

Phoenix DX

Single-Phase AC Drives

- True industrial drives for tough applications
- 3 to 500 HP
- Designed for 50°C ambient
- Higher starting torque at lower inrush currents
- Eliminate energy-wasting bus resistors with unique Follower Circuitry
- Available in many horsepower and voltage configurations
- Fixed or variable carrier frequency
- Short-circuit and ground fault protection
- Multiple communications options

Many locations only have single-phase power available, especially agricultural applications (irrigation, pumping, loaders etc.) and oil & gas (pumping, water injection and extraction). Until now, using a three-phase AC Drive on Single-Phase power systems meant accepting significant performance degradation and a host of reliability problems.

Phoenix Single-Phase AC Drives have been specifically designed to overcome the problems with Single Phase input power. We're so confident, we offer a **3-year warranty** on all our drives.

OUTSTANDING FEATURES

High Voltage Ratings Line voltages are now averaging as high as 500 - 600VAC. A product that doesn't take this fact into consideration can result in power bridge failures and nuisance overvoltage tripping. The Phoenix is rated to handle these new voltage averages with $\pm 10\%$ to spare!

Built In Radio Frequency Filter The standard RFI filter reduces noise in the radio frequency band which may be generated by the drive. The RFI filter has a secondary benefit of protecting the drive from high voltage transients which occur when attached to motors with long leads. Many drive manufacturers ignore these potential problems that can cause radio communications problems in a facility and weaken the integrity of the drive.



3-YEAR WARRANTY

Input Line Suppression Metal oxide varistors are included on each unit to absorb line voltage transients, not only phase to phase, but also phase to ground, protecting the drive's power semiconductors from high potential voltages.

Short Circuit Protection If any of the output phases are shorted together (motor stator failure) or if an output phase shorts to ground, the Phoenix will safely shut down protecting itself until the short is cleared. These types of conditions often occur during installation when a power lead is nicked and shorts to conduit.

Smart Power Start Phoenix Drives have a unique starting which produces a higher starting torque in the motor than is achieved by line starting. By independently finding the right voltage and frequency to apply to the motor, the Phoenix creates more starting torque than most Vector controlled drives! This is essential with loads that require high starting torque and high inertia loads.

50°C Ambient Temperature We know there are many places where the ambient temperature can be very high during the summer months. The Phoenix has been designed to handle the heat with a rating of 122°F(50°C) in a Nema type 1 enclosure.

Power Factor Correction DC Reactor If you need a drive that is impervious to power line disturbances and doesn't create noise on the AC power line, then a built in 3% bus reactor is a must. A 3% bus reactor helps to create close to unity displacement power factor. It also lowers harmonic distortion to the power line and limits inrush currents to the drive. This results in a product that inherently has lower failures and eliminates problems with sensitive external equipment. (Included on all drives 25HP and larger)

Standard Phoenix DX Features

The following additional features are also standard on every Phoenix DX Drive:

- Easy to use, simple setup using keypad with configurable display
- Built-in line voltage surge protection
- Speed-sensitive motor overload protection: meets NEC 430
- Coast-to-Rest or Ramp Stop
- Isolated control circuitry
- Non-volatile parameter storage
- 8 preset speeds with acceleration/ deceleration control
- User security code
- Bi-directional “Flycatcher” (catch spinning motor)
- 2-second power dip ride-through
- KW/KWH metering
- S-Curve acceleration/deceleration control
- Programmable threshold detectors
- Two timers with alarms for customer use
- DC Injection braking
- Critical speed rejection
- Custom V/Hz programming
- Auto-logging fault history
- Programmable auto-restart
- KW / KWh Metering
- Built-in RS-232 Modbus RTU
- **3-year warranty**

Options

Phoenix DX Single-Phase Drives offer a range of options to fit every application.

Communications - plug-in cards are available for Modbus RS-485/422/232, Metasys N2, Ethernet/Modbus TCP, Ethernet/IP, DeviceNet, Profibus DP, Modbus-Plus, CANopen, Interbus, ControlNet, ProfiNet and others.

DriveMaster Configuration Software - Drivemaster is a Windows based program designed to make drive set-up, record keeping, and trouble-shooting easy. Drive parameters can be extracted from a drive, reviewed, modified, printed, stored on disk, reloaded back into the same drive, or copied to another drive. Data Logging and Graphing of drive parameters is also possible. Offline and Online Editing is supported. Drivemaster supports both Modbus Serial Communications and Ethernet / Modbus TCP Communications.

Isolated 4 to 20 ma Process Signal Input/Output Card The standard Phoenix AC Drive can follow a 0 to +/- 10 VDC or a 4 to 20 ma Analog Input Signal. Without an Input Signal Isolator, the Analog Input Signal is directly connected to the signal common of the drive. The Process Input Signal Conditioner/Isolator card isolates the Analog Input Signal from the drive signal common and allows the Phoenix AC Drive to accept a wide range of analog input signals (4 to 20 ma or 0 the 192 VDC). Independent span and zero adjustments allow the user to condition the input signal as required by the application. Only one of these option cards (3000-4040) can be powered from the drive.

HOA Switch - A factory installed Hand-Off-Auto switch allows the operator to select how the drive will be operated. In “Hand” Mode the drive is operated using local Start and Stop Pushbuttons or the Keypad Pushbuttons and a local Speed Reference signal. In “Auto” Mode the drive is controlled by remote Start and Stop Pushbuttons or contacts and remote Speed Reference signal. Available as Factory Installed Only.

Automatic-Bypass for Drive with Manual Bypass - This factory installed option can be added to a Phoenix AC Drive with Manual Contactor Bypass to automatically transfer to Bypass Mode when a fault is detected.

Other options such as 0-15 PSI Pneumatic Signal Follower, 115VAC Operator (Digital Input) Interface Card, Local-Remote switch, Auto/Manual Switch, Speed Potentiometer, Remote Keypad, Nema 12 Sealing, and NEMA 4 Sealing and Fans are also available. Some options are only available factory-installed. Contact your MicroMod representative for information.

ELECTRICAL SPECIFICATIONS

Rated Input Voltage: 200-250VAC, 380-500VAC, 500-600VAC. - 10% of minimum, + 10% of maximum (Single Phase)

Rated Input Frequency: 48 to 63 Hz.

Efficiency: 97% or greater at rated current.

CONTROL

Control Method: Sine coded PWM with programmable carrier. Space Vector control.

Output Voltage: 0 to input voltage (Three Phase)

Output Frequency Range: 0 to 600 Hz.

Frequency Accuracy:

Analog reference: 0.1% of max frequency.

Digital reference: 0.01% of max frequency

Frequency Resolution:

Analog reference: 0.06 Hz at 60 Hz.

Digital reference: 0.0005 Hz at 60 Hz.

Accel / Decel: Adjustable 0.1 to 3276 sec.

Drive Overload:

High Overload Capacity Drives: -150% of drive rated output for one (1) minute.

Normal Overload Capacity Drives: -120% of drive rated output for one (1) minute.

Inverse Time Overload: Programmable for class 10, 20, and 30 protection to comply with N.E.C. Article 430

Current Limit: Proactive current limit programmable in % of motor rated current.

Braking Torque: 5 to 20% without modification.

Braking modules available for added braking to 150%.

Control Power Ride-Thru: Two (2) seconds (typical) depending on load.

INDICATORS

L.E.D.'s: Drive Fault, Motor Direction, Drive In Current Limit, Drive Running, Microprocessor Active.

Liquid Crystal Display: Power On, All Parameters, All Fault Conditions.

ENVIRONMENTAL

Ambient Temperature: -10°C to 50°C (14°F to 122°F) without derating.

Storage Temperature: -40°C to 70°C (-40°F to 158°F)

Altitude: Sea level to 3300 Feet [1000m] without derating.

Humidity: 95% relative humidity non-condensing.

Vibration: 9.8m/sec² (1.0G) peak.

Surge Protection: Line Transients to 6000V IEEE C62.41-1991 Category B

Noise Immunity: Showering Arc - 2000V Peak EN50082 - 1, 2.

Input R.F.I. Filter: Standard on all models.

PHYSICAL ATTRIBUTES

Mounting: Wall Mount: Thru-Hole or Panel Mount.

NEMA Rating:

Type 1 (IP20) as Standard

Type 12 (IP54) Optional

Type 4 (IP65) Optional

Construction: Steel Enclosure (Reduces E.M.I.)

AUTOLOGGING FAULT HISTORY

Ten last faults recorded in order of occurrence.



Dimensions - NEMA1 Enclosure (Drive Only)

Input Voltage	Motor HP ²		Approximate Dimensions (HxWxD)	Mounting	Approximate Weight
	High Overload Capacity ³ (CT)	Normal Overload Capacity ⁴ (VT)			
200 - 250 VAC (208/230/240)	3 - 7.5	5 - 10	13.05"x9.0"x10.9"	Wall	30 lbs
	10 - 20	15 - 20	13.05"x9.0"x10.9"	Wall	30 lbs
	25 - 30	25 - 30	25"x11.6"x11.1"	Wall	75 lbs
	40 - 100	40 - 100	32.5"x20.1"x13.5"	Wall	180 lbs
	125 - 250	125 - 250	44.2"x31.1"x16.8"	Wall	500 lbs
380 - 500 VAC (380/400/415/480)	5 - 15	7.5 - 20	13.05"x9.0"x10.9"	Wall	30 lbs
	20 - 40	25 - 40	13.05"x9.0"x10.9"	Wall	30 lbs
	50 - 60	50 - 60	25"x11.6"x11.1"	Wall	75 lbs
	75 - 200	75 - 200	32.5"x20.1"x13.5"	Wall	180 lbs
	250 - 500	250 - 500	44.2"x31.1"x16.8"	Wall	500 lbs
525 - 600 VAC (525/575/600)	5 - 15	7.5 - 20	13.05"x9.0"x10.9"	Wall	30 lbs
	20 - 40	25 - 40	13.05"x9.0"x10.9"	Wall	30 lbs
	50 - 75	50 - 75	25"x11.6"x11.1"	Wall	75 lbs
	100 - 200	100 - 200	32.5"x20.1"x13.5"	Wall	180 lbs
	250 - 600	250 - 600	44.2"x31.1"x16.8"	Wall	500 lbs

Dimensions - NEMA12 Enclosure (Drive Only)

Input Voltage	Motor HP ²		Approximate Dimensions (HxWxD)	Mounting	Approximate Weight
	High Overload Capacity ³ (CT)	Normal Overload Capacity ⁴ (VT)			
200 - 250 VAC (208/230/240)	3 - 7.5	5 - 10	13.05"x9.0"x10.9"	Wall	35 lbs
	10 - 20	15 - 20	13.05"x9.0"x10.9"	Wall	35 lbs
	25 - 30	25 - 30	25"x11.6"x11.1"	Wall	80 lbs
	40 - 100	40 - 100	32.5"x20.1"x13.5"	Wall	185 lbs
	125 - 250	125 - 250	72"x36"x23.5"	Floor	870 lbs
380 - 500 VAC (380/400/415/480)	5 - 15	7.5 - 20	13.05"x9.0"x10.9"	Wall	35 lbs
	20 - 40	25 - 40	13.05"x9.0"x10.9"	Wall	35 lbs
	50 - 60	50 - 60	25"x11.6"x11.1"	Wall	80 lbs
	75 - 200	75 - 200	32.5"x20.1"x13.5"	Wall	185 lbs
	250 - 500	250 - 500	72"x36"x23.5"	Floor	870 lbs
525 - 600 VAC (525/575/600)	5 - 15	7.5 - 20	13.05"x9.0"x10.9"	Wall	35 lbs
	20 - 40	25 - 40	13.05"x9.0"x10.9"	Wall	35 lbs
	50 - 75	50 - 75	25"x11.6"x11.1"	Wall	80 lbs
	100 - 200	100 - 200	32.5"x20.1"x13.5"	Wall	185 lbs
	250 - 600	250 - 600	72"x36"x23.5"	Floor	870 lbs

(1) All Dimensions in Inches (HxWxD)

(2) Horsepower Rating based on 230, 460 and 575VAC Motors.

(3) High Overload Capacity Drives produce 150% of Rated Drive Output Current for 1 minute.

(4) Normal Overload Capacity Drives produce 120% of Rated Drive Output Current for 1 minute.

MODEL NUMBER SELECTION / RATING TABLES

200-250VAC (-10% to +10%)												
Enclosure Size	NEMA 1 (IP20) Model Number	Motor HP ¹		Output Current (Amps)		Output KVA ⁴		Input Current (Amps)		Input KVA ⁴		Maximum Recommended AC Line Fuses ⁵ (Amps)
		Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	
Size 0	D21-0005-N1	5	3	16	10	7	4	19	12	8	5	35
	D21-0007-N1	7.5	5	22	16	9	7	25	19	10	8	40
	D21-0010-N1	10	7.5	28	22	12	9	33	25	14	10	50
	D21-0015-N1	15	10	42	28	17	12	36	25	15	10	60
	D21-0020-N1	20	15	54	42	22	17	50	36	21	15	70
	D21-0020CT-N1	-	20	-	54	-	22	-	50	-	21	-
Size 1	D21-0025-N1	25	20	68	54	28	22	61	50	25	21	90
	D21-0030-N1	30	25	85	68	35	28	79	61	33	25	100
	D21-0030CT-N1	-	30	-	80	-	33	-	74	-	31	100
Size 2	D21-0040-N1	40	30	104	80	43	33	96	74	40	31	150
	D21-0050-N1	50	40	130	104	54	43	120	96	50	40	200
	D21-0060-N1	60	50	163	130	68	54	155	120	64	50	250
	D21-0075-N1	75	60	192	145	80	60	186	140	77	58	300
	D21-0100-N1	100	75	248	192	103	80	230	186	96	77	300
	D21-0100CT-N1	-	100	-	248	-	103	-	230	-	96	-
Size 3	D21-0125VT-N1	125	-	312	-	130	-	290	-	121	-	⁶
	D21-0125CT-N1	-	125	-	312	-	130	-	290	-	121	⁶
	D21-0150VT-N1	150	-	360	-	150	-	335	-	139	-	⁶
	D21-0150CT-N1	-	150	-	360	-	150	-	335	-	139	⁶
	D21-0200VT-N1	200	-	480	-	200	-	446	-	186	-	⁶
	D21-0200CT-N1	-	200	-	480	-	200	-	446	-	186	⁶
	D21-0250VT-N1	250	-	602	-	250	-	560	-	233	-	⁶
	D21-0250CT-N1	-	250	-	602	-	250	-	560	-	233	⁶

¹ Horsepower rating based on 230 VAC Motors

² High Overload Capacity Drives (CT) produce 150% of Rated Drive Output Current for 1 minute

³ Normal Overload Capacity Drives (VT) produce 120% of Rated Drive Output Current for 1 minute

⁴ Output and Input KVA at nominal 240 VAC

⁵ UL Class T, J and Semiconductor Fuses (preferred): Ferraz Shawmut A50Q, Bussmann FWH

⁶ Included as standard

MODEL NUMBER SELECTION / RATING TABLES

380-500VAC (-10% to +10%)												
Enclosure Size	NEMA 1 (IP20) Model Number	Motor HP ¹		Output Current (Amps)		Output KVA ⁴		Input Current (Amps)		Input KVA ⁴		Maximum Recommended AC Line Fuses ⁵ (Amps)
		Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	
Size 0	D41-0007-N1	8	5	11	8	9	7	13	10	11	8	25
	D41-0010-N1	10	8	14	11	12	9	17	13	14	11	30
	D41-0015-N1	15	10	21	14	17	12	25	17	21	14	40
	D41-0020-N1	20	15	27	21	22	17	33	25	27	21	50
	D41-0025-N1	25	20	34	27	28	22	31	26	26	22	50
	D41-0030-N1	30	25	43	34	36	28	38	31	32	26	60
	D41-0040-N1	40	30	52	40	43	33	48	36	40	30	70
	D41-0040CT-N1	-	40	-	52	-	43	-	448	-	40	70
Size 1	D41-0050-N1	50	40	66	52	55	43	56	48	47	40	90
	D41-0060-N1	60	50	82	65	68	54	72	56	60	47	100
	D41-0060CT-N1	-	60	-	77	-	64	-	67	-	56	100
Size 2	D41-0075-N1	75	60	97	77	81	64	83	67	69	56	125
	D41-0100-N1	100	75	124	96	103	80	110	86	91	71	175
	D41-0125-N1	125	100	156	124	130	103	139	110	113	91	200
	D41-0150-N1	150	125	180	156	150	130	163	139	136	116	250
	D41-0200-N1	200	150	240	180	200	150	225	167	186	139	350
	D41-0200CT-N1	-	200	-	240	-	200	-	223	-	186	350
Size 3	D41-0250VT-N1	250	-	302	-	251	-	281	-	234	-	6
	D41-0250CT-N1	-	250	-	302	-	251	-	281	-	234	6
	D41-0300VT-N1	300	-	361	-	300	-	336	-	279	-	6
	D41-0300CT-N1	-	300	-	361	-	300	-	336	-	279	6
	D41-0350VT-N1	350	-	414	-	344	-	385	-	320	-	6
	D41-0350CT-N1	-	350	-	414	-	344	-	385	-	320	6
	D41-0400VT-N1	400	-	477	-	397	-	444	-	369	-	6
	D41-0400CT-N1	-	400	-	477	-	397	-	444	-	369	6
	D41-0450VT-N1	450	-	540	-	449	-	503	-	418	-	6
	D41-0450CT-N1	-	450	-	540	-	449	-	503	-	418	6
	D41-0500VT-N1	500	-	600	-	499	-	558	-	464	-	6
D41-0500CT-N1	-	500	-	600	-	499	-	558	-	464	6	

For rating greater than 500 HP, 380-500VAC contact factory

¹ Horsepower rating based on 460 VAC Motors

² High Overload Capacity Drives (CT) produce 150% of Rated Drive Output Current for 1 minute

³ Normal Overload Capacity Drives (VT) produce 120% of Rated Drive Output Current for 1 minute

⁴ Output and Input KVA at nominal 240 VAC

⁵ UL Class T, J and Semiconductor Fuses (preferred): Ferraz Shawmut A50Q, Bussmann FWH

⁶ Included as standard

MODEL NUMBER SELECTION / RATING TABLES

500-600VAC (-10% to +10%)												
Enclosure Size	NEMA 1 (IP20) Model Number	Motor HP ¹		Output Current (Amps)		Output KVA ⁴		Input Current (Amps)		Input KVA ⁴		Maximum Recommended AC Line Fuses ⁵ (Amps)
		Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	Normal Overload Capacity (VT) ³	High Overload Capacity (CT) ²	
Size 0	D51-0007-N1	8	5	9	7	9	7	11	9	11	9	20
	D51-0010-N1	10	8	12	9	12	9	13	11	13	11	25
	D51-0015-N1	15	10	17	11	17	11	20	13	20	13	35
	D51-0020-N1	20	15	22	17	22	17	25	20	25	20	40
	D51-0025-N1	25	20	28	22	28	22	28	22	28	22	40
	D51-0030-N1	30	25	34	27	34	27	34	27	34	27	50
	D51-0040-N1	40	30	41	32	41	32	40	32	40	32	60
	D51-0040CT-N1	-	40	-	41	-	41	-	40	-	40	60
Size 1	D51-0050-N1	50	40	52	41	52	41	48	40	48	40	80
	D51-0060-N1	60	50	65	52	65	52	61	54	61	54	90
	D51-0075-N1	75	60	78	62	78	62	72	58	72	58	100
Size 2	D51-0075CT-N1	-	75	-	77	-	77	-	75	-	75	150
	D51-0100-N1	100	75	99	77	99	77	96	75	96	75	150
	D51-0125-N1	125	100	125	99	124	99	124	96	123	96	175
	D51-0150-N1	150	125	157	125	156	124	154	124	153	123	200
	D51-0200-N1	200	150	192	144	191	143	191	142	190	141	300
	D51-0200CT-N1	-	200	-	192	-	191	-	191	-	190	300
Size 3	D51-0250VT-N1	250	-	242	-	241	-	240	-	239	-	350
	D51-0250CT-N1	-	250	-	242	-	241	-	240	-	239	350
	D51-0300VT-N1	300	-	289	-	288	-	286	-	285	-	400
	D51-0300CT-N1	-	300	-	289	-	288	-	286	-	285	400
	D51-0350VT-N1	350	-	336	-	335	-	333	-	331	-	500
	D51-0350CT-N1	-	350	-	336	-	335	-	333	-	331	500
	D51-0400VT-N1	400	-	382	-	380	-	378	-	377	-	600
	D51-0400CT-N1	-	400	-	382	-	380	-	378	-	377	600
	D51-0450VT-N1	450	-	432	-	430	-	428	-	426	-	700
	D51-0450CT-N1	-	450	-	432	-	430	-	428	-	426	700
	D51-0500VT-N1	500	-	472	-	470	-	467	-	465	-	700
	D51-0500CT-N1	-	500	-	472	-	470	-	467	-	465	700
	D51-0600VT-N1	600	-	576	-	574	-	570	-	568	-	800
D51-0600CT-N1	-	600	-	576	-	574	-	570	-	568	800	

For rating greater than 600 HP, 500-600VAC contact factory

¹ Horsepower rating based on 575 VAC Motors

² High Overload Capacity Drives (CT) produce 150% of Rated Drive Output Current for 1 minute

³ Normal Overload Capacity Drives (VT) produce 120% of Rated Drive Output Current for 1 minute

⁴ Output and Input KVA at nominal 240 VAC

⁵ UL Class T, J and Semiconductor Fuses (preferred): Ferraz Shawmut A50Q, Bussmann FWH

⁶ Included as standard

Accessories:	
Isolated 4 to 20 ma Process Signal Input/Output Card	3000-4040-120
Size 0 NEMA1 Enclosure Extension ¹	PEX-SZ0-N1XL
Size 0 NEMA12 Enclosure Extension ¹	PEX-SZ0-N12XL
Isolated Communications Card (RS-232/422/485, Modbus RTU) ^{2, 3}	3000-4135-1
Ethernet Communications Card (Modbus TCP) ³	3000-4235
HOA Switch ¹	PDX-HOA-SW
Automatic-Bypass Adder for Size 0 Drive with Manual Bypass ⁴	PDX-ABP0
Automatic-Bypass Adder for Size 1 Drive with Manual Bypass ⁴	PDX-ABP1
Automatic-Bypass Adder for Size 2 Drive with Manual Bypass ⁴	PDX-ABP2
Automatic-Bypass Adder for Size 3 Drive with Manual Bypass ⁴	PDX-ABP3
Ribbon Cable Extender for Keypad (ROM) - 6 Feet	PDX-CBL-6
Remote Keypad (ROM) Kit	PDX-RMT

¹Enclosure Extension option required if Process I/O Card or HOA Switch is to be mounted and wired inside a Size 0 enclosure

²Only one Communications Card may be added per drive

³One Ethernet communications card may be used with up to 32 drives. Requires the addition of one Isolated Communications Card 3000-4135-1 per drive for drives 2 through 32.

⁴Factory-installed option only. Cannot be added in the field.

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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