

24-pulse control manual

DCS800 drives (20 to 5200 A)



DCS800 Drive Manuals

		Language									
	Public. number	E	D	I	ES	F	CN	RU	PL	PT	SE
DCS800 Quick Guide	3ADW000191	x	x	x	x	x				x	x
DCS800 Tools & Documentation CD	3ADW000211	x									
DCS800 Converter module											
Flyer DCS800	3ADW000190	x	x		x	x				x	
Technical Catalog DCS800	3ADW000192	x	x	x	x	x	x	x	x	x	
Hardware Manual DCS800	3ADW000194	x	x	x	x	x	x	x	x		
Hardware Manual DCS800 update DCF503B/DCF504B	3ADW000194Z	x									
Firmware Manual DCS800	3ADW000193	x	x	p	x	x	x	x	x		
Installation according to EMC	3ADW000032	x									
Technical Guide	3ADW000163	x									
Service Manual DCS800	3ADW000195	x	x								
12-Pulse Manual	3ADW000196	x									
CMA-2 Board	3ADW000136	x									
Flyer Hard - Parallel	3ADW000213	x									
Drive Tools											
DriveWindow 2.x - User's Manual	3BFE64560981	x									
DriveOPC 2.x - User's Manual	3BFE00073846	x									
Optical DDCS Communication Link	3AFE63988235	x									
DDCS Branching Units - User's Manual	3BFE64285513	x									
DCS800 Applications											
PLC Programming with C_s	C_s_V23	x	x			x					
61131 DCS800 target + tool description - Application Program	3ADW000199	x									
DCS800 Crane Drive											
DCS800 Crane Drive Manual suppl.	3AST004143	x									
DCS800 Crane Drive Product note	PDC5 EN	x									
DCS800 Winder ITC											
DCS800 Winder Product note	PDC2 EN	x									
DCS800 Winder description ITC	3ADW000308	x									
Winder Questionnaire	3ADW000253Z	x									
DCS800-E Panel Solution											
Flyer DCS800-E Panel solution	3ADW000210	x									
Hardware Manual DCS800-E	3ADW000224	x									
DCS800-A Enclosed Converters											
Flyer DCS800-A	3ADW000213	x									
Technical Catalog DCS800-A	3ADW000198	x									
Installation of DCS800-A	3ADW000091	x	x								
DCS800-R Rebuild System											
Flyer DCS800-R	3ADW000007	x	x								
DCS800-R Rebuild Kits	3ADW000197	x									
DCS800-R Optical Rebuild Kits	3ADW000415	x									
DCS800-R DCS500/DCS600 Upgrade Kits	3ADW000256	x									
Extension Modules											
RAIO-01 Analog IO Extension	3AFE64484567	x									
RDIO-01 Digital IO Extension	3AFE64485733	x									
RRIA-01 Resolver Interface Module	3AFE68570760	x									
RTAC-01 Pulse Encoder Interface	3AFE64486853	x									
RTAC-03 TTL Pulse Encoder Interface	3AFE68650500	x									
AIMA R-slot extension	3AFE64661442	x									
Door mounting kits											
Door mounting DCS Control Panel (IP54, click in)	3AUA0000076085	x									
Door mounting DCS Control Panel (fix mounting)	3AFE68294673	x									
Door mounting DCS Control Panel (IP66, fix mounting)	3AFE68829593	x									
Serial Communication											
Drive specific serial communication											
NETA Remote diagnostic interface	3AFE64605062	x									
Fieldbus Adapter with DC Drives RPBA- (PROFIBUS)	3AFE64504215	x									
Fieldbus Adapter with DC Drives RCAN-02 (CANopen)											
Fieldbus Adapter with DC Drives RCNA-01 (ControlNet)	3AFE64506005	x									
Fieldbus Adapter with DC Drives RDNA- (DeviceNet)	3AFE64504223	x									
Fieldbus Adapter with DC Drives RMBA (MODBUS)	3AFE64498851	x									
Fieldbus Adapter with DC Drives RETA (Ethernet)	3AFE64539736	x									
x -> existing p -> planned											
Status 01 2015											

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Quasi 24-pulse

General description

Schematical diagram quasi 24-pulse

There is 1 DC Motor ($1350\text{ V}_{\text{DC}}$ / $4750\text{ A}_{\text{DC}}$) connected to a combination of 8 times DCS800.

The DC motor is connected in parallel to a Master and Follower configuration. Both the Master as well as the Follower is realized in serial sequential mode containing a serial sequential master and a serial sequential slave to apply the needed output DC voltage to the DC motor. Each serial sequential master and each serial sequential slave of both Master and Follower can be realized either with DCS800 single stack or hard parallel configuration.

The example structure diagram of hard parallel configuration gives an overview of the installed power and the function of the several DCS800 components:

4 x DCS800-S02-4000-08 + S176 (parallel master with SDCS-CON-4 Controller board)

4 x DCS800-S02-4000-08 + S177 (parallel slave)

The chapter describes the parameters and signals of the firmware.

Safety instructions

Chapter overview




This chapter contains the safety instructions which you must follow when installing, operating and servicing the DCS800. If ignored, physical injury or death may follow, or damage may occur to the DCS800 or the DCS800 equipment. Read the safety instructions before you work on the unit.

To which products this chapter applies

This chapter applies to the DCS800. Size D1 to D7 and field exciter units DCF80x.

Use of warnings and notes

There are two types of safety instructions throughout this manual: warnings and notes. Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment. They also tell you how to avoid the danger. Notes draw attention to a particular condition or fact, or give information on a subject. The warning symbols are used as follows:

	Dangerous voltage warning warns of high voltage which can cause physical injury and/or damage to the equipment.
	General warning warns about conditions, other than those caused by electricity, which can result in physical injury and/or damage to the equipment.
	Electrostatic discharge warning warns of electrostatic discharge which can damage the equipment.

Installation and maintenance work

These warnings are intended for all who work on the DCS800, motor supply cable or motor. Ignoring the instructions can cause physical injury or death.



Only qualified electricians are allowed to install and maintain the DCS800.

- Never work on the DCS800, motor cable or motor when main power is applied.
Always ensure by measuring with a multi meter (impedance at least 1 MΩ) that:
 1. Voltage between DCS800 input phases U1, V1 and W1 and the frame is close to 0 V.
 2. Voltage between terminals C+ and D- and the frame is close to 0 V.
- Do not work on the control cables when power is applied to the DCS800 or to the external control circuits. Externally supplied control circuits may cause dangerous voltages inside the DCS800 even when the main power on the DCS800 is switched off.
- Do not make any insulation or voltage withstand tests on the DCS800 or DCS800 modules.
- When reconnecting the motor cable, always check that the C+ and D- cables are connected with the proper terminal.

Note:

- The motor cable terminals on the DCS800 are at a dangerously high voltage when the input power is on, regardless of whether the motor is running or not.
- Depending on the external wiring, dangerous voltages (115 V, 220 V or 230 V) may be present on the terminals of relay outputs SDCS-IOB-2 and RDIO.
- DCS800 with enclosure extension: Before working on the DCS800, isolate the whole DCS800 from the supply.



WARNING! The printed circuit boards contain components sensitive to electrostatic discharge. Wear a grounding wrist band when handling the boards. Do not touch the boards unnecessarily.

Use grounding strip:

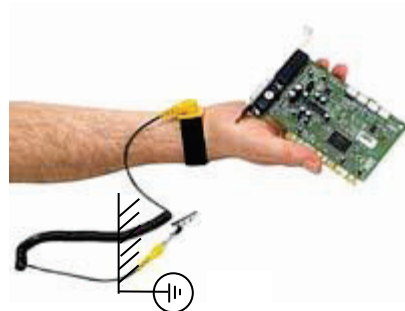


ABB order no.: 3ADV050035P0001

Grounding

These instructions are intended for all who are responsible for the grounding of the DCS800. Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic interference



- Ground the DCS800, motor and adjoining equipment to ensure personnel safety in all circumstances, and to reduce electromagnetic emission and pick-up.
- Make sure that grounding conductors are adequately sized as required by safety regulations.
- In a multiple-DCS800 installation, connect each DCS800 separately to protective earth (PE) \oplus .
- Minimize EMC emission and make a 360° high frequency grounding of screened cable entries at the cabinet lead-through.
- Do not install a DCS800 with EMC filter on an ungrounded power system or a high resistance-grounded (over 30 ohms) power system.

Note:

- Power cable shields are suitable for equipment grounding conductors only when adequately sized to meet safety regulations.
- As the normal leakage current of the DCS800 is higher than 3.5 mA AC or 10 mA DC (stated by EN 50178, 5.2.11.1), a fixed protective earth connection is required.

Fiber optic cables



WARNING! Handle the fiber optic cables with care. When unplugging optic cables, always grab the connector, not the cable itself. Do not touch the ends of the fibers with bare hands as the fiber is extremely sensitive to dirt. The minimum allowed bend radius is 35 mm (1.4 in.).

Mechanical installation

These notes are intended for all who install the DCS800. Handle the unit carefully to avoid damage and injury.



- DCS800 sizes D4...D7: The DCS800 is heavy. Do not lift it alone. Do not lift the unit by the front cover. Place units D4 and D5 only on its back.



DCS800 sizes D5...D7: The DCS800 is heavy. Lift the DCS800 by the lifting lugs only. Do not tilt the unit. The unit will overturn from a tilt of about 6 degrees.

- Make sure that dust from drilling does not enter the DCS800 when installing. Electrically conductive dust inside the unit may cause damage or lead to malfunction.
- Ensure sufficient cooling.
- Do not fasten the DCS800 by riveting or welding.

Operation


These warnings are intended for all who plan the operation of the DCS800 or operate the DCS800. Ignoring the instructions can cause physical injury or death or damage the equipment.



- Before adjusting the DCS800 and putting it into service, make sure that the motor and all DCS800 equipment are suitable for operation throughout the voltage range provided by the DCS800. The DCS800 can be adjusted to operate the motor at voltages above and below the rated voltage.
- Do not activate automatic fault reset functions of the Standard Application Program if dangerous situations can occur. When activated, these functions will reset the DCS800 and resume operation after a fault.
- Do not control the motor supply with the disconnecting device (disconnecting mains); instead, use the control panel keys  and , or commands via the I/O board of the DCS800.
- Mains connection
You can use a disconnect switch (with fuses) in the power supply of the thyristor power converter to disconnect the electrical components of the unit from the power supply for installation and maintenance work. The type of disconnect used must be a disconnect switch as per EN 60947-3, Class B, so as to comply with EU regulations, or a circuit-breaker type which switches off the load circuit by means of an auxiliary contact causing the breaker's main contacts to open. The mains disconnect must be locked in its "OPEN" position during any installation and maintenance work.
- EMERGENCY STOP buttons must be installed at each control desk and at all other control panels requiring an emergency stop function. Pressing the STOP button on the control panel of the thyristor power converter will neither cause an emergency motor supply stop, nor will the DCS800 be disconnected from any dangerous potential.
To avoid unintentional operating states, or to shut the unit down in case of any imminent danger according to the standards in the safety instructions it is not sufficient to merely shut down the DCS800 via signals "RUN", "DCS800 OFF" or "Emergency Stop" respectively "control panel" or "PC tool".
- Intended use
The operating instructions cannot take into consideration every possible case of configuration, operation or maintenance. Thus, they mainly give such advice only, which is required by qualified personnel for normal operation of the machines and devices in industrial installations.

If in special cases the electrical machines and devices are intended for use in non-industrial installations - which may require stricter safety regulations (e.g. protection against contact by children or similar) -, these additional safety measures for the installation must be provided by the customer during assembly.

Note:

- When the control location is not set to Local (L not shown in the status row of the display), the stop key on the control panel will not stop the DCS800. To stop the DCS800 using the control panel, press the LOC/REM key and then the stop key .

Introduction to this manual

Chapter overview

This chapter describes the purpose, contents and the intended use of this manual.

Before you start

The purpose of this manual is to provide the information necessary to handle the motor control.

Study carefully the safety instructions at the beginning of this manual before attempting any work on or with the DCS800. Read through this manual before starting-up the DCS800. The installation and commissioning instructions given in the DCS800 Hardware manual, DCS800 Firmware manual and DCS800 Quick guide must also be read before proceeding.

What this manual contains

General information.

The Safety instructions can be found at the beginning of this manual.

Introduction to this manual, the chapter you are currently reading, introduces you to this manual.

Appendix A – Used standard DCS800 parameters

Appendix B – Application parameters

DCS800 quasi 24-pulse control

Chapter overview

This chapter describes the functions and commissioning of the Quasi 24-pulse configuration.

The application program contains:	Quasi 24-pulse or 24-pulse control 1. Zero current detection and interlocking between the parallel branches 2. Control configuration for 4 converter + field exciter 3. Emergency control configuration of two converter left side + field exciter 4. Emergency control configuration of two converter right side + field exciter
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Name	Value	OPC Address
04.03: ApplicName	DCS800 24pul	{0X1}Par.4.3
04.12: ApplicVer	1.3.5	{0X1}Par.4.12
60.01: SelApplOpMode	Follower	{0X1}Par.60.1
60.02: DRV_is_Master	FALSE	{0X1}Par.60.2
60.03: DRV_is_Follower	TRUE	{0X1}Par.60.3
60.04: SysOpModeAct	HalfSysOn	{0X1}Par.60.4
60.05: SysSelDigInp	ON	{0X1}Par.60.5
60.06: MotorNomCur [A]	4750	{0X1}Par.60.6
60.07: Control Selectio	Local_IO	{0X1}Par.60.7
61.01: CW_CC_Follower	0	{0X1}Par.61.1
61.02: SW_CC_Follower	0	{0X1}Par.61.2
61.03: Trig_Time_Fault [ms]	0	{0X1}Par.61.3
61.04: Fault_Dly_Time [ms]	50	{0X1}Par.61.4
61.05: MotCurFollower [%]	0	{0X1}Par.61.5
61.06: MotCurAll [A]	0	{0X1}Par.61.6
61.07: MCW_Fieldbus	0	{0X1}Par.61.7
62.01: Faulttext	TripFollower	{0X1}Par.62.1

Functional description

Left side 12-pulse serial (or sequential) and right side 12-pulse serial (or sequential) are operated in parallel. The complete system is a 24-pulse or quasi 24-pulse system.

The system is equipped with one speed controller and two current controllers (one at the left side branch and one at the right side branch)

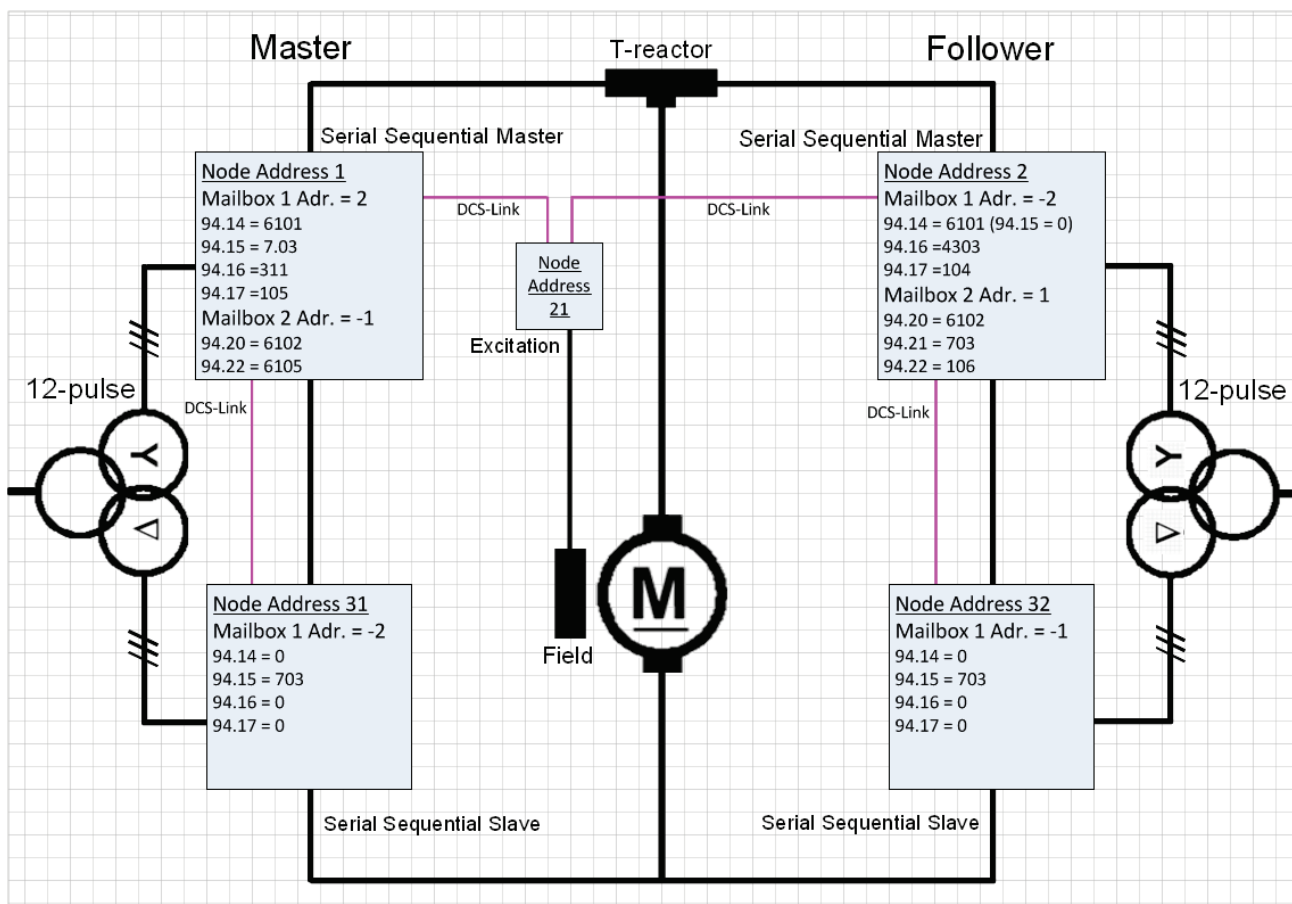
The system can be separated and operated only with one side branch. The other side branch is OFF or stand by.

Mail box configuration

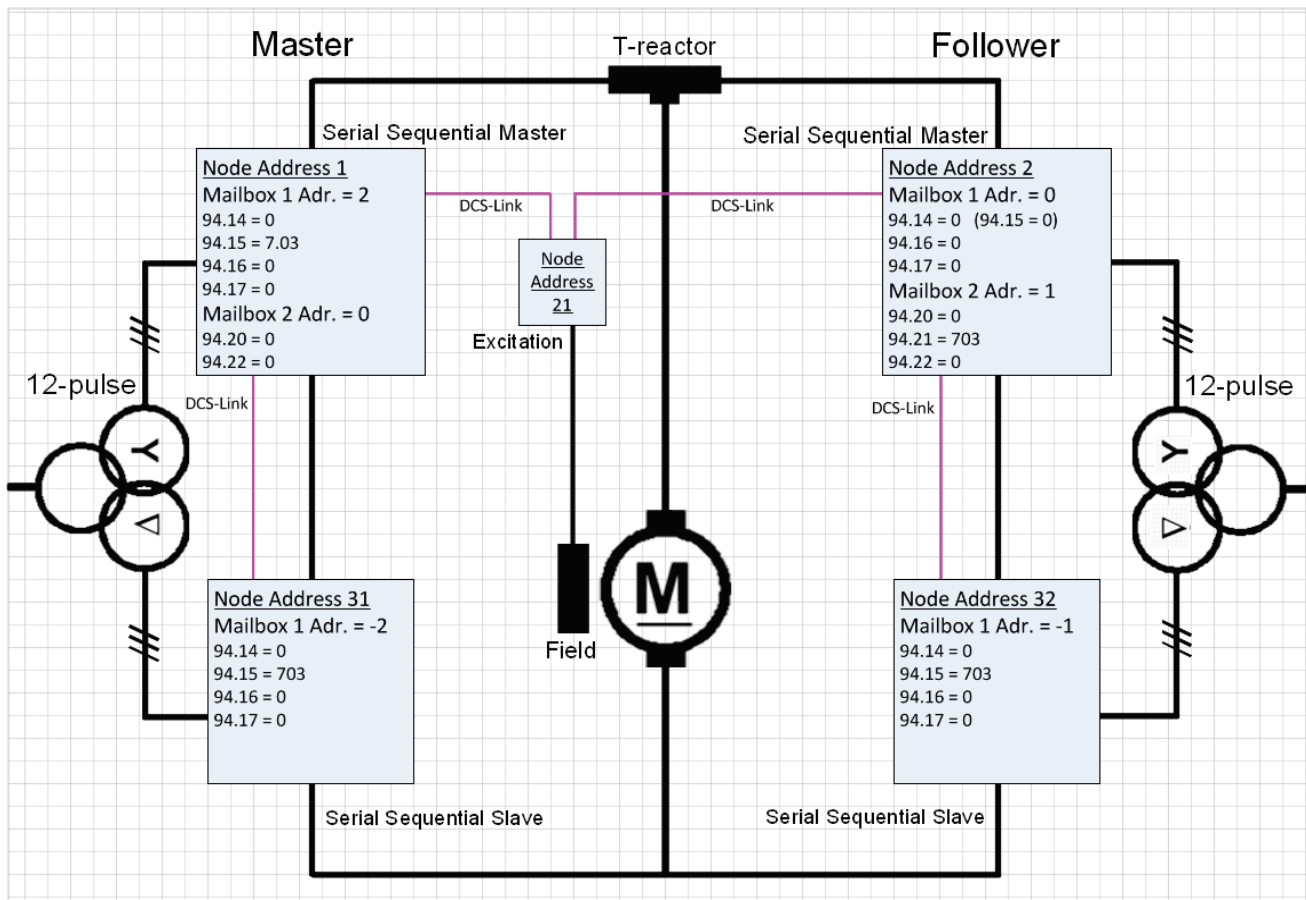
The following structure diagram gives an overview of the DCSLink mailbox communication with the complete system active (60.04 = CompleteSys):

The system contains one speed controller and a current controller for left serial branch and one current controller of right side branch.

The zero current detection and bridge reversal interlocking between right side and left side branch is made in a extra IEC 61131-3 program and located in memory card SDCS-MEM-8.

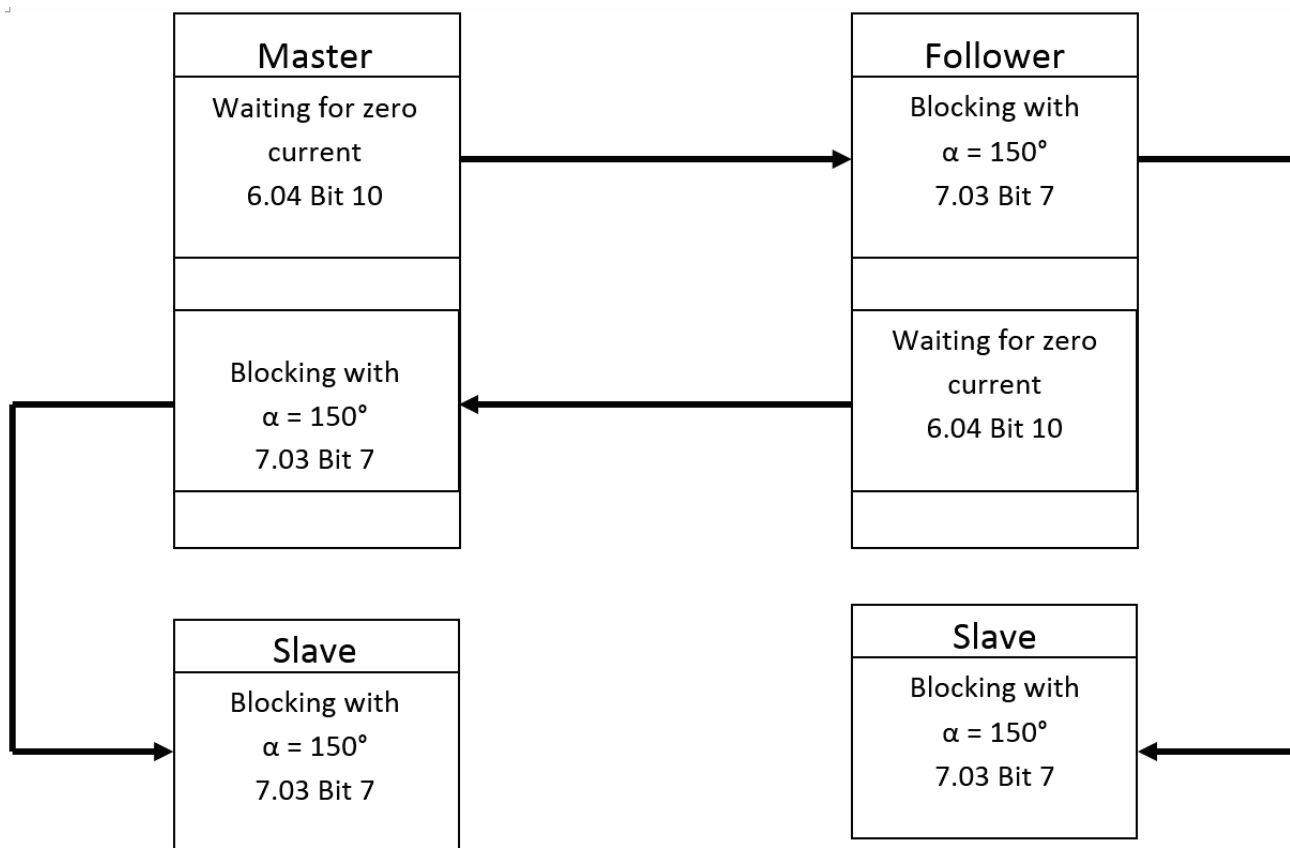


The following structure diagram gives an overview of the DCSLink Mailbox communication with one half system active (60.04 = HalfSysOn) and one half system disabled (60.04 = BranchOff) or both half systems disabled (60.04 = BranchOff):

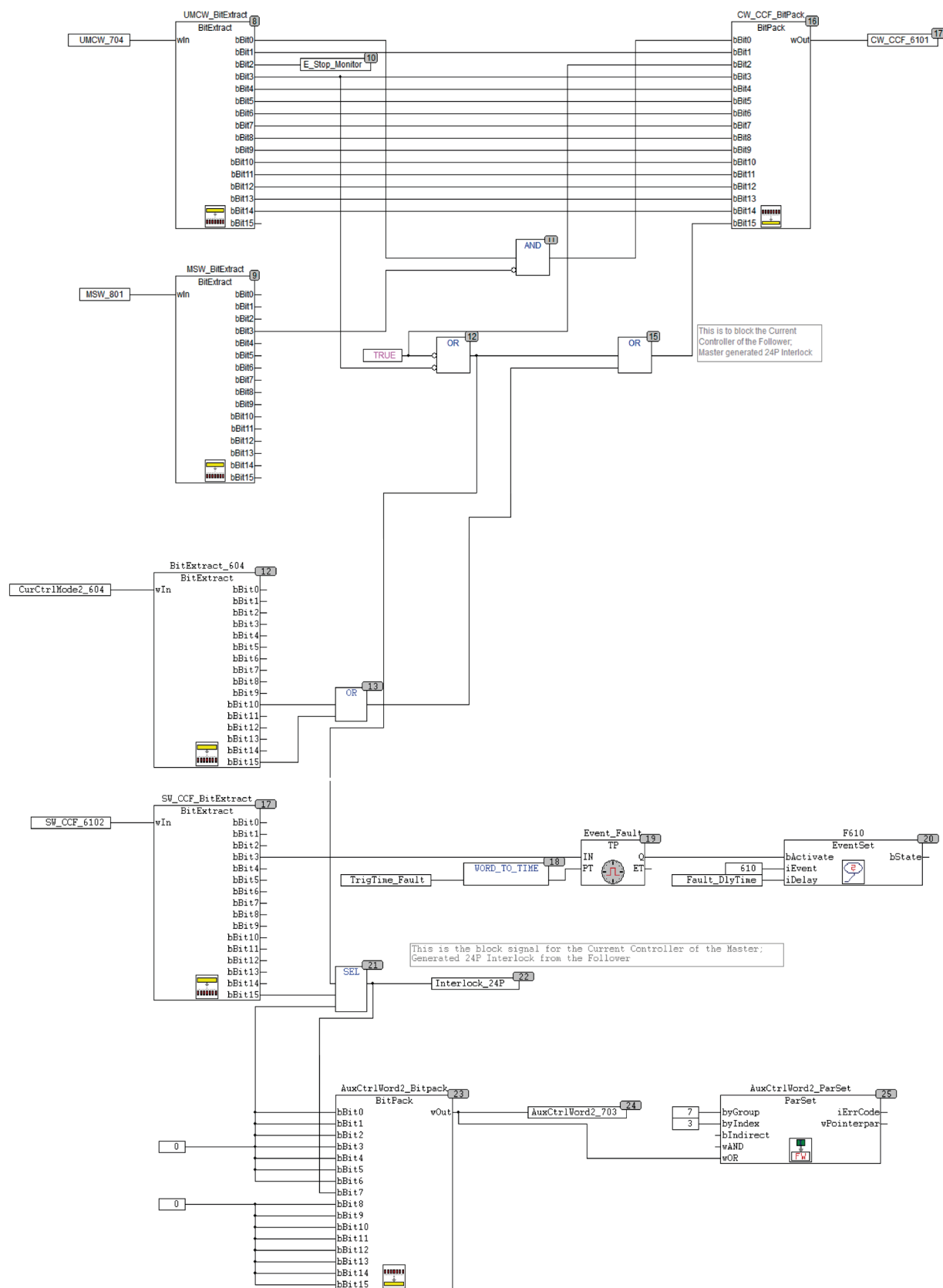


With parameter 60.05 = ON (System Selection by Digital Input) the Mailbox setup is done by the IEC 61131-3 application program.

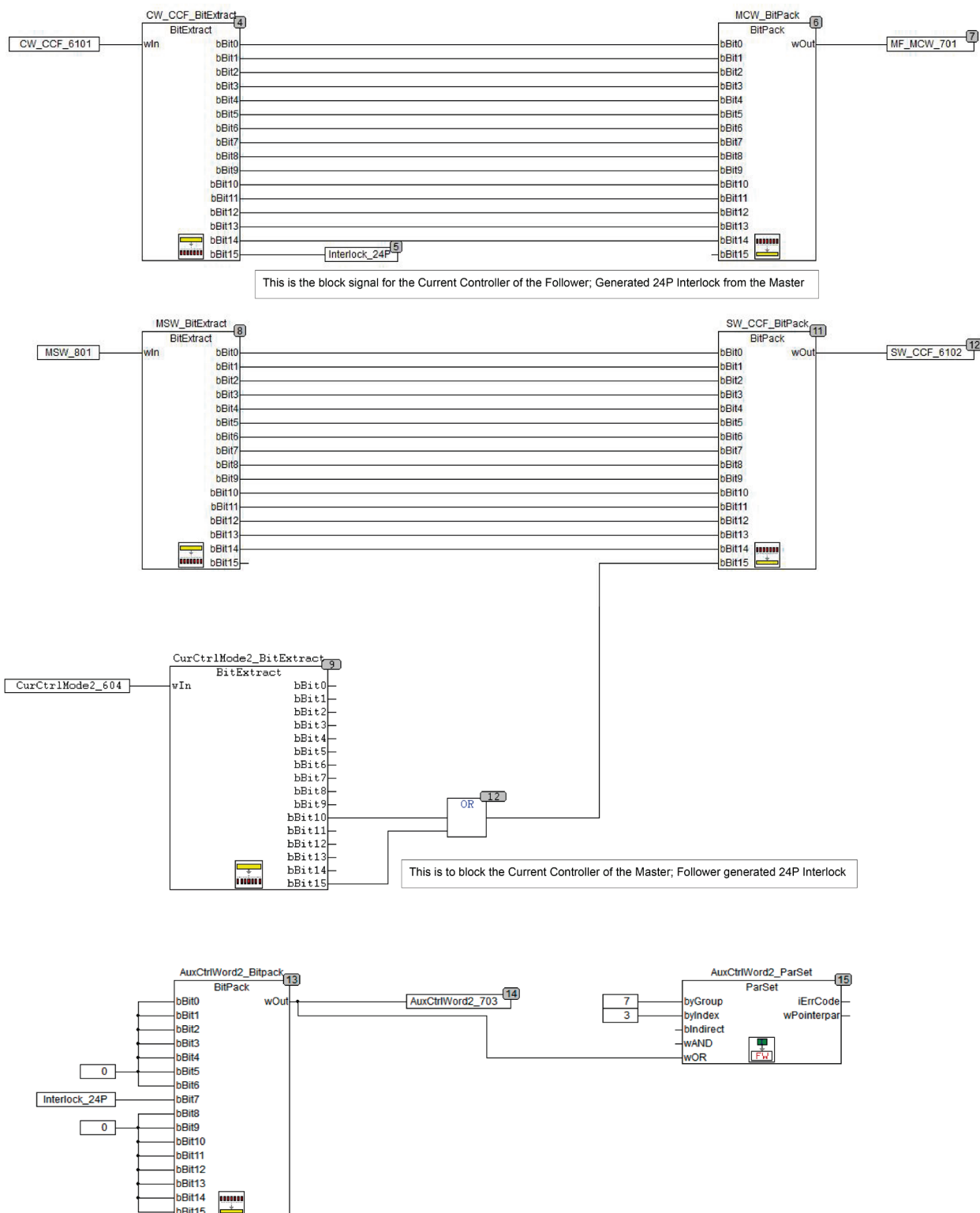
Zero current detection and bridge reversal interlocking



3ADW000476R0101 DCS800 Quasi 24-pulse e a

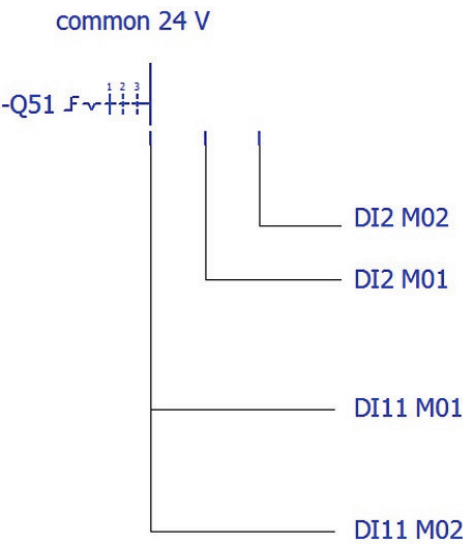


Zero current detection and bridge reversal follower



System configuration selection by digital input (60.05 = ON)

With parameter 60.05 = ON (Default in version 10V2) it should be possible to select the System operation mode (CompleteSys, HalfSysOn, BranchOff) by a combination of 2 digital inputs:



	DI11 M01 & DI11 M02	DI2 M01	DI2 M02
complete system M01 + M02, position 1 of switch Q51	1	0	0
half system - M01, position 2 of switch Q51	0	1	0
half system - M02, position 3 of switch Q51	0	0	1

The following table shows the configuration possibilities:

SysSelDigInp 60.05	SelAppLOpMode 60.01	DI11	DI2	SysOpModeAct 60.04
ON	Master	ON	OFF	CompleteSys
ON	Master	OFF	ON	HalfSysOn
ON	Master	OFF	OFF	BranchOff
ON	Follower	ON	OFF	CompleteSys
ON	Follower	OFF	ON	HalfSysOn
ON	Follower	OFF	OFF	BranchOff
OFF	Master	X	X	CompleteSys
OFF	Follower	X	X	CompleteSys
OFF	NotUsed	X	X	Manual

- CompleteSys:** The complete system in Master-Follower configuration is active.
- HalfSysOn:** This branch is selected in operation as half system in 12-pulse serial.
- BranchOff:** This branch is disabled and not selected. Power Off is possible for this branch.
- Manual:** In this configuration the separate branch handling need to be configured manually.

Please refer explicitly to the 12-pulse manual (3ADW000196R0201) for the commissioning of the serial sequential mode.

Function description

	Master left side	Master right side
Complete system	Speed controller 50 % motor current Field exciter control E-stop function active 24-pulse zero current detection and bridge reversal interlocking Control of serial slave	Current follower 50 % motor current E-stop function NOT active Control of serial slave
Half system left side emergency configuration	Speed controller Full motor current Field exciter control E-stop function active Control of serial slave	Branch OFF
Half system right side emergency configuration	Branch OFF	Speed controller Full motor current Field exciter control E-stop function active Control of serial slave

List of changed parameters fault tracing

END_IF

```
(* Set up valid parameters *)
ParSet1001( byGroup:= 10,byIndex:= 1, wOR:= Par_1001);
ParSet1009( byGroup:= 10,byIndex:= 9, wOR:= Par_1009);
ParSet2103( byGroup:= 21,byIndex:= 3, wOR:= Par_2103);
ParSet2104( byGroup:= 21,byIndex:= 4, wOR:= Par_2104);
ParSet4302( byGroup:= 43,byIndex:= 2, wOR:= Par_4302);
ParSet9408( byGroup:= 94,byIndex:= 8, wOR:= Par_9408);
ParWrite9412(byGroup:= 94,byIndex:= 12, wVal:= Par_9412);
ParSet9413( byGroup:= 94,byIndex:= 13, wOR:= Par_9413);
ParWrite9414(byGroup:= 94,byIndex:= 14, wVal:= Par_9414);
ParWrite9415(byGroup:= 94,byIndex:= 15, wVal:= Par_9415);
ParWrite9416(byGroup:= 94,byIndex:= 16, wVal:= Par_9416);
ParWrite9417(byGroup:= 94,byIndex:= 17, wVal:= Par_9417);
ParWrite9418(byGroup:= 94,byIndex:= 18, wVal:= Par_9418);
ParSet9419( byGroup:= 94,byIndex:= 19, wOR:= Par_9419);
ParWrite9420(byGroup:= 94,byIndex:= 20, wVal:= Par_9420);
ParWrite9421(byGroup:= 94,byIndex:= 21, wVal:= Par_9421);
ParWrite9422(byGroup:= 94,byIndex:= 22, wVal:= Par_9422);
ParWrite9903(byGroup:= 99,byIndex:= 3, wVal:= Par_9903);
ParWrite9912(byGroup:= 99,byIndex:= 12, wVal:= Par_9912);
```

Appendix A – Used standard DCS800 parameters

Index	Signal / Parameter name				min.	max.	def.	unit	E/C
Group 7	<h3>Control Words</h3> <p>from standard firmware</p>								
7.01	MainCtrlWord (main control word, MCW) The main control word contains all drive depending commands and can be written to by AP or overriding control:								
	Bit	Name	Value	Comment					
	B0	On (Off1N)	1	Command to RdyRun state.					
			0	Command to Off state.					
	B1	Off2N	1	No Off2 (Emergency Off / Coast Stop)					
			0	Command to OnInhibit state.					
	B2	Off3N	1	No Off3 (E-stop)					
			0	Command to OnInhibit state.					
	B3	Run	1	Command to RdyRef state.					
			0	Command to RdyRun state. Stop via StopMode					
	(21.03).								
	B4	RampOutZero	1	no action					
			0	speed ramp output is forced to zero					
	B5	RampHold	1	no action					
			0	freeze (hold) speed ramp					
	B6	RampInZero	1	no action					
			0	speed ramp input is forced to zero					
	B7	Reset	1	acknowledge fault indications with the positive edge					
			0	no action					
	B8	Inching1	1	constant speed defined by FixedSpeed1 (23.02)					
			0	no action					
	B9	Inching2	1	constant speed defined by FixedSpeed2 (23.03)					
			0	no action					
	B10	RemoteCmd	1	overriding control has to set this bit to 1)					
			0	The last UsedMCW (7.04) and the last references [SpeedRef (23.01), AuxSpeedRef (23.13), TorqRefA (25.01)] are retained.					
	B11-15	aux. ctrl	x	used by AP or overriding control to control various functions selected by parameters					
	Int. Scaling: 1 == 1				Type: I	Volatile: Y			

Index	Signal / Parameter name				min.	max.	def.	unit	E/C
7.02	7.02 AuxCtrlWord (auxiliary control word 1, ACW1)								
	The auxiliary control word 1 can be written to by AP or overriding control:								
	Bit	Name	Value	Comment					
	B0-1	reserved							
	B2	RampBypass	1	bypass speed ramp					
			0	no action					
	B3	BalRampOut	1	speed ramp output is forced to BalRampRef (22.08)					
			0	no action					
	B4	reserved							
	B5	DynBrakingOn	1	force dynamic braking independent from Off1Mode (21.02), StopMode (21.03) or E StopMode (21.04)					
			0	no action					
	B6	HoldSpeedCtrl	1	freeze (hold) the I-part of the speed controller					
			0	no action					
	B7	WindowCtrl	1	release window control					
			0	block window control					
	B8	BalSpeedCtrl1		speed controller output is forced to BalRef (24.11)					
			0	no action					
	This bit is written by CoDeSys on the Follower drive:								
	CompleteSys:Parameter 7.02 Bit 8 = TRUE; (7.02 = 256; Speed Controller disabled)								
	HalfSysOn: Parameter 7.02 Bit 8 = FALSE (7.02 = 0; Speed Controller enabled)								
	BranchOff: Parameter 7.02 Bit 8 = FALSE (7.02 = 0; Speed Controller enabled)								
	B9-11	reserved							
	B12-15	reserved							
	Int. Scaling: 1 == 1								
	Type: I								
	Volatile: Y								

Index	Signal / Parameter name				min.	max	def	unit	E/C
7.03	AuxCtrlWord2 (auxiliary control word 2, ACW2)								
	The auxiliary control word 2 can be written to by AP or overriding control:								
	Bit	Name	Value	Comment					
	B0-3	reserved							
	B4	DisableBridge1	1	bridge 1 blocked					
			0	bridge 1 released					
	B5	DisableBridge2	1	bridge 2 blocked					
			0	bridge 2 released					
	B6	reserved							
	B7	ForceAlphaMax	1	force single firing pulses and set firing angle (α) to ArmAlphaMax (20.14)					
	The 24 pulse Interlock between the Master's and the Follower's 12 pulse serial master is written to the 12 pulse serial slaves.								
			0	normal firing pulses released					
	B8	DriveDirection	1	drive direction reverse (see note), changes the signs of MotSpeed (1.04) and CurRef (3.11)					
			0	drive direction forward (see note)					
	B9	ResetSPC	1	reset integral part of speed controller					
			0	no action					
	B10	DirectSpeedRef	1	speed ramp output is overwritten and forced to DirectSpeedRef (23.15)					
			0	speed ramp is active					
	B11	reserved							
	B12-14	reserved							
	B15	ResetPIDCtrl	1	reset and hold PID-controller					
			0	release PID controller					
	Note: Changes of DriveDirection become active only in drive state RdyRun . Changing the speed direction of a running drive (RdyRef state) by means of DriveDirection is not possible.								
	Int. Scaling: 1 == 1								
	Type: I								
	Volatile: Y								

Index	Signal / Parameter name	min.	max.	def.	unit	E/C																											
Group 8	Status Words from standard firmware																																
6.04	<div>CurCtrlStat2 (2nd current controller status)</div> <div>2nd current controller status word. The current controller will be blocked, CurRefUsed (3.12) is forced to zero and ArmAlpha (3.13) is forced to the value of ArmAlphaMax (20.14) if any of the bits is set (0 == OK):</div> <table><thead><tr><th>Bit</th><th>Value</th><th>Meaning</th></tr></thead><tbody><tr><td>B0</td><td>1</td><td>overcurrent, F502 ArmOverCur [FaultWord1 (9.01) bit 1]</td></tr><tr><td></td><td>0</td><td>no action</td></tr><tr><td>B1</td><td>1</td><td>mains overvoltage (AC), F513 MainsOvrVolt [FaultWord1 (9.01) bit 12]</td></tr><tr><td></td><td>0</td><td>no action</td></tr><tr><td>B2</td><td>1</td><td>mains undervoltage (AC), F512 MainsLowVolt [FaultWord1 (9.01) bit 11]</td></tr><tr><td></td><td>0</td><td>no action</td></tr><tr><td>B3</td><td>1</td><td>waiting for reduction of EMF to match the mains voltage [see RevVoltMargin (44.21)]</td></tr><tr><td></td><td>0</td><td>no action</td></tr></tbody></table> <div>B4-7 reserved</div> <div><div>B8-9 reserved</div><div><div>B10 bit 10 is</div><div>1</div><div>waiting for zero current, if ZeroCurTimeOut (97.19) is elapsed before set back to 0 F557ReversalTime [FaultWord4 (9.04) bit 8] is set. This bit is</div><div>0</div><div>used for the 24 pulse Interlock in CoDeSys.</div><div>no action</div></div><div>B11 reserved</div></div> <div><div>B12 reserved</div><div>B13 reached</div><div>1</div><div>current controller not released, because DevLimPLL (97.13) is</div><div>0</div><div>no action</div><div>B14</div><div>1</div><div>mains not in synchronism (AC), F514 MainsNotSync [FaultWord1 (9.01) bit 13]</div><div>0</div><div>no action</div><div>B15</div><div>1</div><div>Current controller not released.</div><div>0</div><div>no action</div><div>This bit is used for the 24 pulse Interlock in CoDeSys.</div></div> <div>Note: A set bit does not necessarily lead to a fault message it depends also on the status of the drive.</div> <div>Int. Scaling: 1 == 1</div> <div>Type: I</div> <div>Volatile: Y</div>	Bit	Value	Meaning	B0	1	overcurrent, F502 ArmOverCur [FaultWord1 (9.01) bit 1]		0	no action	B1	1	mains overvoltage (AC), F513 MainsOvrVolt [FaultWord1 (9.01) bit 12]		0	no action	B2	1	mains undervoltage (AC), F512 MainsLowVolt [FaultWord1 (9.01) bit 11]		0	no action	B3	1	waiting for reduction of EMF to match the mains voltage [see RevVoltMargin (44.21)]		0	no action					
Bit	Value	Meaning																															
B0	1	overcurrent, F502 ArmOverCur [FaultWord1 (9.01) bit 1]																															
	0	no action																															
B1	1	mains overvoltage (AC), F513 MainsOvrVolt [FaultWord1 (9.01) bit 12]																															
	0	no action																															
B2	1	mains undervoltage (AC), F512 MainsLowVolt [FaultWord1 (9.01) bit 11]																															
	0	no action																															
B3	1	waiting for reduction of EMF to match the mains voltage [see RevVoltMargin (44.21)]																															
	0	no action																															

Index	Signal / Parameter name				min.	max.	def.	unit	E/C
8.01	MainStatWord (main status word, MSW)								
	Main status word:								
	Bit	Name	Value	Comment					
	B0	RdyOn	1	ready to switch on					
			0	not ready to switch on					
	B1	RdyRun	1	ready to generate torque					
			0	not ready to generate torque					
	B2	RdyRef	1	operation released (Running)					
			0	operation blocked					
	B3	Tripped	1	fault indication					
			0	no fault					
	B4	Off2NStatus	1	Off2 not active					
			0	Off2 (OnInhibit state) active					
	B5	Off3NStatus	1	Off3 not active					
			0	Off3 (OnInhibit state) active					
	B6	OnInhibited	1	OnInhibited state is active after a: - fault - Emergency Off / Coast Stop (Off2) - E-stop (Off3) - OnInhibited via digital input Off2 (10.08) - or E Stop (10.09)					
	B7	Alarm	1	OnInhibit state not active alarm indication					
			0	no alarm					
	B8	AtSetpoint	1	setpoint - SpeedRef4 (2.18) - and actual value – MotSpeed (1.04) - in the tolerance zone					
			0	setpoint - SpeedRef4 (2.18) - and actual value - MotSpeed (1.04) - out of the tolerance zone					
	B9	Remote	1	remote control					
			0	local control					
	B10	AboveLimit	1	speed greater than defined in SpeedLev (50.10)					
			0	speed lower or equal than defined SpeedLev (50.10)					
	B11	reserved							
	B12-B15	reserved							
	Int. Scaling: 1 == 1				Type: I		Volatile: Y		

Appendix B – Application Parameters

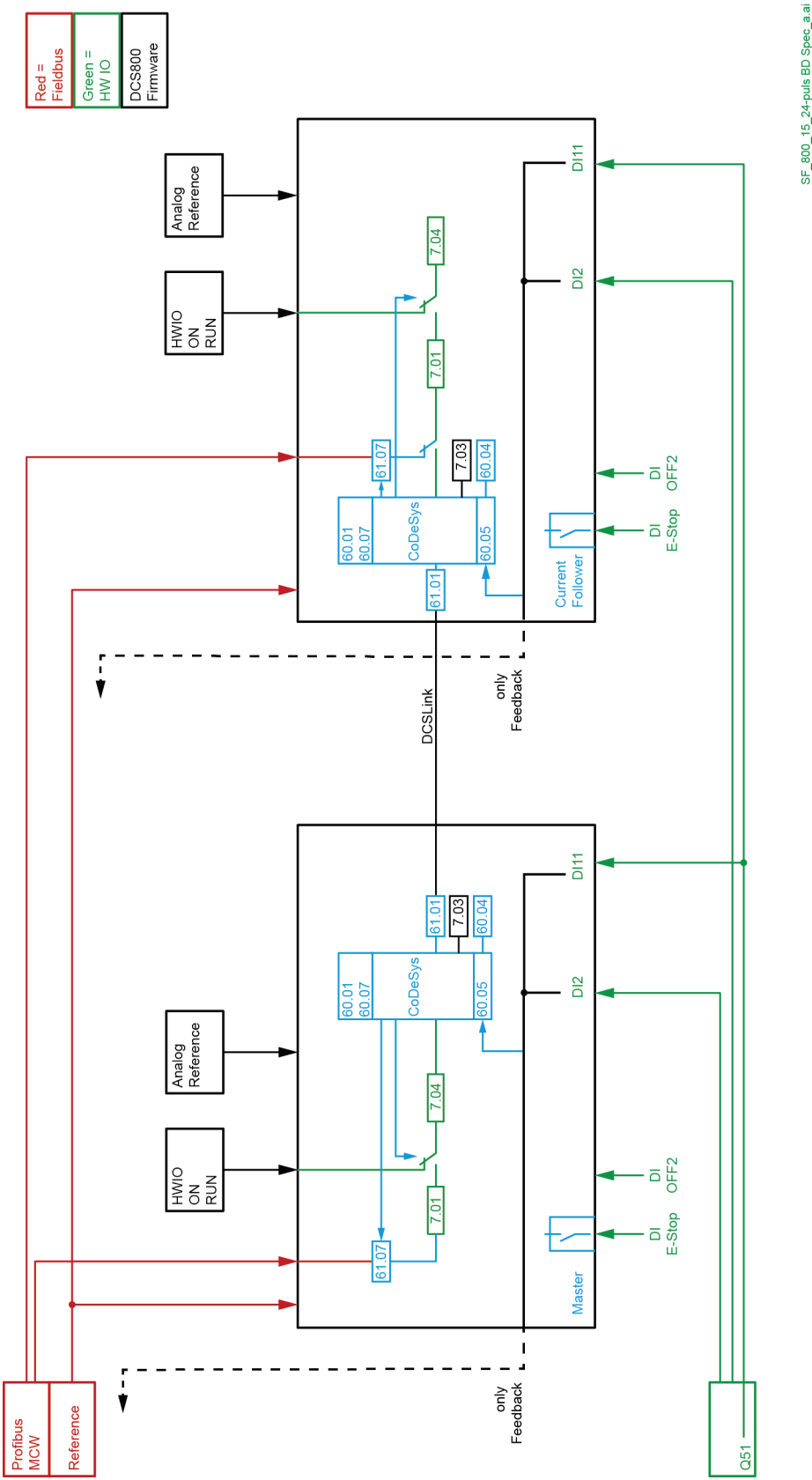
Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 60	Quasi 24-pulse Configuration parameters					
60.01	SelAppOpMode (selection parameter for the operation mode) The implemented selection functions are: 0 = NotUsed 1 = Master 2 = Follower Selection whether a serial sequential master drive (43.01 = 4) is used as Master or Follower . NotUsed is mandatory if the SDCS-MEM-8 card is installed with the implemented program in a serial sequential slave drive (43.01 = 5). In this mode the program has at least no function and is running with a dummy task. NotUsed in a serial sequential master drive (43.01 = 4) can help during commissioning to operate with the 2 serial sequential branches independently. Internal name : SelAppOpMode <div> N Type: C Volatile: </div>	NotUsed	Follower	NotUsed	-	E
60.02	DRV_is_Master (drive is master indication) This signal indicates that the drive is selected with 60.01 = 1 as Master . Internal name : Drive_is_Master Int. Scaling: 1 == 1 Type: Boolean (FALSE / TRUE) Volatile:Y	FALSE	TRUE	FALSE		E
60.03	DRV_is_Follower (drive is follower indication) This signal indicates that the drive is selected with 60.01 = 2 as Follower . Internal name : Drive_is_Follower Int. Scaling: 1 == 1 Type: Boolean (FALSE / TRUE) Volatile:Y	FALSE	TRUE	FALSE		E

Index	Signal / Parameter name	min.	max.	def.	unit	F/C																																																		
60.04	<p>SysOpModeAct (display of the actual selected operation mode) The operation modes that can be selected are:</p> <p>0 = CompleteSys</p> <p>1 = HalfSysOn</p> <p>2 = BranchOff</p> <p>3 = Manual</p> <p>0 (CompleteSys):</p> <p>a) Depends on DI2, DI11 and 60.01 if 60.05 = ON. See configuration table:</p> <table><tr><th>SysSelDigInp 60.05</th><th>SelApplOpMode 60.01</th><th>DI11</th><th>DI2</th><th>SysOpModeAct 60.04</th></tr><tr><td>ON</td><td>Master</td><td>ON</td><td>OFF</td><td>CompleteSys</td></tr><tr><td>ON</td><td>Master</td><td>OFF</td><td>ON</td><td>HalfSysOn</td></tr><tr><td>ON</td><td>Master</td><td>OFF</td><td>OFF</td><td>BranchOff</td></tr><tr><td>ON</td><td>Follower</td><td>ON</td><td>OFF</td><td>CompleteSys</td></tr><tr><td>ON</td><td>Follower</td><td>OFF</td><td>ON</td><td>HalfSysOn</td></tr><tr><td>ON</td><td>Follower</td><td>OFF</td><td>OFF</td><td>BranchOff</td></tr><tr><td>OFF</td><td>Master</td><td>X</td><td>X</td><td>CompleteSys</td></tr><tr><td>OFF</td><td>Follower</td><td>X</td><td>X</td><td>CompleteSys</td></tr><tr><td>OFF</td><td>NotUsed</td><td>X</td><td>X</td><td>Manual</td></tr></table> <p>b) Depends just on the parameter set up in 60.01 with “Master” or “Follower” in configuration with parameter 60.05 = OFF.</p> <p>1 (HalfSysOn) and 2 (BranchOff): Depends on DI2, DI11and 60.01 if 60.05 = ON. See configuration table above.</p> <p>3 (Manual): Depends just on parameter 60.01 in configuration with parameter 60.05 = OFF. If 60.01 = NotUsed half system control can be realized by customer defined parameter set up manually.</p> <p style="text-align: right;">Type: C Volatile: Y</p>	SysSelDigInp 60.05	SelApplOpMode 60.01	DI11	DI2	SysOpModeAct 60.04	ON	Master	ON	OFF	CompleteSys	ON	Master	OFF	ON	HalfSysOn	ON	Master	OFF	OFF	BranchOff	ON	Follower	ON	OFF	CompleteSys	ON	Follower	OFF	ON	HalfSysOn	ON	Follower	OFF	OFF	BranchOff	OFF	Master	X	X	CompleteSys	OFF	Follower	X	X	CompleteSys	OFF	NotUsed	X	X	Manual	CompleteSys	Manual	CompleteSys		F
SysSelDigInp 60.05	SelApplOpMode 60.01	DI11	DI2	SysOpModeAct 60.04																																																				
ON	Master	ON	OFF	CompleteSys																																																				
ON	Master	OFF	ON	HalfSysOn																																																				
ON	Master	OFF	OFF	BranchOff																																																				
ON	Follower	ON	OFF	CompleteSys																																																				
ON	Follower	OFF	ON	HalfSysOn																																																				
ON	Follower	OFF	OFF	BranchOff																																																				
OFF	Master	X	X	CompleteSys																																																				
OFF	Follower	X	X	CompleteSys																																																				
OFF	NotUsed	X	X	Manual																																																				
60.05	<p>SysSelDigInp (parameter to control the selection source) The parameter configures the control of the selection source:</p> <p>ON = System Selection by Digital Inputs (Default since version 1.2.0)</p> <p>OFF = System Selection by 60.01</p> <p>ON: The System Operation Mode (CompleteSys, HalfSysOn, BranchOff) can be selected by Digital Inputs (DI2 and DI11). 60.01 is important to configure the branch function (Master or Follower) with the complete system active.</p> <p>OFF: If 60.01 is set to Master or Follower then 60.04 is set to 0 (CompleteSys). If 60.01 is set to NotUsed then 60.04 is set to Manual which means that the branch handling need to be realized manually (user defined parameter sets For HalfSysOn or Branch OFF).</p> <p>Internal name : SysSelDigInp</p> <p style="text-align: right;">Type: C Volatile: N</p>	OFF	ON	ON		L																																																		

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
61.03	Trig_Time_Fault (Trigger time on master for Trip of “Follower in fault state”) Trigger time on Master in ms for Trip of “Follower in Fault State”. Internal name: TrigTime_Fault Int. Scaling: 1 == 1 ms Type: I Volatile: N	0	10000	1000	-	E
61.04	Fault_Dly_Time (Delay time on master for Trip of “Follower in fault state”) Delay time on Master in ms for Trip of “Follower in Fault State”. Internal name: Fault_DlyTime Int. Scaling: 1 == 1 ms Type: I Volatile: N	0	10000	50	-	E
61.05	MotCurFollower (motor current actual of the Follower) The motor current actual in parameter 1.06 of the Follower is transferred via DCS link mailbox to this parameter which is then only used in the Master. Internal name: MotCurFollower Int. Scaling: 100 == 1 % Type: SI Volatile: Y	-32767	32767	0	%	E
61.06	MotCurAll (total motor current actual in A) The motor current actual in parameter 1.06 of the Master and the motor current actual in parameter 61.05 of the Follower are added. The result as a percentage value is divided by 10000 and then multiplied with MotorNomCur which is the nominal motor current in parameter 60.06. $\text{MotCurAll} = [(1.06 * 61.05) / 10000] * \text{MotorNomCur}$ Internal name: MotCurAll Int. Scaling: 1 == 1 A Type: SI Volatile: Y	-32767	32767	0	A	E
61.07	MCW_Fieldbus (main control word from the fieldbus) This parameter has to be mapped to the fieldbus communication area (Group 90) as data buffer for the main control word sent by the overriding control. If selected by ControlSelection parameter 60.07 = 1 (Fieldbus) the value of this data buffer is written into parameter 7.01 (MCW). If the drive is Master and selected as CompleteSys (60.04 = 0) or HalfSys (60.04 = 1) then 61.07 is written to 7.01. If the drive is Follower then parameter 61.07 is only written to parameter 7.01 as HalfSys (60.04 = 1). As CompleteSys (60.04 = 0) the Follower is controlled by the Master. In this case parameter 61.01 (CW_CC_Follower) is written to parameter 7.01. In BranchOFF (60.04 = 2) the main control word in parameter 7.01 is written by 0. Internal name: MCW_Fieldbus Type: I Volatile: Y	-32767	32767	0	A	E

Index	Signal / Parameter name	min.	max.	def.	unit	E/C
Group 62	<div>Fault-Alarm-Text</div> <div>Quasi 24-pulse application</div>					
62.01	<div>Faulttext (parameter for the displayed fault text of the error event F610)</div> <div>The fault text implemented is:</div> <div><div><div><div>Name</div><div>Fault 610:</div><div>Internal name :</div></div><div><div>→</div><div>→</div><div>faulttext</div></div><div><div>Description</div><div>Follower in Fault State</div></div><div><div>→</div><div></div></div><div><div>Message</div><div>F610 TripFollower</div></div></div></div> <div>Type: C</div>	TripFollower	TripFollower	TripFollower	'	E

Appendix C – Function diagram version 1.35



DCS family



DCS550-S modules

The compact drive for machinery application

20 ... 1,000 A_{DC}
0 ... 610 V_{DC}
230 ... 525 V_{AC}
IP00

- Compact
- Robust design
- Adaptive and winder program
- High field exciter current



DCS800-S modules

The versatile drive for process industry

20 ... 5,200 A_{DC}
0 ... 1,160 V_{DC}
230 ... 1,000 V_{AC}
IP00

- Compact
- Highest power ability
- Simple operation
- Comfortable assistants, e.g. for commissioning or fault tracing
- Scalable to all applications
- Free programmable by means of integrated IEC61131-PLC



DCS800-A enclosed converters

Complete drive solutions

20 ... 20,000 A_{DC}
0 ... 1,500 V_{DC}
230 ... 1,200 V_{AC}
IP21 – IP54

- Individually adaptable to customer requirements
- User-defined accessories like external PLC or automation systems can be included
- High power solutions in 6- and 12-pulse up to 20,000 A, 1,500 V
- In accordance to usual standards
- Individually factory load tested
- Detailed documentation



DCS800-E series

Pre-assembled drive-kits

20 ... 2,000 A_{DC}
0 ... 700 V_{DC}
230 ... 600 V_{AC}
IP00

- DCS800 module with all necessary accessories mounted and fully cabled on a panel
- Very fast installation and commissioning
- Squeezes shut-down-times in revamp projects to a minimum
- Fits into Rittal cabinets
- Compact version up to 450 A and Vario version up to 2,000 A



DCS800-R Rebuild Kit

Digital control-kit for existing powerstacks

20 ... 20,000 A_{DC}
0 ... 1,160 V_{DC}
230 ... 1,200 V_{AC}
IP00

- Proven long life components are re-used, such as power stacks, (main) contactors, cabinets and cabling / busbars, cooling systems
- Use of up-to-date communication facilities
- Increase of production and quality
- Very cost-effective solution
- Open Rebuild Kits for nearly all existing DC drives
- tailor-made solutions for...
 - BBC PxD
 - BBC SZxD
 - ASEA TYRAK
 - other manufacturers



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