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V★S DRIVES

MinPak™ Plus D-C Drive

Single-Phase 1/4-5 HP

The proven stock answer for the toughest single-phase D-C drive applications.

This low horsepower D-C V★S Drive package combines many technological advances in drive design with application versatility never before available from stock single-phase D-C drives. With MinPak Plus Drives you get the standard features you need and the options and modification kits to meet your specific application requirements now or in the future. What's more, you get them from stock.

MinPak Plus Drives feature proven electronic components which significantly improve drive functions, reliability and overall performance. These include custom Large Scale Integrated (LSI) circuits and a modular power cube that is doubly protected by a circuit breaker and MOV surge suppressor. A relay prevents uncontrolled restarts after power outages.

A variety of modification kits allow you to tailor these drives to your specific application requirements. They can be installed quickly by your Reliance authorized distributor, your own personnel or at the factory.

Standard NEMA 4/12 enclosures are designed to accommodate any combination of kits – one, two or all of them – using only a screwdriver. In addition to meeting the washdown requirements of NEMA 4, these enclosures meet U.S. Food and Drug Administration food environment specifications. All enclosures are resistant to a broad range of solvents, acids and alkalis for a rugged water and oil-tight package.

Enclosure bases are made of cast aluminum and covers are molded of glass-reinforced, flame-retardant polyester – built tough to take years of hard service. Raised rails on the controller face help prevent accidental brush-up against critical knobs and switches.

Controller-mounted, operator controls are available in eight different models. Optional NEMA rated types 1, 3R, 4, 4X and 12 operator controls are also available for remote operation.

Every MinPak Plus Drive package comes complete with a power-matched Reliance® D-C Motor.



Choose from a broad selection of permanent magnet or wound field designs with the right base speed and enclosure to meet your requirements.

Standard Features

- Compact, protected enclosure is standard
- U.L. certified NEMA 4/12 controller design keeps out dust, oil and liquids for maximum drive reliability.
- FDA approved enclosure
- Application versatility with optional kit selection. Kits plug in to controller for ease of use.
- Increased performance capabilities
- Easy installation and service
- 50/60 Hz for worldwide application
- Enclosures can be wall mounted vertically or horizontally for installation flexibility.
- Fully regenerative, four-quadrant models provide contactorless reversing as well as hold-back torque capability.
- Controller is easily convertible to chassis mount for fast, space-saving installation in other equipment or cabinets.
- Power matched with Reliance D-C motors for optimum performance.
- Field supply for motor shunt field (2–5 HP)

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MinPak Plus Means More Flexibility

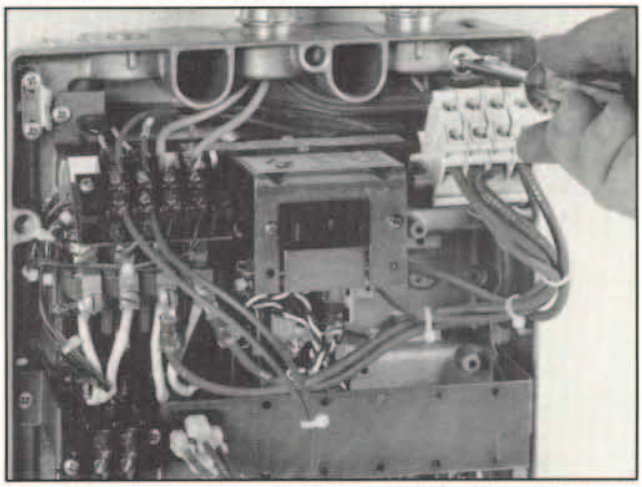
More Standard Features

- Minimum and maximum speed, acceleration rate, deceleration rate, current limit and IR compensation (non-regenerative controllers) are easily adjustable for increased application flexibility.
- Full-wave, full-control conversion for smooth, efficient operation and high performance.
- Power semi-conductors are contained in easily replaceable power cubes to speed service and maintenance.
- Built-in surge suppressor protects semi-conductors from line transients for higher reliability.
- Circuit breaker eliminates fuse replacement for reduced service and maintenance requirements.
- Relay in control circuit prevents automatic restarting after power outage.
- Isolated voltage and current feedbacks for improved drive reliability and versatility.
- Current limit control protects the drive and driven machine from damaging current or torque levels for improved reliability.
- Motor armature contactor disconnects power to the drive motor.
- Armature loop D-C circuit breaker protects equipment against inverting faults (regenertive controllers only).

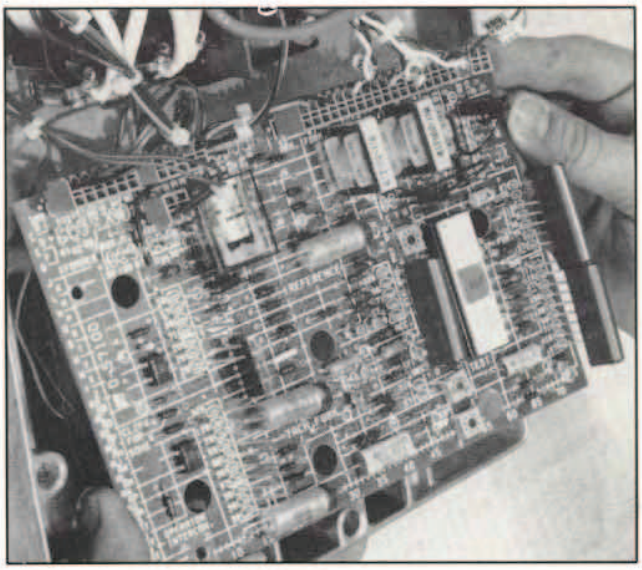
Easy Installation and Service

MinPak Plus Drives are designed for easy installation to save time and money and provide years of dependable service. Threaded input power entries are provided for top conduit entry. Enclosure knockouts are cast and wire entry is made directly to incoming power terminations. Sufficient space has been allowed around all power terminals to assure working room and fast, easy installation of plug-in kits.

Keeping these drives operating reliably and long is simplicity itself. Modular construction makes troubleshooting easy, so components can be removed for repair or replacement in minutes. All leads disconnect quickly and simply by means of plug connectors. All replaceable components are easily accessible without groping around or fighting other components.



Power leads fall straight to incoming terminations with ample room for wiring. Threaded input power entries for top conduit entry enable you to get your equipment in service quickly with just a screwdriver.



Modular design allows for easy troubleshooting so components can be removed for repair or replacement quickly.

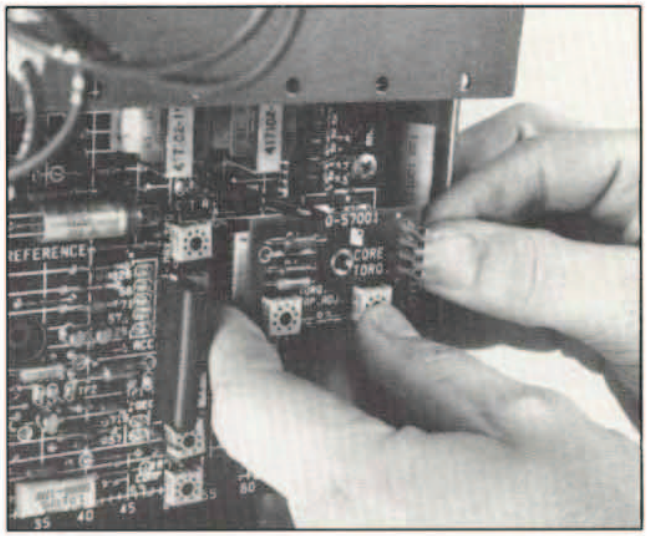
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Plug-In Kit Versatility

Optional Features

All modification kits and accessories are UL listed and available CSA certified.

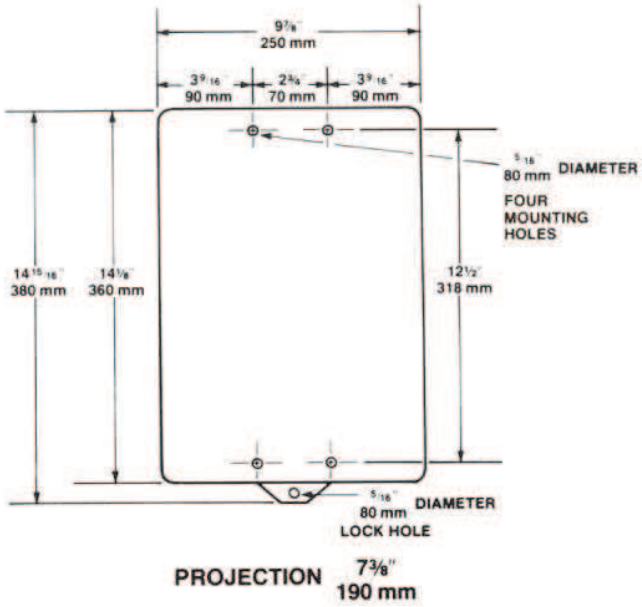
- Remote Operator Adapter Kit for buffering and filtering of external signals when drive is operated by remote control.
- Dynamic Braking Kit for applications requiring quick motor stops.
- Reversing Contactor Kit provides fast change of motor rotation by selector switch. (Non-regenerative controllers)
- Double Pole Circuit Breaker Kit provides capability to remove all voltages from the control circuits. (Standard on regenerative controllers)
- Tachometer Feedback Kit for applications requiring accuracy of speed regulation to 0.5% with 95% load change with specified tachometer. (Standard on regenerative controllers)
- Voltage Follower Kit allows the drive to follow an external D-C voltage signal.
- Instrument Interface/Preset Speed Kit for applications where drive speed is controlled by a process controller over a speed range, or when an adjustable preset speed is desired.
- Field Supply Kit for applications requiring the use of a wound field D-C motor. (Standard on 3 and 5 HP controllers)
- Test Meter Adapter Kit for measuring controller and regulator signal voltages with a voltmeter.
- Automatic Reversing Kit provides an automatic reverse-direction capability. (Non-regenerative controllers only)
- Auxiliary Contact Kit for applications where an interconnection with external signaling devices is required or desired.
- Torque Taper Kit for changing speed-torque relationship to allow motor speed decrease as the load increases. (Non-regenerative controllers only)
- Separate NEMA rated types 1, 3R, 4, 4X and 12 operator control stations available for remote operation of the drive.
- Variety of local operator stations to meet controller operating requirements. Optional remote operator control stations rated for NEMA duty are also available.
- Controller available CSA certified.



Sufficient work room around all power terminals assures fast, easy installation of plug-in kits.

Engineering Data

Dimensions in Inches and Millimeters



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Controller Selection

Drive Rating		Non-Regenerative Controller		Regenerative Controller	
HP	A-C Input (Volts)	Cabinet	Chassis	Cabinet	Chassis
1/4–3/4	115	14C10	14C20	14C30	14C40
1/2–1-1/2	230	14C11	14C21	14C31	14C41
2–3	230	14C12	14C22	14C32	14C42
5	230	14C13	14C23	14C33	14C43

Controller Ratings

Motor HP	115 Volt A-C Input / 230 Volt A-C Input					
	Rated A-C Line (1) Amperes	Input KVA	D-C Armature Voltage	Rated Armature Current (Amperes)	Avail-able Field Voltage (2)	Available Field Current (Amperes) (2)
1/4	3.5	.40	90	2.5	100	3.0
	–	–	–	–	–	–
1/3	5.2	.60	90	3.7	100	3.0
	–	–	–	–	–	–
1/2	7.0	.81	90	5.0	100	3.0
	3.5	.81	180	2.5	200	3.0
3/4	10.5	1.20	90	7.5	100	3.0
	5.2	1.20	180	3.7	200	3.0
1	–	–	–	–	–	–
	7.0	1.61	180	5.0	200	3.0
1-1/2	–	–	–	–	–	–
	10.5	2.42	180	7.5	200	3.0
2	–	–	–	–	–	–
	14.0	3.22	180	10.0	200	3.0
3	–	–	–	–	–	–
	21.0	4.83	180	15.0	200	3.0
5	–	–	–	–	–	–
	35.0	8.05	180	25.0	200	3.0

(1) Includes Motor Field Current

(2) Stated with optional Field Supply Kit. Standard on 2, 3 and 5 HP models.

Service Conditions

Elevation . . . . . Up to 3300 feet (1000 meters)
Ambient Temperatures
– Enclosed Models . . . . . 32°F to 104°F (0°C to 40°C)
– Chassis Models . . . . . 32°F to 131° (0°C to 55°C)
Atmosphere . . . . . Non-condensing relative humidity 5% to 95%
A-C Line Voltage Variation . . . . . ±10% of rated voltage
A-C Frequency . . . . . 48 to 62 Hz

Application Data

Service Factor 1.0
Maximum Load . . . . . 150% for 1 minute
Speed Regulation (95% load change):
– Voltage Feedback (1) 1-2%
– Tachometer Feedback (2) . . . . . 1% or 0.5%
Speed Range
– Voltage Feedback (1) 20:1
– Tachometer Feedback (2) 30:1

(1) Non-regenerative controllers

(2) Standard on regenerative controllers

Adjustments

Maximum Speed (Percent of rated) . . . . . 50 to 100%
Minimum Speed (Percent of rated) . . . . . 10 to 50%
Current Limit (Percent of rated) . . . . . 10 to 150%
IR Drop Compensation . . . . . 0 to 12%
Acceleration Rate . . . . . 0.5 to 30 seconds linear
Deceleration Rate . . . . . 0.5 to 30 seconds linear

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Note: This material is not intended to provide operational instructions. Appropriate Reliance Electric Industrial Company instruction manuals and precautions should be studied prior to installation, operation or maintenance of equipment.

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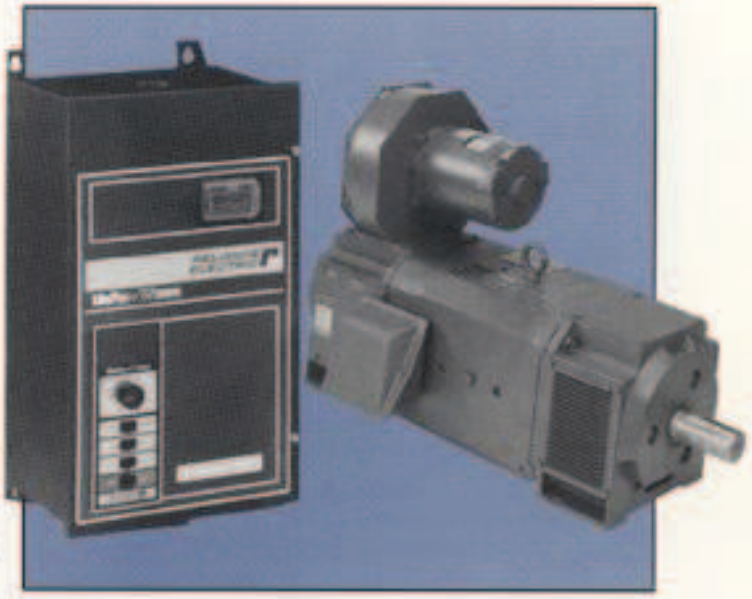
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V★S DRIVES

MinPak™ Plus

Three-Phase
3-40 HP



The stock answer for three-phase D-C adjustable speed drive applications.

This medium horsepower V★S Drive package combines the latest technological advances in drive design with versatility for a wide variety of industrial applications.

We took all the key features of the MinPak Plus, teamed them up with the RPM™ III D-C Motor and extended the horsepower rating to 40 HP. You get all the standard features you need and all the options and modification kits necessary to answer your specific application requirements. What's more, you get them from stock, in a product listed and approved for use virtually anywhere in the world. That's adaptability – PLUS!

MinPak Plus Drives feature proven electronic components which significantly improve drive functions, reliability and overall performance. These include custom circuits and a modular Power Cube that's doubly protected by a circuit breaker and a MOV surge suppressor. A relay prevents uncontrolled restarts after power outages.

MinPak Plus controllers are available immediately from the largest stock of adjustable speed drives in the industry. A variety of modification kits to tailor these drives to your specific application requirements can be installed quickly by your Reliance Authorized Distributor, your own personnel or at the factory.

Standard enclosures are designed to accommodate any combination of kits – one, two or all of them – using only a screwdriver. Optional operator control station in a single NEMA rated types 1, 3R, 4, 4X and 12 enclosure is available for remote operation.

Every MinPak Plus Drive package comes complete with a Reliance Electric RPM III D-C Motor. Choose from a broad selection of designs with the right base speed and enclosure to meet your requirements.

Standard Features

- NEMA 12 enclosure minimizes entry of dust, oil and liquids for added drive reliability.
- Enclosures can be wall mounted.
- Application versatility with optional kit selection. Kits plug into controller quickly and easily.
- Increased performance capabilities
- Easy installation and service
- 50/60 Hz for worldwide application
- Full-wave, full-control conversion for smooth, efficient operation and high performance.
- Isolated voltage and current feedbacks for drive reliability and versatility.
- Power matched with Reliance® RPM III D-C motors for optimum performance.
- Field potential supply for motor shunt field excitation.
- Minimum and maximum speed, acceleration rate, deceleration rate, current limit and IR compensation are easily adjustable for increased application flexibility.
- Power semi-conductors are contained in easily replaceable power cubes to speed service and maintenance.
- Built-in surge suppressor helps protect semi-conductors from line transients for higher reliability.

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MinPak Plus Means Maximum Versatility

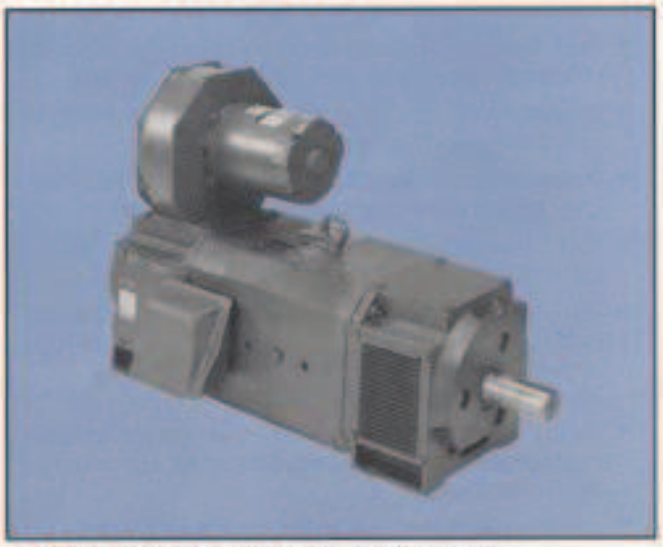
More Standard Features

- Relay in control circuit prevents automatic restarting after power outage.
- Current limit control protects the drive and driven machine from damaging current or torque levels for improved reliability.
- Auxiliary panel provides A-C line protection and motor armature contactor to disconnect power to the drive motor.
- Remote Operator Adapter kit for buffering and filtering of external signals when drive is operated by remote control.
- Insensitive to A-C line phase rotation
- Line loss protection.
- Circuit breaker eliminates fuse replacement for reduced service and maintenance requirements.
- Field excitation and current loss protection.

Easy Installation and Service

MinPak Plus Drives are designed for easy installation to save time and money and provide years of dependable service. Wire entry is made directly to incoming power terminations. Sufficient space has been allowed around all power terminals to assure working room and fast, easy installation of plug-in kits.

Keeping these drives operating reliably and long is simplicity itself. Modular construction makes troubleshooting easy, so components can be removed for repair or replacement in minutes. All leads disconnect quickly and simply by means of plug connectors. All replaceable components are easily accessible without groping around or fighting other components.



RPM III D-C Motor for power matched performance.

RPM III D-C Motors for Optimum Package Performance

RPM III D-C Motors combine the best features of the Reliance RPM and SUPER RPM D-C Motors with advances in design and construction. Overall, they provide more power, reliability and easier serviceability in a smaller package. This third-generation motor design is "performance matched" specifically for adjustable speed applications utilizing rectified power. Here's why this enhanced product is ideal for the most demanding industrial requirements:

- Larger armature diameters provide a significant increase in rating per frame size and improved torque-to-inertia ratios for quick response. Skewed armature designs also improve operation at low speeds.
- Four-pole configuration extends speed ranges, improves linear torque-per-amp relationship and contributes to smoother, quicker response.
- Field-proven square laminated frame construction improves commutation and heat dissipation with less mounting space.
- Mechanically kept commutator provides dynamic stability to eliminate high or low bars and undesirable thermal stress.
- Frames and brackets, based on advanced computer designs, assure low vibration at any speed within the motor operating range. They also minimize motor excitation by harmonics in the rectified power supply. Cast iron end brackets with integral mounting feet provide a rigid, vibration-resistant mechanical enclosure.
- Radial brush holders with a unique pivoting brush finger and a constant-tension coiled spring provide positive, continuous contact of the brush with the commutator surface. This results in optimum commutation and better utilization of the brush length for up to twice the brush life.
- PLS® lubrication system uses open bearings that run cooler for long life. The unique configuration of the bearing cavity allows proper bearing lubrication regardless of mounting position. It also minimizes the possibility of damage to the motor or bearings from overgreasing.
- Other RPM III features include provisions for an integral A-C or D-C tachometer or an integral pulse generator which will add only 1.56 inches (4 cm) to overall motor length.

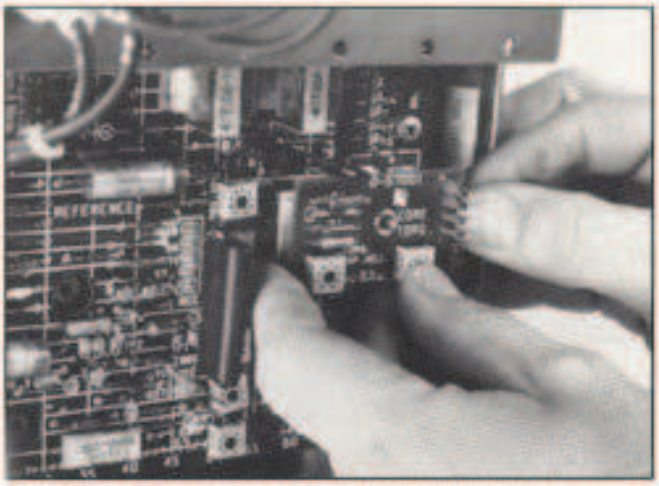
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Plug-In Kit Flexibility

Optional Features

All modification kits and accessories are UL listed and available as CSA certified.

- External Dynamic Braking Kit for applications requiring quick motor stops.
- Reversing Contactor Kit provides fast change of motor rotation by selector switch.
- Tachometer Feedback Kit for applications requiring accuracy of speed regulation to 0.5% with 95% load change with specified tachometer.
- Voltage Follower Kit allows the drive to follow an external D-C voltage signal.
- Instrument Interface/Preset Speed Kit for applications where drive speed is controlled by a process controller over a speed range, or when an adjustable preset speed is desired.
- Test Meter Adapter Kit for measuring controller and regulator signal voltages with a voltmeter.
- Auxiliary Contact Kit for applications where an interconnection with external signaling devices is required or desired.
- Dancer Follower Kit for applications where drive speed is controlled by a process line dancer potentiometer.
- Remote Operator Adapter Kit for buffering and filtering of external signals when drive is operated by remote control.
- Series Field Kit.
- Blower Motor Starter Kit provides a fused A-C starter and interlocking for control of the three-phase blower motor used to cool the D-C motor.
- Test Meter Adaptor Kit.
- Operator Control Stations in NEMA enclosure rated types 1, 3R, 4, 4X and 12 for remote operation of the drive.
- Controller available as CSA certified.



Sufficient work room around all power terminals allows fast, easy installation of plug-in kits.

Multi-tiered Diagnostic Capability



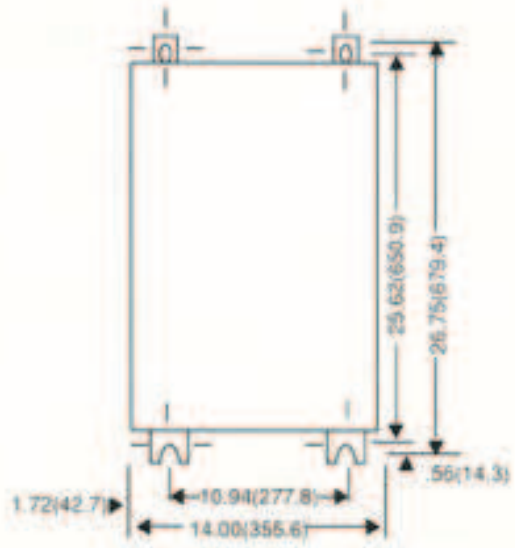
Two levels of diagnostic capability are available with the MinPak Plus Controller:

Level One: Standard with all power modules, provides a Green LED to indicate power on/off status and indicates fault condition.

Level Two: Optional Status/Diagnostor Module Indicator Kit utilizes an LCD array to visually annunciate the status of thirteen critical drive functions, and to indicate drive shutdown resulting from protective circuit action.

Engineering Data

Dimensions in Inches and Millimeters



Maximum Projection 13.00 (330.2)
For Maximum Swing Projection add 14.00 (355.6)

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MinPak Plus D-C Drives

Controller Selection

Drive Rating		Controller Model Number
HP	A-C Input (Volts)	
3–10	230 VAC	14C310
15–20	230 VAC	14C311
3–10	460 VAC	14C312
15–20	460 VAC	14C315
25–40	460 VAC	14C313

Controller Ratings

Motor HP	Rated A-C Line Amperes	Input KVA	D-C Armature Voltage	Rated Armature Current (Amperes)	Available Field Voltage	Available Field Current (Amperes)
	230 Volt A-C Input					
	460 Volt A-C Input					
3	13	5[1]	240	12.0	150	10.0
	10	6[1]	500	6.0	300	10.0
5	20	8[1]	240	20.0	150	10.0
	12	9[1]	500	10.0	300	10.0
7½	28	12[1]	240	29.0	150	10.0
	15	12[1]	500	14.0	300	10.0
10	37	15	240	38.0	150	10.0
	18	15	500	18.0	300	10.0
15	51	21	240	55.0	150	10.0
	26	21	500	27.0	300	10.0
20	66	27	240	72.0	150	10.0
	34	28	500	36.0	300	10.0
25	–	–	–	–	–	–
	40	32	500	43.0	300	10.0
30	–	–	–	–	–	–
	47	38	500	51.0	300	10.0
40	–	–	–	–	–	–
	63	51	500	69.0	300	10.0

(1) Minimum isolation transformer size is 15 KVA

Service Conditions

Elevation ..... Up to 3300 feet (1000 meters)
Ambient Temperatures .... 32°F to 131° (0°C to 55°C)
Atmosphere ..... Non-condensing relative humidity 5% to 95%
A-C Line Voltage Variation ..... ±10% of rated voltage
A-C Frequency ..... 48 to 62 Hz

Application Data

Service Factor 1.0
Maximum Load ..... 150% for 1 minute
Speed Regulation (95% load change):
  Voltage Feedback 1-2%
  Tachometer Feedback ..... 1% or 0.5%
Speed Range
  Voltage Feedback 20:1
  Tachometer Feedback 30:1

Adjustments

Acceleration Rate .. 0.5 to 30 seconds linearMinimum
Deceleration Rate ..... 0.5 to 30 seconds linear
Speed (Percent of rated) ..... Up to 50%
Maximum Speed (Percent of rated) ..... 50 to 100%
Current Limit (Percent of rated) ..... 10 to 150%
IR Drop Compensation ..... 0 to 12%

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