

VVDED397048US R6/00

June 2000

Raleigh, NC, USA

Instruction Bulletin

ALTIVAR[®] 58 Adjustable Speed Drive Controllers

Installation Guide Type H Controllers

Retain for future use.



DANGER

HAZARDOUS VOLTAGE

- Read and understand this bulletin in its entirety before installing or operating ALTIVAR 58 drive controllers. Installation, adjustment, repair, and maintenance of the drive controllers must be performed by qualified personnel.
- Disconnect all power including external control power that may be present before servicing the drive controller. WAIT THREE MINUTES for the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 26 to verify that the DC voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Install and close all covers before applying power or starting and stopping the drive controller.
- User is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Before servicing the drive controller:

- Disconnect all power.
- Place a "DO NOT TURN ON" label on the drive controller disconnect.
- Lock disconnect in open position.

Electrical shock will result in death or serious injury.

INTRODUCTION	1
REVISION LEVEL	1
RECEIVING AND PRELIMINARY INSPECTION.....	2
STORING AND SHIPPING	2
TECHNICAL CHARACTERISTICS	3
SPECIFICATIONS.....	10
DIMENSIONS.....	13
INSTALLATION PRECAUTIONS	15
Mounting and Temperature Conditions (Refer to Figure 3)	16
ATV58HU09M2 to U72M2 and ATV58HU18N4 to U90N4:	16
ATV58HU90M2 to D46M2 and ATV58HD12N4 to D79N4:	17
MOUNTING IN GENERAL PURPOSE METAL ENCLOSURE	18
MOUNTING IN TYPE 12 OR IP54 METAL ENCLOSURE	19
Calculating Enclosure Size	19
Example	20
ELECTROMAGNETIC COMPATIBILITY (EMC).....	21
WIRING	22
Bus Voltage Measurement Procedure	26
General Wiring Practices	28
Branch Circuit Connections	29
Output Wiring Precautions	37
Grounding	38
Power Terminals	39
Control Terminals.....	40
WIRING DIAGRAMS	42
Single-Phase Input.....	42
Three-Phase Input	43
RECOMMENDED POWER FUSES	44
USING A LINE CONTACTOR	46
Output Contactor Wiring Diagram.....	46
EXTERNAL 24 V SUPPLY	47
FAULT RELAY	47
AVAILABLE MOTOR TORQUE	48
FACTORY SETTINGS	49
START UP	50

LIGHT EMITTING DIODES (LEDS)	51
PREVENTIVE MAINTENANCE.....	52
TROUBLESHOOTING AND MAINTENANCE.....	52
Procedure 1: Checking Supply Voltage	53
Procedure 2: Checking the Peripheral Equipment.....	53
Fault Storage	54
APPENDIX A: OPTIONS AND ACCESSORIES	55

INTRODUCTION

The ALTIVAR 58 family of adjustable frequency AC drive controllers is used for controlling three-phase asynchronous motors. They range from:

- 1 to 75 hp (0.75 to 55 kW) constant torque (100 hp variable torque), 400/460 V, three-phase input
- 0.5 to 7.5 hp (0.37 to 5.5 kW) constant torque, 208/230 V, single-phase input
- 2 to 40 hp (1.5 to 30 kW) constant torque (50 hp variable torque), 208/230 V, three-phase input.

ALTIVAR 58 drive controllers in the 30–100 hp (400/460 V) and 15–50 hp (208/230 V) range have built-in line reactors. A 25 hp (400/460 V) product is also available with the built-in line reactor.

All ALTIVAR 58 drive controllers are available with a built-in EMC filter. The filter reduces conducted and radiated emissions and complies with IEC product standards IEC 61800-3 and EN 61800-3 for drive controllers.

As of August 2000, the 5–25 hp 460 Vac variable torque drive controllers are available without the integrated EMC filter for 460 Vac installations where the filter is not required. Removing the filter allows the product to be rated for additional horsepower at 460 Vac as shown in Table 10. An "X" in the part number indicates that the product does not have the filter. Refer to catalog 8806CT9901 for the complete catalog number.

This instruction bulletin covers the technical characteristics, specifications, installation, and wiring of all ALTIVAR 58 Type H drive controllers.

For information on programming and troubleshooting the drive controller, refer to the keypad display instruction bulletin, VVDED397047US.

Many option kits are available for the ALTIVAR 58 drive controller. Refer to Appendix A for a list of the option kits.

REVISION LEVEL

This document replaces VVDED397048US dated April 1999.

RECEIVING AND PRELIMINARY INSPECTION

Before installing the drive controller, read this manual and follow all precautions.

Before removing the drive controller from its packing material, verify that it is not damaged from shipping. Damage to the packing carton usually indicates improper handling. If any damage is found, notify the carrier and your Square D representative.

After removing the drive controller from its packaging, inspect the exterior for shipping damage. If any shipping damage is found, notify the carrier and your sales representative. Verify that the drive controller nameplate and label conform to the packing slip and corresponding purchase order.

CAUTION

EQUIPMENT DAMAGE HAZARD

Do not operate or install any drive controller that appears damaged.

Failure to follow this instruction can result in injury or equipment damage.

STORING AND SHIPPING

If the drive controller is not being immediately installed, store it in a clean, dry area where the ambient temperature is between -13 to +149 °F (-25 to +65 °C). If the drive controller must be shipped to another location, use the original shipping material and carton to protect the drive controller.

TECHNICAL CHARACTERISTICS

Tables 1 through 10 show the ratings of the ALTIVAR 58 Type H drive controllers.

Table 1: Constant Torque, 208/230 V Ratings, Single-Phase Input • Three-Phase Output, Switching Frequency @4kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power 208/230 V		Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load
		kW	Hp	A	A	W
1	ATV58HU09M2•	0.37	0.5	2.3	3.1	42
1	ATV58HU18M2•	0.75	1	4.1	5.6	64
2	ATV58HU29M2•	1.5	2	7.8	10.6	107
2	ATV58HU41M2•	2.2	3	11	15.0	156
3	ATV58HU72M2• ^[2]	3	4	13.7	18.6	160
4	ATV58HU90M2• ^[2]	4	5	18.2	24.8	176
4	ATV58HD12M2• ^[2]	5.5	7.5	24.2	32.9	204

[1] Refer to catalog 8806CT9901 to complete the catalog number.

[2] When these drive controllers are used with a single-phase input, a line reactor (3% minimum) must be used.

Table 2: Variable Torque Low Noise, 208/230 V Ratings, Single-Phase Input • Three-Phase Output, Switching Frequency @ 8kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power 208/230 V		Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load
		kW	Hp	A	A	W
1	ATV58HU09M2•	0.37	0.5	2.5	2.8	42
1	ATV58HU18M2•	0.75	1	4.8	5.3	64
2	ATV58HU29M2•	1.5	2	7.8	8.6	107
2	ATV58HU41M2•	2.2	3	11	12.1	156
3	ATV58HU72M2• ^[2]	3	4	14.3	15.7	160
4	ATV58HU90M2• ^[2]	4	5	17.5	19.3	176
4	ATV58HD12M2• ^[2]	5.5	7.5	25.3	27.8	204

[1] Refer to catalog 8806CT9901 to complete the catalog number.

[2] When these drive controllers are used with a single-phase input, a line reactor (3% minimum) must be used.

Table 3: Constant Torque, 208/230 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HU29M2–D23M2 @ 4kHz, ATV58HD28M2–D46M2 @ 2 kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power 208/230 V		Rated Output Current In	Transient Output Current	Total Dissipated Power @ Rated Load
		kW	Hp	A	A	W
2	ATV58HU29M2•	1.5	2	7.8	10.6	107
2	ATV58HU41M2•	2.2	3	11	15.0	160
3	ATV58HU54M2•	3	4	13.7	18.6	190
3	ATV58HU72M2•	4	5	18.2	24.8	240
4	ATV58HU90M2	5.5	7.5	24.2	32.9	255
4	ATV58HD12M2•	7.5	10	31	42.2	350
6	ATV58HD16M2•	11	15	47	63.9	745
6	ATV58HD23M2•	15	20	60	81.6	895
7	ATV58HD28M2•	18.5	25	75	102.0	900
7	ATV58HD33M2•	22	30	88	119.7	1030
7	ATV58HD46M2•	30	40	116	157.8	1315

[1] Refer to catalog 8806CT9901 to complete the catalog number.

Table 4: Constant Torque Low Noise, 208/230 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HD16M2–D23M2 @ 8 kHz, ATV58HD28M2–D46M2 @ 4 kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power 208/230 V		Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load
		kW	Hp	A	A	W
6	ATV58HD16M2•	7.5	10	31	42.2	745
6	ATV58HD23M2•	11	15	47	63.9	895
7	ATV58HD28M2•	15	20	60	81.6	900
7	ATV58HD33M2•	18.5	25	75	102.0	1030
7	ATV58HD46M2•	22	30	88	119.7	1315

[1] Refer to catalog 8806CT9901 to complete the catalog number.

Table 5: Variable Torque, 208/230 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HU29M2–D23M2 @ 4 kHz, ATV58HD28M2–D46M2 @ 2 kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power 208/230 V		Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load
		kW	Hp	A	A	W
2	ATV58HU29M2•	1.5	2	7.5	8.3	107
2	ATV58HU41M2•	2.2	3	10.6	11.7	158
3	ATV58HU54M2•	3	4	14.3	15.7	190
3	ATV58HU72M2•	4	5	16.7	18.4	198
4	ATV58HU90M2	5.5	7.5	24.2	26.6	235
4	ATV58HD12M2•	7.5	10	30.8	33.9	323
6	ATV58HD16M2•	11	15	46.2	50.1	550
6	ATV58HD16M2•	15	20	60	66.0	745
6	ATV58HD23M2•	18.5	25	75	82.5	895
7	ATV58HD28M2•	22	30	88	96.8	900
7	ATV58HD33M2•	30	40	116	127.6	1030
7	ATV58HD46M2•	37	50	143	157.3	1315

[1] Refer to catalog 8806CT9901 to complete the catalog number.

Table 6: Variable Torque Low Noise, 208/230 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HU29M2–D23M2 @ 8 kHz, ATV58HD28M2–D46M2 @ 4 kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power 208/230 V		Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load
		kW	Hp	A	A	W
2	ATV58HU29M2•	1.5	2	7.5	8.3	107
2	ATV58HU41M2•	2.2	3	10.6	11.7	158
3	ATV58HU54M2•	3	4	14.3	15.7	190
3	ATV58HU72M2•	4	5	16.7	18.4	198
4	ATV58HU90M2	5.5	7.5	24.2	26.6	235
4	ATV58HD12M2•	7.5	10	30.8	33.9	323
6	ATV58HD16M2•	11	15	46.2	50.1	745

Continued
on next
page.

[1] Refer to catalog 8806CT9901 to complete the catalog number.

Table 6: Variable Torque Low Noise, 208/230 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HU29M2–D23M2 @ 8 kHz, ATV58HD28M2–D46M2 @ 4 kHz (Continued)

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power 208/230 V		Rated Output Current A	Transient Output Current A	Total Dissipated Power @ Rated Load W
		kW	Hp			
6	ATV58HD23M2•	15	20	60	66.0	890
7	ATV58HD28M2•	18.5	25	75	82.5	980
7	ATV58HD33M2•	22	30	88	96.8	975
7	ATV58HD46M2•	30	40	116	127.6	1215

[1] Refer to catalog 8806CT9901 to complete the catalog number.

Table 7: Constant Torque, 400 /460 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HU18N4–D46N4 @ 4 kHz, ATV58HD54N4–D79N4 @ 2 kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power		Rated Output Current In A	Transient Output Current A	Total Dissipated Power @ Rated Load W
		400 V kW	460 V Hp			
2	ATV58HU18N4•	0.75	1	2.3	3.1	57
2	ATV58HU29N4•	1.5	2	4.1	5.6	97
2	ATV58HU41N4•	2.2	3	5.8	7.9	120
3	ATV58HU54N4•	3	4	7.8	10.6	170
3	ATV58HU72N4•	4	5	10.5	14.3	210
3	ATV58HU90N4	5.5	7.5	13	17.7	295
4	ATV58HD12N4•	7.5	10	17.6	23.9	360
4	ATV58HD16N4•	11	15	24.2	32.9	480
5	ATV58HD23N4•	15	20	33	44.9	590
6	ATV58HD28N4•	18.5	25	40.7	55.4	421
6	ATV58HD33N4•	22	30	48.4	65.8	491
6	ATV58HD46N4•	30	40	66	89.8	625
7	ATV58HD54N4•	37	50	79.2	107.7	677
7	ATV58HD64N4•	45	60	93.5	127.2	837
7	ATV58HD79N4•	55	75	115.5	157.1	1090

[1] Refer to catalog 8806CT9901 to complete the catalog number.

**Table 8: Constant Torque Low Noise, 400/460 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency:
ATV58HD28N4–D46N4 @ 8 kHz, ATV58HD54N4–D79N4 @ 4 kHz**

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power		Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load
		400 V kW	460 V Hp	A	A	W
6	ATV58HD28N4•	15	20	33	44.9	429
6	ATV58HD33N4•	18.5	25	40.7	55.4	524
6	ATV58HD46N4•	22	30	48.4	65.8	561
7	ATV58HD54N4•	30	40	66	89.8	627
7	ATV58HD64N4•	37	50	79.2	107.7	677
7	ATV58HD79N4•	45	60	93.5	127.2	1007

[1] Refer to catalog 8806CT9901 to complete the catalog number.

Table 9: Variable Torque, 400/460 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency:
ATV58HU18N4–D23N4 @ 8kHz, ATV58HD28N4–D46N4 @ 4 kHz,
ATV58HD54N4–D79N4 @ 2 kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power		Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load
		400 V kW	460 V Hp	A	A	W
2	ATV58HU18N4•	0.75	1	2.1	2.3	57
2	ATV58HU29N4•	1.5	2	3.4	3.7	97
2	ATV58HU41N4•	2.2	3	4.8	5.3	119
3	ATV58HU54N4•	3	4	6.2	6.8	170
3	ATV58HU72N4•	4	5	7.6	8.4	209
3	ATV58HU90N4	5.5	7.5	11	12.1	291
4	ATV58HD12N4•	7.5	10	14	15.4	352
4	ATV58HD16N4•	11	15	21	23.1	472
5	ATV58HD23N4•	15	20	27	29.7	584
6	ATV58HD28N4• ^[2]	18.5	25	34	37.4	474
6	ATV58HD28N4•	22	30	40	44.0	618
6	ATV58HD33N4•	30	40	52	57.2	713
6	ATV58HD46N4•	37	50	65	71.5	770
7	ATV58HD54N4•	45	60	77	84.7	987
7	ATV58HD64N4•	55	75	96	105.6	1075
7	ATV58HD79N4	75	100	124	136.4	1439

[1] Refer to catalog 8806CT9901 to complete the catalog number.

[2] The ATV58HD28N4 drive controller is rated for 8 kHz operation at 25 hp.

Table 10: Variable Torque Low Noise, 400/460 V Ratings, Three-Phase Input • Three-Phase Output: Switching Frequency: ATV58HU18N4–D46N4 @ 8 kHz, ATV58HD54N4–D79N4 @ 4 kHz

Product Frame Size	Drive Controller Catalog Number ^[1]	Motor Power		Rated Output Current	Transient Output Current	Total Dissipated Power @ Rated Load
		400 V kW	460 V Hp	A	A	W
2	ATV58HU18N4•	0.75	1	2.1	2.3	57
2	ATV58HU29N4•	1.5	2	3.4	3.7	97
2	ATV58HU41N4•	2.2	3	4.8	5.3	119
3	ATV58HU54N4X•	[2]	5	7.6	8.4	209
3	ATV58HU72N4X•	[2]	7.5	11	12.1	291
3	ATV58HU90N4X•	[2]	10	14	15.4	352
4	ATV58HD12N4X•	[2]	15	21	23.1	472
4	ATV58HD16N4X•	[2]	20	27	29.7	584
5	ATV58HD23N4X•	[2]	25	34	37.4	654
6	ATV58HD28N4•	18.5	25	34	37.4	502
6	ATV58HD33N4•	22	30	40	44.0	584
6	ATV58HD46N4•	30	40	52	57.2	714
7	ATV58HD54N4•	37	50	65	71.5	732
7	ATV58HD64N4•	45	60	77	84.7	904
7	ATV58HD79N4•	55	75	96	105.6	1183

[1] Refer to catalog 8806CT9901 to complete the catalog number. Refer to page 1 of this bulletin for an explanation of the "X" in the catalog numbers for product frame sizes 3–5.

[2] This product is for 460 Vac applications. See Table 9 for 400 Vac rated product in this hp range.

SPECIFICATIONS

Table 11: Environmental Specifications

Enclosure type	ATV58HU09M2 to U90N4: IP20/open type controllers according to Standard EN50178. ATV58HU90M2 to D46M2, ATV58HD12N4 to D79N4: Type 1 with conduit connection kit. ^[1]
Resistance to vibrations	According to IEC 60068-2-6: 1.5 mm zero to peak from 3 to 13 Hz 1 gn from 13 to 200 Hz
Resistance to shocks	According to IEC 60068-2-27: 15 g, 11 ms
Ambient Pollution degree	ATV58HU09M2–D12M2 and ATV58HU18N4–D23N4: Pollution degree 2 conforming to IEC 60664-1, EN50718 and NEMA ICS-1. ATV58HD16M2–D46M2 and ATV58HD28N4–D79N4: Pollution degree 3 according to IEC 60664-1, EN50718 and NEMA ICS-1. Protect the drive controller against dust, corrosive gas, and falling liquid.
Maximum relative humidity	95% maximum, non-condensing and without dripping according to IEC 60068-2-3. Provide heating system if there is condensation.
Maximum ambient temperature	Storage: -25 to +65 °C (-13 to +149 °F) Operation: Drive controllers ATV58HU09M2 to U72M2 and ATV58HU18N4 to U90N4: ^[1] -10 to +50 °C (+14 to 122 °F) without derating -10 to +60 °C (+14 to 140 °F) with fan kit ^[2] and derating of the current 2.2% per °C above 50 °C Drive controllers ATV58HU90M2 to D46M2 and ATV58HD12N4 to D79N4: -10 to +40 °C (+14 to 104 °F) without derating -10 to +50 °C (+14 to 122 °F) with fan kit ^[1] and derating of the current 2.2% per °C above 40 °C
Altitude	3300 ft (1000 m) maximum without derating; derate the output current by 1% for each additional 330 ft (100 m)
Operational position	Vertical, ±10°, with power terminals at the bottom.

[1] ATV58HU54N4X, ATV58HU72N4X, and ATV58HU90N4X can be used at their highest VT rating in a 40 °C maximum ambient temperature.

[2] See Appendix A for list of accessories.

NOTE: Discoloration of drive controller plastic pieces will occur if exposed to direct sunlight.

Table 12: Electrical Specifications

Input voltage	208 V -15% to 230 V +15% single phase input 208 V -15% to 230 V +15% three phase input 400 V -15% to 460 V + 20% three phase input ^[1]
Input frequency	50/60 Hz ±5%
Output voltage	Three-phase output, maximum voltage equal to input voltage
Galvanic isolation	Galvanic isolation between power and control (inputs, outputs, supplies)
Output frequency	0.1 to 60 Hz (configurable to 500 Hz with programming options) ^[2]
Switching frequency	4 kHz, configurable with programming options ^[2] ATV58HU09M2–D12M2 and ATV58HU18N4–D23N4: 0.5 - 1 - 2 - 4 - 8 kHz without derating 12 - 16 kHz with derating in steady state 12 - 16 kHz without derating and with reduced duty cycle ^[3] ATV58HD16M2–D23M2 and ATV58HD28N4–D46N4: 0.5 - 1 - 2 - 4 - 8 kHz without derating 8 - 12 kHz with derating in steady state 8 - 12 kHz without derating and with reduced duty cycle ^[3] ATV58HD28M2–D46M2 and ATV58HD54N4–D79N4: 0.5 - 1 - 2 - 4 kHz without derating 8 kHz with derating in steady state 4 - 8 kHz without derating and with reduced duty cycle ^[3]
Speed range	1:100
Speed regulation	1% of rated motor speed without adjustments or feedback. ±0.1% of rated motor speed with optional analog I/O card and appropriate tachometer feedback. ^[2] ±0.02% of rated motor speed with optional digital I/O card and appropriate encoder feedback. ^[2]
Efficiency	97% at full load typical.
Displacement power factor	98% through speed range.
Motor control algorithm	Sensorless flux vector control with a pulse width modulated (PWM) output wave form.
DC injection braking	Automatically on stopping as soon as frequency drops below 0.1 Hz for 0.5 seconds.
Braking torque	30% of nominal motor torque without dynamic braking (typical value). Up to 150% with dynamic braking option.

[1] Input voltage is 460 V, -10%, +15% on ATV58HU54N4X–D23N4X controllers as rated in Table 10.

[2] See Appendix A for list of accessories.

[3] The drive controller can be configured to reduce switching frequency if the drive thermal state reaches 95%. When the drive thermal state returns to 70%, the switching frequency returns to the set value. If the duty cycle (drive controller run time) does not exceed 60% (36 second maximum for a 60 second cycle) derating is not required.

[4] Motor power rating must be between 25% minimum, 136% maximum, of drive controller rating.

Table 12: Electrical Specifications (Continued)

Transient output current	160% of nominal NEC rated motor current for 60 seconds (for constant torque ratings). 110% of nominal motor current for 60 seconds (for variable torque ratings).
Transient motor torque	200% of nominal motor torque (typical value at $\pm 10\%$) for 2 seconds. 170% of nominal motor torque (typical value at $\pm 10\%$) for 60 seconds.
Drive controller protection	Protection against short circuits: • between output phases • between output phases and ground • on outputs of internal supplies Thermal protection against overheating and overcurrent. Undervoltage and overvoltage faults. Protection against single-phase input operation on the three-phase drive controllers.
Motor protection	Thermal protection integrated in the drive controller by continuous calculation of I^2t , taking motor speed into account. ^[4] Motor thermal state is retained during loss of power. Motor thermal protection can be modified with a programming option to correspond to the type of motor cooling. ^[2] Protection against motor phase loss. Protection by motor thermal sensors with analog option card. ^[2]
Codes and standards	UL Listed per UL 508C as incorporating electronic overload protection: UL File E164874 CCN NMMS ATV58HU09M2 to D46M2 ATV58HU18N4 to D79N4 CSA Certified to CSA C22.2 No. 14. CSA File LR96921 Class 3211 06 ATV58HU09M2 to D46M2 ATV58HU18N4 to D79N4 CE Marked Conforms to applicable NEMA ICS, NFPA, IEC, and ISO 9001 standards.

[1] Input voltage is 460 V, -10%, +15% on ATV58HU54N4X–D23N4X controllers as rated in Table 10.

[2] See Appendix A for list of accessories.

[3] The drive controller can be configured to reduce switching frequency if the drive thermal state reaches 95%. When the drive thermal state returns to 70%, the switching frequency returns to the set value. If the duty cycle (drive controller run time) does not exceed 60% (36 second maximum for a 60 second cycle) derating is not required.

[4] Motor power rating must be between 25% minimum, 136% maximum, of drive controller rating.

DIMENSIONS

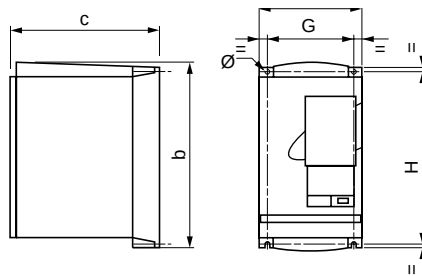


Figure 1: ATV58H..... Dimensions

Table 13: ATV58H..... Dimensions

Product Frame Size	Catalog No. ATV58H.....	a in. (mm)	b in. (mm)	c in. (mm)	G in. (mm)	H in. (mm)	Ø in. (mm)	Weight lb (kg)
1	U09M2, U18M2	4.45 (113)	8.11 (206)	6.58 (167)	3.78 (96)	7.48 (190)	0.20 (5)	4.9 (2.2)
2	U29M2, U41M2, U18N4, U29N4, U41N4	5.91 (150)	9.06 (230)	7.24 (184)	5.20 (133)	8.27 (210)	0.20 (5)	8.4 (3.8)
3	U54M2, U72M2, U54N4, U72N4, U90N4	6.89 (175)	11.26 (286)	7.24 (184)	6.10 (155)	10.63 (270)	0.22 (5.5)	15.2 (6.9)
4	U90M2, D12M2, D12N4, D16N4	9.06 (230)	12.80 (325)	8.27 (210)	7.9 (200)	12.20 (310)	0.22 (5.5)	26 (11.9)
5	D23N4	9.06 (230)	16.35 (415)	8.27 (210)	7.9 (200)	15.75 (400)	0.22 (5.5)	31 (13.9)

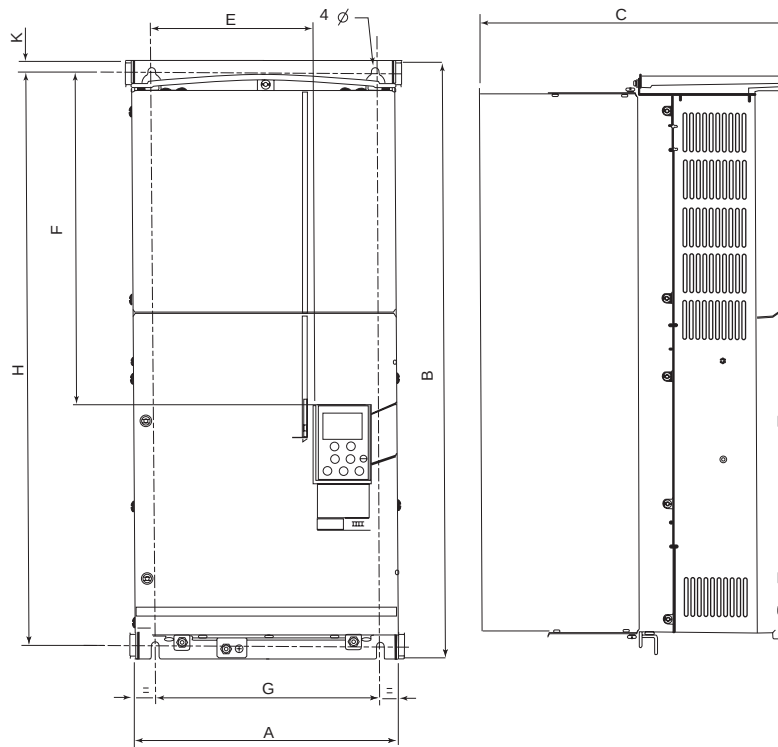


Figure 2: ATV58H..... Dimensions

Table 14: ATV58H..... Dimensions

Product Frame Size	Catalog No. ATV58H.....	A in. (mm)	B in. (mm)	C in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	K in. (mm)	Ø in. (mm)	Weight lb (kg)
6	D16M2, D23M2 D28N4, D33N4 D46N4	9.45 (240)	21.65 (550)	11.14 (283)	5.75 (146)	12.05 (306)	8.07 (205)	20.87 (530)	0.39 (10)	0.28 (7)	75 (34)
7	D28M2, D33M2 D46M2, D54N4 D64N4, D79N4	13.78 (350)	25.59 (650)	11.97 (304)	9.29 (236)	15.35 (390)	11.81 (300)	24.37 (619)	0.39 (10)	0.36 (9)	126 (57)

INSTALLATION PRECAUTIONS

- The ALTIVAR 58 drive controller must be installed in a suitable environment. The environment around the drive controller must not exceed pollution degree requirements as defined in NEMA ICS-1 or IEC 60664. Refer to the ambient pollution degree ratings in Table 11.
- Install the drive controller vertically, $\pm 10^\circ$, with the power terminals at the bottom. Avoid placing the drive controller near any heat sources.
- Leave at least 0.4 in. (10 mm) in front of the drive controller.
- Verify that the voltage and frequency characteristics of the input line match the drive controller nameplate rating.
- Installation of a disconnect switch between the input line and the drive controller should be in accordance with national and local codes.
- Overcurrent protection is required. Refer to Tables 30 to 32 on page 45 for recommended fuses.

DANGER

HAZARDOUS VOLTAGE

Before working on this equipment:

- Turn off all power supplying this equipment before working on it.
- Place a "DO NOT TURN ON" label on the drive controller disconnect.
- Lock the disconnect in the open position.

Failure to follow this instruction will result in death or serious injury.

- Figure 3 shows the minimum clearances required around each drive controller for unobstructed air flow. These clearances should not be used as minimum enclosure size for proper thermal dissipation.

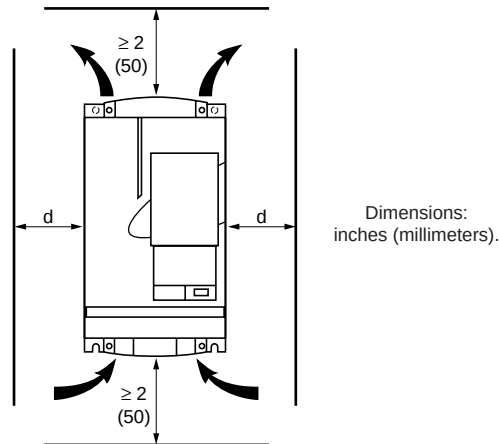


Figure 3: Minimum Clearances

Mounting and Temperature Conditions (Refer to Figure 3)

Refer to Fig. 3
for dimension
"d".

ATV58HU09M2 to U72M2 and ATV58HU18N4 to U90N4:

- From -10 to 40 °C (+14 to 104 °F)
For $d \geq 2$ in. (50 mm): no special precautions.
For $d < 2$ in.: remove the protective cover from the top of the drive controller as shown in Figure 4 on page 17.
- From 40 to 50 °C (104 to 122 °F):
For $d \geq 2$ in. (50 mm): remove the protective cover from the top of the drive controller as shown in Figure 4 on page 17.
For $d < 2$ in.: add the control ventilation kit VW3A5882• (see catalog 8806CT9801).
- From 50 to 60 °C (122 to 140 °F):
For $d \geq 2$ in. (50 mm): add the ventilation fan. See Appendix A for a list of accessories. Derate the current used by 2.2% per °C above 50 °C.

Refer to Fig. 3
for dimension
"d".

ATV58HU90M2 to D46M2 and ATV58HD12N4 to D79N4:

- From -10 to 40 °C (+14 to 104 °F):
For $d \geq 2$ in. (50 mm): no special precautions.
For $d < 2$ in.: remove the protective cover from the top of the drive controller as shown in Figure 4.
- From 40 to 50 °C (104 to 122 °F):
For $d \geq 2$ in. (50 mm): remove the protective cover from the top of the drive controller as shown in Figure 4. Derate the current used by 2.2% per °C above 40 °C.
For $d < 2$ in.: add the ventilation fan. See Appendix A for a list of accessories. Derate the current used by 2.2% per °C above 40 °C.

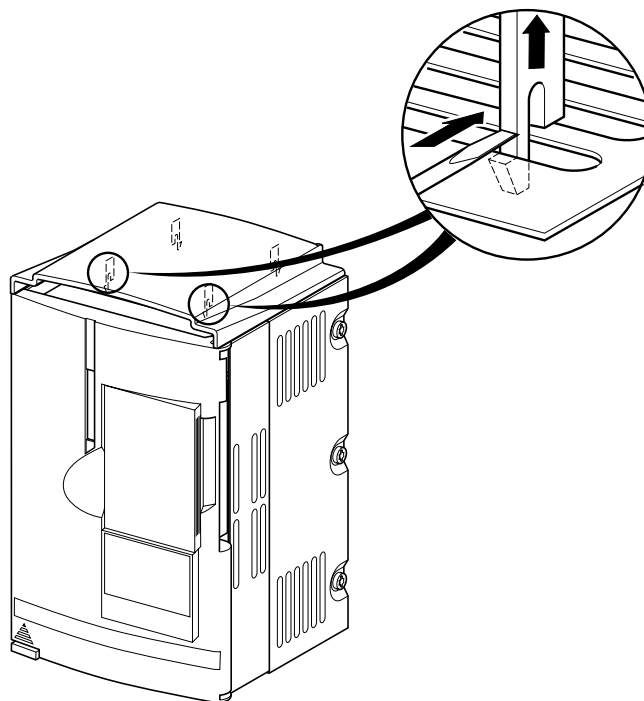


Figure 4: Removing The Protective Cover

MOUNTING IN GENERAL PURPOSE METAL ENCLOSURE

Follow the installation precautions given on pages 15 to 16.

To ensure sufficient air circulation in the drive controller:

- Provide ventilation inlets and outlets in the enclosure as shown in Figure 5.
- If the enclosure does not provide sufficient free air flow, an enclosure ventilation fan is required to exhaust the heat outside of the enclosure. The enclosure fan should have a greater fan flow rate than the drive controller fan flow rate listed in Table 15.
- IP54/NEMA 12 filters should be used if a ventilation fan is required.

If there is a possibility of condensation, keep the control supply switched on during periods when the motor is not running, or install thermostatically controlled strip heaters.

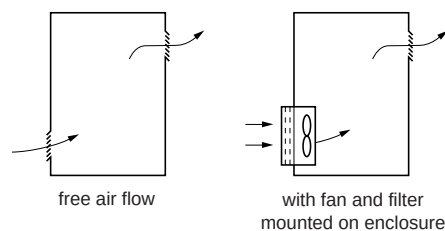


Figure 5: Ventilation for General Purpose Enclosures

Table 15: ALTIVAR 58 Fan Flow Rates

Drive Controller	Fan Flow Rate	
ATV58HU09M2, U18M2	Non-ventilated	
ATV58HU29M2, U18N4, U29N4, U41N4, U54N4	36 m ³ /hour	21 CFM
ATV58HU41M2	47 m ³ /hour	27.5 CFM
ATV58HU54M2, U72M2, U54N4, U72N4, U90N4	72 m ³ /hour	42 CFM
ATV58HU90M2, D12M2, D12N4, D16N4, D23N4	72 m ³ /hour	42 CFM
ATV58HD16M2, D23M2, D28N4, D33N4, D46N4	161 m ³ /hour	94 CFM
ATV58HD28M2, D33M2, D46M2, D54N4, D64N4, D79N4	343 m ³ /hour	200 CFM

MOUNTING IN TYPE 12 OR IP54 METAL ENCLOSURE

Certain conditions may require Type 12 or IP54 protection, such as dust, corrosive gas, high humidity with the risk of condensation, and dripping water.

When mounting in a Type 12 or IP54 enclosure, follow the installation precautions on pages 15 and 16.

To prevent hot spots in the drive controller if it is non-ventilated, use a stirring fan to circulate the air inside the enclosure. The maximum temperature inside the enclosure can then be 60 °C. Derate the current used by 2.2% per °C above 50 °C. If there is the possibility of condensation, keep the power supply switched on during periods when the motor is not running, or install thermostatically controlled strip heaters.

Calculating Enclosure Size

The equation for calculating Rth (°C/W), the maximum allowable thermal resistance of the enclosure, is:

$$R_{th} = \frac{T_i - T_o}{P}$$

T_i = Max. internal ambient temp. (°C) around drive controller
 T_o = Max. external temp. (°C) around enclosure
 P = Total power dissipated in enclosure (W)

Useful heat exchange surface area, S (in²), of a wall-mounted enclosure generally consists of the sides, top, and front. The minimum surface area required for a drive controller enclosure is calculated as follows.

NOTE: Contact enclosure manufacturer for K factors.

$$S = \frac{K}{R_{th}}$$

Rth = Thermal resistance of the enclosure (calculated previously)
K = Thermal resistance per square inch of the enclosure.

Consider the following points when sizing the enclosure:

- Use only metallic enclosures, since they have good thermal conduction.
- This procedure does not consider radiant or convected heat load from external sources. Do not install enclosures where external heat sources (such as direct sunlight) can add to enclosure heat load.
- If additional devices are present inside the enclosure, consider the heat load of the devices in the calculation.
- The actual useful area for convection cooling of the enclosure will vary depending upon the method of mounting. The method of mounting must allow for free air movement over all surfaces considered for convection cooling.

Example

The following example illustrates calculation of the enclosure size for an ATV58HU29N4 (2 hp) drive controller mounted in a Type 12 enclosure.

- Maximum external temperature: $T_o = 25\text{ }^{\circ}\text{C}$
- Power dissipated inside enclosure: $P = 97\text{ W}$ (from Table 7)
- Maximum internal temperature: $T_i = 40\text{ }^{\circ}\text{C}$
- Thermal resistance per square inch of enclosure: $K = 186$
- Calculate maximum allowable thermal resistance, R_{th} :

$$R_{th} = \frac{40\text{ }^{\circ}\text{C} - 25\text{ }^{\circ}\text{C}}{97\text{ W}} = 0.16\text{ }^{\circ}\text{C/W}$$

- Calculate minimum useful heat exchange surface area, S :

$$S = \frac{186}{0.16} = 1162.5\text{ in}^2$$

Useful heat exchange surface area (S) of the proposed wall-mounted enclosure:

- Height: 24 in (610 mm)
- Width: 20 in (508 mm)
- Depth: 12 in (305 mm)

$$\begin{array}{ccc} \text{front area} & \text{top area} & \text{side area} \\ \downarrow & \downarrow & \downarrow \\ S = (24 \times 20) + (20 \times 12) + 2(24 \times 12) = 1296\text{ in}^2 \end{array}$$

If the selected enclosure does not provide the required surface area or does not meet application needs, consider the following:

- Use a larger enclosure.
- Add a passive heat exchanger to the enclosure.
- Add an air conditioning unit to the enclosure.

ELECTROMAGNETIC COMPATIBILITY (EMC)

The ALTIVAR 58 is considered to be a component. It is neither a machine nor a piece of equipment ready for use in accordance with the European Community directives (machinery directive or electromagnetic compatibility directive). It is the user's responsibility to ensure that the machine meets these standards.

A metal EMC plate is available for ALTIVAR 58 drive controllers to assist in meeting the European Community EMC directives. This kit is for integrators and end users who are including the drive controller as part of a machine to be exported to Europe requiring compliance to these directives.

See Appendix A for a list of accessories. Instruction bulletin no. 30072-450-04 ships with the EMC plate kit and contains information about its use.

ALTIVAR 58 drive controllers are marked with the CE European Community mark.

WIRING

Before wiring the drive controller, first perform the bus voltage measurement procedure on page 26. Figure 6 shows the location of the terminal strips.

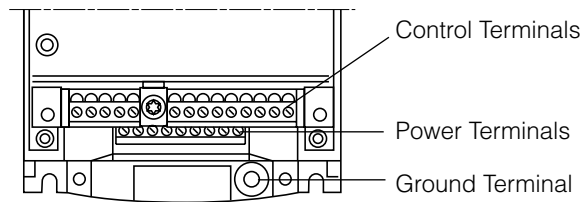


Figure 6: Terminal Locations (Product Frame Size 1)

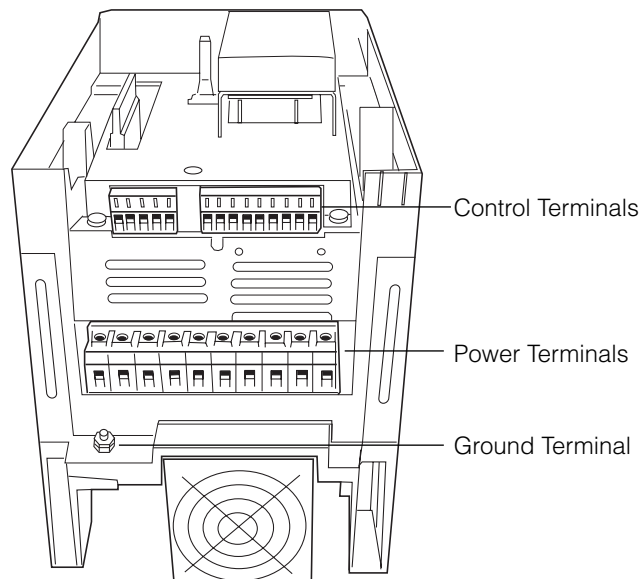


Figure 7: Terminal Locations (Product Frame Sizes 2 and 3)

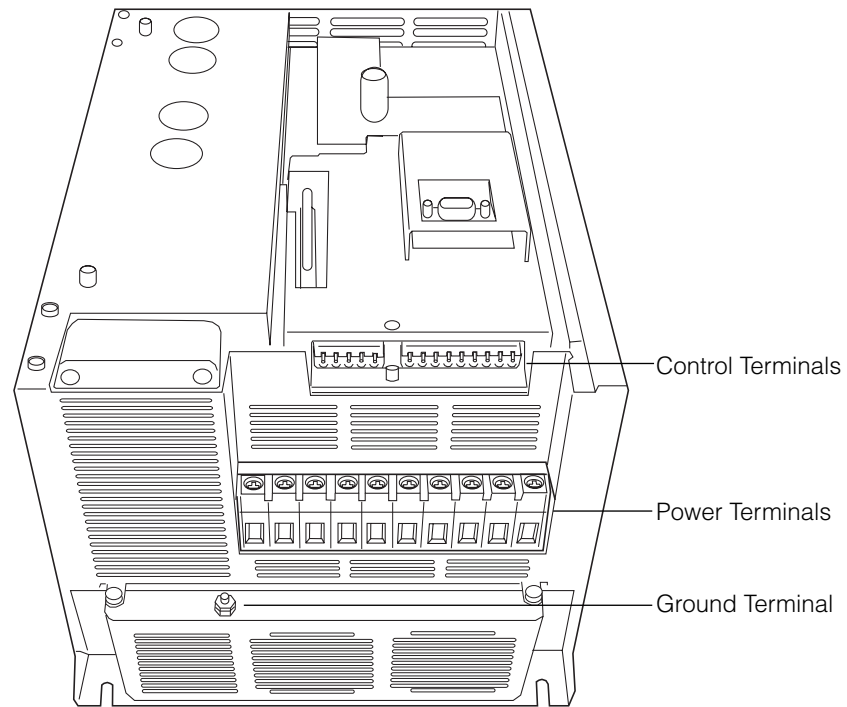


Figure 8: Terminal Locations (Product Frame Sizes 4 and 5)

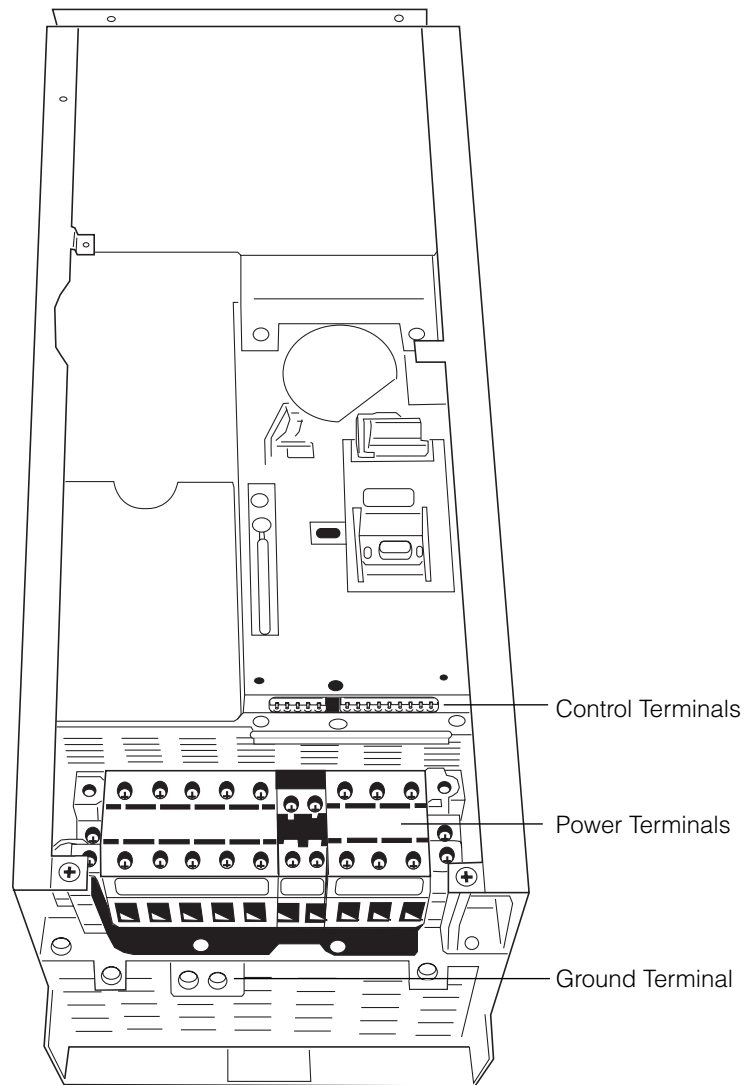


Figure 9: Terminal Locations (Product Frame Size 6)

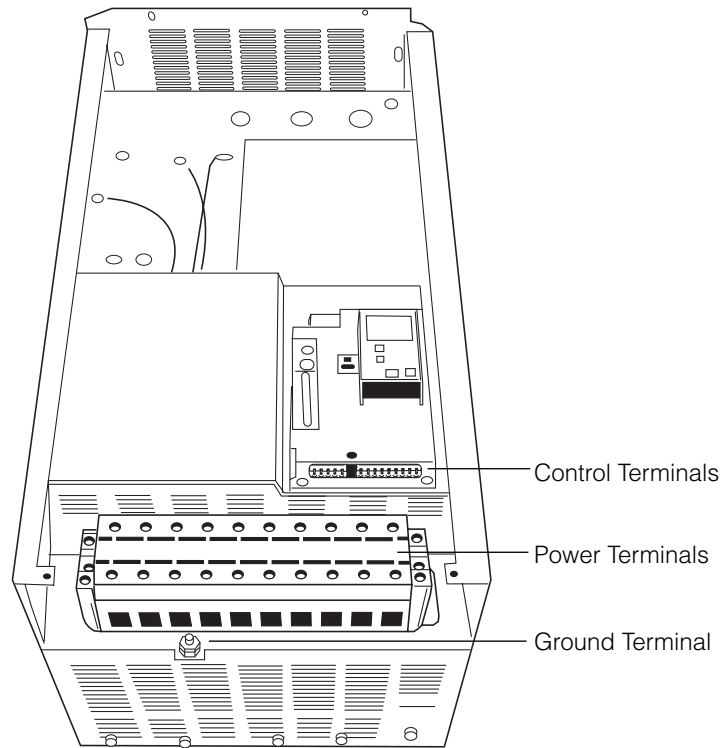


Figure 10: Terminal Locations (Product Frame Size 7)

Bus Voltage Measurement Procedure

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand the bus voltage measurement procedure before performing procedure. Measurement of bus capacitor voltage must be performed by qualified personnel.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Electrical shock will result in death or serious injury.

The DC bus voltage level is determined by monitoring the (+) and (-) measurement points. Their location varies by drive controller model number as listed in Table 16 and shown in Figure 11. The drive controller model number is listed on its nameplate.

Table 16: (+) and (-) Measurement Points

Drive Controller ATV58H•••••	(+) Measurement Point		(-) Measurement Point	
	Terminal Block or Connector	Terminal Designation	Terminal Block or Connector	Terminal Designation
U09M2• and U18M2•	J2	(+)	J2	(-)
U29M2• to D12M2•	J2	PA	J18	7
U18N4• to D23N4•				
D16M2• to D46M2•	J2	(+)	J2	(-)
D28N4• to D79N4•				

To measure the DC bus capacitor voltage:

1. Disconnect all power from the drive controller including external control power that may be present on the control board and the option board terminals.
2. Wait three minutes for the DC bus capacitors to discharge.
3. Read the model number of the drive controller from the nameplate and identify the corresponding (+) and (-) measurement points from Table 16 and Figure 11.

4. Open the door or cover of the drive controller.
5. Set the voltmeter to the 1000 VDC scale. Measure the voltage between the (+) and (-) measurement points identified in step 3. Verify that the DC bus voltage has discharged below 45 V before servicing the drive controller.
6. If the DC bus capacitors will not discharge below 45 V, contact your local Square D representative. **Do not operate the drive controller.**
7. Replace all of the covers after servicing the drive controller.

The J18 connector is in the upper left hand corner of the main control board behind the flexible shield. Use a thin probe to access the connector pin.

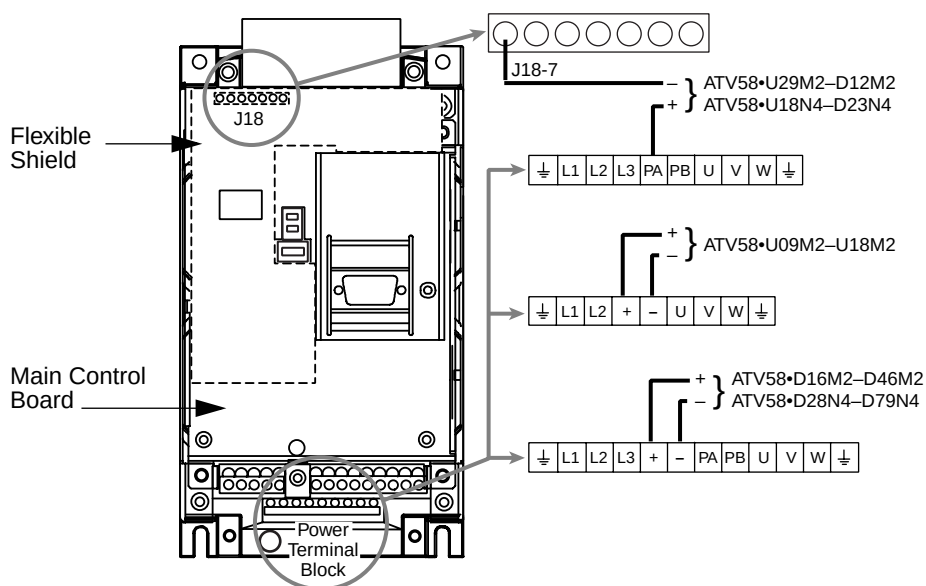


Figure 11: DC Bus Measurement Terminals

General Wiring Practices

Good wiring practice requires the separation of control circuit wiring from all power wiring. Power wiring to the motor must have the maximum possible separation from all other power wiring, whether from the same drive controller or other drive controllers; **do not run power and/or control or multiple power wiring in the same conduit**. This separation reduces the possibility of coupling electrical transients from power circuits into control circuits or from motor power wiring into other power circuits.

CAUTION

EQUIPMENT DAMAGE HAZARD

Follow wiring practices described in this document in addition to those already required by the National Electric Code and local electrical codes.

Failure to follow this instruction can result in injury or equipment damage.

Follow the practices below when wiring enclosed ALTIVAR 58 drive controllers:

- When using metallic conduit, use metal conduit kits. See Appendix A for a list of the conduit kits.
- Use metallic conduit for all drive controller wiring. Do not run control and power wiring in the same conduit.
- Separate metallic conduits carrying power wiring or low-level control wiring by at least 3 in. (76 mm).
- Separate non-metallic conduits or cable trays used to carry power wiring from metallic conduit carrying low-level control wiring by at least 12 in. (305 mm).
- Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays must cross at right angles.
- Equip all inductive circuits near the drive (relays, contactors, solenoid valves) with noise suppressors or connect them to a separate circuit.

Branch Circuit Connections

Refer to NEC Article 430 for sizing the branch circuit conductors. All branch circuit components and equipment (such as transformers, feeder cables, disconnect devices, and protective devices) must be rated for the input current of the ALTIVAR 58 drive controller, or the rated output current, whichever value is larger. The input current of the controller depends on the impedance of the power distribution system and the available fault current at the drive input terminals.

Select the input current corresponding to the available fault current capability or the line impedance present. If the branch circuit available fault current capability is limited by fuses or circuit breakers (not system impedance), use the available fault current capability on the line side of the fuses or circuit breakers to select the drive controller input current. The input current values for the variable torque drive controller ratings are based on nominal NEC rated motor currents. The input current values for the constant torque drive controller ratings are based on drive controller rated output currents. Tables 17 to 26 provide input current information to optimally size branch circuit conductors.

NOTE: The branch circuit feeder protection rating should not be less than the rated output current of the drive controller.

WARNING

OVERCURRENT PROTECTIVE DEVICES MUST BE PROPERLY COORDINATED

- The National Electrical Code requires branch circuit protection. Use the fuses recommended in Tables 30 to 32 on pages 44 to 45 of this manual to achieve published fault withstand current ratings.
- Do not connect drive controller to power feeder whose short circuit capacity exceeds drive controller withstand fault rating listed on drive controller nameplate or Tables 17 to 26.

Failure to follow this instruction can result in death, serious injury or equipment damage.

Table 17: Input Line Currents, Constant Torque, 208/230 V Ratings, Single-Phase Input • Three-Phase Output, Switching Frequency@4kHz

NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power 208/230 V		Rated Output Current In A	Input Line Current								w/ Additional 3% Line Impedance 22000 AIC
				2000 AIC		5000 AIC		22000 AIC				
	kW	Hp		208 V A	230 V A	208 V A	230 V A	208 V A	230 V A	208 V A	230 V A	
ATV58HU09M2•	0.37	0.5	2.3	5.6	4.7	—	—	—	—	4.2	3.8	
ATV58HU18M2•	0.75	1	4.1	9.8	8.3	—	—	—	—	7.9	7.0	
ATV58HU29M2•	1.5	2	7.8	—	—	18.5	15.6	—	—	14.1	12.3	
ATV58HU41M2•	2.2	3	11	—	—	25.6	21.6	—	—	20.5	17.5	
ATV58HU72M2•	3	4	13.7	—	—	25.1	22.7	—	—	23.3	20.6	
ATV58HU90M2•	4	5	18.2	—	—	27.5	24.8	30.7	27.6	32.3	28.6	
ATV58HD12M2•	5.5	7.5	24.2	—	—	39.8	36.6	44.9	40	42.5	37.6	

Table 18: Input Line Currents, Variable Torque Low Noise, 208/230 V Ratings, Single-Phase Input • Three-Phase Output, Switching Frequency @ 8kHz

NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power 208/230 V		Rated Output Current	Input Line Current								w/ Additional 3% Line Impedance 22000 AIC
				2000 AIC		5000 AIC		22000 AIC				
	kW	Hp		A	208 V A	230 V A	208 V A	230 V A	208 V A	230 V A	208 V A	
ATV58HU09M2•	0.37	0.5	2.3	5.6	4.7	—	—	—	—	4.2	3.8	
ATV58HU18M2•	0.75	1	4.8	9.8	8.3	—	—	—	—	7.9	7.0	
ATV58HU29M2•	1.5	2	7.8	—	—	18.5	15.6	—	—	14.1	12.3	
ATV58HU41M2•	2.2	3	11	—	—	25.6	21.6	—	—	20.5	17.5	
ATV58HU72M2•	3	4	14.3	—	—	25.1	22.7	—	—	23.3	20.6	
ATV58HU90M2•	4	5	17.5	—	—	27.5	24.8	35	30	32.3	28.6	
ATV58HD12M2•	5.5	7.5	25.3	—	—	39.8	36.6	46	39.4	42.5	37.6	

Table 19: Input Line Currents, Constant Torque, 208/230 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HU29M2–D23M2 @ 4kHz, ATV58HD28M2–D46M2 @ 2 kHz

NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power 208/230 V		Rated Output Current In	Input Line Current								w/ Additional 3% Line Impedance 22000 AIC
				5000 AIC		10000 AIC		22000 AIC				
	kW	Hp		A	208 V A	230 V A	208 V A	230 V A	208 V A	230 V A	208 V A	
ATV58HU29M2•	1.5	2	7.8	9.7	8.3	—	—	—	—	6.6	5.9	
ATV58HU41M2•	2.2	3	11	13.4	11.4	—	—	—	—	9.5	8.5	
ATV58HU54M2•	3	4	13.7	17.2	15	—	—	—	—	12.6	11.2	
ATV58HU72M2•	4	5	18.2	22.4	19.5	—	—	—	—	16.9	14.6	
ATV58HU90M2	5.5	7.5	24.2	30	26.4	32.1	28.4	34.7	30	23.3	20.6	
ATV58HD12M2•	7.5	10	31	39.7	35	42.3	37.4	44.4	38.2	32.3	28.6	
ATV58HD16M2•	11	15	47	42.4	43.1	42.8	43.3	43.4	43.6	43.4	43.0	
ATV58HD23M2•	15	20	60	58	58.5	58.2	58.3	58.5	58.7	58.5	58.7	
ATV58HD28M2•	18.5	25	75	70.2	70.4	70.6	70.4	70.2	70.4	69.4	70.0	
ATV58HD33M2•	22	30	88	82.3	82.7	82.5	83.9	84.0	84.0	83.2	83.6	
ATV58HD46M2•	30	40	116	100.8	102.2	101.2	103.2	101.7	101.5	101.7	103.7	

Table 20: Input Line Currents, Constant Torque Low Noise, 208/230 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HD16M2–D23M2 @ 8 kHz, ATV58HD28M2–D46M2 @ 4 kHz

NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power 208/230 V		Rated Output Current	Input Line Current								w/ Additional 3% Line Impedance
				5000 AIC		10000 AIC		22000 AIC				
	kW	Hp		A	208 V A	230 V A	208 V A	230 V A	208 V A	230 V A	208 V A	
ATV58HD16M2•	7.5	10	31	36.2	37.1	36.5	37.2	36.8	37.2	36.7	37.3	
ATV58HD23M2•	11	15	47	43.2	43.5	43.3	43.9	44.0	44.5	43.3	43.8	
ATV58HD28M2•	15	20	60	58.3	58.9	58.3	59.3	58.6	59.3	58.3	58.8	
ATV58HD33M2•	18.5	25	75	71.0	71.7	71.3	72.5	72.6	73.5	72.6	73.4	
ATV58HD46M2•	22	30	88	82.3	83.3	84.7	85.7	85.3	86.6	85.0	86.8	

**Table 21: Input Line Currents, Variable Torque, 208/230 V Ratings, Three-Phase Input
• Three-Phase Output, Switching Frequency: ATV58HU29M2–D23M2 @
4 kHz, ATV58HD28M2–D46M2 @ 2 kHz**

NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power 208/230 V		Rated Output Current	Input Line Current							
				5000 AIC		10000 AIC		22000 AIC		w/ Additional 3% Line Impedance	
	kW	Hp		A	208 V A	230 V A	208 V A	230 V A	208 V A	230 V A	208 V A
ATV58HU29M2•	1.5	2	7.5	9.4	8.6	—	—	—	—	6.6	5.9
ATV58HU41M2•	2.2	3	10.6	13	11.8	—	—	—	—	9.5	8.5
ATV58HU54M2•	3	4	14.3	17.2	15	—	—	—	—	12.6	11.2
ATV58HU72M2•	4	5	16.7	21.4	19.5	—	—	—	—	16.9	14.6
ATV58HU90M2	5.5	7.5	24.2	29	26.4	32.1	28.4	34.7	30	23.3	20.6
ATV58HD12M2•	7.5	10	30.8	38.3	35	42.3	37.4	44.4	38.2	32.3	28.6
ATV58HD16M2•	11	15	46.2	41.7	37.8	41.7	38.0	41.7	38.0	41.7	38.0
ATV58HD16M2•	15	20	60	55.5	50.5	55.7	50.5	55.7	50.8	55.1	50.5
ATV58HD23M2•	18.5	25	75	67.0	61.8	67.2	61.8	67.2	61.8	67.1	61.4
ATV58HD28M2•	22	30	88	80.5	73.3	80.6	73.3	80.9	73.6	80.7	73.6
ATV58HD33M2•	30	40	116	107.6	97.9	108.4	97.9	108.4	98.5	107.6	98.5
ATV58HD46M2•	37	50	143	134.8	121.2	135.4	121.2	135.5	124.0	135.0	123.7

Table 22: Input Line Currents, Variable Torque Low Noise, 208/230 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HU29M2–D23M2 @ 8 kHz, ATV58HD28M2–D46M2 @ 4 kHz

NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power 208/230 V		Rated Output Current (In) A	Input Line Current							
				5000 AIC		10000 AIC		22000 AIC		w/ Additional 3% Line Impedance	
	kW	Hp		208 V A	230 V A	208 V A	230 V A	208 V A	230 V A		
ATV58HU29M2•	1.5	2	7.5	9.4	8.6	—	—	—	—	6.6	5.9
ATV58HU41M2•	2.2	3	10.6	13	11.8	—	—	—	—	9.5	8.5
ATV58HU54M2•	3	4	14.3	17.2	15	—	—	—	—	12.6	11.2
ATV58HU72M2•	4	5	16.7	21.4	19.5	—	—	—	—	16.9	14.6
ATV58HU90M2	5.5	7.5	24.2	29	26.4	32.1	28.4	34.7	30	23.3	20.7
ATV58HD12M2•	7.5	10	30.8	38.3	35	35.7	32.4	35.8	32.8	35.2	32.8
ATV58HD16M2•	11	15	46.2	42.7	39.0	42.7	39.0	42.7	39.0	42.4	39.0
ATV58HD23M2•	15	20	60	55.2	48.9	55.2	50.5	55.4	51.2	55.4	50.7
ATV58HD28M2•	18.5	25	75	67.8	61.9	68.2	62.1	68.4	62.6	67.6	61.6
ATV58HD33M2•	22	30	88	82.0	73.8	82.0	75.1	82.8	76.7	82.8	76.5
ATV58HD46M2•	30	40	116	108.6	97.3	109.2	99.2	109.7	99.7	109.4	99.7

Table 23: Input Line Currents, Constant Torque, 400 /460 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HU18N4–D46N4 @ 4 kHz, ATV58HD54N4–D79N4 @ 2 kHz
NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power		Rated Output Current (In) A	Input Line Current							
				5000 AIC		10000 AIC		22000 AIC		w/ Additional 3% Line Impedance	
	400 V kW	460 V Hp		400 V A	460 V A	400 V A	460 V A	400 V A	460 V A	400 V A	460 V A
ATV58HU18N4•	0.75	1	2.3	3.4	2.6	—	—	—	—	1.9	1.6
ATV58HU29N4•	1.5	2	4.1	6.0	4.5	—	—	—	—	3.3	3.0
ATV58HU41N4•	2.2	3	5.8	7.8	6	—	—	—	—	4.8	4.2
ATV58HU54N4•	3	4	7.8	10.2	7.8	—	—	—	—	6.3	5.6
ATV58HU72N4•	4	5	10.5	13.0	10.1	—	—	—	—	8.6	7.2
ATV58HU90N4	5.5	7.5	13	17.0	13.2	—	—	—	—	11.8	10.1
ATV58HD12N4•	7.5	10	17.6	20.7	18.2	22.7	19.9	26.5	21	16	13.2
ATV58HD16N4•	11	15	24.2	28.8	25.3	31.4	27.6	35.4	28	23.6	19.5
ATV58HD23N4•	15	20	33	36.5	32	39.6	34.7	44.7	35.6	30.6	25.8
ATV58HD28N4•	18.5	25	40.7	37.3	38.3	37.9	39.2	38.9	40.1	38.7	40.0
ATV58HD33N4•	22	30	48.4	44.4	44.8	45.9	46.7	46.5	47.6	46.4	47.6
ATV58HD46N4•	30	40	66	59.1	59.9	61.2	61.9	62.0	61.9	62.1	63.7
ATV58HD54N4•	37	50	79.2	70.6	71.4	73.3	74.7	74.7	74.7	74.9	76.3
ATV58HD64N4•	45	60	93.5	84.3	84.8	88.8	89.7	92.3	89.7	92.3	93.8
ATV58HD79N4•	55	75	115.5	102.7	103.3	106.4	108.6	111.6	108.6	112.1	112.7

Table 24: Input Line Currents, Constant Torque Low Noise, 400/460 V Ratings, Three-Phase Input • Three-Phase Output, Switching Frequency: ATV58HD28N4–D46N4 @ 8 kHz, ATV58HD54N4–D79N4 @ 4 kHz
NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power		Rated Output Current A	Input Line Current							
				5000 AIC		10000 AIC		22000 AIC		w/ Additional 3% Line Impedance 22000 AIC	
	400 V kW	460 V Hp		400 V A	460 V A	400 V A	460 V A	400 V A	460 V A	400 V A	460 V A
ATV58HD28N4•	15	20	33	31.7	32.4	32.4	33.1	33.1	33.7	33.0	33.6
ATV58HD33N4•	18.5	25	40.7	37.9	39.3	39.4	40.1	40.4	40.7	40.3	41.0
ATV58HD46N4•	22	30	48.4	46.3	47.0	48.2	48.7	49.0	49.8	49.1	49.4
ATV58HD54N4•	30	40	66	60.9	60.4	63.2	63.0	64.4	65.4	64.7	64.8
ATV58HD64N4•	37	50	79.2	73.0	74.3	77.9	78.8	80.2	82.1	81.0	81.7
ATV58HD79N4•	45	60	93.5	65.3	65.8	90.6	91.7	94.6	95.0	94.4	94.9

Table 25: Input Line Currents, Variable Torque, 400/460 V Ratings, Three-Phase Input
• Three-Phase Output, Switching Frequency: ATV58HU18N4–D23N4 @ 8 kHz, ATV58HD28N4–D46N4 @ 4kHz, ATV58HD54N4–D79N4 @ 2 kHz
NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power		Rated Output Current A	Input Line Current							
				5000 AIC		10000 AIC		22000 AIC		w/ Additional 3% Line Impedance 22000 AIC	
	400 V kW	460 V Hp		400 V A	460 V A	400 V A	460 V A	400 V A	460 V A	400 V A	460 V A
ATV58HU18N4•	0.75	1	2.1	3.2	2.8	—	—	—	—	1.9	1.6
ATV58HU29N4•	1.5	2	3.4	5.5	4.8	—	—	—	—	3.3	3.0
ATV58HU41N4•	2.2	3	4.8	7.4	6.5	—	—	—	—	4.8	4.2
ATV58HU54N4•	3	4	6.2	10.2	7.8	—	—	—	—	6.3	5.6
ATV58HU72N4•	4	5	7.6	12.2	10.7	—	—	—	—	8.6	7.2
ATV58HU90N4	5.5	7.5	11	16.3	14.3	—	—	—	—	11.8	10.1
ATV58HD12N4•	7.5	10	14	20.7	18.2	22.7	19.9	26.5	21	16.0	13.2
ATV58HD16N4•	11	15	21	28.8	25.3	31.4	27.6	35.4	28	23.6	19.5
ATV58HD23N4•	15	20	27	36.5	32	39.6	34.7	44.7	35.6	30.6	25.8
ATV58HD28N4• ^[1]	18.5	25	34	36.3	32.7	36.9	33.4	37.4	34.1	37.6	34.0
ATV58HD28N4•	22	30	40	42.3	38.1	43.0	38.7	43.9	39.8	43.6	39.6
ATV58HD33N4•	30	40	52	55.5	49.3	56.3	51.1	57.1	51.6	56.8	51.4
ATV58HD46N4•	37	50	65	68.9	61.8	70.9	63.5	72.3	65.4	72.0	65.1
ATV58HD54N4•	45	60	77	82.7	72.3	84.1	75.2	85.5	77.7	85.5	77.5
ATV58HD64N4•	55	75	96	103.7	91.0	107.0	96.3	111.1	100.8	111.1	100.0
ATV58HD79N4•	75	100	124	133.6	117.4	138.0	122.6	142.9	129.3	142.4	128.8

[1] The ATV58HD28N4 is rated for 8 kHz operation at 25 hp.

Table 26: Input Line Currents, Variable Torque Low Noise, 400/460 V Ratings, Three-Phase Input • Three-Phase Output: Switching Frequency: ATV58HU18N4–D46N4 @ 8 kHz, ATV58HD54N4–D79N4 @ 4 kHz

NOTE: The input conductor ampacity rating should not be less than the ampacity rating selected based on the rated controller output current.

Drive Controller Catalog Number	Motor Power		Rated Output Current A	Input Line Current							
				5000 AIC		10000 AIC		22000 AIC		w/ Additional 3% Line Impedance 22000 AIC	
	400 V kW	460 V Hp		400 V A	460 V A	400 V A	460 V A	400 V A	460 V A	400 V A	460 V A
ATV58HU18N4•	0.75	1	2.1	3.2	2.8	—	—	—	—	1.9	1.6
ATV58HU29N4•	1.5	2	3.4	5.5	4.8	—	—	—	—	3.3	3.0
ATV58HU41N4•	2.2	3	4.8	7.4	6.5	—	—	—	—	4.8	4.2
ATV58HU54N4X•	[1]	5	7.6	—	10.0	—	—	—	—	—	7.5
ATV58HU72N4X•	[1]	7.5	11	—	14.3	—	—	—	—	—	9.9
ATV58HU90N4X•	[1]	10	14	—	18.1	—	—	—	—	—	13.1
ATV58HD12N4X•	[1]	15	21	—	25.8	—	—	—	—	—	19.6
ATV58HD16N4X•	[1]	20	27	—	32.4	—	—	—	—	—	25.9
ATV58HD23N4X•	[1]	25	34	—	38.9	—	—	—	—	—	31.1
ATV58HD28N4•	18.5	25	34	36.3	32.7	36.9	33.4	37.4	34.1	37.6	34.0
ATV58HD33N4•	22	30	40	43.3	39.0	44.2	40.1	45.1	40.4	44.7	40.4
ATV58HD46N4•	30	40	52	56.9	51.0	58.5	52.8	60.3	54.5	60.2	54.3
ATV58HD54N4•	37	50	65	70.2	61.5	71.9	64.9	73.6	67.0	73.4	67.0
ATV58HD64N4•	45	60	77	84.0	74.4	88.8	79.8	91.8	82.8	91.8	82.5
ATV58HD79N4•	55	75	96	102.8	91.7	106.9	96.4	112.6	100.5	112.3	100.0

[1] This product is for 460 Vac applications at 5000 AIC. A line reactor (3% minimum) must be used at higher AIC ratings. See Table 25 for 400 Vac rated controllers in this hp range.

Output Wiring Precautions

WARNING

DRIVE CONTROLLER DAMAGE

The drive controller will be damaged if input line voltage is applied to output terminals (U, V, W). Check power connections before energizing the drive controller.

Failure to follow this instruction can result in death, serious injury or equipment damage.

The drive controller is sensitive to the amount of capacitance (either phase-to-phase or phase-to-ground) present on the output power conductors. If excessive capacitance is present, the drive controller may trip on overcurrent. Follow the guidelines below when selecting output cable:

- Cable type: the cable selected must have a low capacitance phase-to-phase and to ground. Do not use mineral-impregnated cable because it has a very high capacitance. Immersion of cables in water increases capacitance.
- Cable length: the longer the cable, the greater the capacitance. Cable lengths greater than 100 ft (30.5 m) may affect controller performance.
- Proximity to other output cables: because of high frequency switching and increased capacitance, the drive controller may fault under some conditions.
- **Do not use lightning arrestors on output of drive controller.**

Wiring needs a minimum inductance to protect the drive controller output from short circuits. Provide at least 20 in. (500 mm) of cable at the drive controller output (U, V, W).

CAUTION

DRIVE CONTROLLER SWITCH FAILURE

For proper drive controller short circuit protection, certain values of inductance may be required in the output power wiring. Inductance can be supplied by the power wiring or auxiliary inductors.

Failure to follow this instruction can result in injury or equipment damage.

Grounding

For safe, dependable operation, ground the drive controller according to National Electrical Code and all local codes. To ground the drive controller:

- Connect a copper wire from the ground terminal on the drive controller (see Figure 6 on page 22) to the power system ground conductor. Wire size is determined by the drive controller size and by national and local codes.
- Verify that resistance to ground is one ohm or less. Improper grounding causes intermittent and unreliable operation.

⚠ DANGER

HAZARDOUS VOLTAGE

Ground equipment using provided ground connecting point as shown in Figure 6 on page 22. Drive controller panel must be properly grounded before power is applied.

Do not use metallic conduit as a ground conductor.

Electrical shock will result in death or serious injury.

Ground multiple drive controllers as shown in Figure 12. Use one grounding conductor per device. Do not loop ground conductors or install them in series.

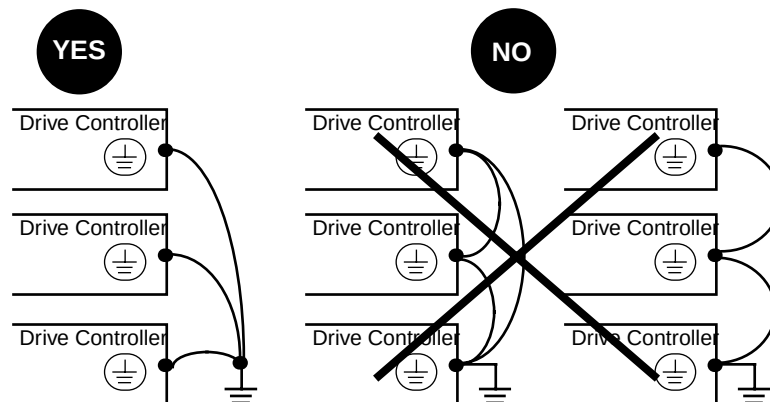


Figure 12: Grounding Multiple Drive Controllers

Power Terminals

ATV58•U29M2–D12M2
ATV58•U18N4–D23N4

⏏	L1	L2	L3	PA	PB	U	V	W	⏏
---	----	----	----	----	----	---	---	---	---

ATV58•U09M2–U18M2

⏏	L1	L2	+	-	U	V	W	⏏
---	----	----	---	---	---	---	---	---

ATV58•D16M2–D46M2
ATV58•D28N4–D79N4

⏏	L1	L2	L3	+	-	PA	PB	U	V	W	⏏
---	----	----	----	---	---	----	----	---	---	---	---

Table 27: Function of Power Terminals

Terminal	Function	For ATV58H•••••
⏏	Ground terminal	All models
L1 L2	Input power	All models
L3		All models except U09M2 and U18M2
+ -	Connection for DB module	U09M2 and U18M2
PA PB	Connection for DB resistor	All models except U09M2 and U18M2
U V W	Output connections to motor	All models
⏏	Ground terminal	All models

Table 28: Power Terminal Wire Size and Torque

Drive Controller ATV58H•••••	Maximum Wire Size ^[1] AWG (mm ²)	Torque lb-in (N•m)
U09M2, U18M2	14 (1.5)	5.0 (0.56)
U29M2, U41M2, U18N4, U29N4, U41N4	8 (6)	7.5 (0.85)
U54M2, U72M2, U54N4, U72N4, U90N4	8 (6)	7.5 (0.85)
U90M2, D12M2, D12N4, D16N4, D23N4	6 (10)	20 (2.26)
D16M2, D23M2, D28N4, D33N4, D46N4	2/0 (35)	88 (10)
D28M2, D33M2, D46M2, D54N4, D64N4, D79N4	4/0 (70)	170 (19)

^[1] 75 °C copper.

Control Terminals

The control terminal strip contains two pull-apart terminal blocks, one for the relay outputs and one for the low level inputs and outputs. The S terminal is used for the shield connection. Maximum wire size for all control terminals is 14 AWG (1.5 mm²). Tightening torque is 3.5 lb-in (0.4 N•m). Figure 13 shows the location of the control terminals.

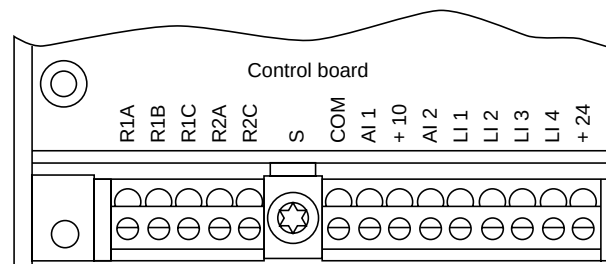


Figure 13: Location of Control Terminals

Table 29: Control Terminals Characteristics

Terminal	Function	Characteristics
R1A R1B R1C	R1A to R1C is a N.O. contact. When the drive controller is powered with no fault, the contact is closed. R1B to R1C is a N.C. contact. When the drive controller is powered with no fault, the contact is open.	Minimum: 10 mA, 24 VDC Maximum: inductive load of 1.5 A for 250 VAC and 30 VDC Maximum resistive load: 5 A for 250 VAC or 30 VDC
R2A R2C	N.O. programmable relay R2	
S	Shield connection	
COM	Common for logic and analog inputs	
AI1	Analog input 1 (voltage) Used for speed reference input	0 to 10 VDC, Impedance = 30 kΩ Frequency resolution analog reference: high speed / 1024 Hz (10 bit). Accuracy ±1%, linearity ±0.5% of the maximum output frequency. Sampling time: 5 ms.
+10	Supply for reference potentiometer (1 to 10 kΩ potentiometer)	10 V ± 1%, protected against short circuits and overloads 10 mA maximum

Table 29: Control Terminals Characteristics (Continued)

Terminal	Function	Characteristics
AI2	Analog input 2 (current) Used for speed reference input or feedback, depending on configuration.	X to Y mA, with X and Y being programmable from 0 to 20 mA; factory setting: 0 to 20 mA Impedance = 100 Ω . Frequency resolution analog reference: high speed / 1024 Hz (10 bit). Accuracy $\pm 1\%$, linearity $\pm 0.5\%$ of the maximum output frequency. Sampling time: 5 ms.
LI1 LI2 LI3 LI4	Logic inputs Function depends on configuration. See Table 35 on page 49 for factory settings.	Supplied by +24 VDC State 0 if < 5 V, state 1 if > 11 V Vmax = 30 V Impedance = 3.5 k Ω Sampling time: 5 ms
+24	Power supply for logic inputs	+24 V protected against short circuits and overloads Minimum 20 V, maximum 30 V 200 mA maximum

WARNING

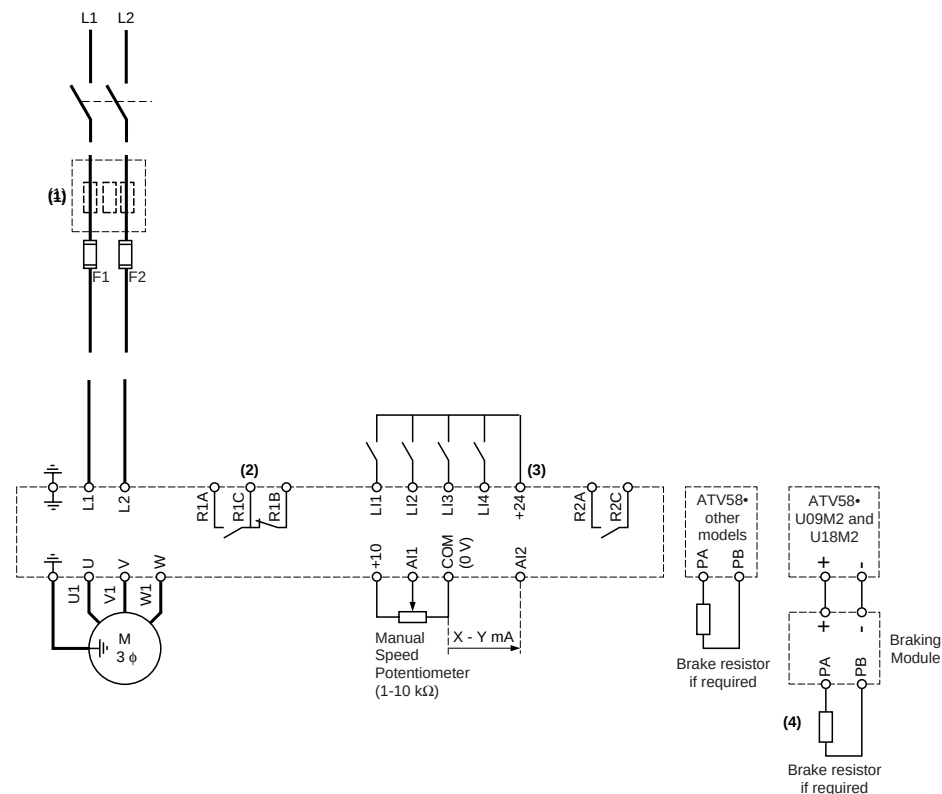
UNINTENDED EQUIPMENT OPERATION

LI1 has priority. If LI1 is closed while LI2 is active, the controller will respond to LI1. If the LI1 input is lost while LI2 is active, the controller will respond to LI2 and reverse directions. The logic inputs must be programmed appropriately for the application to prevent the motor from spinning in an unintended direction.

Failure to follow this instruction can result in death or serious injury.

WIRING DIAGRAMS

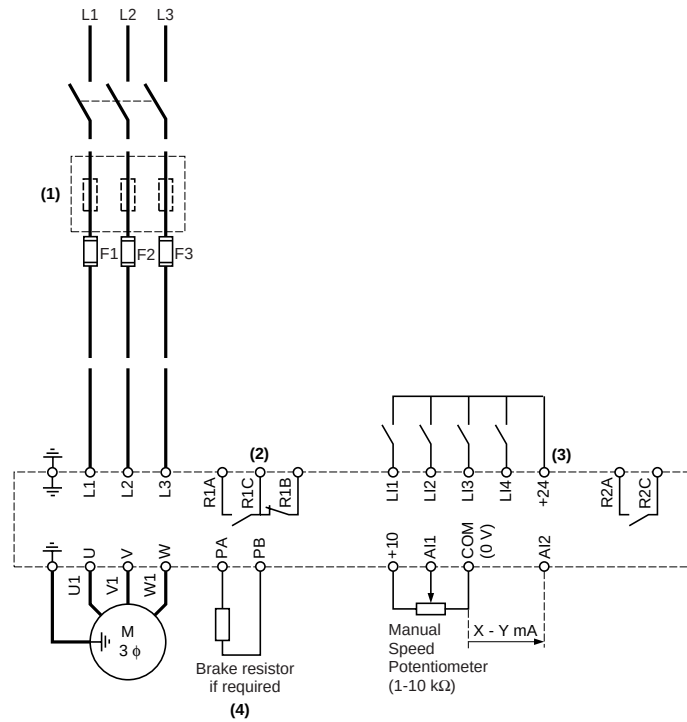
Single-Phase Input



- (1) Line inductor if required.
- (2) Fault relay contacts for remote signalling of the drive controller state.
Contact state shown with drive controller deenergized or faulted.
- (3) Internal +24 V. When using +24 V external supply, connect the 0 V to the COM terminal.
Do not use the +24 terminal on the control board, but connect logic inputs to external +24 V.
- (4) When using dynamic braking on drive controllers ATV58HU09M2 and U18M2, the dynamic braking module, catalog number VW3A58701, must be used. See Appendix A for available braking resistor kits.

Figure 14: Single-Phase Wiring Diagram

Three-Phase Input



- (1) Line inductor if required. See catalog 8806CT9801 for recommendations.
- (2) Fault relay contacts for remote signalling of the drive controller state.
Contact state shown with drive controller deenergized or faulted.
- (3) Internal +24 V. When using +24 V external supply, connect the 0 V to the COM terminal.
Do not use the +24 terminal on the control board, but connect logic inputs to external +24 V.
- (4) See Appendix A for available braking resistor kits.

Figure 15: Three-Phase Wiring Diagram

RECOMMENDED POWER FUSES

Table 30: 208/230 V Single-Phase Drive Controllers

M Motor		A1 Drive Controller ATV58H•••••	F1-F2 Line Power Fuses Class J ^[1]
hp	kW		
0.5	0.37	U09M2	10
1	0.75	U18M2	15
2	1.5	U29M2	30
3	2.2	U41M2	30

*[1] Fast-acting or time delay.
Class J fuses are acceptable.
Class CC fuses may be used if
recommended fuse rating is
30 A or lower.*

Table 31: 208/230 V Three-Phase Drive Controllers

M Motor		A1 Drive Controller ATV58H•••••	F1-F2-F3 Line Power Fuses Class J ^[1]
hp	kW		
2	1.5	U29M2	15
3	2.2	U41M2	20
—	3	U54M2	30
5	4	U72M2	35
7.5	5.5	U90M2	60
10	7.5	D12M2	70

*[1] Fast-acting or time delay.
Class J fuses are acceptable.
Class CC fuses may be used if
recommended fuse rating is
30 A or lower.*

hp	kW	CTLN ATV58H•••••	F1-F2-F3 Class J ^[2]	CT, VTLN ATV58H•••••	F1-F2-F3 Class J ^[2]	VT ATV58H•••••	F1-F2-F3 Class J ^[2]
10	7.5	D16M2	70				
15	11	D23M2	90	D16M2	70	D16M2	70
20	15	D28M2	110	D23M2	90	D16M2	90
25	18.5	D33M2	125	D28M2	110	D23M2	125
30	22	D46M2	175	D33M2	125	D28M2	150
40	30			D46M2	175	D33M2	175
50	37					D46M2	200

[2] Fast-acting Class J fuses.

CT	Constant Torque Rating
CTLN	Constant Torque Low Noise Rating
VTLN	Variable Torque Low Noise Rating
VT	Variable Torque Rating

Table 32: 400/460 V Three-Phase Drive Controllers

Motor		Drive Controller CT, VTLN ATV58H.....	F1-F2-F3 Line Power Fuses Class J ^[1]	Drive Controller VTLN ATV58H.....	F1-F2-F3 Line Power Fuses Class J ^[1]
hp	kW				
1	0.75	U18N4	5	—	—
2	1.5	U29N4	10	—	—
3	2.2	U41N4	12	—	—
—	3	U54N4	15	—	—
5	4	U72N4	20	U54N4X	20
7.5	5.5	U90N4	25	U72N4X	25
10	7.5	D12N4	40	U90N4X	40
15	11	D16N4	50	D12N4X	50
20	15	D23N4	70	D16N4X	70
25	18.5			D23N4X	70

hp	kW	CTLN ATV58H.....	F1-F2-F3 Class J ^[2]	CT, VTLN ATV58H.....	F1-F2-F3 Class J ^[2]	VT ATV58H.....	F1-F2-F3 Class J ^[2]
20	11	D28N4	70				
25	18.5	D33N4	80	D28N4	70	D28N4	70
30	22	D46N4	100	D33N4	80	D28N4	90
40	30	D54N4	125	D46N4	100	D33N4	110
50	37	D64N4	150	D54N4	125	D46N4	150
60	45	D79N4	200	D64N4	150	D54N4	175
75	55			D79N4	175	D64N4	200
100	75					D79N4	200

[1] Fast-acting or time delay. Class J fuses are acceptable. Class CC fuses may be used if recommended fuse rating is 30 A or lower.

[2] Fast-acting Class J fuses.

Table 33: Minimum Ohmic Value of Resistors

ATV58.....	U09M2 U18M2	U29M2 U41M2	U54M2	U72M2	U72M2 D12M2	D16M2X	D23M2X	D28M2X	D33M2X	D46M2X
Min. Resistance Ω	75	38	31	25	13	8	8	4	2.67	2.67

ATV58.....	U18N4 U29N4 U41N4 U54N4	U72N4	U90N4	D12N4	D16N4 D23N4	D16N4, D28N4X D33N4, D33N4X D46N4, D46N4X	D54N4, D54N4X	D64N4, D64N4X D79N4, D79N4X
Min. Resistance Ω	85	57	47	53	19	14	8	5

USING A LINE CONTACTOR

When controlling the power with an isolation line contactor, avoid frequently opening and closing the line contactor as this could cause premature failure of the drive controller. Use inputs LI1 to LI4 to start and stop the drive controller. Limit operations of the line contactor to less than once per minute.

Output Contactor Wiring Diagram

Relay R2 is factory set for the “Output Contactor Command” function. Refer to keypad display instruction bulletin VVDED397047US for more information on this function. In the wiring diagram, the shaded portion is to be added to either the single-phase input wiring diagram (Figure 14 on page 42) or the three-phase input wiring diagram (Figure 15 on page 43).

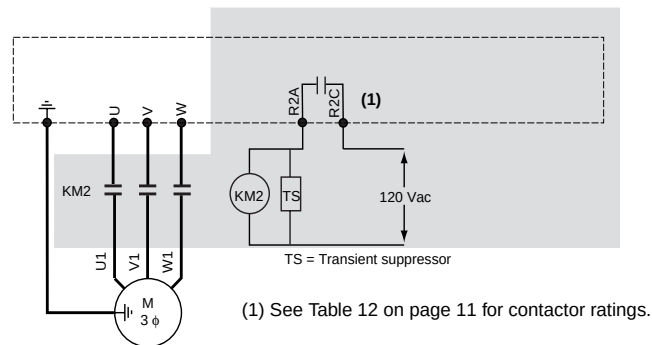


Figure 16: Output Contactor Wiring Diagram

NOTE: Use transient suppression on all inductive circuits near the drive controller or connected on the same circuit, such as relays, contactors, and solenoids.

Table 34: Recommended Output Contactors

ATV58H.....	KM2 LC1-	ATV58H.....	KM2 LC1-
U09M2	D2510**	U18N4	D2510**
U18M2	D2510**	U29N4	D2510**
U29M2	D2510**	U41N4	D2510**

** Refer to the Square D Digest for other control voltages.

Table 34: Recommended Output Contactors (Continued)

ATV58H.....	KM2 LC1-	ATV58H.....	KM2 LC1-
U41M2	D2510**	U72N4	D2510**
U72M2	D2510**	U90N4	D2510**
U90M2	D2510**	D12N4	D2510**
D12M2	D3210**	D16N4	D2510**
		D23N4	D4011**
D16M2	D4010**	D28N4	D4010**
D23M2	D8010**	D33N4	D5010**
D28M2	D8010**	D46N4	D8010**
D33M2	D8010**	D54N4	D8010**
D46M2	F115**	D64N4	F115**
		D79N4	F115**

** Refer to the Square D Digest for other control voltages.

EXTERNAL 24 V SUPPLY

An external 24 V power supply can be used for the logic inputs. In this case, the +24 terminal on the drive controller is not used. Figure 17 shows the wiring diagram when an external supply is used.

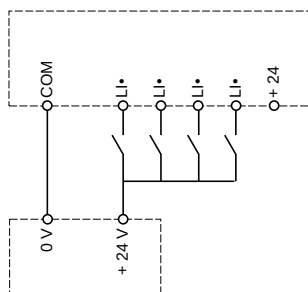


Figure 17: External Supply Wiring Diagram

FAULT RELAY

The fault relay is energized whenever there is power to the drive controller and there is no fault. It provides a normally-open and a normally-closed contact.

To reset the drive controller reset after a fault, cycle the power allowing the red LED to turn off.

AVAILABLE MOTOR TORQUE

Continuous duty:

- For self-ventilated motors, motor cooling depends on the speed.
- Continuous duty results in derating for speeds less than 50% of the nameplate motor speed.

Operation in overspeed:

- In overspeed operation, the voltage no longer increases with the frequency, resulting in reduced induction in the motor which translates into loss of torque. Consult the motor manufacturer to ensure that the motor can operate in overspeed.
- For a special motor, the nominal frequency and the maximum frequency can be adjusted between 40 and 500 Hz using the keypad display, handheld programmer, or Test & Commissioning software. See Appendix A for a list of accessories.

CAUTION

MACHINERY OVERSPEED

Some motors and/or loads may not be suited for operation above nameplate motor speed and frequency. Consult the motor manufacturer before operating motor above rated speed.

Failure to follow this instruction can result in injury or equipment damage.

The available overtorque is a function of the motor design category. For typical NEMA Design B motors, the ALTIVAR 58 controller can deliver 200% of the nominal motor torque for 2 seconds, and 170% for 60 seconds.

Motor power rating must be at least 25% of drive rated power for the drive controller to properly operate the motor.

Figure 18 on page 49 shows the typical torque characteristics of the ALTIVAR 58 drive controller.

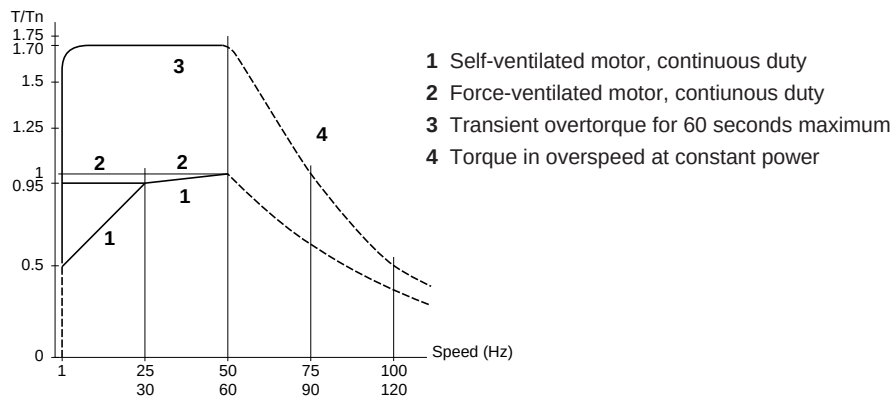


Figure 18: Typical Torque Characteristics

FACTORY SETTINGS

The ALTIVAR 58 drive controller is preset for constant torque applications. Table 35 lists the factory settings. See Appendix A for available configuration tools to alter factory settings.

Table 35: Factory Settings

Function	Setting
Base frequency	50/60 Hz ^[1]
Motor voltage	230 V or 400/460 V ^[1] , depending on the model
Acceleration and deceleration ramps	3 s
Low speed	0 Hz
High speed	50/60 Hz ^[1]
Maximum frequency	60/72 Hz ^[1]
Motor thermal current	0.9 times rated drive controller output current
DC braking current at stop	0.63 times rated drive controller output current for 0.5 s
Operation	Constant torque
Control type	2-wire control
Logic inputs	LI1: Run Forward; LI2: Run Reverse
	LI3 LI4 Preset speed
	0 0 Low speed + reference
	1 0 10 Hz
	0 1 15 Hz
	1 1 High speed

^[1] Depending on the position of the 50/60 Hz switch. Switch is factory-set to 60 Hz.

Table 35: Factory Settings (Continued)

Function	Setting
Analog inputs	AI1: 0 to +10 V speed reference AI2: 4 to 20 mA speed reference Analog inputs set for reference summing
Relay outputs	R1: fault relay (cannot be reassigned) R2: output contactor command (can be reassigned)
Switching frequency	4 kHz
^[1] Depending on the position of the 50/60 Hz switch. Switch is factory-set to 60 Hz.	

START UP

DANGER

HAZARDOUS VOLTAGE

- Read and understand this bulletin in its entirety before installing or operating ALTIVAR 58 drive controllers. Installation, adjustment, repair, and maintenance of these drive controllers must be performed by qualified personnel.
- Disconnect all power before servicing the drive controller. WAIT THREE MINUTES until the DC bus capacitors discharge, then measure DC bus capacitor voltage between J2-4 (+) and J2-5 (-) for drive controllers ATV58HU09M2 and U18M2, or between J2-5 (PA) and J18-7 for drive controllers ATV58HU29M2 to U72M2 and ATV58HU18N4 to U90N4, to verify that the DC voltage is less than 45 V. Refer to the Bus Voltage Measurement Procedure on page 26.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- User is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Electrical shock will result in death or serious injury.

Before powering up the drive controller, the 50/60 Hz switch must be set to correspond with the incoming power frequency. Unlock and open the cover to access the 50/60 Hz switch on the control board. Set the switch to the position corresponding to the mains frequency.

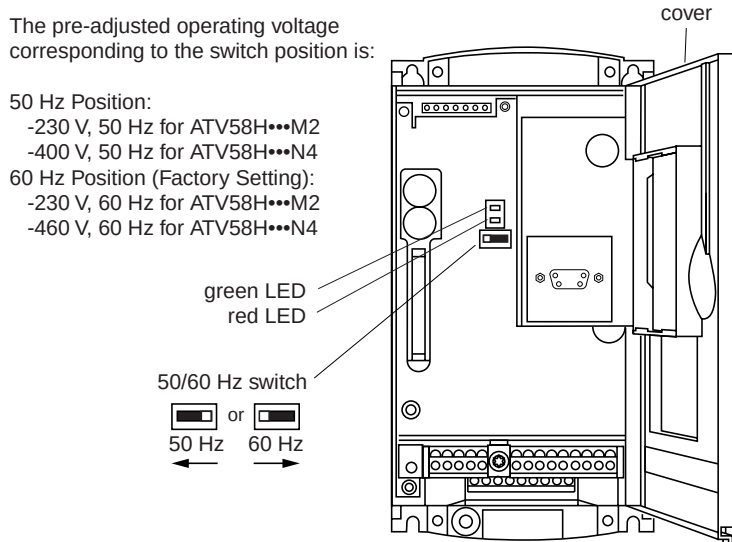


Figure 19: Setting the 50/60 Hz Switch

There are several tools which aid in starting up the ALTIVAR 58 drive controller:

- Keypad display, VW3A58101U. The drive controller is shipped without the keypad display.
- Handheld programmer, VW3A58102U, ordered separately
- Test & Commissioning software connection, VW3A58104, ordered separately

Consult the documentation provided with each of these tools in order to start up and maintain the drive controller.

If your ALTIVAR 58 has an I/O extension card or communication card, also consult the documentation provided with that card.

LIGHT EMITTING DIODES (LEDs)

The LEDs on the front of the ALTIVAR 58 indicate several states as shown in Figure 20 on page 52.

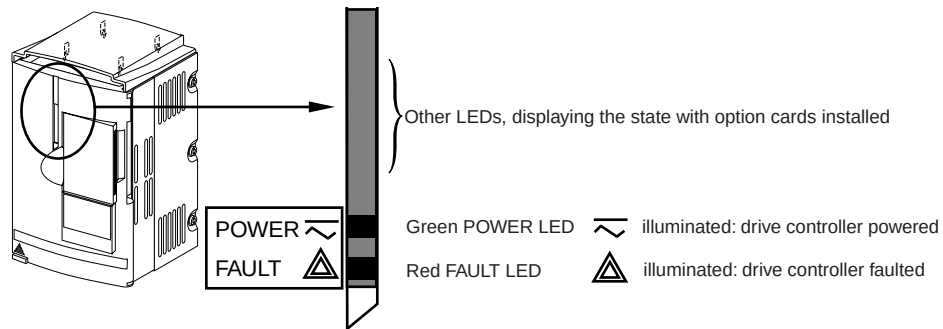


Figure 20: LED States

PREVENTIVE MAINTENANCE

The following steps should be done at regular intervals:

- Check the condition and tightness of the connections.
- Make sure ventilation is effective and temperature around the drive controller remains at an acceptable level.
- Remove dust and debris from the drive controller, if necessary.

TROUBLESHOOTING AND MAINTENANCE

When a fault is detected, the drive controller trips and the fault relay deenergizes.

After performing the "Bus Voltage Measurement Procedure" on page 26, check the supply voltage (Procedure 1 on page 53) and the peripheral components (Procedure 2 on page 53).

If no problem is found with the supply voltage and peripheral equipment, install a keypad display for additional fault information. The faults are identified in the keypad display manual, VVDED397047US.

Procedure 1: Checking Supply Voltage

To determine if the voltage is within the drive controller tolerance:

1. Perform the Bus Voltage Measurement procedure (see "Bus Voltage Measurement Procedure" on page 26).
2. Attach meter leads to L1 and L2. Set the voltmeter to the 600 VAC scale.
3. Reapply power and check for the correct line voltage, shown on the drive controller nameplate rating.
4. Remove power and repeat the procedure for L2 and L3, and L1 and L3.
5. When all phases have been measured, remove power. Remove leads and replace all covers.

Procedure 2: Checking the Peripheral Equipment

The following equipment may need to be checked. Follow the manufacturers' procedures when checking this equipment.

1. A protective device such as fuses or circuit breaker may have tripped.
2. A switching device such as a contactor may not be closing at the correct time.
3. Conductors may require repair or replacement.
4. Connection cables to the motor or high resistance connections to ground may need to be checked. Follow NEMA standard procedure WC-53.
5. Motor insulation may need to be checked. Follow NEMA standard procedure MG-1. Do not apply high voltage to U, V, or W. Do not connect the high potential dielectric test equipment or insulation resistance tester to the drive controller since the test voltages used may damage the drive controller. Always disconnect the drive controller from the conductors or motor while performing such tests.

CAUTION

EQUIPMENT DAMAGE HAZARD

Do not perform high potential dielectric tests on circuits while the circuits are connected to the drive controller.

Any circuit requiring high potential dielectric tests must be disconnected from the drive controller prior to performing the test.

Failure to follow this instruction can result in injury or equipment damage.

Fault Storage

The first fault detected is saved and displayed on the optional keypad if power is maintained. The drive controller trips and the fault relay opens.

To reset the fault:

1. Remove power from the drive controller.
2. Before switching power back on, identify and correct the cause of the fault.
3. Restore power. This will reset the fault if it has been corrected.

In certain cases, if automatic restart has been enabled, the drive can be automatically restarted after the cause of the fault has disappeared.

The Test & Commissioning software can be used to view the last eight faults recorded by the drive controller. See Appendix A for the part number.

APPENDIX A: OPTIONS AND ACCESSORIES

The following table shows the accessories available for ALTIVAR 58 drive controllers.

Catalog No.	Description
VW3A58101U	Keypad
VW3A58102L1U	Programming Terminal (English, French, Spanish)
VW3A58102L2U	Programming Terminal (English, German, Italian)
VW3A58103	Remote Mounting Kit
VW3A58104	Test & Commissioning Software
VW3A58201U	Analog I/O Option Card
VW3A58202U	Digital I/O Option Card
VW3A58253U	General Purpose Option Card
VW3A58301U	FIPIO® Communication Card
VW3A58302U	MODBUS® Plus Communication Card
VW3A58303U	MODBUS/UNITELWAY™ Communication Card
VW3A58304EU	Interbus S Communication Card. Requires external power supply.
VW3A58306U	RS485 Cable w/ MODBUS Mapping Guide
VW3A58307U	Profibus DP Communication Card
VW3A58701	DB Transistor
VW3A58821	Fan Kit for ATV58HU09M2 and U18M2
VW3A58822	Fan Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58823	Fan Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58824	Fan Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58825	Fan Kit for ATV58HD16M2, D23M2, and D28N4 to D46N4
VW3A58826	Fan Kit for ATV58HD28M2 to D46M2 and D54N4 to D79N4
VW3A58831	EMC Kit for ATV58HU09M2 and U18M2
VW3A58832	EMC Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58833	EMC Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58834	EMC Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58842	Conduit Box Kit for ATV58HU09M2 and U18M2
VW3A58843	Conduit Box Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58844	Conduit Box Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58845	Conduit Box Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58846	Conduit Box for ATV58HD16M2, D23M2, and D28N4 to D46N4
VW3A58847	Conduit Box for ATV58HD28M2 to D46M2 and D54N4 to D79N4

*Continued on
next page.*

Catalog No.	Description
VW3A66711	DB Resistor Kit for ATV58HU09M2, U18M2, U18N4 to U72N4
VW3A66712	DB Resistor Kit for ATV58HU29M2, U41M2, U90N4, D12N4
VW3A66713	DB Resistor Kit for ATV58HU54M2, U72M2, D16N4, D23N4
VW3A66714	DB Resistor Kit for ATV58HU90M2 and D12M2

Numerics

50/60 Hz switch 49, 50

A

acceleration ramp 49

altitude 10

analog inputs 41, 50

B

bus voltage measurement 26

C

cable length 37

cable type 37

capacitance 37

CE directives

- electromagnetic compatibility 21

- machinery 21

clearances

- minimum 16

codes and standards 12

condensation 18, 19

constant torque 49

control type 49

control ventilation kit 16

current

- braking 49

- fault withstand. See current, short circuit

- input 29

- maximum thermal 49

- transient output 12

D

DC injection braking 11

deceleration ramp 49

dimensions 13

disconnect switch 15

displacement power factor 11

dynamic braking connection 39

E

efficiency 11

electromagnetic compatibility 21

EMC. See electromagnetic compatibility

enclosure type 10

enclosures

- calculating size 19

- general purpose 18

- Type 12 (IP54) 19

external power supply 47

F

factory settings 49

fans

- flow rates 18

- stirring 19

- ventilation 18

fault relay. See relays

faults

- resetting 54

filters 18

frequency

- input 11

- maximum 49

- output 11

- switching. See switching frequency

fuses 29

- line power 44, 45

G

grounding 38

H

handheld programmer 48, 51

humidity 10

I

installation 15

K

keypad display 48, 51

L

LEDs 47, 51

line contactor 46

logic inputs 41, 46, 49

M

maintenance 52

- preventive 52

metallic conduit 28

motor control algorithm 11

motors
 self-ventilated 48
 special 48
mounting
 general purpose enclosure
 18
 Type 12 (IP54) enclosure 19

O

operating position 10
options 1
output contactors 46
overspeed operation 48

P

peripheral equipment
 checking 53
pollution degree 10, 15
potentiometer 40
protection 15
 drive controller 12
 motor 12
 thermal 12

R

range 1
ratings
 208 to 230 V controllers 3, 4,
 5, 30, 31, 32
 400 to 460 V controllers 6, 7,
 8, 9, 34, 35, 36
receiving 2
recommended equipment
 208/230 V controllers 44
 400/460 V controllers 45

relay outputs 50
relays 28, 40
 fault 47

S

shield connection 40
shipping 2
specifications
 electrical 11
 environmental 10
speed range 11
speed regulation 11
start up 50
storing 2
supply voltage
 checking 53
switching frequency 11, 50

T

temperature 10, 16
terminals
 control 40
 ground 22
 power 39
test and commissioning
 software 48, 51
torque
 available motor 48
 braking 11
 transient motor 12

V

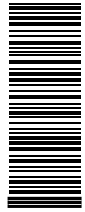
ventilation 18, 52
vibration 10

voltage
 input 11
 output 11

W

weights 13, 14
wiring
 branch circuit components
 29
 control 28
 diagrams 42–47
 general practices 28
 minimum inductance 37
 output 37
 output contactor 46
 power 28
 single phase input 42
 three phase input 43

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