Floating Network Safety Information

Make sure that no excessive emission is propagated to neighboring low voltage networks. In some cases, the natural suppression in transformers and cables will be sufficient. If in doubt, the supply transformer with static screening between the primary and secondary windings can be used.

Note! Remove the grounding screw otherwise you may cause danger or damage the unit. The location of the grounding screw is shown below in Figure 1.

Note! In IT networks do not use RFI filter. The main input power becomes connected to ground through the filter capacitors. In floating networks this may cause danger or damage the unit.

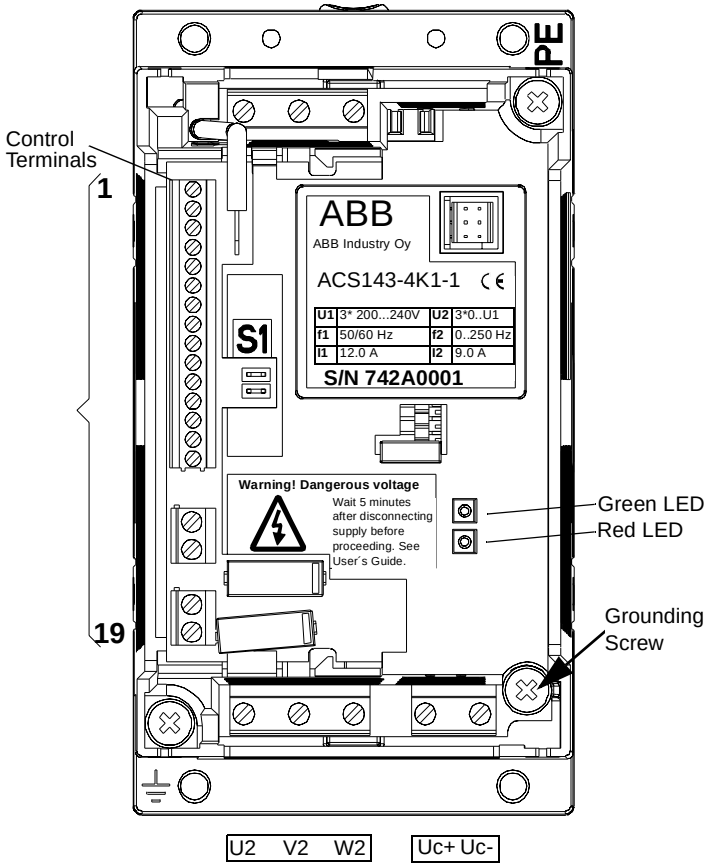


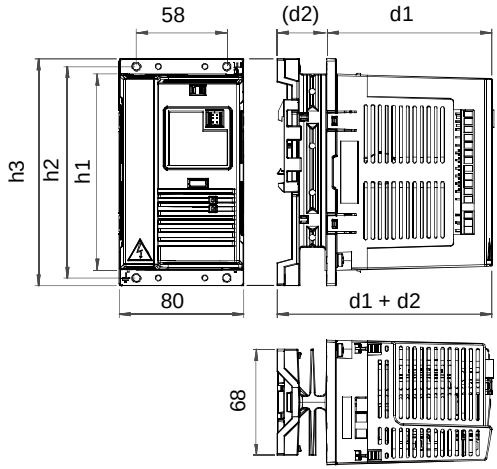
Figure 1 Removing the grounding screw from the ACS 100 / 140 frequency converters.

Installation

Study this guide carefully before proceeding. Failure to observe the warnings and instructions given may cause a malfunction or personal hazard.

1	CHECK the environment.	See **P**
2	INSTALL the ACS 140.	See **A**, **B**
3	REMOVE the cover.	See **C**
4	USE a warning sticker in the language of your choice.	See **E**
5	IDENTIFY power and control terminals.	See **D**, **E**, **G**
6	CHECK voltage supply.	See **F**
7	CHECK the motor.	See **H**
8	CHECK the U/I Jumper Socket S1.	See **G**
9	CONNECT power terminals.	See **D**, **E**
10	CONNECT control wires.	See **E**, **G**, **I**
11	REPLACE the cover.	See **J**
12	TURN the power on.	See **K**

A Dimensions (Inches)



Frame Size IP 20	200V Series						Weight lbs	
	h1	h2	h3	d1	(d2)	d1+d2	1~	3~
A	4.96	5.35	5.75	4.17	1.26	5.43	1.98	1.76
B	4.96	5.35	5.75	4.17	2.72	6.89	2.64	2.42
C	7.80	8.19	8.59	4.17	4.10	8.27	4.84	4.40
D	8.86	9.25	9.65	4.45	4.53	8.98	5.94	5.50
	400 V Series							
B	4.96	5.35	5.75	4.17	2.72	6.89		2.42
C	7.80	8.19	8.59	4.17	4.10	8.27		4.40
D	8.86	9.25	9.65	4.45	4.53	8.98		5.50

B Installing the ACS 140

Install the ACS 140 vertically. Leave 1 inch free space above and below the unit. Ensure that there is sufficient cool air in the cabinet to compensate for the power losses listed at the end of section **P**, Technical Data.

Wall mounting

Use M4 screws.

DIN rail (35 mm)

Press the lever on top of the DIN rail mounting bracket to install or remove the ACS140.

Flange mounting

The ACS 140 can be installed so that the heat sink is in an air duct. The power circuit losses will then be dissipated outside leaving only the control circuit losses to be dissipated inside (see paragraph **O**).

C Removing the Cover

Warning! **Turn power off and wait at least 5 minutes**. Measure the voltage before removing cover.

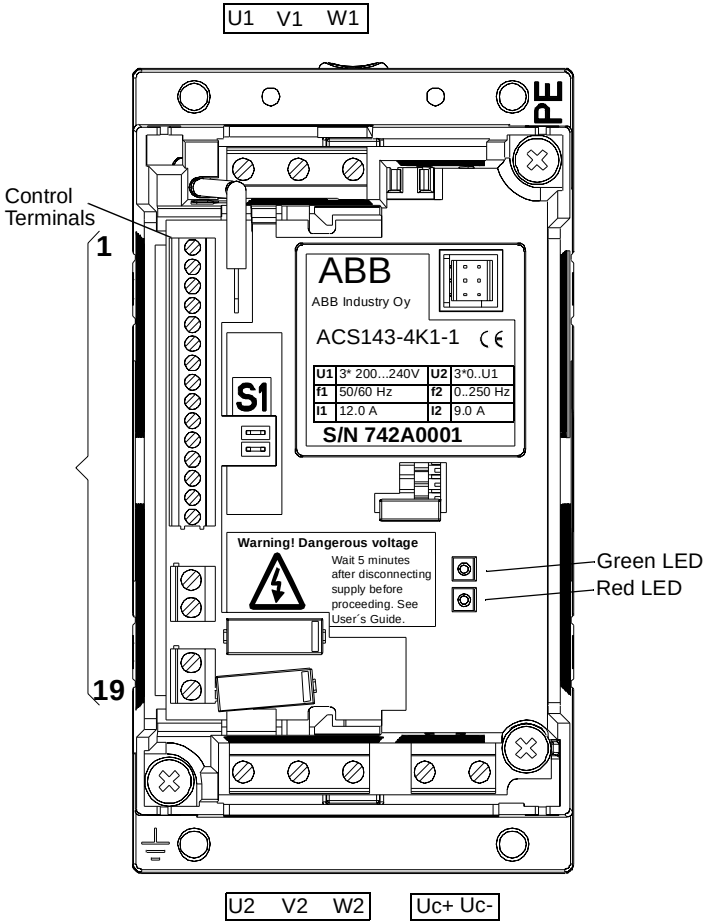
Simultaneously, press the four (4) snap-on buttons in the top and bottom corners of the unit.

D Removing the Cover

Terminal	Description	Note
L, N	1~ power supply input	See paragraph **E** for terminal interface layout.
U1, V1, W1	3~ power supply input	Do not operate 3~ drives on 1~ power. Doing so may cause nuisance overvoltage trips due to excessive DC bus ripple! See Paragraph **E** for terminal interface layout.
PE	Protective Ground	Min. 4mm^2 Cu wire.
U2, V2, W2	Power output to motor	Max. cable length 150 ft. without output choke.
Uc+,Uc-	DC bus	For optional ACS 140 braking unit.
⏚	Motor cable ground	

Follow local rules for cable cross-sections. Use shielded motor cable.
Route the motor cable away from control wires and power supply cable to avoid electromagnetic interference.

E Terminal Interface



F Type Designation Label and Code Key

Supply:
ACS 141 = 1 ~ Power
ACS 143 = 3 ~ Power

ACS 141-xxx-1 = 240V
ACS 141-xxx-3 = 480V

Power:
4K1 = 4.1 kVA

ABB
ABB Industry Oy
ACS143-4K1-1

U1	3*200...240V	**U2**	3*0..U1
f1	50/60 Hz	**f2**	0..250 Hz
I1	12.0 A	**6**	9.0 A

S/N 742A0001

Serial Number:
S/N 742A0001
7 = Year
42 = Week
A0001=Internal Number

G Control Terminals

The analog input signal is selected with V/I jumper S1.
S1 open = V (0-10V input) and S1 connected = I (0-20mA input).

No.	Identification	Description	
1	SCR	Terminal for signal cable shield. (Connected internally to chassis ground.)	
2	AI 1	Analog input channel 1, programmable. Default: 0 - 10V (R_i = 190 kΩ) (S1:1:V) <=> 0 - f_{nom} output frequency 0(4) - 20 mA (R_i = 500 Ω) (S1:1:I) <=> 0 - f_{nom} output frequency Resolution 0.1% accuracy ±1%.	
3	AGND	Analog input circuit common. (Connected internally to chassis ground through 1 MΩ.)	
4	10 V	10V/10 mA reference voltage output for analog input potentiometer, accuracy ±2%, .	
5	AI 2	Analog input channel 2, programmable. Default: 0 - 10 (R_i = 190 kΩ) (S1:2:V) 0 - 20 mA (R_i = 500 Ω) (S1:2:I) Resolution 0.1% accuracy ±1%.	
6	AGND	Analog input circuit common. (Connected internally to frame ground through 1 MΩ.)	
7	AO	Analog output, programmable. Default: 0-20 mA (load < 500 Ω) <=>0-f_{nom}	
8	DGND	Common for DI return signals.	
9	12V	Auxiliary voltage output 12VDC / 100 mA (reference to AGND). Short circuit protected.	
10	DCOM	Digital input common. To activate a digital input, there must be +12V (or -12V) between that input and DCOM. The 12V may be provided by the ACS 140 (X1:9) as in the connection examples (see **J**) or by an external 12-24V source of either polarity.	
DI Configuration		**Factory (0)** (f_{nom} = 50 Hz)	**Factory (1) Three wire control** (f_{nom} = 60 Hz)
11	DI 1	**Start.** Close to start. Motor will ramp up to frequency reference. Disconnect to stop. Motor will coast to stop.	**Start.** If DI 2 is closed, momentary closure of DI 1 starts the ACS 140.
12	DI 2	**Reverse.** Close to reverse rotation direction.	**Stop.** Momentary opening always stops the ACS 140.
13	DI 3	**Jog.** Close to set output frequency to jogging frequency (default: 5 Hz).	**Reverse.** Close to reverse direction of rotation.
14	DI 4	**Has to be open.**	**Has to be closed.**
15	DI 5	**ACC/DEC**	**ACC/DEC**
16	DO 1A	Relay output 1, programmable (default: fault relay). Fault: DO 1A and DO 1B not connected. 12 - 250VAC / 30VDC, 10 mA - 2 A	
17	DO 1B		
18	DO 2A	Relay output 2, programmable (default: running). Running: DO 1A and DO 1B connected. 12 - 250VAC / 30VDC, 10 mA - 2 A	
19	DO 2B		

Digital input impedance 1.5 kΩ.
Use multi-strand 0.5-1.5mm^2 wire.

Note! DI 4 is read only when powered-up (Factory macro 0 and 1).

Note! For fail safe reasons, the fault relay signals a “fault,” when the ACS 140 is powered down.

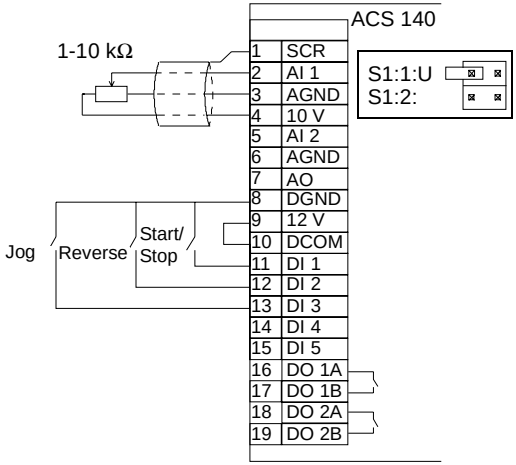
Note! Terminals 3, 6 and 8 are at the same potential.

H Motor

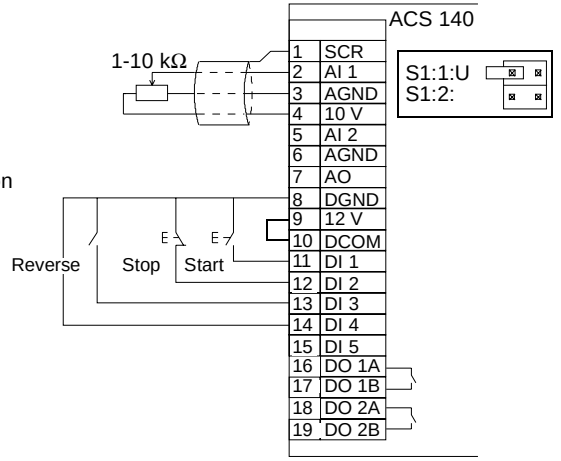
Check that the motor is compatible. The motor must be a three- (3-) phase induction motor, with U_N from 200 to 240V or from 380 to 480V and f_N either 50 Hz or 60 Hz. The motor nominal current, I_N, must be less than the nominal output current of the ACS 140, I_2 (See **F** and **P**).

I Connection Examples

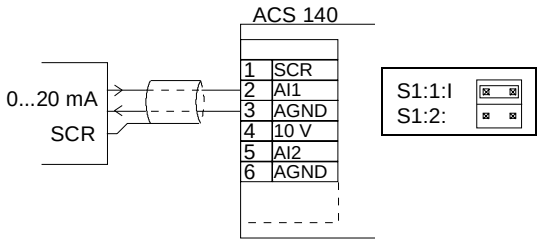
DI Configuration
Factory (0)



DI Configuration
Factory (1)



Frequency Reference from a Current Source



J Replace the Cover

Do not turn the power on before snapping the cover back on.

K Power On

When power is supplied to the ACS 140, the green LED illuminates.

L Protection Features

The ACS 140 has a number of protective features:

- Overcurrent
- Overvoltage
- Undervoltage
- Overtemperature
- Output ground fault
- Output short circuit
- Input phase loss (3~)
- Power loss ride through (500 ms)
- I/O terminal short circuit protection
- Long-term overcurrent limit trip 110%
- Short-term current limit 150%
- Motor overload protection (see **N**)
- Stall protection

The ACS 140 has the following LED alarm and fault indicators:

Red LED: off **Green LED: *blinking***	**ABNORMAL CONDITION**
ABNORMAL CONDITION: • ACS 140 cannot follow control commands. • *Blinking* lasts 15 seconds.	POSSIBLE CAUSES: • Acceleration or deceleration ramp is too fast in relation to load torque requirement • A short voltage interruption

Red LED: on **Green LED: on**	**FAULT**
ACTION: • Apply a stop command to reset fault. • Apply a start commande to restart the drive. NOTE: If the drive fails to start, check that the input voltage is within the tolerance range.	POSSIBLE CAUSES: • Transient overcurrent • Over-/undervoltage • Overtemperature CHECK: • That the supply line for phase loss or disturbances. • The drive for mechanical problems that might cause overcurrent. • That the heat sink is clean.

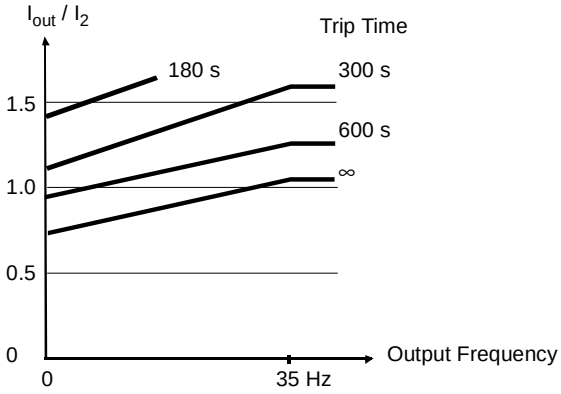
Red LED: *blinking* **Green LED: on**	**FAULT**
ACTION: • Turn the power off. • Wait for the LEDs to turn off. • Turn the power back on. **Caution!** This action may start the drive if the start command is still active.	POSSIBLE CAUSE: • Output ground fault • Short circuit CHECK: • Megger the motor for short circuit or ground fault.

Note! Whenever the ACS 140 detects a fault condition, the fault relay activates. The motor stops and the ACS 140 will wait to be reset. If the fault still persists, and no external cause has been identified, contact your ACS 140 supplier.

M Motor Overload Protection

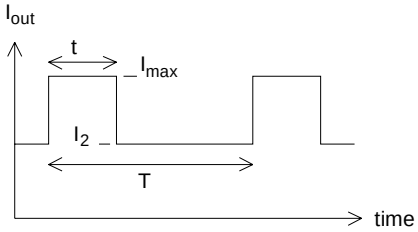
If the motor current I_{out} exceeds I_2 of the ACS 140 for a prolonged period, the ACS 140 automatically protects the motor from overheating by tripping.

The trip time depends on the extent of the overload (I_{out} / I_2), the output frequency and f_{nom}. Times given apply to a “cold start”.



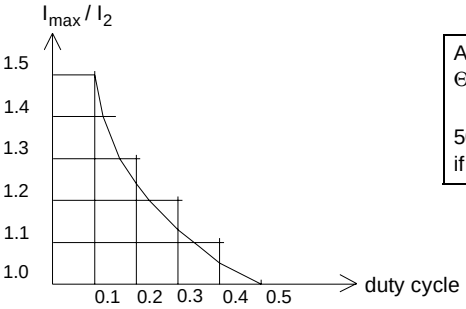
N Overload of ACS 140

In the event of a sustained output overload, the ACS 140 will trip.



duty cycle = t/T

T< 10 min



Ambient temperature, Θ_{amb} max. is 40°C.

50°C is permissible, if I_2 is derated to 80%.

O Type Series and Technical Data

200V series							
Nominal motor P_N	**Hp**	**0.5**	**0.75**	**1.0**	**1.5**	**2.0**	**3.0**
1~ Input	**ACS141-**	**K75-1**	**1K1-1**	**1K6-1**	**2K1-1**	**2K7-1**	**4K1-1**
3~ Input	**ACS143-**	**K75-1**	**1K1-1**	**1K6-1**	**2K1-1**	**2K7-1**	**4K1-1**
Frame size		A	B		C		D
Nominal ratings (See **F, M**)	**Unit**						
Input voltage U_1	V	200V-240V ±10% 50/60 Hz (ACS 141: 1~, ACS 143: 3~)					
Output current I_2	A	2.2	3.0	4.3	5.9	7.0	9.0
Max. output current	A	3.3	4.5	6.5	8.9	10.5	13.5
Output voltage U_2	V	0 - U_1 3~					
Input current I_1 1~	A	6.9	9.0	10.8	14.8	18.2	22.0
Input current I_1 3~	A	3.2	4.2	5.3	7.2	8.9	12.0
Switching frequency	kHz	4 (Standard) 8 (Low noise *)					
Protection limits	(See **M**)						
Overcurrent (peak)	A	7.1	9.7	13.8	19.0	23.5	34.5
Overvoltage: Running Start inhibit	 VDC VDC	 420 (corresponds to 295V input) 390 (corresponds to 276V input)					
Undervoltage: Running Start inhibit	 VDC VDC	 200 (corresponds to 142V input) 230 (corresponds to 162V input)					
Overtemperature	°C	90 (heat sink)			95 (heat sink)		
Max. wire sizes							
Power terminals	mm^2	4 single core/torque 0.8 Nm					
Control terminals	mm^2	0.5 - 1.5 (AWG22...AWG16)/torque 0.4 Nm					
Line fuse 1~ ** ACS141-	A	10	10	16	16	20	25
Line fuse 3~ ** ACS143-	A	6	6	6	10	10	16
Power losses							
Power circuit	W	13	19	27	39	48	70
Control circuit	W	14	16	17	18	19	20

* Low noise setting programmed using control panel (parameter 2605)
Derate ambient temperature to 30°C or derate P_N and I_2 to 90%.

** Fuse type: UL class CC or T. For non-UL installations IEC269 gG.
Use 60°C rated power cable (75°C if T_{amb} above 45°C).

400V series					
Nominal motor P_N	**kW**	**1.0**	**1.5**	**2.0**	**3.0**
3~ Input	**ACS143-**	**1K6-3**	**2K1-3**	**2K7-3**	**4K1-3**
Frame size		B	B	C	D
Nominal ratings (See **F, M**)	**Unit**				
Input voltage U_1	V	380V - 480V ±10% 50/60 Hz (ACS 143: 3~)			
Output current I_2	A	2.0	2.8	3.6	4.9
Output voltage U_2	V	0 - U_1			
Input current I_1 3~	A	2.7	4.0	5.1	6.4
Switching frequency	kHz	4 (Standard) 8 (Low noise *)			
Protection limits	(See **M**)				
Overcurrent (peak)	A	6.6	9.2	11.9	16.3
Overvoltage: Running Start inhibit	 VDC VDC	 842 (corresponds to 595V input) 661 (corresponds to 380-415V input) 765 (corresponds to 440-480V input)			
Undervoltage: Running Start inhibit	 VDC VDC	 333 (corresponds to 247V input) 436 (corresponds to 380-415V input) 505 (corresponds to 440-480V input)			
Overtemperature	°C	90 (heat sink)	95 (heat sink)		
Max. wire sizes					
Power terminals	mm^2	4 single core/torque 0.8 Nm			
Control terminals	mm^2	0.5 - 1.5 (AWG22...AWG16)/torque 0.4 Nm			
Line fuse 3~ ** ACS143-	A	6.0	6.0	10.0	10.0
Power losses					
Power circuit	W	27	39	48	70
Control circuit	W	17	18	19	20

* Low noise setting programmed using control panel (parameter 2605).
Derate ambient temperature to 30°C or derate P_N and I_2 to 90%.
** Fuse type: UL class CC or T. For non-UL installations IEC269 gG.
Use 60°C rated power cable (75°C if T_{amb} above 45°C).

P Environment

- Ambient temperature 0 - 40°C
- Max. ambient temperature 50°C if P_N and I_2 derated to 80%
- Installation altitude 0 - 1000m (3333 ft) if P_N and I_2 100%.
- Installation altitude 0 - 2000m (6666 ft) if P_N and I_2 derated 1% for every 100m (333 ft) above 1000m (3333 ft).
- Relative humidity less than 95% (non-condensing)

The ACS 140 should be installed in clean and dry air, free from dripping water. The installation room must be locked or tool-openable.

Q Product Conformity

The ACS 140 complies with the requirements of the European

- Low Voltage Directive 73/23/EEC with amendments
- EMC Directive 89/336/EEC with amendments

R Safety

 **Warning!** Only a competent electrician should install the ACS 140.

 **Warning!** Dangerous voltages are present when input power is connected. Wait at least 5 minutes after disconnecting the supply before removing the cover. Measure the voltage at DC terminals (U_{c+}, U_{c-}) before servicing the unit. See **E**.

 **Warning!** Even when the motor is stopped, there can be dangerous voltages present at Power Circuit terminals U1, V1, W1 (L,N) and U2, V2, W2 and U_{c+}, U_{c-}.

 **Warning!** Even when power is removed from the ACS 140 there may be dangerous external voltages at relay terminals DO1A, DO1B, DO2A, DO2B.

 **Warning!** The ACS 140 is not a field repairable unit. Never attempt to repair a broken unit; contact the supplier for replacement of the unit.

 **Warning!** The ACS 140 may start automatically after an input voltage interruption if the external run command is still present.

 **Warning!** When the control terminals of two (2) or more ACS100/140 units are connected in parallel, the auxiliary voltage for these control connections must be taken from a single source, which can either be one of the units or an external supply.

 **Warning!** The heat sink may reach a high temperature (see **P**).

Note! For more technical information, contact the supplier.

Accessories

ACS 100-PAN
Control panel for use with the ACS 100 / ACS 140.

ACS 100-EXT
Extension cable kit for use with the control panel.

ACS 100-FLT-
ACS 140-FLT-
RFI input filter.

ACS 100-CHK-
Input/output choke. A and B, 200V

-BRK-
Braking units.

RS485/232 Adapter

ACS 140 is supported by Drives Tools
Contact your supplier.

ABB Drives & Power Products
16250 W. Glendale Drive
New Berlin WI 53151
USA
Telephone: (414) 785-3416
(800) 752-0696
Telefax (414) 785-0397

ACS140-US-04
3AUA489002 B4591 R0101 Rev C
Effective: 10/25/99
Supersedes: 5/1/98