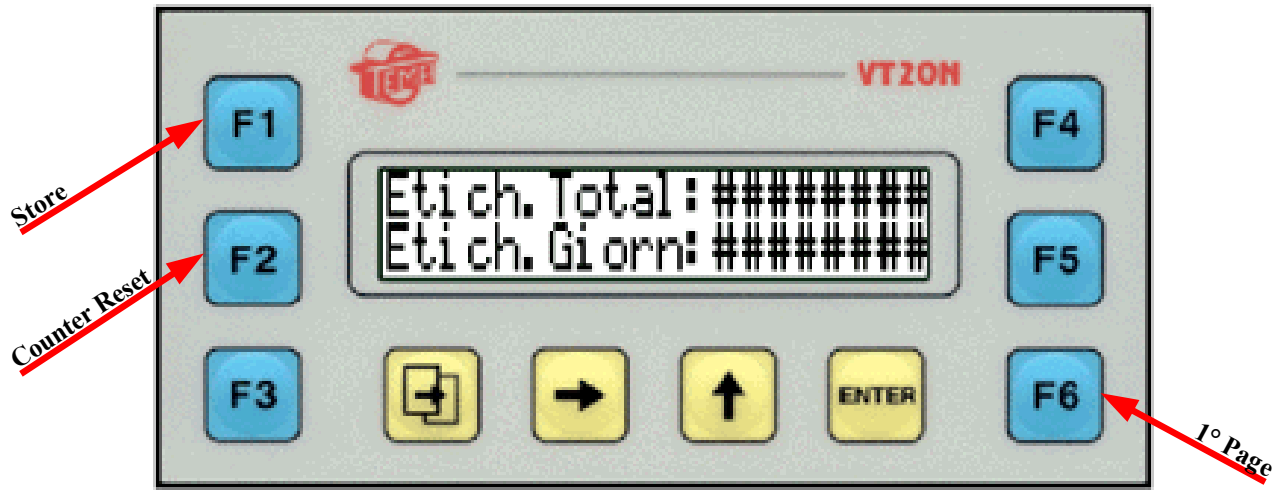


Parameter Pages



Machine Set-up Pages

Counter Page



Alarm Page

Service Page

5.0 Drive connection

The following paragraphs contain the drive connections, with reference to the hardware manuals for further information and technical specifications.

5.1 Connection to power supply and protection earth

- CN5 connector: SDMWD180Vnn Systems

Terminal CN5 is a PHOENIX COMBICON male 3 pin connector.

Input	*Pin*	*Description*
PE	CN5.1	Earth Ground
GND	CN5.2	Power Supply DC (-)
VIN	CN5.3	Power Supply DC (+)

- CN5 connector: SDMWT180Vnn Systems

Terminal CN5 is a WAGO male 4 pin connector.

Input	*Pin*	*Description*
0	CN5.1	Neutral
230Vac	CN5.2	Power Supply AC input
PE	CN5.3	Earth Ground
115Vac	CN5.4	Power Supply AC input

- CN5 connector: SDMWA180Vnn Systems

Terminal CN5 is a WAGO male 4 pin connector.

Input	*Pin*	*Description*
AC_{IN}	CN5.1	Power Supply AC input
AC_{IN}	CN5.2	Power Supply AC input
PE	CN5.3	Earth Ground
AC_{IN}	CN5.4	Power Supply AC input

- CN5 connector: SDMWD170Vnn Systems

Terminal CN5 is a PHOENIX COMBICON male 3 pin connector.

Input	Pin	Description
VINC	CN5.1	DC power supply input DC(+)
VINL	CN5.2	DC logic supply input DC(+)
EG	CN5.3	Earth Ground
GND	CN5.4	0Vdc DC(-)

- CN5 connector: SDMWA170Vnn Systems

Terminal CN5 is a WAGO male 3 pin connector.

Input	Pin	Description
AC_{IN}	CN5.1	AC power supply input
AC_{IN}	CN5.2	AC power supply input
EG	CN5.3	Earth Ground
AC_{IN}	CN5.4	AC power supply input

- CN7 connector: SDMWA130Vnn drive

CN7 is a 5 pin male Molex connector.

Input	Pin	Description
EG	CN7.1	Earth Ground
	CN7.2	
AC_{IN}	CN7.3	AC power supply input
AC_{IN}	CN7.4	AC power supply input
AC_{IN}	CN7.5	AC power supply input

- Connector CN7: MDxx drive

CN7 is 8 pin female Harting connector.

Input	Pin	Description
AC_{IN}	CN7.1	AC power supply input
AC_{IN}	CN7.2	AC power supply input
AC_{IN}	CN7.3	AC power supply input
	CN7.4	
	CN7.5	
	CN7.6	
	CN7.7	
EG	CN7.8	Earth Ground

5.2 CN15: Connection to the control logic power supply

This type of connection is only present on the SDMWA170Vnn system.

The CN15 connector is a WAGO male 2 pin connector.

Input	*Pin*	*Description*
AC_{LG}	CN15.1	AC logic supply input
AC_{LG}	CN15.2	AC logic supply input

The AC_{LG} input powers the control logic of the drive when the main power supply is disconnected. If this type of safety is not necessary, the AC_{IN} power supply enables the drive to be completely powered even if the AC_{LG} voltage is not supplied.

5.3 Motor Connections

- CN6connector: SDMWx180Vnn Systems

CN6 is a PHOENIX COMBICON male 5 pin connector.

Pin	Description
CN6.5	Motor phase (B*)
CN6.4	Motor phase (B)
CN6.3	Motor Earth Ground (MEG)
CN6.2	Motor phase (A*)
CN6.1	Motor phase (A)

- CN6 connector: SDMWx170Vnn Systems

CN6 is a WAGO female 5 pin connector.

Pin	Description
CN6.1	Motor phase (B*)
CN6.2	Motor phase (B)
CN6.3	Motor earth gorund (MEG)
CN6.4	Motor phase (A*)
CN6.5	Motor phase (A)

- CN8 connector: SDMWA130Vnn Systems

CN8 is a Molex male 4 pin connector.

Pin	Description
CN6.1	Motor phase (B*)
CN6.2	Motor phase (B)
CN6.3	Motor phase (A*)
CN6.4	Motor phase (A)

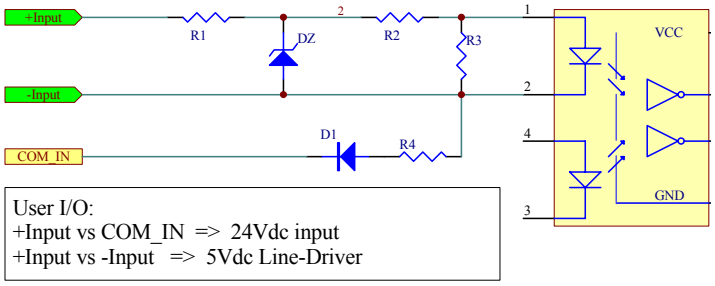
5.4 SDMWx170/SDMWx180 drives Input connections

- CN3 connector: real-time digital inputs, optoinsulated, 200kHz, 5Vdc@17mA Line Driver 24Vdc@12mA PNP/Push-Pull. It is a PHOENIX MICRO-COMBICON male 9 pin connector.

Pin	Description	Function
CN3.1	+B0_IN0	Depends on user configuration. Refer to section "1.7 Functionality of the digital inputs"
CN3.2	-B0_IN0	
CN3.3	+B0_IN1	
CN3.4	-B0_IN1	
CN3.5	+B0_IN2	
CN3.6	-B0_IN2	
CN3.7	+B0_IN3	
CN3.8	-B0_IN3	
CN3.9	COM_IN	Inputs common (- side)

The inputs cannot operate contemporarily at 5Vdc and 24Vdc

Diagram of the Digital Inputs



To avoid incorrect connections and damages to the input circuit, do not exceed the maximum input characteristics. Refer to the drive hardware manual.

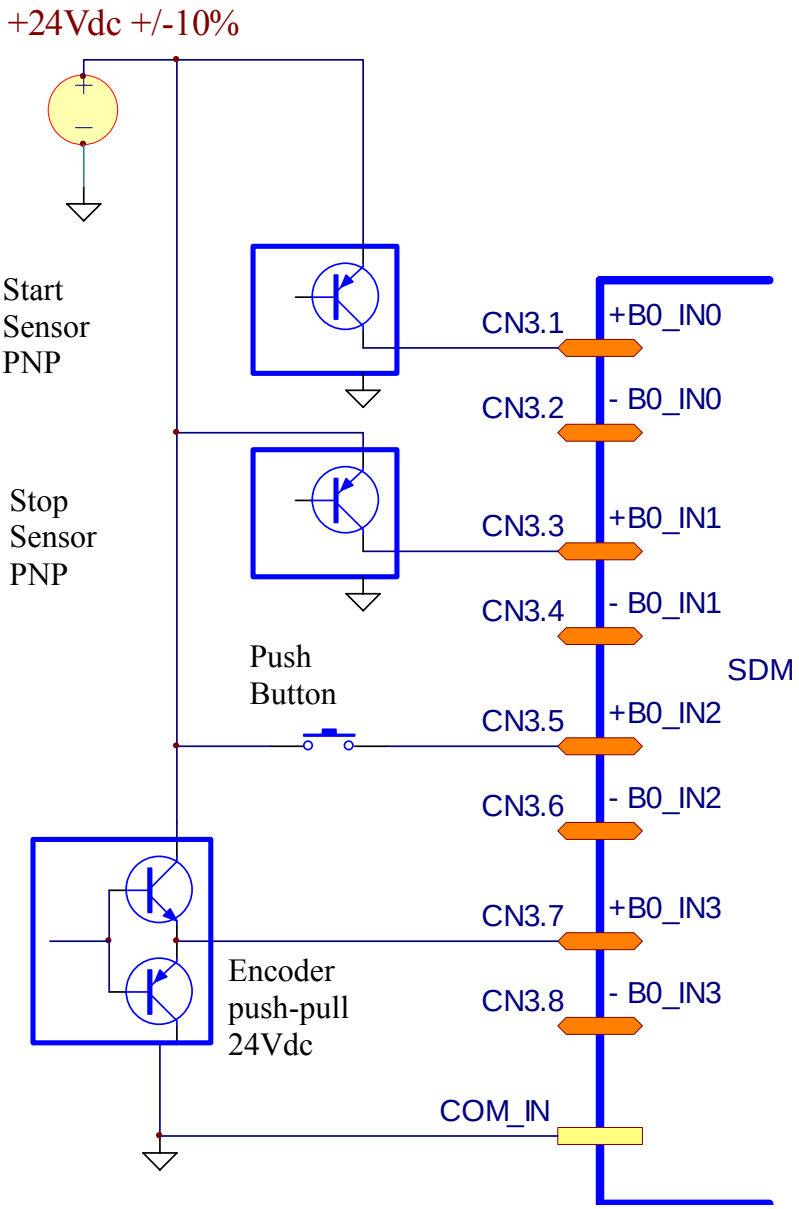
Electrical connection of the digital inputs

The following indications report the main configurations of the digital inputs and the indications for their control using different types of devices, with voltage output Vo (Volt) higher than the characteristics of the Line Driver. In this case the device should be connected to the drive's input by means of an **Rs** series resistance proportioned in the following way (assuming a Volt higher than 10Vdc):

Vcc	Rs	Pd
12 ± 15%	1.2kΩ	½ W
15 ± 15%	1.8 kΩ	½ W
24 ± 15%	2.7kΩ	½ W

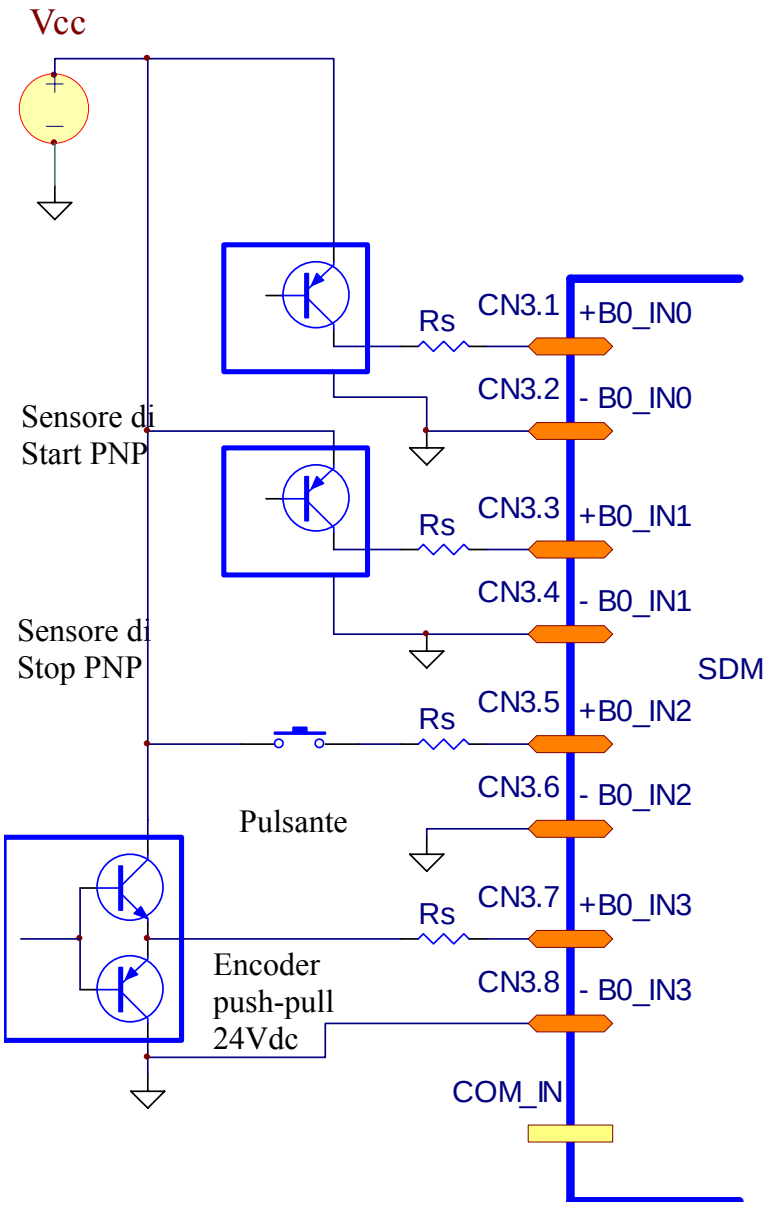
5.4.1 Device connections (24Vdc - PNP), Encoder (Push-Pull)

Sensors (PNP), Encoder (Push-Pull) and Push-button (PNP) connected at 24Vdc.



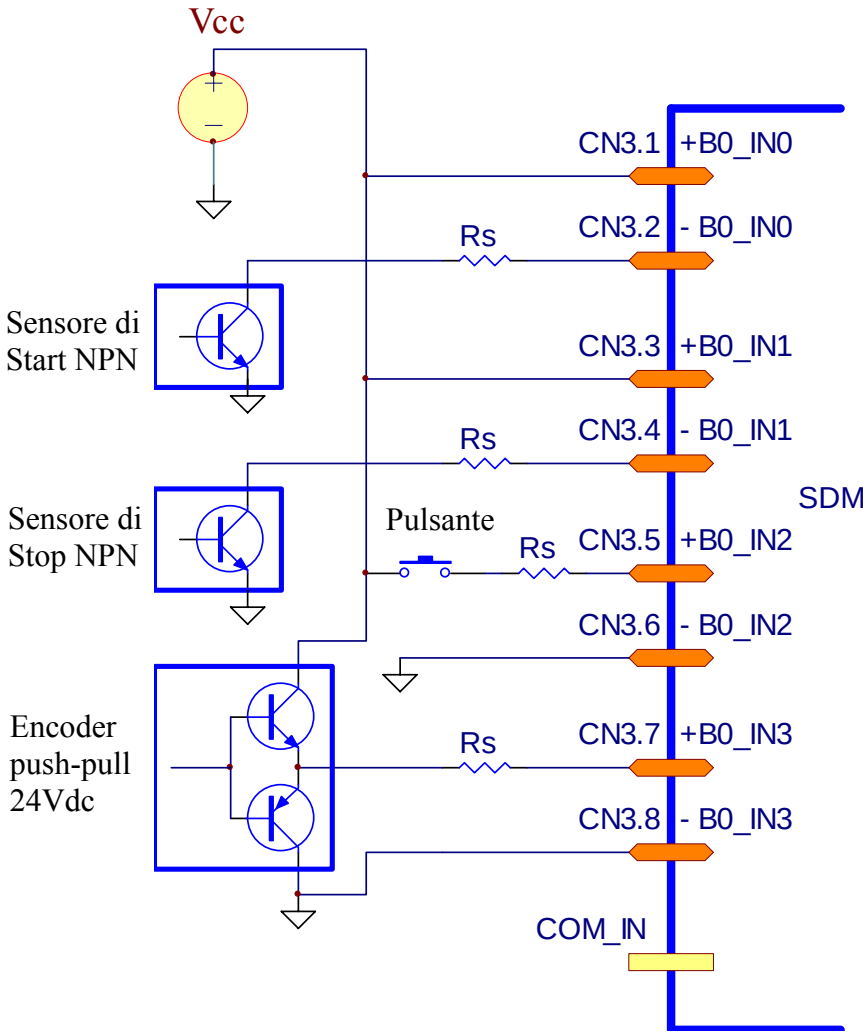
5.4.2 Device connections (Vcc - PNP), Encoder (Push-Pull)

Sensors (PNP), Encoder (Push-Pull) And Push-button (PNP) Vcc powered (see table page 41, connection by means of Rs resistance).



5.4.3 Device connections (Vcc - NPN), Encoder (Push-Pull)

Sensors (NPN), Encoder (Push-Pull) and Push-button (PNP) Vcc powered (see table page 41, connection by means of Rs resistance).

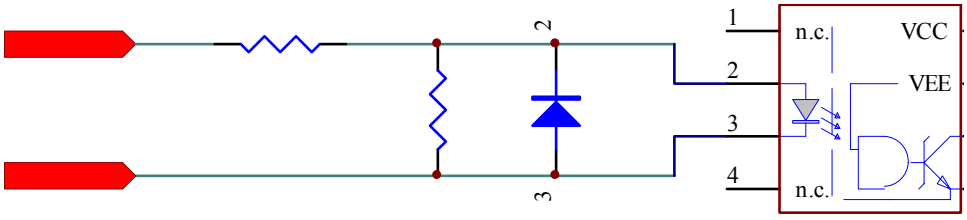


5.5 SDMWA130/MDxx drives Input connections

- CN1 connector: real-time digital inputs, optoinsulated, 200kHz, 24Vdc@12mA PNP/NPN/Push-Pull. For SDMWA130Vnn drive is a molex 53014-0810 8-pin male connector, for MDxx drive is a IEC60947-5-2 8 pin male M12 connector.

Pin	Description	Function
CN3.1	+B0_IN0	Depends on user configuration. Refer to section "1.7 Functionality of the digital inputs"
CN3.2	-B0_IN0	
CN3.3	+B0_IN1	
CN3.4	-B0_IN1	
CN3.5	+B0_IN2	
CN3.6	-B0_IN2	
CN3.7	+B0_IN3	
CN3.8	-B0_IN3	

Diagram of the Digital Inputs



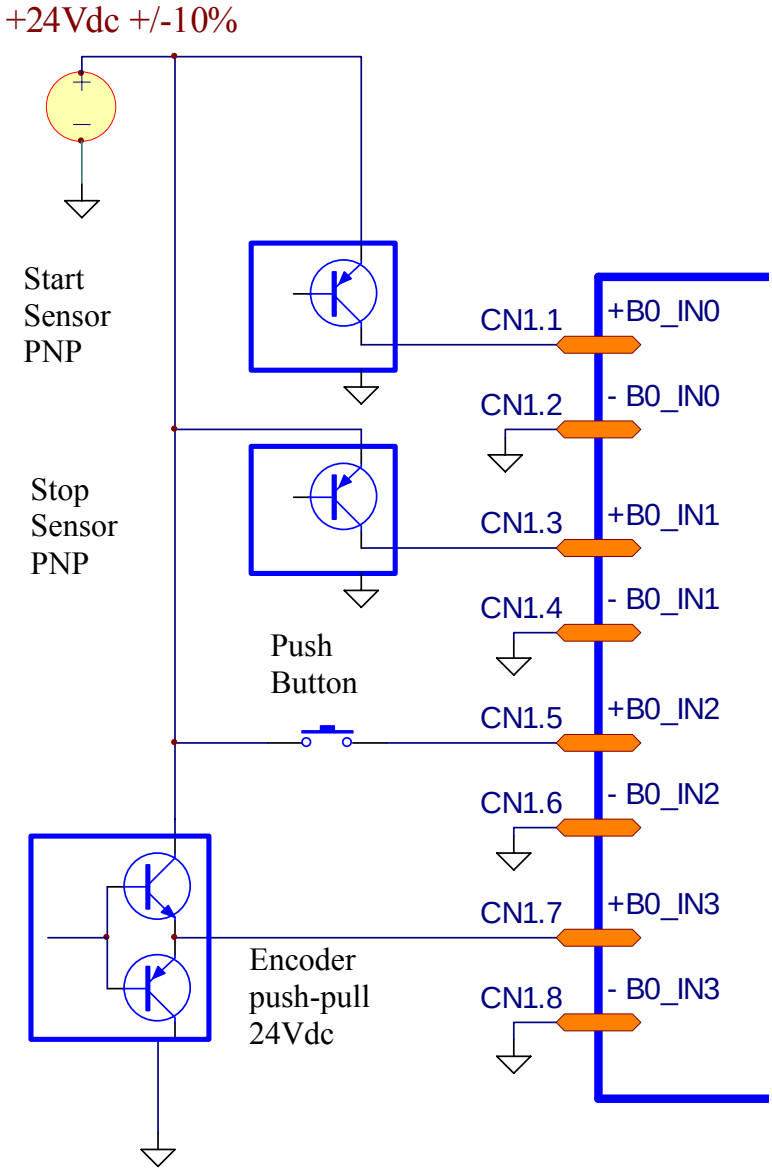
To avoid incorrect connections and damages to the input circuit, do not exceed the maximum input characteristics. Refer to the drive hardware manual.

Electrical connection of the digital inputs

The following indications report the main configurations of the digital inputs.

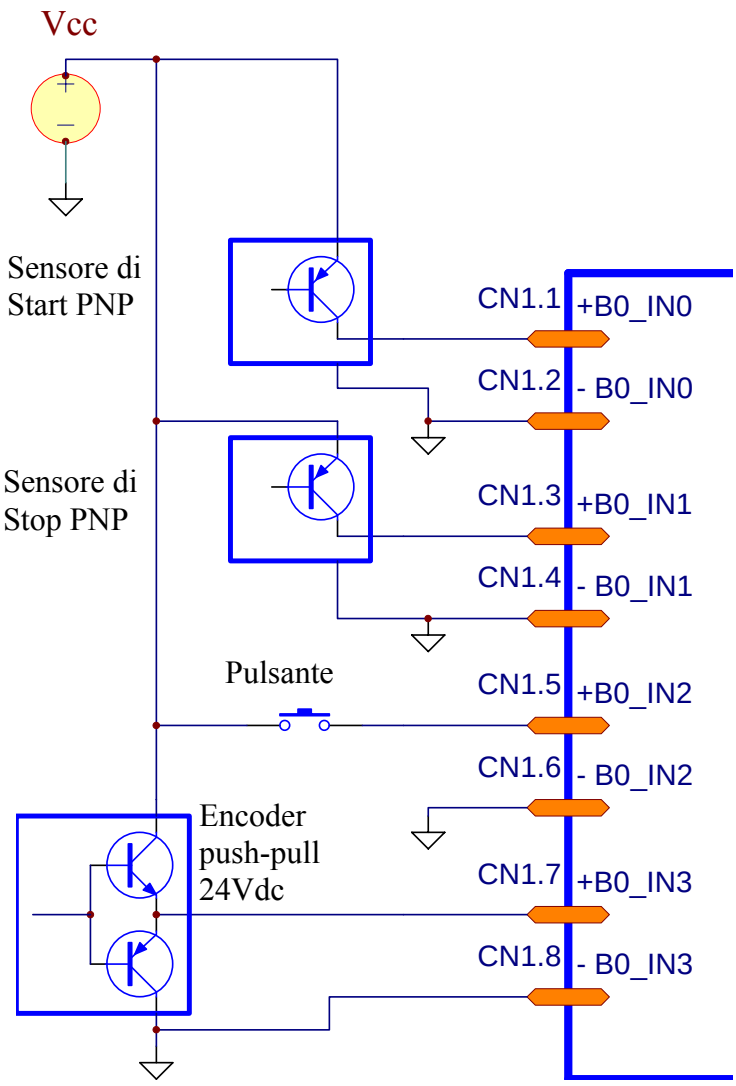
5.5.1 Device connections (24Vdc - PNP), Encoder (Push-Pull)

Sensors (PNP), Encoder (Push-Pull) and Push-button (PNP) connected at 24Vdc.



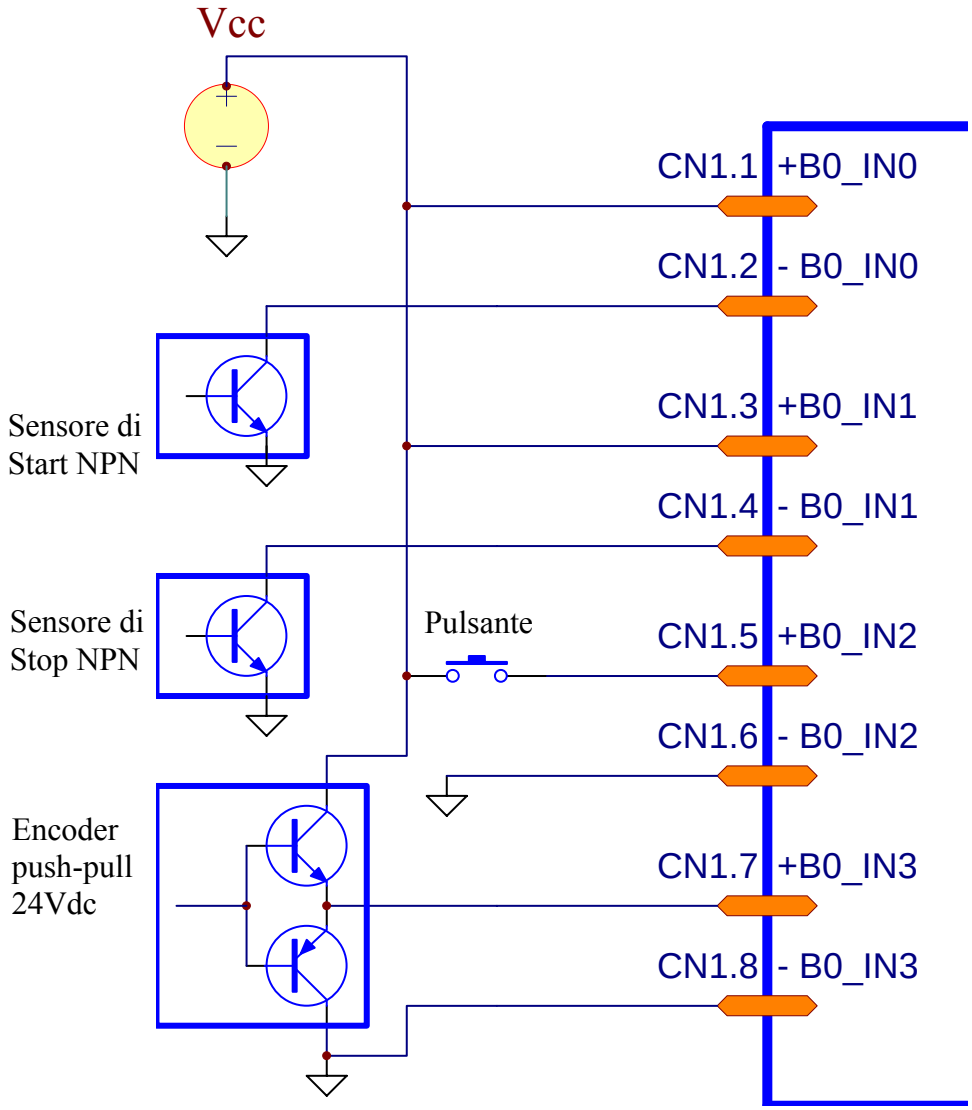
5.5.2 Device connections (Vcc - PNP), Encoder (Push-Pull)

Sensors (PNP), Encoder (Push-Pull) And Push-button (PNP) Vcc=24Vdc powered



5.5.3 Device connections (Vcc - NPN), Encoder (Push-Pull)

Sensors (NPN), Encoder (Push-Pull) and Push-button (PNP) Vcc=24Vdc powered



5.6 Output connections

- CN4 connector: SDMWx180Vnn Systems

Optoinsulated outputs, protected against short circuit, type 24 Vdc@100mA PNP.

CN4 is a PHOENIX MICRO-COMBICON 1881477 female 5 pin connector.

Pin	Description	Function
CN4.1	+24Vdc	Digital outputs supply (+)
CN4.2	VSS	Digital outputs supply (-)
CN4.3	B0_OUT0	Depending on user's program
CN4.4	B0_OUT1	
CN4.5	B0_OUT2	

- CN4 connector: SDMWx170Vnn Systems

Optoinsulated outputs, protected against short circuit, type 24Vdc@500mA PNP.

CN4 is a PHOENIX MICRO-COMBICON male 10 pin connector.

Pin	Description	Function
CN4.1	VSS	Depending on user's program
CN4.2	B0_OUT0	
CN4.3	VSS	Depending on user's program
CN4.4	B0_OUT1	
CN4.5	VSS	Depending on user's program
CN4.6	B0_OUT2	
CN4.7	VSS	Depending on user's program
CN4.8	B0_OUT3	
CN4.9	VSS	Digital outputs supply (-)
CN4.10	+24Vdc	Digital outputs supply (+)

- CN2 connector: SDMWA130Vnn Systems

Optoinsulated outputs, protected against short circuit, type 24Vdc@500mA PNP.

CN4 is a Molex 530410 4 pin male connector.

Pin	Description	Function
CN4.1	B0_OUT0	Depending on user's program
CN4.2	B0_OUT1	
CN4.3	+24Vdc	Digital outputs supply (+)
CN4.4	VSS	Digital outputs supply (-)

- CN2 connector: MDxx Systems

Optoinsulated outputs, protected against short circuit, type 24Vdc@500mA PNP.

CN4 is a Molex 530410 4 pin male connector.

Pin	Description	Function
CN4.1	B0_OUT0	Depending on user's program
CN4.2	B0_OUT1	
CN4.3	+24Vdc	Digital outputs supply (+)
CN4.4	VSS	Digital outputs supply (-)

5.6 Analog input connections

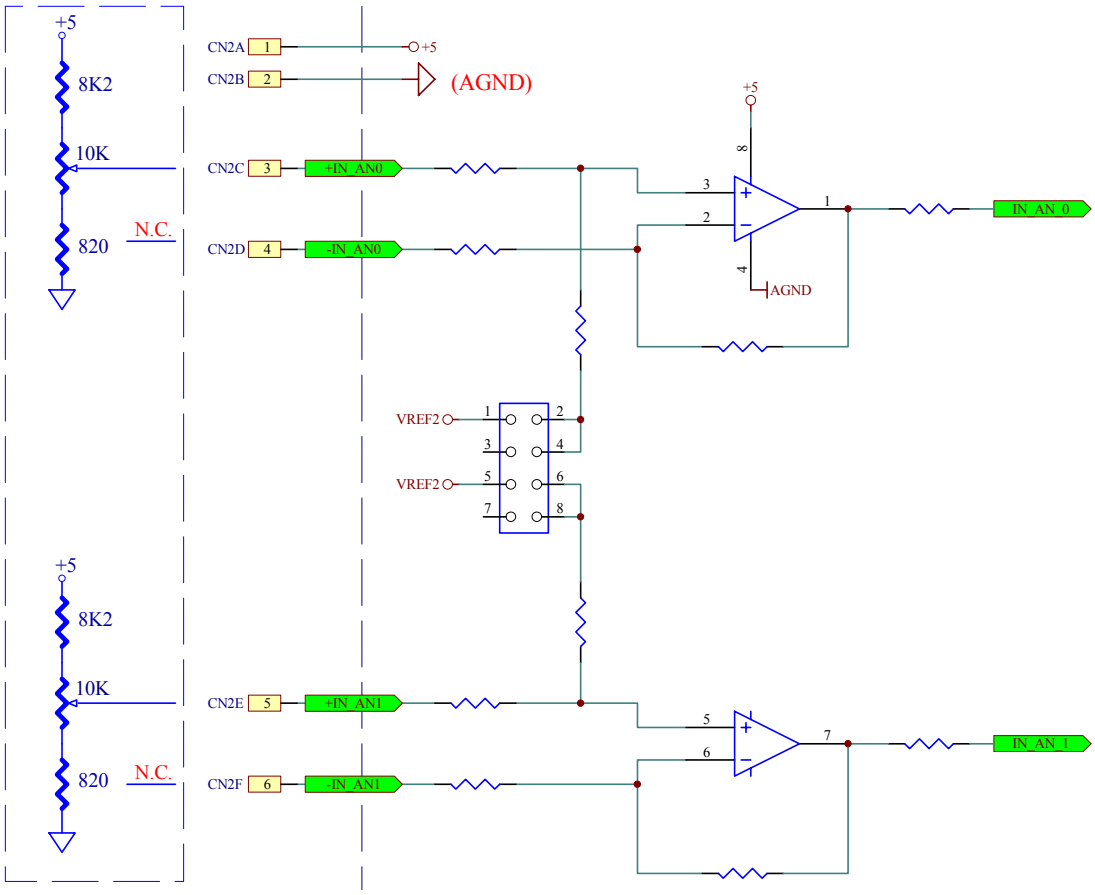
- CN2 connector: SDMWx180Vnn Systems

Analog inputs type +/-10Vdc CEI EN 61131-2, not insulated.

CN2 is a PHOENIX MICRO-COMBICON male 6 pin connector.

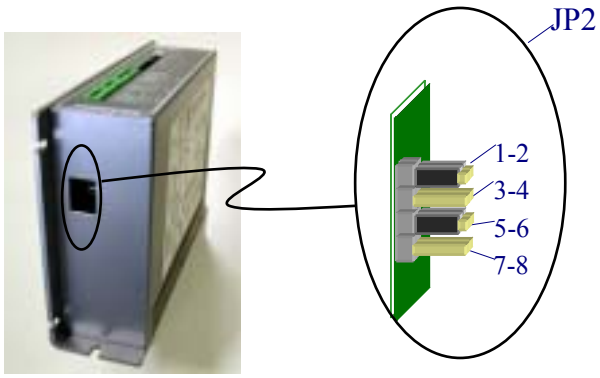
Pin	Description	Function
CN2.1	+5Vdc	Analog inputs supply (+)
CN2.2	AGND	Analog inputs supply (-)
CN2.3	+IN_AN0	Depending user's program
CN2.4	-IN_AN0	
CN2.5	+IN_AN1	
CN2.6	-IN_AN1	

Diagram of inputs and connections



JP2 is used for the analog input settings:

- use of the analog input in differential ±10Vdc: close pins JMP2 1-2 (In0) and 5-6 (In1) pins;
- use of the analog input with potentiometer: close pins JMP2 3-4 (In0) and 7-8 (In1);



Several internal parts of the SDMWx180 unit are potential sources of electric shocks, therefore, before operating on the JUMPERS, switch off the drive and wait until the LEDs of the 7 segment display on the front panel are switched off.

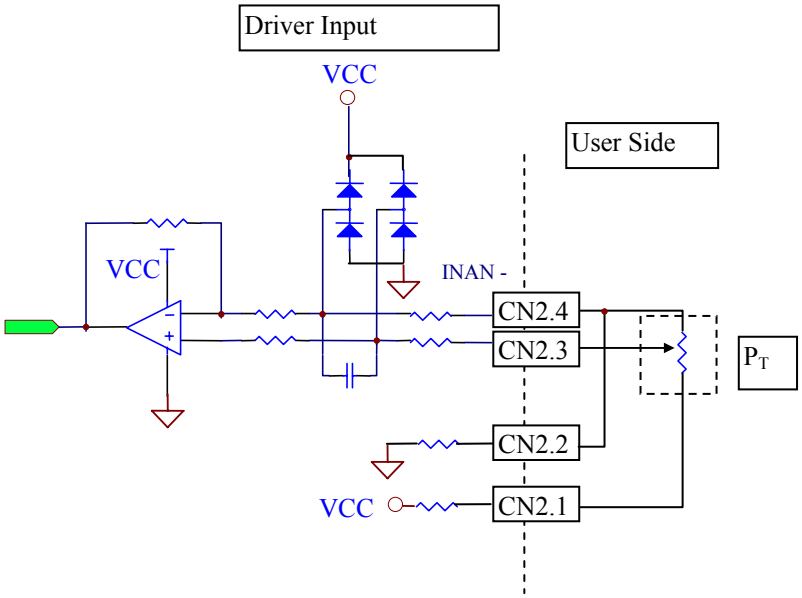
- CN2 connector: SDMWx170Vnn Systems

Analog inputs type +/-10Vdc CEI EN 61131-2, not insulated.

CN2 is a PHOENIX MICRO-COMBICON male 4 pin connector.

Pin	Description	Function
CN2.1	VPOT=5Vdc	Analog inputs supply (+)
CN2.2	AN_GND	Analog inputs supply (-)
CN2.3	+IN_AN0	Depending user's program
CN2.4	-IN_AN0	

Diagram of inputs and connections



External potentiometer: 5kΩ

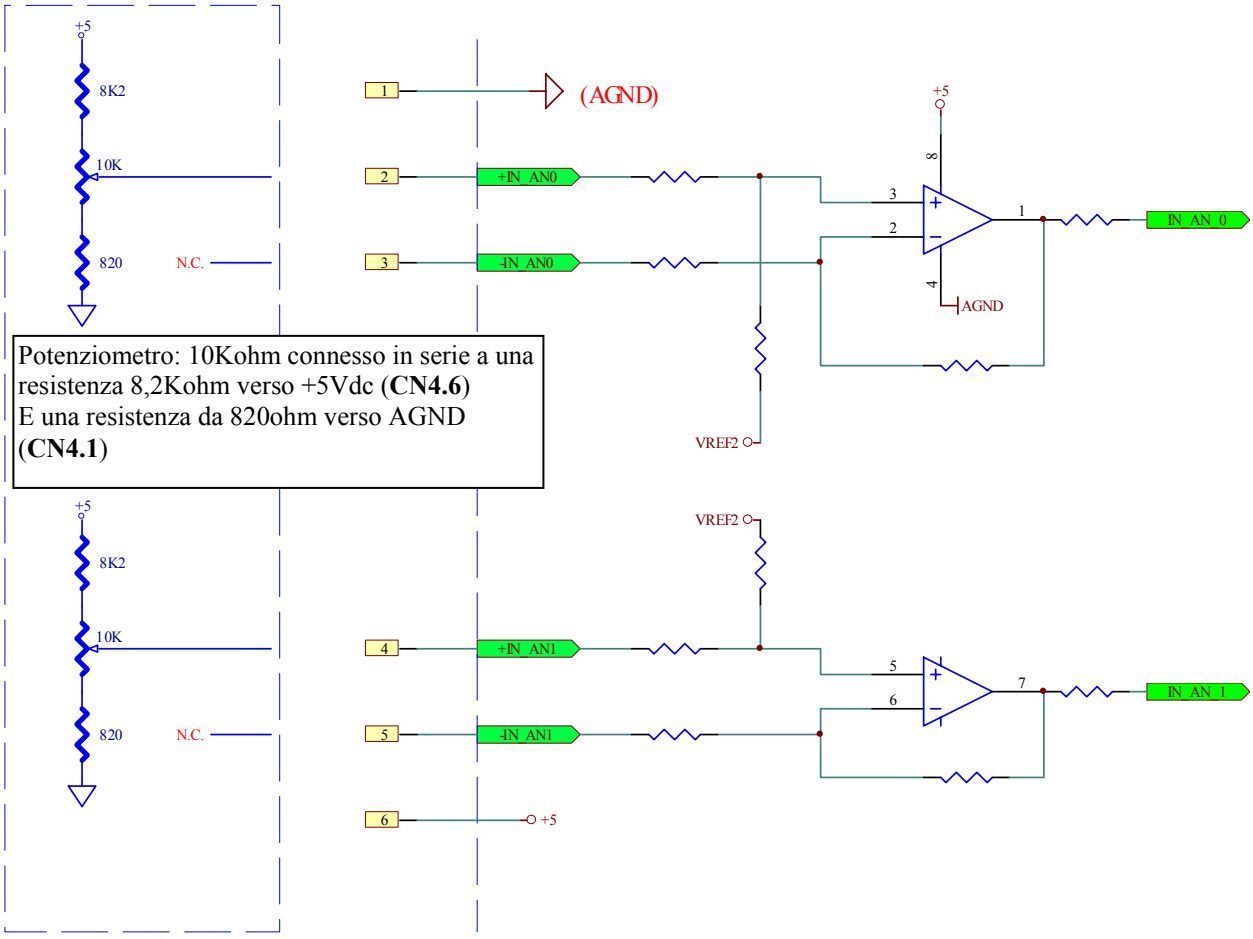
- CN4 connector: SDMWA130Vnn Systems

Analog inputs type +/-10Vdc CEI EN 61131-2, not insulated.

CN4 is a Molex 53014-0610 6 pin male connector.

Pin	Description	Function
CN4.1	AGND	Analog inputs supply (-)
CN4.2	+IN_AN0	Depending user's program
CN4.3	-IN_AN0	
CN4.4	+IN_AN1	
CN4.5	-IN_AN1	
CN4.6	+5Vdc	Analog inputs supply (+)

Diagram of inputs and connections



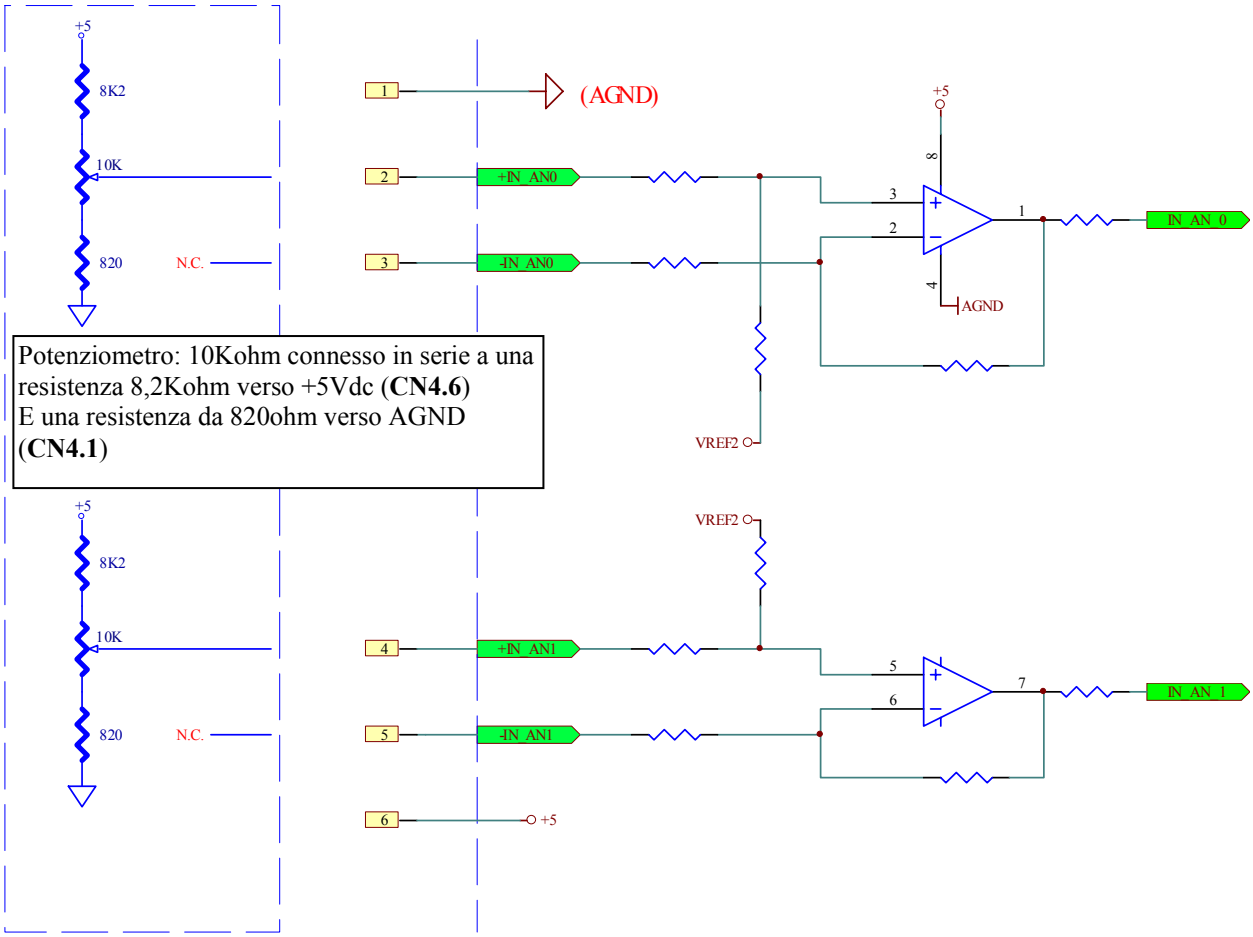
- CN4 connector: MDxx Systems

Analog inputs type +/-10Vdc CEI EN 61131-2, not insulated.

CN4 is a IEC60947-5-2 8 pin female M12 connector.

Pin	Description	Function
CN4.1	AGND	Analog inputs supply (-)
CN4.2	+IN_AN0	Depending user's program
CN4.3	-IN_AN0	
CN4.4	+IN_AN1	
CN4.5	-IN_AN1	
CN4.6	+5Vdc	Analog inputs supply (+)
CN4.7	--	--
CN4.8	--	--

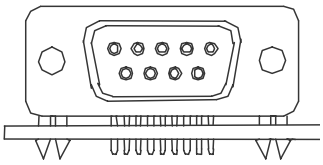
Diagram of inputs and connections



5.7 Interface RS232 and RS485 connection

- CN1 connector: SDMWx170/SDMWx180 drives

CN1 is a SUB-D male 9 pin connector.

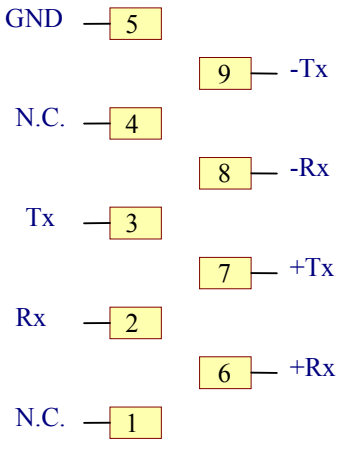


Connection Table

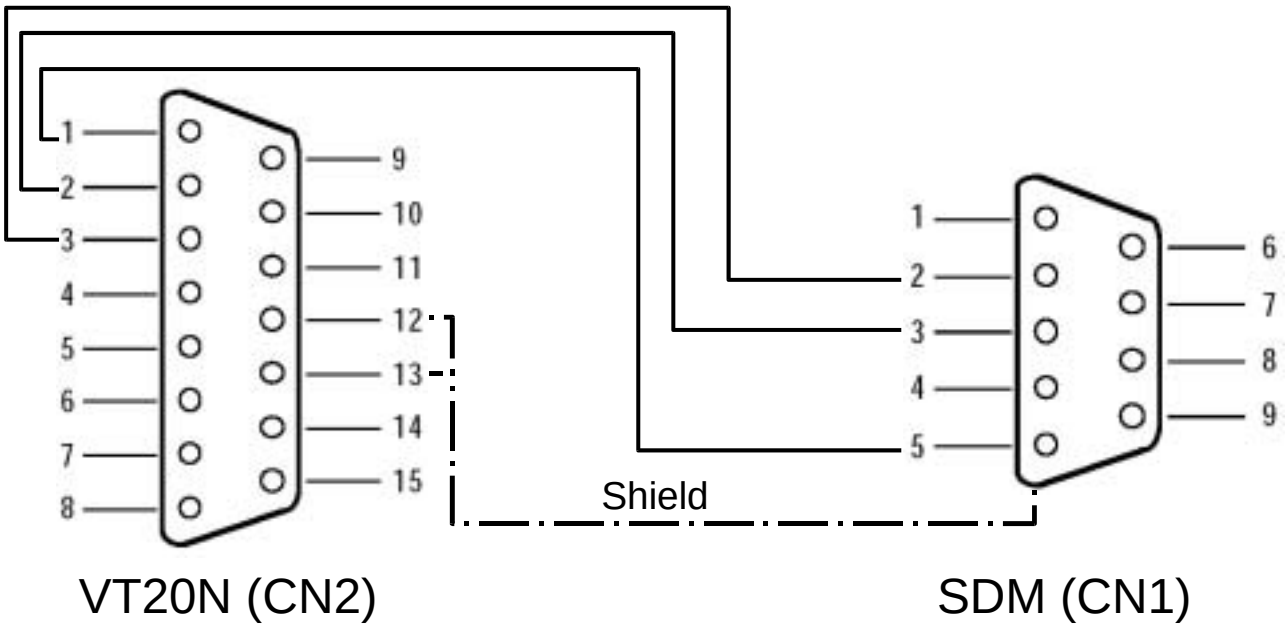
Description	Pin	Function
N.C.	CN1.1	N.C.
Rx	CN1.2	RS232 receiver input
Tx	CN1.3	RS232 transmitter output
DTR	CN1.4	N.C.
GND	CN1.5	RS232 Interface Signal ground
+Rx	CN1.6	RS485 receiver +side (input)
+Tx	CN1.7	RS485 transmitter +side (output)
-Rx	CN1.8	RS485 receiver –side (input)
-Tx	CN1.9	RS485 transmitter –side (output)

Wiring characteristics: Used a shielded cable with 0.5 mm² section (#20 AWG) or 0.25 mm² (#23AWG) for connecting interface RS232/485 or standard wiring.

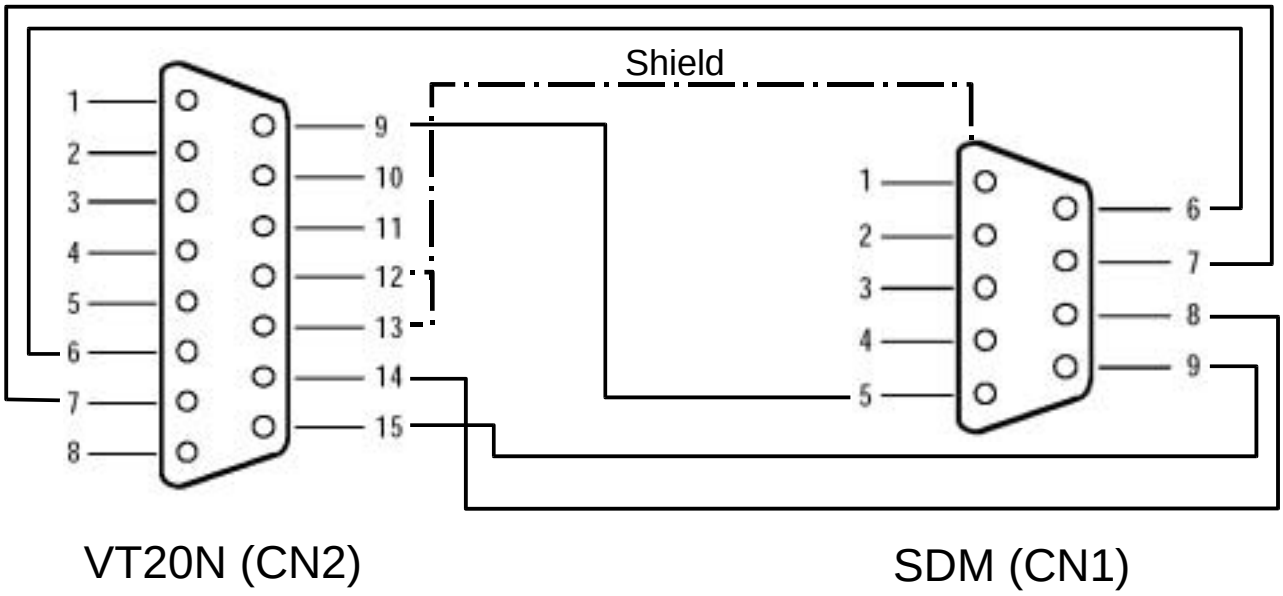
Connector pin-outs



Connection diagram of serial RS232 with VT20N keyboard



Connection diagram of serial RS422 with VT20N keyboard



- CN11 connector: SDMWA130 drives

CN11 is a Molex 530140910 9 pin male connector.

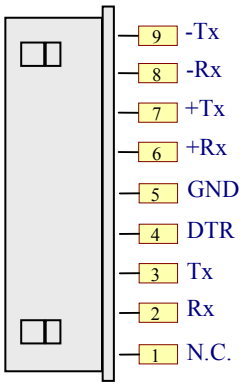
Connection Table

Description	Pin	Function
N.C.	CN1.1	N.C.
Rx	CN1.2	RS232 receiver input
Tx	CN1.3	RS232 transmitter output
N.C.	CN1.4	N.C.
GND	CN1.5	RS232 Interface Signal ground
+Rx	CN1.6	RS485 receiver +side (input)
+Tx	CN1.7	RS485 transmitter +side (output)
-Rx	CN1.8	RS485 receiver –side (input)
-Tx	CN1.9	RS485 transmitter –side (output)

Wiring characteristics: Used a shielded cable with 0.5 mm² section (#20 AWG) or 0.25 mm² (#23AWG) for connecting interface RS232/485 or standard wiring.

Connector Pin out

51004-0900 9-poli femmina 2mm Molex



- CN11 connector: MDxx drives

CN1 is a 9 pin male SUB-D connector.

Connection Table

Description	Pin	Function
N.C.	CN1.1	N.C.
Rx	CN1.2	RS232 receiver input
Tx	CN1.3	RS232 transmitter output
N.C.	CN1.4	N.C.
GND	CN1.5	RS232 Interface Signal ground
+Rx	CN1.6	RS485 receiver +side (input)
+Tx	CN1.7	RS485 transmitter +side (output)
-Rx	CN1.8	RS485 receiver –side (input)
-Tx	CN1.9	RS485 transmitter –side (output)

Wiring characteristics: Used a shielded cable with 0.5 mm² section (#20 AWG) or 0.25 mm² (#23AWG) for connecting interface RS232/485 or standard wiring.

Connector Pin out