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We drive industry

TMdrive-DC

Product Application Guide

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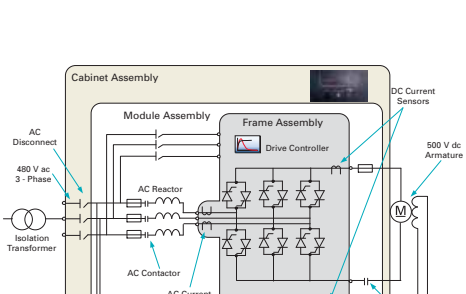
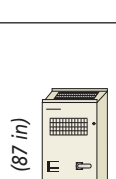
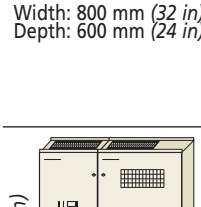
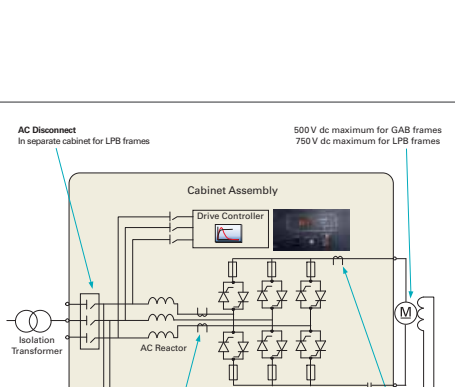
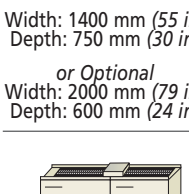
A Wide Variety of Frames and Form Factors To Meet Your Application

	Frame	Power at 300 V kW (hp)	Power at 500 V kW (hp)	Power at 600 V kW (hp)	Power at 750 V kW (hp)	Armature A dc @ 150% for 60s	Field A dc	Typical Topology
 2000 mm (79 in) Width: 800 mm (32 in) Depth: 600 mm (24 in)	GAA-140	42 (56)	—	—	—	140	15	
	GAB-140	—	70 (94)	—	—			
	GAC-140	—	—	84 (113)	—			
	GAA-300	90 (121)	—	—	—	300		
	GAB-300	—	150 (200)	—	—			
	GAC-300	—	—	180 (241)	—			
 2200 mm (87 in) Width: 800 mm (32 in) Depth: 600 mm (24 in)	GAA-450	135 (181)	—	—	—	450	25	
	GAB-450	—	235 (315)	—	—			
	GAC-450	—	—	270 (362)	—			
	GAA-700	210 (282)	—	—	—	700		
	GAB-700	—	350 (470)	—	—			
	GAC-700	—	—	420 (563)	—			
 2200 mm (87 in) Width: 1400 mm (55 in) Depth: 750 mm (30 in) *or Optional* Width: 2000 mm (79 in) Depth: 600 mm (24 in)	GAB-1250	—	625 (838)	—	—	1250	40	
	GAC-1250	—	—	750 (1005)	—			
	GAB-2000	—	1000 (1340)	—	—	2000		
	GAC-2000	—		1200 (1608)	—			
 2375 mm (94 in) Width: 1400 mm (55 in) Depth: 650 mm (26 in)	LPB-1440	—	720 (965)	864 (1158)	1080 (1447)	1440		
	LPB-2000	—	1200 (1608)	1440 (1930)	1800 (2412)	2400		

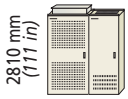
Common Notes:
1. GA* and LPB frames available in 2-quadrant power bridge configuration.
2. Multi-motor configuration is an option.
3. The specified current and power ratings are continuous, to which an overload of 150% for 60 seconds can be applied at frame inlet temperatures of 0-40˚C, and an altitude below 1000 meters above sea level.
4. Cabinet paint color is RAL7032

LPB Notes:
1. LPC and LPD notes 1, 3, 5, 6, and 9 on page 3 apply to the LPB frames.
2. Armature AC disconnect in separate cabinet for LPB frames.
3. Control power is a separate 3-phase 220 Vac 50/60 Hz feed.
4. Cabinet dimensions in illustration assume bottom cable entry and no AC disconnect.

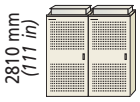
GA* Notes:
1. Frames 140-700 can be configured/ordered as a frame, module, or cabinet level assembly. Frames 1250-2000 are configured/ordered at the cabinet level assembly.
2. Display or optional keypad is remote mounted from frame or module assembly.
3. Field control can support up to 4 field supplies; 1 included and up to 3 optional.
4. Internal field supply can be fed externally as an option. GAC requires 480 VAC or less external supply for field exciter.
5. Internal power supply can be fed externally as an option.
6. Mechanical dimensions for the cabinets are typical; will vary with the application.
7. Air is pulled through the filters at the bottom of the doors and forced out the vents at the top of the doors.

Frame	Power at 750 V kW (hp)	Power at 900 V kW (hp)	Power at 1200 V kW (hp)	Armature A dc @ 150% for 60s	Typical Topology

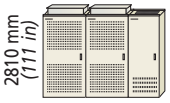
Width: 1000 mm *(40 in)*
Depth: 1300 mm *(52 in)*



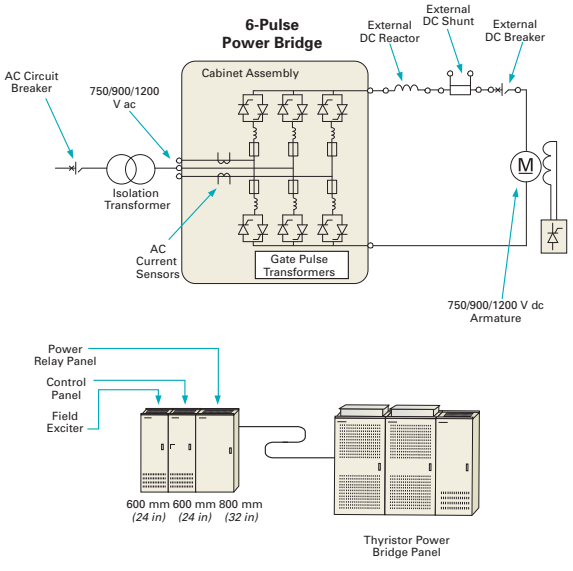
Width: 1600 mm *(63 in)*
Depth: 1300 mm *(52 in)*

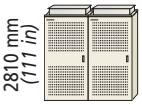


Width: 2000 mm *(80 in)*
Depth: 1300 mm *(52 in)*

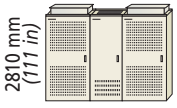


Width: 2600 mm *(103 in)*
Depth: 1300 mm *(52 in)*

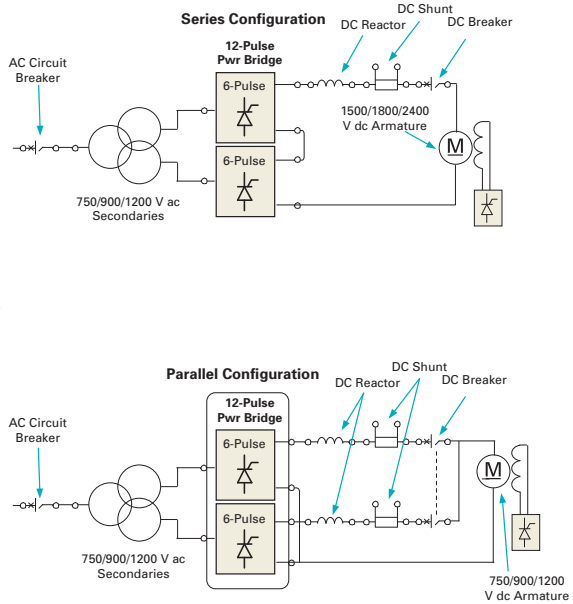


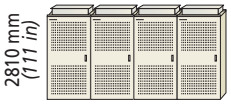


Width: 2000 mm *(80 in)*
Depth: 1300 mm *(52 in)*

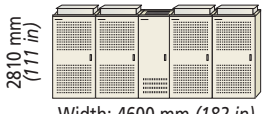


Width: 2600 mm *(103 in)*
Depth: 1300 mm *(52 in)*





Width: 4000 mm *(160 in)*
Depth: 1300 mm *(52 in)*



Width: 4600 mm *(182 in)*
Depth: 1300 mm *(52 in)*

LPC and LPD Notes:

1. Configured/ordered at the cabinet level assembly.
2. Each drive has a field exciter cabinet, control panel cabinet, and power relay cabinet associated with it.
3. Field control can support up to 4 field supplies; 1 included and up to 3 optional.
4. Each configuration requires 3 phase 220 V ac 50/60 Hz control power.
5. Several options are available for the LPB/LPC/LPD field exciter function. Option (a) fits in the standard LPB cabinet. Options (b) and (c) can be used with the LPB, LPC, or LPD frames.
   a. Single-phase 230 V ac input from incoming 3-phase power, 180/230/360 V dc at 40 amps output; fits in standard LPB cabinet shown on page 2, not available with LPC or LPD frames.
   b. Single-phase 460 V ac input, 360 V dc at 40 amps output, 600 mm wide separate cabinet.
   c. Three-phase 230/460 V ac input, 230/460 V dc at 230 or 480 amps output, 600 mm wide separate cabinet.
6. LPC and LPD frames require back access.
7. Field exciter, control, and relay cabinets are 650 mm *(26 in)* in depth and 2425 mm *(96 in)* in height (includes base channel and lifting beams).
8. Air is pulled through the doors and vented out the top of the cabinets.

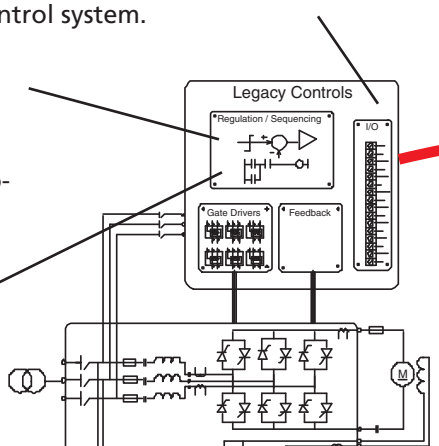
Modernizing Your Legacy DC Drives

Legacy DC Drive

Hardwired I/O Interface
Drive reference, feedback, and status signals hardwired with rest of the control system.

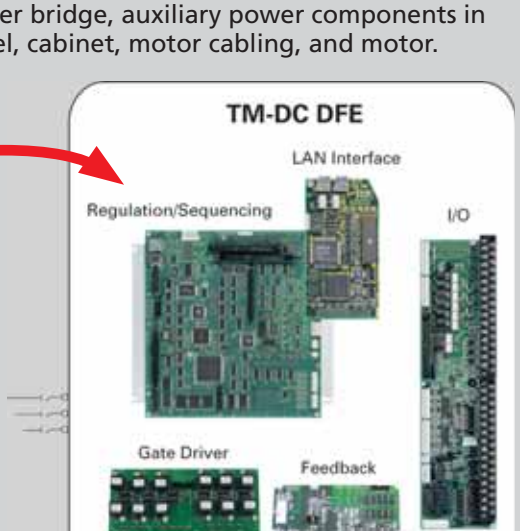
Analog Regulator
Current and speed regulators built from analog components.

Hardware-Based Sequencer
Sequencing functions hardwired in TTL or relays.



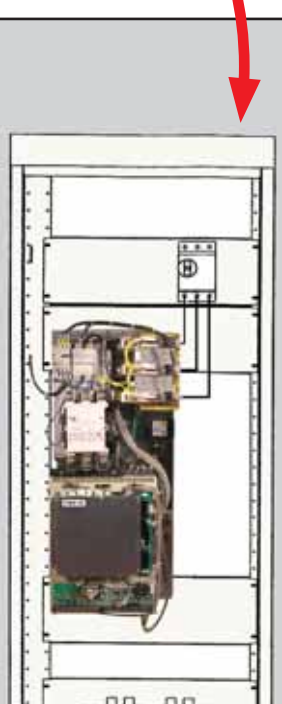
Modernized TM-DC Drive

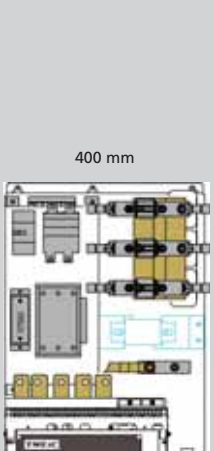
TM-DC DFE
Retrofit legacy drive control with TM-DC digital front-end controls, preserving existing power bridge, auxiliary power components in panel, cabinet, motor cabling, and motor.



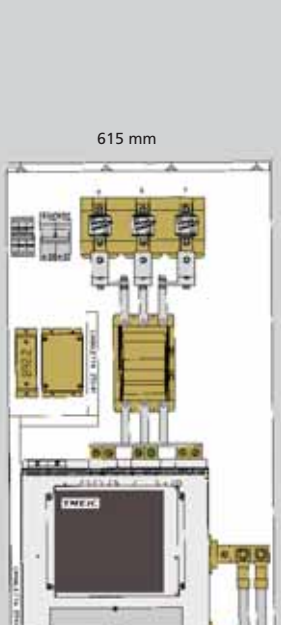
TM-DC Module Assembly
Retrofit legacy drive control and panel with TM-DC digital front-end controls, power bridge, and panel components, preserving existing cabinet, motor cabling, and motor.

TMdrive-DC Module
- Controls
- Power Bridge
- Panel



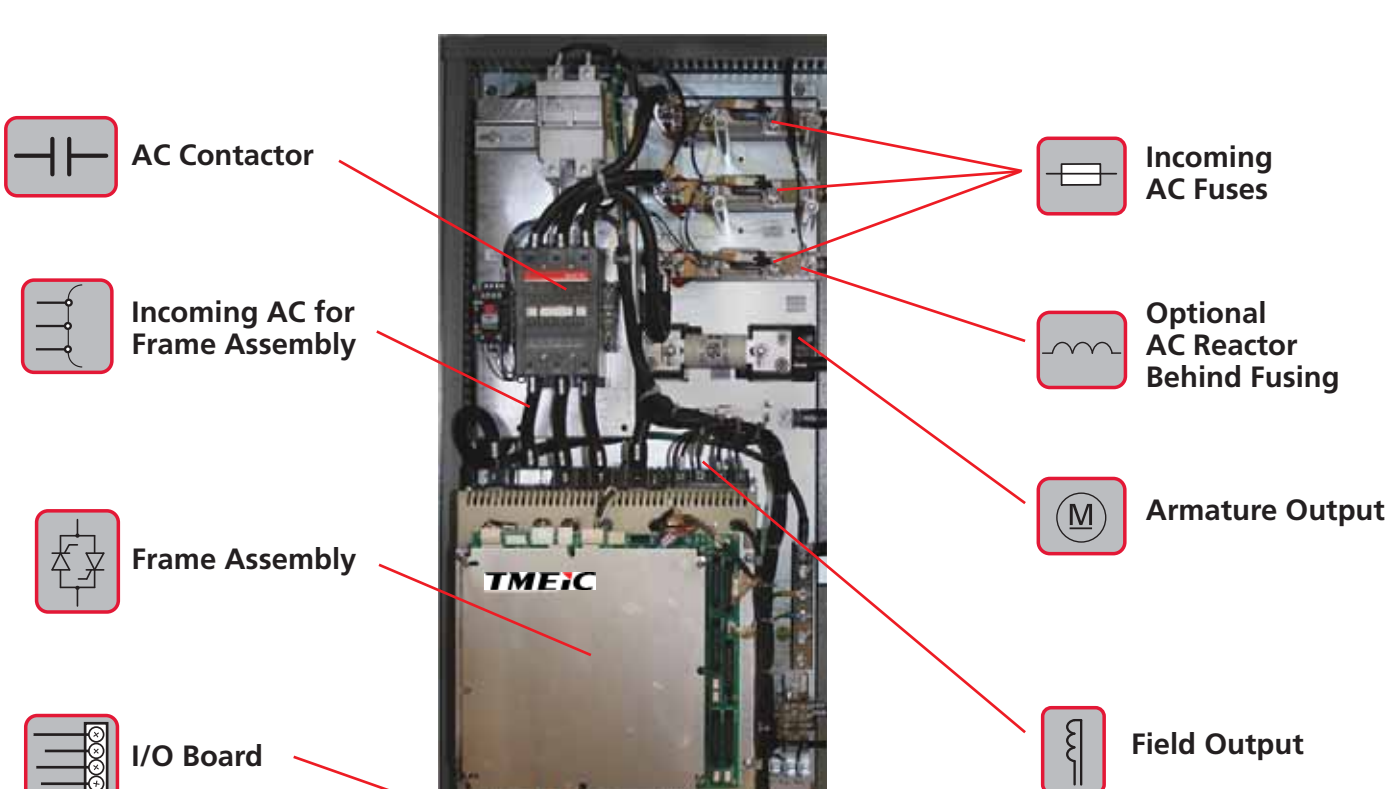


GAB-140/300 Module

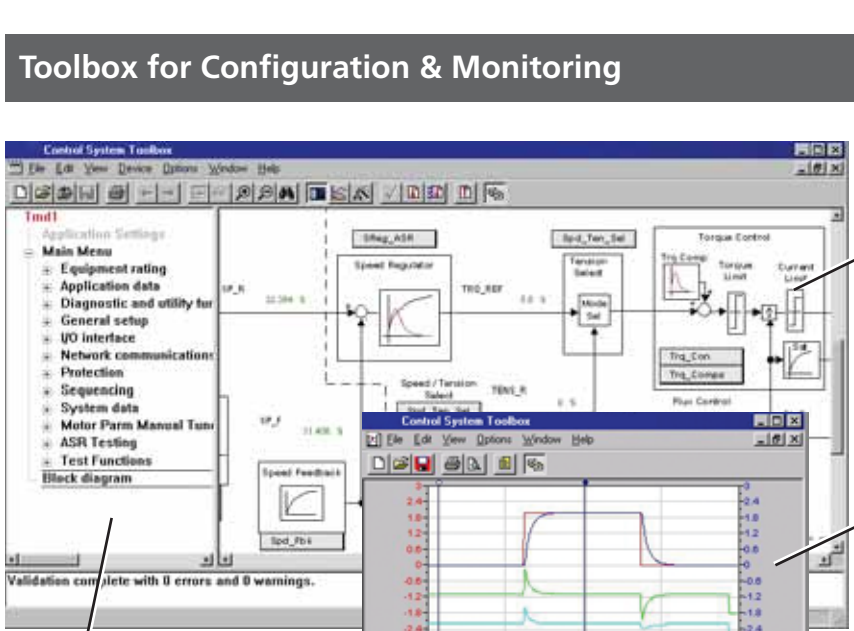


GAB-450/700 Module

A Closer Look at the GAB-300 Module Assembly



Toolbox for Configuration & Monitoring



Outline View
Functionally organized parameters and variables allow quick access to a given function.

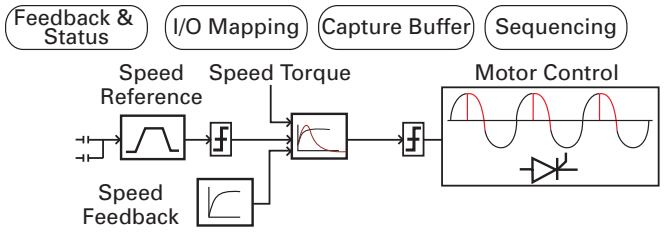
Block Diagram
Provides an animated graphical display of drive sequencing and regulation functions. Animated variables are shown in green. Buttons are used to navigate to associated functions.

Trend Window
Integrated trend window featuring:

- Real-time trending of drive variables with drag-and-drop configuration.
- Configurable capture buffer based trending for process analysis.
- Trace back buffer based trending for after the fact analysis of drive faults.
- Fast Fourier Transform plots for frequency-based analysis.

A Common Control To Reduce Cost of Ownership

Control Functions



LAN Interface Options

ISBus

- Supports both run-time control (10 words in and 10 words out) and Toolbox configuration/monitoring using the Innovation Series controller as a gateway between the ISBus and Ethernet
- RS-485 or optional fiber-optic bus in a synchronous ring configuration
- 5 Mbps master/follower (drive is the follower) protocol using copper or fiber; bus scan time based on the number of nodes:

Quantity of Nodes	Bus Scan Time
2-4	1 ms
17-32	8 ms

TOSLINE-S20

- Supports run-time control (6 words in and 10 words out) from an Innovation Series controller or V Series controller
- Drives can directly exchange data between themselves (4 words)
- Fiber-optic bus in a star configuration
- 2 Mbps peer-to-peer protocol; bus scan time based on the number of nodes:

Quantity of Nodes	Bus Scan Time
2-3	1 ms
9-64	25 ms

Profibus-DP™

- Supports run-time control (6 words in and 10 out) from a Profibus-DP master controller
- Copper bus in a daisy-chain configuration
- 9.6 kbps to 12 Mbps master/follower protocol; bus scan time based on the number of nodes

DeviceNet™

- Supports run-time control (4 words in and 10 words out) from a DeviceNet master controller
- Copper bus in a daisy-chain configuration
- 125 kbps to 500 kbps master/follower protocol; bus scan time based on the number of nodes

Ethernet Global Data (EGD)

- Supports run-time control (10 Words in/out)
- RJ-45 Ethernet interface
- Update rates up to 20 ms using standard 10 Mbps hardware or rates up to 2 ms with optional 100 Mbps card
- Drives can exchange data directly
- Supports peer to peer operation (No master needed)
- No limit to maximum number of nodes

Note: 1 word = 16 bits

Instrumentation Interface

Standard Display	• The digital display alternates between speed, current, and fault code in the event of an error • RJ-45 Ethernet port for local/remote toolbox connection • Ready, Run, and Alarm/Fault LEDs • Interlock button disables drive
Optional Graphic Keypad	• Four configurable variable bar graphs with descriptive legends • Status icons reflecting health of drive at a glance • Dedicated drive control keys for manual operation of the drive • Full access to all parameters and variables
Configuration	• RJ-45 Ethernet interface • 10 Mbps maximum • Drive Navigator option of TOSLINE-S20 to Ethernet connection using V-Series controller as gateway • Toolbox option of ISBus to Ethernet using Innovation Series controller as gateway
Meter Outputs	• Motor current A and B, ±10 V • Quantity 5 configurable, ±10 V, 8-bit resolution

I/O Interface

Digital Inputs	• Opto-coupled 20 mA
	• Quantity 6 configurable mapping
	  • Opto-coupled 10 mA
	  • Quantity 1 configurable mapping
	  • Quantity 1 dedicated mapping

Digital Outputs	• Open collector 70 mA • Quantity 6 user defined
Analog Inputs	• Quantity 2 ±10 V or 4-20 mA - Differential 8 kΩ input impedance - 12-bit resolution • Optional Quantity 2 ±10 V - 12 bit resolution
Analog Outputs	• Quantity 3 ±10 V, 10 mA max • User defined • 8-bit resolution
(Optional) Speed Feedback Resolver Input	• Excitation frequency of 1 or 4 kHz • Source for resolvers is Tamagawa: www.tamagawa-seiki.co.jp
Speed Feedback Encoder Input	• A quad B with marker • Maximum frequency of 100 kHz • Differential 5 or 15 V dc • 5 or 15 V dc at 200 mA supply
Speed Tach Follower Output	• Maximum frequency of 10 kHz • External 15-24 V dc at 100 mA max

Application Information

Motor Control

Speed Regulator With (Resolver or Encoder)	
Speed Control Range	1-100%
Speed Control Accuracy (Rated Speed: 100%)	+/- 0.01%
Field Weakening Range (Base Speed: Top Speed)	1:5
Maximum Speed Response	30 rad/sec
Maximum Current Response	300 rad/sec
Armature Current Control Accuracy	+/- 0.5%
Voltage Regulator	
Speed Control Range	1-100%
Speed Control Accuracy (Rated Speed: 100%)	+/- 1% with digital ref +/- 1% with analog ref
Field Weakening Range (Base Speed: Top Speed)	1:5

Electrical

Main Circuit Input Voltage Variation	+/- 10%
Input Frequency	50/60 Hz +/-5%
Control Power	100-240 VAC 50/60 Hz Single-phase 220/380-480 VAC 50/60 Hz Three-phase

Mechanical

Enclosure	IP20 (NEMA 1)
Wire Colors	Per UL and CE
Short Circuit Ratings	55 kA for ac and dc buswork 10 kA for control power
Code Conformance	UL and cUL available
Optional Equipment Markings	c UL us Canada United States European Union

Environmental

Operating Temperature	0 to 40°C (32 to 104°F) at rated load at conveter inlet -20 to 50°C (-4 to 122°F) with derating
Storage Temperature	-25 to 55°C (-13 to 131°F)
Humidity	5 to 95% relative humidity Non-condensing
Altitude	0 to 3500 m (11480 ft) above sea level Derate 2% per 200 m above 1000 m altitude
Vibration	10-50 Hz, <4.9 m/s² (0.5 G)
Cabinet Acoustic	70dba 3 feet from front of device and 3 feet from the floor, enclosure doors closed

Frame and Module Dimensional Data

Product	Frame					Module				
	Weight** kg (lb)	Dimensions mm (in)			Watts Loss @ Full Load	Weight** kg (lb)	Dimensions mm (in)			Watts Loss @ Full Load
		h	w	d			h	w	d	
GAx-140	30 (66)	465 (18.3)	325 (12.8)	321 (12.6)	454	82 (181)	920 (36.2)	400 (15.7)	400 (15.7)	585
GAx-300	35 (77)	465 (18.3)	325 (12.8)	321 (12.6)	818	82 (181)	920 (36.2)	400 (15.7)	400 (15.7)	980
GAx-450	60 (132)	675 (26.6)	505 (19.9)	400 (15.7)	1194	140 (309)	1500 (59.1)	615 (24.2)	450 (17.7)	1415
GAx-700	70 (154)	675 (26.6)	505 (19.9)	400 (15.7)	1666	180 (397)	1750 (68.9)	615 (24.2)	415 (16.3)	1995

** The actual weight of a Module is directly related to specific hardware option selections.
The weight indicated assumes AC Reactor, AC Contactor, DC bus bar and fuse as the major contributors

Global Supplier of Drive & Automation Systems

Metals Systems
The metals systems integration team supplies drive and automation systems for metal rolling and metal strip processing applications.

Material Handling Systems
The material handling integration team supplies automation systems for dock-side quay and rubber tire gantry (RTG) cranes.

Paper Systems
The paper systems integration team supplies coordinated drive systems for paper machines, off-machine coaters, and super calendars.

Engineered Drives Systems
The engineered drives team supplies drive/motor systems to the mining industry and other general industry applications.

TMEIC

We drive industry

TMEIC Corporation
Office: 1325 Electric Road, Roanoke, VA, 24018, USA
Mailing: 2060 Cook Drive, Salem, VA, 24153, USA
Tel.: +1-540-283-2000; Fax: +1-540-283-2001
Email: info@tmeic.com; Web: www.tmeic.com

TMEIC Corporation - Houston Branch
15810 Park Ten Place., Houston, TX 77084, USA
Tel.: +1-832-659-0505;
Email: OilGas@tmeic.com; Web: www.tmeic.com

TMEIC Power Electronic Products Corporation
13131 W. Little York Road, Houston, Texas 77041, USA

Toshiba Mitsubishi-Electric Industrial Systems Corporation
Tokyo Square Garden
3-1-1 Kyobashi, Chuo-kyo, Tokyo, 104-0031, Japan
Tel.: +81-3-3277-5511
Web: www.tmeic.co.jp

TMEIC Europe Limited
Uxbridge, Middlesex,
United Kingdom, UB7 7LT
Tel.: +44 870 950 7220; Fax: +44 870 950 7221
Email: info@tmeic.eu; Web: www.tmeic.com/Europe

TMEIC Industrial Systems India Private Limited
Unit # 03-04, Third Floor,
Block 2, Cyber Pearl, HITEC City, Madhapur,
Hyderabad, 500081, Andhra Pradesh, India
Tel.: +91-40-44434-0000; Fax: +91-40-4434-0034
Email: inquiry_india@tmeic.com; Web: www.tmeic.in

Toshiba Mitsubishi-Electric Industrial Systems Corp (Beijing)
21/F., Building B, In.do Mansion, 48 Zhichunlu A, Haidian District, Beijing 100098, PRC
Tel.: +86 10 5873-2277; Fax: +86 10 5873-2208
Email: sales@tmeic-cn.com

TMEIC – Sistemas Industriais da América do Sul Ltda.
Av.Paulista, 1439 cj72
Bela Vista, CEP:01311-200
São Paulo/SP, Brasil
Tel: +55-11-3266-6161; Fax: +55-11-3253-0697

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