

Expansion modules of the dPLC_R7

dSTEP

Revision Version 1.0.0





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General Description

Knowing that the **dPLC_R7** is an industrial modular programmable motion controller, it has the characteristic of handling various expansion modules. One of these expansion modules is the **dSTEP** stepper controller module, which function is the reading and transmission of data, powering, and control of a single closed-loop stepper motor with an encoder attachment.

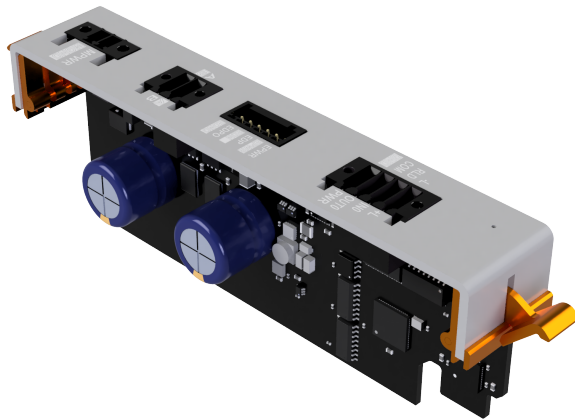


Figure 1 **dSTEP** Expansion Module.

This expansion module is able of showing in real-time a variety of information, such as the position and speed; from the stepper motor connected through the display of the **dPLC_R7**. However, one very important feature distinguishes this expansion module in conjunction with the **dPLC_R7**, thanks to our dPOS® technology; which is the means of communication when more than one **dSTEP** expansion module is connected.

A normal installation of a stepper motor with an encoder attachment would require:

- A set of cables for the coils of the stepper motor.
- A set of cables for the encoder.
- A set of cables for the controller device for that stepper motor.

It's safe to assume that it would require an abundant amount of cables if more than stepper motor is intended to be

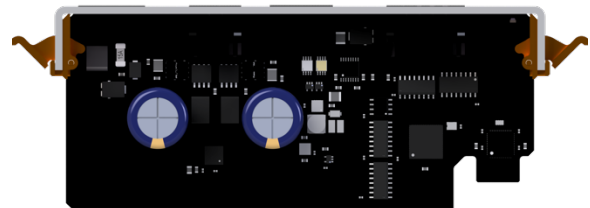


Figure 2 **dSTEP** Expansion Module View 1.

implemented, or better phrased, if more than one axis of movement is implemented, which brings a considerable amount of maintenance and fault-checking in case of malfunctions.

Although, our dPOS® technology gives an alternative to this issue, the communication protocol which the **dPLC_R7** utilizes is similar to a “daisy-chain” structure communication protocol. By making use of this communication protocol it allows the interconnection of various encoders, forming a bi-directional chain communication while each **dSTEP** module receives the respectful data in microseconds. Thanks to this chain of communication, it reduces the amount of cable sets needed, and maintenance as well as fault-checking becomes easier.



Features

- dPOS® technology.
- Less cables.
- Temperature sensor.
- Voltage indicator.
- Speed and direction control.
- Noise reduction.
- Fixed motor voltage of 48V.
- Clamps for easy installation and removal.
- Labels to identify each connector.
- A blue LED to show the state of the expansion module.
- Enumeration.

Applications

- Stepper Motor Drivers.
- Single-axis applications.
- Multiple-axes applications.
- Precise motion machines.
- Plotter machines.
- Assembly Lines.
- CNC machines.



Specifications

Model		dSTEP
Enclosure		dPLC_R7 Rack
Dimensions (H x D x W)		
Weight		
Electrical Specifications	Supply Voltage	24V
	Operating Voltage Range	
	Power Consumption	
Application Environment	Operating Temperature	
	Ambient storage temperature	
	Noise Resistance	



- Mechanical Drawing

- Peripherals



Figure 3 dSTEP Peripherals.

The **dSTEP** expansion module features, taking **Figure 3** as reference from top to bottom; 4 peripherals:

- **dSTEP** Expansion Module Power.
 - Encoder Communication and Power.
 - Stepper Motor Coils.
 - Stepper Motor Power.
- dSTEP Expansion Module Power

An 8-pin connector that serves various functions, although it is focused to the power source of the module.

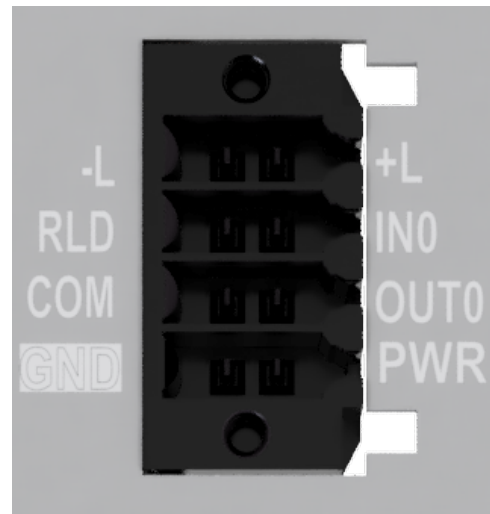


Figure 4 dSTEP Power Peripheral.

-L	Limit switch negative
+L	Limit switch positive
RLD	
IN0	General Purpose Input
COM	Common
OUT0	General Purpose Output
GND	Power ground
PWR	Power source input (24V - 5A)

- Encoder Communication and Power

A 6-pin connector purely for the encoder attachment.

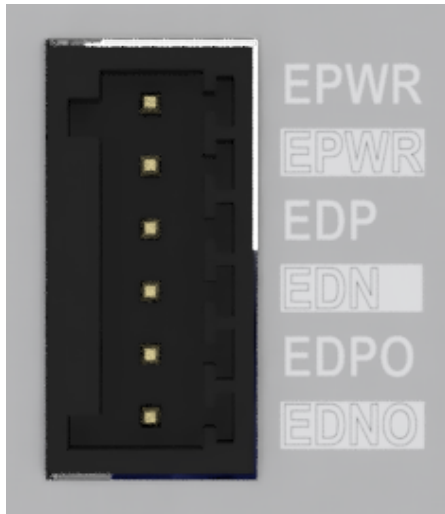


Figure 5 dSTEP Encoder Peripheral.

+EPWR	Encoder Power positive
-EPWR	Encoder Power negative
+EDP	
-EDP	
+EDPO	
-EDPO	

- Stepper Motor Coils

A 4-pin connector dedicated to the coils of the stepper motor.

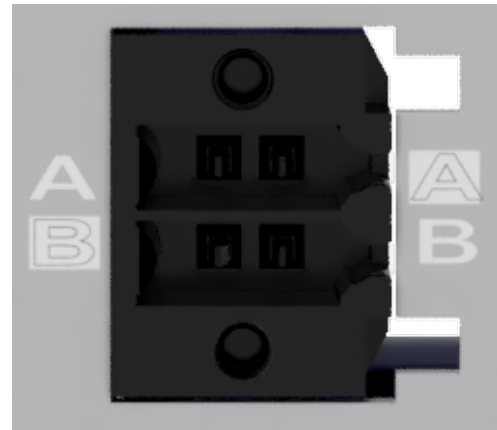


Figure 6 dSTEP Stepper Motor Coils Peripheral.

+A	Coil A positive
-A	Coil A negative
-B	Coil B negative
+B	Coil B positive

- Stepper Motor Power

A 2-pin connector which powers the stepper motor with 48 Volts (5A).

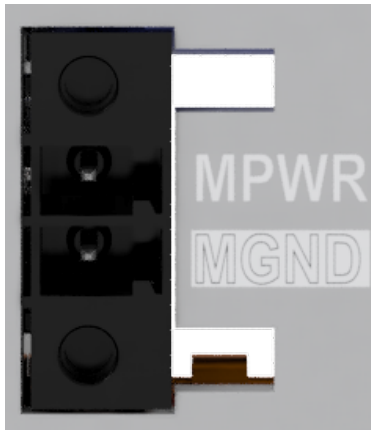


Figure 7 dSTEP Stepper Motor Power Peripheral.

+MPWR	Power Source Input positive
-MGND	Power Source Input negative

Application Stepper Motors (dSMXXXX series)

The company currently offers the dSMXXXX series to the market, which is a variety of closed-loop stepper motors with either our own actuators or if you wish to use our technology with your own actuators its fully compatible. For more information regarding the dSMXXXX series, please check the datasheets in our website www.dciplc.com.

- **Closed-loop Stepper Motors (No Break additament)**

Model	Phase	NEMA	Step Angle	Phase Current	Phase Resistance	Phase Inductance	Holding Torque	Rotor Inertia	Bi/Unipolar	Weight	Body Length	Encoder
			o	A/ø	Ω/\varnothing	mH/ø	N.m	g.cm ²	# of Leads	kg	mm	P/R
dSM17A	2	17	1.8	1.7	1.5	2.8	0.4	54	Bi (4)	0.32	43	325
dSM17B	2	17	1.8	2.3	1.0	1.9	0.5	77	Bi (4)	0.4	51	325
dSM17C	2	17	1.8	2.3	1.4	3.1	0.7	110	Bi (4)	0.55	67	325
dSM23A	2	23	1.8	4.2	0.4	1.2	1.1	200	Bi (4)	0.7	56	325
dSM23B	2	23	1.8	4.2	0.7	2.0	2.2	480	Bi (4)	1.15	80	325
dSM23C	2	23	1.8	4.2	0.7	2.5	2.5	800	Bi (4)	XXXXX	100	325
dSM34A	2	34	1.8	7.0	0.28	1.8	4.2	1400	Bi (4)	XXXXX	80	325
dSM34B	2	34	1.8	7.0	0.38	3.2	8.0	2700	Bi (4)	XXXXX	114	325
dSM34C	2	34	1.8	7.0	0.45	5.2	12	4000	Bi (4)	XXXXX	150	325

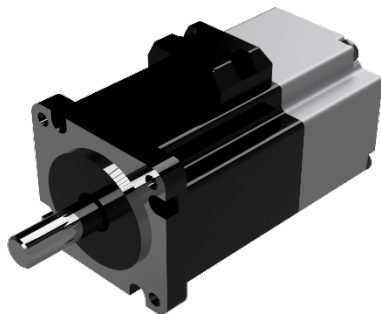


Figure 8 dSM17A.



Figure 9 dSM17A connectors.

- Closed-loop I/O Stepper Motors (No break additament)

Model	Phase	NEMA	Step Angle	Phase Current	Phase Resistance	Phase Inductance	Holding Torque	Rotor Inertia	Bi/Unipolar	Weight	Body Length	Encoder
			o	A/∅	Ω/∅	mH/∅	N.m	g.cm ²	# of Leads	kg	mm	P/R
dSM17AIO	2	17	1.8	1.7	1.5	2.8	0.4	54	Bi (4)	0.32	43	325
dSM17BIO	2	17	1.8	2.3	1.0	1.9	0.5	77	Bi (4)	0.4	51	325
dSM17CIO	2	17	1.8	2.3	1.4	3.1	0.7	110	Bi (4)	0.55	67	325
dSM23AIO	2	23	1.8	4.2	0.4	1.2	1.1	200	Bi (4)	0.7	56	325
dSM23BIO	2	23	1.8	4.2	0.7	2.0	2.2	480	Bi (4)	1.15	80	325
dSM23CIO	2	34	1.8	4.2	0.7	2.5	2.5	800	Bi (4)	XXXXX	100	325
dSM34AIO	2	34	1.8	7.0	0.28	1.8	4.2	1400	Bi (4)	XXXXX	80	325
dSM34BIO	2	34	1.8	7.0	0.38	3.2	8.0	2700	Bi (4)	XXXXX	114	325
dSM34CIO	2	34	1.8	7.0	0.45	5.2	12	4000	Bi (4)	XXXXX	150	325

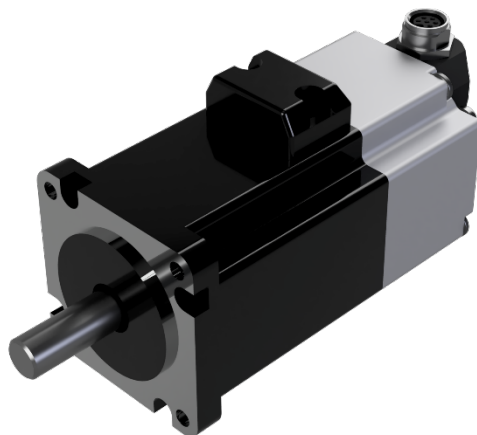


Figure 10 dSM17BIO



Figure 11 dSM17BIO connectors.

- Closed loop-Stepper Motors (With Break additament)

Model	Phase	NEMA	Step Angle	Phase Current	Phase Resistance	Phase Inductance	Holding Torque	Rotor Inertia	Bi/Unipolar	Weight	Body Length	Encoder
			o	A/ø	Ω/ø	mH/ø	N.m	g.cm ²	# of Leads	kg	mm	P/R
dSM17BB	2	17	1.8	2.3	1	1.9	0.5	77	Bi (4)	0.4	51	325
dSM17CB	2	17	1.8	2.3	1.4	3.1	0.7	110	Bi (4)	0.55	67	325
dSM23AB	2	23	1.8	4.2	0.4	1.2	1.1	200	Bi (4)	0.7	56	325
dSM23BB	2	23	1.8	4.2	0.7	2	2.2	480	Bi (4)	1.15	80	325
dSM23CB	2	23	1.8	4.2	0.7	2.5	2.5	800	Bi (4)	XXXXX	100	325
dSM34AB	2	34	1.8	7.0	0.28	1.8	4.2	1400	Bi (4)	XXXXX	80	325
dSM34BB	2	34	1.8	7.0	0.38	3.2	8	2700	Bi (4)	XXXXX	114	325
dSM34CB	2	34	1.8	7.0	0.45	5.2	12.0	4000	Bi (4)	XXXXX	150	325

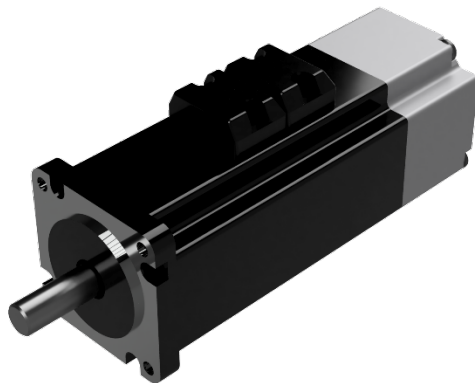


Figure 12 dSM17BB.



Figure 13 dSM17BB connectors.

- Closed loop-I/O Stepper Motors (With break additament)

Model	Phase	NEMA	Step Angle	Phase Current	Phase Resistance	Phase Inductance	Holding Torque	Rotor Inertia	Bi/Unipolar	Weight	Body Length	Encoder
			o	A/ø	Ω/ø	mH/ø	N.m	g.cm ²	# of Leads	kg	mm	P/R
dSM17BBIO	2	17	1.8	2.3	1	1.9	0.5	77	Bi (4)	0.4	51	325
dSM17CBIO	2	17	1.8	2.3	1.4	3.1	0.7	110	Bi (4)	0.55	67	325
dSM23ABIO	2	23	1.8	4.2	0.4	1.2	1.1	200	Bi (4)	0.7	56	325
dSM23BBIO	2	23	1.8	4.2	0.7	2	2.2	480	Bi (4)	1.15	80	325
dSM23CBIO	2	34	1.8	4.2	0.7	2.5	2.5	800	Bi (4)	XXXXX	100	325
dSM34ABIO	2	34	1.8	7.0	0.28	1.8	4.2	1400	Bi (4)	XXXXX	80	325
dSM34BBIO	2	34	1.8	7.0	0.38	3.2	8	2700	Bi (4)	XXXXX	114	325
dSM34CBIO	2	34	1.8	7.0	0.45	5.2	12.0	4000	Bi (4)	XXXXX	150	325

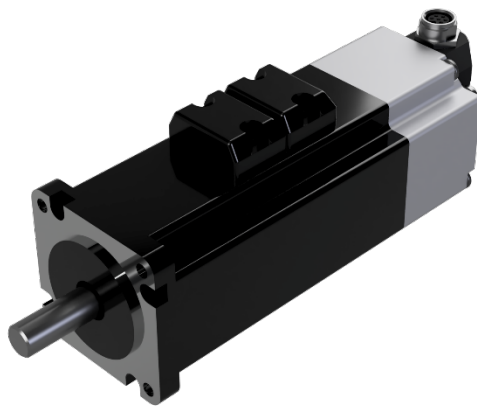


Figure 14 dSM17BBIO.



Figure 15 dSM17BBIO connectors.