

SINGLE AXIS DIGITAL SERVO SYSTEM

2

DS2020 TECHNOLOGY WITH COMBITRONIC[™]

Rev. A, January 2021

THIS DOCUMENT DESCRIBES THE SAFETY INFORMATION FOR THE DS2020 COMBITRONIC[™] SYSTEM



www.animatics.com

Copyright Notice

©2021, Moog Inc., Animatics.

Moog Animatics DS2020 Combitronic[™] Safety Guide, SC80100021-001, Rev. A.

This manual, as well as the software described in it, is furnished under license and may be used or copied only in accordance with the terms of such license. The content of this manual is furnished for informational use only, is subject to change without notice and should not be construed as a commitment by Moog Inc., Animatics. Moog Inc., Animatics assumes no responsibility or liability for any errors or inaccuracies that may appear herein.

Except as permitted by such license, no part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, recording, or otherwise, without the prior written permission of Moog Inc., Animatics.

The programs and code samples in this manual are provided for example purposes only. It is the user's responsibility to decide if a particular code sample or program applies to the application being developed and to adjust the values to fit that application.

Moog Animatics and the Moog Animatics logo, SmartMotor and the SmartMotor logo, Combitronic and the Combitronic logo are Combitronic logo all trademarks of Moog Inc., Animatics. Other trademarks are the property of their respective owners.

Please let us know if you find any errors or omissions in this manual so that we can improve it for future readers. Such notifications should contain the words "DS2020 Combitronic Installation and Startup Guide" in the subject line and be sent by e-mail to: animatics marcom@moog.com. Thank you in advance for your contribution.

Contact Us:

Americas - West	Americas - East
Moog Animatics	Moog Animatics
2581 Leghorn Street	1995 NC Hwy 141
Mountain View, CA 94043	Murphy, NC 28906
USA	USA
Tel: 1 650-960-4215	Tel: 1 828-837-5115 Fax: 1 540-557-6509

Support: 1 (888) 356-0357

Website: www.animatics.com

Email: animatics sales@moog.com

Table Of Contents

Copyright Notice	2
Table Of Contents	
Document Version	5
Revision Record	5
Reader Instructions	5
1 Introduction	7
1.1 Purpose	
1.2 Related Documents	
1.3 Package Contents	8
1.4 Required Qualifications of Personnel	
1.5 Applicable Laws	
2 Safety Information	
2.1 Safety and Usage Guidelines	11
2.2 Qualified Personnel	11
2.3 Electrical Hazards	12
2.3.1 Voltage Arcs and High Voltage	
2.3.2 General Hazards and Safeguards	13
2.4 Thermal Hazards	
2.5 Mechanical Hazards	
2.6 STO Safety Feature	14
2.6.1 Description	14
2.6.2 Directives on Safety	14
2.7 Safe Use of the DS2020 Combitronic System	15
2.7.1 Risk Assessment	
2.7.2 Electrical Connections	15
2.7.3 Motor Selection	
2.7.4 Power Supply	15
2.7.5 Prohibited Use	16
2.8 Risk Assessment	17
2.8.1 Installation Risk Assessment	17
2.8.2 General Machine/System Safeguards Information	
2.8.3 Safeguards Related to SCRF	

3 Certifications	
3.1 CE Certificate	
3.2 Safe Torque Off (STO)	

Document Version

The following table shows the version of this document and all other possible versions:

ES	DA	DE	EL	EN	FR	IT	NL	PT	FL	SV	CS	ΕT	LV	HU	MT	PL	SK	SL	BG	RO	GA
				Х																	

The language of documents and drawings are subject to contractual negotiations with the Customer.

In case of "Translation of the Original Instructions", the manufacturer of the machinery must also supply the "Original Instructions".

Revision Record

The following table shows the revision record:

Revision	Description	Date
А	First release	January 2021

Reader Instructions

The following table shows the symbols adopted in Moog documents:

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTE indicates possible property damage.

The following table shows the structure of a warning:

▲ SIGNAL WORD

Type and source of hazard

Possible consequences of not avoiding the potential hazard

> How to avoid the hazardous situation

The following table shows other typographic elements:

Symbol	Explanation
4	Electrical hazard alert symbol.
	Thermal hazard alert symbol.
	Mechanical hazard alert symbol.
	General hazard alert symbol.
i	Notes about important operations and other useful information.
>	This is an action to be carried out.
• / -	This is a bullet list.
1., 2.,	These are steps in a procedure that must be performed in consecutive order.

The following table shows the abbreviations adopted in Moog documents:

Abbreviation	Explanation
EMA	Electro Mechanical Actuator
EH	Electro Hydraulic Actuator
EHA	Electro Hydrostatic Actuator

1 Introduction

This chapter provides introductory information about this guide and the DS2020 Combitronic system.

1.1 Purpose	8
1.2 Related Documents	8
1.3 Package Contents	8
1.4 Required Qualifications of Personnel	9
1.5 Applicable Laws	9

1.1 Purpose

The DS2020 Combitronic Safety Guide, the document you are currently reading, provides information to ensure proper installation and startup of the DS2020 Combitronic series digital servo drive system with Combitronic technology. See the Table Of Contents on page 3 for a list of all the topics covered in this guide.



The instructions in this guide and the Related Documents (refer to the next section) require SmartMotor firmware: 5.0.4.55 (D-series), 5.98.4.55 (M-series) or later, and DS2020 Combitronic firmware: ds2020 sa 1.0.0 combican or later.

1.2 Related Documents

The following related documents are also available:

- DS2020 Combitronic Installation and Startup Guide (available on the Moog Animatics website)
- Moog motor installation guides (available on the Moog Animatics website)
- Moog motor installation drawing provides information on motor mounting and wiring schematics for electrical installation (shipped in the box with the motor)
- SMI software online help (available within the SMI software)
- *SmartMotor™ Developer's Guide* (available on the Moog Animatics website)
- SmartMotor[™] fieldbus guides (available on the Moog Animatics website)
- *DS2020 Drive With Combitronic Capability Systems Guide* (available on the Moog Animatics website)

1.3 Package Contents

The complete DS2020 Combitronic system includes:

- One DS2020 Combitronic drive
- Anchoring support for the shields
- Interconnect cables



An optional connector kit must be ordered individually and is supplied separately.

1.4 Required Qualifications of Personnel



In addition to the following information, also follow the instructions in Safety and Usage Guidelines on page 11.

This manual and the equipment described in it are intended only for qualified personnel who have proper training and expertise in the following:

- **Transport:** All personnel must have knowledge and experience handling components that are sensitive to mechanical shock and electrostatic discharge (ESD).
- **Unpacking:** All personnel must have knowledge and experience handling components that are sensitive to mechanical shock and electrostatic discharge (ESD).
- Installation and Maintenance: All personnel must have extensive technical knowledge and experience with the installation and maintenance of AC- and DC-powered electrical and electromechanical equipment.
- **Startup:** All personnel must have extensive technical knowledge and experience with electrical drives, motors and their technology.

The qualified personnel must know and observe the following standards: IEC 60364, IEC 60664, and all relevant national accident prevention regulations.

1.5 Applicable Laws

The DS2020 Combitronic drives meet the Low Voltage Directive (2014/35/EU) and EMC Directive (2014/30/EU). The safety function "Safe Torque Off" (STO) integrated in the drive complies with the Machinery Directive (2006/42 / EC).

To comply with the European Directives, the drive meets the requirements of the relevant harmonized installation standards EN 50178 (LVD), EN61800-3 (EMC) and EN 61800-5-2 (Safety of machinery).

The DS2020 Combitronic drives are CE certified; certain models are also UL certified. Contact Moog for details.

2 Safety Information

This chapter provides safety information for the DS2020 Combitronic system.

2.1 Safety and Usage Guidelines	11
2.2 Qualified Personnel	
2.3 Electrical Hazards	12
2.3.1 Voltage Arcs and High Voltage	
2.3.2 General Hazards and Safeguards	13
2.4 Thermal Hazards	
2.5 Mechanical Hazards	
2.6 STO Safety Feature	14
2.6.1 Description	14
2.6.2 Directives on Safety	14
2.7 Safe Use of the DS2020 Combitronic System	15
2.7.1 Risk Assessment	15
2.7.2 Electrical Connections	15
2.7.3 Motor Selection	15
2.7.4 Power Supply	15
2.7.5 Prohibited Use	16
2.8 Risk Assessment	17
2.8.1 Installation Risk Assessment	17
2.8.2 General Machine/System Safeguards Information	
2.8.3 Safeguards Related to SCRF	

2.1 Safety and Usage Guidelines

Do not attempt to install, operate, maintain or inspect the DS2020 Combitronic system until you have carefully read this guide and the other supplied documents, and you are properly trained in the correct use of the equipment. The DS2020 Combitronic system may only be set up and operated in conjunction with this manual and the supplied documentation.



Human safety and equipment safety must be the first considerations when performing the installation, operation or maintenance procedures for the drive system. When it comes to electronics in your factory or workplace, you want to make sure both your facility and its employees are safe. The following gives safety instructions that must be followed when you are working on the DS2020 Combitronic system.

🚹 WARNING



WARNING: Risk of death or serious injury to personnel or damage to equipment.

Failure to follow the safety and usage guidelines in this chapter can result in death or serious injury to personnel, or damage to equipment.

In addition to the DS2020 Combitronic Safety Guide (the guide you are currently reading), you must read the guides listed in Related Documents on page 8.

NOTICE

- Observe and adhere to the technical data and, in particular, the information given on the system component nameplates.
- The installation must comply with the local regulations and use of equipment and installation practices that promote electromagnetic compatibility and safety.
- Safety equipment To protect yourself against personal injury, always wear suitable safety equipment, such as safety glasses, work shoes, and other safety equipment required by the operation.

2.2 Qualified Personnel



WARNING: Risk of death or serious injury to personnel or damage to equipment.

Only qualified, properly trained and certified personnel are permitted to operate and interact with the system.

This manual and the equipment described in it are intended only for qualified personnel who have proper training and expertise.

Qualified personnel are those who are specialized with required knowledge and experience, who have been trained to perform such work and are authorized to commission, systems and circuits in accordance with established safety practices and standards. The qualified personnel must know and observe the following standards and regulations:

- IEC 60364
- IEC 60664
- Accident prevention national, regional and local regulations for the site where the system or machine will be operated

2.3 Electrical Hazards

WARNING: Electrical hazard. High voltage may be present, which can result in death or serious injury to personnel, or damage to equipment. Follow these safety instructions.

Certain electrical systems have to be maintained and cleaned by staff. Before they can be accessed, the systems have to be disconnected from the mains supply to eliminate electrical hazards to operating staff. According to the state of technology, this is accomplished with the five safety rules of DIN VDE 0105-100.

- 1. Disconnect the mains.
- 2. Secure against reconnection.
- 3. Verify that the system is dead.
- 4. Carry out earthing and short circuiting.
- 5. Provide protection from adjacent live parts.

2.3.1 Voltage Arcs and High Voltage

Voltage arcs may occur and/or high voltage may be present that can fatally or seriously harm personnel or damage equipment. Additionally, the drive's capacitors can have dangerous voltages present up to eight minutes after the removal of the mains voltage.

- Never attempt to remove safety covers, or loosen or disconnect the electrical connections when the DS2020 Combitronic system is powered up,
- Never attempt to perform any cleaning or maintenance operations when the DS2020 Combitronic system is powered up.
- Always ensure that the mains power supply is disconnected and locked out before attempting any work on the system.
- Always wait at least eight minutes after disconnecting and locking out the AC mains power before attempting to work on the DS2020 Combitronic system equipment. The DS2020 Combitronic capacitors can still have dangerous voltages present up to eight minutes after power is switched off.
- Always measure the voltage of the direct current circuit (BUS) and wait until the voltage drops below 40V.
- Always measure the voltage of any other contact point(s) to ensure the power is off and there is no voltage present.

- Never attempt to remove safety covers, or loosen or disconnect the electrical connections when the DS2020 Combitronic system is powered up,
- Never attempt to perform any cleaning or maintenance operations when the DS2020 Combitronic system is powered up.

2.3.2 General Hazards and Safeguards

The power from the drive to the motor can be removed in "a safe manner". In this way, when the safe power stage is disabled, the motor is not able to produce torque.

During normal operation, the equipment should not be accessible (i.e., protected as described in the Risk Assessment by covers, guards, barriers, and safety interlocked gates/doors, etc.), all covers/guards must be installed, and cabinet doors must be kept closed/locked.

During the operation of the drives, there may be uncovered live parts in the control cabinet installation, depending on the degree of mechanical protection required by regulations governing the site where the equipment is operated.

At the drive and/or motor, the power and control connections may be live, even when the motor is stopped.

2.4 Thermal Hazards

\wedge	CAUTION: Burn hazard.
	The surface temperature of the drive may reach a temperature of 80 °C, and the motor may reach up to 100 °C (212 °F), and may become very hot in operation, according to their protection category.
	Do not touch hot surfaces, measure the temperature, and wait until the drive and motor has cooled down below 40 °C (104 °F) before touching it.
	It is recommended to always wear gloves when attempting to handle DS2020 Combitronic system components that have been recently operating.

2.5 Mechanical Hazards



WARNING: Mechanical hazard.

Large motors can generate very high torque and impact or trapping hazards, which can result in death or serious injury to personnel, or damage to equipment.

> Follow these safety instructions.

The motor must be properly mounted and anchored as specified in the Moog motor installation guide supplied with the DS2020 Combitronic system motor. For details, consult the Moog motor installation guide.

2.6 STO Safety Feature

2.6.1 Description

The DS2020 Combitronic drives include the STO (Safe Torque Off) function as a standard feature to ensure protection for personnel and equipment against accidental restart and re-enabling of the drive.

The STO function acts as an interlock against accidental motor rotations.

The STO function can be used as a power turn-off command to prevent accidental starts.

The function disables the power control voltage of the semiconductors of the converter output stage, preventing the drive from generating the voltage required to rotate the motor.

Using this feature, you can perform short-term operations and/or maintenance work only on nonelectrical parts of the machine without switching off the mains. This function must be enabled from a safe external control (mechanical or semiconductor) or by a specific external security board.

2.6.2 Directives on Safety



WARNING: Electrical hazard. High voltage may be present, which can result in death or serious injury to personnel, or damage to equipment.

Follow these safety instructions.



WARNING: Mechanical hazard. Large motors can generate very high torque and impact or trapping hazards, which can result in death or serious injury to personnel, or damage to equipment.

> Follow these safety instructions.

Suspended loads must always be securely mechanically locked. The STO function, if activated, does not ensure against movement of suspended loads.

The interruption of the 24 VDC supply of the STO circuit causes an uncontrolled arrest of the motor.

The STO function does not guarantee an electrical disconnection from the power output to the motor. If the motor power cable requires service, always disconnect and lock out the mains power supply, wait for eight minutes for the complete discharge of the intermediate circuit, and then check for residual voltages at any contact point.

NOTICE

When using the STO function, it is necessary to perform the following sequence of operations.

- 1. Stop the movement in a controlled manner, placing the nominal speed value to zero.
- 2. Upon reaching the zero speed, and in the case of suspended loads, mechanically lock the load.
- 3. Disable the drive and at this point turn on the STO function via supply command

Input voltage	24 V +/- 10 %
Max input current	50 mA +/- 10 %
Voltage Feedback	30 V max
Current Feedback	200 mA max

2.7 Safe Use of the DS2020 Combitronic System

The technical data (nameplate) and documentation for the DS2020 Combitronic system and how to install its components must be available to and observed by all personnel.

The drives contain electrostatically sensitive components, which can be damaged by electrostatic discharge (ESD) through improper handling. It is recommended to follow proper ESD procedures to discharge any electrostatic charge before handling the DS2020 Combitronic system components (e.g., using ESD straps, ESD mats or other protective surfaces, etc).

2.7.1 Risk Assessment

The drives are safe industrial devices that are placed in electrical systems or machines and can only be operated as integrated parts of those systems or machines. The builder/manufacturer of the system or machine must generate a risk assessment, and take appropriate measures to avoid unexpected movements that could cause death or injury to personnel and/or damage to equipment or other property. The risk assessment must comply with all national, regional and local regulations for the site where the system or machine will be operated. For more details, see Risk Assessment on page 17.

2.7.2 Electrical Connections

The drives must operate only inside an enclosed control cabinet. Additional ventilation or cooling may be necessary based on the external environmental conditions.

Use only copper conductors for wiring all connections. The conductor cross sections must comply with IEC 60204.

2.7.3 Motor Selection

The DS2020 Combitronic drives have been designed to control brushless asynchronous and synchronous motors with torque control, speed and/or position. The rated voltage of the motors must be at least the same level as:

$V_{DCbus}/\sqrt{2}$

produced by the drive. For more details on selecting the proper motor, see the *DS2020 Combitronic Installation and Startup Guide*.

2.7.4 Power Supply

The drives of the DS2020 Combitronic series (overvoltage category III according to EN 61800-5-1) can be powered by three-phase industrial AC supply, earthing systems (TN system, TT with grounded neutral and symmetrical rated current of not more than 10KA 120V to 480V ± 10%).

Overvoltage between phases and the drive housing must not be greater than 1000 V peak.

According to EN61800-3 transient voltage spikes (<50ms) between the phases must not exceed 1000 V. Transient voltage surge (<50µs) between a phase and the housing must not exceed 2000V.

2.7.5 Prohibited Use



WARNING: Risk of death or serious injury to personnel, or damage to equipment.

Uses other than those described above (safe use) can lead to death or serious injury to personnel, or damage to equipment.

> Avoid the prohibited use cases described below.

The use of the DS2020 Combitronic system is normally prohibited in the following environments:

- Hazardous areas
- Areas subject to corrosive and/or electrically conductive acids, alkaline solutions, vapors, oils
- Directly on electrical supplies/circuits not connected to the ground, or on asymmetrically grounded power supplies with a voltage exceeding 240 VAC
- On ships or offshore installations

The installation and start-up of the drive are prohibited in cases where the machine on which it is installed:

- Does not comply with the requirements of the EC Machinery Directive
- Does not comply with the Directives on EMC or Low Voltage Directives
- Does not conform to national, regional and local regulations for the site where the system or machine will be operated
- Does not conform to the machine's Risk Assessment.

The control of the brake by the DS2020 Combitronic drive alone is prohibited in applications where the safety of personnel must be ensured through the brake.

2.8 Risk Assessment

In order to protect personnel from any safety hazards in the machine or system, the machine/system builder must perform a "Risk Assessment", which is often based on ISO standards. The design/implementation of barriers, emergency stop (E-stop) mechanisms and other safeguards will be driven by the Risk Assessment and the safety standards specified by the governing authority (for example, ISO, OSHA, UL, etc.) for the site where the machine is being installed and operated. The methodology and details of such an assessment are beyond the scope of this manual. However, there are various sources of Risk Assessment information available in print and on the internet.

NOTICE

The following list is an example of items that would be evaluated when performing the Risk Assessment. Additional items may be required. The safeguards must ensure the safety of all personnel who may come in contact with or be in the vicinity of the machine.

2.8.1 Installation Risk Assessment

The safety functional requirements of a DS2020 Combitronic system depend on the application and should be considered during the evaluation of the overall risk of the installation. The designer of the installation is responsible for the risk assessment, and the specification of requirements for levels of functional integrity and safety integrity levels (SIL) of the drive according to CEI EN 62061: 2005 and/or performance levels (PL) according to EN ISO 13849-1: 2008.

The following table, which is identical to Table 4 of the UNI EN ISO 13849-1: 2008, shows the relationship between performance levels (PL) and safety integrity levels (SIL).

PL	SIL (IEC 61508-1) operational mode high/continuous
а	No match
b	1
с	1
d	2
е	3

i

Because SIL 4 level refers to catastrophic events, it does not cover the risks relating to machinery. The risk assessment presented by the machine must be carried out in accordance with Directive 2006/42 / EC, referring to UNI EN ISO 12100: 2010 and must contain the safety circuit configuration relating to the entire machine by taking into account all components of the integrated safety system, including the drive.

2.8.2 General Machine/System Safeguards Information

In general, the machine/system safeguards must:

- Provide a barrier to prevent unauthorized entry or access to the machine or system. The barrier must be designed so that personnel cannot reach into any identified danger zones.
- Position the control panel so that it is outside the barrier area but located for an unrestricted view of the moving mechanism. The control panel must include an E-stop mechanism. Buttons that start the machine must be protected from accidental activation.
- Provide E-stop mechanisms located at the control panel and at other points around the perimeter of the barrier that will stop all machine movement when tripped.
- Provide appropriate sensors and interlocks on gates or other points of entry into the protected zone that will stop all machine movement when tripped.
- Ensure that if a portable control/programming device is supplied (for example, a hand-held operator/programmer pendant), the device is equipped with an E-stop mechanism.

NOTICE

A portable operation/programming device requires *many* additional system design considerations and safeguards beyond those listed in this section. For details, see the safety standards specified by the governing authority (for example, ISO, OSHA, UL, etc.) for the site where the machine is being installed and operated.

- Prevent contact with moving mechanisms (for example, arms, gears, belts, pulleys, tooling, etc.).
- Prevent contact with a part that is thrown from the machine tooling or other part-handling equipment.
- Prevent contact with any electrical, hydraulic, pneumatic, thermal, chemical or other hazards that may be present at the machine.
- Prevent unauthorized access to wiring and power-supply cabinets, electrical boxes, etc.
- Provide a proper control system, program logic and error checking to ensure the safety of all personnel and equipment (for example, to prevent a run-away condition). The control system must be designed so that it does not automatically restart the machine/system after a power failure. Refer to the next section.
- Prevent unauthorized access or changes to the control system or software.

2.8.3 Safeguards Related to SCRF

The manufacturer of the machine and/or final apparatus must perform, maintain and make available a Risk Assessment (risk analysis) of the machine in accordance with the ISO12100 and ISO14121 standards, and implement all necessary measures to avoid unforeseen movements that can cause damage to persons or objects. In particular, the manufacturer of the machine and/or final apparatus has to comply with the relevant product standards. Where it has been chosen to perform safety functions by means of electrical/electronic devices (SCRF), the safety integrity levels (SIL) and the functional requirements of each device must be specified clearly. According to TECHNICAL STANDARD IEC EN 62061, this specification must include all information likely to influence the design of the electrical/electronic device, including, where applicable:

- The machine operating conditions
- Prioritization of functions that can be active simultaneously and cause conflicting actions

- The frequency of operation of each SCRF
- Requested response time of each SCRF
- Description of each SCRF
- SCRF interface with other functions of the machine
- Description of the reactions related to machine reboot failures and constraints, when the reaction to the fault results in the interruption of the reboot
- The operating environment description
- Tests and associated equipment (e.g., access doors, safety gates)
- Frequency of cycles of operation and utilization factor within the working cycles

3 Certifications

This chapter provides information about the DS2020 Combitronic system certifications.

3.1 CE Certificate	 21
3.2 Safe Torque Off (STO)	

3.1 CE Certificate

According to the European Community Directives, drives must conform to:

- EMC 2014/30/EU directive
- Low Voltage Directive 2014/35/EU

The DS2020 Combitronic system has been tested in a laboratory for the verification of the parameters of compliance with the above Directives.

Regarding electromagnetic compatibility, the DS2020 Combitronic system refers to C3 industrial environments.

NOTICE

The DS2020 Combitronic system can emit radio frequency that might interfere with nonindustrial electric and electronic devices.



The machine manufacturer MUST NOT use the DS2020 Combitronic system or its components if there is no documentation that ensures the fulfillment of the requirements of Directive 2006/42/EC.

MOOG ITALIANA S.r.		MOOG	
Sede di Casella Via Avosso, 94	d.		
Telefono (39) 010.9671 Telefax (39) 010.9671 www.moog.it	1 280		
CENELEC	_	Memorandum N*	
DICHIAR	RAZIONE CE I	DI CONFORMITA'I EC DECLARATION OF CONFORMITY	
Il sottoscritto, i the following n	rappresentan nanufacturer	te il seguente costruttore / The undersigned, representing	
MOOG ITALI	ANA S.r.I., \$	Sede di Casella / Casella Site	
Via Avosso S	4. Casella (Genova), Italy	
11111111111111111	1	CONTRACTOR OF THE CARD OF THE ACTION OF THE	
dichiara qui di	seguito che i	prodotti / herewith declares that the products	
Marchio / Brand		⇒ 	
Azionamenti Se	ne i Drives Se	nes: D52020	
staultana in an		ante maniete delle semuenti direttino semunitario / era in	
risultano in col	nformita a qu	anto previsto dalle seguenti direttive comunitarie i are in	
conformity with	h the provisio	ns of the following EC directives	
(comprese tutte	le modifiche a	applicabili / including all applicable amendments)	
rif / ref nr	Ititolo / title	tolo / title	
2014/30/EC	Direttive Compatibilità Elettromagnetica/ EMC Directive		
2014/30/20	Direttiva Co	Tensional Low Valtage Directive	
2014/00/20	Tonettiva ba	ssa rensioner con vonage chechve	
e che sono sta that the followi	ing harmonize	e dorme armonizzate, o part di esse, indicate di seguito i a ed standards, or parts thereof, have been applied	
24	1 to success	A14_1 A144	
nr	issue	titolo / title	
nr EN 50178	<i>issue</i> 1997	titolo / title Electronic equipment for use in power installations	
nr EN 50178 EN 61800-3	<i>issue</i> 1997 2004	titolo / title Electronic equipment for use in power installations Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods	
nr EN 50178 EN 61800-3 EN 61800-3: 20	issue 1997 2004 004 A1 2012	titolo / title Electronic equipment for use in power installations Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods Adjustable speed electrical power drive systems. Amendment	
nr EN 50178 EN 61800-3: 20 Altri riferimenti references or <i>in</i> prodotti è subor installazione". L costruttore rigua observation of ti primary EMC re	issue 1997 2004 i o informazio nformation re dinata al rispe 'utilizzatore ha ardo alle proble he procedures sponsibility in	titolo / title Electronic equipment for use in power installations Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods Adjustable speed electrical power drive systems. Amendment in richlesti dalle direttive comunitarie applicabili / Other quired by the applicable EC directives: La conformità dei Ito delle procedure contenute nei rispettivi "Manuale di la responsabilità primaria nel seguire le raccomandazioni del ematiche EMC./ The conformity of products is subjected to included in the proper "Installation Manual". The user has the following the recommendations of the manufacturer.	
nr EN 50178 EN 61800-3 2005 Altri riferimenti references or <i>i</i> prodotti è subor installazione". L costruttore rigua observation of ti primary EMC re Ultime due cifri year in which t	issue 1997 2004 004 A1 2012 i o information nformation re dinata al rispe 'utilizzatore ha ardo alle proble he procedures sponsibility in e dell'anno in the CE markin	titolo / title Electronic equipment for use in power installations Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods Adjustable speed electrical power drive systems. Amendmeni in inchesti dalle direttive comunitarie applicabili / Other quired by the applicable EC directives: La conformità dei tto delle procedure contenute nei rispettivi "Manuale di la responsabilità primaria nel seguire le raccomandazioni del ematiche EMC./ The conformity of products is subjected to included in the proper "Installation Manual". The user has the following the recommendations of the manufacturer. cui e' stata affissa la marcatura CE / Last two digits of the rg was affixed: 14	
nr EN 50178 EN 61800-3: 20 Altri riferimenti references or in prodotti è subor installazione". L costruttore rigua observation of ti primary EMC re Ultime due cifrr year in which ti Casella, 20 April	issue 1997 2004 i o informazio nformation re dinata al rispe 'utilizzatore ha ardo alle proble he procedures sponsibility in the CE markin ile , 2016	titolo / title Electronic equipment for use in power installations Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods Adjustable speed electrical power drive systems. Amendment in richlesti dalle direttive comunitarie applicabil / Other guired by the applicable EC directives: La conformità dei ito delle procedure contenute nei rispettivi "Manuale di la responsabilità primaria nel seguire le raccomandazioni del ematiche EMC./ The conformity of products is subjected to included in the proper "Installation Manuel". The user has the following the recommendations of the manufacturer. cui e' stata affissa la marcatura CE / Last two digits of the grass affixed: 14	
nr EN 50178 EN 61800-3: 2(Altri riferimenti references or i, prodotti è subor installazione". L costruttore rigua observation of ti primary EMC re Ultime due cifm year in which t Casella, 20 April Gianfranco Cos	issue 1997 2004 i o information nformation re dinata al rispe 'utilizzatore ha ardo alle proble he procedures sponsibility in e dell'anno in the CE markin ile , 2016 ta	titolo / title Electronic equipment for use in power installations Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods Adjustable speed electrical power drive systems. Amendment in irchiesti dalle direttive comunitarie applicabili / Other quired by the applicable EC directives: La conformità dei to delle procedure contenute nei rispettivi "Manuale di la responsabilità primaria nel seguire le raccomandazioni del ematiche EMC./ The conformity of products is subjected to included in the proper "Installation Manual". The user has the following the recommendations of the manufacturer. cui e' stata affissa la marcatura CE / Last two digits of the g was affixed: 14	
nr EN 50178 EN 61800-3: 2(Altri riferimenti references or i prodotti è subor installazione". L costruttore rigua observation of ti primary EMC re Ultime due cifre year in which t Casella, 20 Apri Gianfranco Cos OPERATIONS I	issue 1997 2004 2004 2004 2004 2004 1 2012 i o information re dinata al rispe 'utilizzatore ha ardo alle produres sponsibility in e dell'anno in the CE markin ile , 2016 ta MANAGER	titolo / title Electronic equipment for use in power installations Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods Adjustable speed electrical power drive systems. Amendmeni in inchesti dalle direttive comunitarie applicabili / Other quired by the applicable EC directives: La conformità dei tto delle procedure contenute nei rispettivi "Manuale di la responsabilità primaria nel seguire le raccomandazioni del ematiche EMC./ The conformity of products is subjected to included in the proper "Installation Manual". The user has the following the recommendations of the manufacturer. cui e' stata affissa la marcatura CE / Last two digits of the rg was affixed: 14	
nr EN 50178 EN 61800-3: 20 Altri riferimenti references or in prodotti è subor installazione". L costruttore rigue observation of ti primary EMC re Ultime due cifri year in which ti Casella, 20 April Gianfranco Cosi OPERATIONS I	issue 1997 2004 2004 1 997 2004 1 0 Informazio formation re dinata al rispe 'utilizzatore ha ardo alle proble he procedures sponsibility in e dell'anno in the CE markin ile , 2016 ta MANAGER MANAGER	titolo / title Electronic equipment for use in power installations Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods Adjustable speed electrical power drive systems. Amendment in richlesti dalle direttive comunitarie applicabili / Other quired by the applicable EC directives: La conformità dei tto delle procedure contenute nei rispettivi "Manuale di la responsabilità primaria nel seguire le raccomandazioni del matiche EMC./ The conformity of products is subjected to included in the proper "Installation Manuel". The user has the following the recommendations of the manufacturer. cui e' stata affissa la marcatura CE / Last two digits of the g was affixed: 14	

Figure 1: CE Declaration of Conformity

3.2 Safe Torque Off (STO)

The DS2020 Combitronic integrates the Safe Torque Off (STO) function according to standards EN 61800-5-2; EN/ISO 13849-1. SILCL 3 PL "e" (as per certificate). The function also corresponds to an uncontrolled stop in accordance with stop category 0 of IEC/EN 60204-1 standard.

The validation of the function is based on:

- A guarantee that a single fault does not lead to loss of the safety function
- Some, but not all, possible faults may be identified
- The addition of more undetected failures can lead to loss of the safety function

In case of the occurrence of two simultaneous faults in the power section, the residual risk is for the motor to rotate by an angle dependent on the number of its pole pairs. So, for example, a 6-pole motor can result in a maximum rotation of 60°.

MOOG ITALIANA S.r.I. Sede di Casella Via Avosso, 94 16015 Casella (GE) - ITALIA Telefono (39) 010.96711 Telefax (39) 010.9671280 www.moog.com MOOG

EC DECLARATION OF CONFORMITY (TRANSLATION OF THE ORIGINAL DECLARATION) according to Annex II A of Directive 2006/42/EC

We,

MOOG ITALIANA S.r.I., Casella Site Via Avosso 94, Casella (Genova), Italy

herewith declare that the logic unit to ensure the safety function "Safe Torque Off" integrated in the drives series DS2020

is in conformity with the provisions of the Machinery Directive 2006/42/EC

and is in conformity with the model submitted to EC type-examination, which achieved the EC certificate n. n. 14CMAC0030 dated 13/Nov/2014 issued by the following notified body:

I.C.E.P.I. S.p.A. (Istituto Certificazione Europea Prodotti Industriali) Via Paolo Belizzi, 29/31/33 - 29122 Piacenza - Italy Identification number: 0066

and that the Technical File has been compiled by:

MOOG ITALIANA S.r.I., Casella Site Via Avosso 94, Casella (Genova), Italy

and that the following standards have been applied:

harmonized standards

EN 61800-5-2:2007, EN ISO 13849-1:2008

Casella, April 9th, 2015

OPERATIONS MANAGER

2015 EC MD DS2020.DOC - MOD.328/PMA/2/12

Sede Legale: MOOG ITALIANA S.r.I. – Società a Socio Unico soggetta a direzione e coordinamento da parte di MOOG Gmbh & Co.KG Via G.Pastore, 4 - 21046 Malnate (VA) - Telefono (39) 0332.421111 Fax (39) 0332.429233 -R.E.A. Varese 138918 – Cod. Fisc. , Partita IVA, Nr. Reg. Imp.Varese: IT00531090124 - Cap. Soc. Euro 520.000 i.v.

Figure 2: CE "Safe Torque Off" Certificate of Conformity



Figure 3: EC-Type Examination Certificate

TAKE A CLOSER LOOK

Moog Animatics, a sub-brand of Moog Inc. since 2011, is a global leader in integrated automation solutions. With over 30 years of experience in the motion control industry, the company has U.S. operations and international offices in Germany and Japan as well as a network of Automation Solution Providers worldwide.

Americas - West Moog Animatics 2581 Leghorn Street Mountain View, CA 94043 United States Americas - West Moog Animatics 1995 NC Hwy 141 Murphy, NC 28906 United States

Tel: +1 650-960-4215 Email: animatics_sales@moog.com Europe Moog GmbH Memmingen Branch Allgaeustr. 8a 87766 Memmingerberg Germany

Tel: +49 8331 984 80-0 Email: info.mm@moog.com Asia Sales Office Kichijoji Nagatani City Plaza 405 1-20-1, Kichijojihoncho Musashino-city, Tokyo 180-0004 Japan

Tel: +81 (0)422 201251 Email: mcg.japan@moog.com

For Animatics product information, visit **www.animatics.com**

For more information or the office nearest you, email **animatics_sales@moog.com**

Moog is a registered trademark of Moog Inc. and its subsidiaries. All trademarks as indicated herein are the property of Moog Inc. and its subsidiaries. ©2021 Moog Inc. All rights reserved. All changes are reserved

Moog Animatics DS2020 Combitronic[™] Safety Guide Rev. A, January 2021, SC80100021-001



www.animatics.com