ArmorStart® Distributed Motor Controller

Overview

280/281 ArmorStart Distributed Motor Controller

- On-Machine starting solution
- Full-voltage and reversing
- Horsepower range 0.5…10 Hp (0.37…7.5 kW)
- Robust IP67/NEMA Type 4 and NEMA Type 4X enclosure rating
- Modular plug and play design
- Quick disconnect connections for I/O, communications, motor, three-phase and control power
- Gland plate entry: conduit entrance or ArmorConnect power media
- Four inputs and two outputs (expandable with ArmorPoint)
- LED status indication
- DeviceNet communications
- DeviceLogix component technology
- Peer-to-peer communication (ZIP)
- Connectivity to ArmorPoint distributed I/O products
- ControlNet and EtherNet communications via ArmorPoint
- Factory installed options:
  - Hand/Off/Auto (HOA) keypad configuration
  - Safety monitor

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Standards Compliance

UL 508
CSA C22.2, No. 14
EN/IEC 60947-1
CE Marked per Low Voltage Directive 73/23/EEC and EMC Directive 89/336/EEC
CCC

Certifications

cULus (File No. E3125, Guides NLDX, NLDX7)

Description

The Bulletin 280/281 ArmorStart Distributed Motor Controller is an integrated, pre-engineered, starter for full-voltage and reversing applications. The ArmorStart offers a robust IP67/NEMA Type 4 enclosure design, which is suitable for water wash-down environments. The ArmorStart products are also offered with NEMA Type 4X rating, suitable for environment wash down with caustic chemicals used in the food and beverage industry. The wash-down rating is 1000 psi for the NEMA Type 4X rated devices. The modular plug-and-play design offers simplicity in wiring the installation. The quick disconnects for the I/O, communications, and motor connection reduce the wiring time and eliminate wiring errors. The ArmorStart offers as standard, four DC inputs and two relay outputs to be used with sensors and actuators respectively, for monitoring and controlling the application process. The ArmorStart's LED status indication and built-in diagnostics capabilities allows ease of maintenance and troubleshooting. The optional Hand/Off/Auto (HOA) keypad allows for local start/stop control at the ArmorStart Distributed Motor Controller.

The Bulletin 280/281 ArmorStart Distributed Motor Controller offers short-circuit protection per UL 508 and IEC 60947. The ArmorStart is rated for local-disconnect service by incorporating the Bulletin 140 Motor Protector as the local-disconnect, eliminating the need for additional components. The ArmorStart Distributed Motor Controllers are suitable for group motor installations.

Mode of Operation

Full-Voltage Start

This method is used in applications requiring across-the-line starting. Full in-rush current and locked-rotor torque are realized. The ArmorStart Bulletin 280 offers full-voltage starting, and the Bulletin 281 offers full-voltage starting for reversing applications.

Description of Features

Overload Protection

The Bulletin 280/281 ArmorStart Distributed Motor Controller incorporates, as standard, electronic motor overload protection. This overload protection is accomplished electronically with an I^2t algorithm. The ArmorStart's overload protection is programmable via the communication network providing the user with flexibility. The overload trip class can be selected for class 10, 15, or 20 protection. Ambient insensitivity is inherent in the electronic design of the overload.

Inputs

The inputs are single keyed (two inputs per connector), which are sourced from DeviceNet power (24V DC), with LED status indication.

Outputs

Two dual-key relay output connectors are supplied as standard. The outputs are sourced from the control voltage power, which can be either, 24V DC, 120V AC, or 240V AC with LED status indication.

Motor Cable

With every Bulletin 280/281 ArmorStart Distributed Motor Controller, a 3-meter unshielded 4-conductor cordset is provided with each unit as standard.

Gland Plate Entrance

The ArmorStart product offers two different methods for connecting incoming three-phase and control power to the device. One method offered is the traditional conduit entrance which provides a 3/4 and 1 in. conduit hole opening for wiring three-phase and control power. The second method offers connectivity to the ArmorConnect power media. Factory installed receptacles are provided for connectivity to both three-phase and control power media.

LED Status Indication

The LED Status Indication provides four status LEDs and a Reset button. The LEDs provide status indication for the following:

- **POWER LED**
  The LED is illuminated solid green when control power is present and with the proper polarity
- **RUN LED**
  This LED is illuminated solid green when a start command and control power are present
- **NETWORK LED**
  This bicolor (red/green) LEDs indicates the status of the communication link
- **FAULT LED**
  Indicates Controller Fault (trip) condition
- The "Reset Button" as a local trip reset.

Fault Diagnostics

Fault diagnostics capabilities built in the ArmorStart Distributed Motor Controller help you pinpoint a problem for easy troubleshooting and quick re-starting.

- Short Circuit
- Overload
- Phase Loss
- Control Power Loss
- Control Power Fuse Detection
- I/O Fault
- Output Power Fuse Detection
- Overtemperature
- Phase Imbalance
- DeviceNet Power Loss
- EEPROM Fault
- Hardware Fault

Network and Expandable I/O Capabilities

The Bulletin 280D/281D ArmorStart Distributed Motor Controller delivers enhanced control to access parameter settings and provides fault diagnostics and remote start/stop control. DeviceNet is the communication protocol provided with the ArmorStart, including DeviceLogix.

The Bulletin 280A/281A ArmorStart Distributed Motor Controller allows connectivity to the ArmorPoint backplane. The ArmorPoint I/O system can communicate using DeviceNet, ControlNet, or EtherNet communication protocols. In addition to the different network protocols, the ArmorPoint Distributed I/O products allow the I/O capability to be expanded beyond the standard two outputs. The two dual-key relay output connectors are supplied as standard. The outputs are sourced from the control voltage power of 24V DC, 120V AC, or 240V AC. LED status indication is also provided. When using the ArmorPoint, a maximum of two ArmorPoint Distributed Motor Controllers can be connected to the ArmorPoint Distributed I/O product.

Cat. No. Explanation

Examples given in this section are for reference purposes. This basic explanation should not be used for product selection; not all combinations will produce a valid catalog number.

280	D	–	F	12Z	–	10	C	–	CR	–	Option 1	–	Option 2
a	*b*		*c*	*d*		*e*	*f*		*g*		*h*		*i*

a

Bulletin Number	
280	Full Voltage Starter
281	Reversing Starter

b

Communications	
D	DeviceNet™
A	ArmorPoint

c

Enclosure Type	
F	Type 4 (IP67)
S	Type 4X

d

Contactor Size/Control Voltage		
24V DC	120V AC	240V AC
12Z	12D	12B
23Z	23D	23B

e

Short Circuit Protection (Motor Circuit Protector)	
10	10 A Rated Device
25	25 A Rated Device

f

Overload Selection Current Range	
A	0.24…1.2 A
B	0.5…2.5 A
C	1.1…5.5 A
D	3.2…16 A

h

Option 1	
3	Hand/Off/Auto Selector Keypad
3FR	Hand/Off/Auto Selector Keypad with Forward/Reverse

i

Option 2	
SM	Safety Monitor

g

Control and 3-Phase Power Connections/Motor Cable Connection (CR: Conduit/Round Media) or (RR: Round/Round Media)				
Code		Description		
		Control Power	3-Phase Power	Motor Cable
CR	blank	Conduit Entrance	Conduit Entrance	3 m, unshielded cordset male 90°
CR	W ∗	Conduit Entrance	Conduit Entrance	No cable
RR	blank	Round Media (Male Receptacle)	Round Media (Male Receptacle)	3 m, unshielded cordset male 90°
RR	W ∗	Round Media (Male Receptacle)	Round Media (Male Receptacle)	No cable

∗ See Accessories on page 6 for extended motor cable lengths.

Product Selection

Full-voltage starters — IP67/NEMA Type 4 with conduit entrance and DeviceNet communications, Up to 575V AC

Current Rating [A]	kW		Hp				24V DC Control Voltage	120V AC Control Voltage	240V AC Control Voltage
	230V AC 50 Hz	400V AC 50 Hz	200V AC 60 Hz	230V AC 60 Hz	460V AC 60 Hz	575V AC 60 Hz	Cat. No.	Cat. No.	Cat. No.
0.24…1.2	0.18	0.37	—	—	0.5	0.5	280D-F12Z-10A-CR	280D-F12D-10A-CR	280D-F12B-10A-CR
0.5…2.5	0.37	0.75	0.5	0.5	1	1.5	280D-F12Z-10B-CR	280D-F12D-10B-CR	280D-F12B-10B-CR
1.1…5.5	1.1	2.2	1	1	3	3	280D-F12Z-10C-CR	280D-F12D-10C-CR	280D-F12B-10C-CR
3.2…16	4	7.5	3	5	10	10	280D-F23Z-25D-CR	280D-F23D-25D-CR	280D-F23B-25D-CR

Full-voltage Starters — IP67/NEMA Type 4 with conduit entrance and ArmorPoint communications, Up to 575V AC

Current Rating [A]	kW		Hp				24V DC Control Voltage	120V AC Control Voltage	240V AC Control Voltage
	230V AC 50 Hz	400V AC 50 Hz	200V AC 60 Hz	230V AC 60 Hz	460V AC 60 Hz	575V AC 60 Hz	Cat. No.	Cat. No.	Cat. No.
0.24…1.2	0.18	0.37	—	—	0.5	0.5	280A-F12Z-10A-CR	280A-F12D-10A-CR	280A-F12B-10A-CR
0.5…2.5	0.37	0.75	0.5	0.5	1	1.5	280A-F12Z-10B-CR	280A-F12D-10B-CR	280A-F12B-10B-CR
1.1…5.5	1.1	2.2	1	1	3	3	280A-F12Z-10C-CR	280A-F12D-10C-CR	280A-F12B-10C-CR
3.2…16	4	7.5	3	5	10	10	280A-F23Z-25D-CR	280A-F23D-25D-CR	280A-F23B-25D-CR

Options – Factory Installed

Description				Cat. No. Modification
	Hand/Off/Auto Selector Keypad			-3
	Hand/Off/Auto Selector Keypad with Forward/Reverse Function			-3FR
	Safety Monitor			-SM
	Supplied without motor cable		**Enclosure Rating**	-CRW
			IP67	
			NEMA Type 4X	
	Connectivity to ArmorConnect Power Media supplied without motor cable	**Short Circuit Protection Rating**	**Enclosure Rating**	-RRW
		10 A	IP67	
			NEMA Type 4X	
		25 A	IP67	
			NEMA Type 4X	

Accessories

Sealing Caps

Description	For Use With	Cat. No.
Plastic Sealing Cap (M12)✶	Input I/O Connection	1485A-M12
AC Micro Aluminum Sealing Cap - External✶	Output I/O Connection	889A-RMCAP
Stainless Steel Sealing Cap (M12)❄	Input I/O Connection	1485AS-C3
Stainless Steel Sealing Cap (M12)❄	Output I/O Connection	889AS-RMCAP

✶ To achieve IP67 rating, sealing caps must be installed on all unused I/O connections.
❄ To achieve IP69K/NEMA 4X rating, sealing caps must be installed on all unused I/O connections.

Cables

Description	Cable Rating	Length m (ft)	Cat. No.
Extended Motor Cable Cordsets			
90° M22 Motor Cordset	IP67/NEMA Type 4	6 (19.6)	280-MTR22-M6
		14 (45.9)	280-MTR22-M14
90° M35 Motor Cordset	IP67/NEMA Type 4	6 (19.6)	280-MTR35-M6
		14 (45.9)	280-MTR35-M14
90° M22 Motor Cordset	IP69K	6 (19.6)	280S-MTR22-M6
		14 (45.9)	280S-MTR22-M14
90° M35 Motor Cordset	IP69K	6 (19.6)	280S-MTR35-M6
		14 (45.9)	280S-MTR35-M14
Motor Cable Patchcords			
90° Male/Straight Female M22	IP67/NEMA Type 4	1 (3.3)	280-MTR22-M1D
		3 (9.8)	280-MTR22-M3D
90° Male/Straight Female M35	IP67/NEMA Type 4	1 (3.3)	280-MTR35-M1D
		3 (9.8)	280-MTR35-M3D
90° Male/Straight Female M22	IP69K	1 (3.3)	280S-MTR22-M1D
		3 (9.8)	280S-MTR22-M3D
90° Male/Straight Female M35	IP69K	1 (3.3)	280S-MTR35-M1D
		3 (9.8)	280S-MTR35-M3D

ArmorPoint® Media §

Description	Length m (ft)	Cat. No.
ArmorPoint Bus Extension Cable including Terminating Resistor	1 (3.3)	280A-EXT1
Extension Cable to connect two ArmorStart Distributed Motor Controllers to ArmorPoint communication protocol	1 (3.3)	280A-EXTCABLE

§ ArmorPoint media is only available with an IP67/NEMA Type 4 rating.

DeviceNet Media ♣

Description		Length m (ft)	Cat. No.
			Sealed
	KwikLink pigtail drops are Insulation Displacement Connector (IDC) with integral Class 1 round cables for interfacing devices or power supplies to flat cable.	1 (3.3)	1485P-P1E4-B1-N5
		2 (6.5)	1485P-P1E4-B2-N5
		3 (9.8)	1485P-P1E4-B3-N5
		6 (19.8)	1485P-P1E4-B6-N5
	DeviceNet Mini- T-Port Tap	Left Keyway	1485P-P1N5-MN5KM
		Right Keyway	1485P-P1N5-MN5NF

Description		Connector	Cat. No.
	Grey PVC Thin Cable	Mini Straight Female Mini Straight Male	1485G-P❄N5-M5
		Mini Straight Female Mini Right Angle Male	1485G-P❄W5-N5
		Mini Right Angle Female Mini Straight Male	1485G-P❄M5-Z5
		Mini Right Angle Female Mini Straight Male	1485G-P❄W5-Z5
	Thick Cable	Mini Straight Female Mini Straight Male	1485C-P‡N5-M5
		Mini Straight Female Mini Right Angle Male	1485C-P‡W5-N5
		Mini Right Angle Female Mini Straight Male	1485C-P‡M5-Z5
		Mini Right Angle Female Mini Straight Male	1485C-P‡W5-Z5

Description		Length m (ft)	Cat. No.
	DeviceNet Configuration Terminal Used to interface with objects on a DeviceNet network, includes 1 m communications cable	1 m (3.3)	193-DNCT
	Communication cable, color-coded bare leads	1 m (3.3)	193-CB1
	Communication cable, microconnector (male)	1 m (3.3)	193-CM1
	Panel Mount Adapter/Door Mount Bezel Kit	—	193-DNCT-BZ1

♣ See publication M116-CA001_-EN-P for complete cable selection information.
❄ Replace symbol with desired length in meters (Example: **1485G-P1N5-M5** for a 1 m cable). Standard cable lengths: 1, 2, 3, 4, 5, and 6 m.
‡ Replace symbol with desired length in meters (Example: **1485C-P1N5-M5** for a 1 m cable). Standard cable lengths: 1, 2, 3, 4, 5, 6, 8, 10, 12, 18, 24, and 30 m.

Sensor Media ⌘

Description		ArmorStart I/O Connection	Pin Count	Connector	Cat. No.
	DC Micro Patchcord	Input	5-pin	Straight Female Straight Male	889D-F4ACDM-➤
				Straight Female Right Angle Male	889D-F4ACDE-➤
	DC Micro V-Cable	Input	5-pin	Straight Female	879D-F4ACDM-➤
				Right Angle Male	879D-R4ACM-➤
	AC Micro Patchcord	Output	3-pin	Straight Female Straight Male	889R-F3AERM-➤
				Straight Female Right Angle Male	889R-F3AERE-➤

⌘ See publication M116-CA001A-EN-P for complete cable selection information.
➤ Replace symbol with desired length in meters (Example: **889D-F4ACDM-1** for a 1 m cable). Standard cable lengths: 1, 2, 5, and 10 m.
NOTE: Stainless steel versions may be ordered by adding an **S** to the cat. no. (Example: **889DS-F4ACDM-1**)