

# Commander GP20

## High Performance Open Loop



- V/Hz, Open Loop Vector, or Rotor Flux Control for outstanding motor shaft performance
- Two zero-space option slots for Solution Modules
- Easy to read LCD "multi-language" keypad
- Industry-leading two-year warranty with five year option





Pre-programmed Macros & Parameter Storage/Cloning	
Macro Number	Macro Name
6501	User Defined
6502	I/O Setup
6503	Monitor
6504	Variable Torque Pump & fan
6505	Variable Torque Pressure Control
6506	Constant Torque
6507	Vibrating Feeder - Punch Press
6508	Extruder
6509	Batch Mixer
6510	Compressor

- SmartCard parameter copy device with pre-set macros for fast setup of the most common applications

**2**  
YEAR  
Digital Drive  
Warranty

**5**  
YEAR  
Extended  
Warranty

# Commander GP20 Overview

## High Performance Open Loop

### OPERATOR INTERFACE



HMI Operator Interface



CGP Keypad Plus



CGP SmartCard



Remove the CGP-Keypad Plus to reveal the SmartCard Slot



### EXTERNAL PLC CONTROL

### CONTROL MODE



PLC



PC

### INPUT/OUTPUT

#### Options

#### Standard

SM-I/O 32



SM-I/O Plus



SM-I/O Timer



SM-I/O Lite



SM-PELV



SM-I/O 120V



SM-I/O 24V



5 Analog I/O  
6 Digital I/O  
1 Disable  
1 Relay Out

VHz / Open Loop Vector / Rotor Flux Control (RFC)



### FILTERS

#### Standard

#### Options



### DYNAMIC BRAKING

Zero Space Internal Brake Resistor  
E-Stop Duty sizes 1&2



Dynamic Brake Resistors



### APPLICATIONS WITH PLC FUNCTIONALITY

Programming Platform



Standard

PLC Functionality Features  
Function Block Programming  
Ladder Logic Sequencing

### COMMUNICATIONS

Standard

Options



Modbus RTU



### DC BACK UP POWER SUPPLY



24V Control



48-96V Power

## Commander GP20

### Incorporating "Smart" Technologies

#### V/Hz, Open Loop Vector or Rotor Flux Control (RFC)

With the Commander GP20 many basic applications can be up and running in minutes in the standard V/Hz mode, but for applications with demanding speed torque requirements or high inertial loads, Open Loop Vector and the newly developed Rotor Flux Control modes are available to boost shaft performance. Rotor Flux Control provides near closed loop performance without requiring encoder feedback. RFC is easy to configure using CTSofT or keypad controls.

#### Plain Text, Multi-lingual Keypad

The Commander GP20 has a full-function data display can be either mounted on the drive or remotely mounted. The CGP-Keypad-Plus supports five languages, plus a custom text database, which allows users to customize parameter names to their own terminology. It also possesses one-touch online help, and clearly marked HMI controls. This keypad is "hot-pluggable," enabling it to be moved from one drive to another without powering down.



#### Multi-lingual Keypad

English  
French  
Spanish  
German  
Italian

Keypad to Drive Cable SP-LCD-485-XXX  
XXX=005, 010, 015, 025, 050 feet

## GP20 SmartCard

The SmartCard is a revolution in simplicity, allowing users to store parameters and/or download stored parameters to a drive, or dozens of drives. This is a standard feature that enables simple configuration of parameters in a variety of ways is supplied free with each Commander GP20.





2214-2246

### To Load a Macro...

1. Remove Keypad
2. Insert the SmartCard into the slot (contacts facing the right-hand side of the drive)
3. Re-fit Keypad
4. Set parameter zero in any menu Pr xx.00 (i.e. Pr 1.00, Pr 2.00, Pr 3.00, etc.) equal to the selected 4 digit Macro Number found on the front of this SmartCard
5. Press the red  reset button to load macro

Refer to the Commander GP20 documentation for further information



Drive No. ▼



Industrial Automation

### Pre-programmed Macros & Parameter Storage/Cloning

Macro Number	Macro Name
6501	User Defined
6502	I/O Set-up
6503	Moni...
6504	Variable Torque Pump & Fan
6505	Variable Torque Pressure Control
6506	Constant Torque
6507	Vibrating Feeder - Punch Press
6508	Extruder
6509	Batch Mixer
6510	Compressor

#### The SmartCard can:

- Download pre-programmed macros for intuitive configuration of typical general purpose applications
- Save multiple complete sets of parameters
- Copy a complete set of parameters for serial production
- Set up an application as parameter differences from default
- Automatically save all user parameter changes for maintenance purposes
- Load complete motor map parameters

**FEATURE**

**Performance Advantage**

**Dual Duty Ratings–Normal and Heavy**

Provides cost effective sizing choices for all applications.

**48 VDC Main Power Supply Input**

Ideally suited for elevator rescue and machine tool set up.

**24 VDC Auxiliary Power Supply Input**

Provides an additional means of maintaining control, fieldbus during power loss.

**Comprehensive Auto-tune**

Dynamic and static auto-tune. Optimize drive. Match motor. Great performance.

**High Resolution Analog Input**

16-bit, 250 µsec interface for high performance applications. Two additional 10-bit analog inputs for low level controls.

**Extensive Fieldbus Connectivity**

ModbusRTU (Standard), Profibus-DP (12Mbit), Ethernet, EtherCAT, DeviceNet, CANOpen and Interbus-S optional via zero-space SM modules.

**Two Universal Option Slots**

Fieldbus and or I/O expansion SM modules fit in either of the two option slots beneath the drive cover.

**SmartCard for Simple Setup and Cloning**

Easy-to-use card stores drive configuration for simple startup and parameter cloning. Supplied free with Commander GP20.

**Drive Mounted Brake Resistor**

Commander GP20 sizes 1 and 2 feature a drive mounted E-Stop duty brake resistor option to reduce panel space requirements.

**Standard Features of the Commander GP20**

- 3 Operating modes: V/Hz, Open Loop Vector and Rotor Flux Control
- Programmable boolean logic (AND, NAND, OR, NOR) gates with delay outputs
- Programmable threshold comparators
- Built-in PID controller
- S-ramp accel/decel profiling
- Built-in MOP (motorized potentiometer)
- 8 Preset speeds and independent accel/decel rates
- 3 Skip frequencies with adjustable bandwidths
- Run time chronometers
- Configurable analog and digital I/O
- Selectable Stopping modes including Coast, Ramp, and DC injection
- Dynamic Braking capability
- Removable control terminals common to all sizes
- Output frequencies up to 3000 Hz
- Intelligent Thermal Management (ITM) technology with switching frequencies up to 16 kHz



**TYPICAL APPLICATIONS**

**Extruder**

**Pump**



## COMMANDER GP20 RATINGS

Commander GP20		Motor HP	Continuous Output Current	Peak Output Current	Motor HP	Continuous Output Current	Peak Output Current	Peak Output Current
208/240 VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 230V	I <sub>N</sub> (A)	(A)	HP @ 230V	I <sub>H</sub> (A)	Open loop (A)	RFC (A)
CGP1201	1	1.5	5.2	5.7	1	4.3	6.4	7.5
CGP1202		2	6.8	7.5	1.5	5.8	8.7	10.1
CGP1203		3	9.6	10.5	2	7.5	11.2	13.1
CGP1204		3	11	12.1	3	10.6	15.9	18.5
CGP2201	2	5	15.5	17.0	3	12.6	18.9	22
CGP2202		7.5	22	24.2	5	17	25.5	29.7
CGP2203		10	28	30.8	7.5	25	37.5	43.7
CGP3201	3	15	42	46	10	31	46.5	54.2
CGP3202		20	54	59	15	42	63	73.5
CGP4201	4	25	68	74	20	56	84	98
CGP4202		30	80	88	25	68	102	119
CGP4203		40	104	114.4	30	80	120	140

380/480 VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 460V	I <sub>N</sub> (A)	(A)	HP @ 460V	I <sub>H</sub> (A)	Open loop (A)	RFC (A)
CGP1401	1	1.5	2.8	3.0	1	2.1	3.1	3.6
CGP1402		2	3.8	4.1	2	3	4.5	5.2
CGP1403		3	5	5.5	3	4.2	6.3	7.3
CGP1404		5	6.9	7.5	3	5.8	8.7	10.1
CGP1405		5	8.8	9.6	5	7.6	11.4	13.3
CGP1406		7.5	11	12.1	5	9.5	14.2	16.6
CGP2401	2	10	15.3	16.8	10	13	19.5	22.7
CGP2402		15	21	23	10	16.5	24.7	28.8
CGP2403		20	29	31	15	25	34.5	40.2
CGP2404		20	29	31	20	29	43.5	50.7
CGP3401	3	25	35	38	25	32	48	56
CGP3402		30	43	47	30	40	60	70
CGP3403		40	56	61	30	46	69	80.5
CGP4401	4	50	68	74	50	60	90	105
CGP4402		60	83	91	60	74	111	129.5
CGP4403		75	104	114	75	96	144	168
CGP5401	5	100	138	151	100	124	186	217
CGP5402		150	168	184	125	156	234	273
CGP6401 <sup>1</sup>	6	150	202	225	150	180	231	269
CGP6402 <sup>1</sup>		200	236	259	150	210	270	315

Note: Motor horsepower ratings are based on typical motor current ratings. Actual motor currents should be checked before selecting a particular drive. For some high efficiency motors, the required full load motor current may allow the selection of a smaller drive than is indicated in the chart. The same consideration would also apply for motors with less common power or voltage ratings.

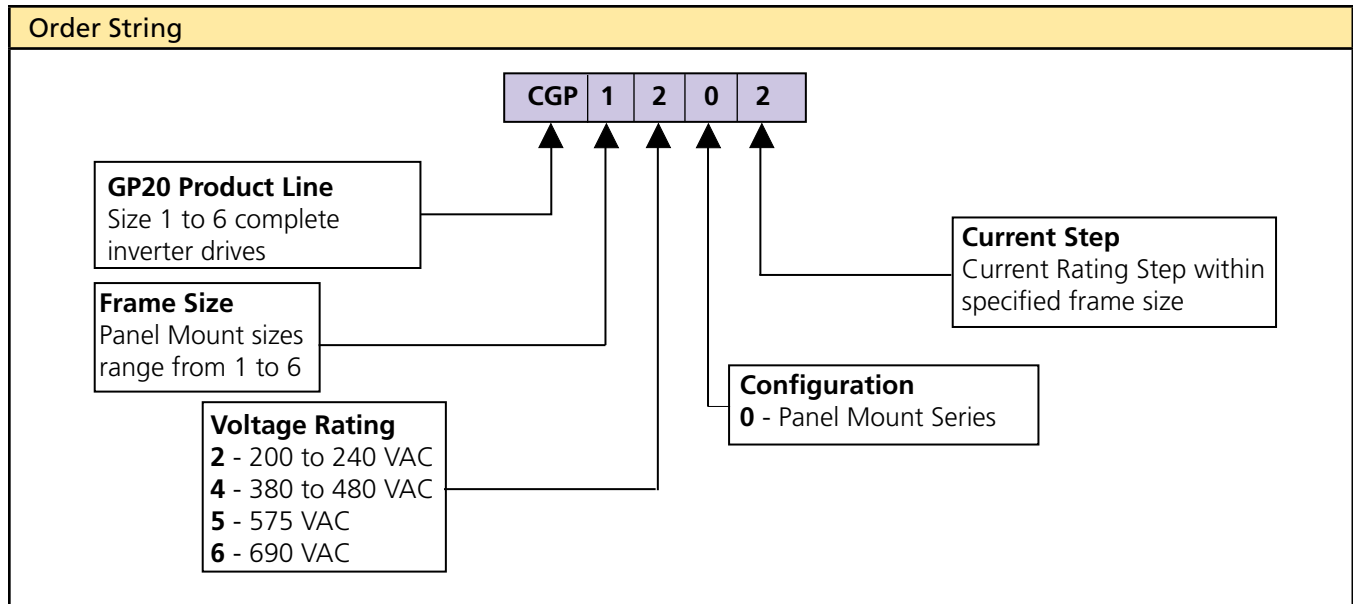
Normal Duty	Heavy Duty
Suitable for most applications, current overload is set at 110% for 60 seconds. Where motor rated current is less than the drive rated continuous current, higher overloads are achieved.	Suitable for demanding applications, current overload is set at up to 175% for 40 seconds (150% on size 6). Where motor rated current is less than the drive rated continuous current, higher overloads (200% or greater) are achieved.

1) Size 6 drives require a +24VDC - 3.5A power supply for the heat sink fans not provided with unit. See the Options & Accessories section for available power supplies.

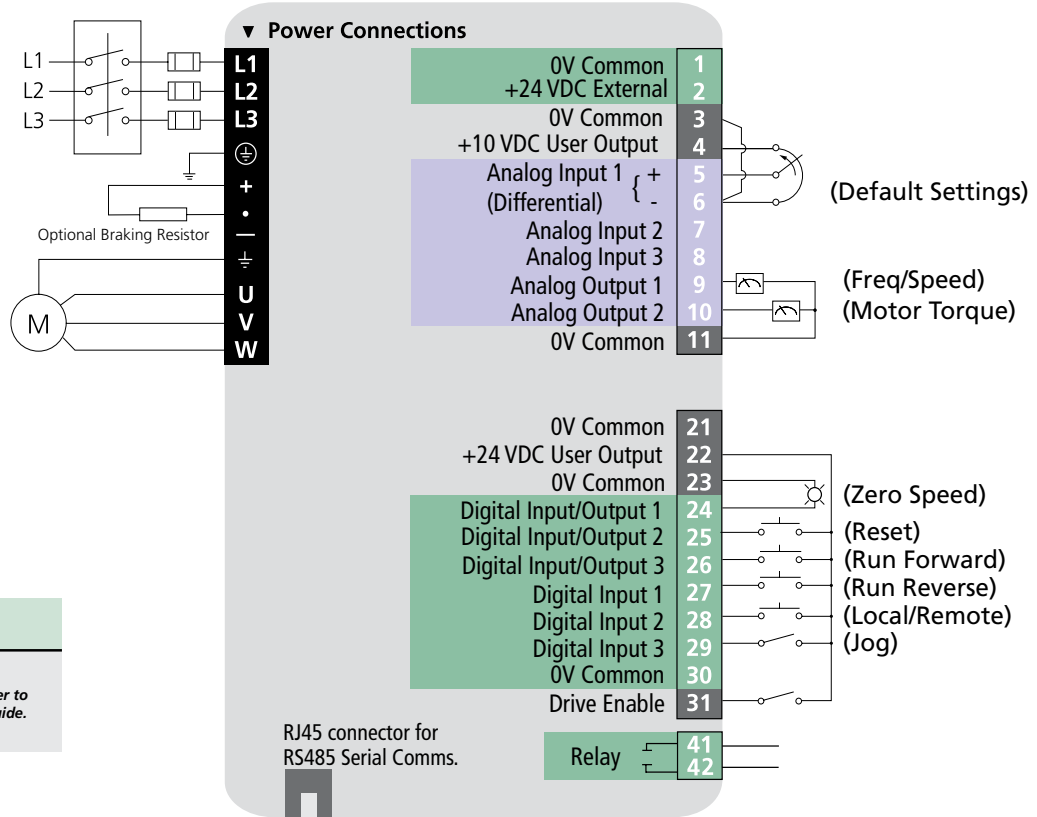
### COMMANDER GP20 RATINGS (continued)

Commander GP20		Motor HP	Continuous Output Current	Peak Output Current	Motor HP	Continuous Output Current	Peak Output Current	Peak Output Current
<b>575 VAC</b>		<b>Normal Duty</b>			<b>Heavy Duty</b>			
Order Code	Frame	HP @ 575V	I <sub>N</sub> (A)	(A)	HP @ 575V	I <sub>H</sub> (A)	Open loop (A)	RFC (A)
CGP3501	3	5	5.4	5.9	3	4.1	6.1	7.1
CGP3502		5	6.1	6.7	5	5.4	8.1	9.4
CGP3503		7.5	8.4	9.2	5	6.1	9.1	10.6
CGP3504		10	11	12.1	7.5	9.5	14.2	16.6
CGP3505		15	16	17.6	10	12	18	21
CGP3506		20	22	24.2	15	18	27	31.5
CGP3507		25	27	29.7	20	22	33	36.5
CGP4603	4	30	36	39.6	25	27	40.5	47.2
CGP4604		40	43	47.3	30	36	54	63
CGP4605		50	52	57.2	40	43	64.5	75.2
CGP4606		60	62	68	50	52	78	91
CGP5601	5	75	84	92	60	63	93	108.5
CGP5602		100	99	108	75	85	126	147
CGP6601 <sup>1</sup>	6	125	125	137	100	100	128	149
CGP6602 <sup>1</sup>		150	144	158	125	125	160	187

<b>690 VAC</b>		<b>Normal Duty</b>			<b>Heavy Duty</b>			
Order Code	Frame	HP @ 690V	I <sub>N</sub> (A)	(A)	HP @ 690V	I <sub>H</sub> (A)	Open loop (A)	RFC (A)
CGP4601	4	25	22	24.2	20	19	27	31.5
CGP4602		30	27	29.7	25	22	33	38.5
CGP4603		40	36	39.6	30	27	40.5	47.2
CGP4604		50	43	47.3	40	36	54	63
CGP4605		60	52	57.2	50	43	64.5	75.2
CGP4606		75	62	68.2	60	52	78	91
CGP5601	5	100	84	92	75	63	93	108.5
CGP5602		125	99	108	100	85	126	147
CGP6601 <sup>1</sup>	6	150	125	137	125	100	128	149
CGP6602 <sup>1</sup>		175	144	158	150	125	160	187



## COMMANDER GP20 TERMINAL DIAGRAM



## TERMINAL DESCRIPTION

Pin#	Function ①	Type/Description	Notes
1	0V Common		
2	+24 VDC External Input	Back up Power Supply for Control	60W, 24 VDC
3	0V Common	Common for External Analog Devices	
4	+10 VDC User Supply	Reference Supply	10 mA max
5	Analog Input 1 (Local Frequency/Speed Reference)	Differential Analog Input, Non-inverting Input, 16 bit	±10 VDC 100 k Ohms
6	Analog Input 1 (Local Frequency/Speed Reference)	Differential Analog Input, Inverting Input 16 bit	±10 VDC 100 k Ohms
7	Analog Input 2 (Remote Frequency/Speed Reference)	Single-ended Analog Input 10 bit	±10 VDC, 100 k Ohms or 4-20 mA, 200 Ohms ②
8	Analog Input 3	Single-ended Analog Input 10 bit	±10 VDC, 100 k Ohms or 4-20 mA, 200 Ohms ②
9	Analog Output 1 (Frequency/Speed Monitor)	Single-ended Analog Output, Bi-polar, 10 bit	±10 VDC or 0-20 / 4-20 mA ②
10	Analog Output 2 (Motor Torque Monitor)	Single-ended Analog Output, Bi-polar, 10 bit	±10 VDC or 0-20 / 4-20 mA ②
11	0V Common	Common External Analog Signals	

Pin#	Function ①	Type/Description	Notes
21	0V Common		
22	+24 VDC User Output	User Supply	200 mA max
23	0V Common	Common for External Digital Inputs	
24	Digital I/O 1 (Zero Speed Output)	Digital Input/Output	0 to 24 VDC input, or 1 to 24 VDC, 100 mA max output
25	Digital I/O 2 (Reset Input)	Digital Input/Output	0 to 24 VDC input, or 1 to 24 VDC
26	Digital I/O 3 (Run Forward Input)	Digital Input/Output	0 to 24 VDC input, or 1 to 24 VDC, 100 mA max output
27	Digital Input (Run Reverse)	Digital Input	0 to 24 VDC, 7.5 k Ohms
28	Digital Input (Local/Remote)	Digital Input	0 to 24 VDC, 7.5 k Ohms
29	Digital Input (Jog)	Digital Input	0 to 24 VDC, 7.5 k Ohms
30	0V Common	Common for External Digital Inputs	
31	Digital Input	Digital Input	0 to 24 VDC, 1 µsec sample
41	Status Relay (Drive Healthy)	Normally Open	240 VAC, 2A resistive
42	Status Relay (Drive Healthy)	Normally Open	240 VAC, 2A resistive

① Values in (parenthesis) designate default functions.

② 0-20, 4-20 mA modes are also available. See Commander GP20 Manual.

## COMMANDER GP20 SPECIFICATIONS

	<b>Environment</b>
Ambient Operating Temperature	0° to 40°C (32° to 104°F)
Cooling method	Forced convection
Humidity	95% maximum non-condensing at 40°C (104°F)
Storage Temperature	-40° to 50°C (-40° to 122°F)
Altitude	0 to 3000 m (9,900 ft). Derate 1% per 100 m (328 ft) between 1000 m (3280 ft) and 3000 m (9,900 ft).
Vibration	Tested in accordance with IEC 68-2-34
Mechanical Shock	In accordance with IEC 68-2-27
Enclosure	NEMA 1 (IP 20), NEMA 12 (IP 54) through panel mounting
Electromagnetic Immunity	In compliance with IEC801 and EN50082-2, and complies with EN61800-3 with built-in filter
Electromagnetic Emissions	In compliance with EN50081-2 when the recommended RFI filter is used and EMC installation guidelines are followed

### AC Supply Requirements

Voltage	200 to 240 VAC ±10% 380 to 480 VAC ±10% 500 to 575 VAC ±10% 500 to 690 VAC ±10%
Phase	3Ø
Phase Imbalance Tolerance	2% negative phase sequence (equivalent to 3% voltage imbalance between phases)
Frequency	48 to 65 Hz
Input Displacement Power Factor	0.93

### Control

Carrier Frequency	3, 4, 6, 8, 12, 16 kHz
Output Frequency	0 to 3000 Hz (Open loop)
Output Speed	0 to 40,000 RPM
Frequency Accuracy	±0.01% of full scale
Frequency Resolution	0.001Hz
Analog Input Resolution	10 Bit + sign (Qty 2); 16 Bit + sign (Qty 1)
Serial Communications	2-wire RS485. Protocol is ANSI x 3.28-2.5-A4, or Modbus RTU Baud rate 300 to 115,200.
Braking	DC injection braking (stopping and holding) standard. Dynamic braking transistor standard.
Control Power Ride Through	Up to 1 second depending on inertia and decel time

### Protection

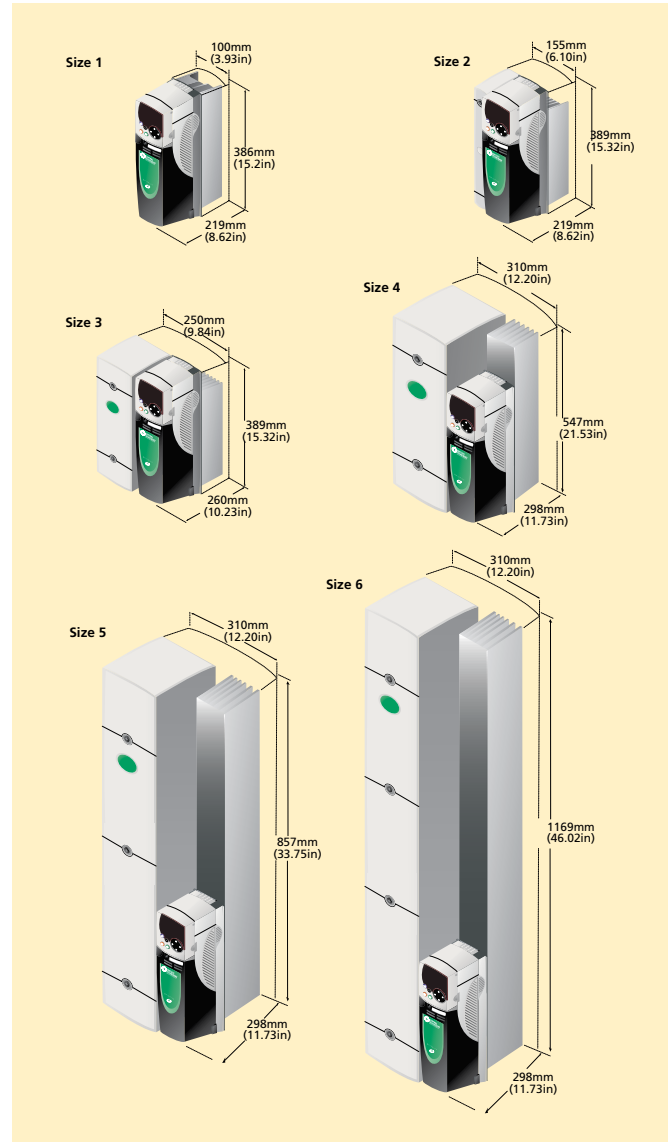
DC Bus Undervoltage Trip	175 / 350 / 435 VDC (approximately 124 / 247 / 307 VAC line voltage)
DC Bus Overvoltage Trip	415 / 830 / 990VDC (approximately 293 / 587 / 700 VAC line voltage)
MOV Voltage Transient Protection	160 Joules, 1400 VDC clamping (Line to line and line to ground)

Drive Overload Trip	Current overload value is exceeded. Programmable for Normal Duty or Heavy Duty, Open loop or Closed loop operation (RFC mode)
Instantaneous Overcurrent Trip	225% of drive rated current
Phase Loss Trip	DC bus ripple threshold exceeded
Overtemperature Trips	Drive heatsink, control board, and option module(s) monitoring
Short Circuit Trip	Protects against output phase to phase fault
Ground Fault Trip	Protects against output phase to ground fault
Motor Thermal Trip	Electronically protects the motor from overheating due to loading conditions

### Approvals & Listings

UL, cUL	UL File #E171230
IEC	Meets IEC Vibration, Mechanical Shock and Electromagnetic Immunity Standards
CE	Designed for marking
NEMA	NEMA 1 enclosure type - All but Size 5
ISO 9002	Certified Manufacturing Facility

## DIMENSIONS



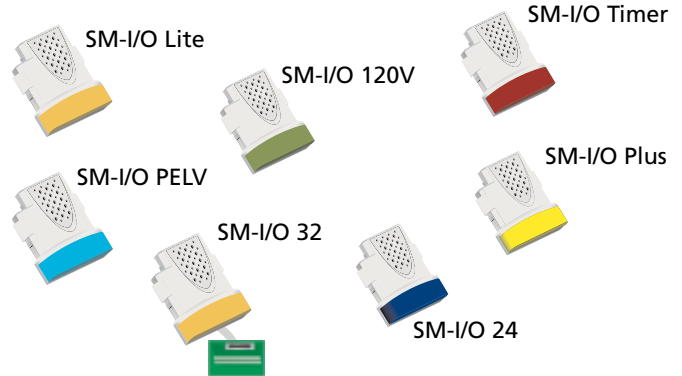
# Options



For complete descriptions of the options listed here, please refer to the Options and Accessories section at the end of the AC Drive section.

## INPUT/OUTPUT MODULES\*

To customize your GP20 with more or specialized I/O, or to install a fieldbus option there are slots beneath the cover for two Solution Modules.

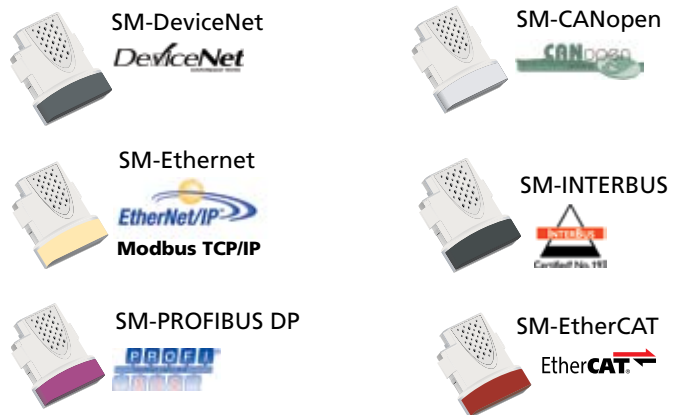


## OPTIONS AT-A-GLANCE

Option	Description	Order Code
Base Drive Configuration and Programming	Cloning and Parameter Storage Card	CGP-SMARTCARD (Standard)
	Configuration Software	CTSOF2 (Standard)
	RS232/485 Comms Cable	CT-COMMS-CABLE
	USB Comms Cable	CT-USB-CABLE
Operator Interface	Keypad to Drive Cable	SP-LCD-485-XXX
	LCD display	CGP-KEYPAD-PLUS
Power Accessories	HMI Operator Interfaces	See Options and Accessories
	Internal EMC Filter	Standard
	External EMC Filter	See the Options & Accessories section
Braking Resistor		
Environmental Protection and Cable Management Options	Conduit boxes	See AC Options & Accessories
Input/Output	Extended I/O	SM-I/O-PLUS
	Extended I/O	SM-I/O-LITE
	Extended I/O	SM-I/O-32
	Extra I/O with RealTime Clock/Calendar	SM-I/O-TIMER
	120/240 Volt AC I/O	SM-I/O-120V
	Double Insulated Extended I/O	SM-I/O-PELV
	+24 VDC Protected I/O	SM-I/O-24V
Communications	Modbus RTU	Standard
	PROFIBUS DP	SM-PROFIBUS-DP
	DeviceNet	SM-DEVICENET
	CANopen	SM-CANOPEN
	Interbus-S	SM-INTERBUS
	Ethernet	SM-ETHERNET
	Ethernet (EtherCAT)	SM-ETHERCAT
Application Programming Software (IEC61131-3)	Ladder and function block programming	SYPTLITE

## COMMUNICATION MODULES\*

Standard Modbus RTU/RS485 - RJ45 connector.



## CONDUIT BOXES\*

Conduit gland plates for Commander SK, Commander GP20 and Unidrive SP (sizes 1-6) wall-mount drives.

For overall dimensions see the AC Options & Accessories section page 83.

\* For complete descriptions of the options listed here please refer to the Options and Accessories section at the end of the AC Drive section.

## Power Accessories

### INTERNAL DYNAMIC BRAKING RESISTORS

During deceleration, the mechanical energy stored in the spinning mass of the motor and load is converted to electrical energy, which recharges the drive's DC bus. Dynamic braking resistors provide a means of rapidly dissipating that energy so that the drive does not fault from overcharging the DC bus. The ohmic value and power rating of the braking resistor is a function of the drive type and size.



Size 1 Commander GP20 heatsink shown

A zero-space braking resistor is available for heatsink mounting on drive frame sizes 1 and 2. These resistors are designed for low-inertia loads commonly used in servo type applications. For higher-inertia loads, the heatsink mounted resistor may not have enough braking capacity, and a larger external resistor may be required. No thermal protection device is required with these heatsink mounted resistor packages.

Frame Size	DC Resistance	Power Rating	Order Code
1	75 Ω	50W	SM-HEATSINK-DBR1
2	37.5 Ω	100W	SM-HEATSINK-DBR2

(Drives Larger than Size 2 do not have this option)

### DYNAMIC BRAKING RESISTORS

#### E-STOP DUTY

E-Stop duty panel mounted and NEMA-1 DB resistors are designed for non-cyclic use where energy dissipation from an active drive is required.



#### CYCLIC DUTY

These heavy-duty kits have been designed to provide dynamic braking for cyclic and continuous braking applications.



*See the Options and Accessories section for details.*

### HUMAN MACHINE INTERFACE (HMI)

These operator interface units complement the product line by offering an easy way of accessing parameters and adding more programming power to your application. The following features make these screens a simple and impressive solution for you... and your customers:

- Graphical full color or monochrome touchscreens
- Menus, submenus, alarms, fault conditions
- Realtime trends and graphs
- Scheduling and background programs
- Modbus RTU and Modbus TCP/IP
- Import pictures and graphics
- Advanced Recipe capabilities



For more information, refer to the Accessories Section.

**When you need it FAST!**

One Week Shipment Standard

See the RapidPak pages in the Packaged Drives and Engineered Systems section for details.