ACS 160

Installation and Start-up Guide

DeviceNet Adapter Module
CFB-DEV

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Safety Instructions

Overview

This chapter states the safety instructions that must be followed when installing and operating the CFB-DEV DeviceNet Adapter Module.

The material in this chapter must be studied before attempting any work on, or with, the unit.

Warnings and Notes

This manual distinguishes two sorts of safety instructions. Warnings are used to inform of conditions which can, if proper steps are not taken, lead to a serious fault condition, physical injury and death. Notes are used when the reader is required to pay special attention or when there is additional information available on the subject. Notes are less crucial than Warnings, but should not be disregarded.

Warnings

Readers are informed of situations that can result in serious physical injury and/or serious damage to equipment with the following symbols:

Dangerous Voltage Warning: warns of situations in which a high voltage can cause physical injury and/or damage equipment. The text next to this symbol describes ways to avoid the danger.

General Warning: warns of situations which can cause physical injury and/or damage equipment by means other than electrical. The text next to this symbol describes ways to avoid the danger.

Electrostatic Discharge Warning: warns of situations in which an electrostatic discharge can damage equipment. The text next to this symbol describes ways to avoid the danger.

Notes Readers are notified of the need for special attention or additional information available on the subject with the following symbols:

CAUTION! **Caution** aims to draw special attention to a particular issue.

Note: **Note** gives additional information or points out more information available on the subject.

General Safety Instructions

WARNING! All electrical installation and maintenance work on the drive should be carried out by qualified electricians.

The drive and adjoining equipment must be properly earthed.

Do not attempt any work on a powered drive. After switching off the mains, always allow the intermediate circuit capacitors 5 minutes to discharge before working on the frequency converter, the motor or the motor cable. It is good practice to check (with a voltage indicating instrument) that the drive is in fact discharged before beginning work.

The motor cable terminals of the drive are at a dangerously high voltage when mains power is applied, regardless of motor operation.

There can be dangerous voltages inside the drive from external control circuits even when the drive mains power is shut off. Exercise appropriate care when

working with the unit. Neglecting these instructions can cause physical injury and death.

WARNING! There are several automatic reset functions in the drive. If selected, they reset the unit and resume operation after a fault. These functions should not be selected if other equipment is not compatible with this kind of operation, or dangerous situations can be caused by such action.

More Warnings and Notes are printed at appropriate instances along the text.

Table of Contents

Chapter 5 – Communication

Chapter 6 – Fault Tracing

Appendix A – Technical Data

Appendix B – Ambient Conditions

Chapter 1 – Introduction to This Guide

Intended Audience

The Guide is intended for the people who are responsible for commissioning and using a CFB-DEV DeviceNet Adapter Module with an ABB drive. The reader is expected to have a basic knowledge of electrical fundamentals, electrical wiring practices, how to operate the drive, and the DeviceNet protocol.

Before You Start

It is assumed that the drive is installed and ready to operate before starting the installation of the adapter module.

In addition to conventional installation tools, have the drive manuals available during the installation as they contain important information not included in this guide. The drive manuals are referred to at various points of this guide.

What This Guide Contains

This manual contains information on the wiring, configuration and use of the CFB-DEV module.

Safety Instructions are featured in the first few pages of this Guide. Safety Instructions describe the formats for various warnings and notations used within this Guide.

Chapter 2 – Overview contains a short description of the DeviceNet protocol and the CFB-DEV DeviceNet Adapter Module, a delivery checklist, and warranty information.

Chapter 3 – Installation contains wiring, bus termination and earthing instructions.

Chapter 4 – Programming explains how to program the master station and the drive before the

communication through the adapter module can be started.

Chapter 5 – Communication contains a description of how data is transmitted through the CFB-DEV module. This chapter also explains how to configure the Scanner.

Chapter 6 – Diagnostics explains how to fault diagnose the DeviceNet connection during installation and normal operation.

Appendix A contains Technical Data.

Appendix B contains a specification of the ambient conditions allowed during transportation, storage and use of the CFB-DEV module.

Definitions and Abbreviations

Bit-Strobe Message — The Bit-Strobe Command is an I/O Message that is transmitted by the Master. A Bit-Strobe Command Message has multi-cast capabilities. Multiple Slaves can receive and react to the same Bit-Strobe Command (multi-cast capabilities). The Bit-Strobe Response is an I/O Message that a Slave transmits back to the Master when the Bit-Strobe Command is received.

CFB-DEV DeviceNet Adapter Module — The CFB-DEV module is an optional device for the ACS 160 that enables the connection of the drive to a DeviceNet serial communication bus.

Change of State/ Cyclic Message — The Change of State/Cyclic Message is transmitted by either the Master or the Slave. A Change of State/Cyclic Message is directed towards a single specific node (point-to-point). An Acknowledge Message may be returned in response to this message.

Input In the ODVA DeviceNet specification the word ‘input’ is used to describe data flow from a device into to the network. In this manual, however, the word ‘input’ is used to describe data flow to a device such as the CFB-DEV.

I/O Assembly Selection Smart networked devices (such as the CFB-DEV) can produce and/or consume more than one I/O value. Typically, they will produce and/or consume one or more I/O value, as well as status and diagnostic information. Each piece of data communicated by a device is represented by an attribute of one of the device’s internal objects.

Transmission of multiple pieces of data (attributes) across a single I/O connection requires that the attributes be grouped or assembled together into a single block.

MAC ID Every node on DeviceNet network has to have a unique identifier. This node number is called MAC ID on device net (Media Access Control ID).

ODVA The ODVA (Open DeviceNet Vendor Association) is an independent organisation that promotes interoperativity between different manufacturers DeviceNet products. ABB is an Associate Member of the ODVA. See *www.odva.org.*

Output In the ODVA DeviceNet specification, the word ‘output’ is used to describe data flow from the network into a device. In this manual, however, the word ’output’ is used to describe data flow from a device such as the CFB-DEV.

Parameter A parameter is an operating instruction for the drive. Parameters can be read and programmed with the drive control panel, or through the CFB-DEV module.

Poll Message

Most DeviceNet Scanners and the CFB-DEV support 3 different data services. These are the Poll, Bit-Strobe and Change of State/Cyclic messages.

The Poll Command is an I/O Message transmitted by the Master. A Poll Command is directed towards a single, specific Slave (point-to-point, the CFB-DEV always acts as a Slave). A Master must transmit a separate Poll Command Message for each one of its Slaves that is to be polled. The Poll Response is an I/O Message that a Slave transmits back to the Master when the Poll Command is received.

Scanlist

The DeviceNet Scanner communicates with the DeviceNet Slaves in a user-defined order. This order of communication is the scanlist. The scanlist contains a complete list of the Slave nodes, and the order in which the Slaves are accessed.

Chapter 2 – Overview

Overview

This chapter contains a short description of the DeviceNet bus topology, the CFB-DEV DeviceNet Adapter Module, a delivery checklist, and warranty information.

Further information on DeviceNet can be obtained from *www.odva.org.*

DeviceNet Bus Topology

The DeviceNet network has a linear bus topology. Terminating resistors are required on each end of the trunk line. Drop lines as long as 6 metres (20 feet) each are permitted, allowing one or more nodes to be attached. DeviceNet allows branching structures only on drop lines. An example of an allowable topology is shown below.

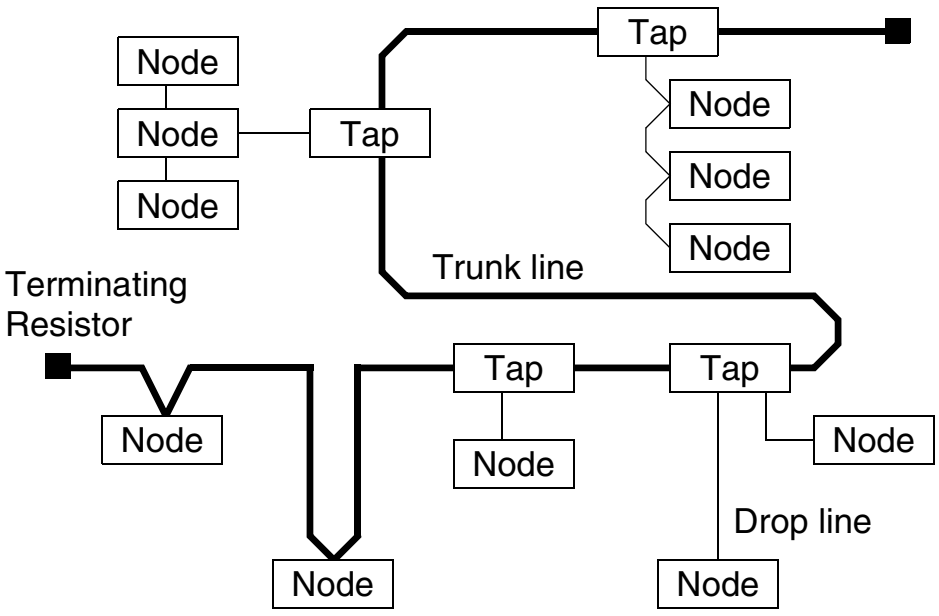


Figure 2-1 DeviceNet bus topology.

The maximum length of trunk cable depends on the data rate and on the type of the cable used (see Appendix A).

Terminating Resistor

The DeviceNet network should be terminated at both ends of the trunk cable with a 121 Ω, ¼ W, 1% Metal Film resistor. Connect this resistor between the two signal wires (CAN_H, CAN_L) on the DeviceNet cable.

The CFB-DEV DeviceNet Adapter Module

The CFB-DEV DeviceNet Adapter Module is an optional device for an ABB ACS 160 drive which enables the connection of the drive to a DeviceNet system. The drive is considered a slave in the DeviceNet network. Through the CFB-DEV module, it is possible to:

- Give control commands to the drive (Start, Stop, Run enable, etc.)
- Feed a motor speed reference to the drive
- Give a process actual value or a process reference to the PID controller of the drive
- Read status information and actual values from the drive
- Read and write drive parameter values
- Reset a drive fault.

The CFB-DEV acts as a Class 2 slave only with predefined master-slave connection set services, viz. 5 UCMM Explicit Server, 1 Master/Slave Explicit Server, 1 Master/Slave Polled I/O Server, 1 Master/Slave Change of State I/O. The DeviceNet commands and services supported by the CFB-DEV are discussed in Chapter 5.

The adapter module is mounted onto the housing of the ACS 160 drive. See the *ACS 160 User's Manual* for more information.

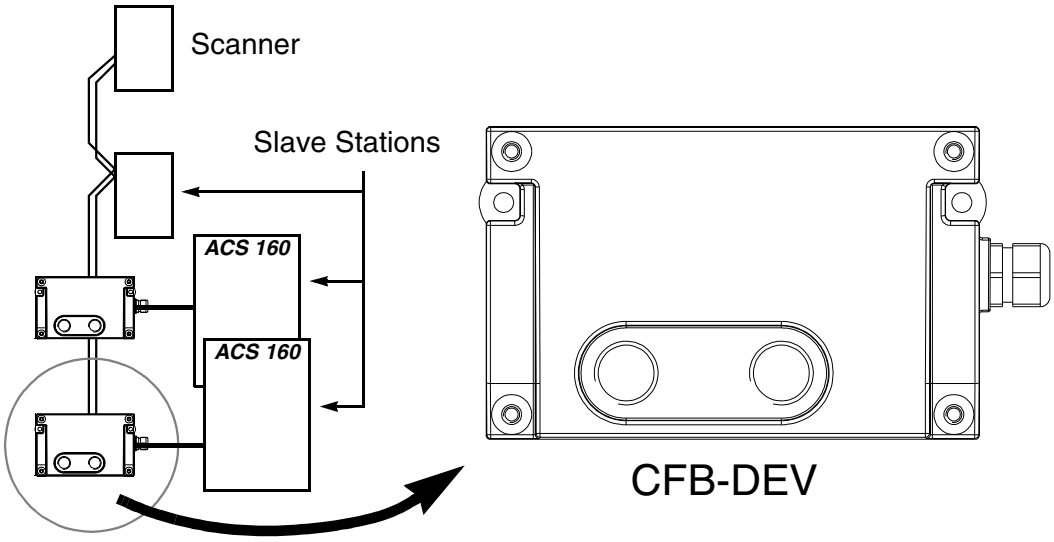


Figure 2-2 The construction of the DeviceNet link and the CFB-DEV DeviceNet Adapter Module.

Delivery Check The option package for the CFB-DEV module contains:

- DeviceNet Adapter Module, Type CFB-DEV
- 2 pcs M16×1.5 cable glands with O ring
- 2 pcs M4×12 mounting screws
- this manual, the *CFB-DEV Installation and Start-up Guide*.

Warranty and Liability Information

The warranty for your ABB drive and options 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 ABB drive, contact your local distributor or ABB Drives office.

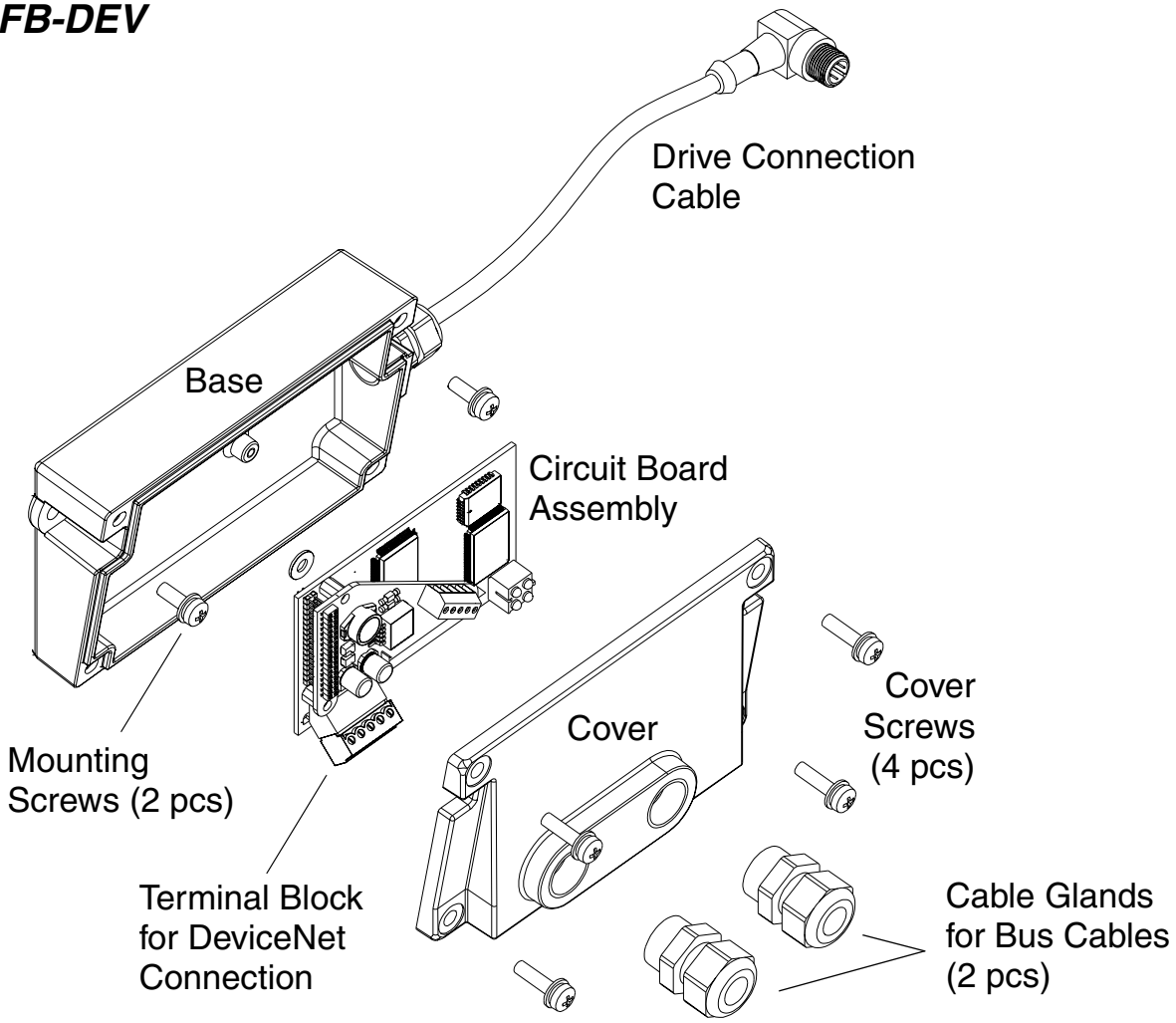
The technical data and specifications are valid at the time of printing. ABB reserves the right to subsequent alterations.

Chapter 3 – Installation

WARNING! Follow the safety instructions given in this Guide and in the *ACS 160 User's Manual.*

WARNING! The CFB-DEV contains components sensitive to electrostatic discharge (ESD). Wear an earthing wrist band when handling the circuit board assembly. Do not touch the boards unnecessarily.

Exploded View of the CFB-DEV



Mounting

The CFB-DEV is mounted onto the ACS 160 drive with two screws as shown in the *ACS 160 User's Manual.* This also provides the earthing of the module housing.

Drive Connection

The CFB-DEV uses the control panel connector of the drive. (However, leave the CFB-DEV disconnected at this point since the control panel is needed later for setting up the communication parameters.)

The CFB-DEV is powered through the drive control panel connector.

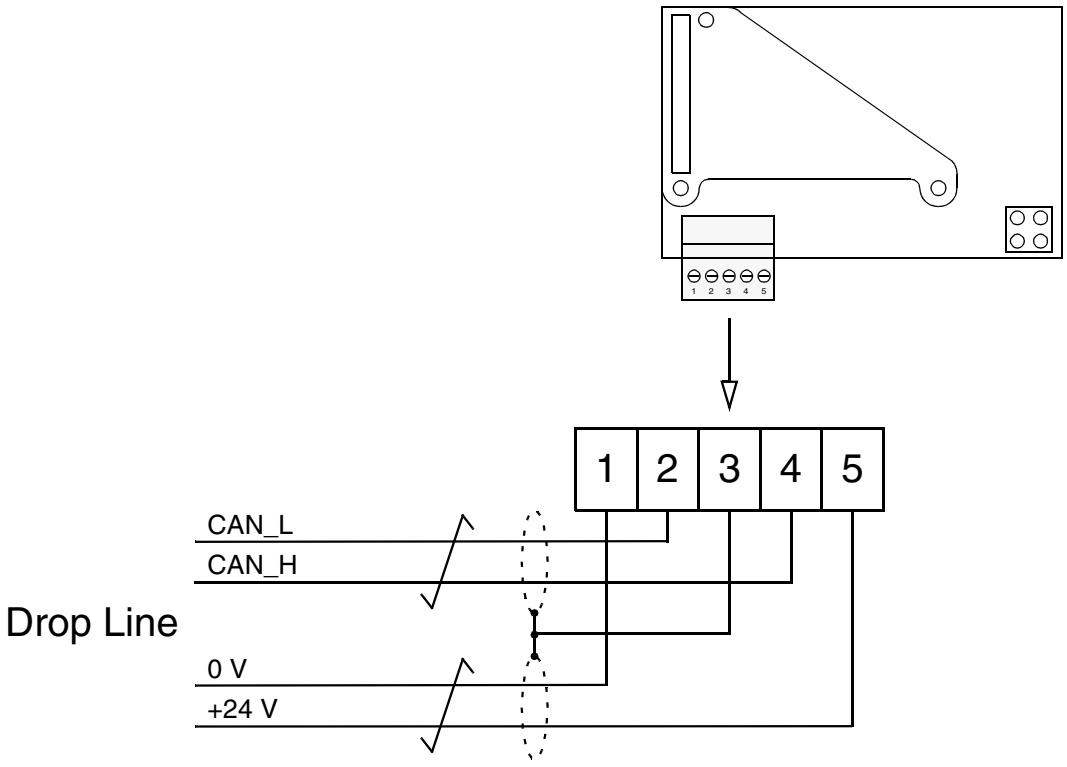
DeviceNet Connection

The CFB-DEV provides two cable entries for the incoming and outgoing DeviceNet cables. The cables are connected to a detachable terminal header, which enables the disconnection of the CFB-DEV without interrupting the data transfer to other devices.

If only one bus cable is connected, the unused cable entry should be plugged.

To connect the DeviceNet cables, follow this procedure:

1. Lead the bus cables to the space where the ACS 160 and the CFB-DEV are installed in. Arrange the bus cables as far away from any power cables as possible. Avoid parallel runs. Use grommets or cable glands at all cable lead-throughs for protection.
2. Remove the cover of the CFB-DEV module. Fasten the cable glands to the cover (if not done already).
3. Lead the bus cables through the cable glands and the cover. Loosen the clamping nuts of the cable glands if necessary.
4. Detach the terminal header from its receptacle on the circuit board assembly and make the connections.



Bus Connector Terminal Designations

Terminal		Description
1	V-	Power supply negative (0 V)
2	CAN_L	DeviceNet bus signal LOW
3	SHIELD	Bus cable screen
4	CAN_H	DeviceNet bus signal HIGH
5	V+	Power supply positive (+24 V)

5. Re-insert the terminal header into its receptacle.
6. Replace the cover of the CFB-DEV.
7. Tighten the clamping nuts of the cable glands.

DeviceNet Bus Termination

The DeviceNet network should be terminated at both ends of the trunk cable with a 121 ohm, ¼ watt, 1% metal film resistor. The resistor is to be connected between the two signal conductors (CAN_H and CAN_L) of the DeviceNet cable.

Chapter 4 – Programming

Overview

This chapter gives information on configuring the DeviceNet Scanner and the drive for communication through the CFB-DEV DeviceNet Adapter Module.

Configuring the System

After the CFB-DEV module has been mechanically and electrically installed, the drive must be prepared for communication with the module and the DeviceNet Scanner.

Please refer to the Scanner documentation for information on configuring the system for communication with the CFB-DEV. Configuration (EDS) files for the CFB-DEV are available through your local ABB representative.

DeviceNet Connection Configuration

The communication between the drive and the CFB-DEV module is configured through drive parameters. As the control panel of the drive and the CFB-DEV share the same connector, the parameters must be set before detaching the panel and connecting the CFB-DEV.

The parameters that configure the CFB-DEV are listed in Table 4-1 below. The alternative selections for these parameters are discussed in more detail below the table.

Note: After making the necessary parameter adjustments, power down the drive, disconnect the control panel, connect the CFB-DEV, and power up the drive.

Table 4-1 The CFB-DEV configuration parameters.

Param. No.	Parameter Name	Alternative Settings	Default Setting
5101	Module Type	**0** None; …; **6** CFB-DEV; …; **9** Other	**6** CFB-DEV
5102	DeviceNet Fault Mode	**0** NOT SEL; **1** FAULT; **2** CONST SP 7; **3** LAST SPEED	**0** NOT SEL
5103	User-defined Output Param. 1	**0** None; **1…9910** (ACS 160 Parameter No.)	**0** None
5104	User-defined Output Param. 2	**0** None; **1…9910** (ACS 160 Parameter No.)	**0** None
5105	Input Assembly Instance	**0** 20; **1** 21; **2** 100	**0** 20
5106	Output Assembly Instance	**0** 70; **1** 71; **2** 101	**0** 70
5107	Baudrate MacID	125 kbit/s; 250 kbit/s; 500 kbit/s 0…63h (See text.)	**63** (125 kbit/s, MacID = 63)
5108	Speed Scaling	**-128…127**	**0**
5109	Time Scaling	**-128…127**	**0**
5110	Stop Mode	**1** Coast; **2** Ramp	**1** Coast

5101 Module Type This parameter must be set to 6.

5102 DeviceNet Fault Mode Defines the action of the module upon a DeviceNet communication error. For further information, see the Control Supervisor Object on page 5-25.

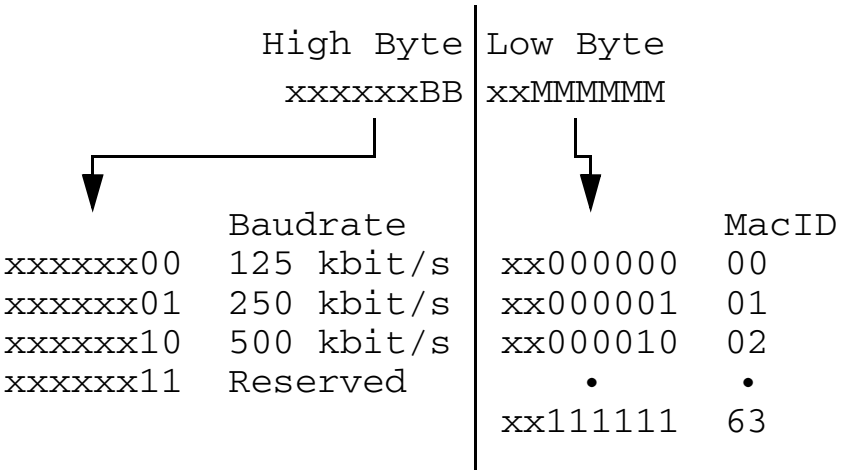
5103 User-defined Output Parameter 1 Source selector for TRANSPARENT assembly, Instance 101, Actual Value 1. See page 5-9.

5104 User-defined Output Parameter 2 Target selector for TRANSPARENT assembly, Instance 101, Actual Value 2. See page 5-9.

5105 Input Assembly Instance Selects the active instance for transferring data to the drive. See ***Assembly Object (0x04)*** starting page 5-5.

5106 Output Assembly Instance Selects the active instance for transferring data from the drive. See ***Assembly Object (0x04)*** starting page 5-5.

5107 Baudrate/MacID This parameter defines both the baudrate used for DeviceNet communication and the node number (MacID) for the module.



For example, a baudrate of 250 kbit/s and MacID 63 are entered as follows:

250 kbit/s → `xxxxxx01 00000000` = 256
63 → `xx111111`

→ The value for the parameter is 256 + 63 = 319.

5108 Speed Scaling (Not effective with Instances 100/101.) Speed scaling. Scaled speed equals rpm / $2^{[\text{value of } 5114]}$.

5109 Time Scaling (Not effective with Instances 100/101.) Time scaling. Scaled time equals ms / $2^{[\text{value of } 5115]}$.

5110 Stop Mode Upon a Stop command, selects whether the drive coasts to stop or decelerates along a pre-defined time ramp. See the *ACS 160 User's Manual,* Parameter Group 21.

Other Parameters

Fieldbus Communication

Parameters 5204 COMM FAULT TIME and 5205 COMM FAULT FUNC define the action taken in the event of a communication error between the CFB-PDP module and the drive.

Control Locations and Actual Signal Selections

The ACS 160 drive can receive control signals from multiple sources (such as the digital and analogue inputs, the control panel, and a fieldbus adapter). The user can separately determine the source for each type of control information, and select which operating data is output as actual signals by the drive. Especially refer to parameter groups 10, 11, 15 and 16 in the *ACS 160 User's Manual* for information on the selection parameters.

Chapter 5 – Communication

Overview

This chapter describes the DeviceNet communication protocol for the CFB-DEV and the configuration of the scanner. For detailed information on DeviceNet communication, refer to ODVA DeviceNet Specifications Release 2.0.

Introduction to DeviceNet

DeviceNet is a protocol based on CAN technology. CAN specifies the physical layer interface. DeviceNet specifies the wiring, and the data transfer through CAN.

The CFB-DEV is a device that acts as a Group 2 Only Server realising the Predefined Master Slave Connection Set functionality. The Offline Connection Set functionality and UCMM are not supported.

Object Modelling and Functional Profiles

One of the main features of DeviceNet is Object modelling. A group of Objects can be described with a Functional Profile. The CFB-DEV realises the ODVA AC/DC Drive Functional Profile with additional features.

The following Objects are supported by the CFB-DEV:

Object		Class
DeviceNet Objects	Identity	0x01
	Message Router	0x02
	DeviceNet	0x03
	Assembly	0x04
	DeviceNet Connection	0x05
	Acknowledge Handler	0x2B
Profile-specific Objects	AC/DC	0x2A
	Control Supervisor	0x29
	Motor Data	0x28
Vendor-specific Objects	CFB-DEV Parameters	0x64

Identity Object (0x01)

Class Attributes							
#	**Name**	**Services**	**Description**	**Default**	**Min**	**Max**	**Data Type**
1	Revision	Get	Revision of Identity Object	1			UINT

Instance Attributes							
#	**Name**	**Services**	**Description**	**Default**	**Min**	**Max**	**Data Type**
1	Vendor ID	Get	Identification of vendor	90			UINT
2	Device Type	Get	Indication of general type of product	2			UINT
3	Product Code	Get	Product code	46			UINT
4	Revision	Get	Revision of the item the Identity Object represents	(1,1)			Array of USINT USINT
5	Status	Get	Summary status of device	0	0	255	WORD
6	Serial Number	Get	Serial number of device	N/A			UDINT
7	Product Name	Get	Information	“ACS 160-DEVS-DEV”			SHORT_ STRING
9	Config. Consist. Value	Get	Device configuration	N/A			UINT

Message Router Object (0x02)

Class Attributes (0)				
#	**Name**	**Services**	**Description**	**Data Type**
1	Revision	Get_Attribute_Single	Revision of Identity Object	UINT

DeviceNet Object (0x03)

Class Attributes (0)				
#	**Name**	**Services**	**Description**	**Data Type**
1	Revision	Get	Revision of DeviceNet Object Class Definition on which the implementation is based	UINT

Instance Attributes (1)							
#	**Name**	**Services**	**Description**	**Default**	**Min**	**Max**	**Data Type**
1	MacID	Get_Attribute_Single	Node address	–	0	63	USINT
2	Baud Rate	Get_Attribute_Single	Baud rate of device	–	0	2	USINT
3	Allocation Info	Get_Attribute_Single	Allocation choice Master's MacID	N/A			UINT

Assembly Object (0x04)

I/O Assembly Instances may also be referred to as Block Transfer of data. Intelligent devices, such as the CFB-DEV, realising a Functional Profile have several objects. Since it is not possible to transmit more than one Object data through a single Connection, it is practical and more efficient to group Attributes from different Objects into a single I/O connection (for example a Polled Connection) using the Assembly Object. The Assembly Object acts as a tool for grouping these attributes.

The Assembly Selections described above are in fact Instances of the Assembly Object Class. The CFB-DEV uses Static Assemblies (in other words, fixed groupings of different object data only). These are predefined and cannot be changed.

The CFB-DEV communicates with the drive mainly using fast cyclic data set communication. The size and meaning of the data transmitted via data sets is predefined. The following tables describe the predefined assembly instances supported by the CFB-DEV.

BASIC SPEED Assembly

The BASIC SPEED Assembly is defined by the ODVA AC/DC Drive Profile. The format of the input assembly is:

Instance 20								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Fault Reset		Run Fwd
1								
2	Speed Reference (Low Byte)							
3	Speed Reference (High Byte)							

Name	**Class**	**Instance**	**Attribute**		**Type**
			Name	**Number**	
RunFwd	Control Superv	1	Run1	3	BOOL
Reset	Control Superv	1	FaultRst	12	BOOL
Speed Ref	AC/DC Drive	1	SpeedRef	8	INT

The format of the output assembly is:

Instance 70								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Running Forward		Faulted
1								
2	Speed Actual Value (Low Byte)							
3	Speed Actual Value (High Byte)							

Name	**Class**	**Instance**	**Attribute**		**Type**
			Name	**Number**	
Faulted	Control Superv	1	Faulted	9	BOOL
Running Forward	Control Superv	1	Running1	7	BOOL
Speed Act	AC/DC Drive	1	SpeedAct	7	INT

Note: If the BASIC SPEED assembly is used, it must be ensured that the following settings are in effect:

- External control location selection is set to EXT1, and COMM is selected as the source for EXT1.
- RUN ENABLE signal is taken from the CFB-DEV module . (This is necessary for having an ODVA Drive Profile-compliant control logic.)
- Reference and actual values are scaled correctly both in the drive and in the CFB-DEV.

EXTENDED SPEED Assembly

The format of the input assembly is:

Instance 21								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0		NetRef	NetCtrl			Fault Reset	Run Reverse	Run Fwd
1								
2	Speed Reference (Low Byte)							
3	Speed Reference (High Byte)							

Name	**Class**	**Instance**	**Attribute**		**Type**
			Name	**Number**	
RunFwd	Control Superv	1	Run1	3	BOOL
RunRev	Control Superv	1	Run2	4	BOOL
Reset	Control Superv	1	FaultRst	12	BOOL
NetCtrl	Control Superv	1	NetCtrl	5	BOOL
NetRef	AC/DC Drive	1	NetRef	4	BOOL
Speed Ref	AC/DC Drive	1	SpeedRef	8	INT

The format of the output assembly is:

Instance 71								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	At Reference	Ref From Net	Ctrl From Net	Ready	Running Reverse	Running Forward	Warning	Faulted
1	Drive State							
2	Speed Actual Value (Low Byte)							
3	Speed Actual Value (High Byte)							

Name	**Class**	**Instance**	**Attribute**		**Type**
			Name	**Number**	
Faulted	Control Superv	1	Faulted	9	BOOL
Warning	Control Superv	1	Warning	11	BOOL
Running Forward	Control Superv	1	Running1	7	BOOL
Running Reverse	Control Superv	1	Running2	8	BOOL
Ready	Control Superv	1	Ready	9	BOOL
CtrlFromNet	Control Superv	1	CtrlFromNet	15	BOOL
DriveState	Control Superv	1	DriveState	6	USINT
RefFromNet	AC/DC Drive	1	RefFromNet	29	BOOL
At Ref	AC/DC Drive	1	AtRef	3	BOOL
Speed Act	AC/DC Drive	1	SpeedAct	7	INT

Note: If the EXTENDED SPEED assembly is used, it must be ensured that the following settings are in effect:

- External control location selection is set to EXT1, and COMM is selected as the source for EXT1.
- RUN ENABLE signal is taken from the CFB-DEV module . (This is necessary for having an ODVA Drive Profile-compliant control logic.)
- Reference and actual values are scaled correctly both in the drive and in the CFB-DEV.

TRANSPARENT Assembly

The format of the input assembly is:

Instance 100								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Control Word (Low Byte)							
1	Control Word (High Byte)							
2	*Reference 1 (Low Byte)							
3	*Reference 1 (High Byte)							
4	**Reference 2 (Low Byte)							
5	**Reference 2 (High Byte)							

*Reference (Speed). This value is available as the fieldbus reference for control location EXT1.
**Reference (%). (Not supported by the ACS 160 firmware at the time of publishing.)

The format of the output assembly is:

Instance 101								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Status Word (Low Byte)							
1	Status Word (High Byte)							
2	*Actual Value 1 (Low Byte)							
3	*Actual Value 1 (High Byte)							
4	**Actual Value 2 (Low Byte)							
5	**Actual Value 2 (High Byte)							

*This value is taken from address defined by Parameter 5103.
**This value is taken from address defined by Parameter 5104.

The Control Word and the Status Word

The Control Word (CW) is the principal means for controlling the drive from a fieldbus system. It is effective when the drive is in external (remote) control and the controlling commands are received through serial communication channel (set by parameters 1001 EXT1 COMMANDS, 1002 EXT2 COMMANDS and 1102 EXT1/EXT2 SEL).

Note: With the ACS 160, fieldbus control is only possible through external control location 1 (EXT1).

The Control Word (detailed in Table 5-1 below) is sent by the fieldbus master station to the drive. The drive switches between its states according to the bit-coded instructions of the Control Word. See also state machine in Figure 5-1.

The Status Word (SW) is a word containing status information, sent by the drive to the master station. The composition of the Status Word is explained in Table 5-3.

Note: Operation of Control Word and Status Word conforms to ABB Drives Profile with the exception of Control Word bit #10 (REMOTE_CMD), which is not used by the ACS 160.

Table 5-1 The Control Word. See also the State machine in Figure 5-1.

Bit	Value	Description
0	1	Enter ***READY TO OPERATE***
	0	Emergency OFF. Ramp to stop according to parameter 2203 DECELER TIME 1. Enter ***OFF1 ACTIVE*;** proceed to ***READY TO SWITCH ON*** unless other interlocks (OFF2, OFF3) are active.
1	1	Continue operation (OFF2 inactive)
	0	Emergency OFF, coast to stop. Enter ***OFF2 ACTIVE***; proceed to ***SWITCH-ON INHIBITED***.
2	1	Continue operation (OFF3 inactive)
	0	Emergency stop. Drive ramps to stop according to parameter 2205 DECELER TIME 2. Enter ***OFF3 ACTIVE***; proceed to ***SWITCH-ON INHIBITED*.**
3	0 - 1	Enter ***OPERATION ENABLED*** (Note that also the Run enable signal must be present on a digital input – see parameter 1601 RUN ENABLE.)
	0	Inhibit operation. Enter ***OPERATION INHIBITED***
4		Unused.
5	1	Normal operation. Enter ***RAMP FUNCTION GENERATOR: ACCELERATOR ENABLED***
	0	Halt ramping (Ramp Function Generator output held)
6	1	Normal operation. Enter ***OPERATING***
	0	Force Ramp Function Generator input to zero.
7	0 - 1	Fault reset (enter ***SWITCH-ON INHIBITED***)
	0	(Continue normal operation)
8 to 10		Unused
11	1	Select external control location 2 (EXT2)
	0	Select external control location 1 (EXT1)
12 to 15		Unused

The following example shows how to use the Control Word to start the drive. When the power is connected for the first time, the state of the drive (see the state machine in Figure 5-1) is NOT READY TO SWITCH ON. Control Word is used to step through the state machine states until OPERATING state is reached, meaning that the drive is running and follows the given reference.

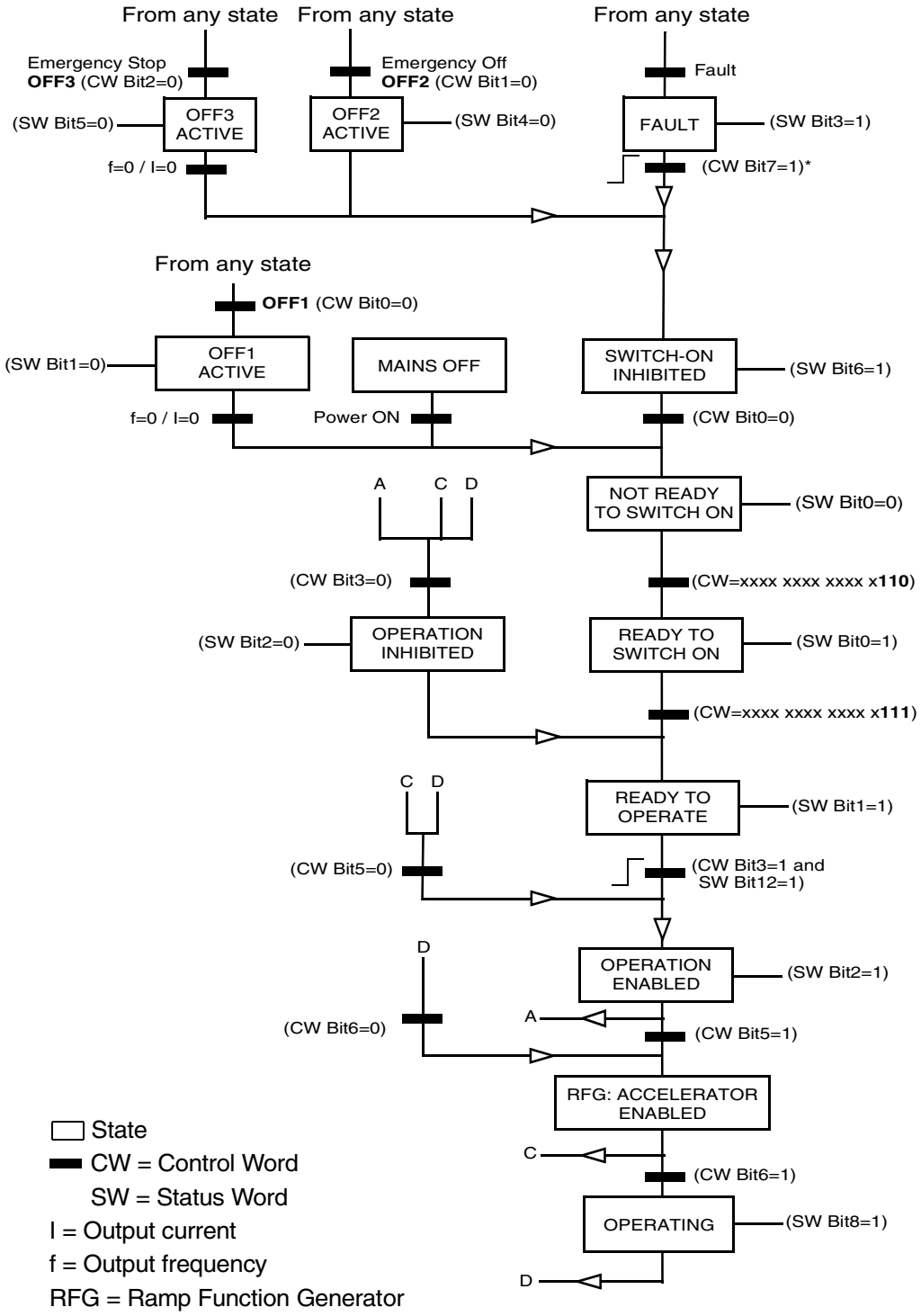
Table 5-2 Using the Control Word.

	Control Word Value/Description
Step 1	CW = 0000 0000 0000 0110 bit 15 bit 0 When this value is written, drive state changes to READY TO SWITCH ON.
Step 2	Wait at least 100 ms before proceeding.
Step 3	CW = 0000 0000 0000 0111 Drive state changes to READY TO OPERATE.
Step 4	CW = 0000 0000 0000 1111 Drive starts, but will not accelerate. Drive state changes to OPERATION ENABLED.
Step 5	CW = 0000 0000 0010 1111 The ramp function generator (RFG) output is released. Drive state changes to RFG: ACCELERATOR ENABLED.
Step 6	CW = 0000 0000 0110 1111 The ramp function generator (RFG) input is released. Drive state changes to OPERATING. Drive will accelerate to given reference and follow the reference.

This example assumes that the ACS 160 is in remote control, that external control place 1 (EXT1) is the active control place (as selected by parameter 1102), and that EXT1 start and stop commands are received through serial communication (parameter 1001).

Table 5-3 The Status Word.

Bit	Value	Description
0	1	ready to switch on
	0	not ready to switch on
1	1	ready to operate
	0	off1 active
2	1	operation enabled
	0	Not ready (*OPERATION INHIBITED*)
3	0 - 1	fault
	0	No fault
4	1	OFF2 inactive
	0	**OFF2 ACTIVE**
5	1	***OFF3*** inactive
	0	**OFF3 ACTIVE**
6	1	switch-on inhibited
	0	
7	1	Alarm is active. See Diagnostics section for a list of relevant alarms.
	0	No alarm
8	1	***OPERATING.*** Actual value equals reference value (= is within tolerance limits).
	0	Actual value differs from reference value (= is outside tolerance limits)
9	1	Drive control location: REMOTE
	0	Drive control location: LOCAL
10	1	The value of first supervised parameter equals to or is greater than supervision limit. Refer to Group 32 Supervision.
	0	The value of first supervised parameter is below supervision limit
11	1	External control location 2 (EXT2) selected
	0	External control location 1 (EXT1) selected
12	1	Run Enable signal received
	0	No Run Enable signal received
13 to 15		Unused



*This state transition occurs also if the fault is reset from any other source (e.g. digital input).

Figure 5-1 The state machine for evaluation of start and stop signals.

References

References are 16-bit words comprising a sign bit and a 15-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference value.

Reference 1 can be used as the frequency reference REF1 for the ACS 160. The signal source of external reference 1 (REF1) must be set to COMM and external control location 1 (EXT1) must be activated. Refer to parameters 1103 EXT REF 1 SELECT and 1102 EXT1/EXT2 SEL.

Reference 2 can be used as the frequency reference REF2 for the ACS 160. The signal source of external reference 2 REF2 must be set to COMM and External control location 2 (EXT2) must be activated. Refer to parameters 1106 EXT REF 2 SELECT and 1102 EXT1/EXT2 SEL.

Fieldbus References

Fieldbus references are scaled as follows:

Reference 1: 20000 ≙ EXT REF1 MAX (Hz, parameter 1105). Scaling Parameter 1104 EXT REF1 MIN is not used.

Reference 2: 10000 ≙ EXT REF2 MAX (%, parameter 1108). Scaling Parameter 1107 EXT REF2 MIN is not used.

Fieldbus reference is selected by setting a reference selection parameter – 1103 EXT REF1 SELECT or 1106 EXT REF2 SELECT – to COMM, COMM+AI1 or COMM*AI1. The latter two enable correction of the fieldbus reference using analogue input AI1. The following table explains these selections. Note that the analogue input value is a percentage value (0-100 %) which can be seen in parameter 0118 AI1. When the analogue input is 50 %, the correction is 0. When the input is <50 % (>50 %), the correction reduces (respectively increases) the reference used.

Table 5-4 Correcting the fieldbus reference through analogue input.

Setting	Effect of AI1 Value on Fieldbus Reference
COMM	None
COMM+AI1	Corrected fieldbus reference = given fieldbus reference + analogue input AI1 value
COMM*AI1	Corrected fieldbus reference = given fieldbus reference × analogue input AI1 value / 50 %

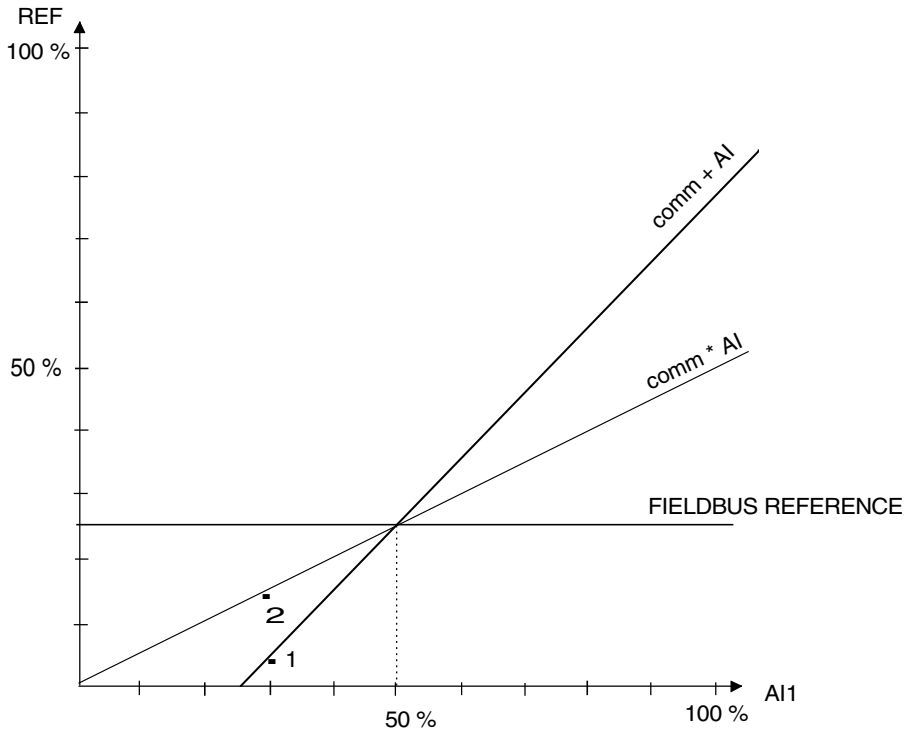
Example of the effect of AI1 value on fieldbus reference:

Assume that 2008 MAXIMUM FREQ = 50 Hz

Assume that fieldbus reference 1 is 5000 (corresponding to 25 % of full scale) and voltage at AI1 is 3 V (corresponding to 30 % of full scale).

1. If setting COMM+AI1 is used, then corrected fieldbus reference is 25 % + 30 % - 50 % = 5 % or 2.5 Hz.

2. If setting COMM*AI1 is used, then corrected fieldbus reference is 25 % × 30 % / 50 % = 15 % or 7.5 Hz.



Actual Values

Actual values are read-only values containing information on the operation of the drive. Actual values are 16-bit words containing sign bit and a 15-bit integer. A negative value is given as two's complement of the corresponding positive value.

Actual Value 1 is the actual output frequency. Scaling: 5000 ≙ 50 Hz.

Actual Value 2 is the actual output current. Scaling: 10 ≙ 1 A.

Fault and Alarm Status

The ACS 160 provides fault and alarm status words for the external control system. These data words are accessible only through the serial communication link but not from the control panel.

Fault and alarm status words are located in parameter group 3. The group also contains copies of the Control Word and Status Word. Group 3 parameters are of read-only type; however, both alarm words can be reset by writing a zero to them.

Table 5-5 Fault and alarm status words.

No	Name	Description
301	**MAIN COMMAND WORD**	Read-only copy of the Control Word. See Table 5-1.
302	**MAIN STATUS WORD**	Read-only copy of the Status Word. See Table 5-3.
305	**FAULT WORD 1**	Fault information. When a fault is active corresponding bit is set. Bit descriptions are given in Table 5-6.
306	**FAULT WORD 2**	Fault information. When a fault is active, the corresponding bit is set. Bit descriptions are given in Table 5-6.
308	**ALARM WORD 1**	Alarm information. When an alarm is active corresponding bit is set. Bits remain set until whole alarm word is reset by writing 0 to it. See Table 5-7.
309	**ALARM WORD 2**	Alarm information. When an alarm is active corresponding bit is set. Bits remain set until whole alarm word is reset by writing 0 to it. See Table 5-7.

Table 5-6 Bit descriptions for fault words 1 and 2. See also the Diagnostics section in the ACS 160 User's Manual for more information about faults and fault codes.

Bit #	Fault Word 1	Fault Word 2
0	Overcurrent	Underload
1	DC overvoltage	Reserved
2	ACS160 overtemperature	DDCS Link
3	Fault current	Reserved
4	Output overload	
5	DC undervoltage	
6	Analogue input 1 fault	
7	Analogue input 2 fault	
8	Motor overtemperature	Hardware error
9	Panel loss	
10	Parameters inconsistent	
11	DC bus ripple too large	
12	Motor stall	
13	Serial communication loss	
14	External fault	
15	Output earth fault	

Table 5-7 Bit descriptions for alarm words 1 and 2. See also the Diagnostics section for more information about alarms and alarm codes.

Bit #	**Alarm Word 1**	**Alarm Word 2**
0	Overcurrent controller alarm	Overload alarm
1	Overvoltage controller alarm	Autorest alarm
2	Undervoltage controller alarm	PID sleep alarm
3	Direction lock alarm	Autochange alarm. Reserved
4	Serial communication loss	Interlock alarm. Reserved
5	Modbus exception	Brake resistor overload alarm
6	Analogue input 1 loss	Reserved
7	Analogue input 2 loss	
8	Panel loss	
9	ACS 160 overtemperature	
10	Motor overtemperature	
11	Underload	

DeviceNet Connection Object (0x05)

Class Attributes (0)				
#	**Name**	**Services**	**Description**	**Data Type**
1	Revision	Get	Revision of DeviceNet Object	UINT

Explicit Connection Instance (1)					
#	**Name**	**Ser-vices**	**Description**	**Range**	**Data Type**
1	State	Get	State of object	0…5 Def: 1	USINT
2	Instance Type	Get	Indicates either IO or messaging connection	0	USINT
3	Transport Class Trigger	Get Set	Defines behaviour of connection	0x83	BYTE
4	Produced Connection ID	Get Set	Placed in CAN Identifier Field when connection transmits	N/A	UINT
5	Consumed Connection ID	Get Set	CAN Identifier Field value that denotes message to be received	N/A	UINT
6	Initial Comm Characteristics	Get Set	Defines message groups across which productions and consumptions with this Connection occur. Bits 7…4: Initial Production Characteristics; Bits 3…0: Initial Consumption Characteristics	N/A	BYTE
7	Produced Conn. Size	Get Set	Max number of bytes transmitted across this Connection	512	UINT
8	Consumed Conn. Size	Get Set	Max number of bytes received across this Connection	512	UINT
9	Expected Packet Rate	Get Set	Defines timing associated with this Connection	N/A	UINT
12	Watchdog Timeout Action	Get Set	Defines how Inactivity and Watchdog timeouts are handled	N/A	USINT
13	Produced Conn. Path Length	Get Set	No. of bytes in the produced_ connection_path length attribute	0	UINT
14	Produced Conn. Path	Get Set	Application Object producing data on this connection	0	Array of USINT
15	Consumed Conn. Path Length	Get Set	No. of bytes in the consumed_ connection_path length attribute	0	UINT
16	Consumed Conn. Path	Get Set	Specifies the Application Objects that are to receive the data consumed by this Connection Object	N/A	Array of 01 UINT

Polled I/O Connection Instance (2)					
#	**Name**	**Ser-vices**	**Description**	**Range**	**Data Type**
1	State	Get	State of object	0…4 Def: 1	USINT
2	Instance Type	Get	Indicates either IO or messaging connection	0…1 Def: 0	USINT
3	Transport Class Trigger	Get Set	Defines behaviour of connection	N/A	BYTE
4	Produced Connection ID	Get Set	Placed in CAN Identifier Field when connection transmits	N/A	UINT
5	Consumed Connection ID	Get Set	CAN Identifier Field value that denotes message to be received	N/A	UINT
6	Initial Comm Characteristics	Get Set	Defines message groups across which productions and consumptions with this Connection occur. Bits 7…4: Initial Production Characteristics; Bits 3…0: Initial Consumption Characteristics	N/A	BYTE
7	Produced Conn. Size	Get Set	Max number of bytes transmitted across this Connection	0…I/O In Length Def: I/O In Length	UINT
8	Consumed Conn. Size	Get Set	Max number of bytes received across this Connection	0…I/O Out Length Def: I/O Out Len.	UINT
9	Expected Packet Rate	Get Set	Defines timing associated with this Connection	N/A	UINT
12	Watchdog Timeout Action	Get Set	Defines how Inactivity and Watchdog timeouts are handled	N/A	USINT
13	Produced Conn. Path Len.	Get Set	No. of bytes in the produced_ connection_path length attribute	3	UINT
14	Produced Conn. Path	Get Set	Application Object producing data on this connection	0x62 0x37 0x31	Array of USINT
15	Consumed Conn. Path Len.	Get Set	No. of bytes in the consumed_ connection_path length attribute	3	UINT
16	Consumed Conn. Path	Get Set	Specifies the Application Objects that are to receive the data consumed by this Connection Object	0x62 0x32 0x31	Array of UINT

Change of State/Cyclic (4) (Acknowledged)					
#	**Name**	**Ser-vices**	**Description**	**Range**	**Data Type**
1	State	Get	State of object	1	USINT
2	Instance Type	Get	Indicates either IO or messaging connection	0…1 Def: 1	USINT
3	Transport Class Trigger	Get Set	Defines behaviour of connection	N/A	BYTE
4	Produced Connection ID	Get Set	Placed in CAN Identifier Field when connection transmits	N/A	UINT
5	Consumed Connection ID	Get Set	CAN Identifier Field value that denotes message to be received	N/A	UINT
6	Initial Comm Characteristics	Get Set	Defines message groups across which productions and consumptions with this Connection occur. Bits 7…4: Initial Production Characteristics; Bits 3…0: Initial Consumption Characteristics	N/A	BYTE
7	Produced Conn. Size	Get Set	Max number of bytes transmitted across this Connection	0	UINT
8	Consumed Conn. Size	Get Set	Max number of bytes received across this Connection	0	UINT
9	Expected Packet Rate	Get Set	Defines timing associated with this Connection	0… 0xFFFF Def: 0	UINT
12	Watchdog Timeout Action	Get Set	Defines how Inactivity and Watchdog timeouts are handled	N/A	USINT
13	Produced Conn. Path Len.	Get Set	No. of bytes in the produced_ connection_path length attribute	0…3 Def: 0	UINT
14	Produced Conn. Path	Get Set	Application Object producing data on this connection	Min: 0 Def: 20 66 24 01 30 03	Array of USINT
15	Consumed Conn. Path Len.	Get Set	No. of bytes in the consumed_ connection_path length attribute	4	UINT
16	Consumed Conn. Path	Get Set	Specifies the Application Objects that are to receive the data consumed by this Connection Object	0x62 0x32 0x31	Array of UINT
17	Production Inhibit Time	Get Set	Defines the minimum time between new data production. Required for I/O Client Connections	0	UINT

Acknowledge Handler Object (0x2B)

Class Attributes (0)				
#	**Name**	**Services**	**Description**	**Data Type**
1	Revision	Get	Revision of DeviceNet Object Class Definition on which implementation is based	UINT
2	Max Instance	Get	Maximum instance number of an object currently created in this class level of the device	UINT

Instance Attributes (1)					
#	**Name**	**Ser-vices**	**Description**	**Range**	**Data Type**
1	Acknowledge Timer	Get Set	Time to wait for acknowledge before resending	1…65535 Def: 16	UINT
2	Retry Limit	Get Set	Number of acknowledge timeouts before informing producing application of a Retry_Limit_Reached event	0…255 Def: 1	USINT
3	COS Producing Conn. Instance	Get Set	ID of conn. instance containing the path of the producing I/O application object which is to be notified of Acknowledge Handler events	N/A	UINT
4	Ack List Size	Get	Max number of members in Ack List 0 = Dynamic	N/A	BYTE
5	Ack List	Get	List of active conn. instances receiving acknowledgements Format: No. of members followed by list of Conn. Instance IDs	N/A	BYTE ARRAY OF: USINT
6	Data with Ack Path List Size	Get	Max number of members in Data with Ack Path List 0 = Dynamic	N/A	BYTE
7	Data with Ack Path List	Get	List of conn. instance/consuming application object pairs. Used to forward data received with acknowledgement	N/A	BYTE Array of UINT USINT Array of USINT

AC/DC Object (0x2A)

Class Attributes (0)				
#	**Name**	**Services**	**Description**	**Data Type**
1	Revision	Get	Revision of DeviceNet Object Class Definition on which implementation is based	UINT

Instance Attributes (1)				
#	**Name**	**Services**	**Description**	**Data Type**
3	At Reference	Get	Actual frequency equals reference (ie. is within tolerance limits)	BOOL
4	NetRef	Get Set	If drive parameter 1103 = 8, then NetRef = 1. Otherwise NetRef = 0.	BOOL
6	Drive Mode	Get	Drive mode of module. Always to be set to 0. 0 = Vendor-specific mode; 1 = Open loop speed (Frequency); 2 = Closed loop speed control; 3 = Torque control; 4 = Process control; 5 = Position control	UINT
7	Speed Actual	Get	Corresponds to drive parameter 0102	INT
8	SpeedRef	Get Set	Corresponds to drive parameter 0111	INT
17	Output Voltage	Get	Corresponds to drive parameter 0109	INT
18	AccelTime	Get Set	Corresponds to drive parameter 2202	UINT
19	DecelTime	Get Set	Corresponds to drive parameter 2203	UINT
20	LowSpdLimit	Get Set	Corresponds to drive parameter 1104	INT
21	HighSpeedLimit	Get Set	Corresponds to drive parameter 1105	UINT
22	Speed Scale	Get Set	Internal in CFB-DEV	USINT
28	Time Scale	Get Set	Internal in CFB-DEV	USINT

Control Supervisor Object (0x29)

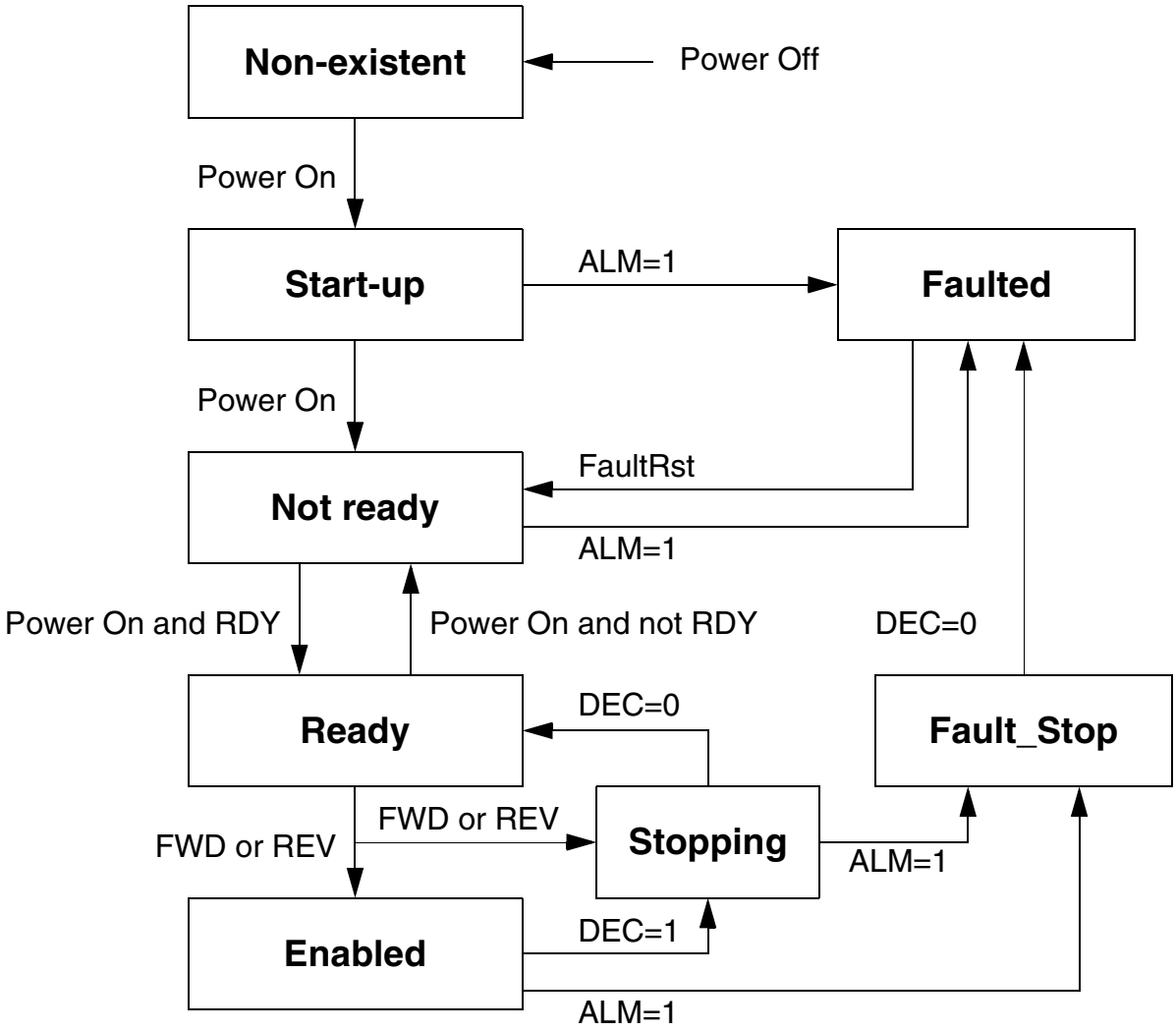
Class Attributes (0)				
#	**Name**	**Services**	**Description**	**Data Type**
1	Revision	Get	Revision of DeviceNet Object Class Definition on which implementation is based	UINT

Instance Attributes (1)				
#	**Name**	**Ser-vices**	**Description**	**Data Type**
3	Run 1	Get Set	Internal in CFB-DEV	BOOL
4	Run 2	Get Set	Internal in CFB-DEV	BOOL
5	Net Control	Get Set	If drive parameters 1001 = 10 and 1102 = 8, then Net Control = 1.	BOOL
6	State	Get	1 = Start-up; 2 = Not ready; 3 = Ready; 4 = Enabled; 5 = Stopping; 6 = FaultStop; 7 = Faulted	UINT
7	Running1	Get	Internal in CFB-DEV	BOOL
8	Running2	Get	Internal in CFB-DEV	BOOL
10	Faulted	Get	If Status Word bit3 = 1, then Faulted = 1. Otherwise Faulted = 0.	BOOL
12	FaultRst	Get Set	Internal in CFB-DEV	BOOL
15	CtlFromNet	Get	If drive parameter 1001 = 10, then CtlFromNet = 1. Otherwise CtlFromNet = 0.	BOOL
16	DNFaultMode	Get Set	See drive parameter 5205 COMM FAULT FUNC	UINT

Run/Stop Event Matrix

Run/Stop Event Matrix			
RunFwd	**RunRev**	**Trigger Event**	**Run Type**
0	0	Stop	N/A
0 → 1	0	Run	RunFwd
0	0 → 1	Run	RunRev
0 → 1	0 → 1	No Action	N/A
1	1	No Action	N/A
1 → 0	1	Run	RunRev
1	1 → 0	Run	RunFwd

State Transition Diagram



Motor Data Object (0x28)

Class Attributes (0)				
#	**Name**	**Services**	**Description**	**Data Type**
1	Revision	Get	Revision of DeviceNet Object Class Definition on which implementation is based	UINT

Instance Attributes (1)					
#	**Name**	**Ser-vices**	**Description**	**Range**	**Data Type**
3	Motor Type	Get	7 = Squirrel Cage Induction Motor	7	UINT
6	Rated Current	Get	Rated stator current from motor nameplate. Corresponds to drive parameter 9906 MOTOR NOM CURR.	See *ACS 160 User's Manual*	UINT
7	Rated Voltage	Get	Rated base voltage from motor nameplate. Corresponds to drive parameter 9905 MOTOR NOM VOLT.	See *ACS 160 User's Manual*	UINT

CFB-DEV Parameter Object (0x64)

The Instance Attributes in this Object are the parameters of the ACS 160, numbered **0102** to **9910**. See the *ACS 160 User's Manual* for a complete listing.

Chapter 6 – Fault Tracing

Overview

This chapter gives diagnostic information for finding out the root causes and corrections to the most common problems with the CFB-DEV module.

CFB-DEV Status Codes

This Status parameter indicates the status of the DeviceNet module.

SELF TEST
The module is initialising and performing self-test.

NO CONNECT
The module has completed its power-up sequence, and is waiting for a DeviceNet Scanner or the Manager software to establish a connection.

CONNECTED
The DeviceNet module is connected and communicating with a DeviceNet Scanner or Manager software.

TIME-OUT
The DeviceNet Scanner has stopped communicating with the CFB-DEV. The Scanner might have been powered down.

Note: Timeout is only observed with I/O connections (Poll, Bit-strobe, COS/Cyclic) and not with explicit messaging connection.

DUP. MAC ERR
The module has observed another device with the same MAC ID in the network. Change the MAC ID value and switch the module power off and on.

BUS OFF
The module has detected an error on the DeviceNet wire physical communication, and is disconnected. To clear this state, switch the module power off and on.

COM. ERROR
Some other communication error (receive buffer overflow for example) has been detected by the module. Try switching the module power off and on. Also check the connections and increase Scanner interscan cycles.

WRONG ASMBLY
The drive does not support the chosen I/O assembly. See the I/O assembly selection parameter settings.

Status LEDs

There are three status LEDs on the CFB-DEV, labelled *DDCS, NS* (Network Status) and *MS* (Module Status). The LEDs are bicolour (green/red) with white diffused lens.

The LED indications are as follows:

LED	Mode	Description
DDCS	Off	Not powered
	Flashing Green	DDCS initialisation in progress
	Green	DDCS communication established
	Flashing Red	DDCS communication errors
	Red	• DDCS communication failed, or • Module fault

NS	Off	Not on-line/Not powered: • Not powered (see *MS* LED), or • Dup_MAC_ID test not completed yet
	Flashing Green	On-line, but without connections in the established state: • Dup_MAC_ID test completed but no established connections to other nodes, or • Not allocated to a master
	Green	Link OK. On-line with connections in the established state. Allocated to a master
	Flashing Red	One or more connections are in timed-out state
	Red	Critical link failure. The module has detected an error that has rendered it incapable of communicating on the network (Duplicate MAC ID, or Bus-off)
MS	Off	Not powered
	Flashing Green	Stand-by. Module needs commissioning due to incomplete or incorrect configuration. E.g. wrong assembly selected
	Green	Operating in a normal condition
	Red	Unrecoverable fault
	Flashing Red–Green	Self test in progress

Installation Problems

Verify all the connections on the module:

- DeviceNet and power cables are connected to terminal blocks X1 and X2 as described in Chapter 3.
- DeviceNet power cable (if used) has sufficient 24 V d.c. regulated power connected to it.

Drive Setup

The fieldbus parameter group is not shown on the panel:

- Enable the CFB-DEV by setting the corresponding drive parameter.

The CFB-DEV is using default values:

- Verify that the fieldbus parameter group is set up correctly. If so, turn off and on the power to the CFB-DEV. This makes the module re-read its setup parameters.

Drive actual values can be read, but the control commands (start/stop or reference) do not go through:

- Check that the control location parameters of the drive are set to use the CFB-DEV as the source of the required command.
- Check that the drive is in REMOTE control.

PLC Programming

The PLC program is beyond ABB Drives support. Contact the manufacturer for assistance.

Scanner Fault Indications

Refer to scanner documentation. The latest revision is available at Allen-Bradley internet homepage *http://www.ab.com*.

Appendix A – Technical Data

Fieldbus Link

Compatible Devices: Any ODVA compliant DeviceNet scanner supporting Poll - Response and/or Bit - Strobe commands to Class-2 Only Slaves

Medium: Shielded, twisted pair RS485 cable

- Termination: 121 Ω, 1%, Metal Film, 1/4 W
- DeviceNet Cables:
  YR-29790 (Thick DeviceNet Cable)
  YR-29832 (Thin DeviceNet Cable)
- Maximum Bus Length: 1200 m

Topology: Multi-drop

Serial Communication Type: Asynchronous, half Duplex

Transfer Rate: 125, 250 or 500 kBit/s

Protocol: DeviceNet

CFB-DEV

Enclosure: Cast aluminium, dimensions 124 × 79 × 42 mm (without cable glands)

Degree of Protection: IP65

Mounting: Onto ACS 160 drive

Settings: Via drive interface (control panel)

Connectors:

- One Phoenix Contact MC1,5/5-ST-3,81 (5-pole, cross-section 1.5 mm^2 max.) screw terminal block for fieldbus connection:

Terminal		Description
1	V-	Power supply negative (0 V)
2	CAN_L	DeviceNet bus signal LOW
3	SHIELD	Bus cable screen
4	CAN_H	DeviceNet bus signal HIGH
5	V+	Power supply positive (+24 V)

General:

- Complies with EMC Standards EN 50081-1 and EN 50082-2

Appendix B – Ambient Conditions

Operation

The following conditions apply to stationary use of the module.

Installation Site Altitude: 0 to 2000 m above sea level. If the installation site is higher than 2000 m above sea level, please contact your local ABB representative for further information.

Temperature: -10 to +50 °C

Contamination Levels (IEC 721-3-3):
Chemical gases: Class 3C3
Solid particles: Class 3S3

Sinusoidal Vibration (IEC 721-3-3, 2nd Edition 1994-12):
Max 3 mm (2 to 9 Hz)
Max 10 m/s^2 (9 to 200 Hz)

Shock (IEC 721-3-3, 2nd Edition 1994-12):
Max 250 m/s^2, 6 ms

Storage and Transportation

The following conditions apply to storage and transportation of the module in the protective package.

Temperature: -40 to +70 °C

Contamination Levels (IEC 721-3-3):

Storage:	Chemical gases: Class 1C2 Solid particles: Class 1S3
Transportation:	Chemical gases: Class 2C2 Solid particles: Class 2S2

Shock (IEC 721-3-3, 2nd Edition 1994-12):
Max 300 m/s^2, 18 ms

CFB-DEV/EN
3BFE 64401882 REV B
EFFECTIVE: 1.11.2002

ABB Oy
AC Drives
P.O.Box 184
FIN-00381 Helsinki
FINLAND
Telephone: +358 10 22 11
Fax: +358 10 22 22681
Internet: www.abb.com

ABB Inc.
Drives
16250 West Glendale Drive
New Berlin, WI 53151
USA
Telephone: 262 785-3200
800 243-4384
Fax: 262 780-5135