

ABB machinery drives

# Supplement to Users Manual ACS355 Low ambient start (+N828)



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# List of related manuals

## Drive manuals and guides

	<b>Code (English)</b>
ACS355 user's manual	3AUA0000066143
ACS355 drives with IP66/67 / UL Type 4x enclosure supplement	3AUA0000066066
ACS355 quick installation guide	3AUA0000092940
ACS355 common DC application guide	3AUA0000070130
ACS355 enhanced sequence program (+N830) Supplement	3AXD50000017465
ACS355 high speed program (+N826) Supplement	3AXD50000017574

## Option manuals and guides

FCAN-01 CANopen adapter module user's manual	3AFE68615500
FDNA-01 DeviceNet adapter module user's manual	3AFE68573360
FECA-01 EtherCAT® adapter module user's manual	3UA0000068940
FENA-01/-11 Ethernet adapter module user's manual	3AUA0000093568
FLON-01 LONWORKS® adapter module user's manual	3AUA0000041017
FMBA-01 Modbus adapter module user's manual	3AFE68586704
FPBA-01 PROFIBUS DP adapter module user's manual	3AFE68573271
FRSA-00 RS-485 adapter board user's manual	3AFE68640300
MFDT-01 FlashDrop user's manual	3AFE68591074
MPOT-01 potentiometer module instructions for installation and use	3AFE68591082
MREL-01 output relay module user's manual	3AUA0000035974
MTAC-01 pulse encoder interface module user's manual	3AFE68591091
MUL1-R1 installation instructions for ACS150, ACS310, ACS320, ACS350 and ACS355	3AFE68642868
MUL1-R3 installation instructions for ACS310, ACS320, ACS350 and ACS355	3AFE68643147
MUL1-R4 installation instructions for ACS310, ACS320, ACS350 and ACS355	3AUA0000025916
SREA-01 Ethernet adapter module quick start-up guide	3AUA0000042902
SREA-01 Ethernet adapter module user's manual	3AUA0000042896
ACS355 and AC500-eCo application guide	2CDC125152M0201
AC500-eCo PLC and ACS355 quick installation guide	2CDC125145M0201

## Maintenance manuals and guides

Guide for capacitor reforming in ACS50, ACS55, ACS150, ACS310, ACS350, ACS355, ACS550, ACH550 and R1-R4 OINT/SINT boards	3AFE68735190
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You can find manuals and other product documents in PDF format on the Internet. See section Document library on the Internet on the inside of the back cover. For manuals not available in the Document library, contact your local ABB representative.

# Supplement to User's Manual

## ACS355 Low ambient start (+N828)

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# 1

# Introduction to the supplement

## **What this chapter contains**

The chapter describes safety issues, scope of this supplement, applicability, target audience and purpose of this supplement. It describes the contents of this supplement and refers to a list of related manuals for more information.

## **Safety**

Safety related instructions please refer to ACS355 user's manual (3AUA0000066143 [English]). The safety instructions must be followed when installing, operating and servicing the drive. Please study the complete safety instructions carefully.

## **Scope**

This document is a supplement to the ACS355 user's manual (3AUA0000066143 [English]). This supplement covers all differences between low ambient start and ACS355 standard firmware. Only the low ambient start contents are given in each chapter of this supplement.

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The following chapters please refer to ACS355 user's manual (3AUA0000066143 [English]):

- Operation principle and hardware description
- Mechanical installation
- Planning the electrical installation
- Electrical installation
- Installation checklist
- Control panels
- Application macros
- Startup, control with I/O and ID run
- Fieldbus control with fieldbus adapter
- Fault tracing
- Maintenance and hardware diagnostics
- Technical data
- Appendixes

### **Applicability**

The manual is applicable to the ACS355 low ambient start firmware version 5098 or later. See parameter 3301 FIRMWARE. Option code +N828 in the drive type code shows that the drive has the low ambient start installed.

### **Target audience**

This supplement is intended for people who work with ACS355 low ambient start. The reader of this supplement is expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.

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## **Purpose of the manual**

This manual provides information needed for commissioning, operating and maintaining the ACS355 low ambient start.

## **Contents of this supplement**

The supplement consists of the following chapters:

- Introduction to the supplement (this chapter, page 7) describes safety issues, scope of supplement, applicability, target audience and purpose of this manual.
- Program features (page 11) describes program features. There are also lists of related user settings in each section.
- Actual signals and parameters (page 13) describes the actual signals and parameters related to high speed program and gives the fieldbus equivalent values for each signal/parameter.
- Further information (page 15) tells how to make product and service inquiries, get information on product training, provide feedback on ABB Drives manuals and how to find documents on the Internet.

## **Related documents**

See List of related manuals on page 2 (inside of the front cover).

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## Overview

### What this chapter contains

The chapter provides an overview of the ACS355 low ambient start firmware. For other standard program overviews please refer to the ACS355 user's manual (3AUA0000066143 [English]).

### Overview

The standard lower operating limit for the ACS355 is  $-10^{\circ}\text{C}$ . Below this temperature the drive would issue a THERM FAIL (F18) fault. The Low ambient start firmware lowers the issuing of this fault to  $-40^{\circ}\text{C}$ .

The firmware allows the ACS355 to be started at an ambient temperature as low as  $-40^{\circ}\text{C}$ . Once the ACS355 is started, its operational ambient environment needs to increase in temperature to  $-10^{\circ}\text{C}$  or greater.

### Operational environment requirements

To prevent condensation or frost inside the drive, ABB recommends that at temperatures below  $-10^{\circ}\text{C}$  the drive's power remain ON. The low ambient start firmware requires a sequential start if the drive temperature has dropped below  $-10^{\circ}\text{C}$ .

The ACS355 must first be powered on. After waiting five (5) minutes, the START command can be issued.

Once the drive START command is issued, the ambient temperature of the drive is required to rise to  $-10^{\circ}\text{C}$  or greater within sixty (60) minutes.

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# Program features

## What this chapter contains

The chapter describes ACS355 low ambient start features. There are also lists of related user settings in each section. Other standard program features please refer to chapter Program features in ACS355 user's manual (3AUA0000066143 [English]).

## Control program introduction

The low ambient start firmware for an ACS355 extends the lower temperature limit for starting from  $-10^{\circ}\text{C}$  to  $-40^{\circ}\text{C}$ . This firmware extends the lower temperature operational limit (for starting purposes) to  $-40^{\circ}\text{C}$ . Once the ACS355 is started, its operational ambient temperature needs to be  $-10^{\circ}\text{C}$  or above.

## Starting and operational requirements

To prevent condensation or frost inside the drive, ABB recommends that at temperatures below  $-10^{\circ}\text{C}$  the drive's power remain ON. The low ambient start firmware requires a sequential start if the drive temperature has dropped below  $-10^{\circ}\text{C}$ .

The ACS355 must first be powered on. After waiting five (5) minutes, the START command can be issued.

Once the drive START command is issued, the ambient temperature of the drive is required to rise to  $-10^{\circ}\text{C}$  or greater within sixty (60) minutes.

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## Motor heating function

The ACS355 +N828 drive includes a motor heating function for extreme low ambient applications. The drive can be programmed to apply a constant DC current (DC Injection) to the motor. This feature is used to prevent condensation build up in the motor and drive.

### ■ Settings

Parameter	Additional information
2104 DC HOLD CTL	Activates the motor heating feature
2114 HEATING CURR REF	The percentage of motor FLA that is to be dc injected into the motor windings
2115 MOT HEATING SEL	Defines the input that turns on motor heating

### ■ Diagnostics

Alarm	Additional Information
2038	Motor heating active.



# Actual signals and parameters

## What this chapter contains

The chapter describes the actual signals and parameters related to low ambient start and gives the fieldbus equivalent values for each signal/parameter.

## Terms and abbreviations

Term	Definition
Actual signal	Sequence program related signals measured or calculated by the drive. Can be monitored by the user. No user setting possible.
Def	Parameter default value
Parameter	A user-adjustable sequence program operation instruction of the drive. Note: Parameter selections are shown on the basic control panel as integer values. E.g. parameter 1001 EXT1 COMMANDS selection COMM is shown as value 10 (which is equal to the fieldbus equivalent FbEq).
FbEq	Fieldbus equivalent: The scaling between the value and the integer used in serial communication.

*Note: More information about drive parameters please refer to the section Actual signal and parameters in ACS355 User's manual (3AUA0000066143 [English]).*

**Actual signals**

No.	Name/Value	Description	Def/ FbEq
33	INFORMATION DATA	Firmware package version, test date, ect.	
3301	FIRMWARE	Shows version 5098 or later	



## Parameters

No.	Name/Value	Description	Def/ FbEq
21	START/STOP	Start and stop modes of the motor	
2104	DC HOLD CTL	Activates the DC hold or DC braking function.	NOT SEL
	NOT SEL	Inactive	0
	DC HOLD	<p>DC hold function active. DC hold is not possible if parameter 9904 MOTOR CTRL MODE setting is SCALAR: FREQ.</p> <p>When both the reference and the motor speed drop below the value of parameter 2105 DC HOLD SPEED, the drive will stop generating sinusoidal current and start to inject DC into the motor. The current is set by parameter 2106 DC CURR REF. When the reference speed exceeds parameter 2105 value, normal drive operation continues.</p> <p>Note: DC hold has no effect if the start signal is switched off.</p> <p>Note: Injecting DC current into the motor causes the motor to heat up. In applications where long DC hold times are required, externally ventilated motors should be used. If the DC hold period is long, the DC hold cannot prevent the motor shaft from rotating if a constant load is applied to the motor.</p>	1

**Parameters**

No.	Name/Value	Description	Def/ FbEq
	DC BRAKING	DC current braking function active.  If parameter 2102 STOP FUNCTION is set to COAST, DC braking is applied after the start command is removed.  If parameter 2102 STOP FUNCTION is set to RAMP, DC braking is applied after the ramp	2
	MTR HEATING	DC current is injected into the motor causing it to remain warm. The amount of DC current injected is set with parameter 2114 .	3
	2114 HEATING CURR REF	Valve as a percentage of the FLA motor current. (Parameter 9906 MOTOR NOM CURR)	0.0%
	0...30%	Percentage of motor FLA	1 = 1%
	2115 MOT HEATING SEL	Defines the input that turns on/off motor heating	0
	NOT SEL	Not Selected	0
	DI1	Digital input DI1. 1 = ramp pair 2, 0 = ramp pair 1.	1
	DI2	See selection DI1.	2
	DI3	See selection DI1.	3
	DI4	See selection DI1.	4
	DI5	See selection DI1.	5

## Parameters

No.	Name/Value	Description	Def/ FbEq
COMM		Fieldbus interface as the source for ramp pair 1/2 selection, ie Control word 0301 FB CMD WORD 1 bit 10. The Control word is sent by the fieldbus controller through the fieldbus adapter or embedded fieldbus (Modbus) to the drive. For the Control word bits, see section DCU communication profile on page 331.  Note: This setting applies only for the DCU profile.	7
DI1(INV)		Inverted digital input DI1. 0 = ramp pair 2, 1 = ramp pair 1.	-1
DI2(INV)		See selection DI1(INV).	-2
DI3(INV)		See selection DI1(INV).	-3
DI4(INV)		See selection DI1(INV).	-4
DI5(INV)		See selection DI1(INV).	-5

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# Fault tracing

## About this chapter

This chapter tells how to reset faults and view the fault history. It also lists the fault codes specific to drives with +N828 Low Ambient Start firmware.

## Safety

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**WARNING!** Only qualified electricians are allowed to maintain the inverter. Read the safety instructions in the chapter Safety, page before you work on the inverter.

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For general fault tracing information of ACS355 firmware, refer the following topics in *ACS355 User's manual (3AUA0000066143[English])*:

- Alarm messages generated by the drive
  - Alarms generated by the basic control panel
  - Fault messages generated by the drive
-

## Alarm and fault indications

A fault is indicated with a red LED. See section LEDs in *ACS355 User's manual (3AUA0000066143[English])*.

An alarm or fault message on the panel display indicates an abnormal inverter status. Using the information given in this chapter, most alarm and fault causes can be identified and corrected. If not, contact your local ABB representative.

To display the alarms on the control panel, set parameter 1610 DISPLAY ALARMS to value 1 (YES). See 16 SYSTEM CONTROLS in *ACS355 User's manual (3AUA0000066143[English])*.

The four-digit code number in parenthesis after the fault is for the fieldbus communication. See chapters Fieldbus control with embedded fieldbus and Fieldbus control with fieldbus adapter in *ACS355 User's manual (3AUA0000066143[English])*.

## How to reset

During a fault condition, you can reset the inverter by pressing the keypad key



(basic control panel)

OR



(assistant control panel)

through digital input or fieldbus or by switching off the supply voltage for a while. The source for the fault reset signal is selected by parameter 1604 FAULT RESET SEL. You can restart the motor after the fault is removed.

## Fault history

The fault history stores all the detected faults. The latest faults are stored together with the time stamp.

Parameters 0401 LAST FAULT, 0412 PREVIOUS FAULT 1 and 0413 PREVIOUS

FAULT 2 store the most recent faults. Parameters 0401...0409 show the inverter operation data at the time the latest fault occurred. The assistant control panel provides additional information about the fault history.

For more information, see section Fault logger mode in *ACS355 User's manual (3AUA0000066143[English])*.

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## Alarm messages

The following alarm messages are generated by the Low Ambient Start firmware.

Code	Alarm	Cause	What to do
2038	MOTOR HEATING ACTIVE	DC injection circuit is putting DC current into the motor.	This is a warning message notifying maintenance that current is being supplied to the motor.





## Further information

### **Product and service inquiries**

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to [www.abb.com/searchchannels](http://www.abb.com/searchchannels).

### **Product training**

For information on ABB product training, navigate to [www.abb.com/drives](http://www.abb.com/drives) and select Training courses.

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