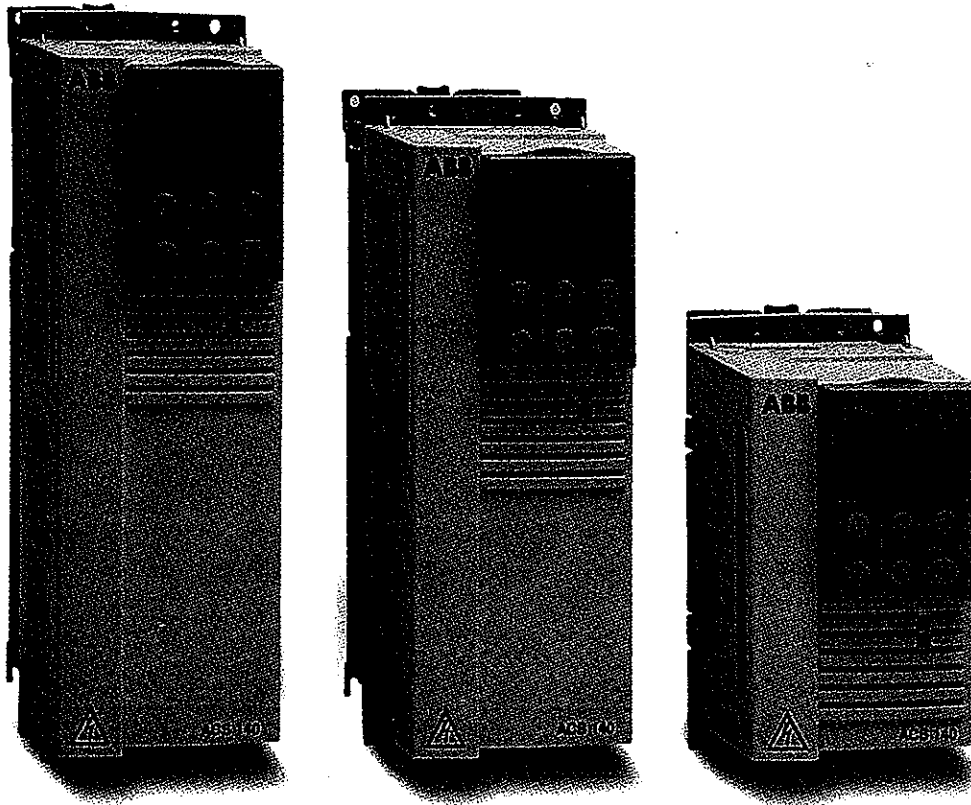


ABB AC Drives

ACS 140 AC Drives

for advanced speed control of
0.5 to 3.0 HP (.37 to 3.7kW)
Induction motors

**NOW UL Approved!
Also available in a
NEMA 1 Enclosure**



No motor is too small to be controlled.

ABB

Designed for optimum flexibility

The ACS 140 has several features which help cut installation and start-up time. The control panel has a parameter copy function which permits the user to easily copy parameters from drive to drive. The panel's clear menu structure has both short and long menus for easy configuration.

Easy integration

The ACS 140 is one of the most durable AC drives on the market which, together with its multiple mounting possibilities, makes it very easy to apply to your most demanding applications.

The drive's design has the added flexibility of not requiring positive/negative conversion logic by accepting both PNP or NPN inputs. Together with the digital and analog inputs' built-in galvanic isolation, installation cost can be reduced.

Modbus Serial communication

In addition to local control through the panel, the ACS 140 can also be remotely controlled by an external device. Modbus serial communication capability makes the ACS 140 adaptable to applications where centralized control is required.

Multiple mounting possibilities

Besides traditional wall mounting, the ACS 140 offers a built-in DIN-rail mount as well as flange mounting, where the heat sink can be placed outside the cabinet. An optional NEMA 1 enclosure kit is available for mounting the ACS140 in a more protected environment. Because of its optimized cooling design, the drives can be mounted adjacent to each other without the traditional space required for heat dissipation thus saving valuable panel space.

Flexible application macros

The ACS 140 has several pre-set application macros to make start-up quick and simple. With a change of just a single variable, all macro-specific parameters are automatically set and all the control terminals are automatically configured.

Factory application macro is intended for applications where control is normally provided by an external device. It provides a general purpose I/O configuration. Individual macros for both 50 Hz and 60 Hz power supplies make it simple to set-up the ACS 140 for European or North American applications.

The **ABB Standard** (typical in Europe) and the 3-wire (typical in North America) application macros are for general purpose use and offer two additional pre-set speeds compared to the Factory macro.

Alternate application macro provides two digital inputs for start forward and start reverse operation. Two preset speeds are also provided as well as selection between two distinct acceleration and deceleration ramps.

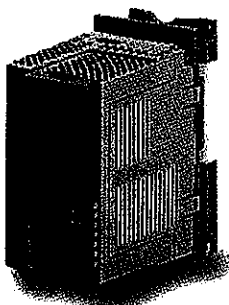
Motor Operated Potentiometer application macro provides a cost-effective interface for PLCs to control start/stop and adjust the speed of the drive using digital inputs.

Hand/Auto application macro offers an I/O-configuration typically used in HVAC applications.

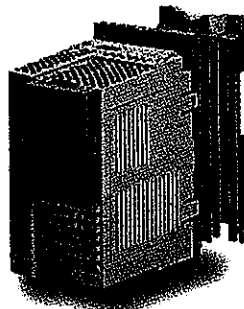
PID-control application macro is intended for use with closed loop systems that control variables such as pressure or flow.

Premagnetize application macro enables the drive to start very quickly by eliminating the delay needed to build up flux in the motor. It can also be configured to provide DC injection braking at start or stop.

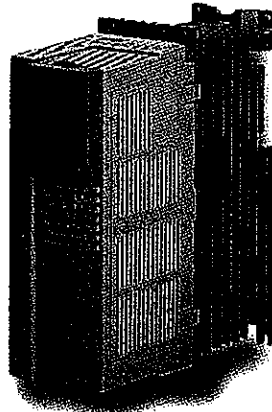
ACS 140 Product Line



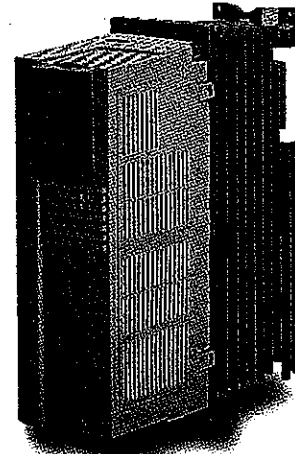
Frame A



Frame B



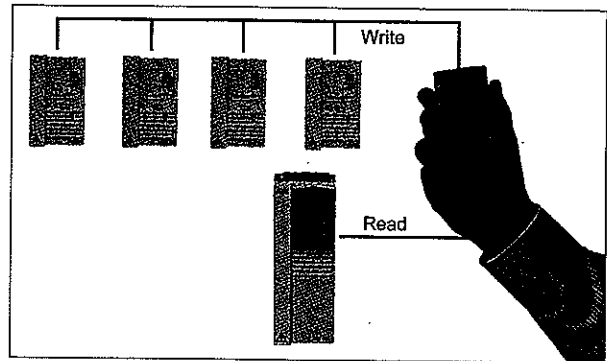
Frame C



Frame D

Factory parameter values:

9905 Motor nom volt	230/460 V	1105 Ext.ref1 max	60 Hz
9907 Motor nom freq	60 Hz	1106 Ext.ref2 select	0 (keypad)
9908 Motor nom speed	1750 rpm	1201 Const speed sel	3 (DI3)
1001 Ext 1 commands	2 (DI1,2)	1503 AO content max	60 Hz
1002 Ext 2 commands	0 (not sel)	1601 Run enable	0 (not sel)
1003 Direction	3 (request)	2008 Maximum freq	60 Hz
1101 Keypad ref sel	1 (ref 1)	2105 Pregmag sel	0 (not sel)
1102 Ext1/Ext2 sel	6 (ext1)	2201 Acc/Dec 1/2 sel	5 (DI5)
1103 Ext1.ref1 select	1 (AI1)		



Parameters can easily be copied from drive to drive using a single, detachable control panel. Other ACS 140 accessories include an extension cable kit, RFI filters and braking units.

An example: Factory Application Macro

This macro is intended for applications where a control panel is not required. For more information, please see the ACS 140 Programming Guide.

Input signals

- Start, stop and direction (DI1,2)
- Analog reference (AI1)
- Constant speed 1 (DI3)
- Accel/Decel 1/2 selection (DI5)

Output signals

- Analog output AO: Frequency
- Relay output 1: Fault
- Relay output 2: Running

Control Terminals

Terminals	Function
1 SCR	
2 AI 1	External reference 1; 0-10 V ↔ 0-60 Hz
3 AGND	
4 10V	Reference voltage 10 VDC
5 AI 2	Not used
6 AGND	
7 AO	Output frequency 0-20 mA ↔ 0-60 Hz
8 AGND	
9 +12V	+12 VDC
10 DCOM	
11 DI 1	Start/Stop. Activate to start the ACS 140.
12 DI 2	Fwd/Rev. Activate to reverse direction of rotation.
13 DI 3	Constant speed 1. Default: 5Hz
14 DI 4	Jumper to term 10 for 60 Hz power supply
15 DI 5	Accel/Decel 1/2 selection. Close for Acc/Dec 2. Defaults: 5 s (Acc/Dec 1), 60 s (Acc/Dec 2)
16 DO 1A	Relay output 1
17 DO 1B	Fault: open
18 DO 2A	Relay output 2
19 DO 2B	Running: closed

Separated power terminals for improved EMC

Wall mounting for traditional installations

Flange mounting for higher packing density
Control Panel Connector

Power inputs

DIN-rail for simple and fast mounting

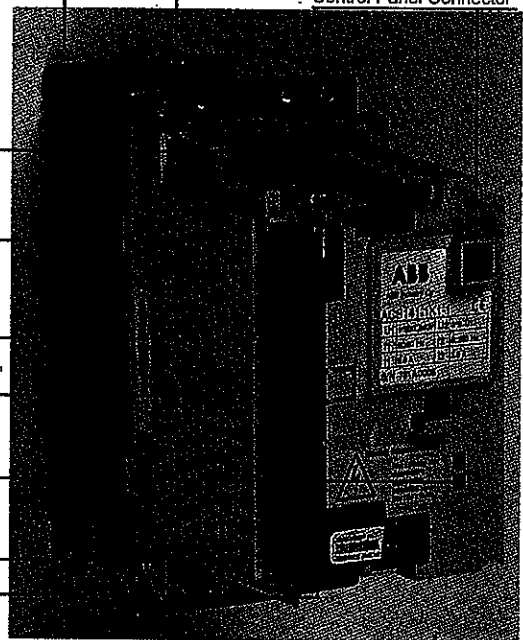
Jumper for selecting current or voltage input

Extensive I/O: 2 AI, 5 DI, 2 RO

Status indicator

Natural cooling for increased reliability and low noise

Motor outputs



Low power AC drive selection

0.5 - 3.0 HP (240 V) and 1.0 - 3.0 HP (380-480 V)

More than 1 analog input	ACS 141	ACS 143	ACS 101	ACS 103
Analog output				
More than 3 digital inputs				
More than 1 relay output				
None of the above				

240 V 1 phase 240 V 3 phase 380 V 3 phase 480 V 3 phase

Refer to the ratings table for the specific product codes for each nominal motor power.

ACS 140 technical data

Input Power

Voltage:

- 1 phase and 3 phase, 200 to 240 V $\pm 10\%$
- 3 phase, 380 to 480 V $\pm 10\%$

Frequency: 50 or 60 Hz

Fundamental power factor: approximately 0.98

Motor Connection

Voltage: 3 phase, from 0 to V_{line}

- V_{max} at field weakening point

Frequency: 0 to 250 Hz

Continuous load capacity (constant torque at maximum ambient temperature of 40 °C):

- ACS 140 rated current I_2

Overload capacity (at maximum ambient temperature of 40 °C):

- constant torque: $1.5 \cdot I_2$

for one minute in every ten minutes

- constant torque: $1.25 \cdot I_2$

for two minutes in every ten minutes

Nominal motor frequency: 50 to 250 Hz

Nominal motor voltage:

- 200 to 240 V

- 380 to 480 V

Switching frequency:

- standard: 4 kHz

- low noise: 8 kHz

Acceleration time: 0.1 to 1800 s

Deceleration time: 0.1 to 1800 s

Control Connections

Two programmable analog inputs:

- voltage signal: 0 (2) to 10 V, 190 kohm single ended

- current signal: 0 (4) to 20 mA, 500 ohm single ended

- potentiometer reference: 10 V $\pm 2\%$ max. 10 mA, 1 kohm - R - 10 kohm

- response time: - 60 ms

- resolution: 0.1 %

- accuracy: $\pm 1\%$

One programmable analog output:

- 0 (4) to 20 mA, load < 500 ohm

Auxiliary voltage: 12 V DC, max 100 mA

Five programmable digital inputs:

- 12 VDC, PNP and NPN logic (internal power supply)

- 24 VDC, PNP and NPN logic (external power supply)

- input impedance: 1.5 kohm

- response time: <8 ms

Two programmable relay outputs:

- switching voltage: 12 to 250 V AC / 30 V DC

- continuous current: 10 mA to 2 A

Serial communication for panel or external control:

- Modbus protocol

Programmable Features

Seven application macros for easy configuration:

- Factory

- ABB Standard

- 3-Wire

- Alternate

- Motor Operated Potentiometer

- Hand-Auto

- PID Control

- Pre-magnetizing

Output current and frequency limit

Two acceleration ramps

Two deceleration ramps

PID control

Flying start

Seven pre-set speeds

Two jump frequencies

IR compensation

Protection

Overcurrent

Current regulation limit: 0.5 to $1.5 \cdot I_2$

Current I²t protection

Overvoltage

Undervoltage

Overtemperature: limit 90 / 95 °C, heatsink

I/O terminal: short circuit protection

Auxiliary voltage: short circuit protection

Ground-fault protection

Output short circuit protection

Input phase loss (3-phase units only)

Power-loss ride-through

Motor overload protection

Stall protection

Serial communication error

Loss of AI signal

Environmental Limits

Ambient operating temperature:

- output current = I_2 , $f_{switch} = 4$ kHz: 0 to 40 °C

- output current = $0.8 \cdot I_2$, $f_{switch} = 4$ kHz: 0 to 50 °C

- output current = $0.9 \cdot I_2$, $f_{switch} = 8$ kHz: 0 to 40 °C

- output current = I_2 , $f_{switch} = 8$ kHz: 0 to 30 °C

Installation altitude:

- output current = I_2 : 0 to 1000 m

- output current derated 1% for every 100 m above 1000 m to a maximum 2000 m

Relative humidity: less than 95 % (non-condensing)

Enclosure

Protection degree: IP 20 - Protected Chassis

Color: NCS 1502-Y, RAL 9002, PMS 420 C

Product Conformity

- Low Voltage Directive 73/23/EEC with amendments

- EMC Directive 89/336/EEC with amendments

- Quality system ISO 9001

- UL, Canadian UL and CSA

Accessories

- Panel remote mounting cable and gasket kit

- RFI input filters

- Dynamic Braking units

- RS 232/485 Adapter

ABB Drive Tools

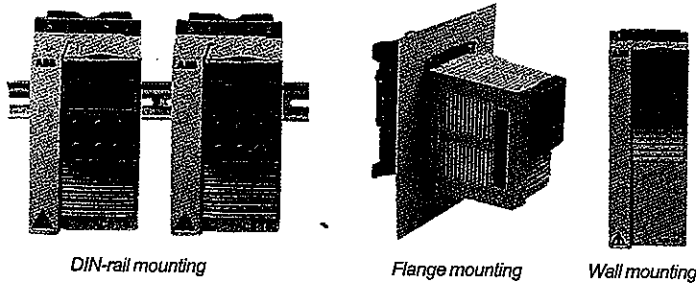
- ACS 140 is supported by PC software packages such as Drives Window and Drives Window Light

ACS 140 ratings, mounting and frame sizes

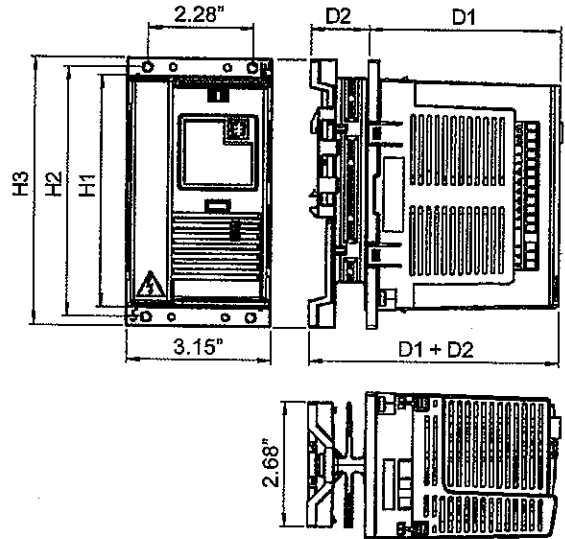
Standard ratings, ambient temperature 40 °C

	Rated motor power P_N (HP)	Rated output current I_2		Type designation	Rated input current I_1		Frame size	Dimensions (See Drawing Below)					Weight	
		Rated current 3~ I_2 (A)	Max current 3~ I_{max} (A)		1 phase I_1 , 1~ (A)	3 phase I_1 , 3~ (A)		H1	H2	H3	D1	D2	1~	3~
200 to 240 V, 1 phase input 50/60 Hz	0.5	2.2	3.3	ACS 141-K75-1	6.9	-	A	4.96	5.35	5.75	4.17	1.26	1.98	1.76
	0.75	3.0	4.5	ACS 141-1K1-1	9.0	-	B	4.96	5.35	5.75	4.17	2.72	2.64	2.42
	1.0	4.3	6.5	ACS 141-1K6-1	10.8	-	B	4.96	5.35	5.75	4.17	2.72	2.64	2.42
	1.5	5.9	8.9	ACS 141-2K1-1	14.8	-	C	7.80	8.19	8.59	4.17	4.10	4.84	4.40
	2.0	7.0	10.5	ACS 141-2K7-1	18.2	-	C	7.80	8.19	8.59	4.17	4.10	4.84	4.40
	3.0	9.0	13.5	ACS 141-4K1-1	22.0	-	D	8.86	9.25	9.65	4.45	4.53	5.94	5.50
200 to 240 V, 3 phase input 50/60 Hz	0.5	2.2	3.3	ACS 143-K75-1	-	3.2	A	4.96	5.35	5.75	4.17	1.26	1.98	1.76
	0.75	3.0	4.5	ACS 143-1K1-1	-	4.2	B	4.96	5.35	5.75	4.17	2.72	2.64	2.42
	1.0	4.3	6.5	ACS 143-1K6-1	-	5.3	B	4.96	5.35	5.75	4.17	2.72	2.64	2.42
	1.5	5.9	8.9	ACS 143-2K1-1	-	7.2	C	7.80	8.19	8.59	4.17	4.10	4.84	4.40
	2.0	7.0	10.5	ACS 143-2K7-1	-	8.9	C	7.80	8.19	8.59	4.17	4.10	4.84	4.40
	3.0	9.0	13.5	ACS 143-4K1-1	-	12.0	D	8.86	9.25	9.65	4.45	4.53	5.94	5.50
380 to 480 V, 3 phase input 50/60 Hz	1.0	2.0	3.0	ACS 143-1K6-3	-	2.7	B	4.96	5.35	5.75	4.17	2.72	2.64	2.42
	1.5	2.8	4.2	ACS 143-2K1-3	-	4.0	B	4.96	5.35	5.75	4.17	2.72	2.64	2.42
	2.0	3.6	5.4	ACS 143-2K7-3	-	5.1	C	7.80	8.19	8.59	4.17	4.10	4.84	4.40
	3.0	4.9	7.4	ACS 143-4K1-3	-	6.4	D	8.86	9.25	9.65	4.45	4.53	5.94	5.50

Mounting Options



In addition to traditional wall mounting and space saving DIN-rail mounting, the ACS 140 offers the added feature of flange mounting. When used in this configuration, the drive's heat sink is placed outside the cabinet, significantly reducing the enclosure's volume. The use of natural convection cooling increases the drive's reliability and allows greater mounting density.



NEW! NEMA 1 Enclosure

The ACS 100 and ACS 140 NEMA 1 Enclosure Kit provides a NEMA 1 housing for the ACS 100 and ACS 140 IP 20 protected chassis units. The NEMA 1 enclosure kit consists of a metal back plate with a conduit plate and a plastic cover. The drive's heatsink is flange mounted to the back plate, placing the heatsink fins outside the enclosure. The assembled NEMA 1 drive unit can be mounted to a vertical surface using a DIN rail or the mounting holes and slots in the heatsink.

