

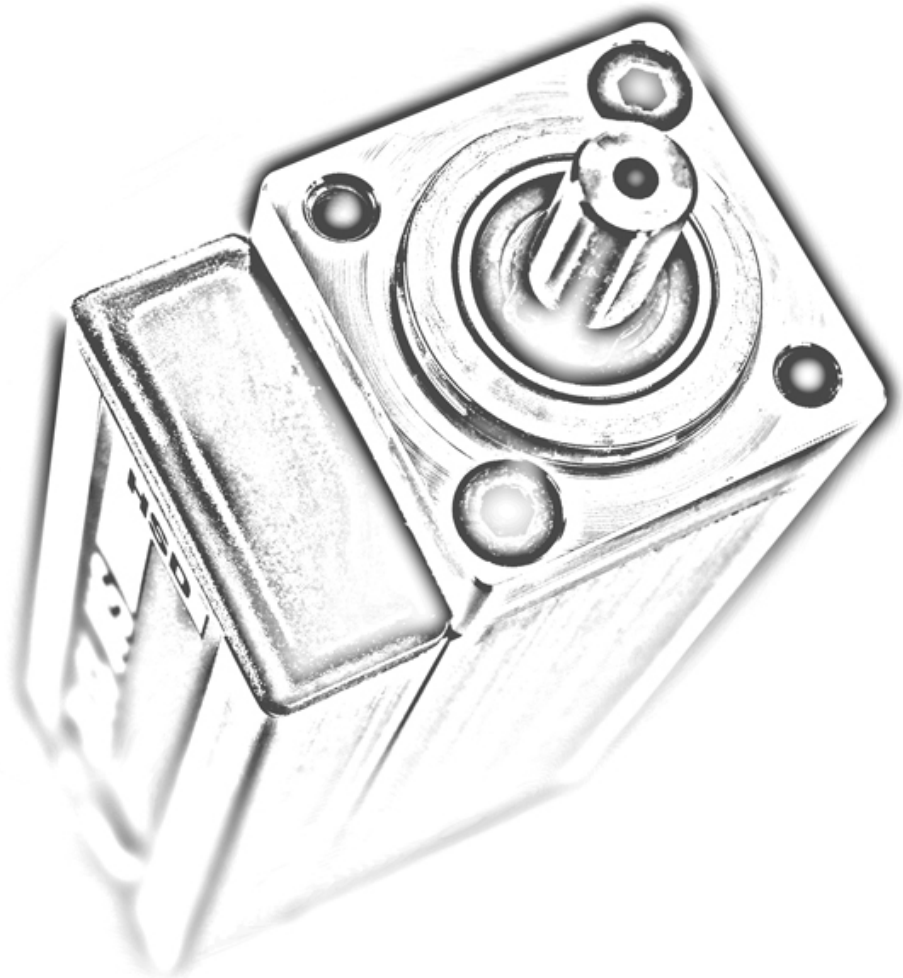


Translation of the original instructions

# SM 137 D

Synchronous motor with built-in drive

## Assembly instructions



Edition.Revision 2.1  
H5834D0189 ENGLISH

Serial number



# Information about the publication

Code	Issue	Code of previous issue
H5834D0189	2	H5834D0154

Revision	Description of updates
0 (07/2017)	New document
1 (10/2019)	Revision of paragraph 5.6.1, 5.6.2, 5.6.3, 5.8, 5.8.2, 5.8.3, 5.8.4, appendix C Addition of paragraph 5.9.1

This manual has been prepared by the manufacturer to be used by customers only and it contains information protected by copyright. It must not be photocopied or reproduced in any form, either fully or in part, without the prior written consent of the manufacturer.



# Table of contents

## Preliminaries

### 1 Preliminary information

	Introduction .....	11
1.1	Scope of the manual .....	11
1.2	Symbols used in the manual .....	12
1.3	Documents supplied with the product .....	12
	EC Declaration of Conformity .....	13
1.4	Identification of the product and manufacturer .....	14
1.5	Orders and requests for information .....	14
1.6	Warranty .....	15

### 2 Safety information

2.1	Safety regulations .....	17
2.2	Safety warnings for maintenance .....	17
2.3	Risks associated with the use of the product .....	18
2.3.1	Prohibitions and risks associated with improper handling and/or use .....	18
2.4	Residual risks .....	18
2.5	Signs fixed to the product .....	19

## Descriptions

### 3 Main parts

3.1	SM 137 D General description and applications .....	23
3.2	SM 137 D General overview and main parts .....	24
3.3	Identification of the manufacturer and the product .....	25
3.4	Safety and information signs .....	25

### 4 Transport, packing, unpacking, storage

4.1	Warnings .....	27
4.2	Overall dimensions and weight of the packed product .....	27

4.3	Transport and packing .....	28
4.4	Unpacking .....	28
4.5	Storage .....	28
<b>5</b>	<b>Installation and commissioning</b>	
5.1	Preliminary installation checks .....	29
5.2	Preparing the factory services .....	29
5.3	Work environmental requisites .....	29
5.4	Mechanical connections .....	30
	Fixing .....	30
	Overall dimensions .....	30
5.5	Electrical connections .....	31
	General regulations for using the electric connectors .....	32
	Electric connector .....	32
5.6	Fieldbus interfaces .....	33
5.6.1	E-NETx .....	33
5.6.2	CANopen .....	33
5.6.3	RS-485 .....	34
5.7	Regenerative effect on DC BUS (dynamo effect) .....	34
5.8	Configuration of the dip-switch .....	35
5.8.1	Configuration following a replacement .....	35
5.8.2	E-NETx configuration .....	36
	Setting the E-NETx address .....	37
5.8.3	CANopen configuration .....	38
	CANopen node address setting .....	39
	Standard or compatible operating mode .....	40
	Additional functions .....	41
	Transmission speed setting (bit-rate) .....	42
	High node address bit settings .....	43
	Resetting the default parameters .....	43
5.8.4	RS-485 configuration .....	44
	Setting the RS-485 address .....	45
5.9	Diagnostics .....	46
5.9.1	Meaning of the green led in the CANopen version .....	46
5.10	General checks after installation .....	47
5.11	Running-in .....	47
5.12	Environmental conditions .....	47

---

## Maintenance

<b>6</b>	<b>Maintenance</b>	
6.1	General cleaning .....	51

---

## Appendices

### A Technical characteristics

A.1	General data .....	55
	SM 137 D torque curve .....	58
	SM 137 D mechanical power curve .....	58
	S1 continuous service .....	59

### B Disposal

### C Spare parts

	Compatibility for replacements .....	64
	Dip-switch configuration for replacements .....	64

### D Assistance service

D.1	Customer service .....	65
-----	------------------------	----

	Analytical index .....	67
--	------------------------	----





# Preliminaries



# 1 Preliminary information

## Introduction

This document, with any enclosures, provides the proper information for a correct installation. The procedures described must only be carried out by suitably trained personnel.

In order to prevent incorrect operation that could constitute a hazard for personnel and/or cause damage to the product, all the documents supplied must be read and fully understood. HSD (or its representative), from here on the **manufacturer**, cannot be held responsible or legally liable for any damage resulting from incorrect use of the documentation.

The description or illustration /of certain devices may differ slightly from the actual ones without in any way compromising their comprehension. Some devices indicated and described in this manual may not be present on the product.

## 1.1 Scope of the manual

This manual is geared to the manufacturer who will integrate this HSD product onto his own machinery or partly completed machinery. It provides the necessary information for proper installation and maintenance of the unit in order to maintain it efficient and safe over time.

The manual forms an integral part of the product and as such must accompany it at all times, otherwise the product will be lacking one of its primary safety requisites.

The manual must be well taken care of, distributed and made available to all personnel involved.

The purpose of the warnings contained in the manual is to safeguard the health and safety of personnel exposed to residual risks.

The manual provides information on the most appropriate behaviour to adopt for the correct use of the product as provided for by the manufacturer.

In the case where the information contained in the manual conflicts with health and safety standards, contact the manufacturer to request the necessary corrections and/or adaptations.

The manual must be stored in an appropriate location and must always be readily available for consultation. The information contained in the manual is indispensable for using the product in a safe and correct manner for the purposes for which it has been designed.

## 1.2 Symbols used in the manual

The parts of the text requiring special attention are highlighted and preceded by the symbols illustrated and explained below.



**Danger**

Indicates a procedure, practice or similar action that could cause injury if not respected or carried out correctly.



**Caution**

Indicates an operating procedure, practice or similar action that could damage or completely destroy the product if not respected or carried out correctly.



**Information**

Highlights particularly important information of a general nature that must not be ignored.

## 1.3 Documents supplied with the product

The supplied documents must be stored in an appropriate location and must always be readily available for consultation.

The following is a list of the documents supplied with the product (unless otherwise agreed with the customer).

- **Assembly instructions** (this manual). It contains warnings and instructions for the transport, installation, use, maintenance and disposal of the product.  
To read it, Adobe® Reader® ([www.adobe.com](http://www.adobe.com)) is required.
- **Test report.** Contains the testing results performed on the unit.
- **EC Conformity Declaration.** This certifies that the product complies with the directives indicated. It is only issued for machines sold in EEC and EFTA (European Free Trade Association) countries.

Check that all the documents listed above are present on delivery of the product. If necessary, further copies can be obtained on request from the manufacturer.

- **Annexes (if included).** These contain additional information that completes and/or replaces the information in the document with which they are enclosed.

## EC Declaration of Conformity

The product is built in conformity with pertinent and applicable EU Directives at the time of its market release, as stated in the EC declaration of conformity for which the facsimile is attached.

<b>HSD</b> MECHATRONICS	<b>DICHIARAZIONE DI CONFORMITÀ UE</b> (2014/30/UE ALLEGATO IV) <b>EU DECLARATION OF CONFORMITY</b> (2014/30/EU ANNEX IV) <b>EU-KONFORMITÄTSERKLÄRUNG</b> (2014/30/EU ANHANG IV) <b>DÉCLARATION UE DE CONFORMITÉ</b> (2014/30/UE ANNEXE IV) <b>DECLARACIÓN UE DE CONFORMIDAD</b> (2014/30/UE ADJUNTO IV)	<b>CE</b>
IL FABBRICANTE: THE MANUFACTURER: DER HERSTELLER: LE FABRICANT: EL FABRICANTE:	<b>HSD S.p.A.</b> registered office: Via Della Meccanica, 16 - 61122 Pesaro (PU) Italy factory/headquarters: Via Pesaro, 10A - 61012 Gradara (PU) Italy Tel.: (+39) 0541 979 001 - Fax: (+39) 0541 979 050	
DICHIARA SOTTO LA PROPRIA ESCLUSIVA RESPONSABILITÀ CHE IL MATERIALE ELETTRICO: MOTORE SINCRONO CON AZIONAMENTO INCORPORATO DECLARES UNDER HIS OWN SOLE RESPONSIBILITY THAT THE ELECTRONIC EQUIPMENT: SYNCHRONOUS MOTOR WITH INCORPORATED DRIVE ERKLÄRT EIGEN ERANTWORTLICH, DASS DAS ELEKTROMATERIAL: SYNCHRONMOTOR MIT INTEGRIERTEM ANTRIEB DÉCLARE SOUS SA SEULE RESPONSABILITÉ QUE LE MATÉRIEL ÉLECTRIQUE: MOTEUR SYNCHRONE À ACTIONNEMENT INCORPORÉ DECLARA BAJO SU EXCLUSIVA RESPONSABILIDAD QUE EL MATERIAL ELÉCTRICO: MOTOR SINCRONO CON ACCIONAMIENTO INCORPORADO		
Denominazione commerciale / Commercial name / Handelsbezeichnung / Nom commercial / Denominación comercial		
Modello / Model / Modell / Modèle / Modelo: <b>SM 137 D</b>		
<b>IT</b>	È CONFORME ALLA PERTINENTE NORMATIVA DI ARMONIZZAZIONE DELL'UNIONE: • <b>2014/30/UE</b> DEL PARLAMENTO EUROPEO E DEL CONSIGLIO del 26 febbraio 2014, concernente l'armonizzazione delle legislazioni degli Stati membri relative alla compatibilità elettromagnetica  <b>E CHE SONO STATE APPLICATE LE PARTI PERTINENTI DELLE SEGUENTI NORME ARMONIZZATE:</b> <b>EN 60034-1:2010+AC:2010, EN 61800-3:2004+A1:2012.</b>	
<b>EN</b>	IS IN CONFORMITY WITH THE RELEVANT UNION HARMONISATION LEGISLATION: • <b>2014/30/EU</b> OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014, on the harmonisation of the laws of the Member States relating to electromagnetic compatibility  <b>AND THAT THE RELEVANT PARTS OF THE FOLLOWING HARMONISED STANDARDS HAVE BEEN APPLIED:</b> <b>EN 60034-1:2010+AC:2010, EN 61800-3:2004+A1:2012.</b>	
<b>DE</b>	DIE EINSCHLÄGIGEN HARMONISIERUNGSRECHTSVORSCHRIFTEN DER UNION ERFÜLLT: • <b>2014/30/EU</b> DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 26. Februar 2014, zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit  <b>UND DASS DIE EINSCHLÄGIGEN TEILE FOLGENDE HARMONISIERTEN NORMEN ANGEWANDT WURDEN:</b> <b>EN 60034-1:2010+AC:2010, EN 61800-3:2004+A1:2012.</b>	
<b>FR</b>	EST CONFORME À LA LÉGISLATION D'HARMONISATION DE L'UNION APPLICABLE: • <b>2014/30/UE</b> DU PARLEMENT EUROPÉEN ET DU CONSEIL du 26 février 2014, relative à l'harmonisation des législations des États membres concernant la compatibilité électromagnétique  <b>ET QUE LES PARTIES PERTINENTES DES NORMES HARMONISÉES SUIVANTES ONT ÉTÉ APPLIQUÉES:</b> <b>EN 60034-1:2010+AC:2010, EN 61800-3:2004+A1:2012.</b>	
<b>ES</b>	ES CONFORME CON LA LEGISLACIÓN DE ARMONIZACIÓN PERTINENTE DE LA UNIÓN: • <b>2014/30/UE</b> DEL PARLAMENTO EUROPEO Y DEL CONSEJO de 26 de febrero de 2014, sobre la armonización de las legislaciones de los Estados miembros en materia de compatibilidad electromagnética  <b>Y QUE HAN SIDO APLICADAS LAS PARTES PERTINENTES DE LAS SIGUIENTES NORMAS ARMONIZADAS:</b> <b>EN 60034-1:2010+AC:2010, EN 61800-3:2004+A1:2012.</b>	
Luogo e data / Place and date / Ort und Datum / Lieu et date / Lugar y fecha:		Procuratore Speciale Special Attorney Sonderbevollmächtiger Fondé de pouvoir extraordinaire Mandatario Especial
_____		_____

## 1.4 Identification of the product and manufacturer

The serial number, together with the code and the revision number, represent the only means recognised by the manufacturer of identifying the product. The product user is responsible for ensuring that the serial number remains intact.

Chapter 3.3 “[Identification of the manufacturer and the product](#)” shows the position of the product serial number and the plate that identifies the product and manufacturer.

## 1.5 Orders and requests for information

When requesting additional copies of the documentation supplied with the product or further information on the documentation, services, assistance or machine parts, please send the request, specifying:

- product code and model
- product serial number
- product revision number
- name of dealer
- specific information on any faults encountered
- periods of use

## 1.6 Warranty

HSD S.p.A. guarantees that the product has been inspected and tested at its works with positive results.

The guarantee shall remain valid for a period of 12 months starting from the date of delivery.

**Repairs and/or replacements under guarantee are carried out free ex works HSD S.p.A. upon agreement with HSD S.p.A., with transport paid by the customer. HSD S.p.A. will not be held liable for damages resulting from production stoppages during the guarantee period.**

Defects due to normal wear of parts which, by their nature, are subject to rapid and continuous wear (e.g.: gaskets, belts, bearings, etc..) are not covered by warranty. In particular, HSD S.p.A. does not guarantee the life of any fitted bearings, in that this depends on a number of factors such as the balance quality grade of the tool, the types of machining operation carried out, impacts and/or mechanical stresses exceeding the values indicated by the manufacturer.


HSD S.p.A. will not be held liable for any defects in the conformity of the product caused by non-compliance with the standards provided for by the Instruction Manual or caused by improper use or mistreatment of the product. **The buyer has the right to receive replacements for defective parts, providing the defects in question are not the result of tampering, i.e. the fitting of non-original HSD spare parts and/or the replacement of components not provided for or authorised by this manual without the prior written consent of HSD S.p.A.**

**Under no circumstances will HSD S.p.A. or its suppliers be held liable for damages (including, and without limit, due to physical damage, damages due to loss of earnings, interruption in production, loss of data or any other economic losses) deriving from the use of HSD products, including in the case where HSD S.p.A. has been informed beforehand of the possibility of said damages.**

The warranty will be rendered null and void if the buyer fails to inform HSD S.p.A. in writing and in detail, the nature of any conformity defects encountered in the product within 15 days of the identification of said defect. In addition, warranty is voided if the customer does not allow the seller to carry out any inspection required or if, the seller having made the request to return the defective piece, the purchaser fails to return it within two weeks of the request.

Dimensional drawings and photographs are provided for illustrative purposes only as a reference for easier understanding.

In the pursuit of a constant development and improvement policy, the company reserves the right to modify both the functional and aesthetic characteristics, to make changes to the design of any functional part or accessory, or to discontinue the production and supply, without committing itself to give notice to anyone and without incurring any obligation. In addition, HSD S.p.A. reserves the right to make any structural or functional modifications to the product, or to modify the supply of spare parts and accessories, without prior notification and without any other obligations.

 The warranty will be annulled if any seals on the product are tampered with or broken.





## 2 Safety information

The product will operate in safety if it is installed and used by qualified personnel in accordance with the recommendations and instructions given in this manual or supplied by HSD's technical engineers at the time of installation.

Tampering with the safety devices to perform unforeseen operation causes the onset of serious danger to the operator.

The manufacturer will not be liable in any way for any damage to persons or property deriving from the use of unqualified operators, unintended use or deliberately incorrect use of the products or failure to comply with the safety requirements and recommendations listed below.

### 2.1 Safety regulations

- Read the instruction manual carefully for assembly and maintenance before starting up, using, performing maintenance or any other operation on the product.
- Always comply strictly with the warning, danger and caution indications provided in the manual, and with the safety signs affixed directly to the product.
- Never work in the dark; use all the available lights and make sure that they are efficient.
- Pay all due attention to what you are doing and take the necessary precautions before doing anything.
- Be careful, during the electrical installation, to not invert the phases.

### 2.2 Safety warnings for maintenance

- In order to be able to work in complete safety on a product already installed on a machine, refer to the machine's instruction manual.
- It is strictly forbidden to work with powered up parts.  
Isolate the product from the mains power supply before proceeding with any maintenance operations.
- Even though the product has been disconnected from the mains power supply, the rotating and mobile parts may still be in motion due to inertia. Therefore, prior to carrying out any maintenance operations, make sure that the rotating and mobile parts of the product are stationary.

## 2.3 Risks associated with the use of the product

HSD is not responsible for installations performed by persons who are unqualified and/or for installations that do not comply with the conditions stated in this manual.

The equipment must only be fitted on machinery. The machine manufacturer must conduct a risk analysis (focusing specifically on the installation type and method) before putting the machine into service. This kind of analysis must take into account the whole machine life cycle.

### 2.3.1 Prohibitions and risks associated with improper handling and/or use

It is absolutely forbidden to bypass, remove, modify or render inoperative any safety devices, controls or guards protecting individual parts or the product as a whole.

- The product must not be used in environments where there is an explosion or fire risk.
- The elimination of faults or anomalies in the operation of the product or modifications to the type of operation or installation must not be carried out by unauthorised personnel.
- All guards and safety devices must be maintained efficient and in perfect condition. Warning and danger signs and symbols must be clearly legible and must never be removed.
- When performing troubleshooting operation on the product, take all the necessary precautions described in the Instruction Manual to prevent damage or injury.
- Remember to tighten all screws, nuts and ring nuts of each mechanical component that has been adjusted or set-up.
- Before running the product, make sure that all the safety devices are installed and in perfect working order. If this is not the case, under no circumstances must the product be started, instead inform the works safety manager or the department head.
- It is not allowed to violate or avoid the prescriptions contained in this manual.
- Any uses other than those intended by the manufacturer are not allowed.
- Installations, modifications or adjustments not described in this manual, or not authorised by the manufacturer, are not allowed.
- Maintenance intervention modalities, other than those described in the Instructions, are not allowed.
- It is strictly forbidden to replace parts of the equipment. In case of malfunctions or failures, don't try to repair but send the product to HSD.

## 2.4 Residual risks

- In nominal conditions, the external surface of the device reaches temperatures of 70-80°C. Wait for it to cool down before touching it.

## 2.5 Signs fixed to the product

The signs on the product are shown below.



**DANGER, HOT SURFACES!** High temperature component, risk of burning. Wear suitable protective clothing.



**USER MANUAL!** It is compulsory to read the whole user manual before performing any operations.

- The signs fixed to the product must never be removed for any reason whatsoever.
- The signs must be clearly legible.
- Damaged signs should be replaced (request new ones from the manufacturer).



**Make sure the information plates are clearly legible. If this is not the case, replace them with new ones in the same positions.**



# Descriptions



# 3 Main parts

This chapter provides information on the type of product, its main and optional parts, and the configurations available.



**Use of the product in conditions other than those described is not allowed.**



Some devices indicated and described in this manual may be optional features and therefore not present in the configuration.

## 3.1 SM 137 D General description and applications

This product is a Synchronous motor with incorporated drive (servomotor) allowing to move parts of CNC machines (numerically controlled machines such as milling machines, cutting machines, point to point boring machines, etc...), and it is designed to perform operations on various materials (for example: wooden materials, metals, marble, glass, etc...). It is designed to be incorporated in a machine or in partly completed machinery, and cannot function independently or outside its range of characteristics.

The servo-motor is made up of a Brushless motor and its drive.

There are three possible types, depending on the type of motor shaft:

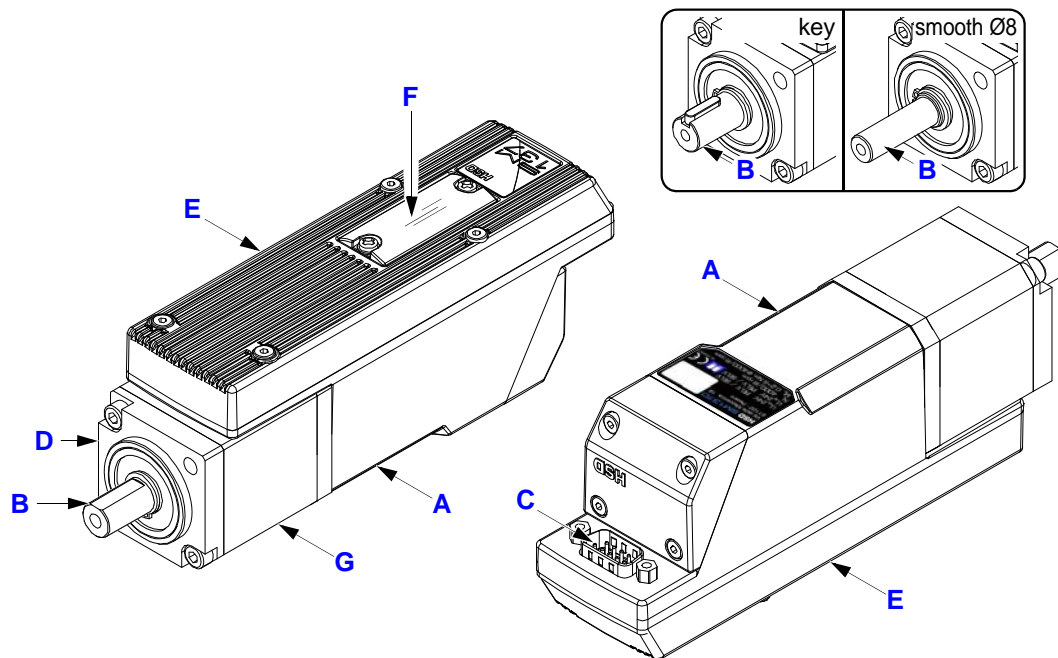
- flat
- key
- smooth Ø8

There are three possible types, depending on the speed reduction ratio to the motor shaft:

- R = 1:6.25
- R = 1:8
- R = 1:25

More detailed information about the servo-motor parts is given in paragraph [3.2 "SM 137 D General overview and main parts"](#).

## 3.2 SM 137 D General overview and main parts



- A- Motor:** synchronous with permanent magnets, allowing the movement of mechanical parts. The rotation is controlled electronically. The shaft outfeed flange (bracketing flange) is fitted with special holes to be fastened to the device.
- B- Motor shaft:** transmits motion to the device.
- C- Connector:** electrical connection of the electronic drive.
- D- Clamping flange:** the clamping flange has holes for installing the equipment on the device or machine (see paragraph 5.4 “Mechanical connections”).
- E- Electronic drive:** electronic device that manages motor rotation.
- F- Dip-switches:** for setting the configuration.
- G- Reducer:** gear-based transmission system that increases the torque and reduces the device speed on the basis of the reduction ratio implemented (R).



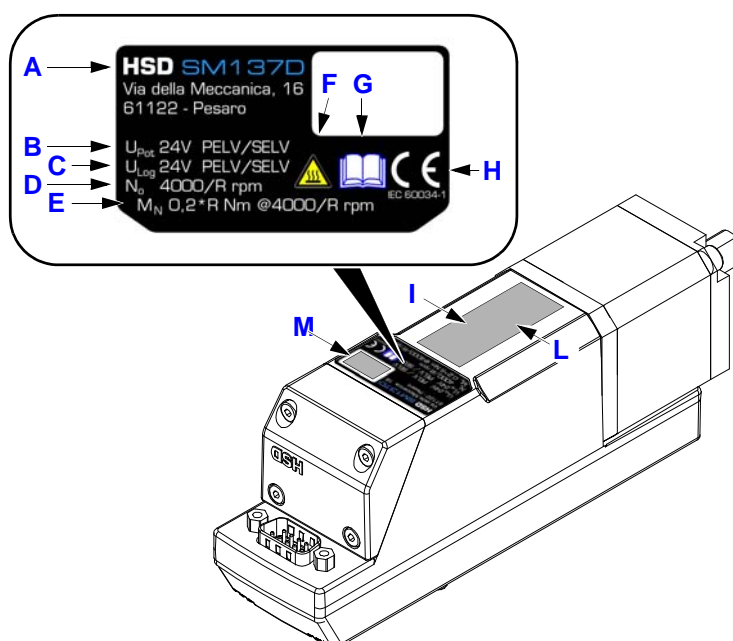
### 3.3 Identification of the manufacturer and the product

The name and address of the manufacturer are:

HSD S.p.A.  
*main headquarters:* Via Pesaro, 10A - 61012 Gradara (PU) ITALY  
*registered offices:* Via della Meccanica, 16 - 61122 Pesaro ITALY

The manufacturer and the product are identified on the plate fixed to the motor body. The plate contains the information listed below.

- A** - manufacturer's logo and address; product name
- B** - rated power supply voltage
- C** - logic supply voltage
- D** - nominal speed
- E** - nominal torque
- F** - danger sign - hot surfaces
- G** - sign - obligation to read instructions
- H** - EC mark
- I** - serial number
- L** - product code and revision number (GDT)
- M** - firmware code and revision number (GDT)



### 3.4 Safety and information signs

For the safety and information signs, refer to paragraph 2.5 “Signs fixed to the product”.



## 4 Transport, packing, unpacking, storage

### 4.1 Warnings

- The installation and assembly operations must always be carried out by specialised technicians only.
- All the lifting and handling operations of the product and its parts must be performed with extreme care, avoiding impacts that could compromise its operation or damage any coated parts.

### 4.2 Overall dimensions and weight of the packed product

Each single product may be lifted and transported manually. The linear dimensions of the packed product are indicated on the documents accompanying it.

## 4.3 Transport and packing

The product can be shipped using various forms of transport (road, rail, sea, air), and the method is usually agreed with the customer at the time of purchase.

The product is shipped protected by a VCI (Volatile Corrosion Inhibitor) plastic cover and knock-proof material, and packed in a cardboard box.

In some cases the product can be packed as requested by the customer.

The following environmental values must be respected during transportation:

<b>Transport temperature</b>	<b>-25°C to +70°C (-13°F to +158°F)</b>
<b>Non-condensing relative humidity</b>	<b>max 95% at 40°C</b>

## 4.4 Unpacking



**Verify the integrity of the packing before opening.**

Open the box and remove the product manually, holding it by the motor or body.



**Do not lift the product by its wires.**



All the packaging scrap is to be disposed of according to the material and in compliance with current regulations in the country of use.

## 4.5 Storage

If the product is to be placed in storage, it must be stored with its original packing.

The packed product must be stored in a place that is protected from bad weather (rain, water, humidity).

The following environmental values must be respected during storage:

<b>Storage temperature</b>	<b>-25°C to +55°C (-13°F to +131°F)</b>
<b>Relative humidity</b>	<b>5% - 95%</b>

# 5 Installation and commissioning

## 5.1 Preliminary installation checks

Before carrying out any operations, MAKE SURE:

- that no parts of the product have been damaged by impact or any other cause during transport and/or handling
- that the connectors are undamaged



**Do not lift the equipment by its electric cables.**

## 5.2 Preparing the factory services

It is the responsibility of the customer to ensure the availability of the factory services (e.g. electricity supply, compressed air supply, etc.).

The electricity supply line must have a sufficient power rating. The connection to the mains electricity supply must be carried out by a qualified electrician.



**The customer is responsible for the electricity supply to the product, as far as the connectors.**

**The user must use a supply connector with a connection to an efficient equipotential protection circuit.**

**The earthing system must comply with current standards in the country of installation and must be checked regularly by qualified personnel.**



**The product must not be installed in places where there is a risk of explosion.**

Installation must be performed in a sufficiently lit area.

## 5.3 Work environmental requisites

- Temperature: from +5 to +40°C (41÷104°F).
- Maximum relative humidity (without condensation): 5÷85%.
- Maximum altitude: 2000 metres a.s.l. (unless agreed otherwise with the customer).

Standard CEI EN 61800-2.

## 5.4 Mechanical connections

The load-bearing structure, on which the product is to be mounted, must be sufficiently rigid to support the weight and type of machining to be carried out.

### Fixing

To fix the servo-motor on the user machine, use the 2 free holes on the clamping flange (ref. [D](#), page [24](#)). M6 or M5 screws can be used.

Use 2 M6 screws, minimum strength class 8.8.

Choose a screw length that ensures they are inserted in the flange by at least 8mm but not more than 10mm.

Alternatively, use two M5 galvanised screws (minimum strength class 8.8).

Choose a screw length that ensures they are inserted in the flange by at least 20mm but not more than 22mm, and are screwed in by at least 8mm.

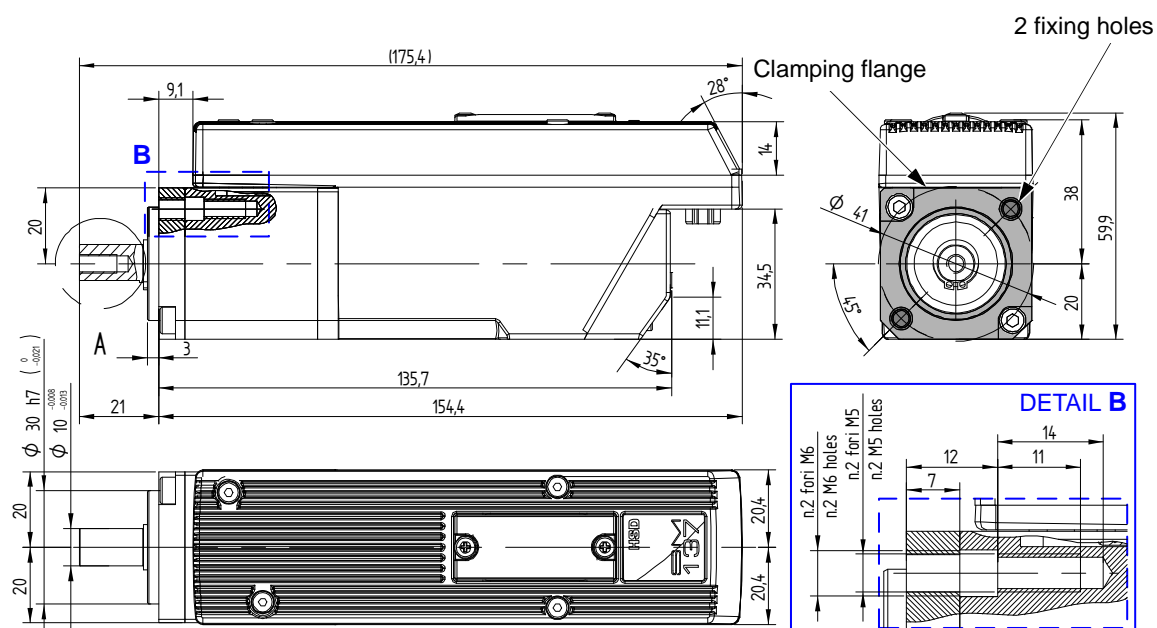


**To ensure the necessary electrical conductivity, use galvanised screws only.**

### Tightening torque of the screws

- M6 screws = 9 Nm
- M5 screws = 6 Nm

### Overall dimensions





More information about fixing can be found in appendix [A](#) "Technical characteristics".

## 5.5 Electrical connections

Refer to the product rating plate for the installed electric power. See paragraph [3.3 "Identification of the manufacturer and the product"](#).

 **The electrical connections must be made by specialised, suitably trained personnel.**

 **Before making the electrical connections, make sure the electricity supply has been disconnected so there is no voltage present.**

 **The device must always be protected from the dangers caused by indirect contact and overload or overcurrent. Prepare adequate protections during installation, referring to the technical characteristics of the product.**

The device needs two different power supplies provided by two different units:


- a logic supply of a suitable power level, protected by a fuse with a nominal value no higher than 4A;
- a power supply protected by a delayed fuse with a nominal value no higher than 10A.

For more information about the technical product data, refer to appendix [A "Technical characteristics"](#).

When running the device the first power that must be supplied is the logical power and then the power supply. When switching the device off, first disconnect it from the power supply and then from the logical power.

 **The user must provide suitable safety insulation between cables and SELV or PELV type components and all the other components.**

 **Do not perform maintenance operations or insert/remove modules or connectors while the system is powered.**

 **A connection error (supply, Fieldbus) could cause immediate, irreversible damage to the main device and the others connected to it.**

## General regulations for using the electric connectors

Remember that the connector cannot sustain heavy twisting or axial strain, so it must be handled with care and without using tools.

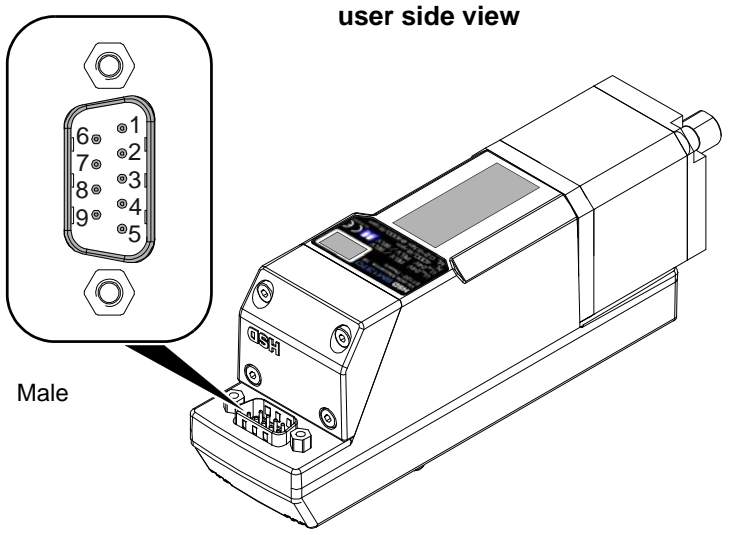
Before inserting/removing the connectors, make sure you can see them clearly so as to avoid incorrect movements that could cause twisting or pressure that would damage the connector and the relative support feet.

When inserting:

- examine the connector carefully to understand the exact position of the pins;
- gently push the connector into its socket, carefully pushing it in all the way;
- after checking that the two connectors are perfectly coupled, use one hand to hold the inserted connector still while you tighten the fixing screws with your other hand.

## Electric connector

PIN	Signal
1	GND Logic
2	FB- CAN_L
3	GND Shield
4	GND Power
5	GND Power
6	V <sub>DC</sub> Logic
7	FB+ CAN_H
8	V <sub>DC</sub> Power
9	V <sub>DC</sub> Power



**i** The motor is put in "safety mode" during switch-on and switch-off, and if there is a communication failure with the PLC. Safety status means that the shaft is not moving. A special software command must be used to restore normal operation.

Refer to the user manual "Technical characteristics and E-NETx connection" (for the E-NETx communication protocol) issued by HSD S.p.A. to correctly use the cable.



## 5.6 Fieldbus interfaces

The device supports three possible communication protocols: E-NETx, CANopen, RS485.

### 5.6.1 E-NETx

Protocol type	E-NETx
Transmission speed	3 Mbit/sec
Max. distance from master	100 m
Number of addresses that can be selected	32

With regards:

- the connection mode
- the max. number of the units that can be connected
- the cable type to be used
- the need to use a hub

refer to the user manual "Technical characteristics and E-NETx connection" (for the E-NETx communication protocol) issued by HSD S.p.A.

### 5.6.2 CANopen

Protocol type	CANopen
Transmission speed (bit/s)	125K - 250K - 500K - 800K - 1000K
Max. distance from master	100 m
Number of addresses that can be selected	31

With regards:

- the use of the module
- the CiA DS 301 and DSP 402 specifications
- the instructions for interrogating the module to discover the firmware version installed

refer to the "SM137D CANopen" User Manual (Synchronous motor with built-in drive for the CANopen Communication Protocol), distributed by HSD S.p.A..

### 5.6.3 RS-485

Protocol type	RS-485
Transmission speed	9600 bit/s 38400 bit/s
Max. distance from master	100 m
Number of addresses that can be selected	32

With regards:

- the use of the module
- the communication protocol specifications
- the instructions for interrogating the module to discover the firmware version installed

refer to the “RS485 Communication Protocol” User Manual (for the RS-485 Communication Protocol), distributed by HSD S.p.A..

## 5.7 Regenerative effect on DC BUS (dynamo effect)

When the motor is switched off, the motor shaft may be moved externally. This will generate energy in the motor.

If the motor is used in this way, remind that a reducer will multiply the motor shaft speed.

The same effect is reached during the motor braking phases. The generated energy depends on: inertia mass on the slow shaft, the number of motors in braking phases on the same line, the cables length, etc....



**The motor shaft max tolerable speed (without reducer) under a dynamo effect is 5000 rpm. A faster speed could damage and ruin the motor.**

## 5.8 Configuration of the dip-switch

Servo motor SM137D is equipped with two dip-switches, respectively called DSW1 and DSW2.

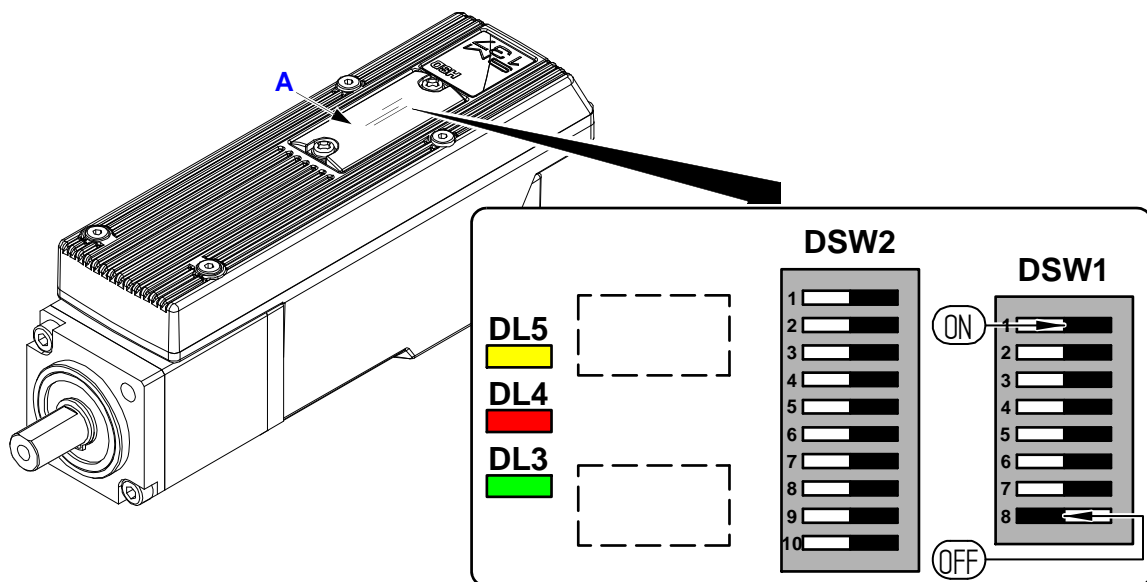
The dip-switches are used to set the Fieldbus address, operating modes, transmission speed and line termination. In addition, they set the communication protocol.


The servo motor communication protocol can be selected using dip-switch DSW1.

The configuration of the dip-switches changes according to the communication protocol used.

To access the dip-switch, release the screws and remove the plastic window **A**.

 Only change the configuration of the dip-switches when the board is not powered up.



 **Once the configuration has been made, make sure the plastic window protecting the dip-switches is closed properly, with the two screws tightened. Don't over-tighten the screws, as you may damage the protective plastic window.**

### 5.8.1 Configuration following a replacement

If you need to replace a servo-motor of a version no longer produced, version SM137D can be made compatible with the previous version by configuring dip-switch DSW2 in the appropriate way.

Refer to the relative comparative paragraph [“Compatibility for replacements”](#) in appendix C [“Spare parts”](#) for the codes of products that are compatible in the various versions and protocols.

To quickly and correctly configure the servo-motor replacing a compatible one, refer to the relevant paragraph [“Dip-switch configuration for replacements”](#) in the appendix C [“Spare parts”](#), where you can find the settings that need to be made for each protocol.

## 5.8.2 E-NETx configuration

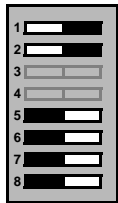
Access the dip-switches of the electronic device tab, as explained on page 35.  
The servo motor communication protocol can be selected using dip-switch DSW1.


 Only change the configuration of the dip-switches when the board is not powered up.

### Dip-switch DSW1

To set the E-NETx protocol on the servo-motor, configure the DSW1 switches as shown below. Switches 3 and 4 are used to terminate the line, which is necessary to avoid signal flip phenomena on the line.

DSW1								
Switch	1	2	3	4	5	6	7	8
Position	On	On	T	T	Off	Off	Off	Off
T = Fieldbus line termination: set Off if the Fieldbus continue, set On at the Bus termination.								



 **If switches 3 and 4 are set differently (for example 3 ON and 4 OFF), the module may not work correctly.**

Refer to the user manual "Technical characteristics and E-NETx connection" (for the E-NETx communication protocol) issued by HSD S.p.A. to have more information on how to end the line correctly.

### Dip-switch DSW2

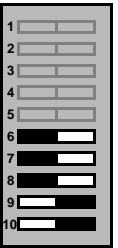
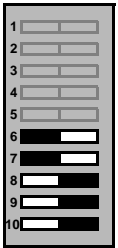
The five addressing switches (A0-A4) are used to set the address on the servo-motor Fieldbus. To set the servo-motor address, enable the switches in such a way that the binary number corresponds to the required address. Bear in mind that the least important address bit is A0, and the most important is A4.

Switches 6 and 7 must be set to OFF.

Switches 8, 9 and 10 are used to select the servo-motor operating mode and its compatibility with previous versions, in the event of a replacement.

To do this, refer also to paragraph 5.8.1 "Configuration following a replacement".

DSW2										
Switch	1	2	3	4	5	6	7	8	9	10
SM 137 D standard mode <sup>d)</sup>	A0	A1	A2	A3	A4	Off	Off	Off	On	On
Mode compatible with SM 137 C <sup>c)</sup>	A0	A1	A2	A3	A4	Off	Off	On	On	On

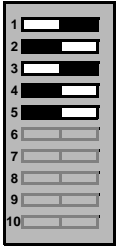



## Setting the E-NETx address

Switches 1 - 5 (DSW2) set the servo-motor E-Net address. In particular, switch 5 corresponds to the most significant address bit (A4), and switch 1 corresponds to the least significant address bit (A0).

DSW2										
Switch	1	2	3	4	5	6	7	8	9	10
Address	A0	A1	A2	A3	A4	-	-	-	-	-

DSW2



Decimal: 05  
←  
like the example in the table below

All 32 combinations between 0 and 31 are allowed.

The table below is given as an example with some address settings.

### Examples:

ADDRESS		DIP-SWITCH SETTING (from 5 to 1 DSW2)				
Decimal	Binary	A4	A3	A2	A1	A0
01	00001	OFF	OFF	OFF	OFF	<b>ON</b>
→ 05	00101	OFF	OFF	<b>ON</b>	OFF	<b>ON</b>
10	01010	OFF	<b>ON</b>	OFF	<b>ON</b>	OFF
21	10101	<b>ON</b>	OFF	<b>ON</b>	OFF	<b>ON</b>



**Two devices on the same Fieldbus line cannot have the same address.**

### 5.8.3 CANopen configuration

Access the dip-switches of the electronic device tab, as explained on page 35.

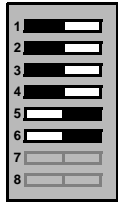
The servo motor communication protocol can be selected using dip-switch DSW1.


 Only change the configuration of the dip-switches when the board is not powered up.

#### *Dip-switch DSW1*

To set the CANopen protocol on the servo-motor, configure the DSW1 switches as shown below. Switches 7 and 8 are used to terminate the line, which are necessary to avoid signal flip phenomena on the line.

DSW1								
Switch	1	2	3	4	5	6	7	8
Position	Off	Off	Off	Off	On	On	T	T
T = Fieldbus line termination: set Off if the Fieldbus continue, set On at the Bus termination.								



 **If switches 7 and 8 are set differently (for example 7 ON and 8 OFF), the module may not work correctly.**

#### *Dip-switch DSW2*

Using dip-switch DSW2, it is possible to:

- Set the node address;
- Select standard or SM137C compatible operating mode;
- Select one of the following additional functions:
  - Bit-rate value setting;
  - Set the high node address bits;
  - Restore default settings.

## CANopen node address setting

Switches 1 to 5 (DSW2) set the servo-motor CANopen node address; in particular switch n°5 corresponds to the most significant address bit A4, and switch n°1 corresponds to the least significant address bit A0.

DSW2										
Switch	1	2	3	4	5	6	7	8	9	10
Address	A0	A1	A2	A3	A4	-	-	-	-	-

DSW2

Decimal: 05  
←  
like the example in the table below

All 31 combinations between 1 and 31 are allowed.

Should it be necessary to set a node address higher than 31 (bits A5 and A6), please refer to paragraph [“High node address bit settings”](#) on page 43.

The table below is given as an example with some address settings.

### Examples:

ADDRESS		DIP-SWITCH SETTING (from 5 to 1 DSW2)				
Decimal	Binary	A4	A3	A2	A1	A0
01	00001	OFF	OFF	OFF	OFF	<b>ON</b>
→ 05	00101	OFF	OFF	<b>ON</b>	OFF	<b>ON</b>
10	01010	OFF	<b>ON</b>	OFF	<b>ON</b>	OFF
21	10101	<b>ON</b>	OFF	<b>ON</b>	OFF	<b>ON</b>



**Two devices on the same Fieldbus line cannot have the same address.**

## Standard or compatible operating mode

Servo-motor SM137D has a standard operating mode and one that is compatible with the previous version SM137C.

Switches 7, 8, 9 and 10 are used to select the servo-motor operating mode and its compatibility with previous versions, in the event of a replacement.

To do this, refer also to paragraph 5.8.1 "Configuration following a replacement".

DSW2											d)	c)
Switch	1	2	3	4	5	6	7	8	9	10		
<b>SM 137 D standard mode</b> d)	-	-	-	-	-	Off	Off	Off	<b>On</b>	Off		
<b>Mode compatible with SM 137 C</b> c)	-	-	-	-	-	Off	Off	<b>On</b>	<b>On</b>	Off		

Firmware version GDT 8 or higher is required for proper operation in SM137D standard mode. Please consult the product rating plate to find the firmware code and its revision index (GDT). See paragraph 3.3 "Identification of the manufacturer and the product".



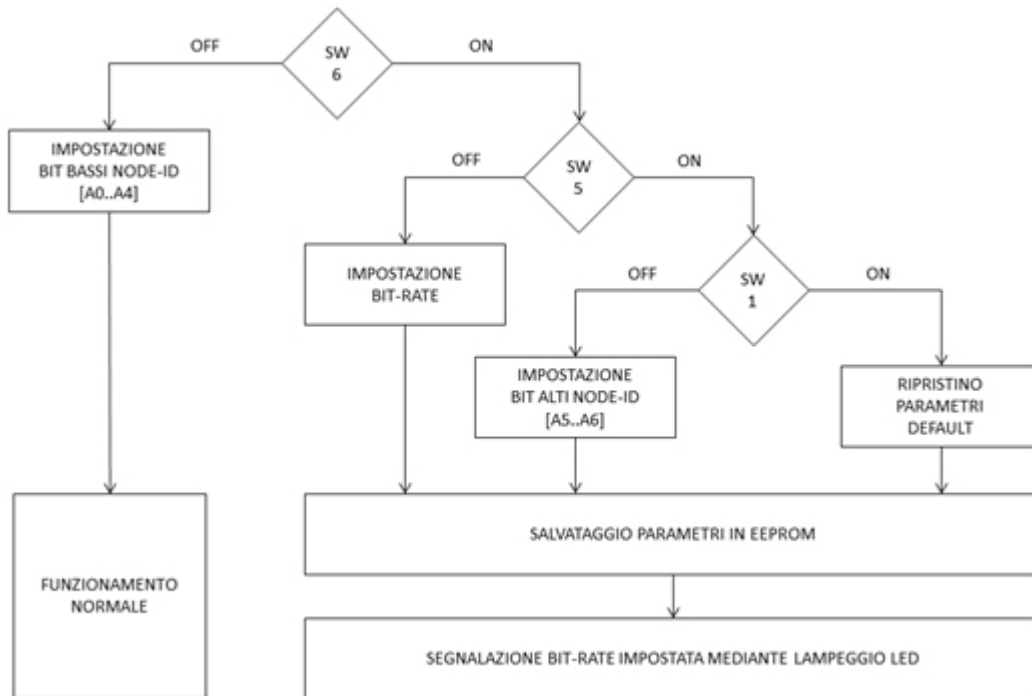
**Full operation in standard mode is guaranteed with version GDT 8 and above. If the firmware has a revision index GDT lower than 8, the module may not function properly.**



## Additional functions

Setting switch 6 On makes it possible to activate a set of additional functions like setting the bit-rate value, setting the node address high bits, or resetting the default parameters.

On the other hand, if switch 6 is Off, switches 1 to 5 set the node address low bits and the servo-motor continues to operate as normal.



Activation of the additional functions is indicated by the green led (DL3) lighting up for 2 seconds, then switching off for 2 seconds.

In that case, once the additional function has been carried out, the servo-motor will update the corresponding parameters in EEPROM, after which it will signal the bit-rate value set, by making the green led flash accordingly for an indefinite time. To do this, refer also to paragraph [5.9.1 "Meaning of the green led in the CANopen version"](#).

In case of error, the event will be signalled with rapid flashing of the green LED.

## Transmission speed setting (bit-rate)

The servo-motor is supplied with an initial bit-rate value of 500 Kbit/s.

If the value is not aligned with the one on the numerical control, it is necessary to follow the bit-rate value setting procedure described below.

To set the required bit-rate value (DSW2), it is necessary to start the servo-motor with switch 6 On, switch 5 Off and switches 1 to 4 set according to the bit-rate value required, as shown in the table below.

Dip-switch (DSW2)						Bit-rate value	Flash* to confirm (green led DL3)
6	5	4	3	2	1		
<b>On</b>	Off	Off	Off	Off	<b>On</b>	1 Mbit/s	1
<b>On</b>	Off	Off	Off	<b>On</b>	Off	800 Kbit/s	2
<b>On</b>	Off	Off	Off	<b>On</b>	<b>On</b>	500 Kbit/s	3
<b>On</b>	Off	Off	<b>On</b>	Off	Off	250 Kbit/s	4
<b>On</b>	Off	Off	<b>On</b>	Off	<b>On</b>	125 Kbit/s	5

\* The LED flashes a certain number of times, followed by a pause before the "N" flashes are repeated.

Immediately after switch-on, the green servo-motor LED lights up for about 1 second. After this, if the required bit-rate value has been successfully saved to the flash memory, it will start to flash periodically with a number of blinks based on the bit-rate that has been selected.

If the dip-switch configuration is not one of those envisaged, the bit-rate value will remain as before. If there are flash storage problems, the green LED will begin a 4-second flashing sequence (2 seconds ON and 2 seconds OFF).

At the end of the procedure the servo-motor must be turned off and the dip-switch configuration restored.

## High node address bit settings

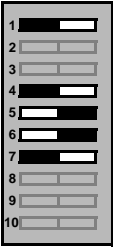
Servo-motor SM137D enables you to set an address between 1 and 127:

$$\text{Node-ID} = (A0 * 1) + (A1 * 2) + (A2 * 4) + (A3 * 8) + (A4 * 16) + (A5 * 32) + (A6 * 64)$$

However, the range of addresses that can be set is usually limited to the range [1...31], which corresponds to the bit address [A0...A4], since only switches 1 to 5 are available to set the address.

In order to also set address bits A5 and A6, you must start the device with switch 5 and 6 On, switch 1 Off and switches 2 and 3 set according to the desired address, as shown in the table below.

DSW2										
Switch	1	2	3	4	5	6	7	8	9	10
Position	Off	A5	A6	X	On	On	-	-	-	-
A5 and A6 = high bits of the node number										



Switch on the servo-motor and wait until the operation has been completed. The green LED will flash with the code shown in the paragraph [“Transmission speed setting \(bit-rate\)”](#) on page 42, indicating storage of the two high bits.

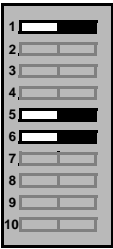
At the end of the procedure the servo-motor must be turned off and the dip-switch configuration restored.

## Resetting the default parameters

To restore all the factory settings, including the bit-rate value and the two high bits in the address, with the power supply to the servo-motor cut, set switches 1, 5 and 6 to On (DSW2).

Connect the logic supply. The green LED will flash with the code shown in the paragraph [“Transmission speed setting \(bit-rate\)”](#) on page 42, indicating that the default settings have been restored.

DSW2										
Switch	1	2	3	4	5	6	7	8	9	10
Position	On	X	X	X	On	On	-	-	-	-



At the end of the procedure the servo-motor must be turned off and the dip-switch configuration restored.

## 5.8.4 RS-485 configuration

Access the dip-switches of the electronic device tab, as explained on page 35.

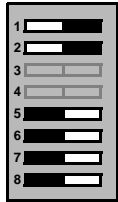
The servo motor communication protocol can be selected using dip-switch DSW1.


 Only change the configuration of the dip-switches when the board is not powered up.

### Dip-switch DSW1

To set the RS-485 protocol on the servo-motor, configure the DSW1 switches as shown below. Switches 3 and 4 are used to terminate the line, which is necessary to avoid signal flip phenomena on the line.

DSW1								
Switch	1	2	3	4	5	6	7	8
Position	On	On	T	T	Off	Off	Off	Off
T = Fieldbus line termination: set Off if the Fieldbus continue, set On at the Bus termination.								



 If switches 3 and 4 are set differently (for example 3 ON and 4 OFF), the module may not work correctly.

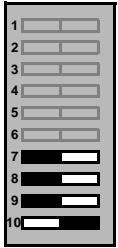
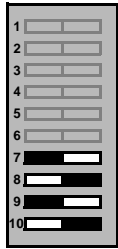
### Dip-switch DSW2

The five addressing switches (A0-A4) are used to set the address on the servo-motor Fieldbus. To set the servo-motor address, enable the switches in such a way that the binary number corresponds to the required address. Bear in mind that the least important address bit is A0, and the most important is A4.

Switch 6 is used to set the communication speed which, in the case of the RS-485 protocol, can be set at 38400 bit/s (ON) or 9600 bit/s (OFF).

Switches 7, 8, 9 and 10 are used to select the servo-motor operating mode and its compatibility with previous versions, in the event of a replacement.

To do this, refer also to paragraph 5.8.1 "Configuration following a replacement".

DSW2											d)	c)
Switch	1	2	3	4	5	6	7	8	9	10		
SM 137 D standard mode	A0	A1	A2	A3	A4	bit-rate*	Off	Off	Off	On		
Mode compatible with SM 137 C	A0	A1	A2	A3	A4	bit-rate*	Off	On	Off	On		

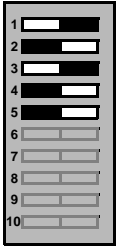
\* Rapid setting of transmission protocol RS-485: ON = 38400 bit/s, OFF = 9600 bit/s.

## Setting the RS-485 address

Switches 1 - 5 (DSW2) set the servo-motor RS-485 address. In particular, switch 5 corresponds to the most significant address bit (A4), and switch 1 corresponds to the least significant address bit (A0).

DSW2										
Switch	1	2	3	4	5	6	7	8	9	10
Address	A0	A1	A2	A3	A4	-	-	-	-	-

DSW2



Decimal: 05  
←  
like the example in the table below

All 32 combinations between 0 and 31 are allowed.

The table below is given as an example with some address settings.

### Examples:

ADDRESS		DIP-SWITCH SETTING (from 5 to 1 DSW2)				
Decimal	Binary	A4	A3	A2	A1	A0
01	00001	OFF	OFF	OFF	OFF	<b>ON</b>
→ 05	00101	OFF	OFF	<b>ON</b>	OFF	<b>ON</b>
10	01010	OFF	<b>ON</b>	OFF	<b>ON</b>	OFF
21	10101	<b>ON</b>	OFF	<b>ON</b>	OFF	<b>ON</b>



**Two devices on the same Fieldbus line cannot have the same address.**

## 5.9 Diagnostics

The following table shows the LED diagnostics displayed through the plastic dip-switch access window (ref. [A](#), page 35).

LED	ACTIVITY	MEANING	LED LAYOUT
DL3	READY green led	Indicates the Fieldbus status.  E-Netx: when active, indicates that the drive is communicating on Fieldbus.  CANopen: refer to specification CiA DS 303-3.  RS-485: when flashing, indicates that the drive is communicating on Fieldbus.	<p>The diagram shows three LEDs labeled DL5 (yellow), DL4 (red), and DL3 (green) arranged vertically. To their right is a dip-switch labeled DSW2 with 10 positions, numbered 1 to 10. Dashed boxes indicate the relative positions of the LEDs and the dip-switch.</p>
DL4	Red LOGIC LED	If it is ON, the logical power is present in the drive.	
DL5	Yellow POWER LED	When ON, indicates that power is being supplied to the drive.	

The drive makes a lot of messages available to the CNC (by means of error codes). These messages can be managed and interpreted by the machine. For further information on CNC diagnostics, refer to the User Manual “Diagnostics and Parameterisation” (for Smart Motors and Drives) distributed by HSD S.p.A..

### 5.9.1 Meaning of the green led in the CANopen version

In standard mode, the green LED usually indicates the NMT status with regard to CANopen communication. For this purpose, see paragraph “[NMT state machine](#)” in the “SM137D CANopen” communication protocol user manual (Synchronous motor with built-in drive for the CANopen Communication Protocol), distributed by HSD S.p.A..

It is also used to errors detected on start-up.

Flashing	Description
Off	Init
Flickering	Pre-operational + Err
Blinking	Pre-operational
Single flash	Stopped
On	Operational

On the other hand, if an additional function has been selected (switch 6 On), the green led indicates the bit-rate value that is currently set (see paragraph “[Transmission speed setting \(bit-rate\)](#)” on page 42).

It is also used to signal an error by means of a rapid flashing light.

## 5.10 General checks after installation

- Verify the correct wiring before start-up.
- Check that the plastic dipswitch access window is properly closed. If the window is not present, the equipment IP degree gets compromised.

## 5.11 Running-in

The products, before being packaged, undergo an automatic running-in cycle to guarantee the correct distribution of the lubricant in the races of the bearings. The running-in cycle also includes a detailed check of all the control and signalling devices through the simulation of various machining cycles on the test-bench. The customer must not launch any additional running-in procedure.

## 5.12 Environmental conditions

The manufacturer has inspected and tested its products under standard environmental conditions (refer to paragraph [A.1 "General data"](#) for a detailed description of the environmental values).

Contact HSD S.p.A. for information about the possibility of applications for special environments.





Maintenance



# 6 Maintenance

The product does not require any particular routine maintenance.

In case of breakages or failures, contact the manufacturer for technical assistance.



**It is strictly forbidden to open the product.**

## 6.1 General cleaning

A periodic cleaning of the product, contributes to maintaining it efficient over time.

Use a vacuum cleaner to remove any wood chips, and if necessary use a compressor to remove fine dust, making sure you stand at a sufficient distance. To prevent the floor from becoming slippery, waste chips must be removed using a vacuum cleaner or brush.



# Appendices



# A Technical characteristics

The following tables show the technical product data.

## A.1 General data

<b>ELECTRICAL CHARACTERISTICS</b>	<b>unit</b>	<b>Value</b>
<b>Logic power</b>		
Logic supply voltage (Logic V DC) Safety supply source $\pm 15\%$ (SELV or PELV)	$V_{DC}$	24
Max. current absorbed by the logic (Logic V DC)	mA	100
<b>Power supply*</b>		
Power supply voltage (Power V DC) Safety supply source $\pm 10\%$ (SELV or PELV)	$V_{DC}$	24
Max. power absorbed by the power		430
Power absorbed by the power (S1** 4000 rpm)	W	135
Power absorbed by the power (S1**0 rpm)		30
Number of poles	no.	8
Rated torque	Nm	0.25
Rated current	A	5.8
Maximum current (SM137D mode)	A	15,55
Maximum current (mode compatible with SM137C and SM137B)	A	11.3
Nominal power ( $T_a=25^\circ\text{C}$ )	W	100
Nominal power ( $T_a=40^\circ\text{C}$ )	W	75
Moment of inertia	$\text{kg}\cdot\text{cm}^2$	0,032324
Voltage constant at $T_a=25^\circ$	V/krpm	2,95
Efficiency	%	70
Thermal insulation class (IEC 60034-1)		F

\* The sizes are measured on the motor shaft at an ambient temperature of  $25^\circ\text{C}$ .

\*\* Refer to the chart in ["S1 continuous service"](#).

## A Technical characteristics

MECHANICAL DATA		unit	Value
Rated speed		rpm	4000
Maximum speed		rpm	5000
Weight		kg	0.92
Overall dimensions (L x H x P)		mm	154.4* x 59.9 x 40.8
Protrusion of shaft with flat or key model (in relation to the support surface)		mm	21
Protrusion of smooth shaft Ø8 (in relation to the support surface)		mm	30,3
Outlet shaft diameter (flat/key)		mm	10
Outlet shaft diameter (smooth Ø8)		mm	8
Protection rating			IP 54
Type of reducer	Epicycloidal reducer with 1 or 2 stages		
Overall reduction ratios**	1:6,25 / 1:8 / 1:25		

\* Without shaft protrusion and centring.

\*\* The reduction ratio is shown on the unit clamping flange.

CHARACTERISTICS OF THE REDUCERS	1:6,25	1:8	1:25
Number of stages	1	1	2
Reducer play (MAX) [Arcmin]	30'	30'	50'
Axial load* (MAX) [N]	250	250	250
Radial load** (MAX at 15mm from the stop) [N]	250	250	250
Radial load** (MAX at 2.5mm from the stop) [N]	500	500	500
For the product codes of each type of reduction ratio, refer to appendix C "Spare parts".			

\* Maximum axial load with reference to 4000/R rpm, with 10000-hour duration.

\*\* Maximum radial load with reference to 4000/R rpm, with 10000-hour duration.

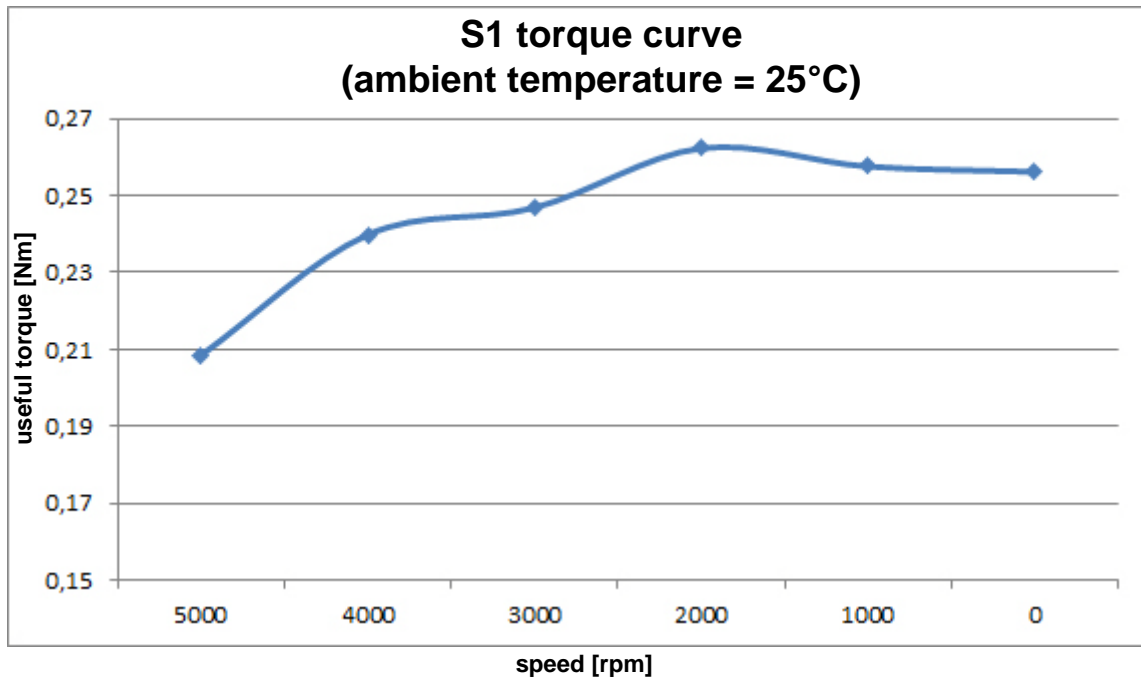
CONTROL METHODS	unit	Value
Built-in incremental encoder (SM137D mode)	counts/rotation	2000 (+ zero index)
Built-in incremental encoder (mode compatible with SM137C and SM137B)		800 (+ zero index)
Encoder impulses	impulses/ rotation	500 (+ zero index)
Feed-forward in position	%	0-100
Speed check interval	rpm	1:6.25   20-800
		1:8   15-625
		1:25   5-200
Feed-forward in speed	%	0-100



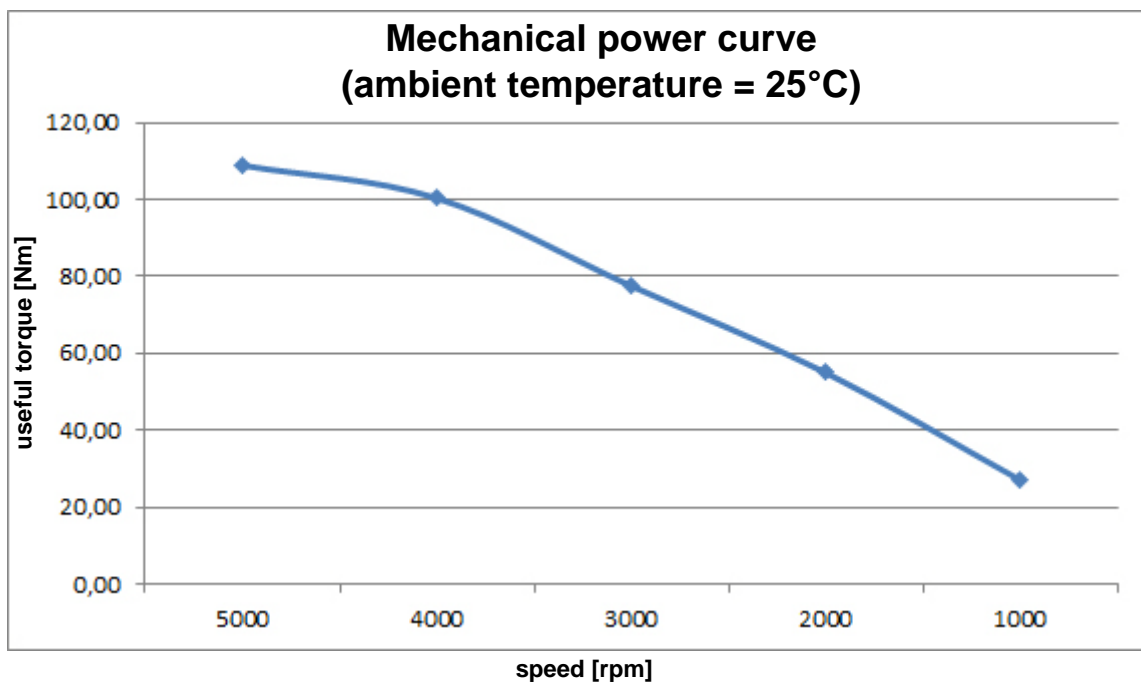
FIELDBUS INTERFACES	
Enet-X / CANopen / RS-485	See paragraph 5.6 "Fieldbus interfaces"

OPERATING ENVIRONMENT	unit	Value
Workplace temperature	°C (°F)	5 to 40 (41 to 104)
Storage temperature	°C (°F)	-25 to 55 (-13 to 131)
Transport temperature	°C (°F)	-25 to 70 (-13 to 158)
Relative workplace humidity (non-condensed) @ 5 to 40°C (41 to 104°F)	%	5-85
Relative storage humidity (non-condensed) @ -25 to 55°C (-13 to 131°F)	%	5-95
Relative transport humidity (non-condensed) @ 40°C (104°F)	%	95
Maximum workplace altitude (unless otherwise agreed)	m	2000
Storage maximum workplace altitude	A.S.L.	(6500ft)
EMC immunity area (CEI EN 61800-3)		Second environment

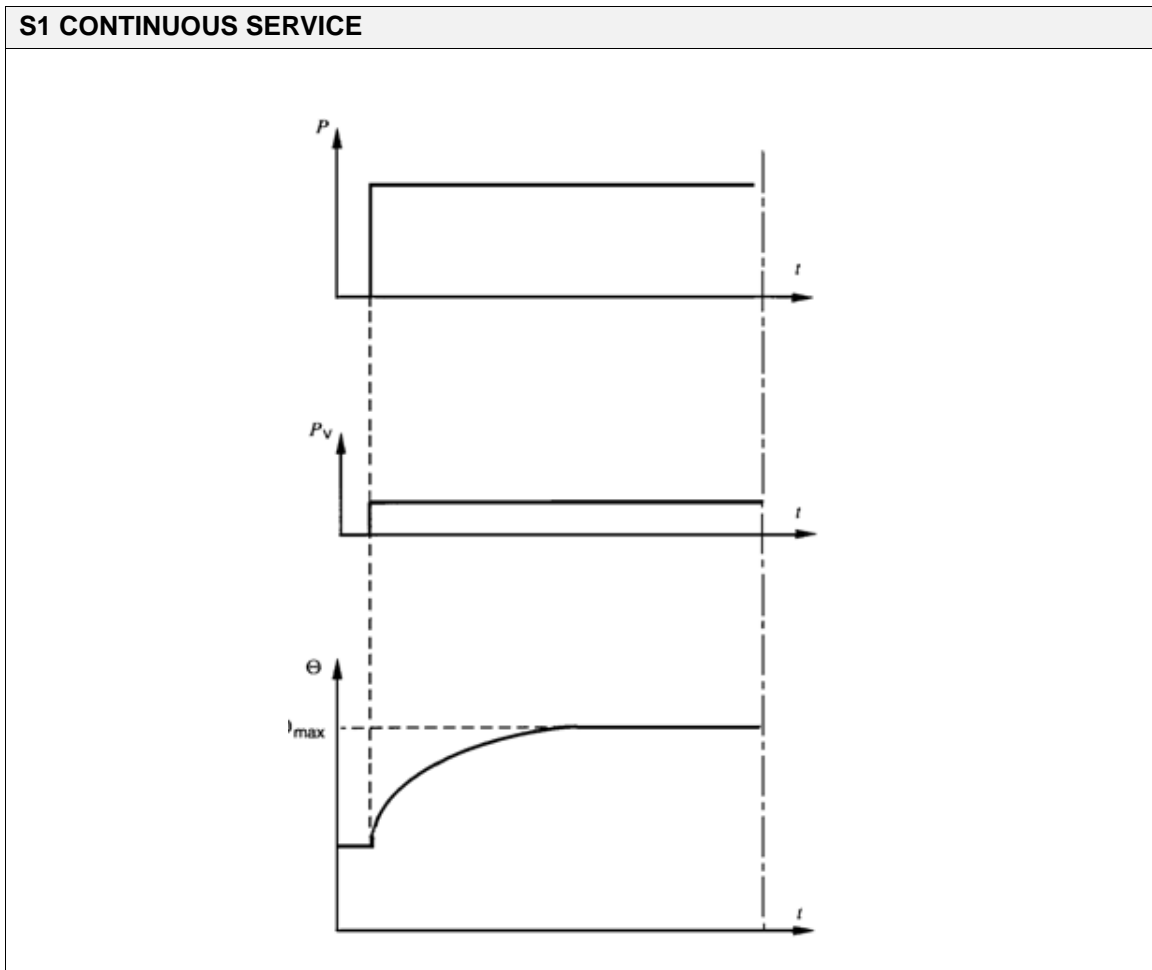
### SM 137 D torque curve



### SM 137 D mechanical power curve



## S1 continuous service



Key	
P	Loading
$P_v$	Electric leakage
$\Theta$	Temperature
$\Theta_{max}$	Maximum temperature reached
t	Time



# B Disposal

At the end of the device's life cycle, it is the user's responsibility to dispose of it in the correct manner.

First of all, clean the various parts and then separate them into mechanical and electrical components.

The different materials, such as electric motors (copper windings), metal components, plastic materials, etc. must be sorted and separated then disposed of in accordance with the laws applicable in the country of installation .

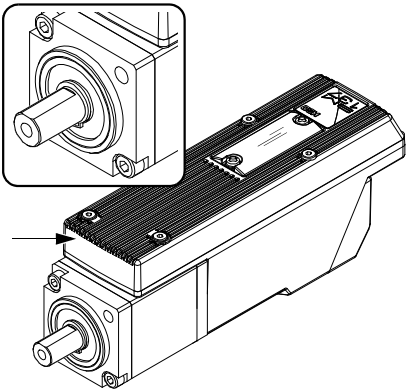
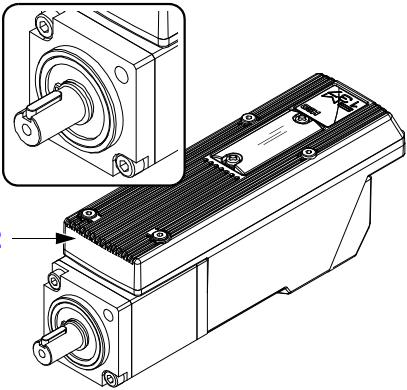
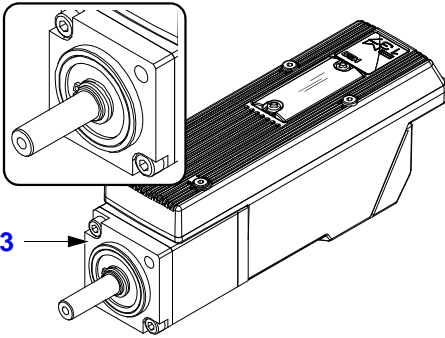


**Only carry out the operations described in this manual. Follow the instructions scrupulously and in the case of doubt, contact the Manufacturer's Assistance Service.**



# C Spare parts

The following is an illustration and description of its parts that can be replaced.  
Below, the compatibility table for replacing products that are no longer produced, and the relative configurations.

Parts	Ref.	Manufacturer code	Description
	1	H0102D0137D0	SMART MOTOR SM137D Shaft 10mm, flat, M5 – ratio 6.25
	1	H0102D0137D1	SMART MOTOR SM137D Shaft 10mm, flat, M5 – ratio 8
	1	H0102D0137D2	SMART MOTOR SM137D Shaft 10mm, flat, M5 – ratio 25
	2	H0102D0137D3	SMART MOTOR SM137D Shaft 10mm, key, M4 – ratio 6.25
	2	H0102D0137D4	SMART MOTOR SM137D Shaft 10mm, key, M4 – ratio 8
	2	H0102D0137D5	SMART MOTOR SM137D Shaft 10mm, key, M4 – ratio 25
	3	H0102D0137D6	SMART MOTOR SM137D Shaft 8mm – ratio 8
			

The manufacturer may update its products range without advance notice.

## Compatibility for replacements

The new D version of the SM137 servo-motor is purposely designed so that it can replace versions of the same product that are no longer produced, respecting the compatibility shown in the table.

SM137D		SM137C (codes that can be replaced with the new version)		
E-NETx, CANopen, RS-485		E-NETx	CANopen	RS-485
H0102D0137D0	→	H0102D137C0	H0102D137CP	-
H0102D0137D1	→	H0102D137C1	-	-
H0102D0137D2	→	H0102D137C2	-	-
H0102D0137D3	→	-	H0102D137C3	-
H0102D0137D4	→	H0102D137CA	H0102D137C4	H0102D137C7
H0102D0137D5	→	H0102D137CB	H0102D137C5	H0102D137C8
H0102D0137D6	→	H0102D137CC	-	-
-		H0102D137CK*	H0102D137CL*	-

\* Cannot be replaced with the new version.

## Dip-switch configuration for replacements

The compatible SM137D servo-motor (that replaces one of a previous version) must be configured as shown below.

SM137D dip-switch		E-NETx	CANopen*	RS-485
		compatible with SM137C	compatible with SM137C	compatible with SM137C
DSW1	1	ON	OFF	ON
	2	ON	OFF	ON
	3	Termination**	OFF	Termination**
	4	Termination**	OFF	Termination**
	5	OFF	ON	OFF
	6	OFF	ON	OFF
	7	OFF	Termination**	OFF
	8	OFF	Termination**	OFF
DSW2	1	A0***	A0***	A0***
	2	A1***	A1***	A1***
	3	A2***	A2***	A2***
	4	A3***	A3***	A3***
	5	A4***	A4***	A4***
	6	OFF	OFF	bit-rate***
	7	OFF	OFF	OFF
	8	ON	ON	ON
	9	ON	ON	OFF
	10	ON	OFF	ON

\* For this configuration the bit-rate value is the default, which is 500 Kbit/s. If this value is not in line with that of the NC, perform the [“Transmission speed setting \(bit-rate\)”](#) procedure described in paragraph 5.8.3 [“CANopen configuration”](#).

\*\* Copy the configuration of SM137C switches 7-8 to be replaced (valid for all protocol types).

\*\*\* Copy the configuration of SM137C dip-switches to be replaced.



# D Assistance service

## D.1 Customer service

The manufacturer has customer service points throughout the world. The entire structure forms a highly efficient, integrated network which the user can contact for any requirement, information, advice or news.

The service department employs technicians with a high level of knowledge and experience on the models manufactured, gained through special training in our factory, who are able to service machines on site.

The list of the manufacturer's Customer Service Authorised Centres can be seen below.

## **HSD** S.p.A.

registered office:

Via della Meccanica, 16

61122 PESARO (ITALY)

Loc. Chiusa di Ginestreto

factory headquarters:

Via Pesaro, 10A

61012 Gradara (PU), ITALY

Tel. (+39) 0541 979 001

Fax (+39) 0541 979 050

Service (+39) 0541 979 010

E-mail [supporthsd@hsd.it](mailto:supporthsd@hsd.it)

Web [www.hsd.it](http://www.hsd.it)

## **HSD Deutschland** GmbH

Brückenstrasse, 32

D-73037 Göppingen, Deutschland

Tel. +49(0) 7161 956660

Fax +49(0) 7161 9566610

E-mail [sales@hsddeutschland.de](mailto:sales@hsddeutschland.de)

Web [www.hsddeutschland.de](http://www.hsddeutschland.de)

## **HSD USA** Inc.

3764 SW, 30th Avenue  
33312 Fort Lauderdale, Florida USA  
Tel. ( +1) 954 587 1991  
Fax ( +1) 954 587 8338  
E-mail [sales@hsdusa.com](mailto:sales@hsdusa.com)  
Web [www.hsdusa.com](http://www.hsdusa.com)

## **HSD Mechatronic Shanghai** Co. Ltd.

1311 Jinhua road, Pudong  
200131 Shanghai, China  
Tel. ( +86) 21 5161 9991  
Fax ( +86) 21 5866 1237  
E-mail [sales@hsd-china.cn](mailto:sales@hsd-china.cn)  
Web [www.hsd-china.cn](http://www.hsd-china.cn)

## **HSD Mechatronics Korea** LLC

414 Tawontakra 2, 76 Dongsan-ro, Danwon-gu  
Ansan-si 15434, South Korea  
Tel. ( +82) 31 380 8161  
Fax ( +82) 303 3443 8161  
E-mail [sales@hsdkorea.kr](mailto:sales@hsdkorea.kr)  
Web [www.hsdkorea.kr](http://www.hsdkorea.kr)

# Analytical index

## C

CANopen, *33, 38*  
 CANopen address setting, *43*  
 CANopen configuration, *38*  
 characteristics of the reducers, *56*  
 clamping (see clamping flange)  
 clamping flange, *24*  
 configuration following a replacement, *35*  
 connections (see "connector" and "installation")  
 connections (see installation)  
 Connector, *24*  
 constructor (see "manufacturer")  
 control method, *56*  
 customer service, *65*

## D

dipswitch configuration, *35*  
 dip-switches, *24, 35*  
 disposal, *61*  
 documents supplied with the product, *12*  
     EC declaration of conformity, *13*  
 dynamo (see regenerative effect on bus DC)

## E

EC, *25*  
 EC declaration of conformity, *13*  
 EC mark, *25*  
 electric connectors, *32*  
 electrical characteristics, *55*  
 electrical connection, *31*  
     electric connectors, *32*  
     standard to use the electric connectors, *32*  
 electrical connections, *31*  
 E-NETx, *33, 36*  
 E-NETx configuration, *36*  
 environmental characteristics, *29*  
 environmental conditions, *47*

## F

factory  
     preparing, *29*  
 factory preparation, *29*

fieldbus (see "fieldbus interfaces")  
 fieldbus interfaces, *33, 57*  
     CANopen, *33*  
     E-NETx, *33*  
     RS-485, *34*  
 firmware revision (see "firmware revision number")  
 firmware revision number, *25*  
 fixing, *30, 51*

## G

GDT (see "firmware revision number")  
 GDT (see "product revision number")  
 general cleaning, *51*  
 general overview of the servo-motor, *24*  
 general post-installation checks, *47*  
 general product description  
     SM 137, *23*

## H

hot surfaces danger signs, *25*

## I

identification of the product, *14*  
 identification plates  
     identification plate of the manufacturer and of the product, *25*  
     safety and information signs, *19, 25*  
 installation  
     electric connectors, *32*  
     electrical connection, *31*  
     electrical connections, *31*  
     fixing, *30*  
     installation area requisites, *29*  
     mechanical connections, *30*  
     overall dimensions, *30*  
     preliminary checks, *29*  
     preparing the factory services, *29*  
     standard to use the electric connectors, *32*  
     tightening screws, *30*  
 installation and commissioning  
     CANopen address setting, *43*  
     CANopen configuration, *38*  
     configuration following a replacement, *35*  
     dipswitch configuration, *35*  
     E-NETx configuration, *36*  
     environmental conditions, *47*  
     fieldbus interfaces, *33*  
     general post-installation checks, *47*  
     led diagnostics, *46*  
     regenerative effect on bus DC, *34*  
     RS-485 configuration, *44*  
     running-in, *47*

- setting the E-NETx address, *37*
- setting the RS-485 address, *45*
- installation area
  - environmental characteristics, *29*
- installation environment maximum altitude, *29*
- installation environment relative humidity, *29*
- installation environment temperature, *29*

### L

- led diagnostics, *46*
- lifting, *28*
  - overall dimensions and weight of the packed product, *27*
  - procedure warnings, *27*
- logic power supply voltage, *25*

### M

- main parts of the servo-motor, *24*
- maintenance
  - checking the bolts and the screws, *51*
  - general cleaning, *51*
  - safety warnings, *17*
  - spare parts, *63*
- manufacturer, *14, 25*
  - logo, *25*
- manufacturer's address, *25*
- manufacturer's logo, *25*
- mechanical data, *56*
- motor, *24*
- motor shaft, *24*
- moving, *28*
  - overall dimensions and weight of the packed product, *27*
  - procedure warnings, *27*

### N

- nominal power supply voltage, *25*
- nominal speed, *25*

### O

- operating environment, *57*
- operating temperature, *57*
- orders and requests for information, *14*
- overall dimensions, *30, 56*
- overall dimensions of the packed product, *27*

### P

- packing, *28*
  - overall dimensions and weight of the packed product, *27*
  - storage, *28*

- preliminary information
  - documents supplied with the product, *12*
  - EC declaration of conformity, *13*
  - identification of the product and manufacturer, *14*
  - orders and requests for information, *14*
  - risks associated with the use of the product, *18*
  - scope of the manual, *17*
  - signs fixed to the product, *19*
  - symbols used in the manual, *12*
  - warranty, *15*
- product applications, *23*
- product code, *25*
- product revision (product revision number)
- product revision number, *25*

### R

- Rated torque, *25*
- read instructions sign, *25*
- reducers (see "characteristics of the reducers")
- reduction (see "reduction ratio")
- Reduction gear, *24*
- Reduction ratio, *24*
- regenerative effect on bus DC, *34*
- replacing
  - configuration following a replacement, *35*
- residual risks, *18*
- risks associated with the use of the product, *18*
  - Prohibitions and risks associated with improper handling and/or use, *18*
  - residual risks, *18*
- RS-485, *34, 44*
- RS-485 configuration, *44*
- running-in, *47*

### S

- S1 (see "technical characteristics")
- S1 continuous service (see "technical characteristics")
- safety, *17*
  - for installation and spaces, *30*
  - risks associated with the use of the product, *18*
  - safety and information signs, *25*
  - safety regulations, *17*
  - signs fixed to the product, *19*
  - warnings for maintenance, *17*
- safety and information signs, *19, 25*
- safety regulations, *17*
- screw tightening torque, *30*
- serial number, *25*
- service centres, *65*
- servo-motor
  - applications, *23*
  - CANopen address setting, *43*
  - CANopen configuration, *38*

- characteristics of the reducers, *56*
- clamping flange, *24*
- configuration following a replacement, *35*
- connector, *24*
- control method, *56*
- dipswitch configuration, *35*
- dip-switches, *24*
- electric connectors, *32*
- electronic drive, *24*
- E-NETx configuration, *36*
- environmental characteristics, *29*
- fieldbus interfaces, *33, 57*
- general overview and main parts, *24*
- led diagnostics, *46*
- main description and applications, *23*
- motor, *24*
- motor shaft, *24*
- overall dimensions and weight, *56*
- reducer, *24*
- reduction ratio, *24*
- regenerative effect on bus DC, *34*
- RS-485 configuration, *44*
- setting the E-NETx address, *37*
- setting the RS-485 address, *45*
- standard to use the electric connectors, *32*
- technical features, *55, 56, 57*
- working parameters, *55, 57*
- servo-motor's electronic drive, *24*
- setting the E-NETx address, *37*
- setting the RS-485 address, *45*
- shipping (see transport)
- signs
  - safety information, *19*
- SM 137
  - (see also servo-motor)
  - main description and applications, *23*
- smart motor
- spare parts, *63*
- standard to use the electric connectors, *32*
- storage, *28*
- storage temperature, *57*

## T

- technical data (see technical characteristics)
- technical features
  - general data, *55*
  - S1 continuous service, *59*
  - SM 137 D torque curve, *58*
- tightening screws, *30*
- torque (see "technical characteristics")
- torque curve (see "technical characteristics")
- transport, *28*
  - overall dimensions and weight, *27*

## U

- uninstalling (see disposal)
- unpacking, *28*
  - overall dimensions and weight of the packed product, *27*
  - procedure warnings, *27*

## W

- warnings
  - safety for maintenance, *17*
- warnings (see also safety regulations)
- warranty, *15*
- weight
  - weight, *56*
  - weight of the packed product, *27*
- workable materials, *23*
- working parameters, *55, 57*





# HSD NEL MONDO

## HSD WORLDWIDE



# HSD

More Value for Your Machine

[hsd.it](http://hsd.it)

[hsdusa.com](http://hsdusa.com)

[hsddeutschland.de](http://hsddeutschland.de)

[hsd-china.cn](http://hsd-china.cn)

[hsdkorea.kr](http://hsdkorea.kr)