



The Bulletin 160 is a microprocessor controlled adjustable frequency drive designed for reliable control of three-phase induction motors. The drive produces a three-phase, PWM, adjustable frequency output to vary the motor speed. Output voltage is a function of output frequency and is adjustable to meet motor parameters so that optimum motor performance can be obtained.

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Conformity to Standards

The Bulletin 160 conforms to the following standards:

Conformity to:	Standard Product	Packaged Product
UL Listed (UL 508C)	✓	✓ ②
CSA Certified (C-UL)	✓ CSA 22.2	✓ ②
CE Approved ① EMC Directive Low Voltage Directive	✓ EN61800-3, EN50081-1, EN50082-2 EN50178, EN60204-1	✓ EN61800-3 ② EN60204-1
VDE Approved	✓	
C-Tick	✓	✓ AS/NZS2064.1 ②

① External components and proper guidelines must be followed. Refer to the 160 User Manual, publication 0160-5.15 for details.

② Standards apply to 160 Standard Packaged Drives only.

Bulletin 160 Standard Drives

This program includes standard Bulletin 160 drives rated from 0.37-4.0 kW (0.5-5.0 HP). Bulletin 160 drives are available in IP20 (NEMA Type 00) and chassis mount (external heatsink) designs. The chassis mount product meets IP40/54/65 (NEMA 1/4/12/4X) ratings when installed in an enclosure of like rating. Chassis mount Bulletin 160 drives rated from 0.37-2.2 kW (0.5-3.0 HP) are available.

Catalog Number Description

160	–	AA02		N		SF1		P1
Bulletin Number		Drive Rating (must be specified)		Enclosure Rating (must be specified)		Control Method (must be specified)		Programmer (Optional)

Product Selection

160 Drives

Mounting	Input Voltage Rating	Drive Ratings			Analog Signal Follower Model	Preset Speed Model
		kW	HP	Output Current Rating	Catalog Number ^①	Catalog Number ^①
IP 20 Open Style	200-240V 50/60 Hz 1 Phase	0.37	1/2	2.3A	160S - AA02NSF1	160S - AA02NPS1
		0.55	3/4	3.0A	160S - AA03NSF1	160S - AA03NPS1
		0.75	1	4.5A	160S - AA04NSF1	160S - AA04NPS1
		1.5	2	8.0A	160S - AA08NSF1	160S - AA08NPS1
	200-240V 50/60 Hz 3 Phase	0.37	1/2	2.3A	160 - AA02NSF1	160 - AA02NPS1
		0.55	3/4	3.0A	160 - AA03NSF1	160 - AA03NPS1
		0.75	1	4.5A	160 - AA04NSF1	160 - AA04NPS1
		1.5	2	8.0A	160 - AA08NSF1	160 - AA08NPS1
		2.2	3	12.0A	160 - AA12NSF1	160 - AA12NPS1
		4.0	5	18.0A	160 - AA18NSF1	160 - AA18NPS1
	380-460V 50/60 Hz 3 Phase	0.37	1/2	1.2A	160 - BA01NSF1	160 - BA01NPS1
		0.55	3/4	1.7A	160 - BA02NSF1	160 - BA02NPS1
		0.75	1	2.3A	160 - BA03NSF1	160 - BA03NPS1
		1.5	2	4.0A	160 - BA04NSF1	160 - BA04NPS1
		2.2	3	6.0A	160 - BA06NSF1	160 - BA06NPS1
		4.0	5	10.5A	160 - BA10NSF1	160 - BA10NPS1

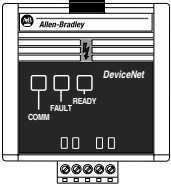
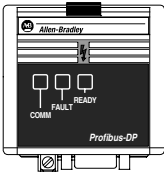
Mounting	Input Voltage Rating	Drive Ratings			Analog Signal Follower Model	Preset Speed Model
		kW	HP	Output Current Rating	Catalog Number ^①	Catalog Number ^①
IP 20 Chassis Mount ^②	200-240V 50/60 Hz 1 Phase	0.37	1/2	2.3A	160S - AA02PSF1	160S - AA02PPS1
		0.55	3/4	3.0A	160S - AA03PSF1	160S - AA03PPS1
		0.75	1	4.5A	160S - AA04PSF1	160S - AA04PPS1
		1.5	2	8.0A	160S - AA08PSF1	160S - AA08PPS1
	200-240V 50/60 Hz 3 Phase	0.37	1/2	2.3A	160 - AA02PSF1	160 - AA02PPS1
		0.55	3/4	3.0A	160 - AA03PSF1	160 - AA03PPS1
		0.75	1	4.5A	160 - AA04PSF1	160 - AA04PPS1
		1.5	2	8.0A	160 - AA08PSF1	160 - AA08PPS1
		2.2	3	12.0A	160 - AA12PSF1	160 - AA12PPS1
		4.0	5	18.0A	160 - AA18PSF1	160 - AA18PPS1
	380-460V 50/60 Hz 3 Phase	0.37	1/2	1.2A	160 - BA01PSF1	160 - BA01PPS1
		0.55	3/4	1.7A	160 - BA02PSF1	160 - BA02PPS1
		0.75	1	2.3A	160 - BA03PSF1	160 - BA03PPS1
		1.5	2	4.0A	160 - BA04PSF1	160 - BA04PPS1
		2.2	3	6.0A	160 - BA06PSF1	160 - BA06PPS1
		4.0	5	10.5A	160 - BA10PSF1	160 - BA10PPS1

^① The Bulletin 160 comes standard with a Ready/Fault indication panel. To order a drive with a Program Keypad Module installed, add suffix P1 to the catalog number.
Example: Catalog Number 160-AA02NSF1 becomes 160-AA02NSF1P1. See Table.

Description	Code
Program Keypad Module, Factory Installed	P1

^② Meets IP40/54/65 (NEMA 1/12/4/4X) when installed in an enclosure of like rating.

User Installed Options

	Program Keypad Module 160-P1
	Remote Keypad Module 160-P2
	CopyCat Keypad Module 160-P3
	Remote Programming Adapter 160-RPA
	DeviceNet Communication Module 160-DN2
	RS-232 Serial Communication Module 160-RS1
	PROFIBUS DP Communication Module 160-PD1
	Interbus Communication Module 160-IB1

Operator Interface & Communication Devices

Accessory	Catalog No.
Ready/Fault Indicating Panel Indicates if the drive is READY for operation or if a FAULT condition has occurred. This is standard if P1 is not factory installed.	160-B1
Program Keypad Module Module to program and/or monitor drive parameters as well as provide local keypad control (start, stop and reverse functions).	160-P1
Remote Keypad Module Module for remote mounting. Has program, monitor and operator interface capability.	160-P2 ❶
CopyCat Keypad Module Hand held module with upload/download capability to program, monitor and control drive.	160-P3 ❶
Remote Programming Adapter Interface connection for the Remote and CopyCat Keypad modules.	160-RPA
Cables Connects the Remote Programming Adapter to either the Remote or CopyCat Keypad Module. - 1 meter cable, non-locking each end - 1 meter cable, non-locking each end, right angle (for minimal depth) - 3 meter cable, locking each end - 5 meter cable, locking each end	160-C10 160-C10R 160-C30 160-C50
24V DC Interface Module 24V DC control interface. Bulletin 160 Series C drives must use a Series B, or later, 24V DC Interface module.	160-DM-SF1 (Analog model) 160-DM-PS1 (Preset model)
Communication Modules Allow control and monitoring of parameters via the networks listed below. These modules add 21.4 mm (0.85 in.) to the overall depth of the drive. - DeviceNet™ - RS-232 Serial Communication - PROFIBUS™ DP - Interbus™	160-DN2 ❷ 160-RS1 160-PD1 160-IB1
DriveExplorer™ Software Windows based software package that provides an intuitive means for monitoring or configuring Allen-Bradley drives and communication adapters (160-RS1 only).	See publication 9303-PL002... for information and pricing.
Common Mode Chokes ❸ Open Style, used to enhance noise immunity. 1A - used with communications and signal cables 9A - (with terminal block) used with all 160 drives	1321-M001 1321-M009

❶ Requires Remote Programming Adaptor (160-RPA) and cable (160-Cxx) to be operational.

❷ Includes 10 pin DeviceNet Connector.

❸ Note the discount schedule difference between 160 and 1321 products. Use Discount Schedule 09 for 1321 products.

User Installed Accessories – All Drive Ratings

Input Voltage Rating	Drive Ratings		Dynamic Brake Modules	Line Reactors Open Style ②	Fan Replacement Kits
	kW	HP	Catalog No.	Catalog No. ②	Series C Drive Cat. No.
200-240V 50/60 Hz 1 Phase	0.37	1/2	—	—	—
	0.55	3/4	—	—	—
	0.75	1	160 - BMA1	—	160-FRK2
	1.5	2	160 - BMA2	—	160-FRK3
200-240V 50/60 Hz 3 Phase	0.37	1/2	—	1321-3R4-B	—
	0.55	3/4	—	1321-3R4-A	—
	0.75	1	160 - BMA1	1321-3R4-A	160-FRK2
	1.5	2	160 - BMA2	1321-3R8-A	160-FRK2
	2.2	3	160 - BMA2	1321-3R12-A	160-FRK2
	4.0	5	160 - BMA2 ❶	1321-3R18-A	160-FRK3
380-460V 50/60 Hz 3 Phase	0.37	1/2	—	1321-3R2-B	—
	0.55	3/4	—	1321-3R2-A	—
	0.75	1	160 - BMB1	1321-3R2-A	160-FRK2
	1.5	2	160 - BMB2	1321-3R4-B	160-FRK2
	2.2	3	160 - BMB2	1321-3R8-B	160-FRK2
	4.0	5	160 - BMB2 ❶	1321-3R8-B	160-FRK3

Input Voltage Rating	Drive Ratings		Line Filters		Capacitor Modules
	kW	HP	Class A Only Catalog No.	Class A & B Catalog No.	Catalog No.
200-240V 50/60 Hz 1 Phase	0.37	1/2	160S-LFA1	160S-RFA-9-A	160-CMA1
	0.55	3/4	160S-LFA1	160S-RFA-9-A	160-CMA1
	0.75	1	160S-LFA1	160S-RFA-9-A	160-CMA1
	1.5	2	160S-LFA1 ❸	160S-RFA-16-B ❸	160-CMA1
200-240V 50/60 Hz 3 Phase	0.37	1/2	160-LFA2	160-RFB-5-A	160-CMA1
	0.55	3/4	160-LFA2	160-RFB-5-A	160-CMA1
	0.75	1	160-LFA2	160-RFB-5-A	160-CMA1
	1.5	2	160-LFA2	160-RFB-14-A	160-CMA1
	2.2	3	160-LFA2	160-RFB-14-A	160-CMA1
	4.0	5	—	160-RFA-22-B ❹	160-CMA1
380-460V 50/60 Hz 3 Phase ❸ ❹	0.37	1/2	160-LFB1	160-RFB-5-A	160-CMB1
	0.55	3/4	160-LFB1	160-RFB-5-A	160-CMB1
	0.75	1	160-LFB1	160-RFB-5-A	160-CMB1
	1.5	2	160-LFB1	160-RFB-5-A	160-CMB1
	2.2	3	160-LFB1	160-RFB-14-A	160-CMB1
	4.0	5	—	160-RFB-14-B ❺	160-CMB1

- ❶ Must order two for a 4.0 kW (5 HP) application. The two dynamic brake modules must be wired in parallel.
- ❷ Use Discount Schedule 09 - Catalog numbers listed are for 3% impedance open style units. NEMA 1 and 5% impedance reactor types are also available, refer to Publication 1321-2.0 for detailed information. Use the line reactor for rated application to attain proper impedance.
- ❸ Catalog No. 1204-RWR-09-B.
- ❹ Reflected Wave Reduction Modules (1204-RWR-09-B) may be used at a 10.5 Amp current rating providing the drive to motor cable length is less than 122 meters (400 feet).
- ❺ Must mount separately when used with Series C drives.

STANDARD PACKAGED DRIVES

Bulletin 160 Standard Packaged Drives

The Standard Packaged Drive Program allows users to create drive packages based on their specific needs. A complete drive package may be specified by assembling a single catalog number string that includes a base drive, enclosure and all required options.

Ordering Instructions

- Select basic Catalog Number based on application requirements (i.e. Voltage, Horsepower, Control Model and Enclosure Ratings). For example: a 200-240V three phase, 0.37 kW (1/2 HP), analog signal follower model and an IP66 (NEMA 4/12) enclosure is: **160-AA02SF1-AF**
- Select Enclosure Options and follow the Option Rules. For example: the catalog number with a fused disconnect switch with Start-Stop pushbuttons is: 160-AA02SF1 -AF - **DS-D17**

Compliance certifications

See [page 1](#) for compliance information. When the “EMC” option is selected, the product will ship with an RFI filter. If the “EMC” option is not selected, reference the *Bulletin 160 Series C User Manual* for proper installation instructions.

Custom Drives Program

Drive packages that cannot be ordered via a catalog number can be customized to meet user requirements for specific options such as special enclosure sizes and colors, terminal blocks, wire type, etc. Contact factory.

Catalog Number Description

160	-	AA02SF1	-	AF	-	DS	-	D17
Bulletin Number		Drive Rating (must be specified)		Enclosure Rating (must be specified)		Options (as required)		

Product Selection

Input Voltage Rating	Drive Ratings			IP 66 (NEMA 4/12)		IP66 (NEMA 4X - 304 Stainless Steel)	
				Analog Signal Follower Model	Preset Speed Model	Analog Signal Follower Model	Preset Speed Model
	kW	HP	Output Current Rating	Catalog No.	Catalog No.	Catalog No.	Catalog No.
200-240V 50/60 Hz 1 Phase	0.37	0.5	2.3A	160S - AA02SF1-AF	160S - AA02PS1-AF	160S-AA02SF1-AS	160S - AA02PS1-AS
	0.55	0.75	3.0A	160S - AA03SF1-AF	160S - AA03PS1-AF	160S-AA03SF1-AS	160S - AA03PS1-AS
	0.75	1	4.5A	160S - AA04SF1-AF	160S - AA04PS1-AF	160S-AA04SF1-AS	160S - AA04PS1-AS
	1.5	2	8.0A	160S - AA08SF1-AF	160S - AA08PS1-AF	160S-AA08SF1-AS	160S - AA08PS1-AS
200-240V 50/60 Hz 3 Phase	0.37	0.5	2.3A	160 - AA02SF1-AF	160 - AA02PS1-AF	160-AA02SF1-AS	160 - AA02PS1-AS
	0.55	0.75	3.0A	160 - AA03SF1-AF	160 - AA03PS1-AF	160-AA03SF1-AS	160 - AA03PS1-AS
	0.75	1	4.5A	160 - AA04SF1-AF	160 - AA04PS1-AF	160-AA04SF1-AS	160 - AA04PS1-AS
	1.5	2	8.0A	160 - AA08SF1-AF	160 - AA08PS1-AF	160-AA08SF1-AS	160 - AA08PS1-AS
	2.20	3	12.0A	160 - AA12SF1-AF	160 - AA12PS1-AF	160-AA12SF1-AS	160 - AA12PS1-AS
	4.0	5	18.0A	160 - AA18SF1-AF	160 - AA18PS1-AF	160-AA18SF1-AS	160 - AA18PS1-AS
380-460V 50/60 Hz 3 Phase	0.37	0.5	1.2A	160 - BA01SF1-AF	160 - BA01PS1-AF	160-BA01SF1-AS	160 - BA01PS1-AS
	0.55	0.75	1.7A	160 - BA02SF1-AF	160 - BA02PS1-AF	160-BA02SF1-AS	160 - BA02PS1-AS
	0.75	1	2.3A	160 - BA03SF1-AF	160 - BA03PS1-AF	160-BA03SF1-AS	160 - BA03PS1-AS
	1.5	2	4.0A	160 - BA04SF1-AF	160 - BA04PS1-AF	160-BA04SF1-AS	160 - BA04PS1-AS
	2.2	3	6.0A	160 - BA06SF1-AF	160 - BA06PS1-AF	160-BA06SF1-AS	160 - BA06PS1-AS
	4.0	5	10.5A	160 - BA10SF1-AF	160 - BA10PS1-AF	160-BA10SF1-AS	160 - BA10PS1-AS

STANDARD PACKAGED DRIVES

Factory Installed Enclosure Options

Description	Option Code	Cannot be used with
Operator Interface:		
DeviceNet Module (Drive Mounted) ❶	- DN2C	D17, P1C, P2C, Ready/Fault, RPAC, RS1C, PD1C, IB1C
RS-232 Serial Communication Module (Drive Mounted)	- RS1C	D17, DN2C, P1C, P2C, Ready/Fault, RPAC, PD1C, IB1C, MX14
Profibus Module (Drive Mounted)	- PD1C	DN2C, PIC, RS1C, Ready/Fault, RPAC, P2C, D17, IB1C, MX14
Interbus Module (Drive Mounted)	- IB1C	PIC, RS1C, Ready/Fault, RPAC, P2C, D17, PD1C, DN2C, MX14
DeviceNet I/O Relay - 24VDC input/relay output w/5 point DeviceNet connector.	- DNRC ❷	EMC
Ready/Fault Panel	- ❷	DN2C, P1C, P2C, RPAC, RS1C, MX14, PD1C, IB1C
Program Keypad Module (Drive Mounted)	- P1C	D17, DN2C, P2C, Ready/Fault, RPAC, RS1C, MX14, PD1C, IB1C
Remote Programming Adapter	- RPAC	D17, DN2C, P1C, P2C, Ready/Fault, RS1C, MX14, PD1C, IB1C
Remote Keypad Module (Door Mounted)	- P2C ❸❹	D17, D32, D33, D61, DN2C, Ready/Fault, P1C, RPAC, RS1C, MX14, PD1C, IB1C
Fused Disconnect Switch (Class J Fuses)	- DS	
Cover Mounted Devices:		
“Hand -Off-Auto” Selector Switch	- D13	D17, D33, MX12, MX19
“Start-Stop” Push buttons	- D17	D13, D33, DN2C, MX12, MX19, P1C, P2C, RPAC, RS1C
“Forward/Reverse” Selector Switch	- D32 ❺	MX12, MX19
“Local/Remote” Selector Switch	- D33	D13, D17, MX12, MX19
White “Drive Run” Pilot Light ❻	- D35	D36, MX12, MX19
Red “Drive Fault” Pilot Light ❼	- D36	D35, MX12, MX19
“Speed” Potentiometer	- D61	MX12, MX19, All Preset Speed Models
“Local/Remote” & “Local Control Off/Run Forward” 800T Selector Switches	- MX12	AS, D13, D17, D32, D33, D35, D36, D61, MX19
“Local/Off/Remote” 800T Selector Switch with One N.O. Interposing Relay	- MX19	AS, D13, D17, D32, D33, D35, D36, D61, MX12, MX14
Control Interface Cards:		
24V DC Interface Card for Analog Model	- DMSF1C	DMPS1C, LTN120, All Preset Speed Models
24V DC Interface Card for Preset Speed Model	- DMPS1C	DMSF1C, LTN120, All Analog Models
120V AC Interface Card for Analog and Preset Speed Models	- LTN120 ❽	DMPS1C, DMSF1C
DeviceNet Enclosure Mounted Connector Options:		
Nema 4/12 5 pin connector side mounted ❺	- DN5C1 ❻	DN5C2, DNBC1, DNBC2, P1C, P2C, RPAC, RS1C, STD Ready/Fault
Nema 4x 5 pin connector side mounted ❺	- DN5C2 ❻	DN5C1, DNBC1, DNBC2, P1C, P2C, RPAC, RS1C, STD Ready/Fault
Nema 4/12 5 pin connector bottom mounted ❺	- DNBC1 ❻	DN5C1, DN5C2, DNBC2, P1C, P2C, RPAC, RS1C, STD Ready/Fault
Nema 4x 5 pin connector bottom mounted ❺	- DNBC2 ❻	DN5C1, DN5C2, DNBC1, P1C, P2C, RPAC, RS1C, STD Ready/Fault
Electro Magnetic Compatibility	- EMC ❷	LTN120, DNRC
Motor Brake Option:		
Motor Brake Contactor and Surge Suppressor (100M cont. 24V powered off DeviceNet Option), DN2C	- MX14 ❹❷	D35, D36, MX19, P1C, P2C, RPAC, RS1C, Ready/Fault, PD1C, IB1C

❶ Includes 10 pin DeviceNet Connector.

❷ If a (P1C), (DN2C), (RS1C), (RPAC) or (P2C) is not specified, the drive is supplied with a factory installed “Ready/Fault” indicating panel as standard.

❸ 120V AC Separate Control Power Required.

❹ Remote Keypad Module option includes the RPA and cable.

❺ 5 pin DeviceNet Connectors are Brad Harrison type. See dimensions/locations on [page 8](#).

❻ DN2C option must be selected. See [page 8](#) for connector locations.

❼ Enclosure dimensions for 1/2 - 2 HP are 8.44"W x 17"H x 9.15"D with or w/o disconnect and for 3 HP 9.61"W x 16.5"H x 9.46"D with or w/o disconnect.

❽ Option is not CE/C-Tick.

❹ When catalog string contains a communication module, D32 must be used with D33 or D13 except with option P2C. When used with option P2C, must be used with D13.

Option Rules

Option	Description
Maximum Number of Cover Devices	0.37-1.5 kW (0.5-2 HP) without a disconnect or Remote Keypad Module or MX14 or EMC or DNRC is 4. 2.2-4.0 kW (3-5 HP) w/o a disconnect or Remote Keypad Module and all drives with a disconnect, MX14 or DNRC or EMC is 5. 0.37-4.0 kW (0.5-5 HP) with the Remote Keypad Module is 3. i.e. Start-Stop (D17) = 2 Cover Devices Forward-Reverse (D32) = 1 Cover Device White Run Pilot Light (D35) = 1 Cover Device = 4 Total
Factory Installed Enclosure Option Catalog Configuration	When ordering, build the catalog string in the following manner: Bulletin number, drive rating, control model, enclosure type and options. Note: Options are to be configured in alpha-numeric sequence.

STANDARD PACKAGED DRIVES

Approximate Dimensions

Figure 1

160 NEMA Type 4/12 & 4x Stainless Steel Enclosures

0.37-0.75 kW (0.5-1 HP) Single-Phase, 200-240V AC

(without DS, P2C, MX14 or EMC)

0.37-1.5 kW (0.5-2 HP) Three-Phase, 200-240/380-460V AC

(without DS, P2C, MX14 or EMC)

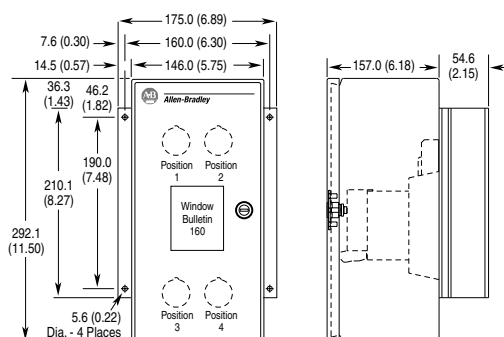


Figure 2

160 NEMA Type 4/12 & 4x Stainless Steel Enclosures

0.37-0.75 kW (0.5-1 HP) Single-Phase, 200-240V AC

(with DS, P2C, MX14 or EMC)

0.37-1.5 kW (0.5-2 HP) Three-Phase, 200-240/380-460V AC

(with DS, P2C, MX14 or EMC)

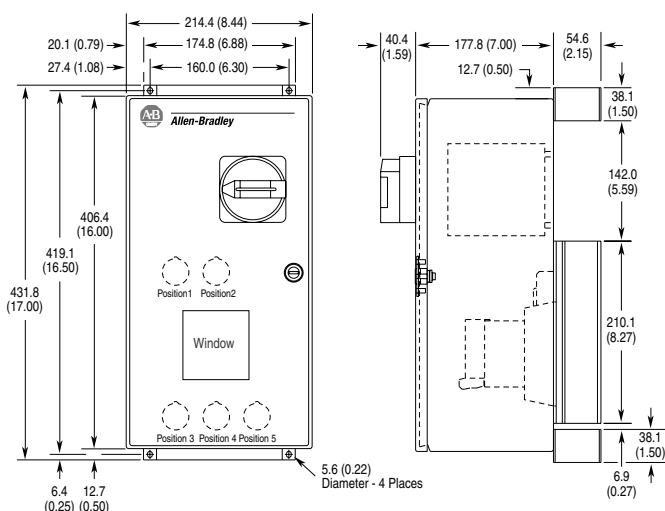


Figure 3

160 NEMA Type 4/12 & 4x Stainless Steel Enclosures

2.2 kW (3 HP) Three-Phase, 200-240/380-460V AC

(with/without DS or with P2C, MX14 or EMC)

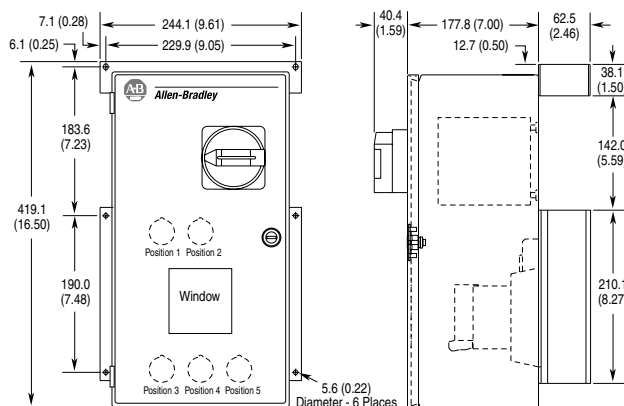


Figure 4

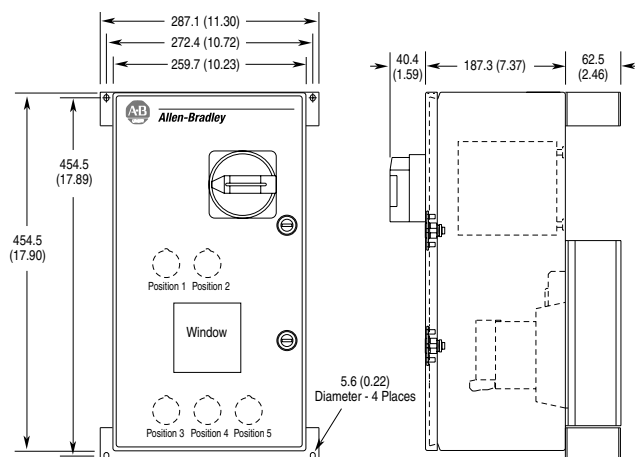
160 NEMA Type 4/12 & 4x Stainless Steel Enclosures

1.5 kW (2 HP) Single-Phase, 200-240V AC

(with DS, P2C, MX14 or EMC)

4 kW (5 HP) Three-Phase, 200-240/380-460V AC

(with DS, P2C, MX14 or EMC)

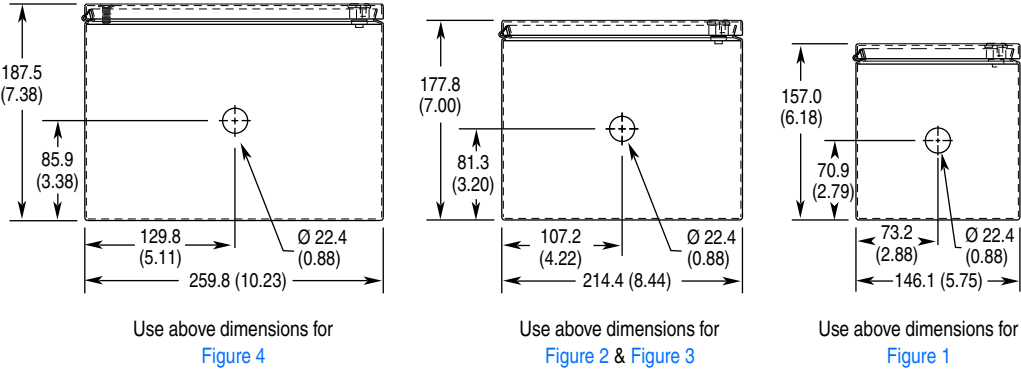


STANDARD PACKAGED DRIVES

Figure 5 – DeviceNet Connector Option Locations

Dimensions are in millimeters (inches) and are not to be used for manufacturing purposes

DNBC1 and DNBC2



DNSC1 and DNSC2

