Installation and Start-up Guide

ACS 400 DDCS Option Module

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Table of Contents

Chapter 1 - Introduction

General

DDCS (Distributed Drive Communication System) is a protocol designed for high speed communication needs of AC drives. The protocol supports many different kinds of functions, such as reading and writing parameters, giving reference values and reading diagnostics. A DDCS network is a ring network, where one master device controls and observes the slaves connected to node modules inside the ring.

This manual describes how to set up the ACS 400 series frequency converters for DDCS operation. The reader is expected to have basic knowledge of electrical fundamentals, ACS 400 series frequency converters, the ACS 400 control panels and fieldbuses.

DDCS in ACS 400

For DDCS use, the ACS 400 needs to be equipped with a DDCS communication module. DDCS makes it possible to connect the ACS 400 to number of different fieldbuses using a fieldbus adapter, to Drive*Window* PC tool and to I/O extension modules (NDIO).

For more information on Drive*Window* software package, contact your supplier.

The module is connected to a fieldbus adapter using optical fibre. For information on the fieldbus adapters, refer to the corresponding manuals.

Packing Checklist

The purchased DDCS Communication Module Kit contains the following:

- DDCS communication module
- This manual

Installation

The ACS 400 DDCS communication module is installed into connector X6.

Warning! Disconnect power from the ACS 400 before installation. Wait at least 5 minutes after disconnecting the supply before removing the cover.

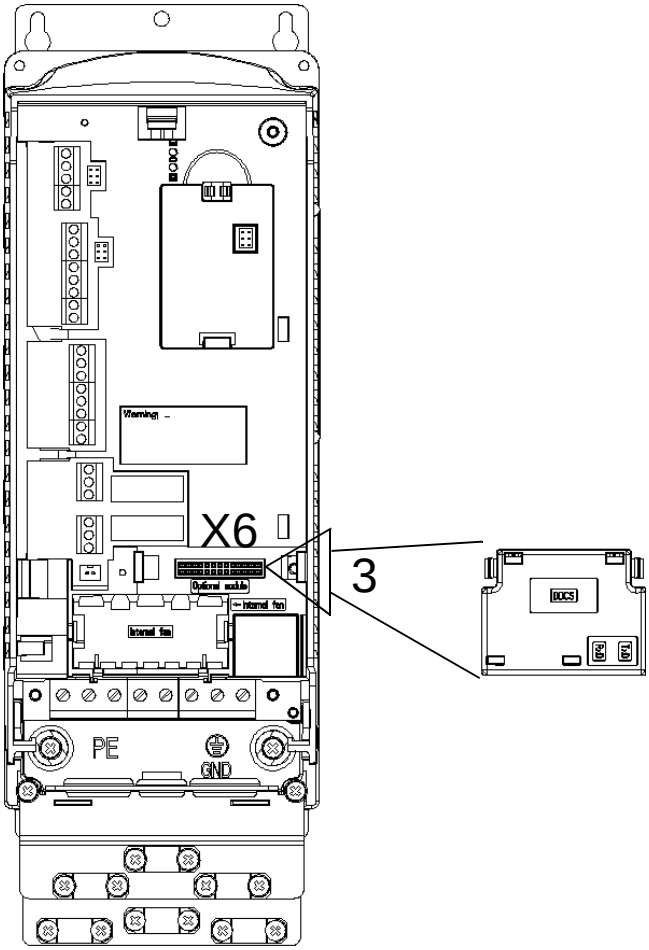

Figure 1 Installing the ACS 400 DDCS option module.

1. Install the fieldbus adapter outside ACS 400.
2. Remove the front cover from ACS 400.
3. Install the DDCS communication module.
4. Connect optical fibres. Follow colour coding.
5. Replace the cover to ACS 400.

Recommended maximum optical fibre length is 5 m.

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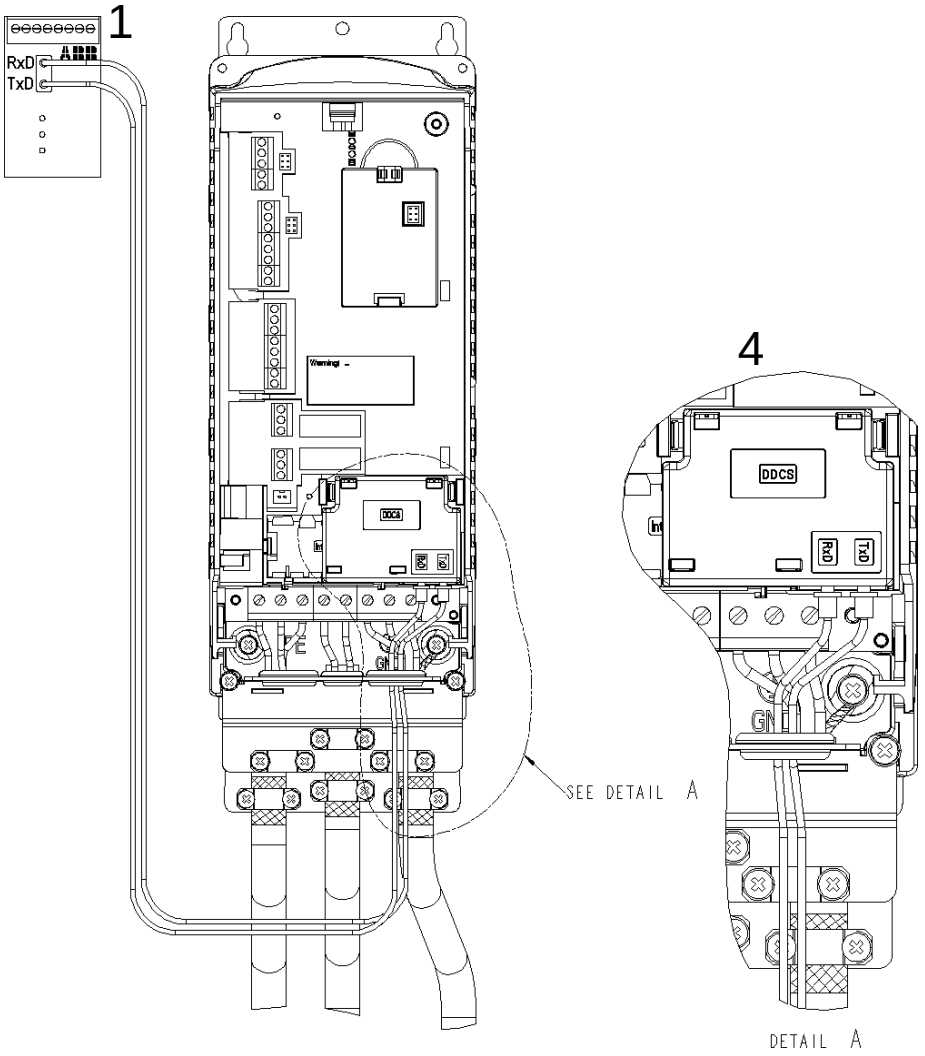


Figure 2 Connecting the optical fibres.

Chapter 2 - Overview

The ACS 400 can be connected to an external control system – usually a fieldbus – using a fieldbus adapter module. The fieldbus adapter module is connected to a drive using fibre optic DDCS link.

The drive can either receive all of its control information from the fieldbus, or the control can be distributed between the fieldbus and other available control locations, e.g. digital/analogue inputs, drive control panel.

Chapter 3 describes how to set up the ACS 400 in a fieldbus system.

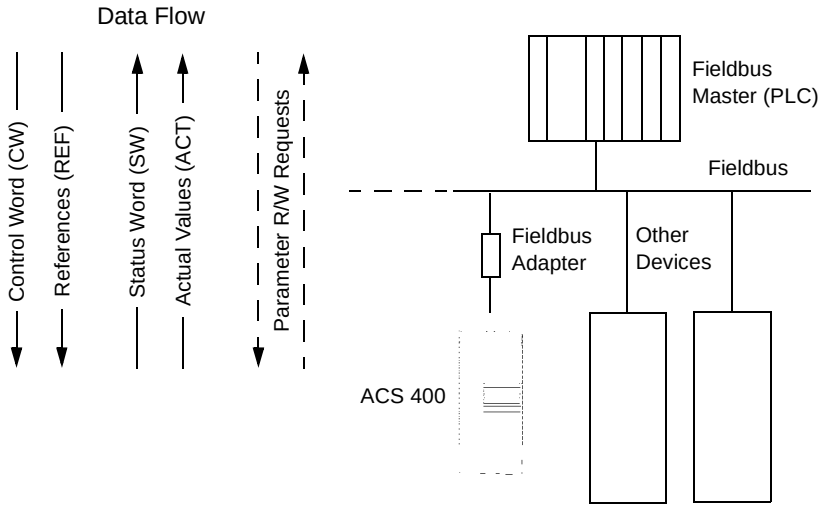


Figure 3 Structure of a fieldbus system.

An alternative use for DDCS link is to use it to extend the number of ACS 400 input/output connections. For more information on the use of these extra I/O connections refer to the ACS 400 User's Manual. Chapter 4 - Extended I/O in this DDCS manual describes how to take I/O extension module to use.

Chapter 3 - Programming the ACS 400 for Fieldbus Control

General

Before configuring the ACS 400 for fieldbus control, the adapter module must be mechanically and electrically installed according to the instructions given in this and the adapter module manual.

The following sections list the parameters that are to be adjusted upon the installation of the fieldbus adapter module.

Activating the Fieldbus Adapter Module

The communication between the ACS 400 and the fieldbus adapter module is activated by setting parameter 5005 PROTOCOL SEL to 1 (DDCS). This selects DDCS communication for use and initializes the fieldbus adapter.

After the communication is initialised, the configuration parameters of the fieldbus adapter can be modified in drive parameter group 51 EXT COMM MODULE. These parameters are specific to the adapter used; see its Installation and Start-up Guide for the available parameter settings. The ACS-PAN control panel will show group 51 parameter names only as generic names (FIELDBUSPAR 1 - FIELDBUSPAR 15).

Table 1 Adapter module configuration.

<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td colspan="2">Group 51
EXT COMM MODULE</td></tr>
<tr><td>5101</td><td>FIELDBUSPAR 1
Parameter 1 of communication module in DDCS link. Value reflects the type of the connected DDCS option module. This parameter needs not to be set by the user.

Table 2 List of module types.
<table>
<tr><th>Value</th><th>Module type</th></tr>
<tr><td>0</td><td>No module connected.</td></tr>
<tr><td>1</td><td>NPBA Profibus</td></tr>
<tr><td>2</td><td>NMBA Modbus</td></tr>
<tr><td>3</td><td>NIBA Interbus-S</td></tr>
<tr><td>4</td><td>NCSA CS31 bus</td></tr>
<tr><td>5</td><td>NCAN CANopen</td></tr>
<tr><td>6</td><td>NDNA DeviceNet</td></tr>
<tr><td>7</td><td>NLON LONWORKS</td></tr>
<tr><td>8</td><td>NMBP Modbus+</td></tr>
<tr><td>9</td><td>Others</td></tr>
</table></td></tr>
<tr><td>5102 - 5115</td><td>FIELDBUSPAR 2 - FIELDBUSPAR 15
Refer to option module documentation for more information on these parameters.</td></tr>
</table>

Control Locations

After the fieldbus adapter configuration parameters in Group 51 are set, the rest of the parameters in Table 3, Table 4 and Table 5 below should be adjusted. The Setting for Fieldbus Control column gives the default parameter value, as well as the value to use when the fieldbus system is the desired source or destination for the signal in question. The Function/Information column gives a description of the parameter.

Further information on the alternative parameter settings is also given in chapter "Complete Parameter List" of the ACS 400 User's Manual.

Table 3 Communication settings.

Code	Parameter Name	Alternative Settings	Setting for Fieldbus Control	Function/Information
Group 50 COMMUNICATION				
5001	DDCS BIT RATE	1= 1 Mbits/s 2= 2 Mbits/s 4= 4 Mbits/s 8= 8 Mbits/s	e.g. 1 Mbits/s	Any value except 8 Mbits/s can be used with a fieldbus adapter. The adapter automatically adjusts the speed to 4 Mbits/s if settings 1 or 2 Mbits/s are used.
5002	DDCS NODE NR	1 - 254	1	Value must be 1 (default value) when fieldbus adapter is used.
5005	PROTOCOL SEL	0 = NOT SEL 1 = DDCS 2 = STD MODBUS 3 = STD MDB+DDCS	1 (DDCS)	Communication protocols selection. Must be set to 1 (DDCS) or 3 (STD MDB+DDCS) to activate DDCS protocol.
5007	DDCS BUS MODE	1 = FIELDBUS 2 = IO EXTENSION	1 (FIELDBUS)	DDCS bus operation mode. Value must be 1 (FIELDBUS) when fieldbus adapter is used.

Table 4 Communication fault functions.

Code	Parameter Name	Alternative Settings	Setting for Fieldbus Control	Function/Information
Group 50 COMMUNICATION				
5003	COMM FAULT TIME	0.1 - 60 S	-	Defines the time between communication loss detection and the action selected by parameter 5004.
5004	COMM FAULT FUNC	0 = NOT SEL 1 = FAULT 2 = CONST SP7 3 = LAST SPEED	-	Determines drive action in case the communication is lost. **Note!** Communication loss detection is applied only to the serial communication channel from which the controlling commands is selected by parameter 5006 COMM COMMANDS.

Table 5 Control command source selection.

Code	Parameter Name	Alternative Settings	Setting for Fieldbus Control	Function/Information
Group 50 COMMUNICATION				
5006	COMM COMMANDS	0 = NOT SEL 1 = STD MODBUS 2 = DDCS	2 (DDCS)	Defines the serial communication channel for the controlling commands (start, stop, direction and reference). Must be set to 2 (DDCS).
Group 10 COMMAND INPUTS				
1001	EXT1 COMMANDS	0 = NOT SEL 1 = DI1 ... 10 = COMM	10 (COMM)	Enables the Control Word (except bit 11) when EXT1 is selected as control location.
1002	EXT2 COMMANDS	0 = NOT SEL 1 = DI1 ... 10 = COMM	10 (COMM)	Enables the Control Word (except bit 11) when EXT2 is selected as control location.
1003	DIRECTION	1 = FORWARD 2 = REVERSE 3 = REQUEST	3 (REQUEST)	Enables rotation direction control. Rotation direction is controlled by the sign of given frequency reference, when the reference is given through serial communication. See group 11 parameters below.
Group 11 REFERENCE SELECT				
1102	EXT1/EXT2 SEL	1 = DI1 ... 8 = COMM	8 (COMM)	Enables external control location EXT1/ EXT2 selection by Control Word bit 11.
1103	EXT REF1 SELECT	0 = KEYPAD 1 = AI1 ... 8 = COMM 9 = COMM+AI1 10 = COMM*AI1	8 (COMM), 9 (COMM+AI1) or 10 (COMM*AI1)	Fieldbus reference 1 is used when EXT1 is selected as control location. See section References on page 19 for information on the alternative settings.
1106	EXT REF2 SELECT	0 =KEYPAD 1 = AI1 ... 8 = COMM 9 = COMM+AI1 10 = COMM*AI1	8 (COMM), 9 (COMM+AI1) or 10 (COMM*AI1)	Fieldbus reference 2 is used when EXT2 is selected as control location. See section References on page 19 for information on the alternative settings.
Group 16 SYSTEM CONTROLS				
1601	RUN ENABLE	0 = NOT SEL 1...5 = DI1 ... DI5 6 = COMM	6 (COMM)	The run enable signal is given through serial communication (Control Word bit 3).
1604	FAULT RESET SEL	0 = KEYPAD ONLY 1...5 = DI1 ... DI5 6 = START/STOP 7 = COMM	7 (COMM)	Fault reset is executed through serial communication (Control Word bit 7).

Output Signal Source Selection

It is possible to control both the relay outputs 1 and 2, as well as the analog output from any serial communication channel, including DDCS.

Relay outputs can be controlled in the following way:

- Step 1: Configure the ACS 400 to *supervise* the value of any of the parameters 131-133 using parameters in group 32 SUPERVISION.
- Step 2: Configure a relay output 1 or 2 to respond to the status of one of the supervised parameter.

The selected relay can now be turned on or off by writing to supervised parameter (131-133) *some* value that is either above or below the given supervision limits.

Refer to Table 6 for more information on required parameter settings. With the given settings, writing any value 100 - 255 to parameter 131 SER LINK DATA 1 causes the relay output 1 to *activate*. Writing any value 0 - 99 to parameter 131 causes the relay output 1 to *deactivate*.

Refer to Table 7 for information on analogue output control.

Table 6 Relay output control.

Code	Parameter Name	Alternative Settings	Setting for Fieldbus Control	Function/Information
Group 01 OPERATING DATA				
0131	SER LINK DATA 1	0 - 255	-	Controlling data for the relay outputs.
0132	SER LINK DATA 2	0 - 255	-	
Group 14 RELAY OUTPUTS				
1401	RELAY OUTPUT 1	0 = NOT SEL ... 7 = SUPRV1 OVER 8 = SUPRV1 UNDER 9 = SUPRV2 OVER 10 = SUPRV2 UNDER ... 30 = AUTOCHANGE	e.g. 7 (SUPRV1 OVER)	Relay output 1 function. With the given setting, the relay 1 is activated when supervised parameter 1 (given by parameter 3201) is above the limit given by parameter 3203.
1402	RELAY OUTPUT 2	As above	e.g. 9 (SUPRV2 OVER)	Relay output 2 function. See above.
Group 32 SUPERVISION				
3201	SUPERV 1 PARAM	102 - 137	e.g. 131	Number of supervised parameter 1. Any parameter of the group 1 OPERATING DATA.
3202	SUPERV 1 LIM LO	0 - 255	e.g. 100	Lower supervision limit for supervised parameter 1.
3203	SUPERV 1 LIM HI	0 - 255	e.g. 100	Upper supervision limit for supervised parameter 1.
3204	SUPERV 2 PARAM	102 - 137	e.g. 132	Number of supervised parameter 1. Any parameter of the group 1 OPERATING DATA.
3205	SUPERV 2 LIM LO	0 - 255	e.g. 100	Lower supervision limit for supervised parameter 2.
3206	SUPERV 2 LIM HI	0 - 255	e.g. 100	Upper supervision limit for supervised parameter 2.

Table 7 Analogue output control.

Code	Parameter Name	Alternative Settings	Setting for Fieldbus Control	Function/Information
Group 01 OPERATING DATA				
0133	SER LINK DATA 3	0 - 255	-	Controlling data for the analoque output.
Group 15 ANALOGUE OUTPUT				
1501	AO CONTENT	102 - 137	e.g. 133	Directs the contents of parameter 133 to the analogue output.
1503	AO CONTENT MAX		255	Analogue output scaling: upper limit (20 mA) reached when value 255 written to parameter 133.

Chapter 4 - I/O Extension Using DDCS

General

The ACS 400 can use extended input/output connections provided by optional I/O extension modules (type name NDIO) under special circumtances, e.g. when PFC (Pump-Fan Control) macro is selected. ACS 400 accepts maximum of two NDIO modules. The extended I/O cannot be used simultaneously with a fieldbus adapter.

Before configuring the ACS 400 to use extended I/O, the NDIO module must be mechanically and electrically installed according to the instructions given in this and the module manual.

Note! Using the DIP switches inside the NDIO module, the NDIO station number must be set to 5 if only one module is used, or to 5 and 6 if two modules are used.

Activating the I/O Extension Module

Table 8 shows the settings required to take the NDIO module into use. Only the communication settings required by the I/O extension module are described here. For more information on the use of extended I/O refer to ACS 400 User's Manual.

Table 8 Communication settings for I/O extension module.

Code	Parameter Name	Alternative Settings	Setting	Function/Information
Group 50 COMMUNICATION				
5005	PROTOCOL SEL	0 = NOT SEL 1 = DDCS 2 = STD MODBUS 3 = STD MDB+DDCS	1 (DDCS) or 3 (STD MDB+DDCS)	Communication protocols selection. Must be set to 1 (DDCS) or 3 (STD MDB+DDCS) to activate DDCS protocol.
5007	DDCS BUS MODE	1 = FIELDBUS 2 = IO EXTENSION	2 (IO EXTENSION)	DDCS bus operation mode. Value must be 2 (IO EXTENSION) when I/O extension module is used.

Chapter 5 - The DDCS Protocol

The fibre optic link between the fieldbus adapter and the DDCS option module uses the DDCS (Distributed Drives Communication System) protocol. The adapter uses fieldbus protocol to communicate with the external control system and DDCS protocol to communicate with the ACS 400.

DDCS protocol employs data sets. DDCS data sets are clusters of data consisting of three 16-bit data words. The ACS 400 supports one dataset in both directions: input dataset and output dataset.

Dataset 1, word 1: Control Word	Dataset 1, word 2: Reference 1	Dataset 1, word 3: Reference 2

Figure 4 Input Dataset.

Dataset 2, word 1: Status Word	Dataset 2, word 2: Actual value 1	Dataset 2, word 3: Actual value 2

Figure 5 Output Dataset.

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), and
- Serial communication channel that is used for the controlling is DDCS (parameter 5006 COMM COMMANDS is set to 2 (DDCS).

The Control Word (detailed in Table 9) is sent by the fieldbus master station to the drive, the adapter module acting as a transparent link. The drive switches between its states according to the bit-coded instructions of the Control Word. See also state machine on page 21.

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 11.

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 400.

Table 9 The Control Word. See also the state machine on page 21.

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

Example on Using the Control Word

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 machine (Figure 6) state 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 10 Using the Control Word.

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

This example assumes that the ACS 400 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 11 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 10 - 25 is active
	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

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.

Fieldbus Reference Scaling

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

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.

Table 12 Correcting the fieldbus reference through analogue input.

Parameter 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 / 100

Actual Values

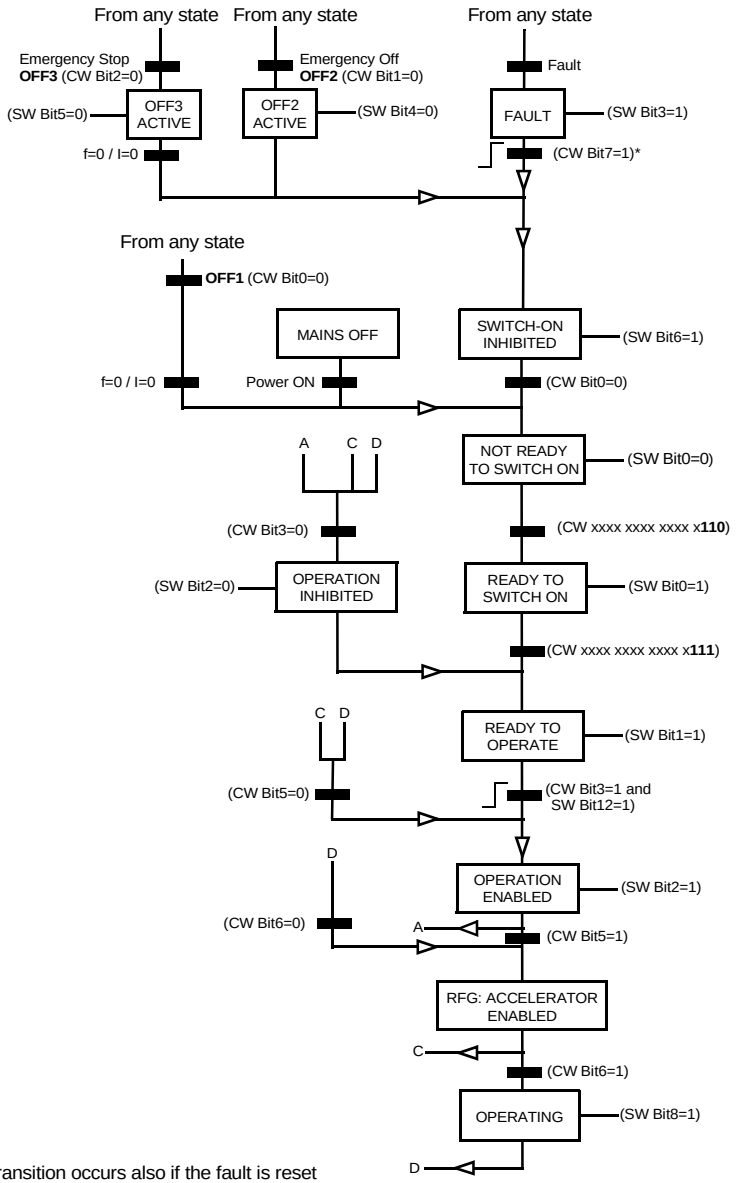
Actual values are read-only values containing information on the operation of the drive. Actual values are 16-bit words containing sign bit and a 15-bit integer. A negative value is given as two's complement of the corresponding positive value.

Actual value 1 contains actual output frequency of the drive, and actual value 2 contains actual output current.

Actual Value Scaling

Actual value 1: Output frequency. Scaling 5000 ≙ 50 Hz.

Actual value 2: Output current. Scaling 10 ≙ 1 A.



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

State
CW = Control Word
SW = Status Word

I = Output current
f = Output frequency
RFG = Ramp Function Generator

Figure 6 The state machine for evaluation of start and stop signals. See also example on page 17.

Fault and Alarm Status

The ACS 400 provides fault and alarm status words for the external control system. These data words are accessible only through serial communication link and not from the control panel.

Fault and alarm status words are located in place of 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 zero to them.

Table 13 Fault and alarm status words.

Code	Name	Description
301	MAIN COMMAND WORD	Read-only copy of the Control Word . See page 16.
302	MAIN STATUS WORD	Read-only copy of the Status Word. See page 18.
305	FAULT WORD 1	Fault information. When a fault is active corresponding bit is set. Bit descriptions are given in Table 14.
306	FAULT WORD 2	Fault information. When a fault is active corresponding bit is set. Bit descriptions are given in Table 14.
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 15.
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 15.

Table 14 Bit descriptions for fault words 1 and 2. See also the ACS 400 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	ACS 400 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 15 Bit descriptions for ALARM WORD 1 and ALARM WORD 2. See also the ACS 400 User's Manual 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	Autoreset alarm
2	Undervoltage controller alarm	PID sleep alarm
3	Direction lock alarm	PFC autochange alarm
4	Serial communication loss	PFC interlock alarm
5	Modbus exception	Reserved
6	Analogue input 1 loss	
7	Analogue input 2 loss	
8	Panel loss	
9	ACS 400 overtemperature	
10	Motor overtemperature	
11	Underload	
12	Motor stall alarm	
13	DDCS link	
14	Reserved	
15	Reserved	

Chapter 6 - Fault Tracing

Fault code 19

Possible reasons for fault 19 are

1. The ACS 400 has detected DDCS communication loss. Cyclical communication between the fieldbus adapter and the ACS 400, or between the fieldbus adapter and external control system, is lost. Parameter 5004 COMM FAULT FUNC is set to 1 (FAULT) and the ACSACS 400400 is receiving controlling commands through the DDCS link (parameter 5006 COMM COMMANDS value is 2 (DDCS)).

   Remedy:

   - Check the status of the fieldbus adapter. Refer to appropriate fieldbus manual.
   - Check parameter settings of the fieldbus adapter from group 51 EXT COMM MODULE.
   - Check the connection of optical fibres between the ACS 400 and the fieldbus adapter. Ensure that the ends of optical fibres are free from dirt and dust.
   - Check connections between external control system and the fieldbus adapter.
   - Ensure that the bus master is communicating and properly configured.

2. DDCS communication module is not properly installed into connector X6, or the module is faulty.

   Remedy:

   - Switch off power from the ACS 400 and try to re-install the module. If the fault persists, contact your supplier.

Alarm code 23

Alarm code 23 is displayed when the ACS 400 has detected DDCS communication loss and parameter 5004 COMM FAULT FUNC is set to 2 (CONST SP 7), or 3 (LAST SPEED). The ACS 400 is receiving controlling commands through the DDCS link (parameter 5006 COMM COMMANDS value is 2 (DDCS)).

Remedy:

- Check the status of the fieldbus adapter. Refer to appropriate fieldbus manual.
- Check parameter settings of the fieldbus adapter from group 51 EXT COMM MODULE.
- Check the connection of optical fibres between the ACS 400 and the fieldbus adapter. Ensure that the ends of optical fibres are free from dirt and dust.
- Check connections between external control system and the fieldbus adapter.
- Ensure that the bus master is communicating and properly configured.

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