Unidrive SP

The "Solutions Platform"
Universal AC Drive

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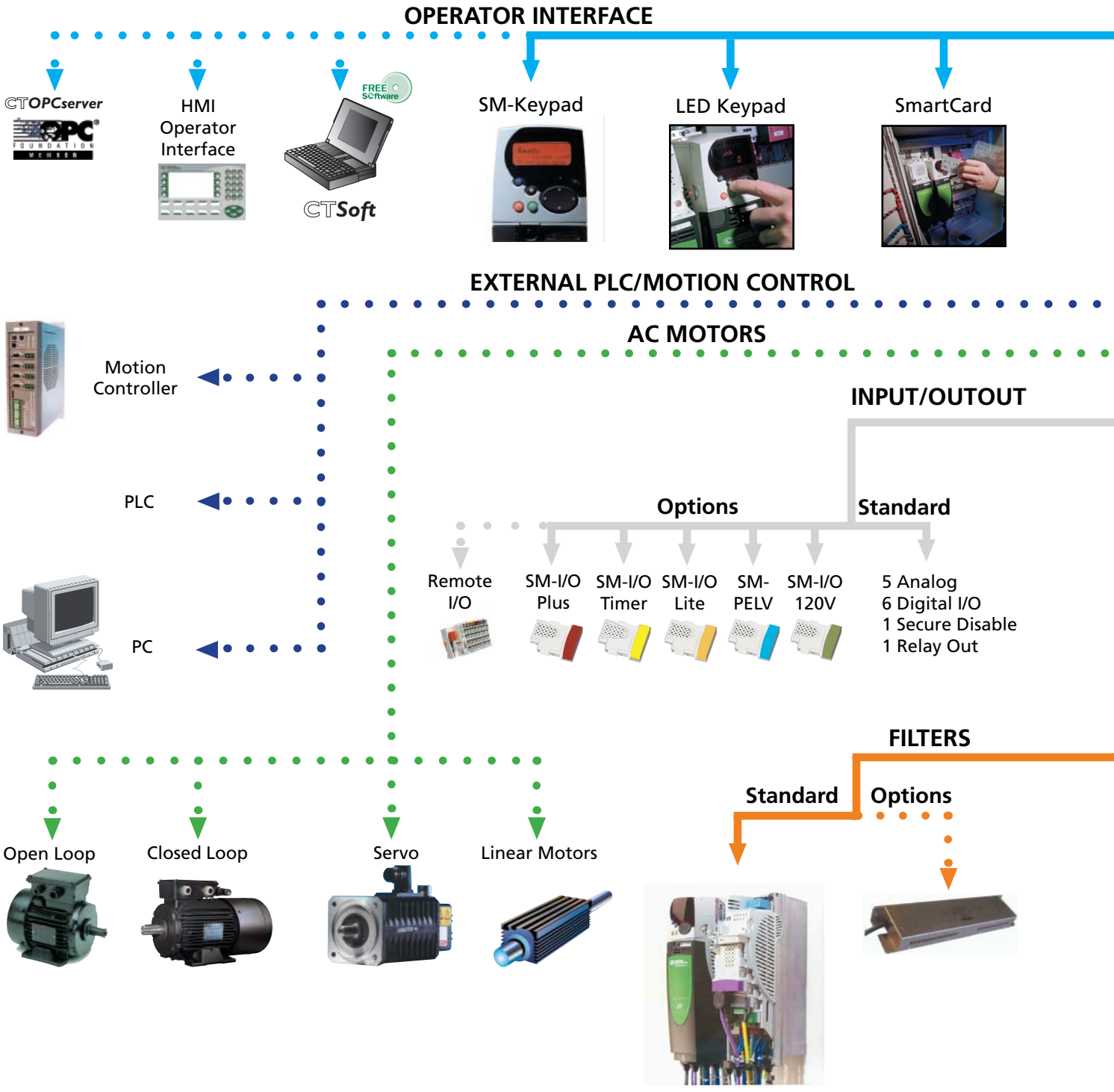
Introducing the Unidrive SP

Integration flexibility with Unidrive SP: The Solutions Platform

THE BENCHMARK

OVERVIEW



Applications with PLC or Motion functionality

SM-Applications Lite

OR

SM-Applications

SM-EZMotion

Programming Platform
PowerTools Pro
Motion Made Easy
Indexing
Gearing
Profiles

Programming Platform

SyPTLite OR SyPTPro (IEC61131-3)

PLC Functionality Features
Function Block Programming
Ladder Logic Sequencing

AND

Motion Functionality Features
Embedded Position Loop
Function Block Programming
Ladder Logic Sequencing

FEEDBACK

Standard

SinCos
Quadrature
Frequency/Direction
Clockwise/
Counter Clockwise

EnDat

HIPERFACE®

SSI

Options

SM-Universal Encoder Plus

Accepts or replicates all standard feedback types

SM-Encoder Plus

Quadrature

SM-Resolver

COMMUNICATIONS

Standard

Options

Modbus RTU

PROFIBUS

INTERBUS Certified No. 197

CAN

DeviceNet

Ethernet

CANopen

CNET

SERCOS interface

Unidrive SP
Solutions Platform

OVERVIEW

The Unidrive SP is **"The Benchmark"** for AC drive and servo controls in the automation industry. It is a truly scalable "Solutions Platform" with the flexibility to be personalized to customer requirements, and lower true total cost while maximizing productivity.

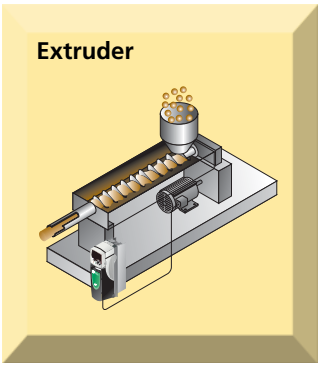
The Unidrive SP "Solution Platform" incorporates many cost saving and performance improvement features based on input from end users and OEMs. These include Secure Disable, Multiple Fieldbus capability, on-board EMC filter, Universal feedback device support, and the facility for up to three Solution Modules to tailor the drive to specific application needs. Open loop, closed loop vector, servo control modes make the Unidrive SP the ideal "Solutions Platform."

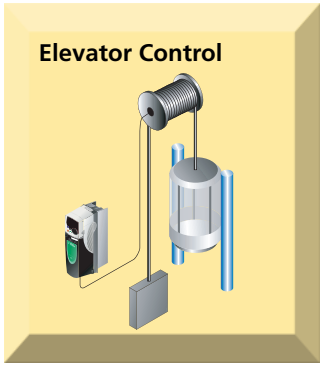
- **Universal Digital AC Drive**
- **1.0 to 40 HP, 3 phase, 208-230 VAC**
- **1.0 to 1000 HP, 3 phase, 380-460 VAC**
- **3.0 to 350 HP, 3 phase, 575 VAC**
- **25 to 400 HP, 3 phase, 690 VAC**
- **Higher HP systems available through paralleling -- See Engineered Systems**
- **Five operating modes with energy-saving Power Factor Control in Regen Mode***
- **Secure Disable for contactor elimination to EN954-1 cat 3**
- **SmartCard – Parameter and application program cloning and back up card**
- **Universal feedback interface supports up to 14 types of encoders**
- **High Resolution Analog Input (16 bit plus sign)**
- **RS485 Interface for PC connection**
- **Dual duty ratings: Normal and Heavy**
- **Three zero-space universal option slots**

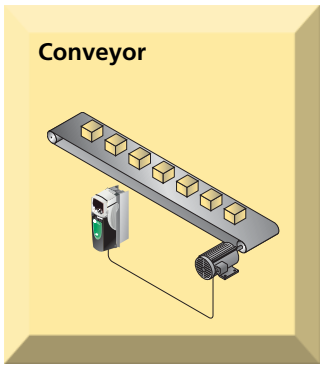
* Note: Additional components are necessary to produce a regen drive package.

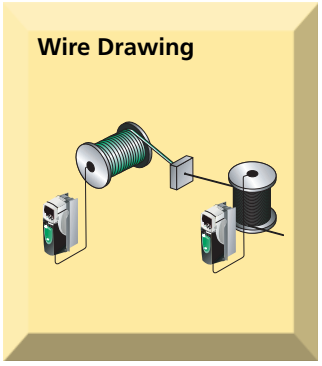
SOLUTIONS PLATFORM

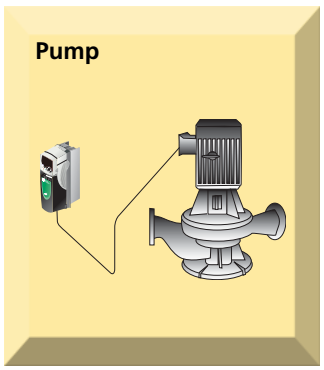
TYPICAL APPLICATIONS

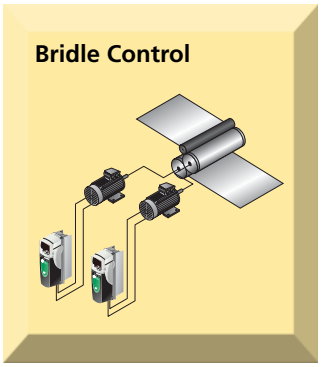












FEATURE
Peformance Advantage

THE BENCHMARK

Dual Duty Ratings–Normal and Heavy
Provides cost effective sizing choices for all applications.

48VDC Main Power Supply Input
Ideally suited for elevator rescue and machine tool set up.

24VDC Auxiliary Power Supply Input
Provides an additonal means of maintaining control, fieldbus and position loop on mains loss

Comprehensive Autotune
Inertia monitoring and static autotune reduce startup time.

Univeral Feedback Interface
Supports 14 different feedback configurations, including several absolute encoders. No need for additional components.

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, DeviceNet, CAN, CANOpen, Interbus-S and CTNet optional via zero-space SM modules. Up to four fieldbuses can connect to a single drive, eliminating the need for expensive gateways.

Three Universal Option Slots
Fieldbus, control and application SM modules fit in any of the three option slots beneath the drive cover.

Secure Disable Function
Conforms to IEC954-1 Category 3 for machine safety with system cost reduction.

SmartCard for Simple Setup and Cloning
Easy-to-use card stores drive configuration for simple startup and parameter cloning. Supplied free with Unidrive SP.

Keypad Options
Choose no keypad, LED keypad or LCD keypad based on the system design and operating environment.

Drive Mounted Brake Resistor
Unidrive SP sizes 1 and 2 feature a drive mounted brake resistor option to reduce panel space requirements.

Standard Features of the Unidrive SP

- *5 Operating modes: V/Hz, open loop vector, closed loop vector, servo, and regen*
- *Encoder feedback as standard (select from 14 types)*
- *Built-in shaft orientation mode*
- *Digital lock with adjustable ratio (frequency slaving)*
- *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*

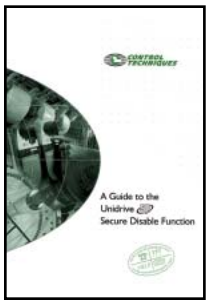
Feature Enhancements to Unidrive SP

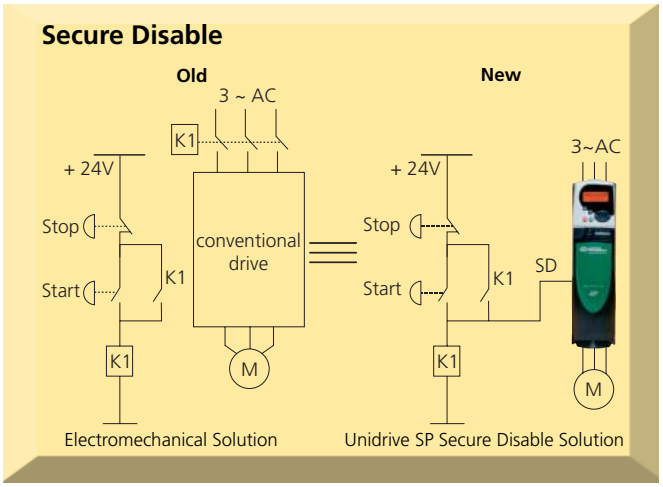
- *Output frequencies up to 3000Hz*
- *Intelligent Thermal Management (ITM) technology with switching frequencies up to 16kHz*

Unidrive SP - *Incorporating "Benchmark" Technologies*

SECURE DISABLE

The Unidrive SP Secure Disable function meets the requirements of EN954-I : category 3 for machine safety, and can serve as a part of a category 4 application. Control Techniques' Secure Disable safety solution has been independently verified by the German safety organization, BIA. This exclusive feature of the Unidrive SP saves money and space. Under many conditions, this standard feature eliminates the need for safety contactors by utilizing secure circuitry to prevent the motor shaft from being driven by the drive.

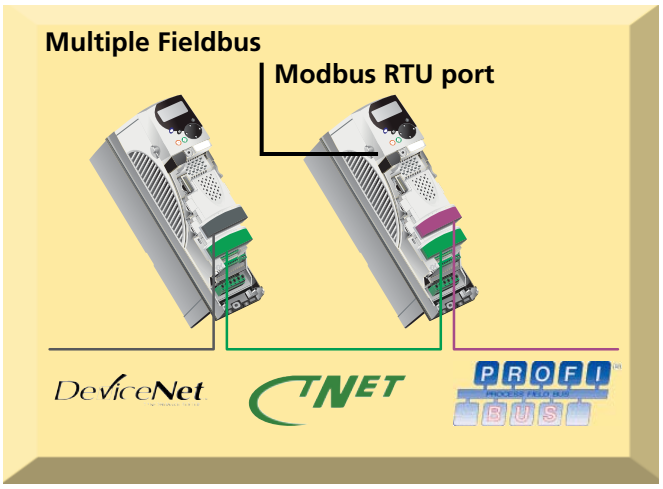




MULTIPLE FIELDBUS CAPABILITY

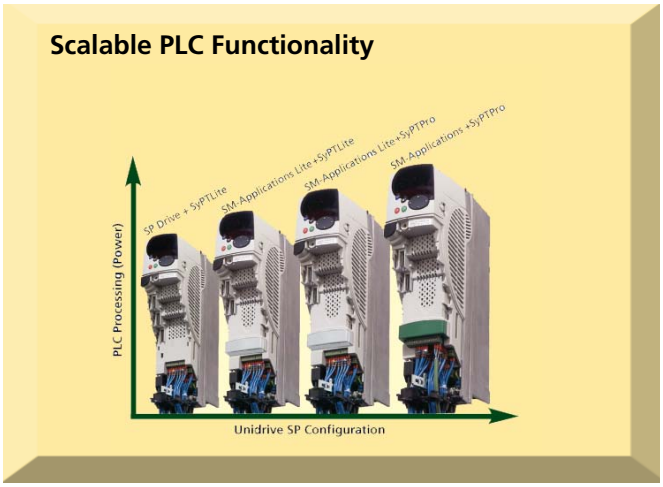
The Unidrive SP provides unrivaled fieldbus flexibility. In addition to the standard Modbus RTU port, up to three fieldbus option modules can be installed in the Unidrive SP's option slots. This provides the capability to control and monitor a Unidrive SP on multiple fieldbus networks. For example, a single Unidrive SP can be configured to communicate on both DeviceNet and Profibus networks simultaneously.

In the example shown, CTNet is used to provide real-time coordination between two Unidrive SP modules. The DeviceNet and Profibus connections allow data to be passed to/from the controllers in a machine line.



PLC FUNCTIONALITY WITH UNIDRIVE SP

In addition to the extensive drive configuration capabilities of the Unidrive SP, scalable programming is available to solve virtually any application requirement. Simple logic function programming is achieved using SyPTLite software and the drive's built in PLC. More complex systems can be solved by adding SM-Applications Lite (with SyPTLite or SyPTPro) and SM-Applications (SyPT only) option modules.



SM-Applications

SM-Applications Lite

RATINGS: *SELECT MODEL BASED ON ACTUAL MOTOR FULL LOAD CURRENT*

The Unidrive SP platform is available as wall mount drives or free standing drives.

Wall Mount Drives - Drives from 1 to 200 HP used for any AC Drive application. Shipped as drive only, and to be mounted into customer machine enclosure with other power/control components.

Free Standing Drives - Pre-Engineered drive packages from 150-1000hp in IP20 enclosure (standard), perfect for many standard applications (i.e. fans, pumps, conveyors, etc.)

Wall Mount Drives are available in six frame sizes

WALL MOUNT DRIVES RATINGS

Unidrive SP		Motor HP	Continuous Output Current	Peak Output Current	Motor HP	Continuous Output Current	Peak Output Current	Peak Output Current
208/230VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 230V	I_N (A)	(A)	HP @ 230V	I_H (A)	Open loop (A)	Closed loop (A)
SP1201-XXX	1	1.5	5.2	5.7	1	4.3	6.4	7.5
SP1202-XXX		2	6.8	7.5	1.5	5.8	8.7	10.1
SP1203-XXX		3	9.6	10.6	2	7.5	11.3	13.1
SP1204-XXX		3	11	12.1	4	10.6	15.9	18.5
SP2201-XXX	2	5	15.5	17.0	4	12.6	18.9	22.0
SP2202-XXX		7.5	22	24.2	5	17	25.5	29.7
SP2203-XXX		10	28	30.8	7.5	25	37.5	43.7
SP3201-XXX	3	15	42	46.2	10	31	46.5	54.2
SP3202-XXX		20	54	59.4	15	42	63	73.5
SP4201-XXX	4	25	68	74.8	20	56	84	98
SP4202-XXX		30	80	88	25	68	102	119
SP4203-XXX		40	104	114.4	30	80	120	140

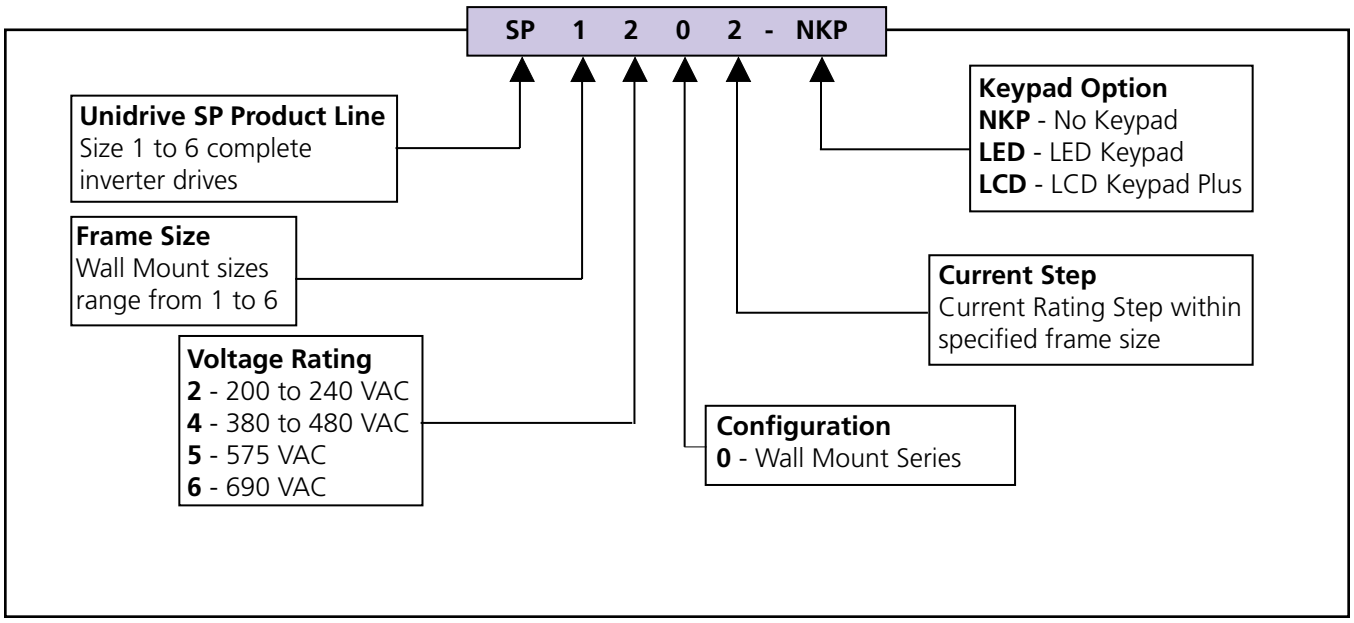
Note: Motor horsepower ratings are based on typical motor current ratings. Actual motor currents should be checked before selecting a particular drive. For some high efficiency motors, the required full load motor current may allow the selection of a smaller drive than is indicated in the chart. The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

Normal Duty	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 over loads are achieved.	**Heavy Duty**	Suitable for demanding applications, current overload is set at up to 175% for 40 seconds. Where motor rated current is less than the drive rated continuous current, higher overloads (200% or greater) are achieved.

WALL MOUNT DRIVES RATINGS *(continued)*

Unidrive SP		Motor HP	Continuous Output Current	Peak Output Current	Motor HP	Continuous Output Current	Peak Output Current	Peak Output Current
380/480VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 460V	I_N (A)	(A)	HP @ 460V	I_N (A)	Open loop (A)	Closed loop (A)
SP1401-XXX	1	1.5	2.8	3.0	1	2.1	3.1	3.6
SP1402-XXX		2	3.8	4.1	2	3	4.5	5.2
SP1403-XXX		3	5	5.5	3	4.2	6.3	7.3
SP1404-XXX		5	6.9	7.5	4	5.8	8.7	10.1
SP1405-XXX		5	8.8	9.6	5	7.6	11.4	13.3
SP1406-XXX		7.5	11	12.1	5	9.5	14.2	16.6
SP2401-XXX	2	10	15.3	16.8	10	13	19.5	22.7
SP2402-XXX		15	21	23.1	10	16.5	24.7	28.8
SP2403-XXX		20	29	31.9	15	25	34.5	40.2
SP2404-XXX		20	29	31.9	20	29	43.5	50.7
SP3401-XXX	3	25	35	38.5	25	32	48	56
SP3402-XXX		30	43	47.3	30	40	60	70
SP3403-XXX		40	56	61.6	30	46	69	80.5
SP4401-XXX	4	50	68	74.8	50	60	90	105
SP4402-XXX		60	83	91.3	60	74	111	129.5
SP4403-XXX		75	104	114.4	75	96	144	168
SP5401-XXX	5	100	138	151.8	100	124	186	217
SP5402-XXX		150	168	184.8	125	156	234	273
SP6401-XXX	6	150	202	222.2	150	180	231	269
SP6402-XXX		200	236	259.6	150	210	270	315

Unidrive SP Wall Mounted Drives Order String



WALL MOUNT DRIVES RATINGS *(continued)*

Unidrive SP		Motor HP	Continuous Output Current	Peak Output Current	Motor HP	Continuous Output Current	Peak Output Current	Peak Output Current
575VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 575V	I_N (A)	(A)	HP @ 575V	I_H(A)	Open loop (A)	Closed loop (A)
SP3501-XXX	3	5	5.4	5.9	3	4.1	6.1	7.1
SP3502-XXX		5	6.1	6.7	5	5.4	8.1	9.4
SP3503-XXX		7.5	8.4	9.2	5	6.1	9.1	10.6
SP3504-XXX		10	11	12.1	7.5	9.5	14.2	16.6
SP3505-XXX		15	16	17.6	10	12	18	21
SP3506-XXX		20	22	24.2	15	18	27	31.5
SP3507-XXX		25	27	29.7	20	22	33	38.5
SP4603-XXX	4	30	36	39.6	25	27	40.5	47.3
SP4604-XXX		40	43	47.3	30	36	54	63
SP4605-XXX		50	52	57.2	40	43	64.5	75.3
SP4606-XXX		60	62	68.2	50	52	78	91
SP5601-XXX	5	75	84	92.4	60	62	93	108.5
SP5602-XXX		100	99	108.9	75	84	126	147
SP6601-XXX	6	125	125	137.5	100	100	130	150
SP6602-XXX		150	144	158.4	125	125	162.5	187.5

Unidrive SP		Motor HP	Continuous Output Current	Peak Output Current	Motor HP	Continuous Output Current	Peak Output Current	Peak Output Current
690VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 690V	I_N (A)	(A)	HP @ 690V	I_H (A)	Open loop (A)	Closed loop (A)
SP4601-XXX	4	25	22	24.2	20	19	28.5	33.3
SP4602-XXX		30	27	29.7	25	22	33	38.5
SP4603-XXX		40	36	39.6	30	27	40.5	47.3
SP4604-XXX		50	43	47.3	40	36	54	63
SP4605-XXX		60	52	57.2	50	43	55.7	75.2
SP4606-XXX		75	62	68.2	60	52	67.6	91
SP5601-XXX	5	100	84	92.4	75	62	93	108.5
SP5602-XXX		125	99	108.9	100	84	126	147
SP6601-XXX	6	150	125	137.5	125	100	128	149
SP6602-XXX		175	144	158.4	150	125	160	187

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	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 over loads are achieved.	**Heavy Duty**	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.

Unidrive SP

Free-standing cubicle drives

OVERVIEW

THE BENCHMARK

The Unidrive SP Free-standing AC cubicle drives extend the power range of "**the Benchmark"** solution platform to 1000hp, while providing users with the same integration options as the standard, wall-mount Unidrive SP . Packaged in an IP20 cubicle, these Free-standing drive cublices deliver maximum horsepower density for physical size, and include rectifier, inverter and inductor.

In addition, an "Incomer" cubicle is available to integrate fuse switch/MCCB etc., and an "Application" cubicle is available for additional control and equipment, i.e., a PLC., providing a complete, packaged solution.

Cubicle Dimensions	W		H		D	
	in	mm	in	mm	in	mm
All	15.74	400	87.12	2213	23.62	600

Unidrive SP Free Standing Drives Order String

SP 7 4 1 2 - LED

Unidrive SP Product Line
Size 6 to 9 complete Free Standing inverter drives

Frame Size
Free Standing sizes range from 6 to 9

Voltage Rating
4 - 380 to 480 VAC
5 - 575 VAC
6 - 690 VAC

Configuration
1 - Free Standing Series

Current Step
Current Rating Step within specified frame size

Keypad Option
NKP - No Keypad
LED - LED Keypad
LCD - LCD Keypad Plus

FREE STANDING DRIVES RATINGS

Unidrive SP		Motor HP	Continuous Output Current	Peak Output Current	Motor HP	Continuous Output Current	Peak Output Current	Peak Output Current
460VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 460V	I_N (A)	(A)	HP @ 460V	I_H (A)	Open loop (A)	Closed loop (A)
SP6411-XXX	6	150	205	226	150	180	232	270
SP6412-XXX		200	236	260	150	210	271	315
SP7411-XXX	7	250	290	319	200	240	307	357
SP7412-XXX		280	335	369	250	290	371	435
SP8411-XXX	8	300	389	428	280	333	432	503
SP8412-XXX		400	450	495	300	388	502	584
SP8413-XXX		450	545	600	400	440	581	675
SP8414-XXX		500	620	682	450	540	703	818
SP9411-XXX	9	600	690	759	500	620	800	930
SP9412-XXX		700	790	869	600	688	882	1026
SP9413-XXX		800	900	990	700	770	1019	1185
SP9414-XXX		900	1010	1111	800	850	1125	1305
SP9415-XXX		1000	1164	1280	900	990	1303	1515
575VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 575V	I_N (A)	(A)	HP @ 575V	I_H (A)	Open loop (A)	Closed L. A
SP6611-XXX	6	100	125	137	75	100	130	150
SP6612-XXX		150	144	158	100	125	162	187
SP7611-XXX	7	150	168	184	150	144	203	233
SP7612-XXX		200	192	211	150	168	236	272
SP8611-XXX	8	250	231	254	200	186	262	301
SP8612-XXX		250	266	292	250	231	325	374
SP8613-XXX		300	311	342	250	266	375	430
SP8614-XXX		350	355	390	300	311	438	503
690VAC		Normal Duty			Heavy Duty			
Order Code	Frame	HP @ 660V	I_N (A)	(A)	HP @ 660V	I_H (A)	Open loop (A)	Closed loop (A)
SP6611-XXX	6	150	125	137	125	100	130	150
SP6612-XXX		150	144	158	150	125	162	187
SP7611-XXX	7	200	168	184	150	144	203	233
SP7612-XXX		200	192	211	200	168	236	272
SP8611-XXX	8	200	231	254	200	186	262	301
SP8612-XXX		300	266	292	250	231	325	374
SP8613-XXX		350	311	342	300	266	375	430
SP8614-XXX		400	355	390	350	311	438	503

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	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 over loads are achieved.	**Heavy Duty**	Suitable for demanding applications, current overload is set at up to 175% for 40 seconds (150% on Size 6 and above). Where motor rated current is less than the drive rated continuous current, higher overloads (200% or greater) are achieved.

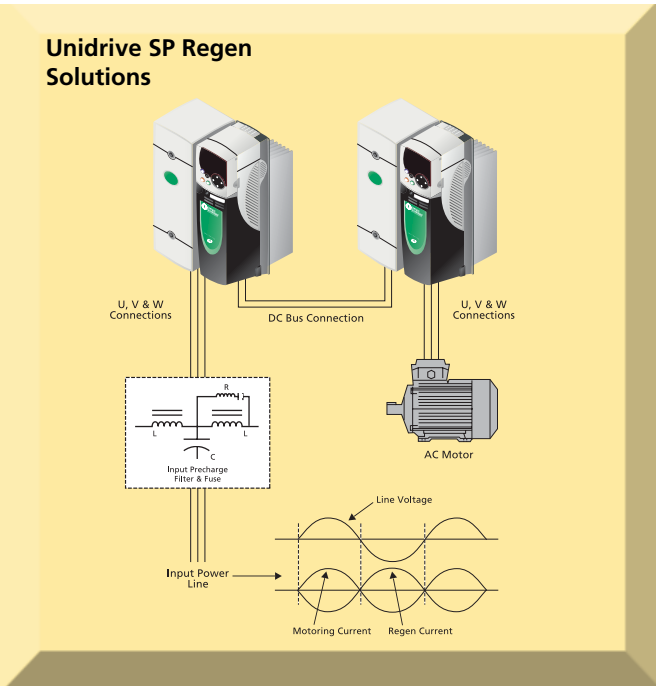
UNIDRIVE SP REGEN MODE

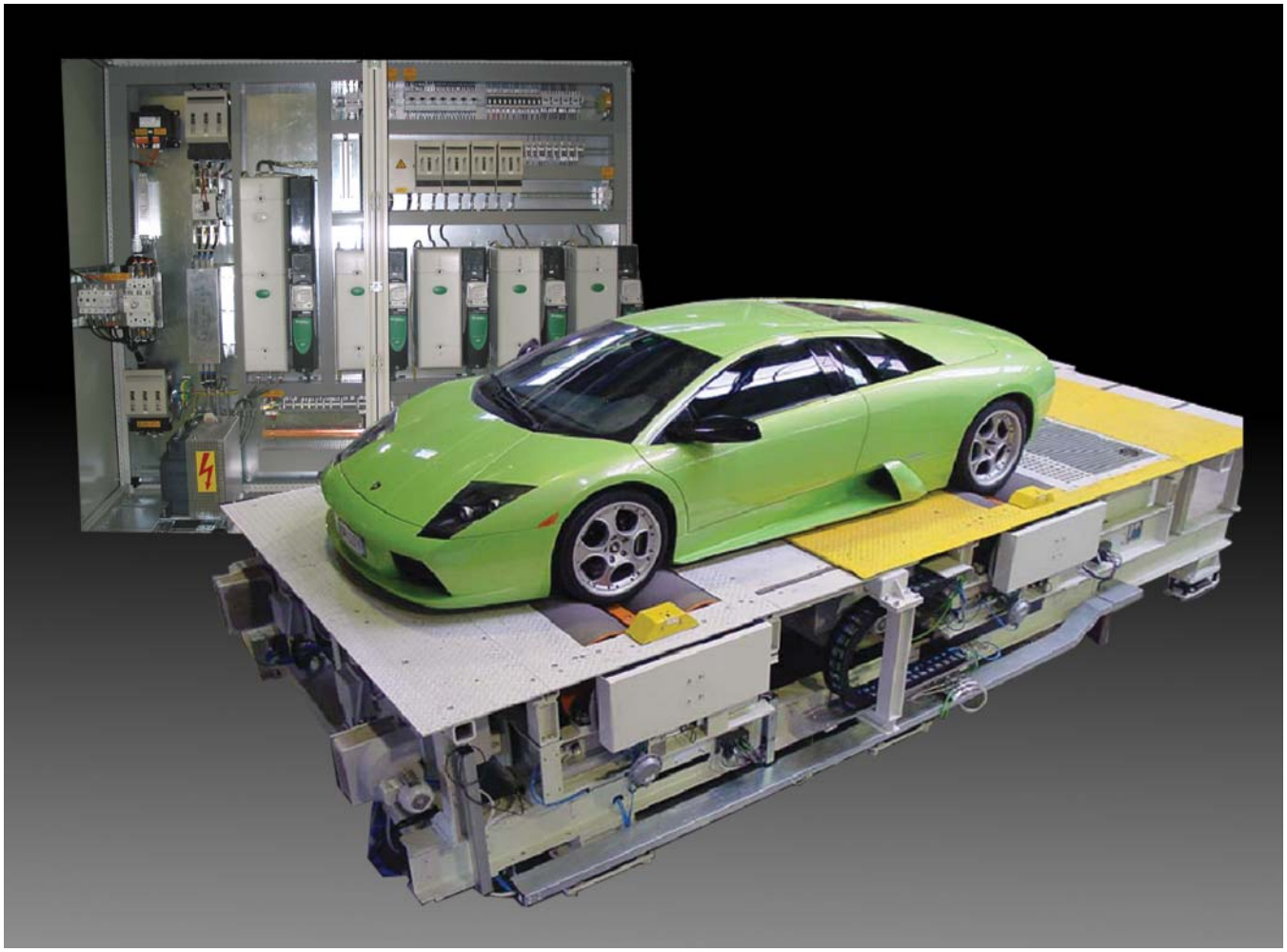
Unidrive SP can be configured to provide full four-quadrant control of the power or drive system. In regen mode, the Unidrive is capable of either supplying power to the DC bus of the Unidrive controlling the motor or removing power from the DC bus of the Unidrive controlling the motor and returning it back to the supply.

- Unity or controllable Input Power Factor
- Sinusoidal Input Current (Low Harmonic Content)

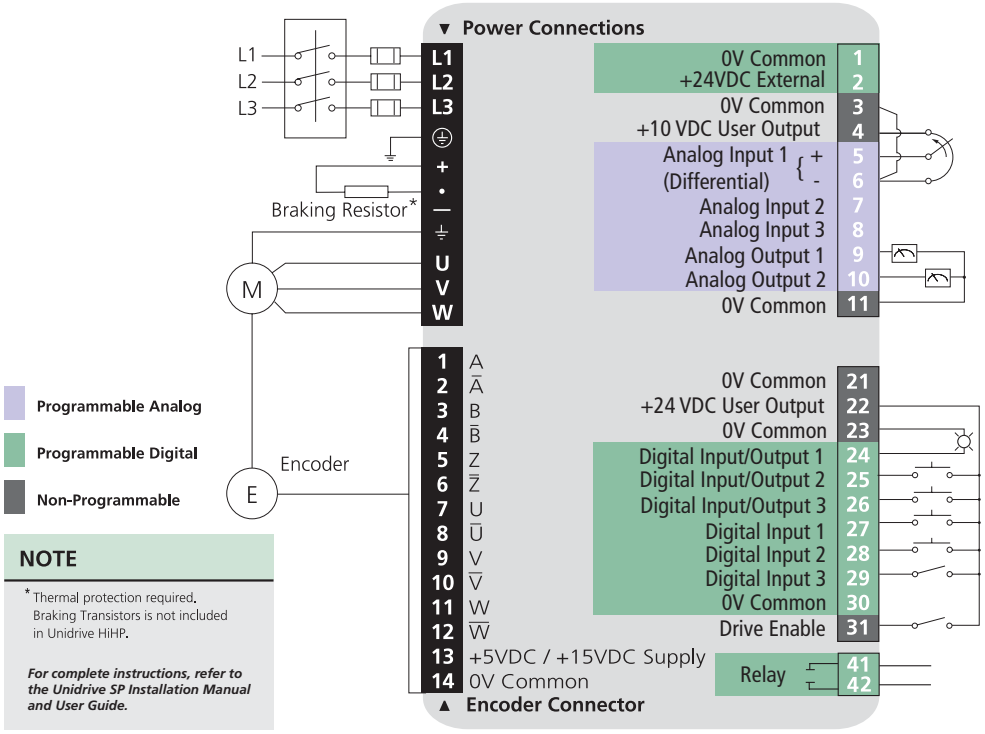
The Control Techniques Engineered Systems builds four-quadrant regenerative systems for use in many applications, where clean, sinusoidal power can be put back to AC supply. See page 192 for Engineered Systems.

Whether it is cranes and hoists or sophisticated test rigs requiring pure sinosoidal regenerative output, Control Techiques has your regen solution.





TERMINAL DIAGRAM



NOTE

* Thermal protection required. Braking Transistors is not included in Unidrive HiHP.

For complete instructions, refer to the Unidrive SP Installation Manual and User Guide.

TERMINAL DESCRIPTION

Pin#	Function ①	Type/Description	Notes
1	0V Common		
2	+24VDC External Input	Back up Power Supply for Control	60W, 24 VDC
3	0V Common	Common for External Analog Devices	
4	+10VDC 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 100k Ohms
6	Analog Input 1 (Local Frequency/Speed Reference)	Differential Analog Input, Inverting Input 16 bit	±10 VDC 100k Ohms
7	Analog Input 2 (Remote Frequency/Speed Reference)	Single-ended Analog Input 10 bit	±10 VDC, 100k Ohms or 4-20 mA, 200 Ohms ②
8	Analog Input 3	Single-ended Analog Input 10 bit	±10 VDC, 100k 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	+24VDC 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) 100 mA max output	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, 7.5k Ohms
28	Digital Input (Local/Remote)	Digital Input	0 to 24 VDC, 7.5k Ohms
29	Digital Input (Jog)	Digital Input	0 to 24 VDC, 7.5k Ohms
30	0V Common	Common for External Digital Inputs	
31	Digital Input (Secure Disable)	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

Programmable Analog Programmable Digital All Analog I/O is scalable

① Values in (parenthesis) designate default functions.
② 0-20, 4-20 mA modes are also available. See Unidrive SP Manual.

SPECIFICATIONS

Environment

Ambient Operating Temperature	0° to 40°C (32° to 104°F) 0° to 50°C (32° to 122°F) with derating
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 3000m (9,900 ft). Derate 1% per 100m (328 ft) between 1000m (3280 ft) and 3000m (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 240VAC ±10% 380 to 480VAC ±10% 500 to 575VAC ±10% 500 to 690VAC ±10%
Phase	3Ø
Phase Imbalance Tolerance	2% negative phase sequence (equivalent to 3% voltage imbalance between phases)
Frequency	48 to 65Hz
Input Displacement Power Factor	0.93

Control

Carrier Frequency	3, 4, 6, 8, 12,16kHz
Output Frequency	0 to 3000Hz (Open loop)
Output Speed	0 to 40,000 RPM (Closed loop)
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 or 4-wire RS232 or 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

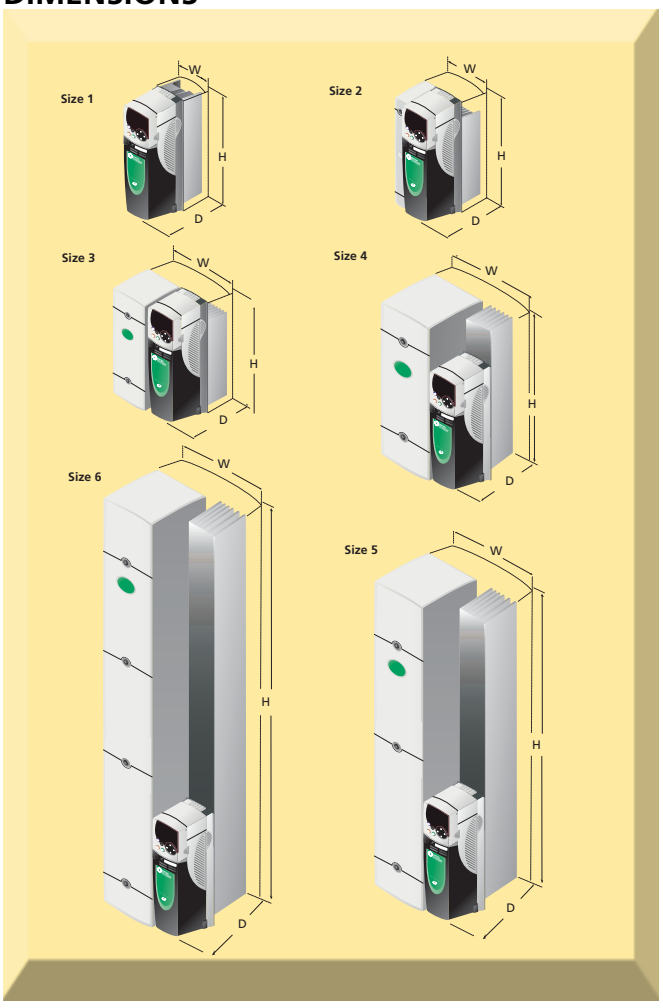
Protection

DC Bus Undervoltage Trip	175 / 350 / 435VDC (approximately 124 / 247 / 307VAC line voltage)
DC Bus Overvoltage Trip	415 / 830 / 990VDC (approximately 293 / 587 / 700VAC line voltage)
MOV Voltage Transient Protection	160 Joules, 1400VDC 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
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
VDE	Meets VDE Electromagnetic Emissions Standards
ISO 9002	Certified Manufacturing Facility

DIMENSIONS



Frame Size	H		W		D		Weight	
	in	mm	in	mm	in	mm	lb	kg
1	15.20	386	3.93	100	8.62	219	12.8	5.8
2	15.32	389	6.10	155	8.62	219	15.4	7.0
3	15.32	389	9.84	250	10.23	260	33.1	15.0
4	21.53	547	12.20	310	11.73	298	66.1	30.0
5	33.75	857	12.20	310	11.73	298	121.3	55.0
6	46.02	1169	12.20	310	11.73	298	165.3	75.0

For through-panel mounting dimensions or dimensions of size 6, 7, 8 and 9 Free Standing Drives, contact your local Drive Center