

DCS800

Firmware manual supplement for North America,
Firmware Rev. 2.60 and Rev. 2.70

DCS800 Drives (20 to 5200 A)



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Revision Information

This supplement is dedicated to **Revision 2.6** and **Revision 2.7** of the DCS800 Firmware. Drives shipped after March, 2008 will most likely have this revision.

What revision do I have?

To determine your firmware revision number, check the value of signal:

FirmwareVer (4.01).

Or check the label on the box:

ABB Automation Products GmbH Wallstadter STR.59 D-68526 Ladenburg Germany	Ser no 0009213 A7332097
Type DCS800-S02-0140-05 DCS800	Country / Week US 0734
Manuf. Ref. 40003065.0009213 0800	5 0.260
	

Indicates Revision 2.6

What's different with this revision

1. New Macros: Four new macros have been added. See details later in this supplement.
2. Date display in control panel data logger: The data logger now correctly displays the date and time of the fault.
3. Autotuning field current controller assistant: Autotuning now works when both field exciters are enabled.
4. Nuisance A131 ParAdded: This alarm was seen sometimes after drive is energized. This has now been corrected.
5. RdyOn with RDIO: When energizing the drive and using a RDIO, the signal RdyOn (*MainStatWord* 8.01) came on too early.
6. DC Voltage Measurement: Overflow protection has been added. This was needed for electromagnet control.
7. DC Nom Current: A fault is now set when M1NomCur (99.03) is set to zero.
8. Autotuning Speed Controller: This autotune tripped when M1MinSpeed (20.01) or M1MaxSpeed (20.02) was set to zero. This has now been corrected.
9. Bumpless transition: When changing torque selector (26.01) from MIN/MAX to SPEED, you will now see a bumpless transition.

Introduction

This supplement to the DCS800 Firmware Manual contains information that is especially important to the North American market. Some of the information is not shown in the firmware manual; other information is shown but it deserves to be highlighted. We have also included a list of known issues with the latest firmware releases, rev. 2.6 and rev. 2.7. There are no significant differences between these two revisions.

Macros

Overview

The DCS800 uses macro's differently than the ACS800 and other ABB AC drives. In the DCS800, macro's are mainly used to designate analog and digital inputs and outputs. Moreover, once a macro has been implemented, these designations are easily changed. For many, a macro is a starting point. it may also be the end point, but it is not necessarily so.

Revised macros in rev. 2.6 and above

Revision 2.6 and above includes new selections for macros, along with some minor changes to a couple of the existing macros. The following macros are now available:

- Factory
- Standard
- Manual / Constant Speed
- Hand / Auto
- Hand / Motor Pot
- Motor Pot
- Torque Control
- Torque Limit*
- 2-Wire DC Contact US*
- 3-Wire DC Contact US*
- 3-Wire Standard*
- User 1 and 2

* new in rev. 2.6

Tables 1a and 1b show each configuration. The notes indicate what has changed.

Enabling a macro – special note about 2.6 and above

Typically, there are two ways to enable (otherwise known as downloading) a macro:

- With the parameter browser in the keypad, DriveWindow Light, or DriveWindows
- With the startup assistant in DriveWindow Light

In the Revision, the new macros cannot be enabled with the startup assistant in DriveWindow Light. Use the parameter browser method instead.

Terminal #	Signal	Factory	Standard	Manual / Const Spd	Hand / Auto	Hand / Motor Pot	Motor Pot
X3:	1	90...270 V AITAC-	-	-	-	-	-
	2	30...90 V AITAC-	-	-	-	-	-
	3	8...30 V AITAC-	-	-	-	-	-
	4	AITAC+	-	-	-	-	-
	5	AI1-	-	Speed Reference	Speed Reference	Speed Reference	Speed Reference
	6	AI1+	-	-	-	-	-
	7	AI2-	-	-	-	-	-
	8	AI2+	-	-	-	-	-
	9	AI3-	-	-	-	-	-
	10	AI3+	-	-	-	-	-
X4:	1	AI4-	-	-	-	-	-
	2	AI4+	-	-	-	-	-
	3	0 V	-	-	-	-	-
	4	+10 V	-	-	-	-	-
	5	-10 V	-	-	-	-	-
	6	0 V	-	-	-	-	-
	7	AO1	-	Motor speed	Motor speed	Motor speed	Motor speed
	8	AO2	-	Arm. voltage act.	Actual motor current	Actual motor current	Actual motor current
	9	IAC T	Actual motor current	Actual motor current	Actual motor current	Actual motor current	Actual motor current
	10	0 V	-	-	-	-	-
X5:	1-10	-	-	-	-	-	-
X6:	1	DI1	Converter fan ack.	Jog1	Jog1*	StartStop (MainContAck)	Motor pot up
	2	DI2	Motor fan ack.	Jog2	Jog2*	HandAuto, Speed ref select	Motor pot down
	3	DI3	Main contact. ack.	External fault	Direction	Direction	Direction
	4	DI4	Off2 (coast stop)	External alarm	KpS & TiS to Set1 or Set2 (24.29)	-	Speed ref. select (Off=MotorPot; On=AI1)
	5	DI5	E-Stop	E-Stop	E-Stop	E-Stop	E-Stop
	6	DI6	Reset	Reset	Reset	Reset	Reset
	7	DI7	OnOff1	OnOff1	On Start pulse	OnOff1	On Start pulse
	8	DI8	StartStop (MainContAck)	StartStop (MainContAck)	Off1 Stop pulse NC	-	Off1 Stop pulse NC
	9	+24 V	-	-	-	-	-
	10	0 V	-	-	-	-	-
X7:	1	DO1	Fans On cmd.	ReadyRun	ReadyOn	ReadyOn	ReadyOn
	2	DO2	Field excit. On cmd.	ReadyRef (running)	ReadyRef (running)	ReadyRef (running)	ReadyRef (running)
	3	DO3	Main contact. On cmd.	Fault or alarm	Tripped (fault)	Tripped (fault)	Tripped (fault)
	4	DO4	-	Zero speed	Zero speed	Zero speed	Zero speed
	5	DO5	-	Above limit	Above limit	Above limit	Above limit
	6	DO6	-	-	-	-	-
	7	DO7	-	-	-	-	-
	8	0 V	-	-	-	-	-
X96:	1 2	DO8 Relay	Main Contact. On	Main Contact. On	Main Contact. On	Main Contact. On	Main Contact. On
Description		Factory macro. Resets all parameters to default values.	Drive turns on with maintained input. Motion is commanded with RUN, JOG1, or JOG2. Run speed is set with AI-1.	Speed is controlled by AI-1, but if Jog1 or Jog2 is set, speed is set to 23.02 or 23.03. DI-4 switches to another set of tuning values to run a different motor. Control is 3-wire. *Jog inputs do not initiate motion, only change speed.	DI-2 switches between Hand (Local I/O) and Auto (MainCtrlWord) mode, and also switches speed reference. In "hand" mode, speed select is via AI-1; in "auto" mode, it is via parameter 23.01. Fieldbus module is required. Manual control is 2-wire.	DI-4 switches between Motor Pot and AI-1 to select reference speed. Control is 3-wire.	Speed is always controlled through the motor pot up and down inputs. Motor pot minimum speed can be released by setting DI-4 to allow motor pot down to reduce speed to zero. Control is 2-wire.

Table 1a: Macro Configurations: The analog and digital inputs and outputs shown in this table are automatically configured when you implement the macro identified in the top row.

***In revisions prior to 2.6, AI-2 was set to torque limit. AI-2 is unused in rev. 2.6 and higher. If "torque limit" feature is required, use the new "Torque Limit" macro instead.*

****In revisions prior to 2.6, DI-4 controlled "speed reference select." DI-2 controls this selection in rev. 2.6 and above, along with selection of hand or auto mode. In "hand" mode, speed select is via AI-1; in "auto" mode, speed select is via parameter 23.01.*

Terminal #	Signal	Torque Control	Torque Limit*	2-Wire DC Contact US*	3-Wire DC Contact US*	3-Wire Standard*	
X3:	1	90...270 V AITAC-	-	-	-	-	
	2	30...90 V AITAC-	-	-	-	-	
	3	8...30 V AITAC-	-	-	-	-	
	4	AITAC+	-	-	-	-	
	5	AI1-	Torque Reference	Speed Reference	Speed Reference	Speed Reference	Speed Reference
	6	AI1+					
	7	AI2-	-	Torque Limit	-	-	-
	8	AI2+					
	9	AI3-	-	-	-	-	-
	10	AI3+					
X4:	1	AI4-	-	-	-	-	
	2	AI4+	-	-	-	-	
	3	0 V	-	-	-	-	
	4	+10 V	-	-	-	-	
	5	-10 V	-	-	-	-	
	6	0 V	-	-	-	-	
	7	AO1	Motor speed	Motor speed	Motor speed	Motor speed	Motor speed
	8	AO2	Motor torque	Arm. voltage act.	Arm. voltage act.	Arm. voltage act.	Arm. voltage act.
	9	IACT	Actual motor current	Actual motor current	Actual motor current	Actual motor current	Actual motor current
	10	0 V	-	-	-	-	-
X5:	1-10	-	-	-	-	-	
X6:	1	DI1	Off2 (coast stop)	Jog1	Jog1	FixedSpeed1	FixedSpeed1
	2	DI2	Speed/Torque select	Jog2	Jog2	-	-
	3	DI3	External fault	External fault	External fault	External fault	External fault
	4	DI4	-	External alarm	Main Cont Ack	Main Cont Ack	External alarm
	5	DI5	E-Stop	E-Stop	E-Stop	E-Stop	E-Stop
	6	DI6	Reset	Reset	Reset	Reset	Reset
	7	DI7	OnOff1	OnOff1	OnOff1	On Start pulse	On Start pulse
	8	DI8	StartStop (MainContAck)	StartStop (MainContAck)	StartStop (MainContAck)	Off1 Stop pulse NC	Off1 Stop pulse NC
	9	+24 V	-	-	-	-	-
	10	0 V	-	-	-	-	-
X7:	1	DO1	ReadyRun	ReadyRun	ReadyRun	ReadyRun	ReadyRun
	2	DO2	ReadyRef (running)	ReadyRef (running)	ReadyRef (running)	ReadyRef (running)	ReadyRef (running)
	3	DO3	Fault or alarm	Fault or alarm	Fault or alarm	Fault or alarm	Fault or alarm
	4	DO4	Zero speed	ZeroSpeed	Zero speed	Zero speed	Zero speed
	5	DO5	DC-breaker trip cmd.	Above limit	Above limit	Above limit	Above limit
	6	DO6	-	-	-	-	-
	7	DO7	-	-	-	-	-
	8	0 V	-	-	-	-	-
X96:	1	DO8 Relay	Main Contact. On	Main Contact. On	US - DC Contactor On	US - DC Contactor On	Main Contact. On
	2						
Description		DI-2 switches between speed and torque control. While in torque control, AI-1 is used as reference; while in speed control 23.01 is used as reference. DO-5 can control a DC circuit breaker. Control is 2-wire.	Same as "Standard" except AI-2 determines torque limit.	Same as "Standard" except it controls a DC contactor and requires a DC contactor acknowledge.	Same as "3-Wire Standard" except it controls a DC contactor and requires a DC contactor acknowledge.	Drive turns on and runs with pulsed RUN input. It turns off with clearing of STOP input (aka, 3-wire control). Once running, speed changes to fixed speed 1 (23.02) when input DI-1 is set, and returns to run speed when it is cleared. Run speed is set with AI-1.	

Table 1b: Macro Configurations: The analog and digital inputs and outputs shown in this table are automatically configured when you implement the macro identified in the top row.

*New Macro

Enabling a macro, continued

To use the parameter browser, either through the control panel, DriveWindow, or DriveWindow Light, use the following parameters:

- *ApplMacro* (99.08)
- *Applrestore* (99.07)
- *MacroSel* (8.10)

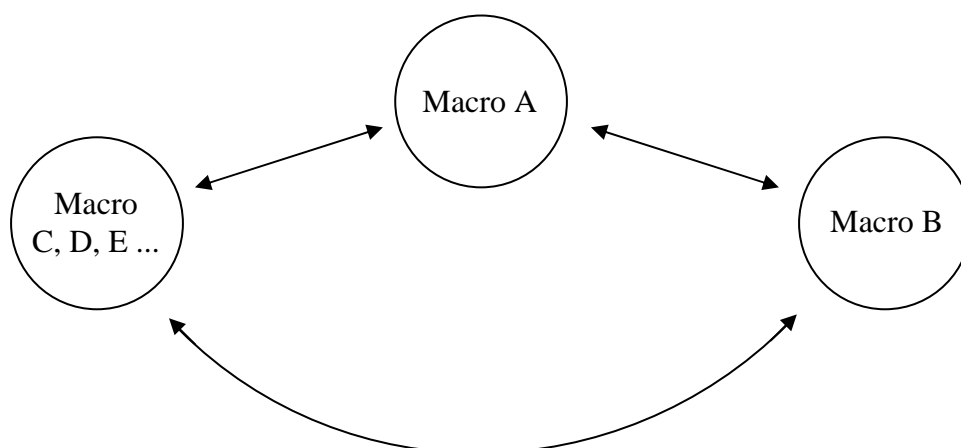
ApplMacro (99.08) is used to select the desired macro. *Applrestore* (99.07) is used to execute the command. First, change *ApplMacro* (99.08) to the macro of your choice from the drop down box (in DW or DWL) or by using the arrow keys (in the control panel). Then change the selection of *Applrestore* (99.07) from **Done** to **Yes**. When finished executing, the drive will set this value back to Done. If using DWL, you may need to right click and select **upload** to see this change. Verify the macro was loaded by observing the setting of *MacroSel* (8.10). This signal shows the last macro loaded.

To use the wizard: **IMPORTANT**: *New macros, as identified above, cannot be enable with this method.*

After connecting to the drive with DriveWindow Light (see Quick Guide for details), click on the wizard. Then select the checkbox next to **2. Macro Assistant**. Then select **Next**. At the top of the page is the selection for parameter *Application Macro* (9908). Choose the desired macro in the drop down box. Then click on **Apply**. The page will then fill in the designations of the analog and digital inputs and outputs according to the macro selected.

Switching between macros – it’s easier, starting with rev. 2.6

One new feature that has been implemented in rev. 2.6 is the ability to freely switch between macros. For example, if you download the “standard” macro and then decide you want to switch to “torque control,” you can do so without concern. The macro will be loaded without any affect on motor or tuning parameters. *Please note, however, that the factory macro will reset all parameters back to factory default.*



Revision 2.6 allows you to freely switch between any macro, except factory, without changing motor or tuning parameters. Factory macro resets all parameters back to default.

For additional information

Macros: See the help screen in Drive Window Light by clicking on **Help** from any wizard screen or in the following location on computers that have been loaded with DC drive tools:

C:\Program Files\DriveWare\DriveWindow Light 2\DCS800\DCS800HelpEnglish.chm

Note: DriveWindow Light “help” file does not yet include macro changes in rev 2.6 and 2.7.

Parameter Lists: See appendix A for a complete list of parameter settings for each macro.

DriveWindow Light: For basic instructions on DriveWindow Light (incl. communication settings), see the **DCS800 Quick Guide** which is included with every D1 – D4 drive.

DC contactors with/without dynamic braking

Overview

The type of DC contactor used in North America is not used worldwide. The US typically uses DC contactors with 1 or 2 normally-open (NO) poles and sometimes 1 normally-closed (NC) pole. The NO poles are used to make and break the connection between the drive and the motor. Some contactors also have a NC pole used to connect a resistor across the motor leads to make it stop (dynamic braking). The Europeans use a different technique. In Europe, the dc contactor never breaks the circuit between the drive and the motor. Instead, an AC input contactor is used. A single pole NO DC contactor is used for dynamic braking. When dynamic braking is required, the AC contactor is opened, removing power to the drive, and the DC contactor is closed, connecting the resistor across the motor leads to make it stop. Then the DC contactor is opened again after the motor stops. In revisions 1.7 and 1.8, only the European type was supported by the DCS800. Revisions 2.1 and above also support the North American type. Revisions 2.2 and higher, however, supports it differently with improved results.

DC Contactor Macros

Beginning in revision 2.6, the drive can automatically be configured to control a DC contactor by enabling one of two new macros: “2-wire DC Contact US” or “3-wire DC Contact US.” These macros will not, however, configure the drive for dynamic braking. This must be done manually. See below for instructions. See above for how to enable a macro.

Contactor acknowledge input

When using the DCS800 to control the DC contactor, firmware 2.2 and above require that an auxiliary contact from the DC contactor be connected to a drive input. This is the only sure way for the drive to know that the contactor is closed and current can flow to the motor. To configure this, set the following parameter:

- *MainContactorAck* (10.21) = **DI-1** (or whichever input is chosen)

IMPORTANT: This configuration is different than what was recommended for revision 2.1. In 2.1, parameter 10.22 was used instead, and the input was inverted (using parameter 10.25 for example). This is not recommended for revisions 2.2 and above.

Using DC contactors with or without dynamic braking

Use digital output 8 (DO-8) to control the DC contactor. DO-8 is the only relay output in the DCS800 drive and is rated at 3 Amps at either 115/230 Vac or 24 Vdc. (Rated at 0.3 Amps at 115-230 Vdc.) Control of DO-8 is configured with parameters *DO8Index* (14.15) and *DO8BitNo* (14.16).

Parameter *DO8Index* (14.15) is used to select the control word;

Parameter *DO8BitNo* (14.16) is used to select which bit in that word is the switch;

The default setting for *DO8Index* (14.15) is **603**, which refers to *CurCtrlStat1* (6.03). Three bits can be used to control the various types of contactors:

- | | | |
|----|---------------------|---|
| 7 | MainContactorOn | (default – for AC contactors) |
| 8 | DynamicBrakingOn | (for European 1-pole DB contactors) |
| 10 | US-DynamicBrakingOn | <u>(for North American DC contactors)</u> |

For all types of DC contactors that break the circuit between the drive and the motor, set the parameters as follows:

- Parameter *DO8Index* (14.15) = **603** (default)
- Parameter *DO8BitNo* (14.16) = **10**

For revision 2.2 and above, the following parameter must also be set:

- *MainContCtrlMode* (21.16) = **DCcontact** (3)

Configuring the drive for dynamic braking

The drive allows you to select the stopping method under three different situations.

Parameters 21.02, 21.03 and 21.04 select the stopping method for loss of the OnOff, run command (StartStop, Jog1, Jog2, etc.), and E-Stop input, respectively. Each can be set to:

- | | |
|-------------|---------------|
| • RampStop | • TorqueLimit |
| • CoastStop | • DynBraking |

In order to command the drive to perform a DB stop, one or more of these parameters must be set to DynBraking. Most users will want the drive to ramp stop when OnOff or a run command (StartStop, Jog1, Jog2, etc.) input is cleared, and dynamically brake when the E-Stop input is cleared. In that case, use the following settings:

- Parameter *Off1Mode* (21.02) = **RampStop**
- Parameter *StopMode* (21.03) = **RampStop**
- Parameter *E StopMode* (21.04) = **DynBraking**

However, any case is allowed and the final decision is left to the user.

NOTE: Stopping by way of OnOff takes precedence over stopping by way of StartStop (or Jog1 or Jog2). For example, assume:

Off1Mode (21.02) is set to DynBraking, and

StopMode (21.03) is set to RampStop

If StartStop is cleared, then the drive will begin to ramp stop. If OnOff is then cleared before the motor comes to a stop, then the motor will dynamically brake the rest of the way.

Other parameters control the stopping method during certain fault conditions. See:

- | | |
|--------------------------------|---------------------------------|
| • <i>LocalLossCtrl</i> (30.27) | • <i>ComLossCtrl</i> (30.28) |
| • <i>FaultStopMode</i> (30.30) | • <i>SpeedFbFitMode</i> (30.36) |

EMF feedback with dynamic braking

If using EMF feedback with dynamic braking (meaning parameter *M1SpeedFbSel* (50.03) is set to EMF and one or more of the above parameters is set to DynBraking), you will also need to set up the *DynBrakeDly* (50.11) parameter. This is necessary, because, when using a DC contactor with EMF feedback, when the contactor opens to dynamically brake, there is no valid information about the motor speed and thus no zero speed information in the drive. To prevent an interlocking of the drive after dynamic braking, the speed is assumed to be zero after *DynBrakeDly* (50.11) time is elapsed. When dynamically braking, the zero speed output will be set after this time expires.

The following parameter must be set:

- Parameter *DynBrakeDly* (50.11) = **the time (seconds) it normally takes the motor to stop during dynamic braking**

For additional information

See the DCS800 firmware manual:

- | | | |
|-------------------|---------------------|---------------------|
| • Page 120 | group 6 parameters | Drive Logic Signals |
| • Page 168 | group 14 parameters | Digital Outputs |
| • Pages 180 – 181 | group 21 parameters | Start / Stop |
| • Pages 205 - 207 | group 30 parameters | Fault Functions |

AC contactors

The drive's DO-8 output can control an AC input contactor instead. For an AC contactor, use these settings:

- Parameter *DO8Index* (14.15) = **603** (default)
- Parameter *DO8BitNo* (14.16) = **7** (default)
- Parameter *MainContCtrlMode* (21.16) = **On** (default)
- Parameter *MainContAck* (10.21) = **the acknowledge input number, if present.***

*As an alternative to using parameter (10.21), the contactor acknowledge signal (from an auxiliary contact on the AC input contactor) can be used to set the "StartStop" input. This would permit the motor to be turned on and commanded to move by setting just one input, the OnOff input. When OnOff is set, the drive will set DO-8 which will close the AC contactor. The auxiliary contact will then give the StartStop input, initiating motion. If this is desired, use the following parameter instead of 10.21:

- Parameter *StartStop* (10.16) = **the acknowledge input number**

Field heating

Overview

Field heating (also referred to as “field warming and field economy”) is traditionally been used in the US for a couple reasons. Previous generations of dc drives used voltage-controlled field supplies, meaning that the only thing the field supply could directly control was voltage. For DC motors, maintaining the field’s current is what’s important to maintaining optimal torque. Ohm’s law tells us that current equals voltage multiplied by resistance, so as long as resistance remains constant, current will be proportional to voltage. But field resistance changes with temperature. Therefore, a cold motor would have a different field current than a warm motor, even though voltage remained unchanged. To keep the resistance, and thus the current constant, the field was left on to keep it warm. Then the voltage-controlled field supply would work just fine.

The new generation of drives, including all field supplies used with the DCS800, are current controlled, meaning that the field supply directly regulates field current. This means that field heating may no longer be necessary when this drive is employed.

The other reason field heating is used is to keep moisture out of the motor.

If field heating is still required, the drive does allow for this option.

Two parameters are used to turn on and control field heating:

- *FldHeatSel* (21.18)
- *M1FldHeatRef* (44.04)

Field heating modes of operation

There are two modes of operation, depending on the setting of *FldHeatSel* (21.18): On and OnRun.

- On Mode:** In general, the field will be on unless the Emergency Off or Emergency Stop inputs are clear.
- OnRun Mode:** In general, the OnOff input must also be set, in addition to the Emergency Off and Emergency Stop inputs, in order for the field to be on.

In both modes, the field current will at a reduced level, determined by *M1FldHeatRef* (44.04), whenever the drive is in a non-run mode. See tables, below, for details.

Field heat On

When parameter *FldHeatSel* (21.18) = **On**, the feature works as follows:

Condition	OnOff Input (DI-7)	Off2 Input*	Result
Power Up:	Off	On	Field On - reduced**
Start drive:	On	On	Field On
Normal stop:	On → Off	On	Field On, then reduced** after stop
Off2 while running:	On	On → Off	Field turns off safely as motor coasts to stop.

* Parameter *Off2 Emergency Off / Coast Stop* (10.08) must be set to a valid input bit number for this to be valid. Default value is **DI-4**.

** If parameter 44.04 is set below 100%, field will be at this reduced level while motor is stopped.

Field heat OnRun

When *FldHeatSel* (21.18) = **OnRun**, the feature works as follows:

<u>Run (StartStop, Jog1, Jog2, etc.)</u>	OnOff Input (DI-7)	Off2 Input*	Result
Off	On	On	Field On - reduced**
On	On	On	Field On
On or Off	On	On → Off	Field will turn off safely as motor coasts to stop and cannot turn back on again until Off2 is switched on while OnOff and Run are off.
All other conditions			Field Off

* Parameter *Off2 Emergency Off / Coast Stop* (10.08) must be set to a valid input bit number for this to be valid. Default value is **DI-4**.

** If parameter 44.04 is set below 100%, field will be at this reduced level while motor is stopped.

The Estop Input

In both modes of operation, the estop input (configured with parameter 10.09) is cleared while the drive is off, the field will turn off. It will not turn back on again until the estop input is again set. If estop is cleared while in motion, the motor will decelerate to a stop, the drive will turn off, and then the field will shut off.

For additional information

See the DCS800 firmware manual:

- Page 148 - 152 group 10 parameters Start / Stop Select
- Pages 180 – 181 group 21 parameters Start / Stop
- Page 222 group 44 parameters Field Excitation

Saving and restoring a parameter set

Overview

There are many ways to save a parameter set in DriveWindow Light and in the control panel. This section describes the best way for each.

Using DriveWindow Light

In DriveWindow Light, there are many ways to save and restore a parameter set. The easiest method is to use Save as and Open in Browser, found under the File menu. This will save and restore the entire parameter set, including motor data and any existing AP programming. Type code parameters will not be affected. This means there is no danger with uploading parameters from a 10 hp drive and downloading them to a 100 hp drive. The drive will not forget that it is a 100 hp drive, but you will need to modify the motor voltage, current, etc. after the download.

Saving with SAVE AS: This function transfers the parameter set from the DCS800 to the PC. It is done as follows:

1. Connect to the DCS800 and go on line by clicking on File, then New Online Drive.
2. Click on File, then Save As.... Enter a file name and select a location.
3. Click SAVE. A file of type .dwp will be created. This will take about a minute. The process is done when the hourglass stops spinning.

Restoring with OPEN IN BROWSER: This function transfers the parameter set from the PC to the DCS800. It is done as follows:

1. Connect to the DCS800 and go on line by clicking on File, then New Online Drive.
2. Click on File, then Open in Browser. Find the desired .dwp file. Then click OPEN.
3. A message will appear stating, *"You are opening a new file in OnLine Mode. All values from the file will be written to the drive. Do you want to continue?"* Click YES.
4. In some cases, another message will appear stating, *"loaded file and active parameter browser version numbers differ..."* followed by file and parameter browser information. This occurs when the original drive had a different version of either the operating system (OS) or the control module (HW) than the connected drive. In almost all cases, the parameter sets will be compatible, so we recommend answering YES, but if in doubt, click NO. Then back up your current parameter set using the SAVE AS procedure above, before proceeding with this restore. This will allow you to easily recover if there is a compatibility issue.

NOTE 1: FOLLOWING ERRORS OCCURRED or NO WIZARD FILE: If one of these error messages appears after the download, close the error window, close the browser window, then reopen the browser by clicking on File, then New Online Drive.

NOTE 2: In some cases, the AP program will not be downloaded to the drive during a restore. If this happens, close any open parameter browser windows, open the .dwp file (in Offline mode), change 83.01 to EDIT, click SAVE, close the parameter browser, then repeat the restore, starting with step 1 above. After the download, change 83.01 in the drive back to START to enable the AP program.

NOTE 3: If using a tachometer, you will need to perform TACHO FINE TUNING after the download by running Startup Assistant 5 (Speed Feedback Assistant) from the wizard.

Using the control panel

The current version of the control panel only supports one method of upload and download. The function DOWNLOAD APPLICATION is not currently available.

UPLOAD: This function transfers the parameter set from the DCS800 drive to the control panel. It is done as follows:

1. Put the drive in "local mode" by pushing the LOCAL REMOTE button on the control panel.
2. Select PAR BACKUP from the main menu (use the arrow button to find it), then UPLOAD TO PANEL. If the control panel reports an error "Parameter Upload Failed," the you probably did not do step 1.

DOWNLOAD: This function transfers the parameter set from the control panel to the DCS800. It is done as follows:

1. Put the drive in "local mode" by pushing the LOCAL REMOTE button on the control panel.
2. Select PAR BACKUP from the main menu (use the arrow button to find it), then DOWNLOAD FULL SET. If the control panel reports an error "Parameter Download Failed," the you probably did not do step 1.

NOTES: 1) You must first do an UPLOAD before this function appears. 2) The function DOWNLOAD APPLICATION is currently not available.

For additional information

See the DCS800 firmware manual:

- Page 272 - 280 DCS800 panel operation
- Page 279 Parameter backup mode

Adaptive programming

Overview

This section contains some helpful hints about how to use adaptive programming.

Using spare control bits

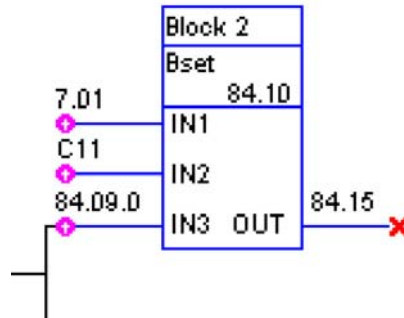
Many times with adaptive programming, a bit in a control word needs to be set. This could be a defined control bit or a spare control bit. The *MainCtrlWord (7.01)* has 11 defined bits, from bit 0 (OnOff1) to bit 10 (RemoteCmd). The last five, B11 through B15 are spare, available for use by the AP program. More often than not, it is better to use a spare control bit than a defined control bit. If you use a defined bit, one never knows whether it will be written over by the firmware, undoing the work of your AP program. Furthermore, most of the start/stop functions in group 10, including direction, reset, handauto, Off2, and E-stop, can be set to switch on one of these spare bits.

The importance of BSet (Bit Set)

Setting and clearing a bit in a control word is done by use of the BSet function block. If BSet is not used, instead of switching just one bit, the AP program will likely switch all the

bits in a word, usually setting them all to 1 (TRUE) or 0 (FALSE). The firmware uses the defined bits in the control words to perform important functions. Undoing the good work of the firmware with your AP program is bound to cause trouble.

This means that, in many cases, the last block you will use in your AP program will be a BSet block. Here is an example:



In this example, the block is toggling bit 11 of the *MainCtrlWord* (7.01) according to the state of 84.09.0, leaving the other *MainCtrlWord* bits as they were before. The modified copy of the *MainCtrlWord* is written to parameter 84.15. To complete this process, the output must be set as follows:

Block1 Out	86.01	0
Block1 Out Signal		0
Block2 Out	86.02	701
Block2 Out Signal		0
Block3 Out	86.03	0

This will direct the program to write the value of block 2 output (84.15) to parameter 701 *MainCtrlWord* (7.01). This all happens very quickly. The result will be that the value of bit 11 will change, but the other bits will remain intact.

For additional information

See the DCS800 firmware manual:

- Page 67 – 75 Adaptive Program Instructions
- Page 76 – 98 Adaptive Program Function Blocks

Configuring and displaying digital inputs and outputs

Overview

In the keypad, the only way to view the status of digital inputs and outputs is in hexadecimal format (parameters 8.05 and 8.06). Setting them up during commissioning can be a bit complicated. Digital inputs and outputs (analog too) can be configured in a much more user friendly format by using the “I/O assistant” wizard in DriveWindows Light.

Using DriveWindows Light

1. Connect to the DCS800 and go on line by clicking on File, then New Online Drive.
2. Click on Wizard, on the left side of the screen.
3. Click on Advanced.
4. Check the box for “I/O assistant,” then click on Next.
5. In the digital input box or digital output box, click on “edit parameters.”

In this screen, you can:

- View the status of digital inputs and outputs
- Invert inputs and outputs
- View the current input and output setting
- Change the input and output setting (by clicking on edit for the desired bit)

NOTE: In many cases, the initial input and output configuration will be done by using one of the predefined macros. The “Macro assistant” is almost the same as the I/O assistant. I/O status can be viewed and configuration changed in that assistant in much the same way.

Appendix A

These tables show parameter settings for each of the 11 macros. With the exception of “factory” macro, parameters not shown are not changed by the macro. Factory macro changes all parameters to factory default.

Parameter	Item No.	Factory	Standard	Manual / Const Spd	Hand / Auto	Hand / Motor Pot	Motor Pot
Direction	10.02	NotUsed	NotUsed	DI-3	DI-3	DI-3	DI-1
Motor Fan Ack	10.06	DI-2	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
HandAuto	10.07	NotUsed	NotUsed	NotUsed	DI-2	NotUsed	NotUsed
Off2	10.08	DI-4	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
OnOff1	10.15	DI-7	DI-7	DI7DI8	DI-7	DI7DI8	DI-7
StartStop	10.16	DI-8	DI-8	DI7DI8	DI-1	DI7DI8	DI-8
Jog1	10.17	NotUsed	DI-1	DI-1	NotUsed	NotUsed	NotUsed
Jog2	10.18	NotUsed	DI-2	DI-2	NotUsed	NotUsed	NotUsed
ConvFanAck	10.20	DI-1	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
MainContAck	10.21	DI-3	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
Ref1Mux	11.02	Close	Close	Close	DI-2	DI-4	Close
Ref1Sel	11.03	SpeedRef2301	AI-1	AI-1	AI-1	AI-1	MotorPot
Ref2Sel	11.06	SpeedRef2301	SpeedRef2301	SpeedRef2301	SpeedRef2301	MotorPot	SpeedRef2301
Ref2Mux	11.12	Open	Open	Open	Invert1102	Invert1102	Open
MotPotUp	11.13	NotUsed	NotUsed	NotUsed	NotUsed	DI-1	DI-2
MotPotDown	11.14	NotUsed	NotUsed	NotUsed	NotUsed	DI-2	DI-3
MotPotMin	11.15	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed	DI-4
DO1 Index	14.01	603	801	801	801	801	801
DO1 Bit No	14.02	0	1	1	0	0	1
DO2 Index	14.03	603	801	801	801	801	801
DO2 Bit No	14.04	5	2	2	2	2	10
DO3 Index	14.05	603	802	801	801	801	802
DO3 Bit No	14.06	7	13	3	3	3	13
DO4 Index	14.07	0	802	802	802	802	802
DO4 Bit No	14.08	0	11	11	11	11	11
DO5 Index	14.09	0	801	801	801	801	801
DO5 Bit No	14.10	0	10	10	10	10	8
DO8 Select	14.16	7	7	7	7	7	7
Index AO1	15.01	0	104	104	104	104	104
Index AO2	15.06	0	113	106	106	106	113
TorqUsedMaxSel	20.18	TorqMax	TorqMax	TorqMax	TorqMax	TorqMax	TorqMax
TorqUsedMinSel	20.19	TorqMin	TorqMin	TorqMin	TorqMin	TorqMin	TorqMin
SpeedRef	23.01	0	0	0	100	0	100
FixedSpeed1	23.02	0	75	75	75	0	50
FixedSpeed2	23.03	0	100	100	0	0	0
TorqRefASel	24.29	Par1Sel	Par1Sel	DI4	Par1Sel	Par1Sel	Par1Sel
TorqRefA2Sel	25.10	TorqRefA2501	TorqRefA2501	TorqRefA2501	TorqRefA2501	TorqRefA2501	TorqRefA2501
TorqSel	26.01	Speed	Speed	Speed	Speed	Speed	Speed
TorqMuxMode	26.04	TorqSel2601	TorqSel2601	TorqSel2601	TorqSel2601	TorqSel2601	TorqSel2601
TorqMux	26.05	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
ExtFaultSel	30.31	NotUsed	DI-3	DI-3	NotUsed	NotUsed	NotUsed
ExtAlarmSel	30.32	NotUsed	DI-4	DI-4	NotUsed	NotUsed	NotUsed
USI Sel	16.09	Compact	Extended	Extended	Extended	Extended	Extended
All others		Default	not changed	not changed	not changed	not changed	not changed

18 Appendix A – Macro Parameter Lists

Parameter	Item No.	Torque Control	Torque Limit*	2-Wire DC Contact US*	3-Wire DC Contact US*	3-Wire Standard*
Direction	10.02	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
Motor Fan Ack	10.06	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
HandAuto	10.07	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
Off2	10.08	DI-1	NotUsed	NotUsed	NotUsed	NotUsed
OnOff1	10.15	DI-7	DI-7	DI-7	DI7DI8	DI7DI8
StartStop	10.16	DI-8	DI-8	DI-8	DI7DI8	DI7DI8
Jog1	10.17	NotUsed	DI-1	DI-1	NotUsed	NotUsed
Jog2	10.18	NotUsed	DI-2	DI-2	NotUsed	NotUsed
ConvFanAck	10.20	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
MainContAck	10.21	NotUsed	NotUsed	DI-4	DI-4	NotUsed
Ref1Mux	11.02	Close	Close	Close	DI1	DI1
Ref1Sel	11.03	SpeedRef2301	AI-1	AI-1	Fixed speed1	Fixed speed1
Ref2Sel	11.06	AuxSpeedRef	SpeedRef2301	SpeedRef2301	AI-1	AI-1
Ref2Mux	11.12	Open	Open	Open	invert 1102	invert 1102
MotPotUp	11.13	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
MotPotDown	11.14	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
MotPotMin	11.15	NotUsed	NotUsed	NotUsed	NotUsed	NotUsed
DO1 Index	14.01	801	801	801	801	801
DO1 Bit No	14.02	1	1	1	1	1
DO2 Index	14.03	801	801	801	801	801
DO2 Bit No	14.04	2	2	2	2	2
DO3 Index	14.05	802	802	802	802	802
DO3 Bit No	14.06	13	13	13	13	13
DO4 Index	14.07	802	802	802	802	802
DO4 Bit No	14.08	11	11	11	11	11
DO5 Index	14.09	603	801	801	801	801
DO5 Bit No	14.10	15	10	10	10	10
DO8 Select	14.16	7	7	10	10	7
Index AO1	15.01	104	104	104	104	104
Index AO2	15.06	108	113	113	113	113
TorqUsedMaxSe	20.18	TorqMax	AI-2	TorqMax	TorqMax	TorqMax
TorqUsedMinSe	20.19	TorqMin	Negate2018	TorqMin	TorqMin	TorqMin
SpeedRef	23.01	100	0	0	0	0
FixedSpeed1	23.02	0	75	75	75	75
FixedSpeed2	23.03	0	100	100	100	100
TorqRefASel	24.29	Par1Sel	Par1Sel	Par1Sel	Par1Sel	Par1Sel
TorqRefASel	25.10	AI-1	TorqRefA2501	TorqRefA2501	TorqRefA2501	TorqRefA2501
TorqSel	26.01	Torque	Speed	Speed	Speed	Speed
TorqMuxMode	26.04	Speed/Torq	TorqSel2601	TorqSel2601	TorqSel2601	TorqSel2601
TorqMux	26.05	DI-2	NotUsed	NotUsed	NotUsed	NotUsed
ExtFaultSel	30.31	DI-3	DI-3	DI-3	DI-3	DI-3
ExtAlarmSel	30.32	NotUsed	DI-4	NotUsed	NotUsed	DI-4
USI Sel	16.09	Extended	Extended	Extended	Extended	Extended
All others		not changed	not changed	not changed	not changed	not changed

Notes:

