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Options for ABB drives

Original user's manual
Emergency stop, stop category 0 with opening mains contactor
(option +Q951) for DCS8x0-A enclosed converters
equipped with DCS880 modules (+S880)

Individual Drive E-Stop

	E-Stop cat.0	E-Stop cat.1	POUS	forced MC opening
+Q951	x			x
+Q952		x		x
+Q963	x			
+Q964		x		
+Q957			x	

List of related manuals

All the documents available for the drive system DCS880 are listed below:

	Publication number	Language						
		E	D	I	ES	F	CN	RU
General								
DCS880 Quick guide	3ADW000545	x	x	x	x	x		
Safety instructions all languages	3ADW000481	x	x	x	x	x	x	x
DCS880 Documentation pack	DCS880 CD download	x						
DCS880 Units								
DCS880 Flyer	3ADW000475	x	x			x		
DCS880 Technical catalog	3ADW000465	x						
DCS880 Hardware manual	3ADW000462	x						
DCS880 Firmware manual	3ADW000474	x						
DCS880 Service manual	3ADW000488	x						
DCS880 Hardparallel manual	3ADW000530	x						
DCS880 12-pulse manual	3ADW000533	x						
Instructions for mounting the SDCS-CMA-2	3ADW000396	x						
ACS-AP-x assistant control panels user's manual	3AUA0000085685	x						
DCS Thyristor power converter – Technical guide	3ADW000163	x						
Functional safety								
Supplement for functional safety	3ADW000452	x						
Functional safety for enclosed converter								
+Q957 Prevention of unexpected Start Up	3ADW000504	x						
+Q951 Emergency stop, category 0 with MC opening	3ADW000505	x						
+Q952 Emergency stop, category 1 with MC opening	3ADW000506	x						
+Q963 Emergency stop, category 0 without MC opening	3ADW000507	x						
+Q964 Emergency stop, category 1 without MC opening	3ADW000508	x						
Enclosed converter								
Installation manual	3ADW000091	x	x					
DCS800-A +S880 Enclosed converters, flyer	3ADW000523	x	x					
Door mounting kits								
DPMP-01 mounting platform for ACS-AP control panel	3AUA0000100140	x						
DPMP-02 mounting platform for ACS-AP control panel	3AUA0000136205	x						
Serial communication								
FCAN-01 CANopen adapter module	3AFE68615500	x	x					
FDNA-01 DeviceNet™ adapter module	3AFE68573360	x						
FECA-01 EtherCAT adapter module	3AUA0000068940	x	x					
FENA-11/-21 Ethernet adapter module	3AUA0000093568	x						
FEPL-02 Ethernet POWERLINK adapter module	3AUA0000123527	x	x					
FPBA-01 PROFIBUS DP adapter module	3AFE68573271	x	x					
FSCA-01 RS-485 adapter module	3AUA0000109533	x						
FDCO-01/02 DDCS communication modules	3AUA0000114058							
Tool and maintenance manuals and guides								
Drive composer PC tool	3AUA0000094606	x						
Drive (IEC61131-3) application programming manual	3AUA0000127808	x						
Adaptive programming, Application guide	3AXD50000028574	x						
NETA-21 remote monitoring tool	3AUA0000096939	x						
NETA-21 remote monitoring tool guide	3AUA0000096881	x						
DDCS branching unit NDBU-95 user's manual	3BFE64285513	x						
Extension modules								
FIO-11 Analog extension module	3AFE68784930	x						
FIO-01 Digital extension module	3AFE68784921	x						
FAIO-01 Analog extension module	3AUA0000124968	x						
FDIO-01 Digital extension module	3AUA0000124966	x						
FEN-01 TTL encoder interface	3AFE68784603	x						
FEN-31 HTL encoder interface	3AUA0000031044	x						
FEA-03 F series extension adapter	3AUA0000115811	x						
Ethernet tool network for ACS880 drives application guide	3AUA0000012563	x						

Table of contents

Safety Instructions

Only a qualified electrician who has appropriate knowledge on functional/machine/process safety is allowed to install, start up and maintain the safety circuit.

WARNING!
This safety function does not disconnect the voltage of the main and auxiliary circuits from the drive. You must not work on the electrical parts of the drive or the motor before you have also disconnected the drive system from the electric supply and ensured by measuring that there is no dangerous voltage present.

WARNING!
After making additions to the drive safety circuit or modifying it, or changing circuit boards inside the drive, always test the functioning of the safety circuit according to the acceptance test procedure. Any changes in the electrical installations of the drive may affect the safety performance or operation of the drive unexpectedly. All customer-made changes are on the customer's responsibility.

WARNING!
Read and obey all safety instructions given for the drive in its hardware manual. If you ignore them, injury or death, or damage to the equipment can occur.

This manual does not repeat the complete safety instructions of the drive, but it only includes the instructions related to the scope of this manual.

Introduction to the manual

Contents of this chapter
This chapter describes the manual in short and gives some general information for the reader. The chapter also contains a quick reference for implementing a safety system.

Applicability
The manual applies only to DCS880-A cabinet drives and to DCS800-A cabinet drives with plus code +S880 (exchange of DCS800 with DCS880 drives modules) which have the option: Emergency stop, stop category 0 with STO, with safety relays (option +Q951). In this emergency stop option, the main contactor/breaker of the drive is opened.

Target audience
The manual is intended for people who install, start up, use and service the safety option of the drive. Read the manual before working on the drive. You are expected to know the fundamentals of electricity, wiring, electrical components, electrical schematic symbols, and functional safety.

Contents
The chapters of this manual are briefly described below.
Introduction to the manual (this chapter) introduces this manual.
Option description and instructions describes the safety option and instructs how to wire, start up, test, validate, use and maintain it. The chapter also contains the safety data.

Related documents
– Product manuals (see the inside of the front cover)
– Circuit diagrams delivered with the drive
– Safety data (if the safety circuit is application engineered)

Abbreviations

Abbreviations used in this manual are listed below.

Abbreviation	Description	Reference
Cat.	Category 1. Stop category according to EN/IEC 60204-1 The stop categories are: 0 (uncontrolled stop) and 1 (controlled stop) 2. Classification of the safety-related parts of a control system in respect of their resistance to faults and their subsequent behavior in the fault condition, and which is achieved by the structural arrangement of the parts, fault detection and/or by their reliability. The categories are: B, 1, 2, 3 and 4.	EN/IEC 60204-1 EN ISO 13849-1
CCF	Common cause failure (%)	EN ISO 13849-1
DC	Diagnostic coverage	EN ISO 13849-1
DI	Digital input	
E-stop	Emergency stop	
Frame (size)	Relates to the construction type of the drive in question. For example, several drive types with different power ratings can have the same basic construction, and a frame size is used in reference to all those drive types.	
HFT	Hardware fault tolerance	IEC 61508, EN/IEC 62061
PFH	Probability of dangerous failures per hour	IEC 61508, EN ISO 13849-1, EN/IEC 62061, EN/IEC 61800-5-2
PL	Performance level (levels are: a, b, c, d and e). Corresponds to SIL.	EN ISO 13849-1
RO	Relay output	
SC	Systematic capability	IEC 61508
SIL	Safety integrity level	IEC 61508, IEC 61511, EN/IEC 62061, EN/IEC 61800-5-2
SILCL	Maximum SIL that can be claimed for a safety function or subsystem	EN/IEC 62061
SS1	Safe stop 1	EN/IEC 61800-5-2
STO	Safe torque off	EN/IEC 61800-5-2
T1	Proof test interval or lifetime (the smaller one)	IEC 61508, EN/IEC 62061

Exclusion of liability

ABB is not responsible for the implementation, verification and validation of the overall safety system. It is the responsibility of the system integrator (or other party) who is responsible for the overall system and system safety. The system integrator (or other responsible party) must make sure that the entire implementation complies with all relevant standards, directives and local electrical code, and that the system is tested, verified and validated correctly.

Quick reference guide for implementing a safety system

✓	Task
☐	Select the appropriate functional safety standard for the implementation: EN ISO 13849-1, EN/IEC 62061, IEC 61511 or other
☐	If you select EN/IEC 62061 or IEC 61511, make a safety plan. See EN/IEC 62061.
☐	Assess safety: analyze and evaluate risks (estimate SIL/PL) and define risk reduction strategies. Define the safety requirements
☐	Design the safety system. The part of the design made by ABB is described in chapter *Option* description and instructions on page 10.
☐	If you made any changes to the delivered safety system, verify the achieved SIL/PL with, for example, FSDT-01 Functional safety design tool or similar. See *Functional safety design tool user's manual* (3AXD10000102417 [English]).
☐	Connect the wiring. See section *Wiring* on page 13.
☐	Set the parameters. See section *Parameter settings* on page 12.
☐	Validate that the implemented system meets the safety requirements: – Do the acceptance test. See section *Start-up and acceptance test* on page 14.
☐	Write the necessary documentation.

Option description and instructions
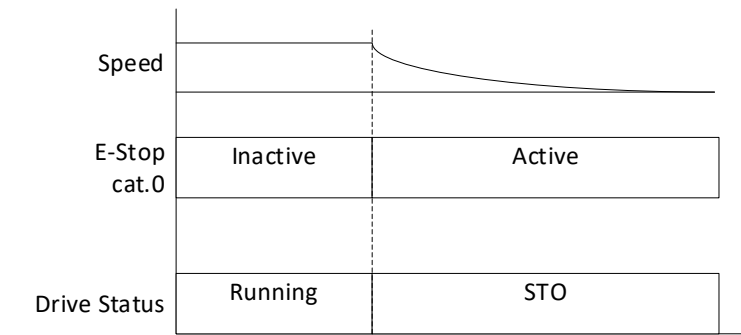
Contents this chapter

This chapter describes the +Q951 emergency stop option and instructs how to wire, start up, test, validate, use and maintain it. The safety data is also given.

+Q951 basic function description

Option +Q951 corresponds to an uncontrolled stop in accordance with stop category 0 (EN/IEC 60204-1). The option corresponds to the Safe torque off (STO) function. After the emergency stop command has been given, the drive option activates the dual channel Safe torque off (STO). This prevents the drive from generating torque. The motor coasts to a stop and the main contactor/breaker of the drive is opened.

For a detailed description of the Safe torque off function, see the appropriate hardware manual. The STO functions comply with EN/IEC 61800-5-2:2016. Option +Q951 has been designed according to the principles of EN ISO13850.
For a complete list of related standards and European directives, see section *Related standards and directives* on page 20 .

Basic timing diagram

Operation principle +Q951 E-Stop cat.0 with opening Main Contactor

A41	Drive Control board	P62	Emergency stop indication lamp
A61	Emergency stop safety relay	S61	Emergency stop button
S62	Emergency stop reset button	Q1/Q2	Mains breaker / DC breaker
T22	+24 V power supply	$K_{STOreset}$	Reset indication for safety relay
U1	DCS880 Converter		
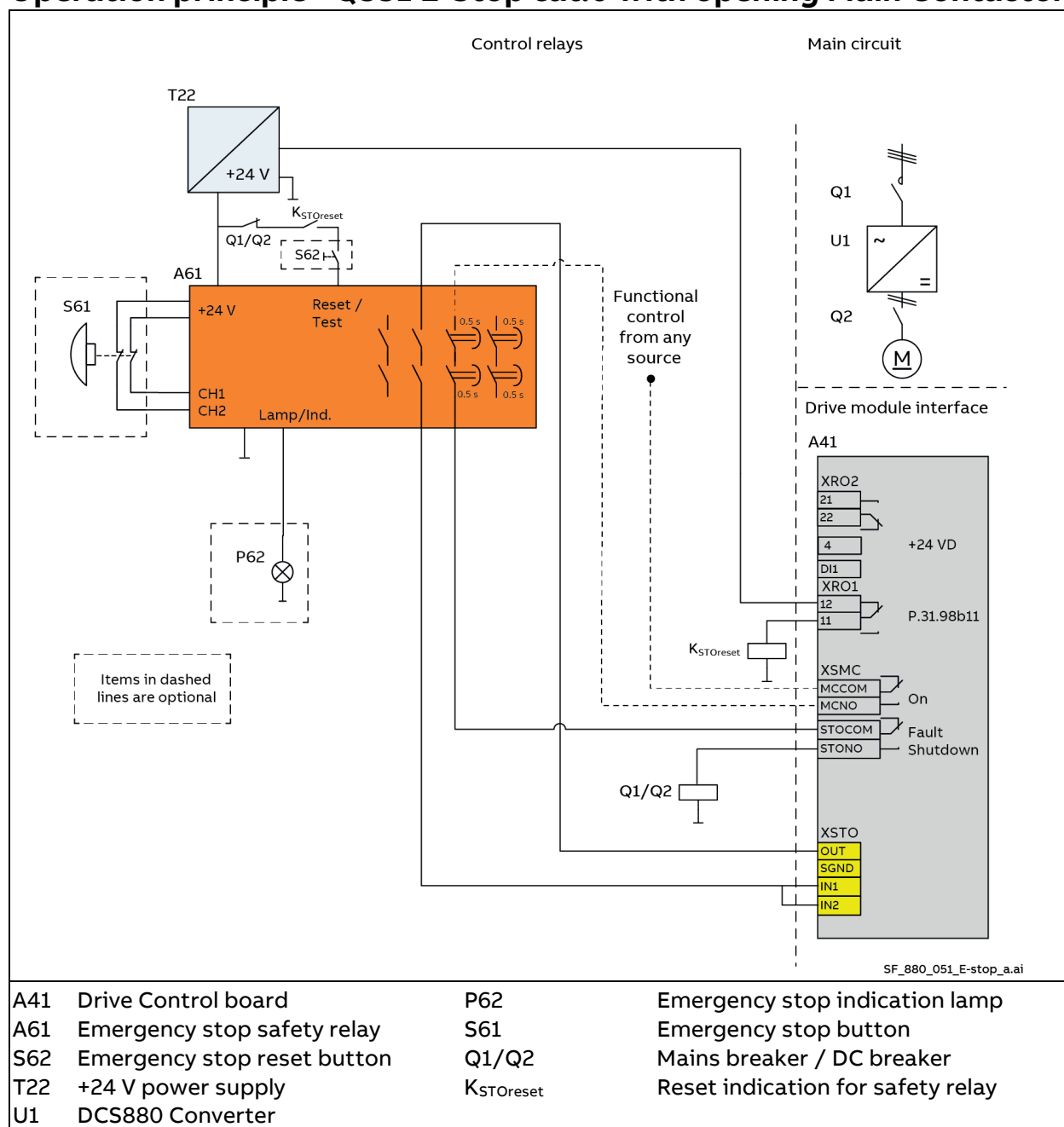
Initial status: The drive is in operation and the motor(s) is running

Step	Operation
1.	The user activates the emergency stop with the emergency stop button [S61].
2.	The emergency stop safety relay [A61] trips and the relay switches off the Safe torque off (STO) control signals on the drive control board [A41]. The STO cuts off the drive control pulses preventing motor control and torque generation.
3.	The delayed contacts of the safety relay [A61] switches of the power supply to the mains contactor or AC-breaker after 0,5s.
4.	The aux. contact of safety relay [A61] energizes the indication lamp [P62].
5.	The motor coasts to zero speed and cannot restart while the emergency stop is active.
6.	Normal operation resumes after the user: – releases the emergency stop button [S61] to normal (up) position – resets the emergency stop circuit with the emergency stop reset button [S62] (the user must push the reset button for 0.1 to 3 seconds) – resets the drive (if the STO indication parameter 31.22 has been set so that a fault is generated) – makes sure that the drive has received the start signal (depends on the configuration, see the firmware manual).

+Q951 Fault reaction function

Definition: A safety function requires a 'fault reaction function' that attempts to initiate a safe state if the safety function's diagnostics detect a fault within the hardware/software that performs the safety function.

The fault reaction function of the emergency stop safety relay [A61] trips if it detects a failure (short circuit between signals, open circuits, redundancy fault when the emergency stop button is pushed) in the safety circuit. The fault reaction function shifts the drive immediately into the safe state by activating the Safe torque off (STO) function, switching on the drive emergency stop command, and keeping it on until the detected fault has been repaired. The emergency stop indication lamp of the reset button is on until the fault has been repaired.

The emergency stop reset circuit must be open when the user releases the emergency stop button. The emergency stop safety relay [A61] detects if the reset circuit is closed and the relay does not close. The user must reset the safety relay, see section Fault tracing on page 15. For a detailed description of the emergency stop safety relay [A61], see section Hardware settings on page 13.

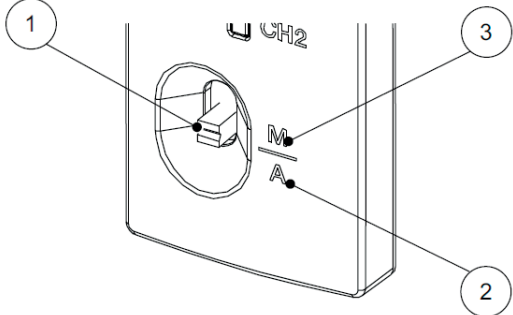The DCS880 STO function has its own internal fault diagnostics and fault reaction function

Parameter settings

This table lists the drive parameters settings for the +Q951 option. For more information, see the firmware manual.

No.	Name	Value	Description
10.24	RO1 source	STO Reset indication P.31.98b11	Selects a drive signal to be connected to relay output RO1. In this case, the RO1 is energized if the Drive is in STO state and no STO related fault is active.
31.22	STO indication run/ stop	Warning / Warning	Selects which indications are given when one or both Safe torque off (STO) signals are switched off or lost, depending on whether the drive is Running / Stopped, when they occur. Fault/Warning is the recommended setting. When a fault occurs in the drive, the mains contactor, AC-B or DC-B is opened by the relay XSMC:1/2.

Hardware settings

Appropriate hardware settings have been preset at the factory for the safety function.
The hardware rest of [A61] is preset to manual (Dip Switch).

Use the switch (1) to change settings between automatic reset (2) and manual reset (3). Power cycle (power off and on) the safety relay when a setting has been changed.	

Wiring

One emergency stop button and one reset button are installed on the cabinet door and wired to the drive at the factory. There are double contacts in the emergency stop button and double wiring (two-channel connection) between the button and the emergency stop safety relay [A61]. The safety relay detects cross faults and faults across one contact from the emergency stop button.

If needed, install additional emergency stop buttons on site and wire them to the appropriate terminal block inside the drive cabinet. See the circuit diagrams delivered with the drive. Follow the rules below:
1. Use only double-contact buttons approved for the emergency stop circuits.
2. Connect the emergency stop buttons with two conductors (two-channel connection).
Note: Keep the channels separate. If you use only one channel, or if the first and second channels are connected together (for example, in a chain), the cross fault detection of the emergency stop safety relay trips and activates the emergency stop command of the drive as it detects a redundancy fault.
3. Use shielded, twisted pair cable. We recommend a double-shielded cable and gold-plated contacts in the emergency stop button.
4. Ensure that the sum resistance for one channel (loop resistance) does not exceed 1 kΩ.
5. Follow the general control cable installation instructions given in the drive hardware manual.
You can also install additional reset buttons and indication lamps for the emergency stop circuit on site. We recommend gold-plated contacts in the reset button. Wire the buttons to the appropriate terminal block inside the drive cabinet. See the circuit diagrams delivered with the drive. Follow the rules below:
    1. Sum resistance of the external reset circuit may not exceed 1 kΩ.
    2. Follow the general control cable installation instructions given in the drive hardware manual.
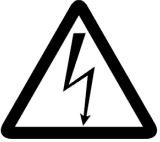
Start-up and acceptance test

You need the Drive composer PC tool or a control panel to perform the start-up and acceptance test.
Initial status: Make sure that the drive is ready for use, that is, you have done the tasks of the drive start-up procedure. See the hardware manual.

Action	☑
⚠ WARNING! Follow the Safety instructions, page 5. Otherwise serious injury, death, or damage to the equipment can occur.	
Checks and settings with no voltage connected	
If any connections of the emergency stop circuit have been changed on site (such as wiring of additional emergency stop buttons, connection of shipping splits of large drives, etc.), verify that the connections are correct with the appropriate circuit diagrams.	☐
Check that the hardware settings relevant to the safety function are set as defined in section Hardware settings on page 13.	☐ M
Settings with voltage connected	
Check that the parameters relevant to the safety function are set as defined in section Parameter settings on page 12.	☐
Ensure that the motor can run and be stopped freely during the test.	☐
Start the drive and ensure that the motor is running. If possible, use a motor speed close to the maximum speed of the application.	☐
Push the emergency stop button [S61]. (if installed)	☐
Ensure that the motor coasts to a stop and that the drive displays a related warning. For a description of the messages, see the firmware manual of the drive.	☐
Ensure that the mains contactor, AC or DC breaker has opened. If the mains contactor, AC breaker or DC breaker is not part of the delivery or project, check the auxiliary contactor K10 instead.	☐
Ensure that the indication lamp [P62] switches on. (if installed)	☐
Ensure that you cannot start the drive and motor from any control location: Ensure that the motor does not start even if you switch the start signal off and on or push the start key of the panel.	☐
Ensure that you cannot close the mains contactor, AC breaker or DC breaker from any Location (or auxiliary contactor K10 accordingly).	☐
Turn the emergency stop button [S61] until it releases and returns to the up position	☐
Push the emergency stop reset button [S62]. Ensure that the emergency stop reset indication lamp [P62] switches off (if installed).	☐
Switch off the drive start signal. If a fault message is generated, reset the drive. See section Parameter settings on page 12.	☐
Restart the drive and motor and check that they operate normally.	☐
Repeat the test from each operating location (every emergency stop button and reset button)	☐
Fill in and sign the acceptance test report which verifies that the safety function is safe and approved for operation.	☐

Option description and instructions

Use of the safety function

Activating
1. Push the emergency stop button [S61]. The emergency stop activates and the button locks in "ON" (open) position.

Resetting
1. Turn the emergency stop button [S61] until it releases.
2. Push the emergency stop reset button [S62. The emergency stop indication lamp [P62] goes out, the emergency stop deactivates.
   Note: You must push the reset button [S62] for 0.1 to 3 seconds.
3. Reset the drive if necessary.
4. Make sure that the drive has received the start signal (depends on the configuration, see the firmware manual).
5. You can now restart the drive.

Note: You have to reset the emergency stop circuit with the reset button [S62] also after you have powered up the drive.

Emergency stop indications

When the emergency stop is on:
– the drive control program has the warning Safe torque off active,
– the emergency stop indication lamp [P62] is illuminated,
– the mode LED of the emergency stop safety relay [A61] is steady blue.

+Q951 Fault tracing

This table describes the status LEDs of the emergency stop safety relay [A61].

LED operation and error status for ABB safety relay SSR32				
CH1	Mode	CH2	Comment	Action
off	off	off	The safety relay is not powered.	Check A1–A2 voltage and connections.
green	green	green	CH1 and CH2 accepted. Reset made and outputs activated.	
off	flash green	off	CH1 and CH2 unaccepted. A timer function is counting down while the safety relay remains activated.	
off	flash green	green	CH1 unaccepted and CH2 accepted. A timer function is counting down while the safety relay remains activated.	
green	flash green	off	CH1 accepted and CH2 unaccepted. A timer function is counting down while the safety relay remains activated.	
off	blue	off	No channels accepted.	Check CH1 and CH2
off	blue	green	green CH1 unaccepted, CH2 accepted	Check CH1
green	blue	off	CH1 accepted, CH2 unaccepted	Check CH2

green	blue	green	CH1 and CH2 accepted, the safety relay wait for reset.	Check reset settings, wiring and reset circuit
green	blue	fast flash green	Two-channels error: CH2 has been unaccepted and then accepted again while CH1 remained accepted.	Check installation. Restore by opening and closing both CH:s at the same time.
fast flash green	blue	green	Two-channels error: CH1 has been unaccepted and then accepted again while CH2 remained accepted.	Check installation. Restore by opening and closing both CH:s at the same time.
fast flash green	blue	fast flash green	Reading error on R1 and R2.	Check installation. Restore by opening and closing both CH:s at the same time.
red	flash blue	red	Failsafe mode due to a new setting has been entered.	Power cycle the relay to confirm the new settings.
red	flash red	red	Failsafe mode due to incorrect settings.	Check and correct settings.
red	fast flash red	red	The safety relay is in failsafe mode.	Power cycle.
red	fast flash red	fast flash red	Failsafe mode due to short circuit between CH2 and 24 VDC or T2	Check and remove the short circuit.
fast flash red	fast flash red	red	Failsafe mode due to short circuit between CH1 and 24 VDC or T2	Check and remove the short circuit.

For more information see 2TLC010002M0201

+Q951 Maintenance

After the operation of the circuit is tested at start-up, it does need scheduled maintenance testing during its specified lifetime depending on its usage.

In addition to proof testing, it is a good practice to check the operation of the function when other maintenance routines of the machinery are carried out.
If you change any wiring or component after the start up, or restore parameters to their default values:
– Use only ABB approved spare parts.
– Register the change to the change log for the safety circuit.
– Test the safety function again after the change.
  Follow the rules given in section Startup and +Q951 acceptance test on page 14.
– Document the tests and store the report in the logbook of the machine.

Proof test interval

After the operation of the safety function is validated at start-up, the safety function must be maintained by periodic proof testing. In high demand mode of operation, the maximum proof test interval is 20 years. In low demand mode of operation, the maximum proof test interval is one year (high or low demand as defined in IEC 61508, EN/IEC 62061 and EN ISO 13849-1).

Option description and instructions

Diagnostic test interval

Regardless of the mode of operation, it is a good practice to check the operation of the safety function at least **once** a year. Do the test as described in section Start-up and +Q951 acceptance test on page 14. The person responsible for the design of the complete safety function should also note the Requirements from IEC61800-5-2:2016 / EN61800-5-2:2017 for the drives STO circuit:

> 6.2.2.1.4: Diagnostic test interval when the hardware fault tolerance is greater than zero
> The diagnostic test interval of any subsystem of the PDS (SR) shall be appropriate to meet the required PFH (see 6.2.2.1.1).
> NOTE 2: For redundant parts of a PDS (SR) which cannot be tested without disrupting the application in which the PDS (SR) is used (machine or plant) and where no justifiable technical solution can be implemented, the following maximum diagnostic test intervals can be considered as acceptable:
> – one test per year for SIL 2, PL d / category;
> – one test per three months for SIL 3, PL e / category 3;
> – one test per day for SIL 3, PL e / category 4 (not applicable).
> PL and category according to ISO 13849-1.
> The noted DC Values are taken from SS-EN ISO 13849-1:2016 (E) chapter 4.5.3.

Competence

The maintenance and proof test activities of the safety function must be carried out by a competent person with adequate expertise and knowledge of the safety function as well as functional safety, as required by IEC 61508-1 clause 6.

Residual risk

The safety functions are used to reduce the recognized hazardous conditions. In spite of this, it is not always possible to eliminate all potential hazards. Therefore, the warnings for the residual risks must be given to the operators.

Intentional misuse

The safety circuit is not designed to protect a machine against intentional misuse.

Decommissioning

When you decommission an emergency stop circuit or a drive, make sure that the safety of the machine is maintained until the decommissioning is complete.

Safety data

The safety data given below is valid for the default design of the safety circuit. In case the final design differs from the default, it is obligation of the changing person to calculate new safety data and deliver it separately to the customer.

Safety data values

Drive module frame size	SIL[1] / SILCL	SC	PL[1]	PFH[2] [1/h]	DC [%]	Cat.	HFT	CCF	Lifetime [a]	T1[3][4] [a]
H1 … H8	3	3	e	5.4 E-8	>90	3	1	80	20	20/1

1) The drive may be used for applications with the given SIL / PL only if the function is tested regularly (see chapter: test interval above).
2) PFH values are according to EN ISO 13849.
3) See the recommendation of use CNB/M/11.050 published by the European co-ordination of notified bodies for lower T1 requirement and also IEC61800-5-2:2016 / EN61800-5-2:2017 6.2.2.1.4 Note 2 for guidance.
4) T1 = 20a is used with high demand mode of operation. See also section Proof test interval on page 16.
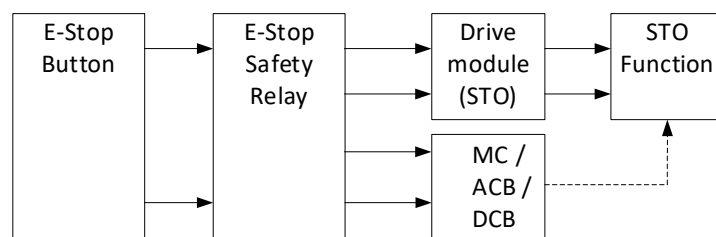
Safety component types

Safety component types as defined in IEC 61508-2:
- emergency stop button: type A
- safety relays: type A
- drive STO circuit:
- frame sizes H1 … H8: type A

Safety block diagram

The components that are included in the safety circuit are shown in the safety block diagram below.

Parallel to the Drive STO function the MC / ACB / DCB is forcibly opened by the safety relay. However, this is not part of the safety calculation as it is not needed for the safety function STO. The Drive module already provides a hardware fault tolerance of 1 with a sufficient PFH - Value. Therefore, the calculation gives a worst case approximation and excludes the typically worse and often unknown safety values of the MC / ACB / DCB.

Relevant failure modes

Internal failures of safety relays, the emergency stop button and STO. These failures are included in the PFH value of the function.

Fault exclusions

Fault exclusions (not considered in the calculations):
- any short and open circuits in the cables of the safety circuit
- any short and open circuits in the cabinet terminal blocks of the safety circuits.

Option description and instructions

Operation delays

Emergency stop total delay: Emergency stop relay delay time (500 ms) +mechanical delay times (100 ms).

General rules, notes and definitions

Validation of the safety functions

You must do an acceptance test (validation) to validate the correct operation of safety functions.

Validation procedure

You must do the acceptance test using the checklist given in section Start-up and acceptance test on page 14:
– at initial start-up of the safety function
– after any changes related to the safety function (wiring, components, safety function related parameter settings etc.)
– after any maintenance action related to the safety function.

The acceptance test must include at least the following steps:
– you must have an acceptance test plan
– you must test all commissioned functions for proper operation, from each operation location
– you must document all acceptance tests.

Acceptance test reports

You must store the signed acceptance test reports in the logbook of the machine. The report must include, as required by the referred standards:
– a description of the safety application (including a figure)
– a description and revisions of safety components that are used in the safety application
– a list of all safety functions that are used in the safety application
– a list of all safety related parameters and their values
– documentation of start-up activities, references to failure reports and resolution of failures
– the test results for each safety function, checksums, date of the tests and confirmation by the test personnel.

You must store any new acceptance test reports performed due to changes or maintenance in the logbook of the machine.

Competence

The acceptance test of the safety function must be carried out by a competent person with adequate expertise and knowledge of the safety function as well as functional safety, as required by IEC 61508-1 clause 6.

The test procedures and report must be documented and signed by this person.

Ambient conditions

For the environmental limits for the safety functions and the drive, refer to the hardware manual.

Reporting problems and failures related to safety functions

Contact your local ABB representative.

Related standards and directives

Standard	Name
EN 60204-1:2006 + AC:2010 IEC 60204-1:2005 + A1:2008	Safety of machinery – Electrical equipment of machines – Part 1: General requirements
IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety related systems - Part 1: General requirements.
IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety related systems - Part 2: Requirements for electrical/electronic/ programmable electronic safety related systems.
EN 61800-5-2:2017 IEC 61800-5-2:2016	Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional
EN 62061:2005 + AC:2010 + A1:2013 + A2:2015 IEC 62061:2015	Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems
EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction
ISO 13849-1:2015	Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
EN ISO 13849-2:2012	Safety of machinery – Safety-related parts of control systems – Part 2: Validation
EN ISO 13850:2015 ISO 13850:2015	Safety of machinery. Emergency stop. Principles for design
IEC 61511-1:2016	Functional safety – Safety instrumented systems for the process industry sector
IEC 61326-3-1: 2008	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – General industrial applications
2006/42/EC	European Machinery Directive
Other	Machine-specific C-type standards

Compliance with the European Machinery Directive

The drive is an electronic product which is covered by the European Low Voltage Directive. However, the drive internal safety function of this manual (option +Q951) is in the scope of the Machinery Directive as a safety component. This function complies with European harmonized standards such as EN/IEC 61800-5-2. The declaration of conformity is delivered with the drive.

Option description and instructions

Further information

Product and service inquiries

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

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

Providing feedback on ABB manuals

Your comments on our manuals are welcome. Navigate to new.abb.com/drives/manuals-feedback-form.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet at www.abb.com/drives/documents

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

DCS880 modules
For safe productivity

20 ... 5,200 A_{DC}
0 ... 1,600 V_{DC}
230 ... 1,000 V_{AC}
IP00

– Safe torque off (STO) built in as standard
– Compact and robust
– Single drives, 20 A to 5,200 A, up to 1,600 V_{DC}
– IEC 61131 programmable
– Intuitive control panel and PC tool with USB connection and start up assistant
– Wide range of options to serve any DC motor application

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

DCT880 modules
Thyristor controller

20 ... 4,200 A_{AC}
110 ... 990 V_{AC}
IP00

– Precise power control in industrial heating applications
– Two or three phase devices
– Power optimizer for peak load reduction
– Built on ABB's all-compatible drives architecture
– Intuitive control panel and PC tool with USB connection and start up assistant
– Application control programs and drive application programming with IEC 61131 programming

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