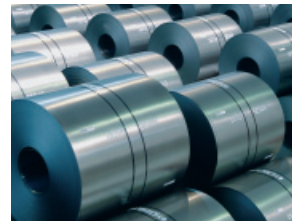
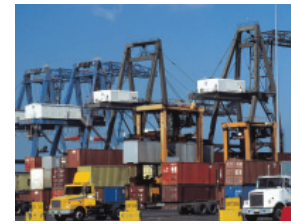


Global Supplier of Drive & Automation Systems



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.



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



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

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TMdrive®-DC

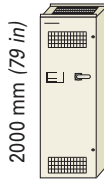
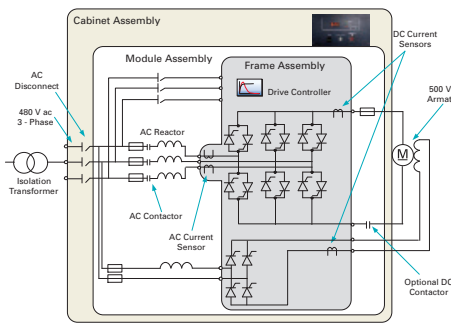
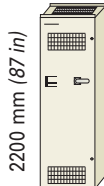
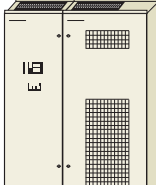
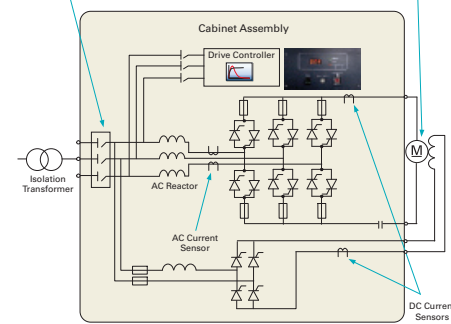
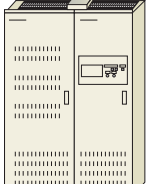
DC System Drive

- metals
- cranes
- mining
- testing
- oil & gas
- solar inverters
- power generation
- cement

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



Application Information

	Frame	Power at 300V kW (hp)	Power at 500V kW (hp)	Power at 600V kW (hp)	Power at 750V kW (hp)	Armature A dc @ 150% for 60s	Field A dc	Typical Topology	
 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)	—				
 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)	—				
 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)	—				
	 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:

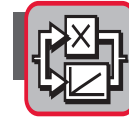
- GA* and LPB frames available in 2-quadrant power bridge configuration.
- Multi-motor configuration is an option.
- The specified current and power ratings are continuous, to which an overload of 150% for 60 seconds can be applied at frame inlet temperatures of 0-40°C, and an altitude below 1000 meters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

LPB Notes:

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

GA* Notes:

- 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.
- Display or optional keypad is remote mounted from frame or module assembly.
- Field control can support up to 4 field supplies; 1 included and up to 3 optional.
- Internal field supply can be fed externally as an option. GAC requires 480 VAC or less external supply for field exciter.
- Internal power supply can be fed externally as an option.
- Mechanical dimensions for the cabinets are typical; will vary with the application.
- Air is pulled through the filters at the bottom of the doors and forced out the vents at the top of the doors.



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%

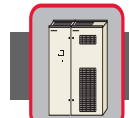
Voltage Regulator

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





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



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	 

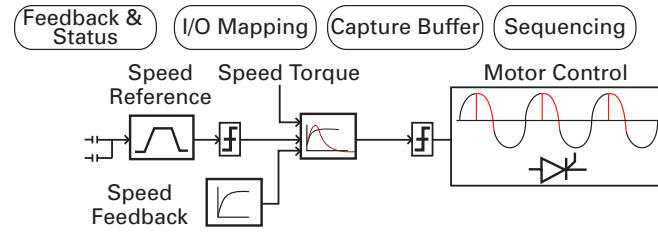


Environmental

Operating Temperature	0 to 40°C (32 to 104°F) at rated load at converter 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/s ² (0.5 G)
Cabinet Acoustic	70dba 3 feet from front of device and 3 feet from the floor, enclosure doors closed

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

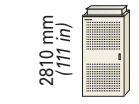
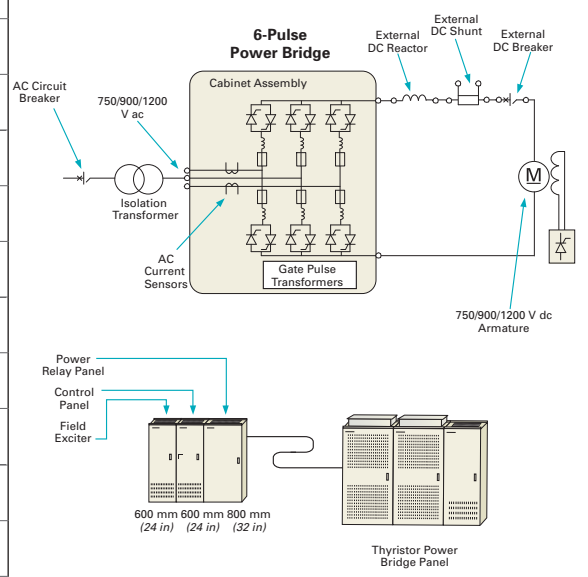
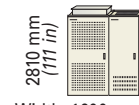

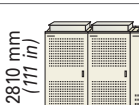
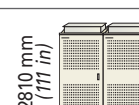
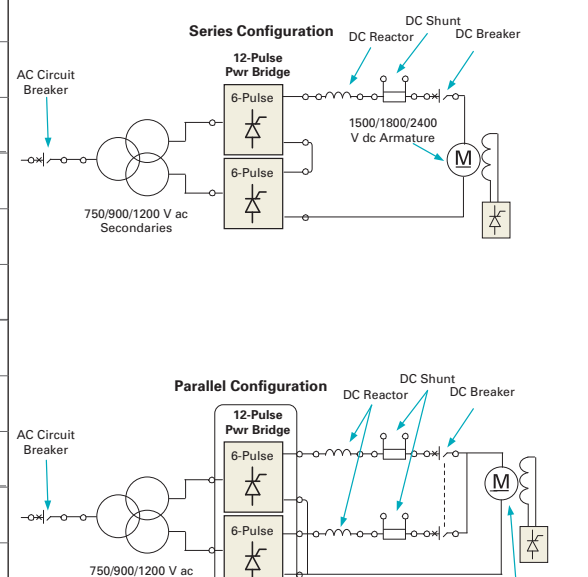
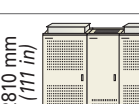
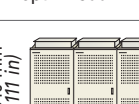
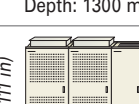
- Analog Inputs**
- Quantity 2 ± 10 V or 4-20 mA
 - Differential 8 k Ω input impedance
 - 12-bit resolution
 - Optional Quantity 2 ± 10 V
 - 12-bit resolution

- 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

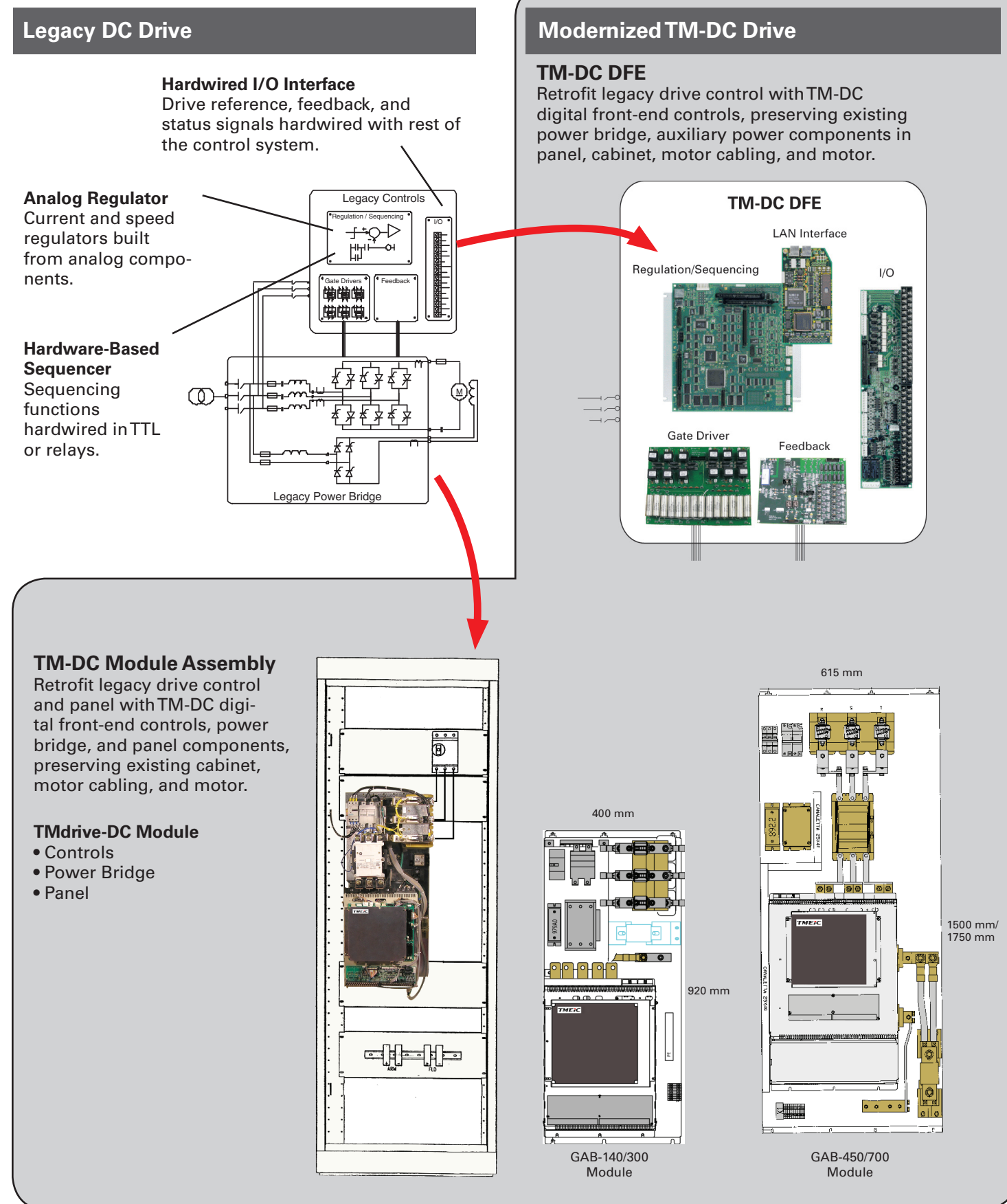
	Frame	Power at 750 V kW (hp)	Power at 900 V kW (hp)	Power at 1200 V kW (hp)	Armature A dc @ 150% for 60s	Typical Topology
 Width: 1000 mm (40 in) Depth: 1300 mm (52 in)	LPC-750-1	1853 (2482)			2470	
	LPC-900-1		1800 (2412)		2000	
	LPC-1200-1			2400 (3216)	2000	
 Width: 1600 mm (63 in) Depth: 1300 mm (52 in)	LPC-750-2	3540 (4744)			4720	
	LPC-900-2		3600 (4824)		4000	
	LPC-1200-2			4800 (6432)	4000	
 Width: 2000 mm (80 in) Depth: 1300 mm (52 in)	LPC-750-3	5063 (6784)			6750	
	LPC-900-3		5400 (7236)		6000	
	LPC-1200-3			7200 (9648)	6000	
 Width: 2600 mm (103 in) Depth: 1300 mm (52 in)	LPC-750-4	6750 (9045)			9000	
	LPC-900-4		7200 (9648)		8000	
	LPC-1200-4			9600 (12864)	8000	
 Width: 2000 mm (80 in) Depth: 1300 mm (52 in)	LPD-750-1	3705 (4965)			4940	
	LPD-900-1		3600 (4824)		4000	
	LPD-1200-1			4800 (6432)	4000	
 Width: 2600 mm (103 in) Depth: 1300 mm (52 in)	LPD-750-2	7080 (9487)			9440	
	LPD-900-2		7200 (9648)		8000	
	LPD-1200-2			9600 (12864)	8000	
 Width: 4000 mm (160 in) Depth: 1300 mm (52 in)	LPD-750-3	10125 (13568)			13500	
	LPD-900-3		10800 (14472)		12000	
	LPD-1200-3			14400 (19296)	12000	
 Width: 4600 mm (182 in) Depth: 1300 mm (52 in)	LPD-750-4	13500 (18090)			18000	
	LPD-900-4		14400 (19296)		16000	
	LPD-1200-4			19200 (25728)	16000	

LPC and LPD Notes:

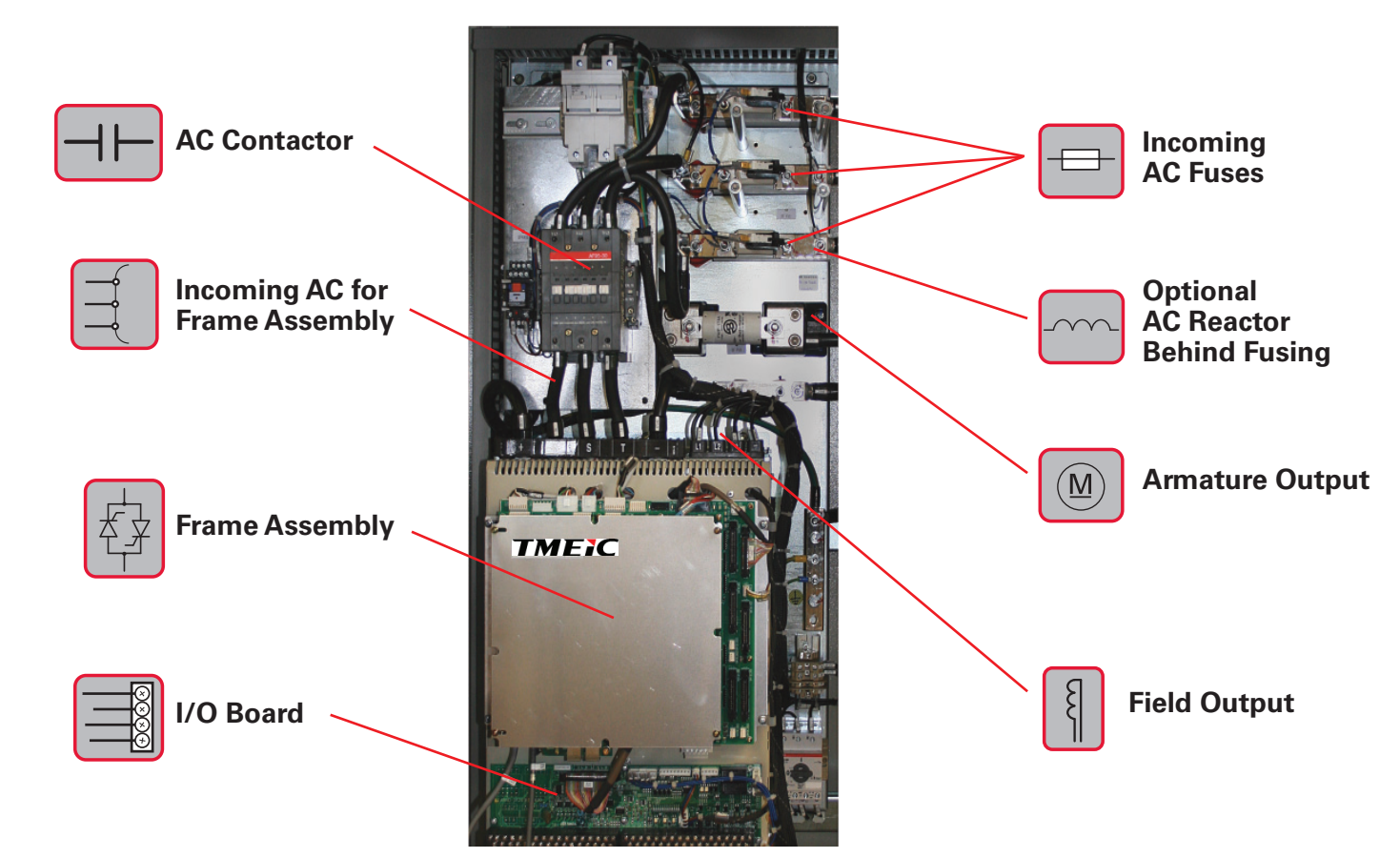
- Configured/ordered at the cabinet level assembly.
- Each drive has a field exciter cabinet, control panel cabinet, and power relay cabinet associated with it.
- Field control can support up to 4 field supplies; 1 included and up to 3 optional.
- Each configuration requires 3 phase 220 V ac 50/60 Hz control power.
- 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.

- 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.
 - Single-phase 460 V ac input, 360 V dc at 40 amps output, 600 mm wide separate cabinet.
 - Three-phase 230/460 V ac input, 230/460 V dc at 230 or 480 amps output, 600 mm wide separate cabinet.
- LPC and LPD frames require back access.
 - 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).
 - Air is pulled through the doors and vented out the top of the cabinets.

Modernizing Your Legacy DC Drives



A Closer Look at the GAB-300 Module Assembly



Toolbox for Configuration & Monitoring

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.

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

Axis	Pen	Signal Name	Left Value	Right Value	Difference	Min \
SP	TEST22	0.000	2.000	2.000	0	
DLT	SP	0.000	1.996	1.996	-0	
IO	R	14.975	15.0125	0.0375		
II	F	42.3	42.325	0.025	42	