

# Operating instructions



## PCP VOLUMETRIC PUMP DRIVE VIA MODBUS



### DAV TECH SRL

Via Ravizza, 30 - 36075 Montecchio Maggiore (VI) - ITALIA

Tel. 0039 0444 574510 - Fax 0039 0444 574324

[davtech@davtech.it](mailto:davtech@davtech.it) - [www.davtech.it](http://www.davtech.it)

### Index

<b>1 INTRODUCTION</b>	pag. 3
1.1 The manual	
1.2 Warranty	
1.3 Goods receipt	
<b>2 TECHNICAL DESCRIPTION</b>	pag. 3
2.1 Operation	
2.1 Technical specifications	
<b>3 SAFETY STANDARDS</b>	pag. 4
3.1 Safety notes	
<b>4 INSTALLATION</b>	pag. 10
4.1 Panel installation	
4.2 Thermal dissipation	
4.3 Electrical connections	
4.4 Power supply	
4.5 Ground connections	
4.6 Power connector	
4.7 Control connector	
<b>5 CONNECTION DIAGRAM</b>	pag. 16
5.1 Signal encoder	
5.2 Drive logic	
5.3 Interfacing via Modbus Tcp/Ip	
<b>6 CONNECTION BETWEEN DRIVE AND PUMP</b>	pag. 22
<b>7 ELECTRICAL DIAGRAM</b>	pag. 23

## 1 INTRODUCTION

### 1.1 The manual

The user manual is the document that accompanies the pump from the moment of its construction and for the entire period of use, it is therefore an integral part of the pump. The manual must be read before undertaking any operation involving the pump. The manual must be readily available to personnel assigned to use and maintenance of the pump. The user and the person responsible for use are required to know the contents of this manual. Reproduction of any part of this manual, in any form, without the express written permission of DAV Tech is prohibited. The texts and illustrations contained in the manual are not intended to be binding, DAV tech reserves the right, at any time and without notice, to make any changes to improve the product or for constructive or commercial needs.

### 1.2 Warranty

The warranty is valid for a period of 12 months starting from the commissioning date and in any case not later than 15 months from the delivery date. Interventions carried out during the warranty period do not in any way extend the warranty period. The seller is not liable for defects due to the normal wear of parts which, by their nature, are subject to wear.

### 1.3 Goods receipt

Upon receipt of the goods, check that:

- The packaging is intact.
- The exact correspondence of the ordered material.

The original drive configuration must definitely not be changed.

## 2 TECHNICAL DESCRIPTION

### 2.1 Operation

The controller was created to manage the movement of a PCP pump with DC motor with feedback from an encoder.

The DMD1204LIE controller has Modbus TCP / IP connectivity via ethernet, this allows the drive to be controlled by most PLCs.

The device internally manages a "Modbus Server" in addition to the IO Device, it must therefore be interrogated by another Client device to read and write data.

The parameterization and the programming of the drive is simple and fast thanks to DC Control, the Tool supplied with an advanced graphic interface for Windows able to communicate with the drive both with USB and with Ethernet.

The drive already contains a software that manages the PCP pump in all its aspects, enabling, dispensing, suck-back function, possible outlet valve etc., this program can be parameterized with the variables exchanged with the PLC via Modbus TCP / IP.

### 2.1 Technical specifications

<b>Output current</b>	Rated current	$A_{RMS}$	4
	Peak current	$A_{RMS}$	8
<b>Supply</b>	Voltage range	$V_{DC}$	+24 .. 85
	Rated voltage	$V_{DC}$	+65
<b>Current control</b>	Type		Dual MOSFET H-bridges
	Frequency	KHZ	20 (50 $\mu$ s)
	PWM outputs		20 KHz center-weighted PWM
<b>Protections</b>			Short circuit, overvoltage, undervoltage,   T, pursuit, position
<b>Feedback</b>			Incremental line driver or push pull encoder (PNP o NPN)
<b>Input digital general purpose</b>	Number		9 + 3 (superimposed on the service inputs)
	Type		PNP TTL compatible up to +30 VDC
	Function		configurable via software
<b>Output digital general purpose</b>	Number		4
	Type		PNP +24 VDC
	Current	mA	100 per channel
	Protection		Temperature, short circuit
	Function		Configurable via software
<b>Service Digital Input</b>	Number		6 (superimposed on general purpose inputs)
	Type		PNP o NPN da 5 a 30 VDC
	Current consumption	mA	8
	"High" / "Low" level threshold	$V_{DC}$	> + 2.2/ < + 0,8
	Features		High-speed inputs
<b>Analog input</b>	Number		3 (optional)
	Resolution	bit	12
	Range	$V_{DC}$	0 ... +10 (+/- 10V optional on Ana.inp. and Ana.inp.1)

## Operating instructions

---

### 3 SAFETY STANDARDS

It is recommended to follow the instructions below in order to avoid damage to the system, the device, or injury to the technician, or to other people during operation.

Throughout this manual, the following symbols are used to indicate the possible danger levels if the installation instructions are not followed.



#### **DANGER**

Indicates conditions that could result in death or serious injury if the given precautions are not observed.



#### **ATTENTION**

Indicates conditions that could result in death or serious injury if the given precautions are not observed.

The following symbols indicate the operations that must be done and the prohibited operations.



#### **NOT ALLOWED**

Indicates prohibited actions that must NEVER be performed.



#### **OBLIGATORY**

Indicates actions that MUST be performed.

The following symbols are used to indicate information useful for a correct installation. (Assistance)



#### **IMPORTANT**

Indicates important information to be memorized including precautions such as displaying alarms to avoid damaging devices.



#### **INFORMATION**

Indicates additional information.



## DANGER

Read the following instructions in their entirety before checking the products at the time of delivery, before transport and storage, installation, wiring, operation, inspection, and disposal.



**Make sure you have correctly connected the connectors and fixed the cables.**

Incorrect wiring can cause electric shock, fire, equipment damage or injury.



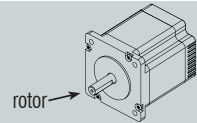
**Do not expose cables to sharp objects or edges, excessive pressures or traction, or to objects that could cause them to be crushed.**

Breakage or misplacement of a cable can cause electric shock, fire, equipment damage or injury.



**Do not touch any rotating part of the motor when the drive and the motor itself are operational.**

Not observing this rule can cause injury.



**Wait at least 5 minutes after switching off before removing, modifying wiring, or inspecting the device. Only specialized personnel can perform these operations.**

Not observing this rule can cause electrical shocks.



**Never touch the inner parts of the drive.**

Failure to observe this warning can result in injury.



**Do not remove cables, connectors, protective or optional elements while the power supply is on, or in the absence of the appropriate safety systems.**

Failure to observe this warning can cause electric shock or equipment damage.



**Do not approach the machine immediately after resetting a momentary power failure, to avoid unexpected restarts.**

Failure to observe this warning can result in injury.



**Do not touch the motor or the drive during operation. The surface may reach high temperatures.**

Not observing this warning can cause burns.



**Do not subject the product to water, corrosive liquids, flammable gases or combustible gases.**

Not observing this rule can cause fires.



### REQUIRED



**During installation, protections must be provided for over-currents, for electricity leakage, for over-temperatures, as well as emergency stop devices.**

Failure, in the absence of protection, can cause electrical shock, injury or fire.



**Strictly follow the instructions and procedures contained in this manual to verify the correct installation.**

Malfunions that occur, due to incorrect installation, damage the equipment and can cause accidents or serious injuries.



**Installation, wiring, and consultancy relating to inspections and malfunions must only be carried out by authorized personnel.**

Failure to observe this warning can cause electrical shock, injuries, fires, damage, or malfunions.



**Install an emergency stop device on the machine to ensure its safety.**

Failure to observe this warning can cause electric shock, injury, fire.



**Applications and installations must meet all applicable safety requirements.**

Failure to observe this warning can result in injury.



**Make sure that the devices have been properly grounded. Connect the grounding terminal, in compliance with the regulations for electrical installations. (Ground resistance  $<100\Omega$ )**

Not observing this rule can cause electrical discharges.



**Use properly sized equipment for the type of load to be handled.**

Failure to observe this warning can result in equipment damage or injury.



### ATTENTION



**Do not carry the drive or motor holding it by the cables or the motor shaft.**

Failure to observe this warning can result in malfunions or injuries.



**Do not apply loads higher than those indicated in the technical documentation.**

Failure to observe this warning can result in malfunctions or injuries.



**Do not cover the drive inputs, outputs and ventilation slots and prevent foreign bodies, such as metal or liquid fragments, from entering the product.**

Failure to observe this warning can cause deterioration of the internal components with consequent fires or malfunctions.



**DAV Tech products are precision equipment. Avoid violent shocks during transportation, installation, and operation.**

Failure to observe this warning can cause malfunctions.



**Do not store or install the product in the following places:**

- Places with temperature outside the allowed ranges.
- Places with humidity levels outside the allowed ranges.
- Places subject to condensation formation due to thermal excursions.
- Places exposed to corrosive, explosive or flammable gases.
- Places exposed to dust, saline agents, or metal powders.
- Places exposed to water, oils or chemical agents.
- Places subject to shock or vibration.

Failure to observe this warning can result in malfunctions or damage to the product.



**Do not step or place heavy objects on the product.**

Failure to observe this warning can result in malfunction or injury.



**Be sure to comply with all the installation conditions.**

Failure to observe this warning can malfunction, fire or electric shock.



**Power the drive only with voltages isolated from the mains voltage and included within the admissible limits.**

Failure to observe this warning can cause malfunctions, fires or electric shocks.



**Make sure you have connected the product correctly.**

Failure to observe this warning can cause malfunctions.



**Keep the specified distances between the drive and other devices.**

Failure to observe this warning can cause malfunctions or fires.

## Operating instructions

---



**Securely connect the power terminals. Use cables with a section suitable for their use.**

Failure to observe this warning can cause a fire.



**Keep the power and signal lines at a distance of at least 300mm. Use twisted pairs or shielded cables.**

Failure to observe this warning can cause malfunctions.



**Perform the motor operating tests only with the drive shaft disconnected from the machine.**

Failure to observe this warning can cause serious injuries.



**When disposing of the products, consider them as general industrial waste.**



### 3.1 Safety notes

**DAV Tech automation products must be handled, installed, and maintained only by competent personnel trained in the installation of automation components, and only for the purposes described in the user manual. The technician must pay particular attention to potential risks caused by mechanical and electrical hazards.**

It is very important that applications and installations meet all applicable safety requirements.

Each technician is obliged to take responsibility for verifying his / her knowledge and understanding of all applicable safety standards.

Any use that does not comply with the safety requirements can damage the equipment and injure the user.

DAV Tech Srl will not be held responsible and will not assume any responsibility for damages caused by products handled and / or installed improperly, or in cases where the customer has allowed, or performed, modifications and / or repairs not authorized by DAV Tech Srl.

#### General precautions

- The illustrations in this manual are typical examples and may differ from the product received.
- This manual is subject to change due to product improvements, specification changes or improvements to the manual.
- DAV Tech srl is not responsible for damage to things and / or people caused by incorrect installations and / or unauthorized modifications of the product.

#### European directives



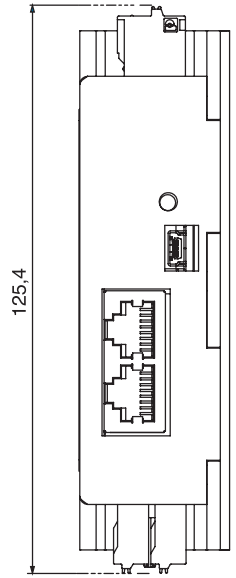
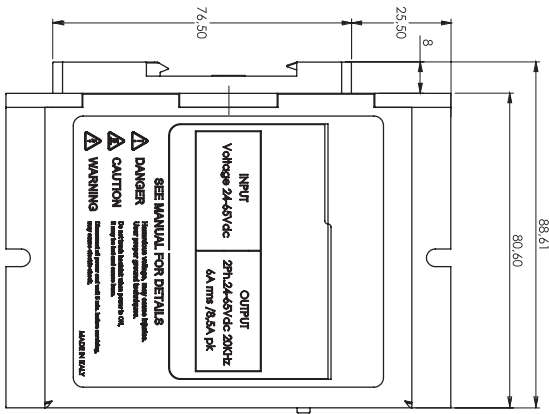
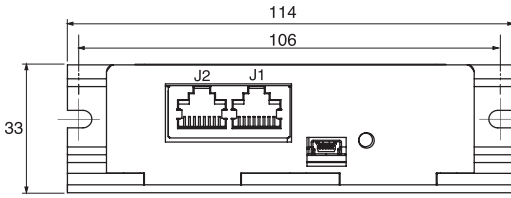
NORMATIVA	DESCRIZIONE	DATA
<b>89/336/EEC</b>	EMC Directive	3-may1989
<b>EN 55011</b>	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment	15-Sep-1998
<b>93/68/EC</b>	CE Marketing - Low voltage	22-Jul-1993
<b>98/37/EC</b>	Machinery	22-Jun-1998
<b>EN 60204-1</b>	Safety of machinery - Electrical equipment of machines	30-Jun-2006
<b>2002/95/CE</b>	RoHs Directive	27-Jan-2003

NOTE. Since the drives are of an integrated type, they need a new confirmation after installation in the final product.

## Operating instructions

### 4 INSTALLATION

FEATURE	SPECIFIC	
<b>Operating temperature</b>	0°C ... +50°C	
<b>Cooling</b>	Ventilate the drive in case of continuous operation	
<b>Operating humidity</b>	95% relative or lower humidity (without condensation)	
<b>Storage temperature</b>	-20°C ... +70°C	
<b>Storage humidity</b>	95% relative or lower humidity (without condensation)	
<b>Place of installation</b>	Free of corrosive gases Free of dust and iron powder Not subject to moisture or lubricating oil such as cutting oil	
<b>Altitude</b>	1,000 m or less	
<b>Vibration resistance</b>	4,9 m/s <sup>2</sup>	
<b>Shock resistance</b>	19,6 m/s <sup>2</sup>	
<b>Operating conditions</b>	Installation category (overvoltage category): III Pollution degree: 2 or better Protection class: IP3X (EN50178)	
<b>Place of installation</b>	Installing in a control panel	Design the control panel size, module layout and cooling method so that the temperature around the drive does not exceed 50 ° C. Note: To increase product life and maintain reliability, keep the temperature inside the control panel below 40 ° C.
	Installation near a heating module	Minimize thermal radiation from the heating module and any temperature rises caused by natural convection, so that the temperature around the drive does not exceed 55 ° C.
	Installation near a vibration source	Install a vibration damper below the drive to avoid subjecting it to excessive vibration.
	Installation in a place exposed to corrosive gases	Corrosive gases do not have an immediate effect on the device but, in the long term, cause malfunctions of the electronic components. Take appropriate measures to avoid the presence of corrosive gases.



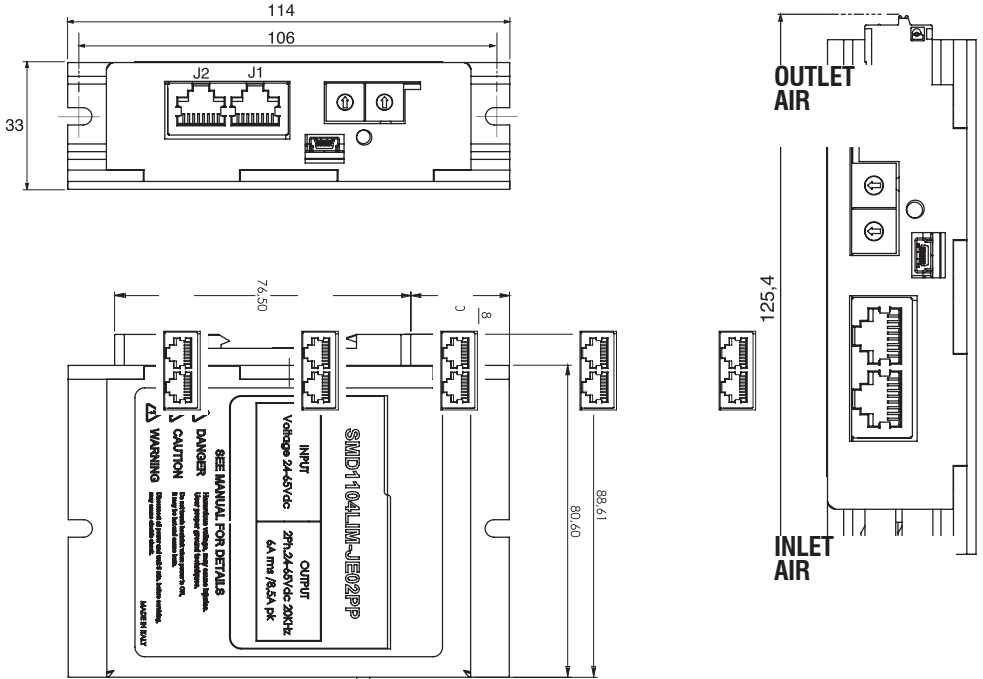
Sizes are expressed in mm.

FEATURE	SPECIFIC
Weight	320 g
Cover material	Complies with U.L. Spec 94 V-0 Flammability Rating

# Operating instructions

## 4.1 Panel installation

If installed inside an electrical panel, leave a free space of at least 50 mm around the module in case of the installation of a single drive. If more drives are installed, respect the minimum space, as shown in the following figure, between two contiguous drives, in order to guarantee air flow and cooling of the modules.



### ATTENTION

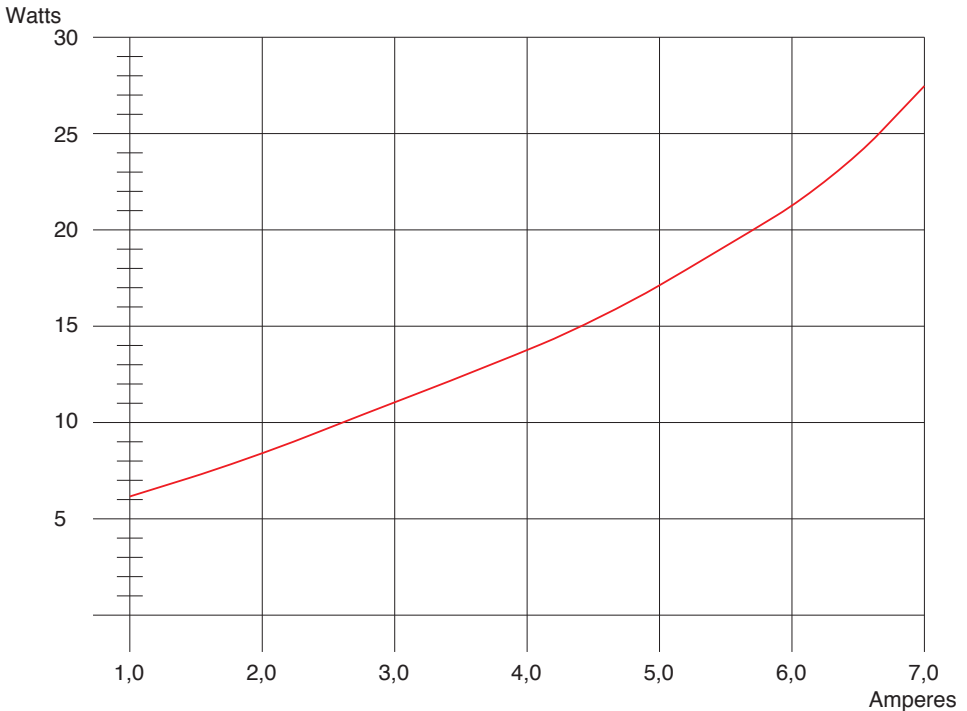


Do not cover the ventilation slots and prevent foreign bodies, such as metal fragments, liquids or combustibles, from entering the product. It is expressly forbidden to undertake actions aimed at modifying any mechanical part of the drive.

Failure to observe this warning can cause internal components to deteriorate, resulting in fires or malfunctions.

## 4.2 Thermal dissipation

The trend of the thermal dissipation in relation to the supplied current is shown below.



The electric current required to control the PCP pumps is 2.5 A.

## 4.3 Electrical connections

Below is the trend of the thermal dissipation in relation to the supplied current.



### ATTENTION

- Avoid short-circuits, incorrect mass conductor connection, and polarity inversions.
- Check the voltage levels before plugging in the power connector.
- Always connect the ground terminal.

## Operating instructions

### 4.4 Power supply

The drive power supply will be 24VDC as it is also the rated voltage of the motor.

The drive has 2 separate power supplies, one for the logic and one for the power, this is to make it possible to cut the power of the pump from a safety circuit, even if the pump is not considered dangerous as it has no moving part on the outside. The maximum absorption for a PCP pump is about 2.5 A while the drive logic is about 200-300mA.

It is advisable to use cables with a minimum section of 1 mm<sup>2</sup> for connections with a length of less than 20 m and at least 2.5 mm<sup>2</sup> in the case of connections with a longer length (maximum length allowed = 20 m).

Use 4- core twisted pair and shielded cables.

### 4.5 Ground connections

It is preferable to use a ground bar that acts as a collector especially if there are several drives connected.

It is important to connect to ground:

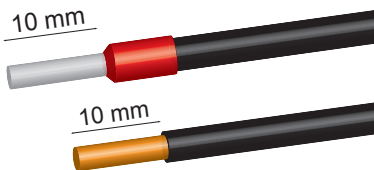
- the gnd of the power supply
- the drive housing
- the expected connection provided on the power terminal board
- the power cable screen (connected via the terminal of the power terminal board)
- the encoder cable screen.

### 4.6 Power connector

The power connector is used to:

- bring power to the drive
- connection of the motor power supply

The connector carries the following wire diameters and tips



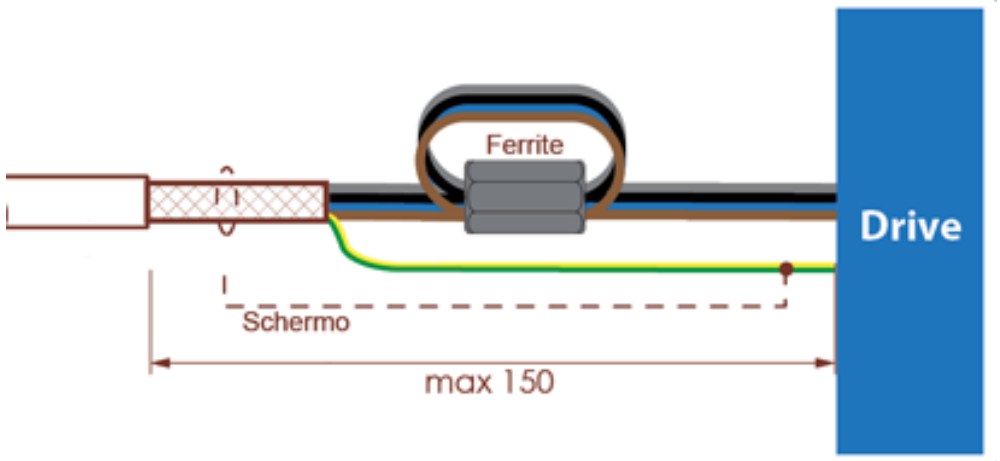
CONDUCTOR CHARACTERISTICS	mm <sup>2</sup>
Rigid conductor section	0,2 - 2,5
Flexible conductor section	0,2 - 2,5
Flexible conductor cross section with cable lug without collar	0,2 - 2,5
Flexible conductor section with ferrule with collar	0,2 - 2,5
Stripping length or cable lug length	10

To reduce EMI disturbances, it is required to install a ferrite filter at a maximum distance of 150 mm from the drive on the motor cable.

The filter is composed of low-grade ferrite which has high radio frequency losses; in this way the filter works as a high impedance at those frequencies.

Recommended ferrites:

MANUFACTURER	FAIR-RITE	WÜRTH ELEKTRONIK
Code	1463444	74271132
Outer diameter	23,7 mm	24,5 mm
Inner diameter	10,15 mm	8,5 mm
Length	39,4 mm	40,5 mm
25 MHz impedance	144 Ω	141 Ω
100 MHz impedance	240 Ω	241 Ω



#### 4.7 Control connector

Instead, the control connector provides:

- to supply power to the IO side of the drive
- connection of the encoder signals
- connection of the digital inputs and outputs
- connection of the analog input

# Operating instructions

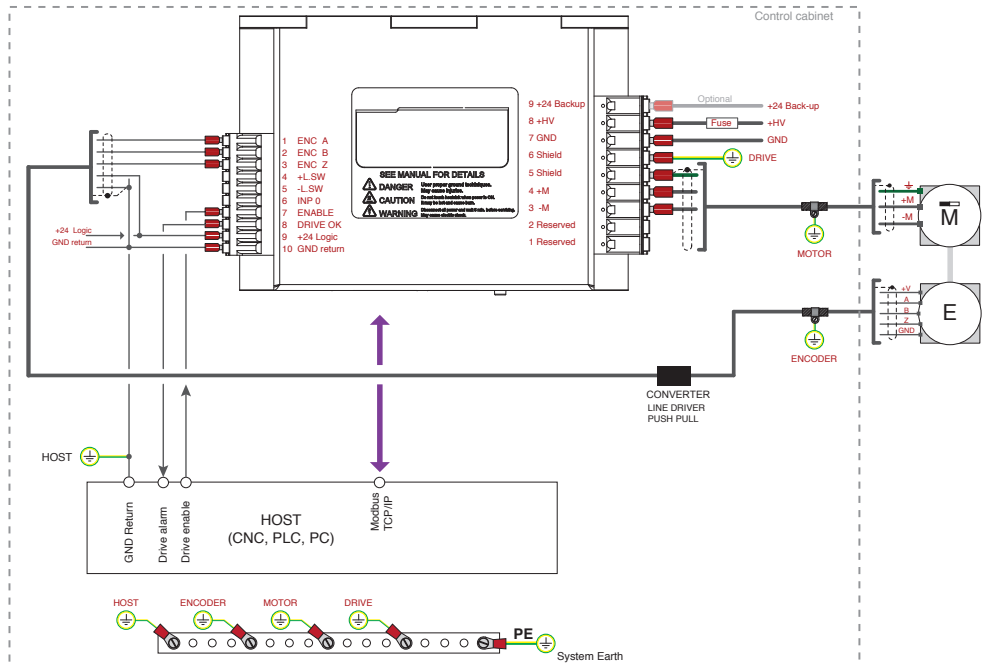


## ATTENTION

The digital outputs are protected against overloads (Max 500mA) and short-circuits; in case of overload the output will switch off until the anomaly is removed.  
If inductive loads, such as relays, solenoid valves, etc. have to be driven, connect a flyback diode in parallel to the load.

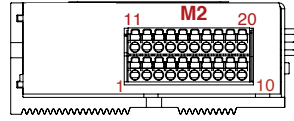
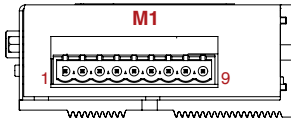
## 5 CONNECTION DIAGRAM

### Typical connection





Components identification



Power supply and motor connector (M1)

PIN	Signal name	Description
1	Reserved	Do not connect
2	Reserved	Do not connect
3	-M	Motor power output (-M)
4	+M	Motor power output (+M)
5	Shield	Screen
6	Shield	Screen
7	GND power	Negative supply voltages
8	+HV	Positive supply voltages
9	+24V Back-up	Voltage back-up referred to GND

Service input connector (M2)

PIN	Signal name	Description
1	Motor encoder A / Inp5	Channel A enc. motore / Input dig. 5
2	Motor encoder B / Inp6	Channel B enc. motore / Inputdig. 6
3	Motor encoder Z / TOP/Inp7	Channel Z enc. motore / Input TOP/ ingresso dig. 7
4	Aux encoders A/ FLS Inp8	Channel A enc. Aux / Forward Limit / Ing. 8
5	Aux encoders B/ BLS Inp9	Channel B enc. Aux / Backward Limit / Ing. 9
6	Aux encoders z/ Inp0	Channel Z enc. Aux / Input dig. 0
7	Digital input 1	Digital input 1
8	Digital output 0	Digital output 0
9	Service power input (+24V <sub>DC</sub> )	Ingresso di alimentazione +24V <sub>DC</sub>
10	Common ground	Common input/output
11	Digital output 1	Digital output 1
12	Analog common ground	Common input analog
13	Analogue input	Analog input
14	Analogue input 1	Analog input 1
15	Analogue input 2	Analog input 2
16	+5 V DC out / (max 100mA)	Uscita +5 V <sub>DC</sub> (max 100 mA)
17	Digital input 2	Digital Input 2
18	Digital input 3	Digital Input 3
19	Digital input 4	Digital Input 4
20	Common ground	Common input/output

only versions DIMD 10.0.4xxx-02xx

## Operating instructions

The program inside the drive already includes the following connections:

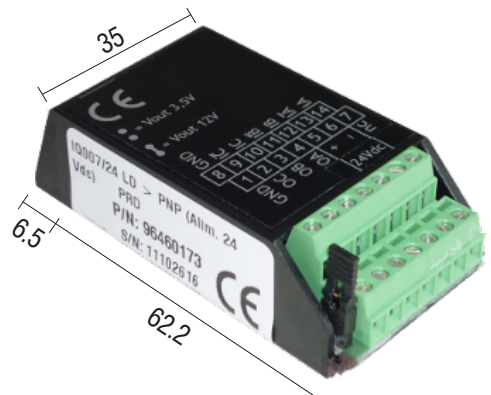
PIN	CONNECTION NAME	PROGRAMME FUNCTION
1	Channel A encoder	Channel A encoder
2	Channel B encoder	Channel B encoder
3	Channel Z encoder (Top)	Not used
4	Channel A encoder ext	Not used
5	Channel B encoder ext	Not used
6	Channel Z encoder ext	Not used
7	Input 1	Enable
8	Output 0	Alarm
9	24 VDC (Power supply IO)	24 VDC (Power supply IO)
10	GND (internally connected to pin 20)	GND
11	Output 1	Ready
12	Analogic GND	Analog GND
13	Analogic Input 0 (0-10V)	Pressure sensor
14	Output 2	End of dispensing
15	Output 3	Dispensing in progress
16	Out 5VDC (max 100mA)	Power supply for encoder and pressure sensor
17	Input 2	JOG Dispensing
18	Input 3	Preset Dispensing
19	Input 4	Alarm Reset
20	GND (internally connected to pin 10)	GND

All signals are PNP.

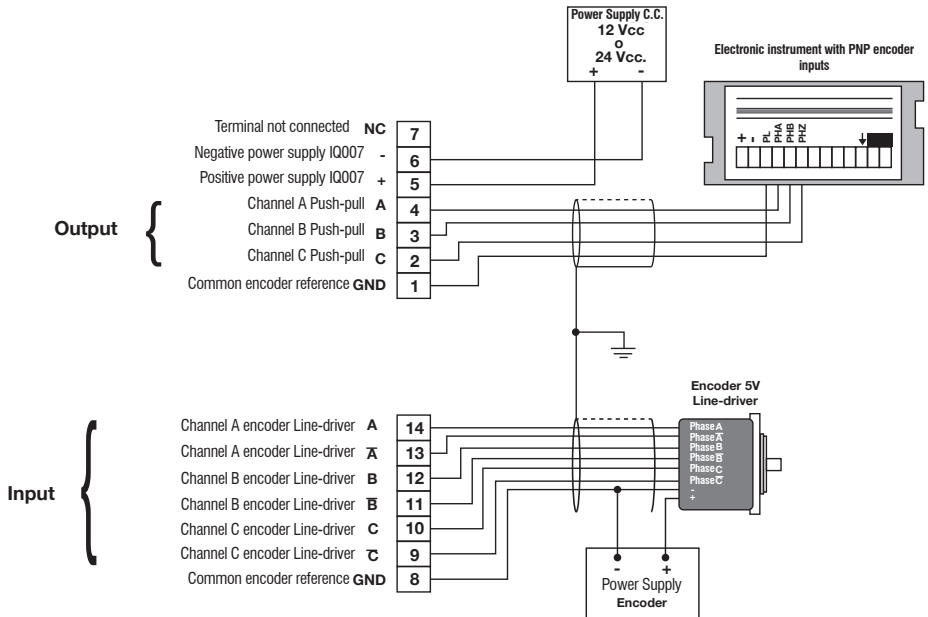
### 5.1 Signal encoder

The drive prepares a connection for the push pull encoder signals, to adapt this type of signal to that of the PCP pump encoder, of the line drive type, a Qem module is required which will be supplied together with the drive.

The converter is supplied with a DIN rail support.



Generic connection example with 3-channel encoder:



In the attachments it will be possible to see an example diagram for the connection to a PCP pump. It is necessary to pay attention that the encoder power supply is 5VDC, this power supply can be taken directly from pin 16 of the Drive.

## 5.2 Drive logic

The drive has been designed to perform all the dispensing functions necessary for a PCP pump, these functions can all be parameterized via Modbus TCP IP, without this communication it will be possible to use the drive with only one static data set.

By using the inputs or variables via Modbus it is possible to activate the following functions in the drive:

### Enable (Power Enable)

With input 1 it is possible to couple the pump motor, if the power supply is missing or the pump is physically disconnected, the drive will give the power timeout alarm.

## Operating instructions

---

### Jog Dispensing

With input 2 it is possible to activate the pump to dose at constant speed, by turning off the command the pump will stop immediately.

### Predetermined dispensing

With input 3 it is possible to activate the dispensing of a set quantity, the input must be kept active until the end of dispensing, the “End of dispensing” signal will then be activated when the command is switched off.

### Alarms reset

The designated input is input 4.

### Suck back

The drive automatically performs the suck back (inversion of the rotation); whenever the controlled pump stops, the direction of rotation is reversed with programmable speed and quantity.

INPUT	PIN	Description
IN 1	7	Enable
IN 2	17	Jog dispensing
IN 3	18	Predetermined dispensing
IN 4	19	Reset

There are also 4 outputs that define the drive's status:

### Alarm

When 1 or more hardware alarms are active in the drive

### Ready

When there are no alarms and the motor is in torque (enable active)

### End of dispensing

Signal that activates at the end of a predetermined dispensing

### Dispensing in progress

Signal that allows you to connect for example a solenoid at the output of the pump (with a programmable delay)

INPUT	PIN	DESCRIPTION
OUT 0	8	Alarm
OUT 1	11	Ready
OUT 2	14	End of dispensing
OUT 3	15	Dispensing in progress

### 5.3 Interfacing via MODBUS TCP/IP

The drive in the upper part has 2 ethernet ports which are related to a single network interface, the ethernet parameters of the drive can be configured through a “DC Control” program that will be supplied together with the drive. The drive is in fact a Modbus server, to implement the communication it will be necessary to implement a Modbus Client on the PLC or controller to read and write the variables on the drive.

The variables of the Drive program are exchanged using the 16Bit Modbus Holding registers. Being 32-bit program variables, they use 2 consecutive holding registers, it is necessary to pay attention to the endian of the controller used compared to the one configured on the drive.

Modbus holding register	Drive variables	Name register	Type	Description
1002-1003	V1	Commands from modbus	In	Bit 0 Free Bit 1 Enable Bit 2 Continuous Dispensing Bit 3 Predetermined Dispensing Bit 4 Allarms Reset Bit 5 Output Command EV
1004-1005	V2	Dispensing speed	In	Dispensing speed in rpm
1006-1007	V3	Ramps	In	Acceleration and deceleration ramp in Rps <sup>2</sup> *100
1022-1023	V11	Cycle time pid	In	Suck-Back Delay in ms
1026-1027	V13	Suck-Back steps	In	Suck-Back steps 2048 = 1 motor round
1028-1029	V14	Dispensing steps	In	Dispensing steps 2048 = 1 motor round
1030-1031	V15	Mode	In	It must be set to 3
1032-1033	V16	Dispensing signal delay	In	Delay for dispensing valve(ms)
1034-1035	V17	Suck-Back Speed	In	Suck-Nack Speed in rpm
1040-1041	V20	Ouput position	Out	Relative position of the encoder
1042-1043	V21	Pressure	Out	Outlet pressure in hundredths of a bar
1064-1065	V32	Last Dispensing Pressure	Out	Last Dispensing Pressure
1066-1067	V33	Status output	Out	Bit 0 Alarm Bit 1 Ready Bit 2 Ed of Dispensing Bit 3 Dispensing in progress Bit 4 Power enabling alarm Bit 5 Standby Bit 6 Pressure allarm

## Operating instructions

---

When implementing the Modbus Client, it must be considered that in some functions already implemented as for Siemens PLCs, the index of the Modbus register is shifted by 1 forward, for example the “Modbus Commands” register will be between register 1203 and 1204.

To give the correct commands to the pumps it is also necessary to consider the reducer present on each model:

- PCP 005, 015, 050 reducer 62:1
- PCP 150, 500, 1000 reducer 76:1

An FB block is available on request for Siemens S7 1200/1500, which completely manages the communication with the drive.

The programming of the IP ADDRESS for the only Modbus TCP / IP communication can be done through the specific software supplied DCCONTROL.

## 6 CONNECTION BETWEEN DRIVE AND PUMP

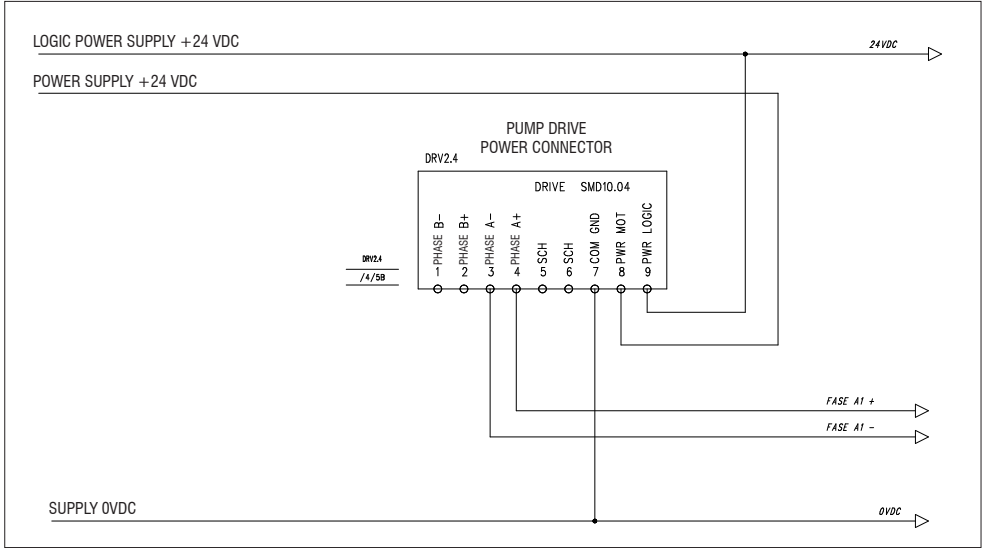
The cable supplied for the connection of the PCP pump is a 7 meter long shielded PUR cable suitable for handling. Below the typical connection table:

PIN	DESCRIPTION	CABLE COLOR	PIN DRIVE
1	+ Motor	Black	M1-4
2	+ 5V Encoder	Blue	M2-1
3	GND Encoder	Blue/Black	M2-2
4	- Motor	Black/White	M1-3
5	Channel A Encoder	Red	M2-6
6	Encoder A_Channel	Green	M2-3
7	Channel B Encoder	Red-White	M2-7
8	Encoder B_Channel	Green/Black	M2-4

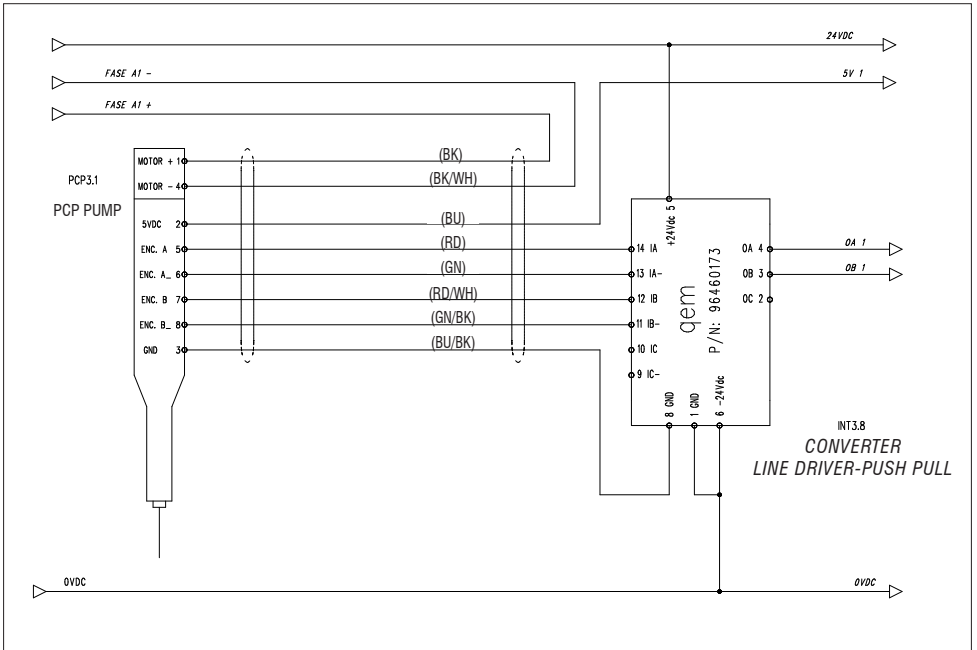
Alternative connections:

PIN	DESCRIPTION	CABLE COLOR	PIN DRIVE
1	+ Motor	Black	M1-4
2	+ 5V Encoder	Brown	M2-1
3	GND Encoder	Red	M2-2
4	- Motor	Orange	M1-3
5	Channel A Encoder	Yellow	M2-6
6	Encoder A_Channel	Green	M2-3
7	Channel B Encoder	Blue	M2-7
8	Encoder B_Channel	White	M2-4

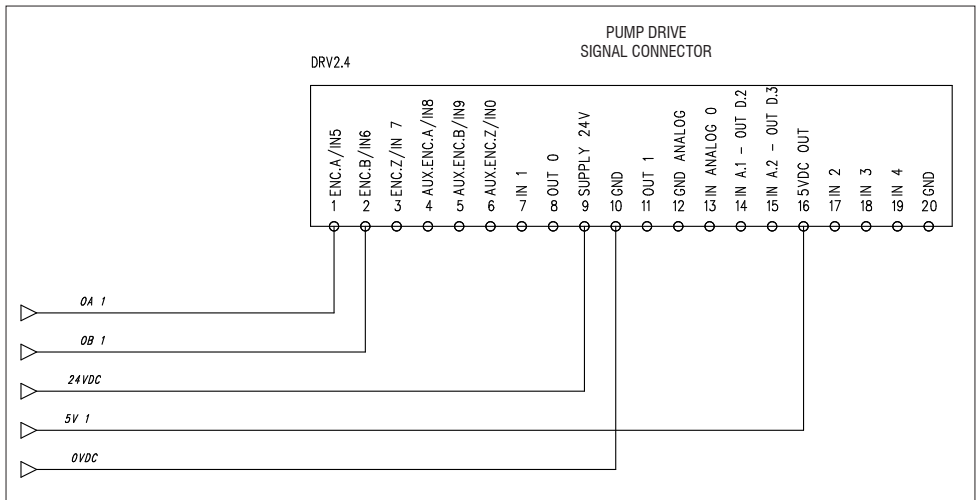
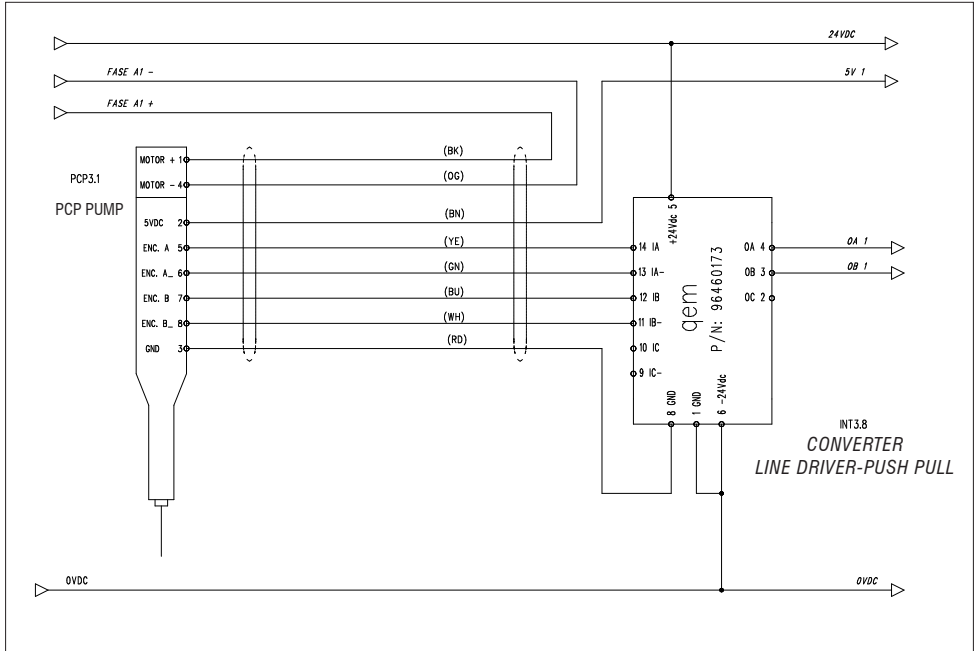
## 7 ELECTRICAL DIAGRAM



### Typical connections



## Alternative connections:



**DAV TECH SRL** Via Ravizza, 30 - 36075 Montecchio Maggiore (VI) - ITALY - Ph. 0039 0444 574510 - Fax 0039 0444 574324  
**davtech@davtech.it - www.davtech.it**