

ACS 501

Users Manual

ACS 501 with Option Pack

ACS 501-08D
EFFECTIVE 10/1/95
SUPERCEDES 9/1/94

ABB Drives



ACS 501 with Option Pack

Users Manual

ACS 501-08D

EFFECTIVE: 1995-10-01
SUPERCEDES: 1994-09-01

Safety Instructions

General Safety Instructions

Warnings in this manual appear in either of two ways:

- *Dangerous voltage warnings*, preceded by a Dangerous Voltage symbol, indicate the presence of voltages which may cause death or serious injury. These warnings describe procedures to avoid death or serious injury.
- *General warnings*, preceded by a General Warning symbol, indicate situations or conditions which may cause death or serious injury. These warnings describe procedures to avoid death or serious injury.

CAUTIONS inform you of situations or conditions which will damage machinery or cause additional motor-operation down-time if you do not take suggested steps to correct or address such situations or conditions.

Note: Notes provide you with additional and useful information. Although less urgent than cautions and warnings, notes are important and should not be ignored.

Warning Symbols

For your own safety please pay special attention to instructions containing these symbols:



This warning symbol indicates the presence of dangerous voltage. This symbol informs you of high voltage conditions, situations, and locations that may cause death or serious injury if you do not follow precautions and proper steps.



This warning symbol indicates a general warning.



This warning symbol indicates an electrostatic discharge hazard.

**Warnings, Cautions,
and Notes**



WARNING! Your drive contains dangerous voltages when connected to the line power. Always check that the ACS 501 is safe, after disconnecting the power, by measuring the DC bus voltage and line input voltage. Failure to check voltages could cause death or serious injury. Only a qualified electrician should carry out the electrical installation.

Note that the Motor Control Card of the ACS 501 is at DC bus voltage potential.

The DC bus capacitors contain dangerous DC voltage levels ($1.35 \times V_{IN}$). After disconnecting the supply, wait at least five minutes after the display readout on the control panel has disappeared before taking any measurements.

Dangerous external control voltages may be present on the relay outputs of the Control Interface Card and Option Cards.



CAUTION: Electrostatic Discharge (ESD) can damage electronic circuits. Do not handle any components without following the proper ESD precautions.

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Chapter 1 – Introduction

This chapter explains the purpose and contents of this manual, intended audience, and conventions used in this manual, and lists related publications.

How To Use This Manual

The purpose of this manual is to provide you with the information necessary to install and start-up your ACS 501 with Option Pack. This manual also explains features and functions of the Option Pack and requirements such as external drive control connections, wiring, cable sizes, and cable routing.

The ACS 501 with Option Pack user documentation also includes the *ACS 501 Adjustable Frequency AC Drives 2 to 50 HP Installation and Start-up Manual*, and the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros*, which are included with the ACS 501 drive.

Chapter 1 – Introduction, the chapter you are reading now, introduces you to the *ACS 501 with Option Pack Users Manual* and conventions used throughout the manual.

Chapter 2 – Overview of the ACS 501 with Option Pack explains drive identification and the available features and functions, and lists and explains the available components of the Option Pack.

Chapter 3 – Installation Instructions explains Option Pack installation planning, inspection, and mounting. This chapter also includes requirements and connections for input and output wiring, terminal connections, external control wiring, and available control locations.

Chapter 4 – Start-up Procedure explains safety, installation inspection, Start-up Data parameters, keypad control, external control, Option Pack macro parameters, and Password Protection.

Chapter 5 – Option Pack Parameter Settings lists and explains the Option Pack parameter settings.

The *Index* helps you locate the page numbers of topics contained in this manual.

Intended Audience

The audience for this manual has:

- Minimal knowledge of ABB product names and terminology.
- No experience or training in installing, operating, or servicing the ACS 501 with Option Pack.
- Basic knowledge of standard electrical wiring practices, electronic components, and electrical schematic symbols.

The audience for this manual will install and start-up the ACS 501 with Option Pack.

Conventions Used In This Manual

Listed below are terms and language conventions used in this manual. These terms and conventions are defined here to help you understand their meanings and applications throughout this manual.

Control Panel Display

The Control Panel display is an LCD readout of drive functions, drive parameter selections, and other drive information. Letters or numbers appear in the display according to which Control Panel keys you press.

Control Panel Keys

Control Panel keys are flat, labeled, pushbutton-type devices that allow you to monitor drive functions, select drive parameters, and change drive macros and settings. These keys are located on the Control Panel Keypad.

Main

A main is the first level of programming. The Mains organize the Parameters into four main functional groups. A Main in this manual is the number corresponding to Group access. All Groups in the 10s range are accessed on the Control Panel through CONTROL CONNECTIONS/MAIN 10. Access Groups in the 20s range through DRIVE PARAMETERS/MAIN 20. Access Groups in the 30s range through PROTECTION PARAMETER/MAIN 30, and access Groups in the 40's range through APPLIC PARAMETERS/MAIN 40. Refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Chapter 2 – Overview of ACS 500 Programming* and *Chapter 5 – Parameters*, for a more detailed explanation of programming the ACS 501 drive.

Group

A Group is a sub-set of a Main. Groups are grouped within Mains according to their 10s, 20s, 30s, or 40s range. For example, Groups numbered 30.1, 30.2, 30.3, and 30.4 are found in PROTECTION PARAMETER/MAIN 30. Parameters are accessed through Groups. Refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Chapter 2 – Overview of ACS 500 Programming* and *Chapter 5 – Parameters*, for a more detailed explanation of programming the ACS 501 drive.

Parameter

A parameter is a sub-set of a Group, selected through the Control Panel keys. Parameters in this manual often are expressed as a number, a decimal (.), another number, a decimal, and another number. The first number at the left represents the Main. The number between the decimals represents the Group, for example, 20.2 (Start/Stop). The number at the right represents a Parameter within that group, for example, 4 (Brake Chopper). In this manual, Parameter 4 in Group 20.2 is expressed as Parameter 20.2.4. Refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Chapter 2 – Overview of ACS 500 Programming* and *Chapter 5 – Parameters*, for a more detailed explanation of programming the ACS 501 drive.

Press

Press a key on the Control Panel to achieve a desired result. In this manual, individual Control Panel keys are enclosed in square brackets. For example, the Setting mode key is expressed as [*]. Refer to the *ACS 501 Adjustable Frequency AC Drives 2 to 50 HP Installation & Start-up Manual, Chapter 2 – Overview of the ACS 501, Control Panel Operation*, for details.

Terminal Block A terminal block is a group of wire connections on a drive. This manual expresses specific terminal blocks and connections as a letter or letters, a number, a colon (:), and another number. The letter(s) and number to the left of the colon represent the name of the terminal block, for example TB1. The number to the right of the colon represents the terminal connection, for example 16, on the terminal block. In this manual, a terminal connection numbered 16, located on a terminal block named TB1, is expressed as TB1:16.

Warranty and Liability Information

The warranty for your ABB Option Pack covers manufacturing defects. The manufacturer carries no responsibility for damage due to transport or unpacking.

In no event and under no circumstances shall the manufacturer be liable for damages and failures due to misuse, abuse, improper installation, or abnormal conditions of temperature, dust, or corrosives, or failures due to operation above rated capacities. Nor shall the manufacturer ever be liable for consequential and incidental damages.

The period of manufacturer's warranty is 12 months, and not more than 18 months, from the date of delivery.

Extended warranty may be available with certified start-up. Contact your local distributor for details.

Your local ABB Drives company or distributor may have a different warranty period, which is specified in their sales terms, conditions, and warranty terms.

If you have any questions concerning your ACS 501 with Option Pack, contact your local distributor or ABB Drives office.

The technical data and specifications are valid at the time of printing. ABB reserves the right to subsequent alterations.

Related Publications

For related information, refer to the *ACS 501 Adjustable Frequency AC Drives 2 to 50 HP Installation & Start-up Manual (ACS 501-04)* and the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros (ACS 500-05)*.

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Chapter 2 – Overview of the ACS 501 with Option Pack

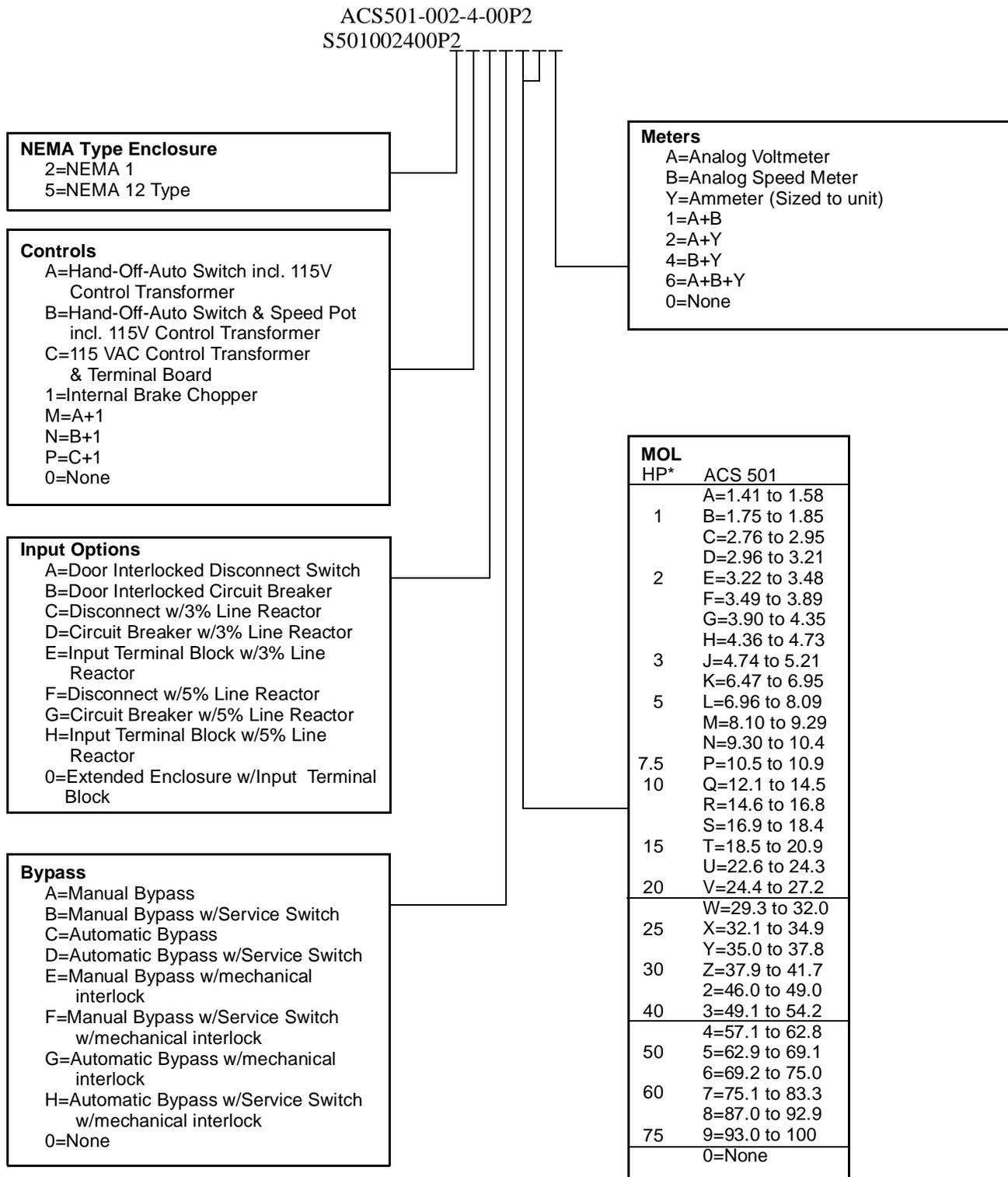
This chapter explains the numbers and letters on the control nameplate, describes available Option Pack features and functions, and includes illustrations. It also describes the ACS 501 with Option Pack hardware components and terminal block connections.

General Information About the ACS 501

Control Identification

The numbers and letters in the last seven spaces of the ACS 501 Model Number stand for the specific options included in your Option Pack. Locate the Control Nameplate on the Option Pack and use Figure 2-1 to verify the options included in your Option Pack.

Figure 2-1 Nameplate Codes



* Horsepowers listed are estimated only for 460 volts. MOL's MUST be sized for the specific motor. Horsepowers for 230 V are half the horsepower at 460 V.

Option Pack Features and Functions

The ACS 501 with Option Pack is an ACS 501 AC adjustable frequency drive with an extended enclosure for control options. Depending on the options chosen, the ACS 501 with Option Pack provides motor overload protection, disconnect switch or circuit breaker, bypass, analog meters, indicator lights, and external control connections.

Figure 2-2 shows the door of the ACS 501 Option Pack, and indicates all possible options. Your Option Pack may not look exactly like the illustration.

Figure 2-2 Option Pack Cover with Options

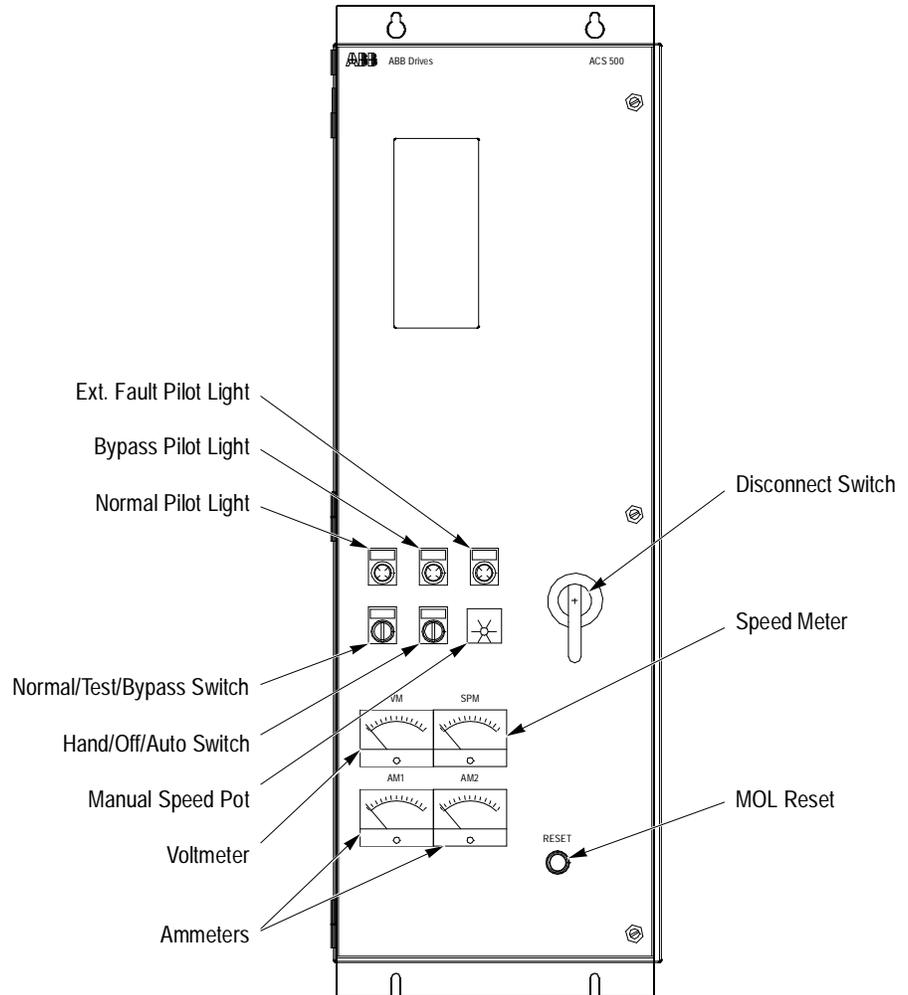
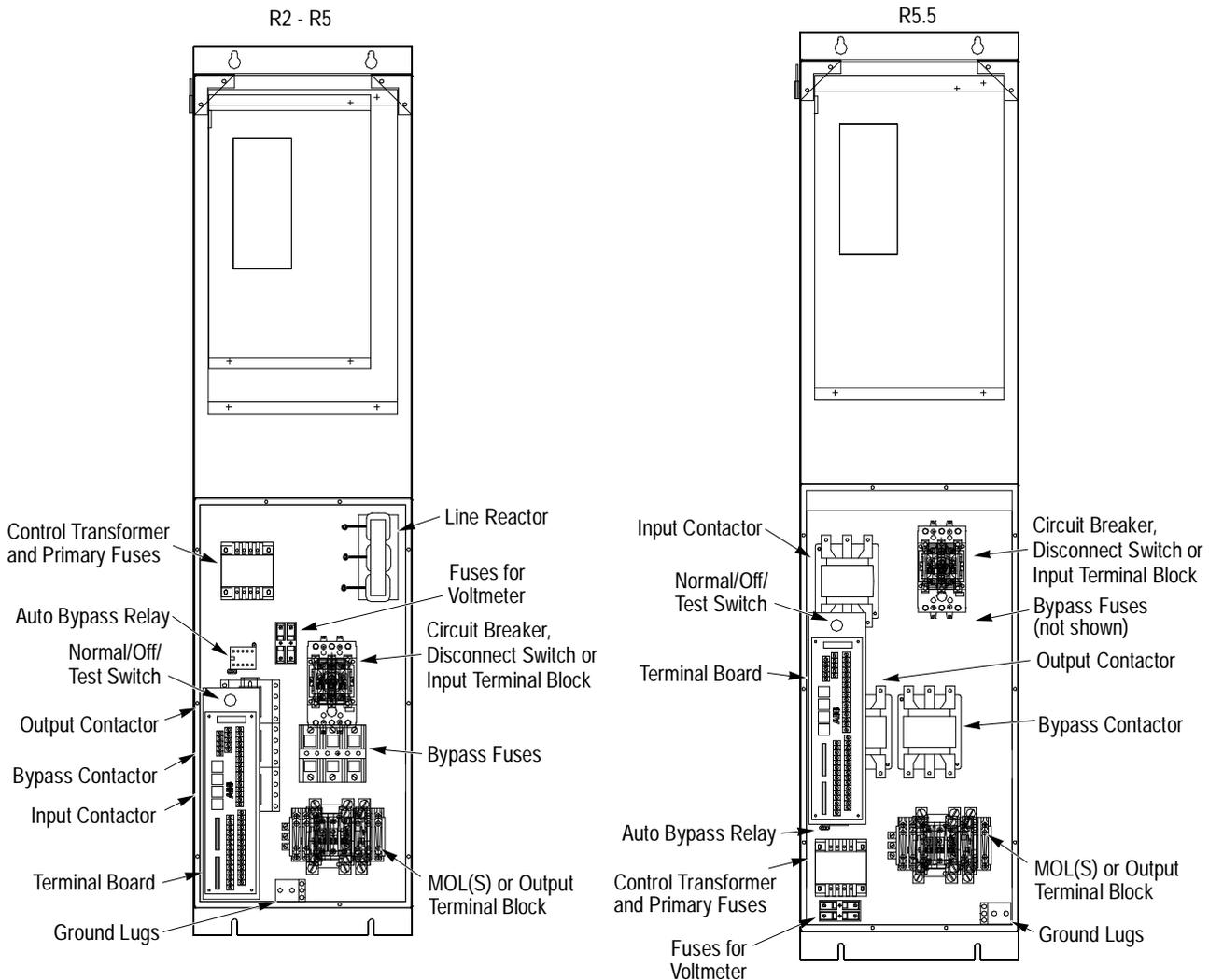


Figure 2-3 shows the interior of the ACS 501 Option Pack, for the two enclosure sizes, and indicates all possible options. Your Option Pack may not look exactly like the illustration.

Figure 2-3 Option Pack Interior with Options



There are three enclosure sizes, although the component layout for the R2 through R5 are similar:

- One enclosure for R2 and R3 units
- One enclosure for R4 and R5 units
- One enclosure for R5.5

See the *ACS 501 Installation and Start-up Manual* (ACS501-04) that was included in the delivery to determine which frame size is used for each rating.

The ACS 501 drive is mounted so the keypad is accessible through the door of the Option Pack enclosure.

All control connections are made to either TB1 or X50, depending on the configuration of the ACS 501. TB1 is located on the Terminal Board in the Option Pack. The Terminal Board is supplied when the 115 VAC control is ordered. This is indicated in the thirteenth character of the part number, Control (see Figure 2-1). 115 VAC control is required with the Hand-Off-Auto Control Option and Bypass Options. When the Terminal Board is supplied, all connections should be made to TB1.

When the terminal board is not supplied, all control connections should be made to Terminal Board X50 as indicated in the *ACS 501 Adjustable Frequency AC Drives 1 to 75 HP Installation & Start-up Manual*.

Custom Options

Custom options for the ACS 501 with Option Pack fall into five main categories:

- Control Options
- Input Options
- Bypass Options
- Thermal Overload Relays
- Meters

Control Options

The Control Options are Hand/Off/Auto and Hand/Off/Auto with Speed Potentiometer. Both options include 115 VAC control power and control power transformer. The 115 VAC control can also be ordered without HOA or Speed Pot.

When the 115 VAC Control is supplied, a Terminal Board is also supplied. This board (illustrated in *Chapter 3 – Installation Instruction*) is the location of Terminal Block TB1, to which all connections are made. Terminal Board connections are described in this manual. 115 VAC Control is required with all Bypass options. If the Terminal Board is not supplied, all control connections are made to Terminal Block X50. Refer to the *ACS 501 Adjustable Frequency AC Drives 2 to 50 HP Installation & Start-up Manual, Chapter 3 – Installation Instructions*, for information about control connections on Terminal Block X50.

Hand/Off/Auto

Hand/Off/Auto is a door mounted switch, wired at the factory. This switch allows you to select one of three modes. In the Hand mode, the Drive Enable signal enables the drive and the ACS 501 Keypad (Operating Data Parameter 14) controls the speed. In the Off mode, the drive is disabled even if you use an external speed reference or if you attempt to start the drive via the keypad. In the Auto mode, a remote contact closure starts the drive, provided you have connected a remote contact. A remote signal (voltage, current or pneumatic) controls speed. A 115 VAC control transformer provides control voltage.

Hand/Off/Auto with Speed Potentiometer

Hand/Off/Auto with Speed Potentiometer is the same switch as Hand/Off/Auto with the addition of a manual speed potentiometer mounted on the drive enclosure. In the Hand mode, the speed potentiometer controls speed. The speed potentiometer is connected to Analog Input 2 (AI2).

Input Options The Disconnect Options are the Door Interlocked Disconnect Switch and the Door Interlocked Circuit Breaker.

Door Interlocked Disconnect Switch The Door Interlocked Disconnect Switch is a non-fused disconnect switch. Fuses are standard in the drive and additional fuses are supplied separately when bypass is ordered.

Door Interlocked Circuit Breaker The Door Interlocked Circuit Breaker is a thermal magnetic, molded case circuit breaker.

Both options are a thru-the-door interlock design and can be padlocked in the OFF position.

Input Line Reactor 3% or 5% input line reactors to reduce the harmonics to the power line.

Bypass Options Manual and Automatic Bypass are both available with and without a service switch (input contactor).

If bypass is supplied, and a circuit breaker is not ordered, fuses are provided in the Option Pack. Table 2-1 shows fuse sizing.

Table 2-1 Fuse Sizes

Drive Type	Rating	Manufacturer	Type (all Class J, Dual Element)
ACS 501-002-4 ACS 501-001-2	6A, 600V	Bussmann	LPJ-6SP
ACS 501-003-4	10A, 600V	Bussmann	LPJ-10SP
ACS 501-005-4 ACS 501-002-2 ACS 501-005-6	15A, 600V	Bussmann	LPJ-15SP
ACS 501-007-6	17.5A, 600V	Bussmann	LPJ-17½SP
ACS 501-007-4 ACS 501-003-2 ACS 501-010-6	20A, 600V	Bussmann	LPJ-20SP
ACS 501-010-4 ACS 501-005-2	25A, 600V	Bussmann	LPJ-25SP
ACS 501-015-4 ACS 501-007-2 ACS 501-015-6	30A, 600V	Bussmann	LPJ-30SP
ACS 501-020-6	40A, 600V	Bussmann	LPJ-40SP
ACS 501-020-4 ACS 501-010-2 ACS 501-025-6	50A, 600V	Bussmann	LPJ-50SP
ACS 501-025-4 ACS 501-030-6	60A, 600V	Bussmann	LPJ-60SP
ACS 501-030-4 ACS 501-015-2	70A, 600V	Bussmann	LPJ-70SP
ACS 501-040-6	80A, 600V	Bussmann	LPJ-80SP
ACS 501-040-4 ACS 501-020-2 ACS 501-050-6	100A, 600V	Bussmann	LPJ-100SP
ACS 501-050-4	125A, 600V	Bussmann	LPJ-125SP
ACS 501-060-4 ACS 501-025-2	150A, 600V	Bussmann	LPJ-150SP
ACS 501-030-2	175A, 600V	Bussmann	LPJ-175SP

These fuses are UL Listed components.

Manual Bypass

The Manual Bypass option is a selector switch which transfers the motor to line power and allows the motor to operate at full speed.

Note: If motor overload is not provided in the option pack, one must be installed external to the drive and sized in accordance with NEC.

The Manual Bypass option has two contactors, electrically interlocked and controlled by a three position, door-mounted switch. Switch positions are NORMAL, TEST, and BYPASS. In the NORMAL position, the Bypass contactor is open, the Output contactor is closed, and the Normal indicator light is illuminated. In the TEST position, both contactors are open. In the BYPASS position, the Output contactor is open, the Bypass contactor is closed, the drive is disabled, and the Bypass indicator light is illuminated. Motor duty fuses or a circuit breaker protect the motor in the Bypass mode.

An External Fault indicator light is included. The External Fault indicator light illuminates if any of the safety interlocks (FREEZE, FIRE, SMOKE) open, or if the Thermal Motor Overload Relay trips.

CAUTION: When changing from Bypass to Normal, place the Bypass Switch in the TEST position for five seconds before selecting Normal. Failure to do so could result in damage to the ACS 501.

Note: The ACS 501 is disabled when BYPASS is selected. If the drive is to be run while in BYPASS, a connection must be made between TB1:42 and TB1:43. This should be done by a qualified service technician only.

CAUTION: Remove the jumper before switching from BYPASS to NORMAL. Failure to do so could result in damage to the ACS 501.

Note: The Output contactor opens when the drive receives a stop command, which will cause the motor to coast to a stop. If ramp to a stop is required by the application, it will be necessary to install wires from TB1:25 to TB1:40 and from TB1:26 to TB1:41. This will cause the Output contactor to remain closed until the output frequency reaches 0 Hz when a stop command is received.

CAUTION: If BYPASS is selected, and the motor is not running because a stop command is given, the motor will start when the drive is started.

*Manual Bypass with
Service Switch*

The Manual Bypass with Service Switch option is the same as the Manual Bypass option with the addition of another switch and a third contactor on the line power input side of the drive. The additional switch allows you to apply power to, or remove power from the drive for servicing while the motor continues to operate on line power. In the BYPASS position, the Drive Input contactor opens and removes power from the drive. The Drive Input contactor also is controlled by the three position Service Switch, with the positions labeled NORMAL, OFF, and TEST. This switch is mounted inside the enclosure. In the NORMAL position, the Bypass contactor controls the Drive Input contactor. In the TEST position, the Drive Input contactor is closed. In the OFF position, the Drive Input contactor is open.

***Note:** The Drive Input contactor opens when BYPASS is selected, removing power from the drive. The service switch will energize the input contactor in the TEST position to allow the drive to be powered while in BYPASS for servicing.*

***Note:** The ACS 501 is disabled when BYPASS is selected. If the drive is to be run while in BYPASS, a connection must be made between TB1:42 and TB1:43. This should be done by a qualified service technician only.*

CAUTION: Return the service switch to Normal and remove the jumper from TB1:42 to TB1:43 before switching from BYPASS to NORMAL. Failure to do so could result in damage to the ACS 501.

***Note:** The Output contactor opens when the drive receives a stop command, which will cause the motor to coast to a stop. If ramp to a stop is required by the application, it will be necessary to install wires from TB1:25 to TB1:40 and from TB1:26 to TB1:41. This will cause the Output contactor to remain closed until the output frequency reaches 0 Hz when a stop command is received.*

CAUTION: If BYPASS is selected, and the motor is not running because a stop command is given, the motor will start when the drive is started.

Automatic Bypass An Automatic Bypass may be added to the Manual Bypass or Manual Bypass with Service Switch. The Automatic Bypass automatically transfers the motor to line power when the drive shuts down on a protective trip. If Automatic Restart is enabled on the drive, the drive will attempt to automatically restart before the motor transfers to line power. Bypass transfer occurs when the drive is in a fault condition and will not reset. When an automatic transfer occurs, the Bypass indicator light illuminates.

Thermal Motor Overload Relays The Thermal Motor Overload Relay options are relays rated 30, 60, or 100 amps. These options are standard, manually resettable, bimetallic motor overload relays with a Class 20 trip curve. The relays provide thermal motor protection when operating a motor from the drive. If a Bypass Option is included, the relays also provide thermal motor protection across the line power. If the overload trips, power is removed from the motor whether in Normal or Bypass mode. When the drive has the Bypass option, an external fault indicator is included. This indicator will illuminate if the overload relay trips. The overload relay is reset by a pushbutton on the enclosure cover.

Thermal Motor Overload Relays have heater elements wired in series with the output wiring. The heater elements determine the trip level of the overload relay. The heater element type is stamped on the element. If the overload is not sized properly for the motor, purchase new heaters of the correct size. See Table 2-2 for heater sizes. Your Option Pack may have either one or two overload relays, depending upon how many motors the Option Pack controls.

Table 2-2 Heater Sizes

Heater Code	Amps 30	60	100
E3	.30 – .32		
E4	.33 – .35		
E5	.36 – .38		
E6	.39 – .41		
E7	.42 – .44		
E8	.45 – .49		
E9	.50 – .54		
E11	.55 – .58		
E12	.59 – .63		
E13	.64 – .67		
E14	.68 – .73		
E16	.74 – .81		
E17	.82 – .87		
E18	.88 – .94		
E19	.95 – 1.00		
E23	1.10 – 1.10		
E24	1.11 – 1.26		
E26	1.27 – 1.40		
E27	1.41 – 1.58		
E28	1.59 – 1.74		

Heater Code	Amps 30	60	100
E29	1.75 – 1.85		
E31	1.86 – 1.99		
E32	2.00 – 2.11		
E33	2.12 – 2.31		
E34	2.32 – 2.59		
E36	2.60 – 2.75		
E37	2.76 – 2.95		
E38	2.96 – 3.21		
E39	3.22 – 3.48		
E41	3.49 – 3.89		
E42	3.90 – 4.35		
E44	4.36 – 4.73		
E46	4.74 – 5.21		
E47	5.22 – 5.74		
E48	5.75 – 6.05		
E49	6.06 – 6.46		
E50	6.47 – 6.95		
E51	6.96 – 8.09		
E52	8.10 – 9.29		
E53	9.30 – 10.4		
E54			
E55	10.5 – 10.9		
E56	11.0 – 12.0		
E57	12.1 – 14.5		
E60	14.6 – 16.8		
E61	16.9 – 18.4	16.9 – 18.4	
E62	18.5 – 20.9	18.5 – 20.9	
E65	21.0 – 22.5	21.0 – 22.5	
E66	22.6 – 24.3	22.6 – 24.7	
E67	24.4 – 27.2	24.8 – 27.2	27.1 – 30.0
E69	27.3 – 29.2	27.3 – 29.2	30.1 – 33.2
E70	29.3 – 30.0	29.3 – 32.0	33.3 – 35.7
E71		32.1 – 34.9	35.8 – 39.4
E72			39.5 – 43.4
E73		35.0 – 37.8	43.5 – 46.9
E73A		37.9 – 41.7	
E74		41.8 – 45.9	47.0 – 51.5
E76		46.0 – 49.0	51.6 – 57.0
E77		49.1 – 54.2	57.1 – 62.8
E78		54.3 – 60.0	62.9 – 69.1
E79			69.2 – 75.0
E80			75.1 – 83.3
E88			
E89			
E91			

Heater Code	Amps 30	60	100
E92 E93 E94 E96 E97			83.4 – 86.9 87.0 – 92.9
E98 E99 E101 E102 E103			93.0 – 100.0
E104 E106 E107			

Meters The Meter Options are Output Voltmeter, Output Speed Meter, and Output Ammeter. A total of four analog meters can be installed in the ACS 501 with Option Pack.

Output Voltmeter The Output Voltmeter indicates motor voltage on a 0 – 500 VAC scale connected directly to the drive output.

Output Speed Meter The Output Speed Meter is calibrated in percent of maximum speed with a 0 – 100 percent scale connected to one of the analog outputs.

Note: This option uses one of the analog outputs on the ACS 501.

Output Ammeters The Ammeters have five calibration sizes ranging from 10 to 100 amps. Depending on the number of motors driven, one or two Output Ammeters can be installed in the Option Pack. If two ammeters are ordered, two Thermal Motor Overload Relays must be ordered; the ammeters are sized to the Thermal Motor Overload Relays. If two Thermal Motor Overload Relays are ordered and only one ammeter is ordered, the ammeter will indicate the sum of the current at the two relays.

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Chapter 3 – Installation Instructions

This chapter explains how to install the ACS 501 with Option Pack and connect all power, motor, and control wiring. It also explains the initial inspection procedures.

Pre-Installation Planning

The ACS 500 has been short circuit tested in accordance with UL508. The R3-R5.5 drives are suitable for use on a circuit capable of delivering not more than 65,000 rms symmetrical Amperes; R2 unit 20,000 rms symmetrical Amperes, (240 Volts, 500 Volts or 600 Volts maximum for 230 VAC, 480 VAC, and 600 VAC units respectively).

When circuit breakers or disconnects are supplied, the drive package may be limited to the rating of that device.

Table 3-1 Drive package with Disconnect or Circuit Breaker ratings

HP	230 VAC		460 VAC		600 VAC	
	Ckt Brkr	Disc.	Ckt Brkr	Disc.	Ckt Brkr	Disc.
1	20 kA	10 kA				
2	20 kA	10 kA	18 kA	10 kA		
3	10 kA	10 kA	18 kA	10 kA		
5	10 kA	10 kA	18 kA	10 kA	14 kA	10 kA
7.5	25 kA	10 kA	18 kA	10 kA	14 kA	10 kA
10	10 kA	10 kA	18 kA	10 kA	14 kA	10 kA
15	25 kA	10 kA	18 kA	10 kA	14 kA	10 kA
20	25 kA	65 kA	18 kA	10 kA	14 kA	10 kA
25	25 kA	65 kA	18 kA	10 kA	14 kA	10 kA
30	25 kA	65 kA	18 kA	10 kA	14 kA	10 kA
40			18 kA	65 kA	14 kA	10 kA
50			18 kA	65 kA	14 kA	10 kA
60			18 kA	65 kA	14 kA	65 kA

Environment

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

The maximum ambient temperature allowed is 113°F (45°C) for an ACS 501 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 501 in a NEMA 12 enclosure for constant torque loads; and an ACS 501 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.

Table 3-2 Required Cooling Air Volume for ACS 501 Units

Unit	Cooling Air
R2	30 CFM (51 m ³ /hr)
R3	60 CFM (102 m ³ /hr)
R4	240 CFM (406 m ³ /hr)
R5 & R5.5	330 CFM (560 m ³ /hr)

If the cooling air contains dust, clean the cooling surfaces of the unit regularly using compressed air and a brush. If the ACS 501 is in a NEMA 1 enclosure, cover the vents to prevent the dust from entering the unit.

If the heatsink is not cleaned and is not able to dissipate the expended heat, the ACS 501's thermal protection will operate, causing a fault indication which stops the drive. The ACS 501 can be started again when the temperature of the heatsink has fallen below the tripping level, which is 158°F (70°C).

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

Mounting Area

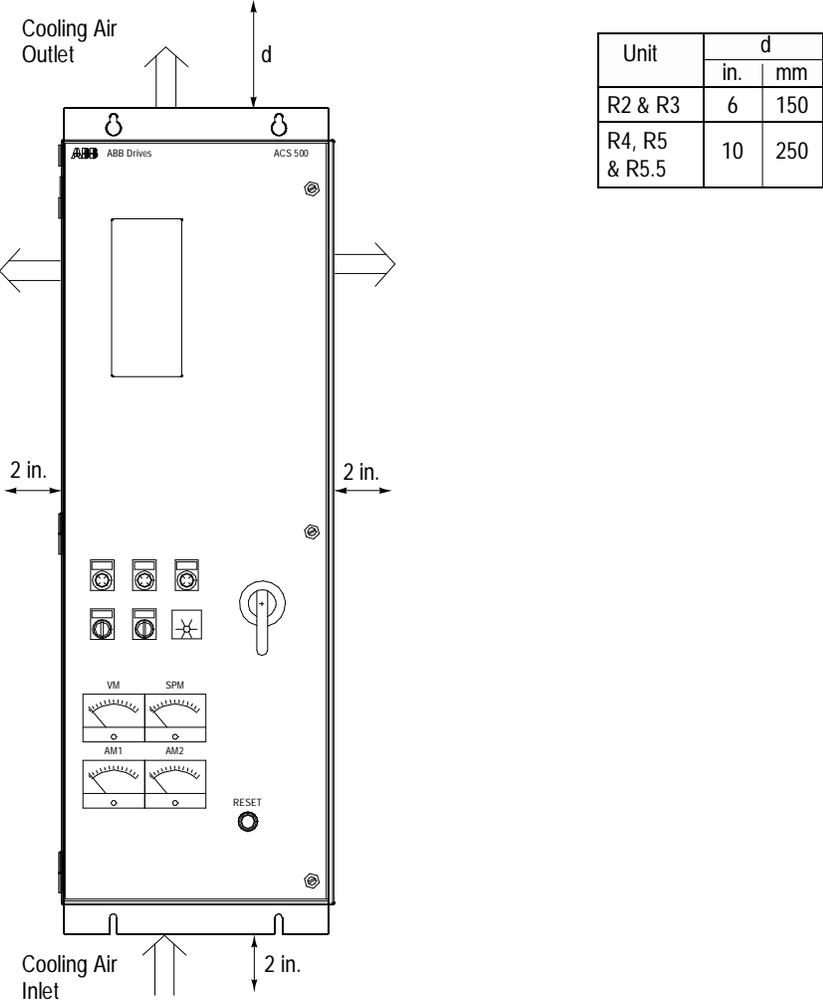
Mounting the Control

When mounting the control take the following precautions.

- DO NOT mount in direct sunlight.
- DO NOT mount on surfaces with temperature above 104°F (40°C).
- DO NOT allow the ambient temperature around the ACS 501 to exceed the ambient temperature as stated in *Environment* above.
- Mount the ACS 501 vertically with the factory supplied conduit knockouts at the bottom.
- See Figure 3-1 for the space requirements.
- If units are to be mounted next to each other, each unit must have two inches (50 mm) of clear space, so that a total of four inches (100 mm) between two units is available for proper cooling.
- If units are mounted one above the other, at least 12 inches (300 mm) is required between the units.
- At least three (3) separate grounded conduits are required. One each for input, output, and control wiring.

Figure 3-1 shows the space requirement for adequate cooling of the ACS 501.

Figure 3-1 ACS 501 Space Requirements



Installation Site Power

The ACS 501 with Option Pack is designed for use on a three-phase system. Four wires (three phase wires plus a ground wire) are required for the input wiring. Input and output conductors, and branch circuit protection must be sized to local codes.

Power Wiring Sizes

Table 3-3 shows the minimum and maximum input and output wire sizes allowable for each size ACS 501 drive.

Table 3-3 Maximum and Minimum Wire Sizes

Unit	Wire Sizes
R2 – R4	14 AWG – 8 AWG
R5	14 AWG – 1 AWG
R5.5	6 AWG - 2/0

All field power wiring shall be copper, rated for 140°F (60°C) for currents less than 100A, or 167°F (75°C) for currents 100A or more.

Control Wiring Control wires for the ACS 501 with Option Pack should be 16 – 22 AWG shielded, multi-conductor cables, Belden type 8761 or equivalent, when connected to Terminal Block X50, or 12 – 22 AWG when connected to TB1.

Initial Inspection Procedure

As you unpack the ACS 501 with Option Pack, check for any signs of damage and verify that the delivery is complete. In the event of damage, please contact the shipping company or the supplier. Locate the drive nameplate and confirm that the Option Pack is configured to the order specifications. Refer to *Chapter 2 – Overview of the ACS 501 with Option Pack* in this manual.

If the Option Pack is stored before start-up, verify that the environmental conditions in the storage room are acceptable:

- Temperature between -40°F and +158°F (-40°C and +70°C),
- Relative humidity is less than 95 percent, and
- No condensation.

The warranty covers defects in manufacturing. The manufacturer carries no responsibility for damage incurred during transport or unpacking.

If any questions arise concerning the ACS 501 with Option Pack, please contact your Distributor or Local ABB Drives Office.

Mechanical Installation

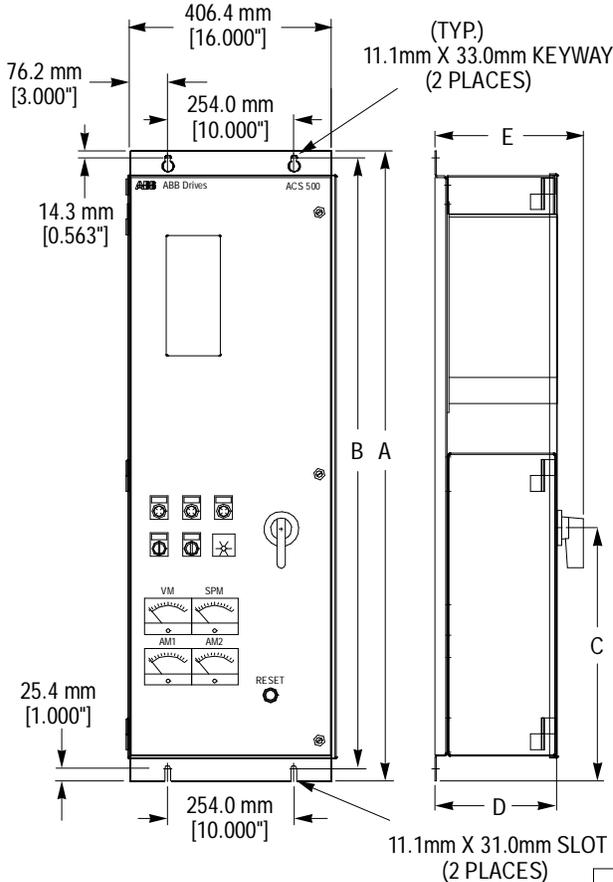
Mount the ACS 501 with Option Pack on a wall in a vertical position. Use the four mounting notches at the top and bottom of the unit. Before mounting the unit, verify that the environmental conditions conform to the specifications listed in *Pre-Installation Planning* in this chapter.

To ensure safe installation, check that the surface of the mounting location is flat. The maximum size of the mounting bolts is 3/8 in. (8 mm).

Attach the Option Pack enclosure at the mounting notches and tighten the bolts.

Figure 3-2 shows the Option Pack dimensions.

Figure 3-2 Option Pack Dimensions



	R2 & R3		R4 & R5		R5.5	
	mm	in.	mm	in.	mm	in.
A	1270.0	50.0	1651.0	65.0	1727.2	68.0
B	1230.3	48.4	1611.3	63.6	1687.5	66.6
C	510.2	20.1	675.3	26.6	809.5	31.9
D	240.2	9.5	298.0	11.7	343.0	13.5
E	292.4	11.5	350.2	13.8	395.2	15.6

Note: 20 HP (CT) 230 volt unit is R5.5 size optionpack

Drive Type	With Disconnect		With Bypass	
	lbs	Kg	lbs	Kg
R2	95	43.1	106	48.1
R3	107	48.5	118	53.5
R4	158	71.7	170	77.1
R5	176	79.8	198	89.8
R5.5	198	89.8	235	106.6

Power Connections

Input Wiring

The ACS 501 with Option Pack is designed for use on a three-phase system. Four wires (three phase wires plus a ground wire) are required for the input wiring.



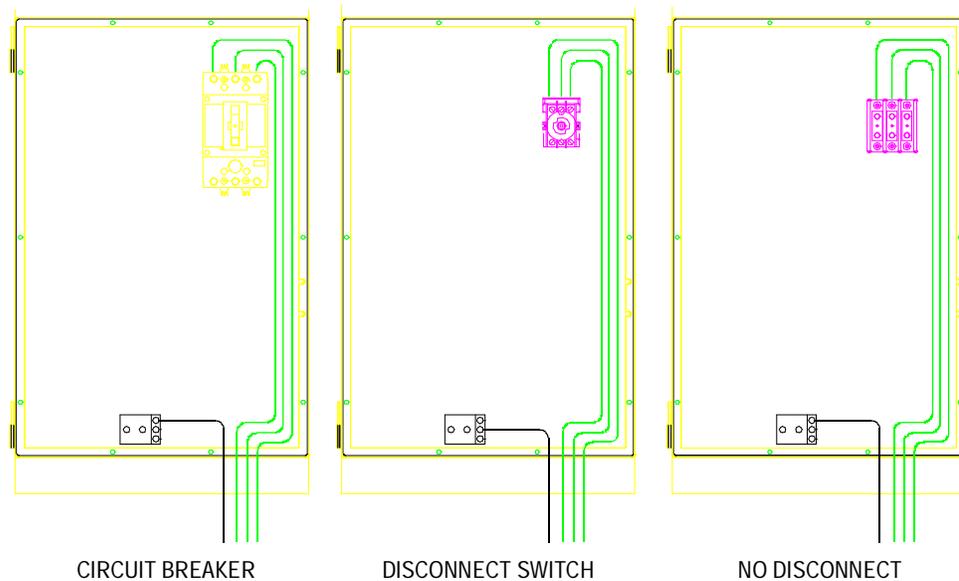
WARNING!

- Do not connect or disconnect input or output power wiring, or control wires, when power is applied.
- Never connect line voltage to drive output Terminals U_2 , V_2 , and W_2 .
- Do not make any voltage tolerance tests (Hi Pot or Meggar) on any part of the unit. Disconnect motor wires before taking any measurements in the motor or motor wires.
- Make sure that power factor correction capacitors are not connected between the drive and the motor.

The tightening torque for the input power connections to the circuit breaker should be: 50 in.-lbs. for circuit breakers 15A-100A; 120 in.-lbs. for circuit breakers 125A-150A; and 275 in.-lbs. for circuit breakers from 175A-225A. Tightening torques to other termination points should be as labeled on the devices.

The line input wiring connections are shown in Figure 3-3.

Figure 3-3 Input Power Wiring Connections



Output Wiring

Install the motor wiring away from other wire routes. Avoid long parallel runs with other wires. A dedicated conduit should be provided from the drive to the motor for the output wiring.



WARNING! Check the insulation on the motor wiring and the motor before connecting the ACS 501 to line power. Before proceeding with the insulation resistance measurements, check that the ACS 501 is disconnected from incoming line power. Failure to disconnect line power could result in death or serious injury.

1. Check that the motor wires are disconnected from the Option Pack output on Terminals T₁, T₂, and T₃.
2. Check that the motor wires are disconnected from the motor and remove bridging connections at the motor.
3. Measure the insulation resistances of the motor. The voltage range of the insulation resistance meter must be at least equal to the line voltage, but not exceeding 1000 V. The insulation resistance must be greater than 1 megohm.
4. Measure the insulation resistance of the motor wiring between the phases and between each phase and ground. The insulation resistance must be greater than 1 megohm.

The rapid rate of voltage changes causes capacitive coupling between motor wiring and the grounded metallic conduit. This capacitive coupling increases with switching frequency and motor wire length. This phenomenon can cause substantially higher measured current than actual motor current, which may result in nuisance overcurrent trips.

The motor wire lengths in Table 3-4 must not be exceeded.

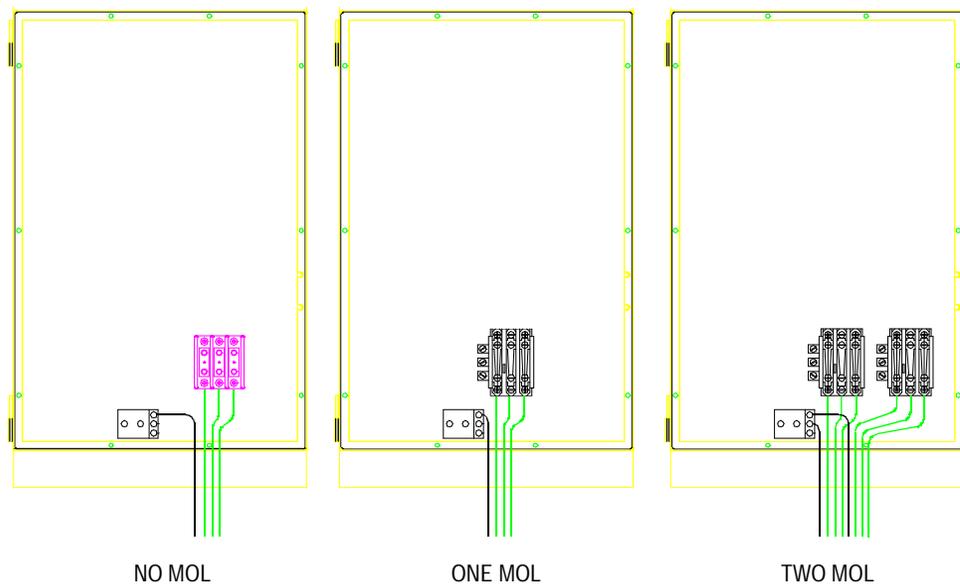
Table 3-4 Maximum Recommended Motor Wire Lengths

Switching Frequency, kHz	Maximum Cable Length	
	Feet	Meters
1	200	61.0
3	175	53.3
12	100	30.5

Note: Do not connect the motor wires before proceeding with the Keypad Control Test, Motor Disconnected. Refer to Keypad Control Tests, Chapter 4 – Start-up Procedure, in this manual.

Figure 3-4 shows the Option Pack output power wiring connections.

Figure 3-4 Output Power Wiring Connections



Control Connections

Available Control Locations

The ACS 501 with Option Pack can be controlled from the ACS 501 Keypad located on the front of the enclosure or with an external control device.

External control devices, for example a PLC or remote operator devices, can be connected to Terminal Block TB1, when supplied, or Terminal Block X50. These control devices can be Analog or Digital. Refer to *Option Pack Terminal Connections* in this chapter. If the Terminal Board is not supplied, follow the installation and start-up procedures in the *ACS 501 Adjustable Frequency AC Drives 2 to 50 HP Installation & Start-up Manual*.

Refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Chapter 3 – Control Operations*, for keypad control information.

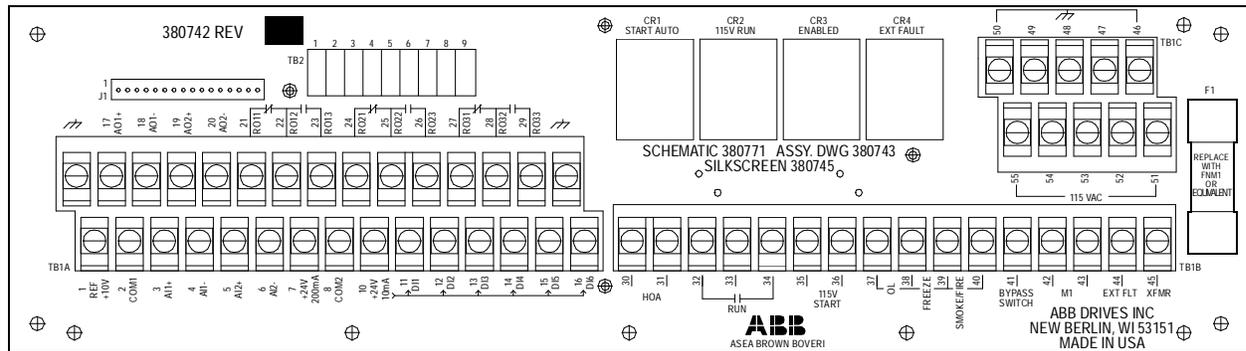
All external control wiring to TB1:1 through TB1:20 must be done with shielded cable and must not be run in the same conduit or raceway with any high power wiring. The shield connection must be terminated at the chassis ground lug provided, the other end of the shield should be cut and taped back at the signal source. TB1 terminals 2 and 8 are “GND2” (circuit common), and TB1 terminals 4, 6, 18, and 20 are also connected to circuit common.

Note: These terminals are optically isolated from power, and isolated from chassis ground by a 10 megohm resistor. They are not isolated from one another.

Option Pack Terminal Block Connections

The Terminal Block TB1 is located on the terminal board, which is supplied with any option with 115 VAC control (i.e., HOA, HOA with Speed Pot, 115 V control alone, and any Bypass option). Figure 3-5 shows the Terminal Block TB1 connections. Terminals TB1:1 through TB1:29 are the same as terminals X50:1 through X50:29.

Figure 3-5 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.

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

Note: When the Terminal Board is supplied, the Option Pack macro must be used so the terminal board connections operate properly.

Terminal Block TB1

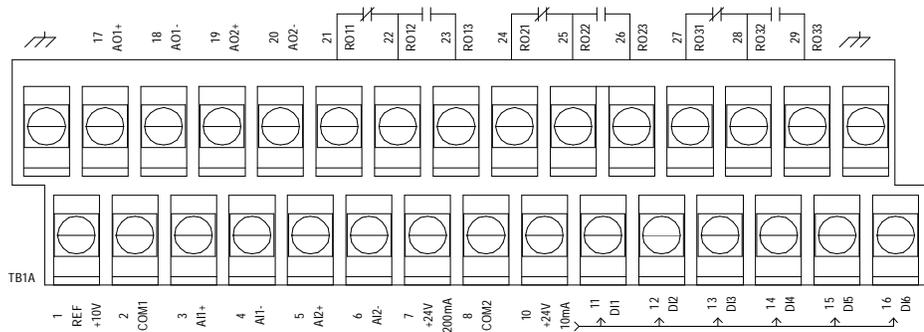
Terminal Block TB1 can accept wire sizes from 12 – 22 AWG. All connections to Terminals TB1:1 to TB1:20 should be made with shielded cables.

TB1:2, 4, 6, 18, and 20 are circuit common. These terminals 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.

Note: The ACS 501 with Option Pack is shipped with a wire from X50:8 to chassis ground, or with a jumper labeled S9 next to X50. This connects the circuit common to chassis ground. To isolate the circuit common from ground, remove this connection.

Figure 3-6 shows connections TB1:1 through TB1:29.

Figure 3-6 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 Option Pack has two analog inputs. AI1 is on Terminals TB1:3 and TB1:4. AI2 is on TB1:5 and TB1:6. AI2 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 501 (S1 for AI1 and S2 for AI2), determine the signal type.

Place the jumper in the “V” position for voltage or the “I” position for current. Orientation may vary with different versions of the control board. Figure 3-7 shows jumper positions. The shaded areas represent jumper positioning.

Figure 3-7 Jumper Positions



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, and 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.

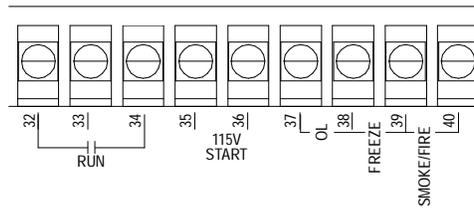
Maximum Switching Voltage: 300 VDC / 250 VAC.

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

Maximum Continuous Current: 2 A rms.

Figure 3-8 shows connections TB1:32 through TB1:40.

Figure 3-8 TB1:32 Through TB1:40



Two-Wire Start (Dry Contact)

To start the ACS 501 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 501 by applying 115 VAC, connect the 115 VAC signal to TB1:35 and TB1:36. Operation is the same as Two-Wire Start.

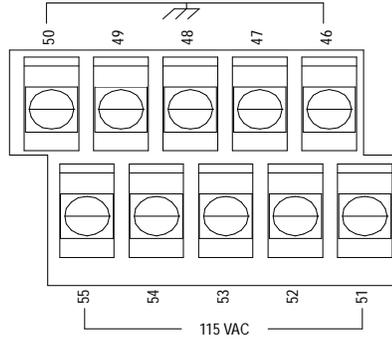
Freeze/Fire/Smoke Protection

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. 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 3-9 shows connections TB1:46 through TB1:55.

Figure 3-9 TB1:46 Through TB1:55



Chapter 4 – Start-up Procedure

This chapter explains how to inspect the installation and how to start up the ACS 501 with Option Pack.

Safety Precautions

Before start-up, read and follow the precautions listed below.

- The Motor Control Card (bottom card) is at DC Bus potential ($1.35 \times V_{IN}$) when the ACS 501 with Option Pack is connected to supply voltage. This voltage is extremely dangerous and can cause death or serious injury.
- When the supply voltage is disconnected from the input Terminal Block X1, the DC Bus capacitors should discharge to a safe voltage in about five minutes.
- To ensure that the voltage level is safe, measure the voltage between positive (+) and negative (-) on Terminal Block X2. Terminal Block X2 is the Brake terminal. The testing meter must be rated for 1000 VDC.

Note: If the internal brake option is installed, measure between the input Terminal Block X1 and positive (+) on Terminal Block X2. The testing meter must be rated for 1000 VDC.



WARNING! When the ACS 501 with Option Pack is connected to the line power, the Motor Terminals U_1 , V_1 , and W_1 are live even if the motor is not running. Do not make any connections when the ACS 501 with Option Pack is connected to the line. Disconnect and lock out power to the drive before servicing the drive. Failure to disconnect power may cause death or serious injury.

Installation Inspection

Inspect the mechanical and electrical installation of the ACS 501 with Option Pack for compliance with the prevailing electrical installation regulations and codes.

Note: Do not connect the motor wires before proceeding with the Keypad Control Test with Motor Disconnected. Refer to Keypad Control Tests in this chapter.



WARNING! The brake control terminals carry a dangerous DC voltage ($1.35 \times V_{IN}$). No device other than an ABB Drives dynamic braking device may be connected to the positive and negative terminals of Terminal Block X2.

After installation, inspect the following:

- ACS 501 with Option Pack and motor grounding.
- Supply and motor wire size and connections.
- Control cable connections, wire shield grounding, and control cable location away from the power wires.
- Quantity and quality of cooling air for the ACS 501 with Option Pack.

Connect the ACS 501 with Option Pack to supply voltage. Check that the voltage between $L_1 - L_2$, $L_1 - L_3$, and $L_2 - L_3$ is $V_N \pm 10\%$.

Refer to *Chapter 3 – Installation Instructions* in this manual for detailed installation instructions and requirements.

Start-up Data Parameters

Power up the ACS 501. The display shows Operating Data Parameter 1 (Output Frequency). Before proceeding with the start-up, check and complete the Start-up Data Parameter values. Do not change parameters at this time except as described in the following steps.

While viewing Parameter 1 (Output Frequency) press and hold [*], then press [Right Arrow]. The display shows Parameter A (Language) in Setting mode.

A LANGUAGE

Press [Up Arrow] or [Down Arrow] to select your preferred language. The ACS 501 displays all information in the language you select. Press [*] to confirm the selection and move to the next parameter. The available languages are: English, German, Italian, Spanish, Dutch, French, Danish, Finnish, and Swedish.

B APPLICATIONS

Leave this in the FACTORY setting to perform the start-up procedure. If anything other than FACTORY displays, press [Up Arrow] or [Down Arrow] to change the parameter to FACTORY. Press [*] to confirm the selection and move to the next parameter.

C APPLIC. RESTORE

This parameter restores all parameters of the current application to factory-set parameter values. Set this to YES by pressing [Up Arrow]. Press [*] to confirm the selection and move to the next parameter.

D SUPPLY VOLTAGE

This parameter offers choices of 440, 460, 480, and 500 VAC for 480-volt units; 380, 400, and 415 VAC for 380-volt units; or 208, 220, 230, and 240 VAC for 230-volt units.

Press [Up Arrow] or [Down Arrow] to select the voltage value matching line voltage providing power to your ACS 501. Press [*] to confirm the selection and move to the next parameter.

- E USER DISPLAY SCALE** This parameter is used to set the scaling factor for Operating Data Parameter 2 (Speed). When set to 0, the speed display will show RPM. When set to 100, the speed display will show %. When set to any other value from 0 – 10000, the display will show this value (minus slip unless slip compensation is ON) when the output frequency is at the frequency set by Start-up Data Parameter I (Motor Base Frequency).
- Press [Up Arrow] or [Down Arrow] to set the desired value of the speed display. Press [*] to confirm the selection and move to the next parameter.
- F MOTOR CURRENT -FLA** This parameter matches the ACS 501 to the rated motor current, adjustable between 0 and 1000 amps. The drive uses this parameter for motor overload protection and current (amperage) information displays.
- Press [Up Arrow] or [Down Arrow] to select the current (amperage) value for your motor. Press [*] to confirm the selection and move to the next parameter.
- G MOTOR POWER** This parameter matches the motor rated power, adjustable between 0.7 hp and 1340 hp. The drive uses this parameter for motor overload and kWh information displays. The left key switches the display between hp and kWh. To change the display, press and hold the left key for two seconds.
- Press [Up Arrow] or [Down Arrow] to select the motor power value for your motor. Press [*] to confirm the selection and move to the next parameter.
- H MOTOR POWER FACTOR** This parameter matches the motor power factor (at rated speed and load on sinusoidal power), adjustable between 0.10 and 1.0. The drive uses this parameter for motor torque and power information displays.
- Press [Up Arrow] or [Down Arrow] to select the motor power factor value for your motor. Press [*] to confirm the selection and move to the next parameter.
- I MOTOR BASE FREQUENCY** This parameter is used to set the designed frequency of the motor, adjustable from 30 Hz to 500 Hz in 10 Hz increments. Changing this value will automatically set the FWP to the same value.
- Press [Up Arrow] or [Down Arrow] to select the base frequency value for your motor. Press [*] to confirm the selection and move to the next parameter.
- J MOTOR BASE R.P.M.** This parameter is used to set the nameplate speed of the motor and is adjustable from 200 to the maximum 2-pole motor speed based on Start-up Data Parameter I (Motor Base Frequency).
- Press [Up Arrow] or [Down Arrow] to set the motor nameplate speed value for your motor. Press [*] to confirm the selection and move to the next parameter.

**K MOTOR NOM.
VOLTAGE**

The default is 460 V for 480-volt units, 380 V for 380-volt units, and 230 V for 230-volt units. Changing this parameter automatically changes the Maximum Output Voltage.

Press [Up Arrow] or [Down Arrow] to select the motor rated voltage for your motor. Press [*] to confirm the selection and return to Operating Data Parameter 1 (Output Frequency).

Keypad Control Tests

Motor Disconnected from the ACS 501 with Option Pack

After setting the Start-up Data parameters, test the drive as follows:

1. Disconnect and lock out power from the ACS 501 with Option Pack. Wait at least five minutes after disconnecting power. Verify that the DC Bus voltage is at a safe level by measuring the voltage between positive (+) and negative (-) on Brake Terminal Block X2. Check for zero volts at Terminals X50:21 – 29 before continuing.

Note: If the internal brake option is installed, measure between the Input Terminal Block X1 and positive (+) on Terminal Block X2. Your measuring meter must be rated for 1000 VDC.

2. Disconnect the motor from the ACS 501 with Option Pack.
3. Power up the ACS 501 with Option Pack.
4. Press [Start/Stop] to issue a start command. The Run Status indicator on the LCD Display displays the Start (I) symbol.
5. Press [*] to enter setting mode. Press [Up Arrow] until the frequency display shows 60 Hz, then press [*] to enter the value.
6. Press [Up Arrow] or [Down Arrow] to scroll through and check the Operating Data parameters. Check that Operating Data Parameter 7 (Output Voltage) is equal to the input voltage.

If the drive operates according to these steps, disconnect and lock out power to the ACS 501 with Option Pack to prepare for the next test.



WARNING! Wait at least five minutes after disconnecting power from the drive before you attempt to service the drive. Bus capacitors in the intermediate DC circuit must discharge before servicing the drive. Check for zero volts at Terminals TB1:21 – 29 and X2:(+) and (-), or between the input Terminal Block X1 and Terminal Block X2:(+) if an internal brake option is installed. Your measuring meter must be rated for 1000 VDC. Failure to check voltages may result in death or serious injury.

If the drive does not operate according to these steps, refer to the *ACS 501 Adjustable Frequency AC Drives 2 to 50 HP Installation & Start-up Manual, Chapter 5 – Fault Tracing*, for additional information.

**Motor Connected to
the ACS 501 with
Option Pack**

After successfully testing the drive with the motor disconnected, continue testing the drive as follows:

1. Disconnect and lock out power from the ACS 501 with Option Pack. Check for zero volts at Terminals X50:21 – 29 and X2:(+) and (-) before continuing.

If a Bypass option is supplied, set the Drive Switch to NORMAL and the Bypass Switch to NORMAL.
2. Connect the motor to the ACS 501 with Option Pack.
3. Power up the ACS 501 with Option Pack.
4. Set Operating Data Parameter 10 (Keypad Ref 1) to 0.5 Hz.

CAUTION: Check motor rotation direction as soon as the motor begins to move. If motor rotation direction is critical and the motor does not run in the direction indicated by the Rotation Direction indicator on the ACS 501 with Option Pack LCD Display:

- Shut down the drive.
- Disconnect and lock out power to the drive.
- Wait five minutes.
- Check for zero volts at Terminals TB1:21– 29 and X2:(+) and (-).

When the drive has reached zero volts, swap any two *motor output* wires at the Output Terminals. Incorrect motor rotation direction may cause equipment damage.

-
5. Press [Start/Stop] to issue a start command. The Run Status indicator on the LCD Display displays the Start (I) symbol.
 6. Check the monitored values of Operating Data Parameters 1 – 8 for normal drive and motor operation.
 7. Return to Operating Data Parameter 1 (Output Frequency).
 8. Slowly increase the frequency value of Parameter 1. Verify that motor speed varies as frequency varies.
 9. Increase the Parameter 1 frequency value to 60 Hz and return to Display mode.
 10. Measure the output current in all three phases. The current should be balanced, and should not exceed the motor or drive rating.
 11. If a Bypass option is supplied, check the motor rotation in bypass. Set the Bypass switch to BYPASS, then to TEST. If the motor turns in the wrong direction, swap any two *input* power wires.

If the drive operates according to these steps, your ACS 501 with Option Pack is ready to use with preset or modified macro settings.

If the drive does not operate according to these steps, refer to the *ACS 501 Adjustable Frequency AC Drives 2 to 50 HP Installation & Start-up Manual, Chapter 5 – Fault Tracing*.

Note: *If you plan to use an external control device for your drive, you must wire the control to the drive according to the wiring scheme of the macro you select. If the terminal board is supplied in the Option Pack, the Option Pack macro should be selected. Refer to Chapter 3 – Installation Instructions in this manual for more information on specific Option Pack external control wiring schemes.*

Refer to the *ACS 501 Adjustable Frequency AC Drives 2 to 50 HP Installation & Start-up Manual, Chapter 2 – Overview of the ACS 501, Control Panel Operation* for more information on accessing and changing parameters.

Refer to *Option Pack Macro Parameters* in this chapter for more information about the commonly modified parameters for the Option Pack macro.

Keypad Control vs. External Control

The ACS 501 can be controlled from two external control locations or from the Control Panel keypad. Refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Chapter 3 – Control Operations*, for additional information. The selection between KEYPAD and EXTERNAL is made through Operating Data Parameter 9 (Control Location).

KEYPAD R1 is a direct frequency reference, set by Operating Data Parameter 10 (Keypad Ref 1). KEYPAD PI goes through an application block, where it can be manipulated when the PI-controller is selected, set by Operating Data Parameter 11 (Keypad PI (REF 2)). Refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Chapter 3 – Control Operations*, for additional information.

EXTERNAL selection will cause the ACS 501 to follow commands connected to X50 (or TB1), such as a manual speed pot, HOA switch, Automatic Start, and Speed Signals, etc.

Option Pack Macro Parameters

Change Parameter B (Applications) in the Start-up Data Menu to the Option Pack macro. Press [Up Arrow] or [Down Arrow] to change the parameter to OPT PACK. Press [*] to confirm the selection and move to the next parameter. The other parameters can be modified to meet the needs of your application. For example, the Option Pack macro default for Start-up Data Parameter D (Supply Voltage) is 480 V. If your supply voltage is 460 V, you need to change this parameter to 460 V.

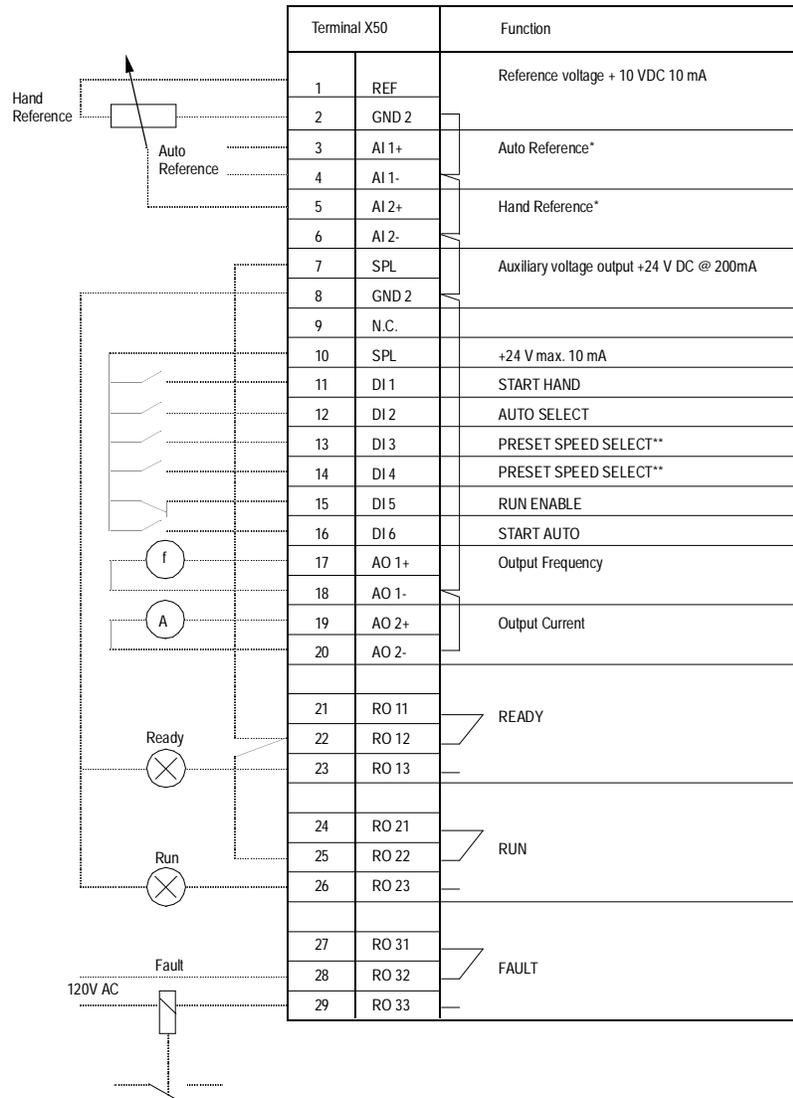
You may need to change other parameter values to customize the Option Pack macro for your application. The application determines which parameters to change.

To complete the start-up, select the Option Pack macro, and make any parameter changes necessary for your application. Connect all external wiring based on the configuration selected and test all external interfacing.

Refer to *Chapter 3 – Installation Instructions* in this manual for detailed wiring instructions.

Figure 4-1 shows all possible external control wiring connections without Terminal Board TB1 according to Option Pack macro parameters.

Figure 4-1 External Control Wiring Connections Without Terminal Board TB1 (Connect to X50)



* Select voltage or current reference with plugs S1 and S2 on the customer interface board (beside the screw terminals 1-6 of X50).

** Operation:

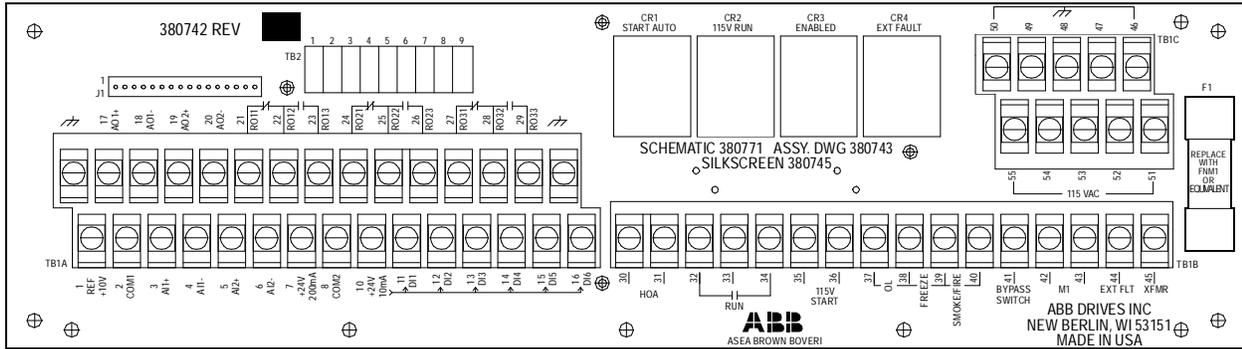
D15	D16	Output
0	0	set freq. through AI1
1	0	Preset Speed 1
0	1	Preset Speed 2
1	1	Preset Speed 3

0 = Open
1 = Closed

Terminal X51	Function
1	+8V
2	GND2
3	Shield1
4	GND3
5	SGNA
6	SGNB
7	Shield2

Figure 4-2 shows all possible external control wiring connections with Terminal Board TB1 according to Option Pack macro parameters. The functions of terminals TB1:1 to TB1:29 are the same as X50:1 to X50:29 in Figure 4-1.

Figure 4-2 External control wiring connections with Terminal Board TB1



Password Protection (Parameter Lock)

Parameter Lock prevents unauthorized persons from altering the parameters. When Parameter Lock is active the Setting mode cannot be selected and ACS 501 with Option Pack parameters can not be changed. The ACS 501 with Option Pack Parameter Lock can be controlled with the Keypad (Operating Data Parameter 20 (Parameter Lock)) or a digital input. Parameter 10.4.3 (Param. Lock Sel) (Keypad, DI1 – DI6) selects the control location. To activate the Parameter Lock, set operating Data Parameter 20 (Parameter Lock) to LOCKED xxx if the control location is the Keypad or activate the selected digital input if the control location is a DI setting.

The Parameter Lock control location is indicated in Operating Data Parameter 20 (Parameter Lock). Characters xxx after the parameter value (OPEN xxx , LOCKED xxx) indicate that the current control location is Keypad.

To open the Parameter Lock, you must enter the correct combination. The combination for all ACS 501 with Option Pack units is 358. When viewing Parameter Lock, enter setting mode and set the xxx to 358. Press [*] to open the Parameter Lock. Refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Chapter 3 – Control Operations*, for detailed setting instructions

Chapter 5 – Option Pack Parameter Settings

This chapter lists and explains the Option Pack parameter settings.

The following tables contain the ACS 501 with Option Pack parameter settings. You are most likely to change the parameter values indicated with an arrow (→).

Opt. Pack Parameter Settings

START-UP DATA

A LANGUAGE	→ ENGLISH
B APPLICATIONS	→ OPT. PACK
C APPLIC. RESTORE	→ NO
D SUPPLY VOLTAGE	→ 480/230/380
E USER DISPLAY SCALE	→ 0
F MOTOR CURRENT -FLA	→ I_N of drive
G MOTOR POWER (kW)	→ P_N of drive
H MOTOR POWER FACTOR	→ 0.83
I MOTOR BASE FREQ.	→ 60
J MOTOR BASE R.P.M.	→ 1728
K MOTOR NOM. VOLTAGE	→ 460/230/380

OPERATING DATA

1 OUTPUT	
2 SPEED	
3 MOTOR CURRENT	
4 % RATED TORQUE	
5 % RATED POWER	
6 DC BUS VOLTAGE	
7 OUTPUT VOLTAGE	
8 DRIVE TEMPERATURE	
9 CONTROL LOCATION	→ EXTERNAL
10 KEYPAD REF 1	
11 KEYPAD PI (REF 2)	
12 EXT REF 1 OR 2	REF 1
13 EXTERNAL REF 1	
14 EXTERNAL REF 2	
15 RUN TIME	
16 KILOWATT HOURS	
17 LAST-RECD FAULT	
18 SECOND-RECD FAULT	
19 FIRST-RECD FAULT	
20 PARAMETER LOCK	OPEN

10 CONTROL CONNECTIONS

10.1 START/STOP/DIRECTION

10.1.1 EXT 1 STRT/STP/DIR	DI1
10.1.2 EXT 2 STRT/STP/DIR	DI6

10.2 EX REFERENCE SELECT

10.2.1 EXT 1/EXT 2 SELECT	DI2
10.2.2 EXTERNAL REF1 SEL	AI2
10.2.3 EXT REF1 MINIMUM	0 Hz
10.2.4 EXT REF1 MAXIMUM	60 Hz
10.2.5 EXTERNAL REF2 SEL	AI1
10.2.6 EXT REF2 MINIMUM	0 Hz
10.2.7 EXT REF2 MAXIMUM	60 Hz

10.3 PRESET SPEEDS

10.3.1 PRESET SPEED SEL	DI3,4
10.3.2 PRESET SPEED 1	→ 5 Hz
10.3.3 PRESET SPEED 2	→ 10 Hz
10.3.4 PRESET SPEED 3	→ 15 Hz

10.4 SYSTEM CONTR INPUTS

10.4.1 RUN ENABLE	DI5
10.4.2 FAULT RESET SELECT	NOT SEL
10.4.3 PARAM. LOCK SEL	OP DATA 20
10.4.4 EXTERNAL FAULT	NOT SEL

10.5 ANALOG INPUTS

10.5.1 MINIMUM AI1	→ 0 V/0 mA
10.5.2 MAXIMUM AI1	→ 10 V/20 mA
10.5.3 RC FILTER ON AI1	0.1s
10.5.4 INVERT AI1	NO
10.5.5 MINIMUM AI2	0 V/0 mA
10.5.6 MAXIMUM AI2	10 V/20 mA
10.5.7 RC FILTER ON AI2	0.1s
10.5.8 INVERT AI2	NO

10.6 RELAY OUTPUTS

10.6.1 RELAY RO1 OUTPUT	READY
10.6.2 RELAY RO2 OUTPUT	RUN
10.6.3 RELAY RO3 OUTPUT	FAULT

10.7 ANALOG OUTPUTS

10.7.1 ANALOG OUTPUT 1	OUT FREQ
10.7.2 SCALE AO1	100%
10.7.3 MINIMUM AO1	→ 0 mA
10.7.4 RC FILTER ON AO1	2s
10.7.5 INVERT AO1	NO
10.7.6 ANALOG OUTPUT 2	OUT CURR
10.7.7 SCALE AO2	100%
10.7.8 MINIMUM AO2	→ 0 mA
10.7.9 RC FILTER ON AO2	2s
10.7.10 INVERT AO2	NO

20.1 FREQ/CURRENT LIMITS

20.1.1 MINIMUM FREQUENCY	→ 0 Hz
20.1.2 MAXIMUM FREQUENCY	→ 60 Hz
20.1.3 FREQUENCY RANGE	0 – 120 Hz
20.1.4 CURRENT LIMIT	→ $1.5 \times I_N$

20.2 START/STOP

20.2.1 START FUNCTION	FLYING
20.2.2 TORQUE BOOST CURR	$1.5 \times I_N$
20.2.3 STOP FUNCTION	COAST
20.2.4 BRAKE CHOPPER	NO
20.2.5 DC HOLD	OFF
20.2.6 DC HOLD VOLTAGE	$0.01 \times V_N$
20.2.7 DC BRAKE VOLTAGE	$0.01 \times V_N$
20.2.8 DC BRAKE TIME	0s

20.3 ACCEL/DECEL

20.3.1 ACC/DEC 1 0R 2 SEL	NOT SEL
20.3.2 ACC/DEC RAMP SHAPE	LINEAR
20.3.3 ACCEL TIME 1	→ 30s
20.3.4 DECEL TIME 1	→ 30s
20.3.5 ACCEL TIME 2	60s
20.3.6 DECEL TIME 2	60s
20.3.7 ACCEL REF2 TIME	0.1s
20.3.8 DECEL REF2 TIME	0.1s

20.4 MOTOR CONTROL

20.4.1 SWITCHING FREQ	3 kHz
20.4.2 MAX OUTPUT VOLTAGE	460 V
20.4.3 V/Hz RATIO	SQUARED
20.4.4 FIELD WEAK POINT	60 Hz
20.4.5 IR COMPENSATION	NO
20.4.6 IR COMP VOLTAGE	$0.01 \times V_N$
20.4.7 IR COMP RANGE	0 Hz
20.4.8 SLIP COMPENSATION	OFF
20.4.9 NOMINAL SLIP	4%
20.4.10 VOLTAGE LIMIT	ON

20.5 CRIT FREQUENCIES

20.5.1 CRIT FREQ SELECT	OFF
20.5.2 CRIT FREQ 1 LOW	0 Hz
20.5.3 CRIT FREQ 1 HIGH	0 Hz
20.5.4 CRIT FREQ 2 LOW	0 Hz
20.5.5 CRIT FREQ 2 HIGH	0 Hz
20.5.6 CRIT FREQ 3 LOW	0 Hz
20.5.7 CRIT FREQ 3 HIGH	0 Hz
20.5.8 CRIT FREQ 4 LOW	0 Hz
20.5.9 CRIT FREQ 4 HIGH	0 Hz
20.5.10 CRIT FREQ 5 LOW	0 Hz
20.5.11 CRIT FREQ 5 HIGH	0 Hz

30 PROTECTION/INFORMAT

30.1 FAULT FUNCTION

30.1.1 SERIAL FAULT FUNC	STOP
30.1.2 AI <MIN FUNCTION	NO
30.1.3 MOT TEMP FLT FUNC	FAULT
30.1.4 MOTOR THERM TIME	700
30.1.5 MOTOR LOAD CURVE	100%
30.1.6 ZERO SPEED LOAD	40%
30.1.7 BREAK POINT	60 Hz
30.1.8 STALL FUNCTION	WARNING
30.1.9 STALL CURRENT	$1.5 \times I_N$
30.1.10 STALL TIME/FREQ	20s/25 Hz
30.1.11 UNDERLOAD FUNC	NO
30.1.12 UNDERLOAD TIME	600s
30.1.13 UNDERLOAD CURVE	1

30.2 AUTOMATIC RESET

30.2.1 NUMBER OF RESETS	5
30.2.2 TIME WINDOW	30s
30.2.3 TIME BETW. RES ATT	0
30.2.4 OVERVOLTAGE	→ NO
30.2.5 UNDERVOLTAGE	YES
30.2.6 OVERCURRENT	→ NO
30.2.7 AI SIGNAL <MIN	NO

30.3 SUPERVISION

30.3.1 OUTPUT FREQ 1 FUNC	→ NO
30.3.2 OUTPUT FREQ 1 LIM	→ 0
30.3.3 OUTPUT FREQ 2 FUNC	NO
30.3.4 OUTPUT FREQ 2 LIM	0
30.3.5 CURRENT FUNCTION	NO
30.3.6 CURRENT LIMIT	$0 \times I_N$
30.3.7 REF1 FUNCTION	NO
30.3.8 REF1 LIMIT	0 Hz
30.3.9 REF2 FUNCTION	NO
30.3.10 REF2 LIMIT	0%
30.3.11 SUPERVIS MESSAGES	ON

30.4 INFORMATION

30.4.11 CRI PROG VERSION	(version)
30.4.2 MC PROG VERSION	(version)
30.4.3 TEST DATE	(date)

→ = Typical parameter values to check during start-up. If needed, change values to meet the needs of your application. Complete parameter list provided in the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Appendix A.*

The most common Option Pack parameter settings are explained below. For a detailed explanation of all the parameter settings, refer to the *ACS 500 Adjustable Frequency AC Drives 2 to 350 HP Programming Manual Including Application Macros, Chapter 3 – Control Operations and Chapter 5 – Parameters*.

Start-up Data Parameters

For information on setting Start-Up Data Parameters, see *Chapter 4 – Start-Up Procedure* in this manual.

Operating Data Parameters

9 CONTROL LOCATION

This parameter allows you to select the location of the drive controls for start/stop, speed reference, and rotation direction commands. Select:

- KEYPAD R1 to operate the drive from the Control Panel Keypad.
- EXTERNAL to operate the drive from an external control device connected to Terminal Block TB1, including HOA Switch, Speed Pot, External Start, Speed, etc.
- KEYPAD PI to use the Control Panel Keypad to change the reference for a PI controller if you are using a PI control.

Main 10 Control Connections

10.3 PRESET SPEEDS

These parameter values can be altered while the ACS 501 with Option Pack is running.

2 PRESET SPEED 1

The available range of programmable preset speeds is 0 – 500 Hz.

When in External Control mode, preset speeds override any other reference. Digital Input(s) selected through Parameter 10.3.1 (Preset Speed Sel) activate Preset Speeds.

3 PRESET SPEED 2

The available range of programmable preset speeds is 0 – 500 Hz.

When in External Control mode, preset speeds override any other reference. Digital Input(s) selected through Parameter 10.3.1 (Preset Speed Sel) activate Preset Speeds.

4 PRESET SPEED 3

The available range of programmable preset speeds is 0 – 500 Hz.

When in External Control mode, preset speeds override any other reference. Digital Input(s) selected through Parameter 10.3.1 (Preset Speed Sel) activate Preset Speeds.

10.5 ANALOG INPUTS

These parameter values can be altered while the ACS 501 with Option Pack is running.

1 MINIMUM AI1

The available selections are 0V/0mA, 2V/4mA, and READ INPUT. This parameter sets the minimum value of the signal to be applied to AI1. This value will then correspond to zero speed. Typical minimum values are 0V/0mA or 2V/4mA.

When input minimum is not 0 or 2 V for a voltage signal, or 0 or 4 mA for a current signal, the drive can read the minimum from this third display. While in Setting Mode at this third display, the ACS 501 will store the applied value in memory. Apply the minimum signal to the analog input and press [*]. This value then becomes the minimum. The range is 0 – 10 V and 0 – 20 mA.

The ACS 501 with Option Pack has a living zero function which allows the protection and supervision circuits to detect a loss of signal. For this feature to be functional, the minimum input signal must be greater than 0.3 V/0.6 mA. When the minimum is set less than this level, the slash “/” between the volts and milliamps display will disappear, indicating the living zero is not active even if it has been programmed.

2 MAXIMUM AI1

The available selections are 10V/20mA and READ INPUT. When the maximum reference is less than 10 V or 20 mA, this parameter will set the maximum reference, so the drive will run at full speed when this reference is applied. If you select this parameter and apply the maximum reference, pressing [*] will store the applied reference and consider that value to be the maximum reference.

10.7 ANALOG OUTPUTS

These parameter values can be altered while the ACS 501 with Option Pack is running.

3 MINIMUM AO1

The available selections are 0mA and 4mA. The minimum value of the Analog Output signal can be set to either 0 mA or 4 mA.

8 MINIMUM AO2

The available selections are 0mA and 4mA. The minimum value of the Analog Output signal can be set to either 0 mA or 4 mA.

Main 20 Drive Parameters

20.1 FREQ/CURRENT LIMITS

These parameter values can be altered while the ACS 501 with Option Pack is running.

1 MINIMUM FREQUENCY

The available range is 0 – 500 Hz. This parameter value represents the minimum output frequency.

2 MAXIMUM FREQUENCY

The available range is 0 – 500 Hz. This parameter value represents the maximum output frequency.

4 CURRENT LIMIT The available range is $0.5 - 2.0 \times I_N$ Amps. This parameter setting is the output current limit the ACS 501 with Option Pack supplies to the motor. If the rated current of the motor is lower than the rated current of the ACS 501 with Option Pack, set the current limit in accordance with the motor rating in standard applications.

Note: Current limitation time is not supervised. Too long a period of overcurrent may cause the ACS 501 with Option Pack to shut down due to overtemperature.

20.3 ACCEL/DECEL These parameter values can be altered while the ACS 501 with Option Pack is running.

3 ACCEL TIME 1 The available range is 0.1 – 1800s. This parameter represents the time required for the output frequency to change from minimum to maximum frequency. Regardless of the settings, the maximum acceleration/deceleration is 120 Hz/0.1s and the minimum is 120 Hz/1800s. The time required for the acceleration from zero to minimum frequency depends on the Accel Time (acceleration equals $f_{\max} - f_{\min} / \text{acceleration time}$).

Note: The ACS 501 with Option Pack incorporates a bus controller that prevents overcurrent and overvoltage trips caused by too quick acceleration and deceleration settings for a given system (by increasing the acceleration/deceleration).

If a small number is entered for acceleration time in a system with high inertia, Parameter 20.1.4 (Current Limit) limits acceleration time. Conversely, if a small number is entered for deceleration time in such a system, the DC bus regulator limits deceleration time. In some cases, the motor will take a long time to stop. If a short deceleration time is critical to your application, add a dynamic braking device to your system.

The maximum/minimum recommended acceleration/deceleration for the nominal size motor is 40 Hz in one second. If the motor rating is less than the maximum power of the ACS 501 with Option Pack, smaller settings can be used.

If the reference signal changes at a rate slower than the acceleration or deceleration time, the output frequency change will follow the reference signal. If the reference signal changes faster than the acceleration or deceleration time, the output frequency change will be limited by the parameters.

4 DECEL TIME 1 The available range is 0.1 – 1800s. This parameter represents the time required for output frequency to change from maximum to minimum. Refer to Parameter 20.3.3 (Accel Time 1).

**Main 30 Protection
Parameters**

**30.2 AUTOMATIC
RESET**

- 4 OVERVOLTAGE** If you select YES, the ACS 501 resumes operation when the DC bus voltage returns to normal level.
- 6 OVERCURRENT** If you select YES, the fault resets automatically and the ACS 501 resumes normal operation.

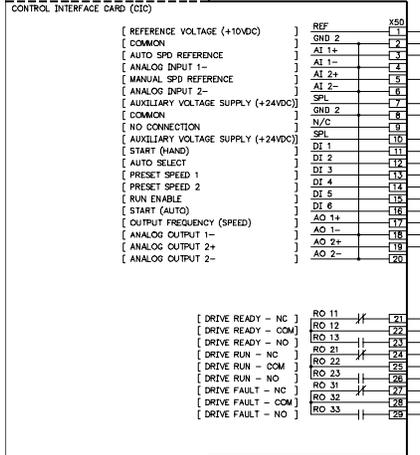
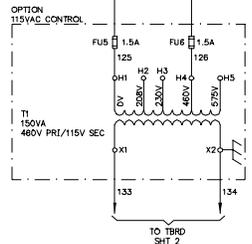
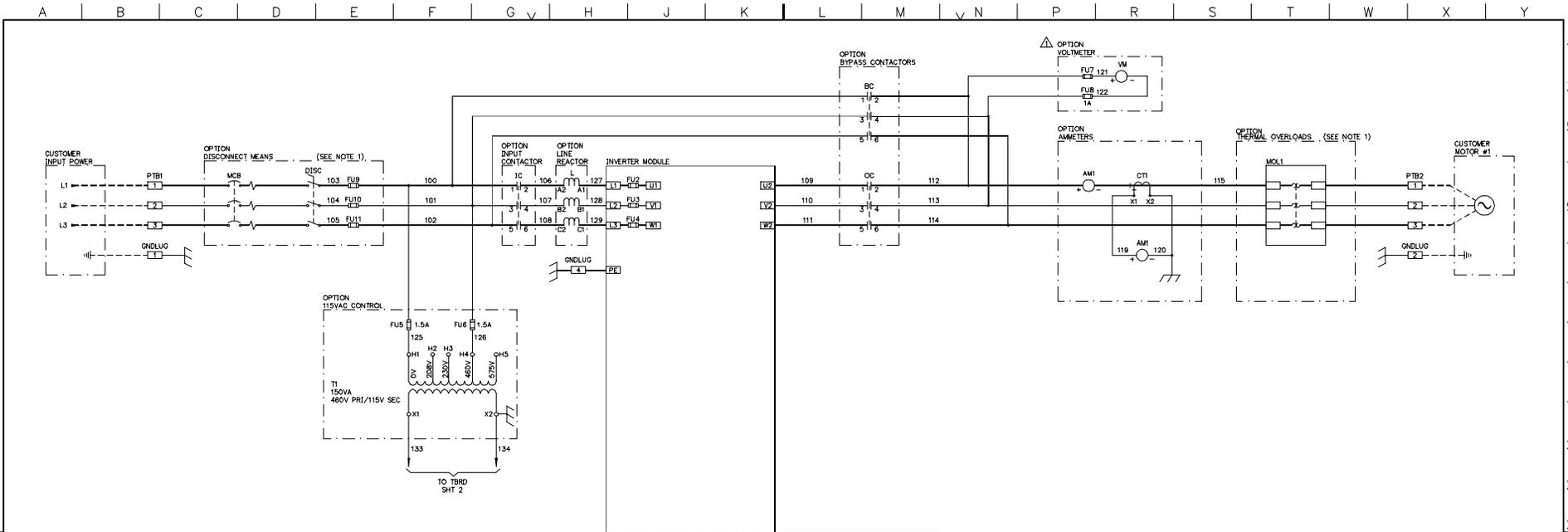
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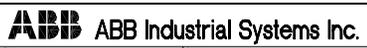
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- NOTES:**
1. IF NOT PROVIDED, MUST BE INSTALLED EXTERNAL TO THE DRIVE PER NEC.
 2. COPPER WIRE RATED FOR 60°C INSULATION IF RATED LESS THAN 100A OR 75°C IF RATED 100A OR MORE MUST BE USED.
 3. SEE PAGE 4 FOR NAMEPLATE PART NUMBER BREAKDOWN OF INCLUDED OPTIONS.
 4. REFER TO CHAPTER 3 OF INSTALLATION MANUAL FOR TIGHTENING TORQUE VALUES.

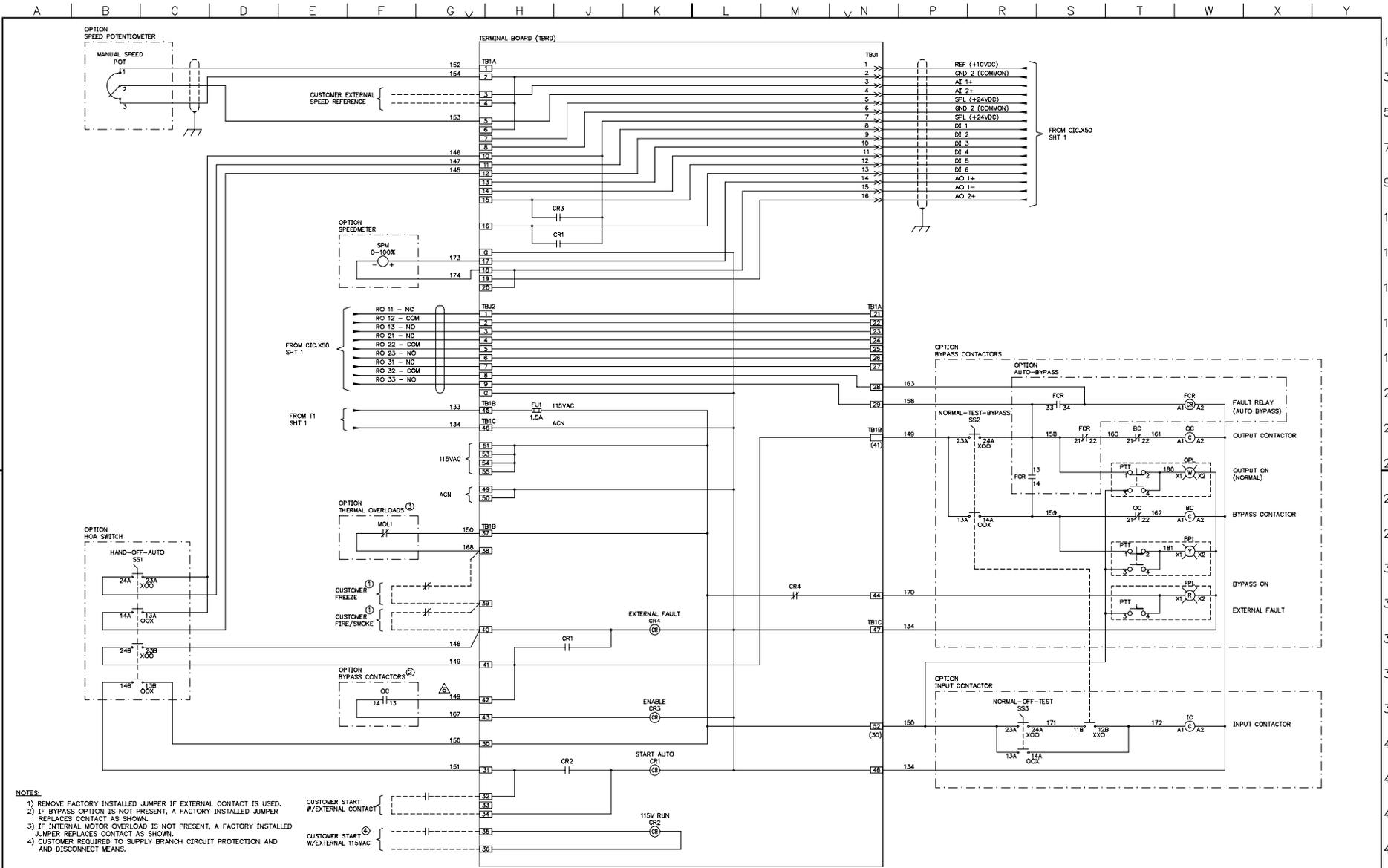
Rev	8	SEE ECO #951511, SEE SHT 2-4	09/08/95	Project Name	ACSS01	Description	CIRCUIT DIAGRAM - POWER ALL DRIVE OPTIONS	Approved	C. RIAN	Reference Number	3AUA489001A445	Sheet	1
Rev		Description	Appd	Date				Checked	C. RIAN	Document Number	3AUA489001A445	Cont.	2
Based On:		445-1						Prepared	S. HARE	Dept	AOa	Date	04/02/93



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- NOTES:**
- 1) REMOVE FACTORY INSTALLED JUMPER IF EXTERNAL CONTACT IS USED.
 - 2) IF BYPASS OPTION IS NOT PRESENT, A FACTORY INSTALLED JUMPER REPLACES CONTACT AS SHOWN.
 - 3) IF INTERNAL MOTOR OVERLOAD IS NOT PRESENT, A FACTORY INSTALLED JUMPER REPLACES CONTACT AS SHOWN.
 - 4) CUSTOMER REQUIRED TO SUPPLY BRANCH CIRCUIT PROTECTION AND DISCONNECT MEANS.

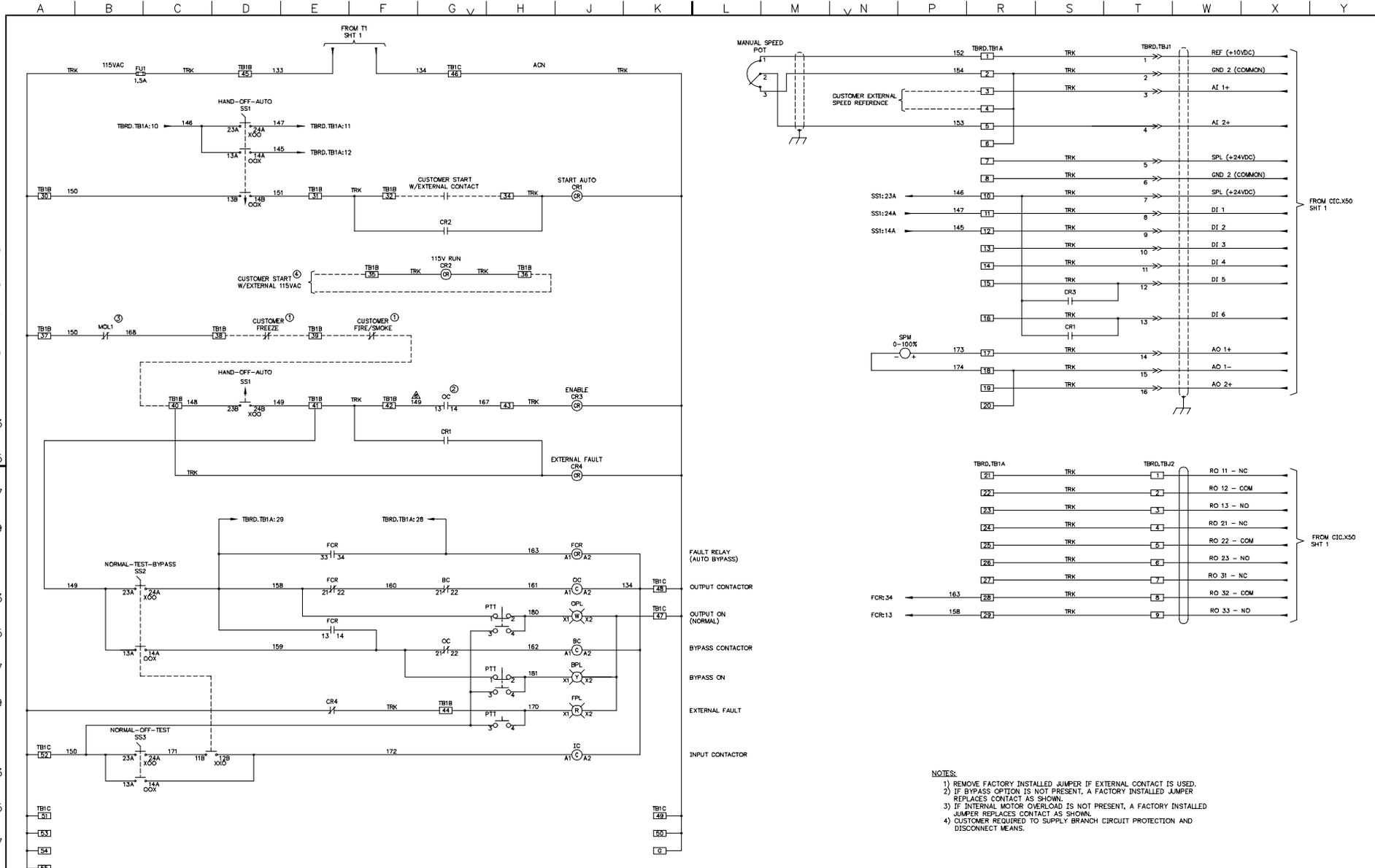
CUSTOMER START
W/EXTERNAL CONTACT

CUSTOMER START
W/EXTERNAL 115VAC

8	SEE ECO #951511	09/08/95	Project Name ACS501	Description CIRCUIT DIAGRAM - CONTROL ALL DRIVE OPTIONS	Approved C. RIAN	ABB Industrial Systems Inc.	Reference Number	Sheet
Rev	Description	Appd	Date	Prepared S. HARE	Draft AOa		Document Number	Cont.
Based On	445-2		ADJ FREQUENCY AC DRIVES 1-60HP CONSTANT TORQUE		Date 04/02/93		3AUA489001A445	2 3

09/08/95

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8	SEE ECO #951511	09/08/95	ACSS01	CIRCUIT DIAGRAM - CONTROL	Approved C.RIAN	ABB Industrial Systems Inc.	Reference Number	Sheet	
Rev	Description	Appd	Date	Description	Checked C.RIAN		Document Number	Cont.	
Based On:	445-3		ADJ FREQUENCY AC DRIVES 1-60HP CONSTANT TORQUE	ALL DRIVE OPTION	Prepared S.HARE	Dwg AOa	Date 12/21/92	3AUA489001A445	3
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A | B | C | D | E | F | G | H | J | K | L | M | N | P | R | S | T | W | X | Y

Nameplate Identification

ACS 501 - 002 - 4 - 0 0 P 2

**ACS501-002-4-00P2
S501002400P2 0**

AC=AC Drive

Product Type:
S=Standard Product

Family:
50=ACS500

Construction
1=Sizes 001 to 060, Wall Mounted
2=Sizes 050 to 300, Std Floor Stand Cabinet
4=Sizes 050 to 300, Module

Output Power (HP, Constant Torque)
(KVA, Constant Torque for 380 VAC)

Input Voltage
2=208-240 VAC
3=380-415 VAC
4=440-500 VAC
6=525-600 VAC

Internal Option 2
3=Tach Board (SNAT 7610 BAC)
0=No Option

Internal option 1
2=I/O Extension Board (SNAT 7520 IOE)
8=(5) Isolated Digital Inputs (SNAT 763 DII)
9=3-15 PSI and (2) Isolated Digital Inputs (SNAT 762 PSI)
A=115 VAC Control Power Board (SNAT 7650 RIB)
0=No Option

Control Panel
P=Internal Control Panel (Keypad and Display)
0=No Panel

Enclosure Type *
0=Chassis (IP 00)
2=NEMA 1 (IP 21)
3=NEMA 1 w/Air Filters
5=NEMA 12 (IP 54)
6=NEMA 4 (IP 65)
M=MCC Mount
*Not all Enclosure Types are available for all units.

Dynamic Braking
Blank=No Brake
1=Internal Dynamic Brake Chopper Installed

Controls

A=Hand-Off-Auto Switch incl. 115V Control Transformer
B=Hand-Off-Auto Switch & Speed Pot incl. 115V Control Transformer
C=115 VAC Control Transformer & Terminal Board
1=Internal Brake Chopper
M=A+1
N=B+1
P=C+1
O=None

Disconnect Options

A=Door Interlocked Disconnect Switch
B=Door Interlocked Circuit Breaker
C=AC Line Reactor-3% Imp. w/Disc
D=AC Line Reactor-3% Imp. w/CB
E=AC Line Reactor-3% Imp.
F=AC Line Reactor-5% Imp. w/Disc
G=AC Line Reactor-5% Imp. w/CB
H=AC Line Reactor-5% Imp.
O=None

Bypass

A=Manual Bypass, Elect Interlocked
B=Man Byp, Elect Int, w/Service Switch
C=Automatic Bypass, Elect Interlocked
D=Automatic Bypass w/Service Switch
E=Man. Byp., Elect./Mech. Interlocked
F=Man Byp, Elect./Mech Int w/Serv Sw
G=Auto Byp, Elect./Mech Interlocked
H=Auto Byp, Elect./Mech Int w/Serv Sw
O=None

Meters

A=Analog Voltmeter
B=Analog Speed Meter
Y=Ammeter (Sized to unit)
1=A+B
2=A+Y
4=B+Y
6=A+B+Y
O=None

MOL

HP *	ACS501
1	A=1.41 to 1.58
	B=1.75 to 1.85
	C=2.76 to 2.95
2	D=2.95 to 3.21
	E=3.22 to 3.48
	F=3.49 to 3.89
	G=3.90 to 4.35
	H=4.36 to 4.73
3	J=4.74 to 5.21
	K=6.47 to 6.95
5	L=6.96 to 8.09
	M=8.10 to 9.29
	N=9.30 to 10.4
7.5	P=10.5 to 10.9
10	Q=12.1 to 14.5
	R=14.6 to 16.8
	S=16.9 to 18.4
15	T=18.5 to 20.9
	U=22.6 to 24.3
20	V=24.4 to 27.2
	W=29.3 to 32.0
25	X=32.1 to 34.9
	Y=35.0 to 37.8
30	Z=37.9 to 41.7
	2=46.0 to 49.0
40	3=49.1 to 54.2
	4=57.1 to 62.8
50	5=62.9 to 69.1
	6=69.2 to 75.0
60	7=75.1 to 83.3
	8=87.0 to 92.9
75	9=93.0 to 100
	0=None
	1=Overload sized to Drive V.T. rating

*Horsepowers listed are estimated only for 460 volts. MOL's MUST be sized for the specific motor. Horsepowers for 230 V are half the horsepower at 460 V.

8	SEE ECO #951511	09/08/95	Project Name ACS501	Approved C.RIAN	 ABB Industrial Systems Inc.	Reference Number	Sheet
Rev	Description	Appd	Date	Checked C.RIAN		Document Number	4
Based On:	445-4		ADJ FREQUENCY AC DRIVES 1-60HP CONSTANT TORQUE	Prepared S.HARE	Dept AOa	3AUA489001A445	Cont.
			ENCLOSURE IDENTIFICATION		Date 04/02/93		-

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09/08/95



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ACS 501-08D
EFFECTIVE 10/1/95
SUPERCEDES 9/1/94