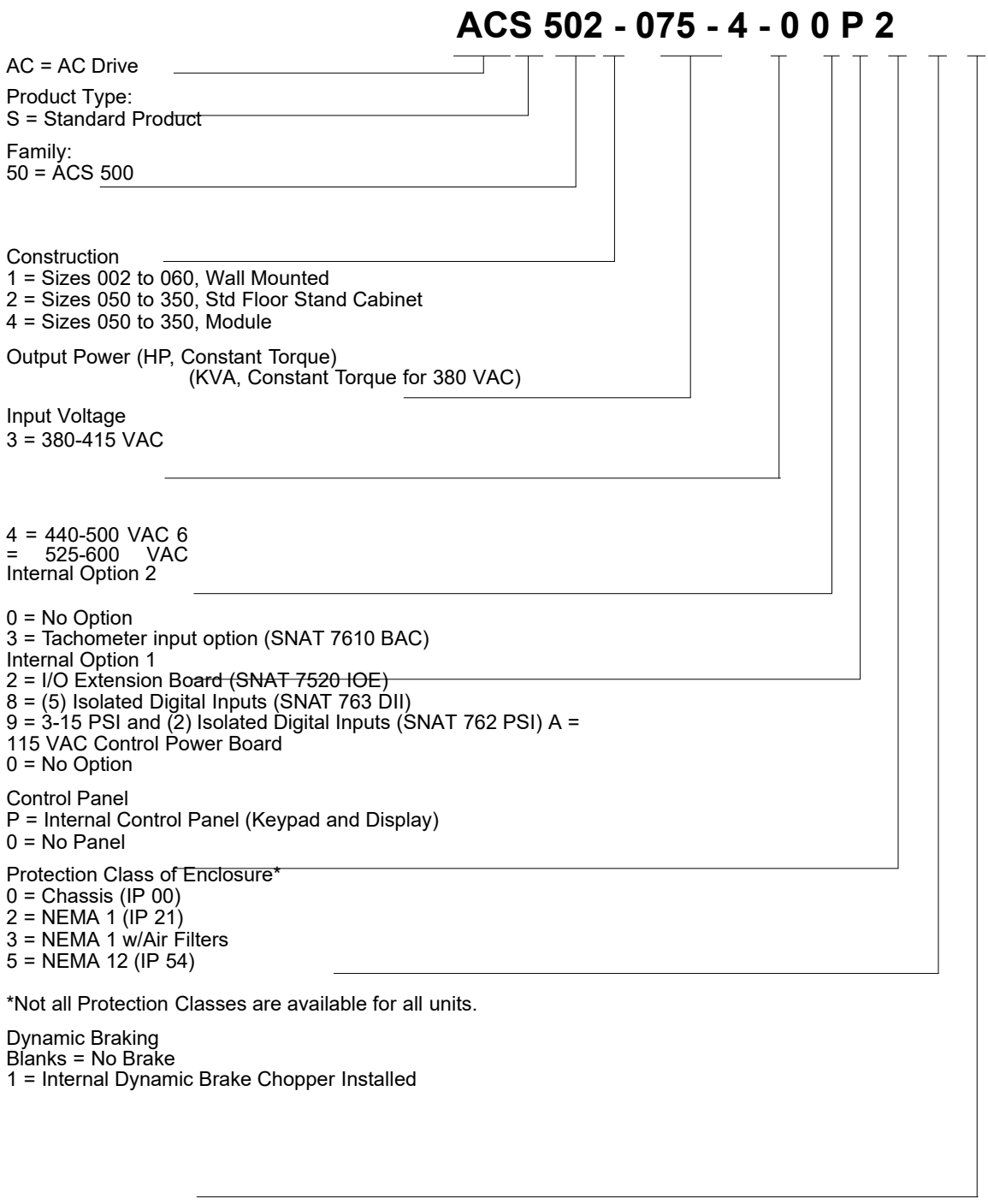
ПРИВОДЫ ПЕРЕМЕННОГО ТОКА НИЗКОВОЛЬТНЫЕ

Техническое описание на преобразователи ACS502/504

Figure 2-1 Explanation of ACS 502/504 Drive Code



Types and Ratings of the ACS 502/504 Table 2-1 shows the type series and ratings of the ACS 504.

Table 2-1 Rating Table for ACS 502 and ACS 504, 440 – 500 VAC,& 525 – 600 VAC

Drive Type	Constant Torque			Variable Torque			I_N	Dimension Reference
	hp	Amps (Current Rating of Drive)		hp	Amps (Current Rating of Drive)			
		I_R	I_{IN}		I_{RSQ}	I_{INSQ}		
480 volt units								
ACS50X-050-4-	50	65	62	60	77	69	65	R6
ACS50X-060-4-	60	77	71	75	96	87	84	
ACS50X-075-4-	75	96	87	100	124	111	112	
ACS50X-100-4-	100	124	113	125	156	141	135	R7
ACS50X-125-4-	125	156	143	150	180	159	164	
ACS50X-150-4-	150	180	161	200	240	214	200	R8
ACS50X-200-4-	200	240	218	250	302	269	240	
ACS50X-250-4-	250	302	273	300	361	328	300	R9
ACS50X-300-4-	300	361	333	350	414	376	365	
ACS50X-350-4-	300	361	333	400	460	418	365	
600 volt units								
ACS50X-060-6-	60	62	54	75	77	67	77	R6
ACS50X-075-6-	75	77	67	100	99	87	77	
ACS50X-100-6-	100	99	87	125	125	110	99	R7
ACS50X-125-6-	125	125	110	150	144	126	125	R8
ACS50X-150-6-	150	144	126	200	192	168	172	R9

Table 2-2 shows the definitions for symbols used in this manual.

Table 2-2 Symbol Definitions

Symbol	Definition
V_{IN}	Rated supply voltage [V]. The actual voltage is set by a parameter.
I_{IN}	Approximate input current (rms) when shaft power is P_R, line voltage is 480 V, and the motor is a standard NEMA motor [Amps].
I_R	Rated output current in constant torque applications [Amps].
P_R	Maximum motor nominal shaft power in constant torque applications for 2-, 4-, and 6-pole standard motors [hp].
I_{INSQ}	Approximate input current when shaft power is P_{RSQ}, line voltage is 480 V and the motor is a standard NEMA motor. This is the maximum thermal input current [Amps].
I_{RSQ}	Rated output current in squared torque applications [Amps].
P_{RSQ}	Maximum motor nominal shaft power in squared torque applications for 2-, 4-, and 6-pole standard motors [hp].
I_N	The output current on which the drive's internal trips and settings are based [Amps].

ACS 502 Control Identification

The numbers and letters in the last seven spaces of the ACS 502 Model Number stand for the specific options included with your drive. Locate the Control Nameplate on the right side of the enclosure or inside the door of the ACS 502 and use Figure 2-2 to verify the options included with your drive. The first part of the part number is derived from Figure 2-1 by removing the letters *AC* in the first two places and the dashes (-).

ACS 502 Installation Instructions

This chapter explains how to install the ACS 502 and connect all power, motor, and control wiring. It also describes the initial inspection procedures.

Grounding and Ground Faults

The ACS 502 must always be grounded through a ground conductor connected to the ground terminal.

If the ACS 502 is connected to a system without system ground, the ground fault protection must be capable of starting at ground fault currents containing high frequency and DC components. The ACS 502 ground fault protection guards the variable frequency drive against ground faults occurring in the motor or the motor wiring.
Fault current protective switches do not necessarily operate properly with variable frequency drives. When using such switches their function should be checked at possible ground fault currents arising in a fault situation.

Pre-Installation Planning

This drive has been tested in accordance with UL508.
480 VAC units: The drives are suitable for use on a circuit capable of delivering not more than 42,000 rms Amperes, 500 Volts maximum.

When circuit breakers are supplied, the drive package is limited to the rating of the circuit breaker, which is 18,000 rms Amperes for the 50 & 60 HP units; 25,000 for the 75 - 125 HP units; and 30,000 for the 150 - 400 HP units. **600 VAC units:** are suitable for use on a circuit capable of delivering not more than 42,000 rms Amperes, 600 Volts. When circuit breakers are supplied, the drive package is limited to the rating of the circuit breaker, which is 14,000 rms Amperes.

When output chokes are supplied, 480 and 600 VAC units are suitable for use on a circuit capable of delivering not more than 65,000 rms Amperes, 500 Volts or 600 Volts.

Environment that is

These drives are to be used in a heated, indoor controlled environment relatively free of moisture and conductive contaminates such as condensation, carbon dust, and the like.

The maximum ambient temperature allowed is 113°F (45°C) for an ACS 502 in a NEMA 1 enclosure for constant torque loads, when the load current is lower than or equal to the continuous rated constant torque current (I_R). The maximum ambient temperature allowed is 104° F (40°C) for an ACS 502 in a NEMA 12 enclosure for constant torque loads; and an ACS 502 in a NEMA 1 enclosure for variable torque loads, when the load current is lower than or equal to the continuous maximum load current (I_{RSQ}).

The cooling air must be clean and free from corrosive materials. When necessary the required cooling should be provided by using clean, dry air. If the cooling air contains dust, clean the cooling surfaces of the unit regularly using compressed air and a brush.

If the heatsink is not cleaned and it is not able to dissipate the expended heat, the ACS 502's thermal protection will operate, causing a fault indication which stops the drive. The ACS 502 can be started again when the temperature of the heatsink has fallen below 167°F (75°C).

The temperature of the heatsink can be read from the Control Panel Display Operating Data, Parameter 8 (Drive Temperature).

Mounting Area

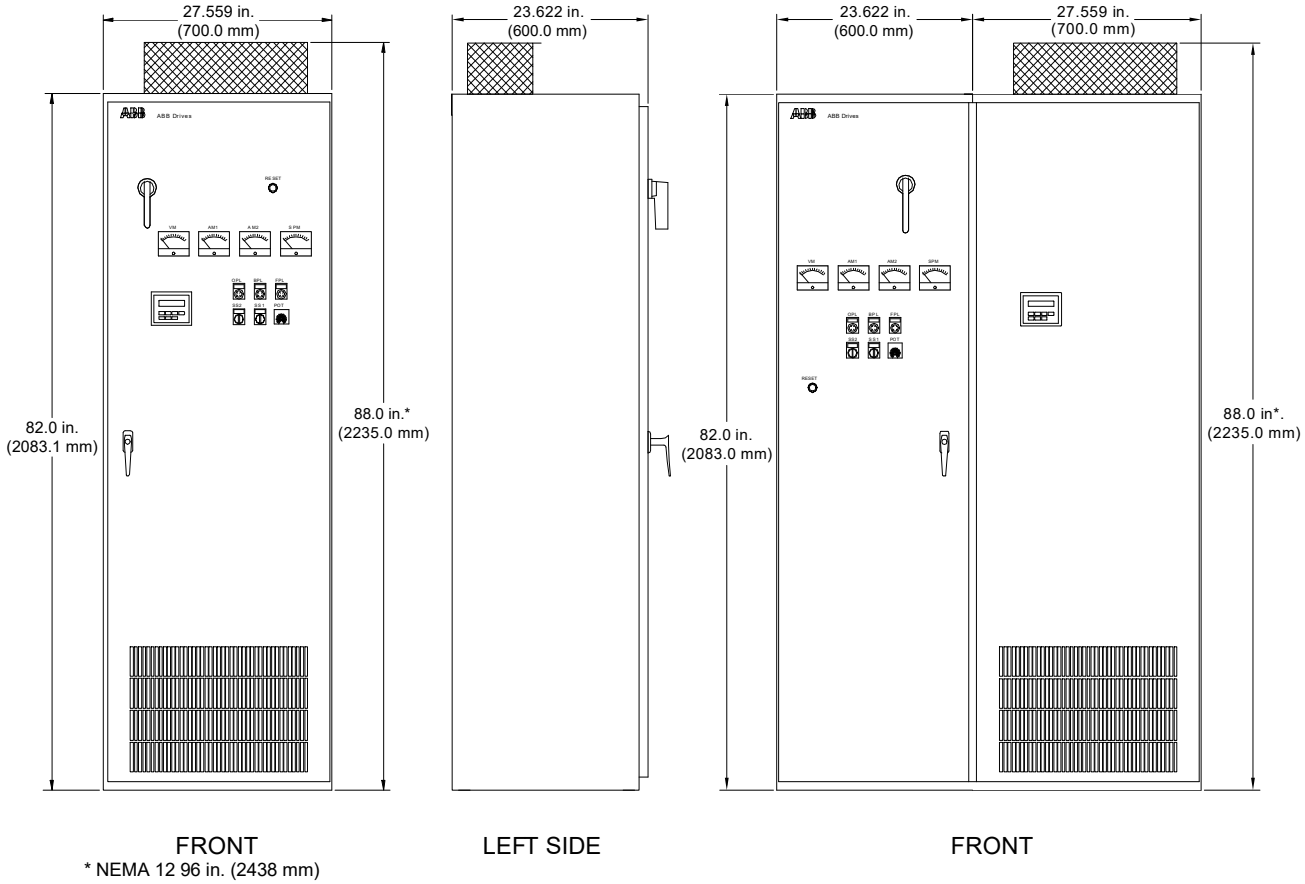
Mounting the Control precautions.

When mounting the control take the following

- DO NOT mount in direct sunlight.
- DO NOT allow the ambient temperature around the ACS 502 to exceed the ambient temperature as stated in *Environment* above.
- At least three (3) separate grounded conduits are required. One each for input, output, and control wiring.
- NEMA 12 units require side clearance of 3" for replacing air filters.

Figure 3-1 shows the dimensions of the ACS 502.

Figure 3-1 ACS 502 Dimensions



* NEMA 12 96 in. (2438 mm)

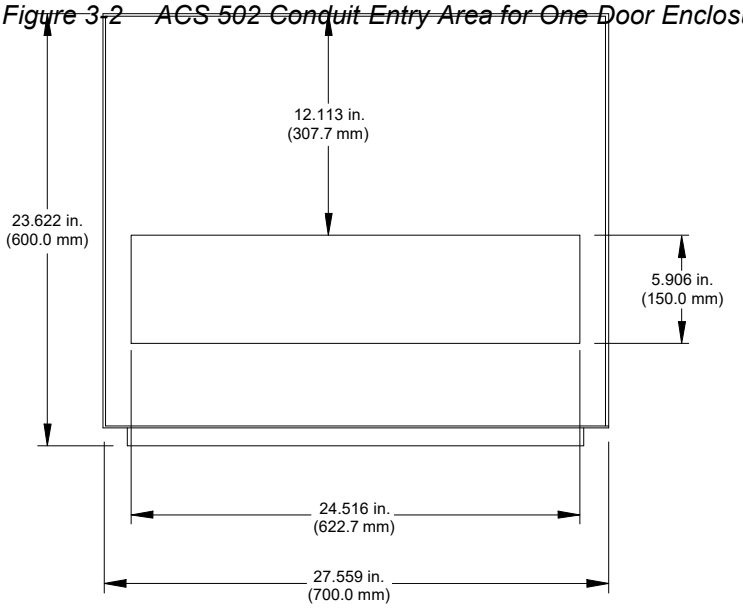
Installation Site Power

The ACS 502 is designed for use on a three-phase system. Four wires (three phase plus a ground wire) are required for the input wiring. Input and output conductors, and branch circuit protection must be sized to local codes.

Conduit Size entry

Figure 3-2 and Figure 3-3 show top views of the ACS 502 and conduit area. The panels must be removed from the drive before being drilled and punched to prevent metal particles from falling into the drive.

Figure 3-2 ACS 502 Conduit Entry Area for One Door Enclosure



TOP VIEW

Figure 3-3 ACS 502 Conduit Entry Area for Two Door Enclosure

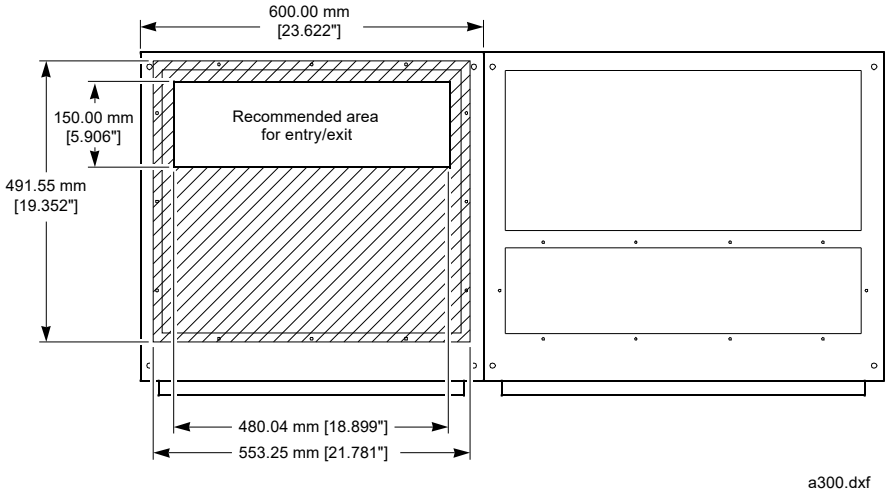


Figure 3-3 shows the left bay at the enclosure only.

Power Wiring All field wiring shall be rated for 167°F (75°C).

Install the motor wiring away from other wire routes. Avoid long parallel runs with other wires.

The tightening torque for the input power connections to the circuit breaker should be 275 in.-lbs. Tightening torques to other termination points should be as labeled on the device.

Table 3-1 shows the allowable input wire sizes for the ACS 502.

Table 3-1 ACS 502 Input Wire Sizes

Drive Type	Terminal Block	Disconnect	Circuit Breaker
ACS 502-050-4 –ACS 502-125-4 & ACS 502-060-6–ACS 502-150-6	#6-4/0	#6-4/0	#2-4/0
ACS 502-075-6	* #6-4/0	* #2-4/0	* #2-4/0
ACS 502-150-4 –ACS 502-200-4	* #6-4/0	* #2-4/0	* 3/0-4/0
ACS 502-250 – ACS 502-350	* #6-500MCM	* #2-500MCM	* 250MCM-500MCM

* Indicates 2 pole per phase for terminal information and 2 conductor for wire size information.

Table 3-2 shows the fuse ratings, UL R/C (JFH R2), for the ACS 502.

Table 3-2 ACS 502 Fuse Ratings

Drive Type	Fuse Ratings			Bussmann Type
	A	kA^2s	V	
ACS 502-050-4 ACS 502-060-6 ACS 502-075-6	160	16	660	170M1369
ACS 502-060-4 ACS 502-100-6	200	28	660	170M1370
ACS 502-075-4	200	28	660	170M1370
ACS 502-125-6	250	51.5	660	170M1371
ACS 502-100-4 ACS 502-150-6	400	105	660	170M3019
ACS 502-125-4	400	105	660	170M3019
ACS 502-150-4	550	190	660	170M5011
ACS 502-200-4	550	190	660	170M5011
ACS 502-250-4	700	405	660	170M5013
ACS 502-300-4	700	405	660	170M5013
ACS 502-350-4	700	405	660	170M5013

Table 3-3 ACS 502 Output Wire Sizes

Amp Range	Overload	Terminal Block
29.3 – 60.0	#12 – #2	#6-250MCM
57.1 – 100.0	#10 – 2/0	#6-250MCM
98.0 – 180.0	#6 – 250MCM	#6-250MCM
175.0 – 220.0	* #6 – 4/0	* #6-4/0
221.0 – 465.0	* #6 – 4/0	* #6-4/0

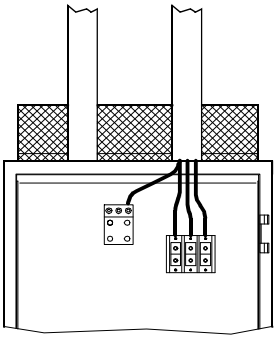
* Indicates 2 pole per phase for terminal information and 2 conductor for wire size information.

Table 3-4 shows ground lug wire sizes for the ACS 502.

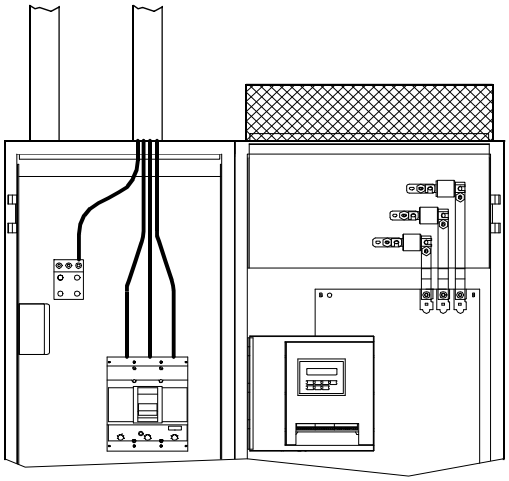
Table 3-4 ACS 502 Ground Lug Wire Sizes

Drive Type	Ground Lug
ACS 502-050 to ACS 502-350	#6-350MCM

Figure 3-4 Input Power Wiring



R6 & R7 (all) and R8 w/o bypass



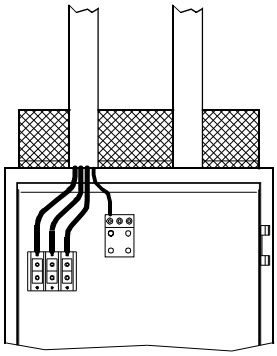
R8 w/bypass and R9 (all)

a317.dxf
a318.dxf

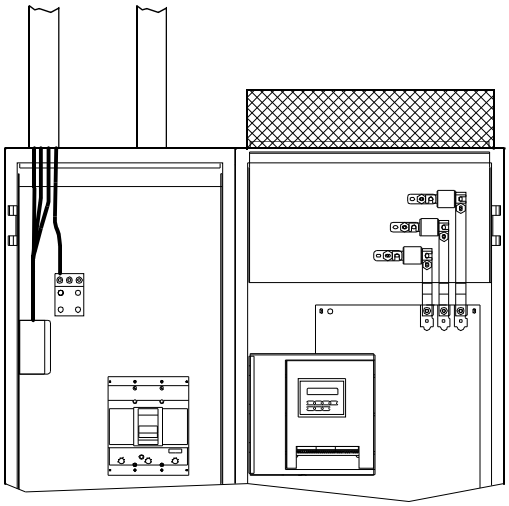
Output Wiring Sizing is the same as for the input wiring.

Figure 3-5 shows output power wiring for the ACS 502.

Figure 3-5 Output Power Wiring



R6 & R7 (all) and R8 w/o bypass



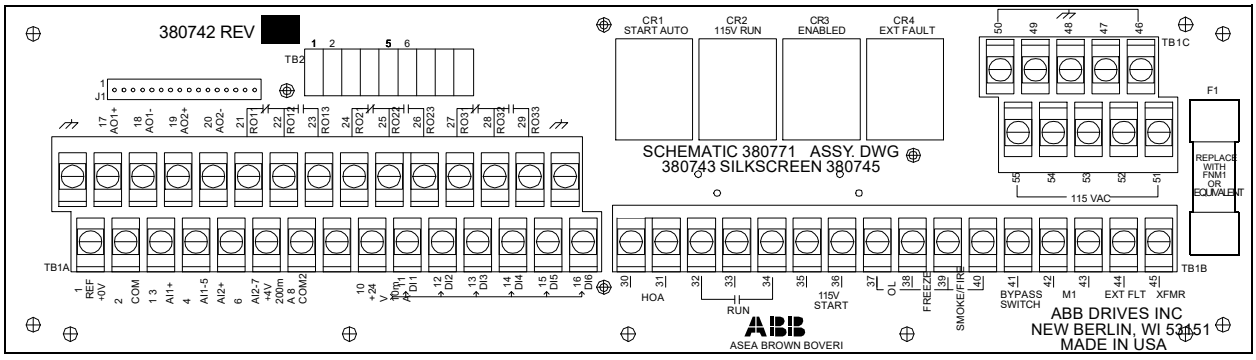
R8 w/bypass and R9 (all)

a317.dxf
a318.dxf

2. TB1 terminals 2 and 8 are “GND 2” (circuit common). TB1 terminals 4, 6, 18, and 20 are also connected to circuit common.
3. These terminals are optically isolated from power and isolated from chassis ground by a 10 megohm resistor. They are not isolated from one another.
4. Refer to the *Terminal Block Connections* section in this chapter for an outline of control signal requirements when selecting an Application macro.

Terminal Block Connections The Terminal Block TB1 is located on the terminal board. Figure 3-6 shows the Terminal Block TB1 connections. Terminals TB1:1 through TB1:29 are the same as terminals X50:1 through X50:29. Refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros* to determine the functions of these terminals based on the Application macro selected.

Figure 3-6 Terminal Block TB1 Connections



Terminals TB1:1 through TB1:20 are low voltage terminals (24 VDC maximum). Terminals TB1:21 through TB1:29 are relay output terminals.

Ground terminals are located next to TB1:17 and TB1:29. These are to be used to connect the shields of shielded cables.

Terminals TB1:30 through TB1:55 are 115 VAC control. These terminals are not used when the 115 VAC Control Transformer is not supplied.

Connection to all of these terminals is described in the following paragraphs.

Note: *When 115 VAC Control Transformer is supplied, the Option Pack macro must be used so the terminal board connections operate properly.*

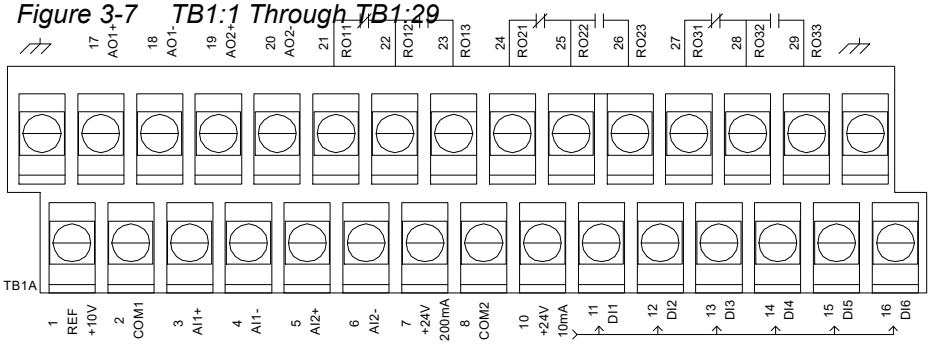
Terminal Block TB1

Terminal Block TB1 can accept wire sizes from 12 – 22 AWG. All connections to Terminals TB1:1 to TB1:20 should be made with shielded cables.

TB1:2, 4, 6, 18, and 20 are circuit common. They are optically isolated from the power line potential and from chassis ground by a 10 megohm resistor. The common points are not isolated from each other.

Figure 3-7 shows connections TB1:1 through TB1:29.

Figure 3-7 TB1:1 Through TB1:29



Potentiometer

A manual speed potentiometer is connected to the reference at TB1:1 (+10 VDC) and TB1:2 (common), and to one of the analog inputs. When the speed potentiometer is supplied from the factory for manual (Hand) operation, it is connected to AI2 (TB1:5).

Analog Inputs

The ACS 502 has two analog inputs. AI1 is on Terminals TB1:3 and TB1:4. AI2 is on TB1:5 and TB1:6, and is used by the Manual Speed Potentiometer when it is supplied.

The analog inputs can accept a voltage signal (0 – 10 VDC) or a current signal (0 – 20 mA). Jumpers S1 and S2, located on the Control Interface Board in the ACS 502 (S1 for AI1 and S2 for AI2), determine the signal type.

The jumper is placed in the “V” position for voltage, and the “I” position for current. Orientation may vary with different versions of the control interface board.

Place the jumper in the left position for voltage or the right position for current. Figure 3-8 shows jumper positions. The shaded areas represent jumper positioning.

Figure 3-8 Jumper Po

Note: *These jumpers are set in the voltage position from the factory. The control interface board assembly is mounted on the door, and is hinged for easy access. To change the jumpers, remove the two screws on the fixed side of the assembly.*

Auxiliary 24 VDC An auxiliary +24 VDC supply is available on Terminals TB1:7 and TB1:8. This supply can drive auxiliary devices whose total current draw is less than 200 mA.

Digital Inputs TB1 has six digital inputs, DI1 through DI6 on Terminals TB1:11 through TB1:16 respectively. The digital inputs use 24 VDC logic from terminal TB1:10 and are active high.

DI1, DI2, DI5, and DI6 are used by the logic on the Terminal Board when the 115 VAC control transformer is supplied. DI3 and DI4 can be used for Preset Speeds or floating point control.

Analog Outputs TB1 has two analog output signals. AO1 is on Terminals TB1:17 and TB1:18. AO2 is on TB1:19 and TB1:20. These signals are 0 – 20 mA (or 4 – 20 mA), and can operate into a maximum 500 ohm load. When the Speed Meter is supplied, it uses AO1.

Digital (Relay) Outputs Three relay outputs are each Form C. Relay RO1 is on Terminals TB1:21, TB1:22, and TB1:23. Relay RO2 is on Terminals TB1:24, TB1:25, and TB1:26. Relay RO3 is on Terminals TB1:27, TB1:28, and TB1:29.

The first terminal for each relay is the normally closed (NC) terminal, the second is the common, and the third is the normally open (NO) terminal.

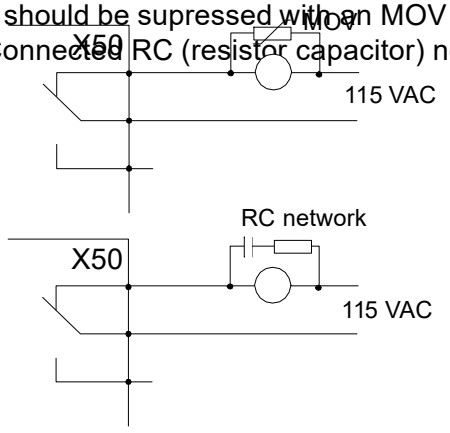
Maximum Switching Voltage: 300 VDC / 250 VAC.

Maximum Switching Current/Power: 8 A @ 24 VDC, 0.4 A @ 250 VDC, or 2000 VA @ 250 VAC.

Maximum Continuous Current: 2 A rms.

If the relay outputs are used to control inductive loads, such as the coils of relays or contactors, some form of noise supression must be provided at the load. This is to reduce the electrical noise that could interfere with the electronics in the drive, as well as increase the life of the contacts in the relay.

AC coils should be supressed with an MOV (metal oxide varistor) or a Series-Connected RC (resistor capacitor) network, as illustrated below:



MOV should be rated 120 VAC - 240 VAC for 115 VAC circuits, 240 VAC - 320 VAC for 230 VAC circuits, minimum 10 joules. Values for the RC Network vary, as they effect the opening and closing time. Contact the contactor manufacturer for recommended values.

DC coils should be supressed with a diode, although this is not required because of the small amount of noise generated by these type of circuits. If a diode is used, it should have a voltage rating greater than or equal to the supply voltage, and be connected as shown below:

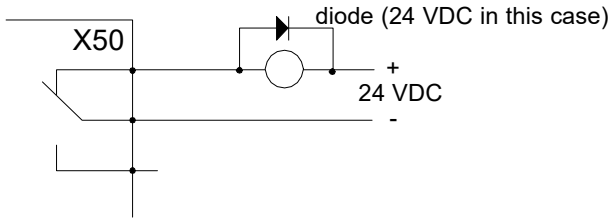
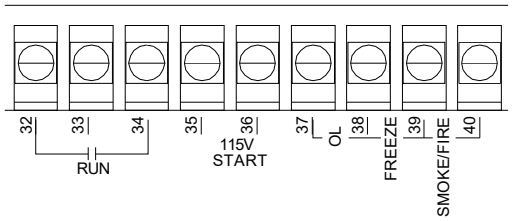


Figure 3-9 shows connections TB1:32 through TB1:40.

Note: *The 115 VAC control transformer must be supplied for these terminals to be active.*

Figure 3-9 TB1:32 Through TB1:40



Two-Wire Start (Dry Contact) To start the ACS 502 by dry contact (maintained), connect contact to TB1:32 and TB1:34. This will start the drive in Auto when HOA is supplied, and will start and stop the motor in Bypass when Bypass is supplied.

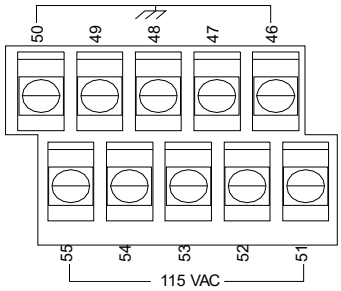
115 VAC Start To start the ACS 502 by applying 115 VAC, connect the 115 VAC signal to TB1:35 and TB1:36. Operation is the same as Two-Wire Start.

Freeze/Fire/Smoke Protection Safety interlocks, such as Freeze, Fire, and Smoke protection are normally closed dry contacts connected in series between TB1:38, TB1:39, and TB1:40. Remove the jumper wire before making your connection. When the contact opens, the motor will stop, whether in NORMAL or BYPASS. When the External Fault indicator is provided (supplied with Bypass Option), the indicator will illuminate when any of these contacts open.

115 VAC Auxiliary Power 115 VAC is available for customer use. There is approximately 100 VA available. TB1:46 through TB1:50 are ground, and TB1:51 through TB1:55 are hot.

Figure 3-10 shows connections TB1:46 through TB1:55.

Figure 3-10 TB1:46 Through TB1:55



Chapter 4 – ACS 504 Installation Instructions

This chapter explains how to properly install an ACS 504

chassis unit The ACS 504 chassis includes:

- ACS 504 Inverter Module
- Control Unit including cable (6 feet)
- Control Unit Brackets
- Input Fuses (supplied loose)
- Fuse Holder (supplied loose)
- Control Label (supplied loose)
- Ground fault current transformer
- Input choke (600 volt units only)

Pre-Installation Planning

This drive has been tested in acccordance with UL508. **480 VAC units:** The drives are suitable for use on a circuit capable of delivering not more than 42,000 rms Amperes, 500 Volts maximum. **600 VAC units:** are suitable for use on a circuit capable of delivering not more than 42,000 rms Amperes, 600 Volts.

When output chokes are supplied, 480 and 600 VAC units are suitable for use on a circuit capable of delivering not more than 65,000 rms Amperes, 500 Volts or 600 Volts.

Careful planning is required to insure proper operation of the ACS 504. The information provided in this chapter includes all dimensions, cooling requirements, and wiring information.

Figure 4-1 shows the dimensional drawings of the ACS 504 Inverter Module and Figure 4-3 shows the dimensional drawings of the ACS 504 Control Unit. Figure 4-2 shows the foot print dimensional drawing of the Inverter Module. Table 4-2 gives the dimensions and approximate weights of the Inverter Module.

Figure 4-1 shows the dimensions of the Inverter Modules. Dimensions marked with letters and numbers are found in Table 4-2. Numbers are in inches (mm).

Figure 4-1 Inverter Module Dimensions

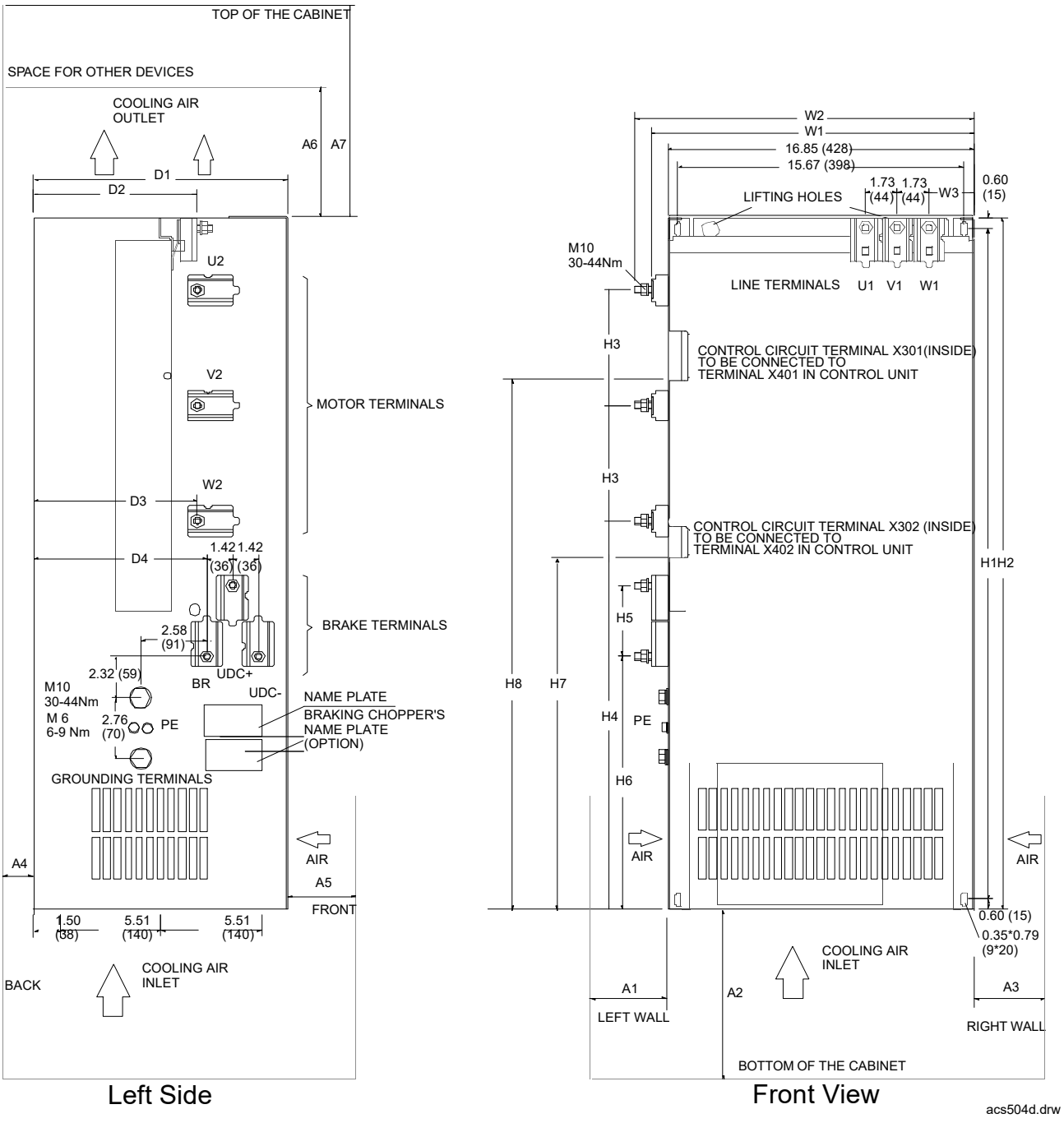


Table 4-1 ACS 504 Inverter Module Weights

	R6	**R7**	**R8**	**R9**
Weight (lb)	137	196	278	364
Weight (kg)	62	89	126	165

Table 4-2 shows the dimensions of the Inverter Modules.

Table 4-2 ACS 504 Inverter Module Dimensions

Code	R6		R7		R8		R9	
	mm	in	mm	in	mm	in	mm	in
H1	675	26.57	959	37.76	1255	49.41	1608	63.31
H2	705	27.76	989	38.94	1285	50.59	1638	64.49
H3	125	4.92	165	6.50	205	8.07	265	10.43
H4	390	15.35	557	21.93	720	28.35	928	36.54
H5	101	3.98	101	3.98	101	3.98	99	3.90
H6	214	8.43	363	14.29	538	21.18	717	28.23
H7	350	13.78	535	21.06	775	30.51	1080	42.52
H8	570	22.44	755	29.72	994	39.13	1300	51.18
W1	451	17.76	451	17.76	482	18.98	482	18.98
W2	473	18.62	473	18.62	512	20.16	512	20.16
W3	50	1.97	64	2.52	50	1.97	50	1.97
D1	385	15.28	385	15.28	415	16.34	415	16.34
D2	228	8.98	228	8.98	260	10.24	260	10.24
D3	229	9.02	229	9.02	259	10.20	259	10.20
D4	242	9.53	242	9.53	272	10.71	272	10.71
A1 – A7	Refer to Table 4-3							

Figure 4-2 shows the footprint of the Inverter Modules.

Figure 4-2 Inverter Module Footprint

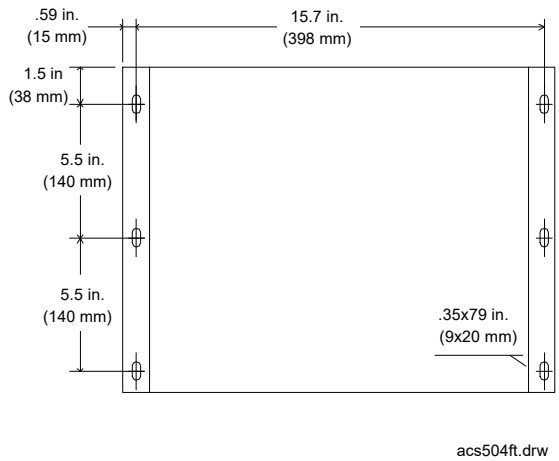


Figure 4-3 shows the dimensions of the Control Unit. The control unit can be mounted inside the enclosure per the illustration below. The control unit is also supplied with two brackets to allow it to be mounted to the door of the enclosure. Refer to Figure 4-4 for an example. Figure 5-5 shows the dimensions of the window required and the dimensions required to mount the brackets in the correct location with respect to the window.

Figure 4-3 Control Unit Dimensions

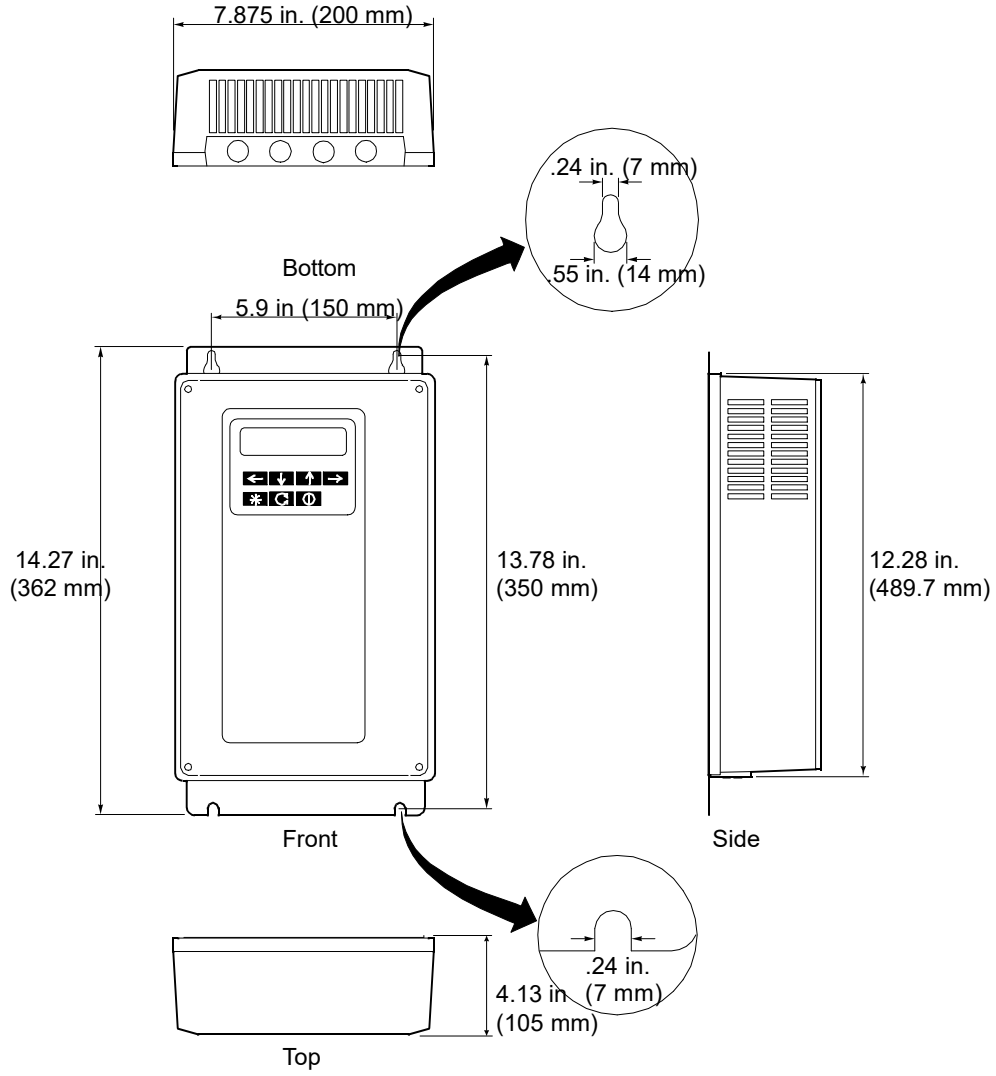


Figure 4-4 Example of Control Box Mounting

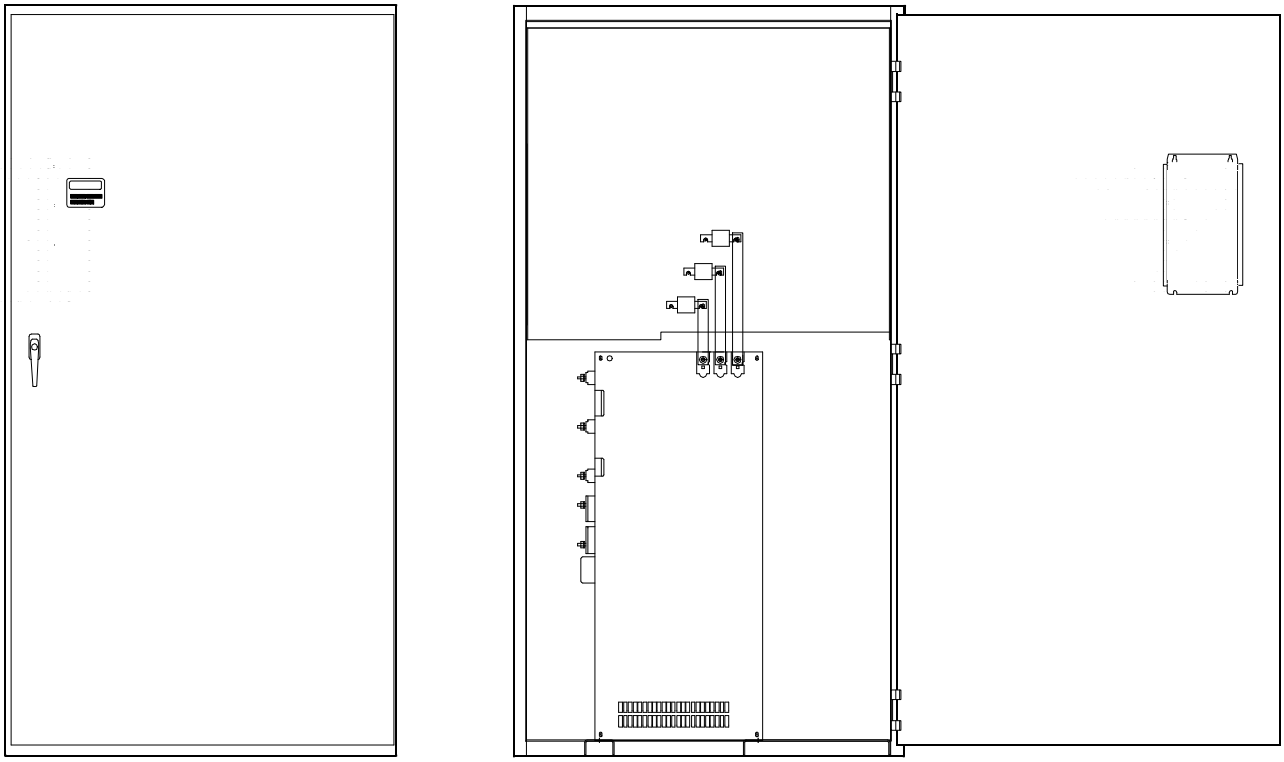


Figure 4-5 Mounting Bracket location in relation to window cut-out

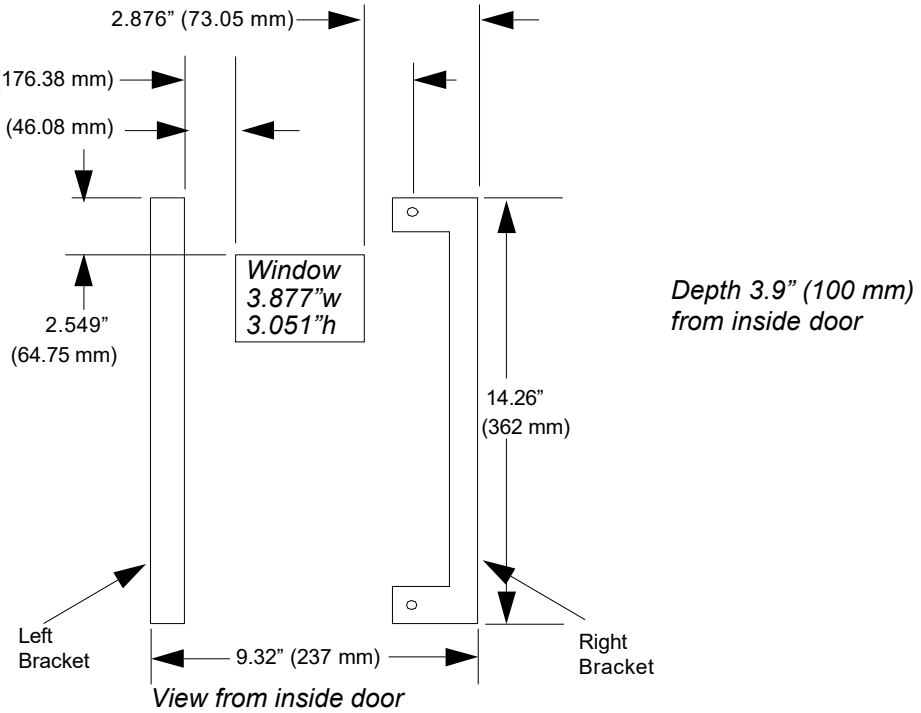


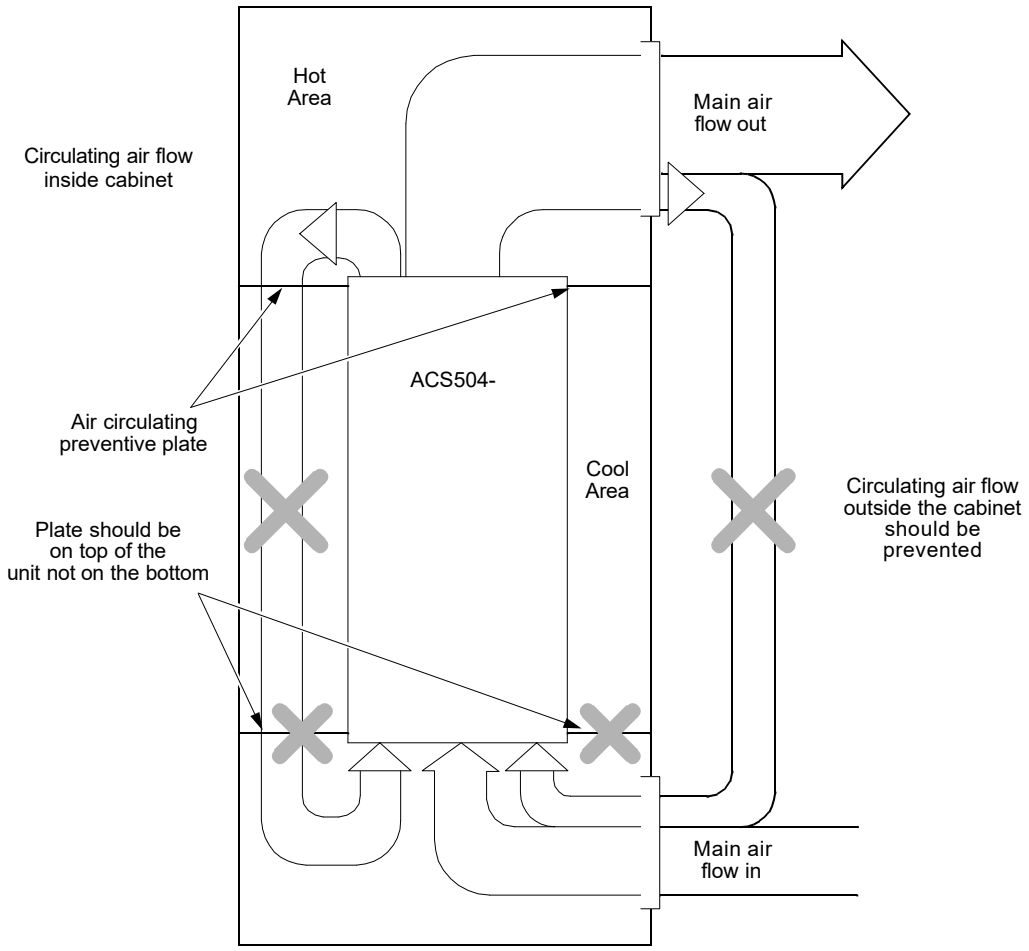
Table 4-3 shows power losses and cooling air volumes with free space requirements for ACS 504 Inverter Modules.

Table 4-3 ACS 504 Cooling Requirements

Drive Type	Losses	Air Volumes		Free Space Requirements								Opening Areas		
	Watts	Unit	Volume	Unit	A1	A2	A3	A4	A5	A6	A7	Unit	Inlet	Outlet
ACS 504-050-4	1750	m^3/hr	300	mm	150	100	50	100	-	150	400	cm2	600	800
		CFM	177	in.	6	4	2	4		6	16	sq in.	93	124
ACS 504-060-4 & 060-6	2500	m^3/hr	570	mm	150	100	50	100	-	150	400	cm2	800	1000
		CFM	335	in.	6	4	2	4	-	6	16	sq in.	124	155
ACS 504-075-4 & 075-6	3000	m^3/hr	570	mm	150	100	50	100	-	150	400	cm2	800	1000
		CFM	335	in.	6	4	2	4	-	6	16	sq in.	124	155
ACS 504-100-4	3500	m^3/hr	690	mm	150	-	50	100	50	150	400	cm2	1000	1500
		CFM	406	in.	6	-	2	4	2		16	sq in.	155	233
ACS 504-125-4 & 100-6	4250	m^3/hr	690	mm	150	-	50	100	50	150	400	cm2	1000	1500
		CFM	406	in.	6	-	2	4	2		16	sq in.	155	233
ACS 504-150-4	5250	m^3/hr	950	mm	150	-	50	100	50	150	400	cm2	1200	1800
		CFM	559	in.	6	-	2	4	2		16	sq in.	186	279
ACS 504-200-4 & 125-6	6500	m^3/hr	950	mm	150	-	50	100	50	150	400	cm2	1200	1800
		CFM	559	in.	6	-	2	4	2		16	sq in.	186	279
ACS 504-250-4	8000	m^3/hr	1350	mm	150	-	50	100	50	150	400	cm2	1400	2000
		CFM	795	in.	6	-	2	4	2		16	sq in.	217	310
ACS 504-300-4 and 350-4 & 150-6	10000	m^3/hr	1350	mm	150	-	50	100	50	150	400	cm2	1400	2000
		CFM	795	in.	6	-	2	4	2		16	sq in.	217	310

Figure 4-5 shows the cooling requirements of the ACS 504.

Figure 4-6 ACS 504 Cooling Requirements (side view)



Environment

Inverter Modules are

The Inverter Modules are provided with one or more cooling fans which located on the bottom of the unit.

The maximum allowed ambient temperature, the temperature of the air entering the unit, is 104°F (40°C).

The cooling air must be clean and free from corrosive agents (according to ISA G1). When necessary the required cooling should be arranged by using specially filtered air.

The maximum total power losses of the modules and required cooling air volumes with free space requirements are shown in Table 4-3. For dimensional reference for the free space around the module, see Figure 4-1.

Included in Table 4-3 are recommendations for total open areas in the enclosure walls or door for cooling air inlet and outlet. If the total open areas are smaller or if the air path is very curved, the cooling capacity may be reduced due to reduced air flow.

The terminal sizes and tightening torques of the power terminals are shown in Table 4-4, which also includes minimum current ratings and maximum I^2t ratings for the input fuses to be used with the module (see page 3-4 for fuse types).

Check that the supply capacity is adequate for the drive (P_R or P_{RSQ}).

Table 4-4 ACS 504 Electrical Specifications

Drive Type	Power terminals U_1, V_1, W_1 and U_2, V_2, W_2			Ground terminal (PE)			Fuse Ratings		
	Size	Torque in Nm	Torque in lb-in.	Size	Torque in Nm	Torque in lb-in.	A	kA^2s	V
ACS 504-050-4 & ACS504-060-6 to ACS504-075-6	M10	30 – 44	260 – 380	M10	30 – 44	260 – 380	160	16	660
ACS 504-060-4 to ACS 504-075-4 & ACS 504-100-6	M10	30 – 44	260 – 380	M10	30 – 44	260 – 380	200	28	660
ACS504-125-6	M10	30 – 44	260 – 380	M10	30 – 44	260 – 380	250	28	660
ACS 504-100-4 & ACS 504-125-4 & ACS 504-150-6	M10	30 – 44	260 – 380	M10	30 – 44	260 – 380	400	105	660
ACS 504-150-4 & ACS 504-200-4	M12	50 – 75	435 – 650	M10	30 – 44	260 – 380	550	190	660
ACS 504-250-4 to ACS 504-350-4	M12	50 – 75	435 – 650	M10	30 – 44	260 – 380	700	405	660

Precautions with Motor Cable

Install the motor cable away from other cable routes. Avoid parallel runs with other cables.

WARNING! The brake control terminals carry a dangerous DC voltage (>600V). No device other than an ABB Drives dynamic braking device may be connected to the UDC+, BR, and UDC- terminals.

Connecting the Control Unit to the Inverter Module

The cable coming out of the Control Unit is to be connected to connector X604 on the Inverter Module. The connector must be secured with the thumb screws. The cable provided is 6 feet long, and should not be extended.

Connecting the Ground Fault Current Transformer

The yellow/green grounding wire that is connected to one of the PE terminals on the left side of the Inverter Module is also to be connected to the Control Unit Chassis (PE2).

The ACS 504 is supplied with a current transformer (CT) to provide the ground fault protection. This CT should be installed on the input of the drive by running all three line wires through the CT (do not run the ground wire

current should flow from the side labeled H1 to the side labeled H2.

The wires on the CT should be connected to the grey cable on the left side of the inverter module. The wires should be connected as follows: black - black; white - clear. The shield is connected at the drive end, and should not be connected at the CT end. Avoid running the signal wires parallel to the power wires.

Note: *Polarity is critical in this installation. Ensure that the WHITE lead from the CT is connected to X1001:2 and the BLACK lead is connected to X1001:1 on SNAT7670EFS card.*

Checking the Motor Insulation

Do not make insulation checks on the ACS 504 unless there is reason to suspect an isolation failure. Every unit has been tested for isolation between main circuit and chassis (2500 VAC for 1 minute) at the factory.

Before proceeding with the insulation resistance measurements, make sure that the ACS 504 is disconnected from the input line and then disconnect the output conductors from terminals U_2, V_2 and W_2.

Check that the motor cable is disconnected from the motor.

Measure the insulation resistance in the motor. The voltage range of the insulation resistance meter must be at least equal to the input line voltage but not exceeding 1000 V. The insulation resistance must be greater than 1 Mohm.

Measure the insulation resistance of the output conductors between the phases and between each phase and ground. The insulation resistances must be greater than 1 Mohm.

Control Connections

Available Control Locations

The available control locations for the ACS 504 are the:

- ACS Keypad located on the front of the drive.
- X50 screw terminals on the Control Interface Card SNAT-759.

Figure 4-8 shows the control interface card SNAT-759 with terminal and control locations.

Figure 4-9 SNAT-759 Connections

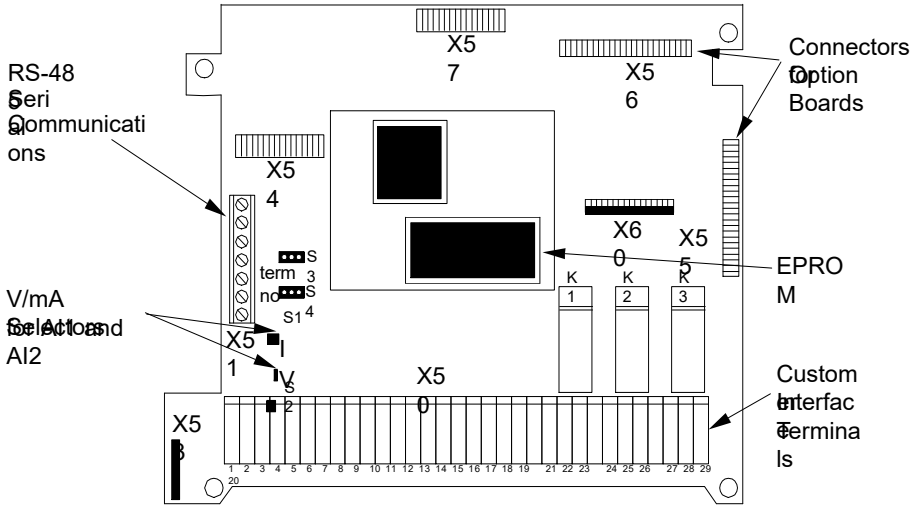
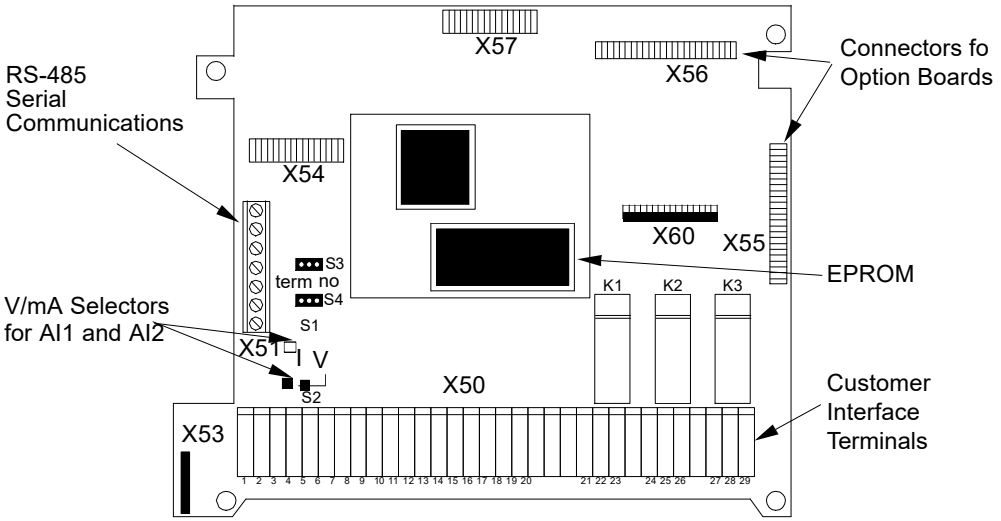


Figure 4-9 SNAT-759 Connections



External control devices, for example a PLC or remote operator devices, are connected to Terminal Block X50 according to the connection diagram of each Application macro or according to the programming of the parameters in Main 10, Control Connections. The connection diagrams of Application macros are presented in the *ACS 500 Adjustable Frequency AC drives 2 to 350 HP Programming Manual Including Application Macros*. The X50 connection diagram based on factory settings is presented in Figure 4-8 (Control Interface Card SNAT-759 connections). The terminal functions can be altered by means of parameter settings.

X50 Terminal Block X50 can accept wire sizes from 16 – 22 AWG. All connections to terminals X50:1 to X50:20 should be made with shielded cables.

X50:2, 4, 6, 8, 18, and 20 are circuit common. They are optically isolated from the power line potential, and from chassis ground by a 10 megohm resistor. The common points are not isolated from each other.

Potentiometer A manual speed potentiometer is connected to the reference at X50:1 (+ 10 VDC) and X50:2 (common), and to one of the analog inputs.

Analog Inputs There are two analog inputs. AI1 is on terminals X50:3 and X50:4. AI2 is on X50:5 and X50:6.

The analog inputs can accept a voltage signal (0 – 10 VDC) or a current signal (0 – 20 mA), as selected by jumpers S1 and S2 (S1 for AI1 and S2 for AI2).

The jumper is placed in the “V” position for voltage and the “I” position for current. Figure 4-9 shows jumpers. Orientation may vary with different versions of the control interface board.

Digital (Relay) Outputs on

There are three relay outputs which are each Form C. Relay RO1 is terminals X50:21, X50:22, and X50:23; Relay RO2 is on terminals X50:24, X50:25, and X50:26; Relay RO3 is on terminals X50:27, X50:28, and X50:29.

The first terminal for each relay is the normally closed terminal (NC), the second is the common, and the third is the normally open (NO).

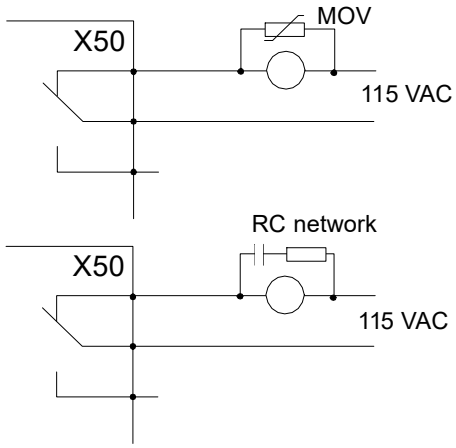
Maximum Switching Voltage: 300 VDC / 250 VAC

Maximum Switching Current/Power: 8 A @ 24 VDC, 0.4 A @ 250 VDC, or 2000 VA @ 250 VAC

Maximum Continuous Current: 2 A rms

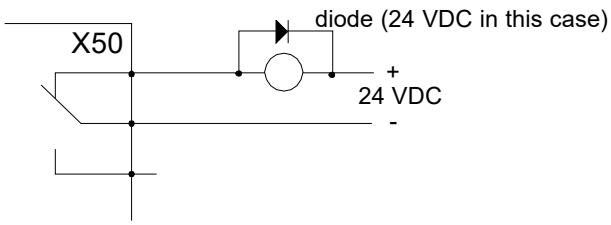
If the relay outputs are used to control inductive loads, such as the coils of relays or contactors, some form of noise supression must be provided at the load. This is to reduce the electrical noise that could interfere with the electronics in the drive, as well as increase the life of the contacts in the relay.

AC coils should be supressed with an MOV (metal oxide varistor) or a Series-Connected RC (resistor capacitor) network, as illustrated below:



MOV should be rated 120 VAC - 240 VAC for 115 VAC circuits, 240 VAC - 320 VAC for 230 VAC circuits, minimum 10 joules. Values for the RC Network vary, as they effect the opening and closing time. Contact the contactor manufacturer for recommended values.

DC coils should be supressed with a diode, although this is not required because of the small amount of noise generated by these type of circuits. If a diode is used, it should have a voltage rating greater than or equal to the supply voltage, and be connected as shown below:



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