Automation

Robohand FERGUSON

CAMCO

INSTALLATION MANUAL

HDE-SERIES INDEX DRIVES MODELS

HDE1200M INDEXER
HDE1200S SERVO

Contents

1 Identification

Product identification

Product identification

Manufacturer:	DE-STA-CO CAMCO PRODUCTS
Street:	1444 SOUTH WOLF ROAD
City:	WHEELING, ILLINOIS 60090 USA
Tel.:	+1-847-459-5200
Fax:	+1-847-459-3064
E-mail:	marketing@destaco.com;
Internet:	http://www.destaco.com
After-Sales Service address:	camco@destaco.com / europe@destaco.com
Machine designation:	INDEX DRIVE MODEL
Type designation:	HDE-SERIES
Serial No.:	SEE NAME PLATE
Year of construction:	2015
Product No.:	SEE NAME PLATE
P.O. No.:	
Order No.:	
Sales:	**DE-STA-CO Europe GmbH** Hiroshimastraße 2 61440 Oberursel Germany
Manufacturer:	**DE-STA-CO Camco Products** Industrial Motion Control, LLC 1444 South Wolf Road Wheeling, IL 60090 USA

Document identification

Version:	1.0
Creation date:	IV 2015
Last revision:	NA

Product Identification

Product:	Model No.:	HDE1200M HDE1200S
	Serial No.:	
	Year of construction:	2015

Sales:	**DE-STA-CO Europe GmbH** Hiroshimastraße 2 61440 Oberursel Germany	
Manufacturer:	**DE-STA-CO Camco Products** Industrial Motion Control, LLC 1444 South Wolf Road Wheeling, IL 60090 USA	

2.1 Justification for classification in accordance with the Machinery Directive

The products from the Automation division are divided into the following classes:

- Index drive models.

In accordance with the Machinery Directive 2006/42/EC, the above-mentioned products are classified as incomplete machines according to Article 2g). This results in the necessity to produce the technical documentation in accordance with Annex VII B and the declaration of incorporation in accordance with Annex II B.

Justification for classification as an incomplete machine:

- The machine as such does not fulfil a particular function.
- The pneumatic/hydraulic/electric control system is not included in the scope of supply.
- The machine is intended for incorporation into other machines or to be assembled with them.
- There are no elementary protection devices at the man-machine interface

2 Instructions for Use

Purpose of the document

Purpose of the document

The operating manual is intended to help the user familiarise himself with the machine and its intended application possibilities. The operating manual contains important information on the safe, proper and profitable operation of the machine. Observation of this information will help avoid hazards, reduce repair costs and standstill times and increase the reliability and service life of the machine.

Notes on precautionary measures to be taken by the machine owner:

- Employ only personnel with the necessary qualification for the work in hand to operate the machine.
- Define clear responsibilities and authorities for the operating and maintenance personnel.
- Supplement the operating manual with rules derived from the national occupational health and safety and environmental protection regulations (e.g. work organisation).
- Instruct the personnel to observe the operating manual and its additions, and check compliance from time to time. Have one copy of the operating manual available at the place of operation of the machine at all times!
- Operate the machine only when it is in a technically safe condition, and take measures to maintain this safety.

In addition to the operating manual, the binding accident prevention regulations applicable in the country of operation and at the place of work must also be observed. In addition, the acknowledged engineering rules for safe and proper working must be observed.

Target groups

Target groups

a) The **owner** as superordinate legal entity is responsible for the intended use of the machine and for the training and employment of the authorised persons. He lays down the binding competencies and authorities of the authorised persons for his company.

b) According to the latest Machinery Directive, the **operating personnel** are the persons responsible for installation, operation, set-up, maintenance, cleaning, repair or transport of machines.

c) A **specialist** is a person who thanks to his technical training, know-how and experience is able to assess the assigned duties and to recognise potential hazards. Furthermore, this person has know-how of the applicable regulations. Only qualified specialists or such persons considered by the owner to be capable are to be employed.

d) **Trained/instructed persons** are persons who have been instructed and possibly trained in the assigned duty and in the potential dangers associated with improper behaviour. The person has also been instructed about the necessary protective devices and safety measures. Persons undergoing training, instruction or familiarisation and persons undergoing general training may only work under the constant supervision of an experienced person.

Liability and warranty

Liability and warranty

All information and tips given in this operating manual are given to the best of our knowledge and belief and on the basis of our experience and findings to date. The original version of this operating manual was drawn up in English and was examined technically by us. The translation in the respective national/contract language was produced by an acknowledged translation agency.

This operating manual was compiled with the greatest care. Should you discover any gaps and/or errors, however, please inform us accordingly in writing. Your suggestions for improvements will help us in producing a user-friendly operating manual.

Reorders and copyright

Reorders and copyright

Further copies of this operating manual can be ordered from the address shown under "Identification" in chapter 1. Please note that further copies are subject to payment.

3 Product Safety

A basic precondition for the safe handling and trouble-free operation of this machine is thorough knowledge of the fundamental safety precautions.

Organisational measures

Keep the operating manual available at the place of operation of the machine and in a legible condition at all times!

a) Supplement the operating manual to include provisions to cover specific company aspects (e.g. supervisory and reporting obligations, work organisation, work processes, personnel employed, and fire alarm and firefighting possibilities, operation of fire extinguishers).

b) Supplement the operating manual to include binding local provisions on accident prevention and environmental protection (e.g. handling of hazardous substances, disposal of operating and/or ancillary media, provision/wearing of personal protective equipment)!

c) Instruct all personnel to observe the operating manual!

d) If the personnel discovers faults or hazards, the owner or his representative must be informed immediately.

Technically safe condition

a) Keep all safety and hazard signs on and around the machine complete and in a legible condition!

b) Do not make any modifications, attachments or alternations to the machine that could impair safety without consultation/agreement with the manufacturer/supplier. This applies also to the installation and setting of safety devices and valves, and for welding on load-bearing parts.

c) Do not make any program changes to the software of programmed control systems!

NOTICE	**Major modifications to the machine and/or program changes may invalidate the EC Declaration of Conformity!**

d) Observe intervals prescribed by law or in the operating manual for recurring tests/inspections and the replacement intervals for safety-critical components!

e) Spare parts must satisfy the technical requirements stipulated by the manufacturer. This is always guaranteed with OEM spare parts.

f) Be sure to have appropriate workshop equipment available for carrying out independent service and maintenance work.

g) In addition to this operating manual, the information and tips contained in the suppliers' documentation (see Annex) must also be observed!

3.1 Training of the personnel

Training of the personnel

Personnel selection and qualification

a) Work on and with the machine may only be carried out by reliable personnel. Observe the statutory minimum working age!

b) Employ only qualified or at least trained personnel. Give the necessary instructions and check from time to time that only authorised personnel are working on/with the machine!

c) Clearly define the responsibilities and authorities of the personnel for operation, set-up, maintenance and repair!

d) Allow persons undergoing training, instruction or an apprenticeship to work on the machine only under the supervision of an experienced person.

e) Work on the electrical equipment of the machine may only be carried out by an electrician or by trained persons under the instruction and supervision of an electrician. For safety reasons, the rules of electrical engineering must be observed.

f) Work on gas and heating installations may only be carried out by appropriately qualified personnel.

g) Only experienced and qualified personnel may be allowed to work on hydraulic and pneumatic installations!

3.2 Presentation of safety precautions

HAZARD SYMBOLS	
SYMBOL	**DEFINITION**
⚠ 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	**Indicates a situation which, if not avoided, could result in damage to the unit, equipment, or environment.**

⚠ DANGER	**Adhere to subsequent SAFETY PROTOCOLS throughout this document, and observe all HAZARD SYMBOLS.**

3.3 Symbols on the machine

Symbols on the machine

Electric shock hazard

3.4 Personal protective equipment (PPE)

Personal protective equipment (PPE)

The personal protective equipment (PPE) described below must be provided by the machine owner and be worn by the responsible operating personnel when working with the machine.

Personal protective equipment (PPE)

Wear protective gloves

Wear safety shoes

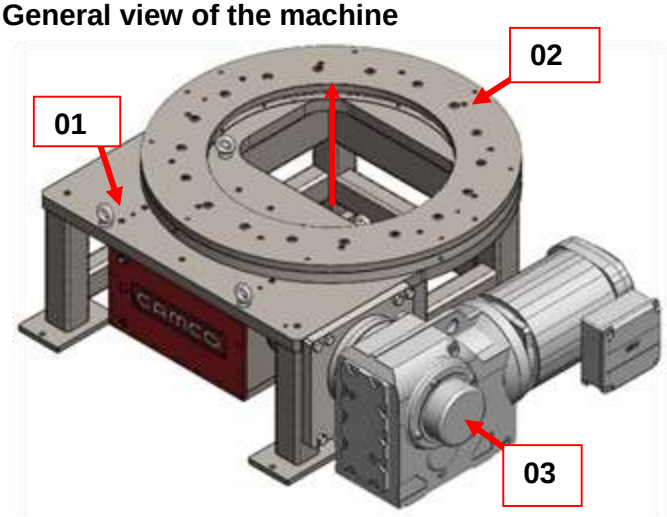
Wear ear protectors

Wear a safety helmet

4 Machine Description

4.1 Presentation and identification

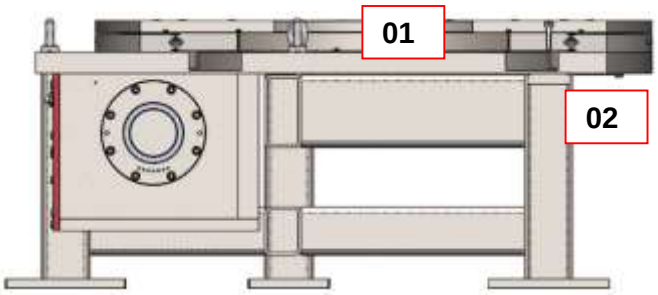
General view of the machine



- The **unit** consists of the following main components

01. Housing: Machined Housing Weldment, Cover Plate
02. Output Assembly: Follower-Wheel, Dial Plate, Output bearing
03. Input Assembly: Cam, Cam-Shaft, Reducer Mounting plate, Gear motor with brake.

Figure 1 Unit

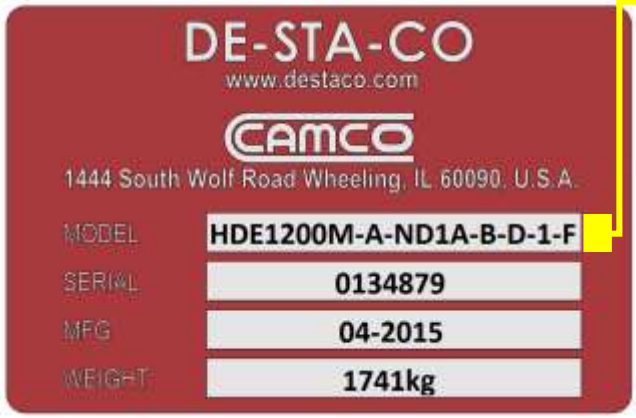


01. Center-Bore: Allows passage of wires, robotics and various tooling through **unit**.
02. Allows for cam follower removal access

Figure 2 Access

Identification of the machine

The following information can be found on the machine rating plate:



HDE1200M-A-ND1-B-D-1-F	
CODE	**NAME**
HDE	MODEL FAMILY
1200	MODEL DIAL SIZE
M	MODEL TYPE
A	MODEL MOTION
ND1A	MODEL GEAR-MOTOR
B	GEAR-MOTOR RATIO
D	GEAR-MOTOR BRAKE
1	GEAR-MOTOR MOUNT SIDE
F	MODEL SENSOR OPTION

- Company name with full address

  DE-STA-CO CAMCO PRODUCTS

  1444 SOUTH WOLF ROAD

  WHEELING, ILLINOIS 60090 USA
- Article No.: HDE1200M, HDE1200S
- Year of construction: 2015

4.2 Intended use

Intended use

The machine has been built within the battery limits to the state-of-the-art and in accordance with the acknowledged general safety engineering rules. Nevertheless hazards can arise during its use for the life and limb of the operator or third parties and for impairment to the machine and other assets.

The machine may only be operated for its intended when it is in a technically safe condition, giving consideration to safety and the potential hazards, in accordance with the operating manual! Have all malfunctions remedied immediately, in particular those which could impair safety.

The machine is intended exclusively for the purpose described in chapter 4.5 "Description of function". Any other or further use constitutes an improper use. The

manufacturer/supplier assumes **no liability** for injury or damage resulting from such use. This risk must be borne solely by the owner.

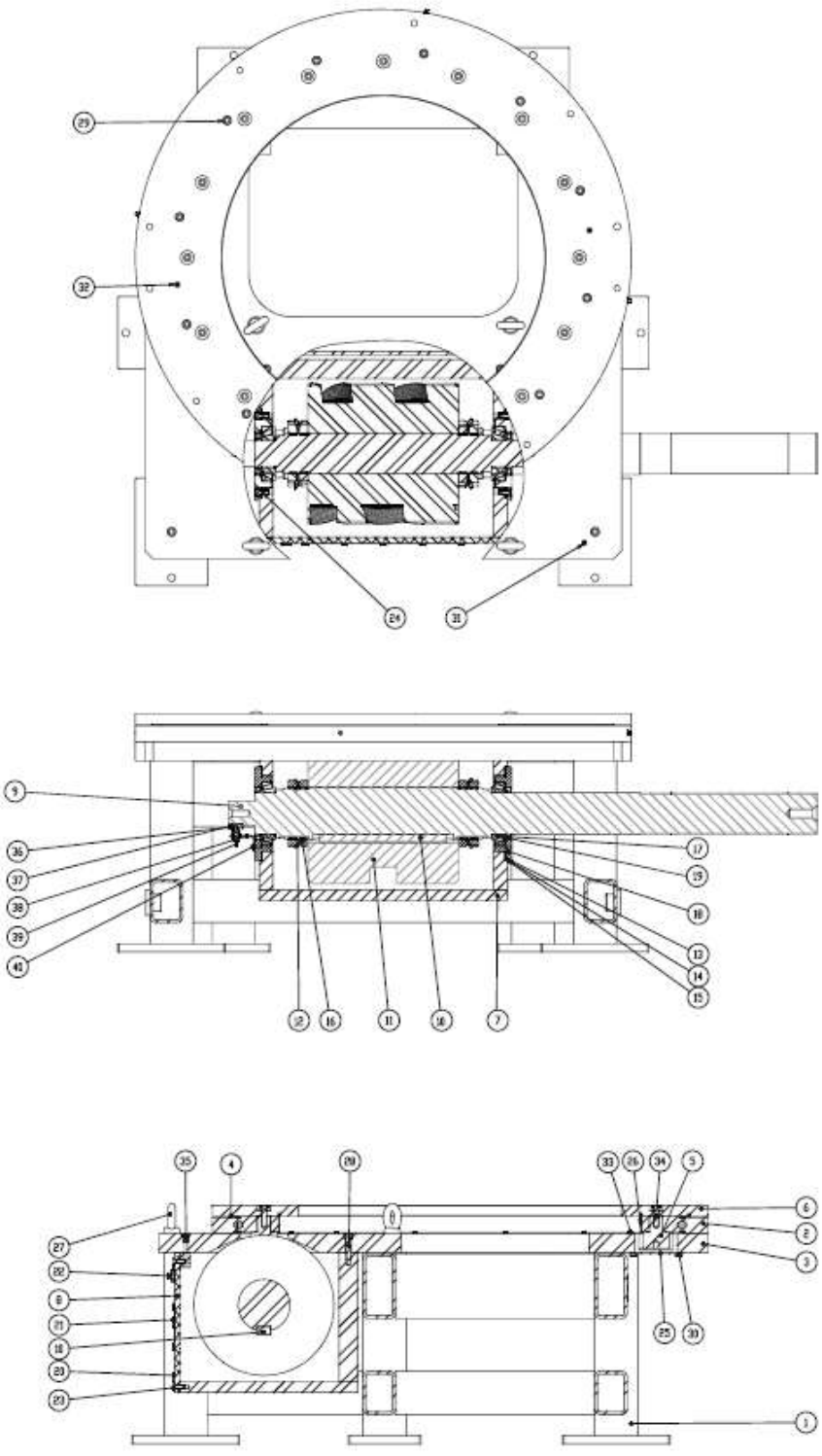
NOTICE	**The intended use also includes observance of the operating manual and compliance with the inspection and maintenance conditions.**

4.3 Foreseeable improper use

Any **use**, **setting**, **application** or **alteration** of the **unit** beyond the stated terms in section 4.5 is defined as improper and prohibited.

4.4 Design and components of the machine

HDE Mechanical



	HDE Bill Of Materials	
ITEM NO.	DESCRIPTION	QTY.
1	HDE BASE	1
2	HDE OUTPUT BEARING	1
3	HDE TOP PLATE	1
5	CAM FOLLOWERS	V
6	HDE INDEX RING	1
7	HDE CAM BOX	1
8	HDE COVER , CAM BOX	1
9	SHAFT INP	1
11	CAM	1
19	OIL SEAL	2
20	DRAIN PLUG	1
21	SIGHT GLASS	1
22	BREATHER	1
25	COVER, CAM FOLLOWER REMOVAL	1
36	KEY (PROXIMITY SENSOR)	1
37	SET SCREW	1
38	BRACKET PROXIMITY SWITCH	1
39	PROXIMITY SWITCH	1

Design and components of the machine

4.5 Description of function

Description of function

The Mechanical HDE Series Indexer is a ***pre-loaded-right-angle indexing table*** designed to precisely move heavy loads at a predetermined number of stations with zero-backlash. This machine is exactly defined as ***incompleted machinery*** that has no specific function / output until incorporated into a ***complete machine***

4.6 Places of work of the operating personnel

Places of work of the operating personnel

The Mechanical HDE Series Indexer is designed for integration into complete machines. Safe operation and control are the responsibility of the machine builder and the machine operator.

4.7 Hazard zones

Hazardous zones of the machine may only be entered by designated and authorised persons!

If several persons are working on the machine, good cooperation and close coordination of the activities is necessary.

Electrical energy

a) Use only original fuses with the prescribed amperage! In the event of faults in the electric power supply, switch off the machine immediately!

b) Work on electrical installations or equipment may only be carried out by an electrician or by trained persons under the instruction and supervision of an electrician.

c) Parts of machines and installations on which inspection, maintenance and repair work is being carried out on the electrical equipment must – if prescribed – be isolated and secured to prevent restarting. First check that the isolated parts are no longer live, then earth and short-circuit and isolate adjacent live parts

d) The electrical equipment of the machine must be inspected and checked at regular intervals. Faults such as loose connections or scorched cables must be remedied immediately.

e) If work is necessary on live parts, have a second person standing by who can turn off the master switch or emergency stop switch in the event of an emergency. Cordon off the working area with a red/white safety chain and a warning sign. Use only insulated tools and equipment!

f) When working on high-voltage assemblies, switch off the power supply, connect the supply cable to earth and short-circuit the components, e.g. capacitors, with a ground rod.

Hydraulic/pneumatics

a) Work on this equipment may only be carried out by persons with specialist know-how and experience!

b) Inspect all lines, hoses and screw fittings at regular intervals for leaks and obvious signs of damage! Repair damage immediately! Escaping oil can lead to injuries and fires.

c) Depressurise system sections and pressure lines to be opened in accordance with the descriptions of the assemblies before starting the repair work!

d) Lay and install hydraulic and compressed air lines correctly! Do not confuse connections. Fittings, lengths and qualities of the hoses must comply with the requirements.

Noise

a) Soundproofing installations on the machine must be functional during operation.

b) Wear the prescribed personal protective equipment (ear protectors)!

Oils, greases and other chemical substances

a) Process media must be used and disposed of in accordance with the instruction of the manufacturers of these substances.

b) Pay particular attention with hot process media (risk of burns and scalding)!

Gas, dust, steam, fumes

a) Carry out welding, flame cutting and grinding work on the machine only when this is permitted. There is a risk of fire and explosion!

b) Before starting welding, flame cutting and grinding work, clean the machine and its environment of dust and inflammable substances and ensure adequate ventilation (explosion hazard)!

c) Inspect fume extraction and ventilation systems at regular intervals and check for proper function!

d) When working in confined spaces, observe any applicable national regulations! (e.g. have a second person standing by for a fast rescue)

4.8 Technical data

The HDE unit is not shipped with oil and is the output bearing is greased.

Dimensions and weights:

Dimensions (LxWxH)[mm]

MODEL	L	W	H
HDE1200M	1705	1380	562
HDE1200S	1372	1380	562

Weights [kg]

Table 1 Approximate weights of MDE models with gear motors

MODEL	REDUCER	WEIGHT (Kg)
HDE1200M	SEW KHZ107	1741
HDE1200M	SEW KHZ97	1630
HDE1200M	NORD SK9072	1790
HDE1200M	NORD SK9052	1630
MODEL	**REDUCER**	**WEIGHT (Kg)**
HDE1200S	STOBER P721	1110
HDE1200S	SEW PSF621	1110

Power supply, interfaces, connections:

Electrical equipment

Rated voltage: 3 x 400 V / 50 Hz / N + PE

Control voltage: 24 V

Rated current: SEE MOTOR NAME PLATE

Installed load: SEE MOTOR NAME PLATE

Hydraulic equipment:

Recommended Oil and Quantity

Lubricating oil should be high quality, well-refined petroleum oils or synthetic lubricants with extreme pressure additives. They may be subjected to high operating temperatures, so they must have good resistance to oxidation. ISO 220 grade oils with EP additives such as MOBILGEAR 630 (Exxon-Mobil) or OMALA 220 (Shell Oil).

MODEL	OIL CAPACITY (l)
MDE600	19.2
MDE700	16.3
MDE900	22.7

Grease

Bearings should be greased with NGLI #2 bearing grease (such as MOBILGREASE XHP222) at least twice per year. Do not over lube since the excess grease will eventually fall into the indexer oil reservoir.

Process media

See data and information in the annex Suppler documentation and annex Safety data sheets

The technical data in the annexed supplier documentation and safety data sheets must also be observed!

5 Transport

5.1 Transporting machine and machine parts

Transporting machine and machine parts

The transport may only be carried out by personnel capable of carrying out such work as a result of their own know-how and experience in the field of transport.

The machine and larger assemblies must be carefully attached and secured to lifting equipment. Use only suitable lifting equipment and slings in a technically safe condition and with a sufficient load-bearing strength! Do not stand or work under suspended loads!

Allow only experienced persons to attach loads to lifting equipment!

Installing and removing transport locks on the machine parts

NOTICE	Dispose of the packaging and insulating materials in a proper and environmentally safe manner. Observe the national regulations.

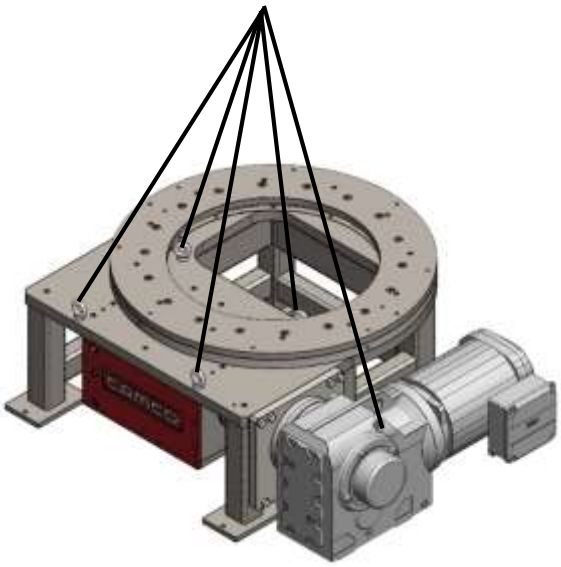
5.2 Unpacking

The packaging materials should be re-used, as far as possible, or disposed of in accordance with the applicable local regulations.

The machine requires an acclimatisation period of 24 hours in order to rule out malfunctions due to condensation moisture. Remove any condensate formed. Check the delivery condition of the installation.

5.3 Handling

Attach eyebolts (not supplied) to points on HDE housing. Attach hook to reducer. Lift with long chains – included angles between chains should be less than 90 degrees.



Markings and Weight

- The following table illustrates the appropriate markings for transport placed on the **unit**'s packaging.
    - The **unit**'s weight can be obtained from the Type-Plate.

Approved Transportation Equipment & Procedures

- This section discusses necessary and recommended installation equipment and procedures

Transportation Inside of Packaging

- EQUIPMENT
    - Lifting straps/chains with safety hooks
    - Lifting frame
    - Forklift/Crane
    - Proper PPE: gloves, glasses, footwear
- PREPARATION
    - Check to make sure only authorized personnel are present.
    - Set clear path of transportation that is clearly marked and closed off.
    - Inspect package for any weak or damaged areas.
- EXECUTION

MODEL	REDUCER	WEIGHT (Kg)
HDE1200M	SEW KHZ107	1741
HDE1200M	SEW KHZ97	1630
HDE1200M	NORD SK9072	1790
HDE1200M	NORD SK9052	1630

MODEL	REDUCER	WEIGHT (Kg)
HDE1200S	STOBER P721	1110
HDE1200S	SEW PSF621	1110

Table 2 Approximate weights of HDE models with reducer

NOTICE	The weight table in 4.8 Technical Data is an average, not an exact value, of the unit. Please reference the Type-Plate for accurate information in applications involving the unit's weight.
⚠ WARNING	Use a hoist or a crane to lift. Attach hooks to eye bolts (not supplied by CAMCO) at two points at front and top of housing. Use eyebolt on motor or strap around motor to level the HDE during the lift.

Transportation Outside of Packaging

- EQUIPMENT:
  - Lifting straps/chains
  - Metric eyebolts
  - Forklift/Crane
  - Proper PPE: gloves, glasses, footwear
  - Level
- PREPARATION:
  01. Carefully unpack the **unit** making sure to preserve packaging.
  02. Review and verify contents comply with the packaging list.
  03. Inspect and document key **unit** areas for damage or leaks.
- EXECUTION:
  04. Place eye-bolts in lifting holes (FIG. X); firmly screw into place.
  05. Attach lifting straps/chains to eyebolts.
  06. Use a forklift/crane to lift **unit**.
  07. Move the **unit** to desired location of installation and slowly place on the floor in a safe, pre-assigned area marked appropriately.

Transportation Damage

- Inspect the following areas of the **unit** for any signs of damage after transportation:
  - Housing Assembly: dents, cracks, bends, leaks
  - Output Assembly: seal (leaks), dents, looseness, flatness (a level should be fine in this application as a noticeable change in flatness due

to damage is the measurement being observed not the function parameter).

- Input Assembly: seal (leaks), dents

NOTICE	**In the event of damage after transportation do not proceed with installation until contacting the manufacturer.**

Intermediate Storage

- In the event of a need for storage for a delayed period of time (1 week +) retain the **unit** within its original packaging.
- The original packaging is conditioned to preserve the **unit** in most environmental settings (save extreme ones).

6 Installing and Commissioning

The machine must be installed on a firm, low-vibration surface in a dry, frost-free, ventilated room.

NOTICE	Good accessibility to the machine must be ensured at all times to permit simple and safe operation of the machine. The machine footprint and space requirements indicated in the technical data must be observed.

NOTICE	The machine may only be operated in an environment having adequate lighting in accordance with the ergonomic regulations.

6.1 Installation and connection

Before the respective energy and media supplies are connected, the corresponding shut-off device must be closed and secured to prevent unauthorised opening!

Pay attention that there are no leaks after installation of the media connections.

Installation and adjustment instructions

Demands on the mounting

Admissible ambient conditions

Connection of the power supply (electric, pneumatic)

Installation Safety Protocol

⚠ WARNING	The following hazards may be present during this Life-Phase of the unit.

⚠ WARNING	Lifting the unit introduces the hazard of falling/crushing. Ensure lifting area is clear of all but authorized personnel.
⚠ WARNING	Lifting the unit introduces a hazard of free-movement. Move the unit at a slow, deliberate pace. Take care working with a hoist that does not have a brake as it will not lock in place.
⚠ WARNING	Improperly sized equipment introduces the hazard of failure. Make sure all equipment is properly sized and selected.
⚠ CAUTION	A new, foreign object introduces the hazard of tripping/entanglement to the general, everyday workflow of the area. Make sure installation and transportation area is well marked and restricted.
⚠ CAUTION	Cumbersome objects introduce the hazard of awkward positions. Ensure all staff are properly trained on lifting and position techniques.
⚠ CAUTION	Unguarded unit introduces the hazard of sharp edges. Ensure sharp edges are clearly marked and visible to personnel.
NOTICE	Ensure transportation route/area is completely clear to avoid collision of package/unit with external objects.

Installation Prerequisites

- Permits/Legal Documentation
  - Be sure to comply with all local standards, ordinances and legal requirements
- Building/Installation Site Integrity: Be sure the conditions comply with requirements of **parent** and **unit** documentation requirements. **Unit** will be mounted to an anchored base pate.
  - Base plate is anchored with floor bolts of the same size or larger than the mounting bolts for the **unit**. The table below shows the **unit** bolt and dowel requirements.

Unit	Unit Mounting Screw	Qt	Base Plate Thickness (mm)
HDE1200M/S	M16	6	19
HDE1600M/S	M20	6	25.4
HDE2000M/S	M24	8	25.4

  - Base plate is compliant within required 0.1 mm of flatness.
  - Careful leveling is critical. Mounting to an uneven surface will cause housing distortion

- **Unit** Position: Ensure the **unit** is properly accessible in its position of incorporation
  - Cam-Box cover easily accessible
  - Motor easily accessible
- Seal Integrity: Ensure integrity of input and output assembly seals

- Verify atmospheric conditions are not abrasive, or seals are protected from atmospheric conditions
- **Parent** function does not introduce abrasive conditions, or seals are protected from **parent** function.

Installation of Unit

Operating Media / Auxiliary Media / Tools

- Torque wrench
- Set of screwdrivers
- Screw adhesive: LOCTITE*
- Commercial solvents
- Drift for parallel pins
- High-strength (size) screws
- Fixture-anchors
- Electric/Pneumatic bolt gun

Installation

Installation Preparation

- Ensure accessibility of the **unit** from all sides
- Dismount the **unit** from packaging pallet
  - Remove mounting screws
  - Lift **unit** from pallet
  - Retain **unit** in suspended position
- Clean all exposed surfaces of the **unit** with an appropriate neutral solvent.
  - Be sure to clean mounting surfaces
- Clean installation surface thoroughly with neutral solvent
- Appropriately restrict access to installation area from all foot-traffic.
- Maintain constant ambient conditions
  - Retain enclosed space (building garage doors remain closed etc.) as this can affect any adhesives to be set
- Properly isolate/protect seals from all preparation processes to prevent damage
- Thoroughly clean base-plate surfaces with neutral solvent

Installing the Base Plate or Frame

- Transport base-plate to installation surface slowly and deliberately with appropriate equipment
- Install base-plate
- Base-Plate Pre-attached
  - If attached to **unit** do not remove, but instead transport **unit** as whole since detaching the plate would require remounting procedures to the plate.
  - Proceed as if base plate is separate normally
- Base-Plate Separate
  - Lift base-plate with forklift/crane
  - Move base plate over installation surface
  - Check to make sure bottom of base-plate is clean
  - Apply any cements, adhesives, or epoxies to installation surface
  - Lower base-plate onto installation surface with authorized personnel guiding it into exact position with the installation surface
  - Clean any residual cement or adhesives from around the base-plate
  - Mark drill points through mounting holes of base-plate
  - Drill holes with base-plate in place

- Drive fixture-anchors into the drilled holes with a heavy mallet.
- Use an electric/pneumatic-bolt gun to tighten the fixture-anchors down
- use a large torque wrench (long bar) to apply finishing torques to the fixture-anchors

Attach **Unit** to Base-Plate

- In the event the unit came pre-attached to the base plate this section can be disregarded
  01. Lift **unit** with forklift/crane
  02. Move unit over base-plate
  03. Check to make the unit's sure frame surfaces or mounting feet of indexer are clean of any debris
  04. Apply any cements, adhesives or epoxies to the base-plate surface
  05. Lower unit onto base-plate with authorized personnel guiding it into exact position
  06. Clean any residual cement, adhesives or epoxies from around the unit's frame or mounting feet.
  07. While cements, adhesives or epoxies are still wet insert mounting screws into mounting holes of unit's frame or mounting feet
  08. Verify again the unit is correctly aligned with the base-plate
      - This is important as once any adhesives set it will be much more difficult to properly align the unit
  09. Use an electric/pneumatic bolt gun to tighten the mounting bolts in a star-pattern
      - Do not tighten bolts in a sequential pattern as this can lead to cock-eyeing
  10. Use a large torque wrench with a long-bar to apply finishing torques to the mounting bolts

Manual Adjustment of Unit

- HAZARDS
  - Unexpected Activation: unexpected activation of the motor can result in drawing in, entanglement and electrocution.
    - Ensure no power is supplied to the unit
  - Damage to Unit: damage to the unit can occur if the motor-brake is not manually released prior to adjustment
    - Ensure the motor-brake is manually released before making manual adjustments
  - EQUIPMENT
    - Brake release lever
    - Screwdriver set
  - STEPS
    01. Disconnect all power to unit
    02. Manually release brake with brake-lever attached to motor
    03. Remove fan-cover of the motor with screwdriver set
    04. Remove the cover plate from the indexer
    05. Spin motor-fan by hand until desired output position is achieved
    06. Reapply motor-fan cover
    07. Reapply brake
    08. Store brake release lever back on motor mount
    09. Reapply input shaft cover with screwdriver set

Installation of Additional Components

- The unit allows for the installation of additional components through fixture holes etc.
- A fixture of importance is a proximity/sensor switch (if included with unit, or purchased outside of manufacturer).
  - Equipment
    - Soft/plastic mallet
    - Screwdriver set
    - Allen wrench set
  - Mounting a Single Switch
    01. Verify unit is completely disconnected from power
    02. Remove motor fan-cover
    03. Verify all components match the packing list
        a. Proximity/sensor switch
        b. Proximity/sensor switch bracket
        c. Proximity/sensor switch key
        d. Mounting bolts
    04. Mount the proximity/sensor switch bracket to the unit housing at the appropriate mounting holes
    05. Back-drive unit by manually turning motor fan until the key-way of exposed input shaft is pointing upwards
    06. Use soft/plastic mallet to drive proximity/sensor switch key into the key-slot of the exposed input shaft
    07. Place lock-nut followed by lock-washer on proximity/sensor switch
    08. Screw the lock-nut until halfway down the length of the proximity/sensor switch
    09. Place the proximity/sensor switch face down in the slot of the bracket
    10. Screw lock-nut and lock-washer on to end of proximity/sensor switch protruding from the bracket
    11. Adjust locknuts of proximity/sensor switch until the switch is approximately 2-3mm from the proximity/sensor key
    12. Turn fan blades of the motor to rotate the input shaft to see if there is any interference of the proximity/sensor key with the proximity/sensor switch.
        a. *Do not force the key past the proximity/sensor switch if contact is made.*
    13. Should interference occur adjust the lock-nuts of the proximity/sensor switch to place the switch farther from the key and repeat step 12
    14. Once the key can rotate and clear the proximity/sensor switch tighten the lock-nuts to prevent vibration from lowering the proximity/sensor switch.

○

NOTICE	Use only holes provided for mounting fixtures. Do not add, modify or weld on the unit

6.2 Commissioning

NOTICE	Before the machine is put into operation it is the obligation of the operator to carry out a visual check to ensure that there are no unauthorised persons on the machine or inside the machine.

6.3 Set-up and tooling

Retooling

Retooling is necessary when different products are processed on the machine (product change).

A product change necessitates various retooling and/or modification measures.

The following operations have to be performed:

Installation of Additional Dial Plates and Tooling
It is highly recommended that additional mounting plates be installed using only the supplied fixture holes. This is to ensure that concentricity and accuracy are maintained.

Installation of Safety Equipment
It is the responsibility of the operator to properly size, select and fit safety equipment.

⚠ DANGER	It is forbidden to proceed with any Life-Phase of the unit or parent prior to application of Unit Safety Equipment.

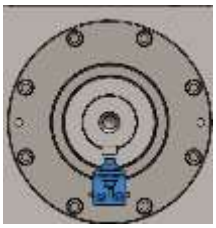
Packaging Disposal
Packaging should be stored or discarded in compliance with national and local regulations.

⚠ WARNING	The following hazards may be present during this Life-Phase of the unit.
⚠ WARNING	Commission of new equipment introduces the hazard of unexpected startup. Make sure unit is completely disconnected from power before commissioning.

⚠ WARNING	Commission of new equipment introduces the hazard of high voltage. Make sure all voltage areas are clearly labeled. Make sure only authorized personnel operate power.
⚠ WARNING	Commission of new equipment introduces the hazard of drawing-in. Ensure safety equipment is installed. Make sure only authorized personnel are present during commission
⚠ CAUTION	A new, foreign object introduces the hazard of tripping/entanglement to the general, everyday workflow of the area. Make sure installation and transportation area is well marked and restricted.

- **In addition to the above hazards make sure to verify the following items:**
  - dial-plate is correctly mounted with screws and dowels
  - all electrical equipment is appropriately selected/sized for the unit
  - All safety guarding is correctly installed
  - All residual hazard zones are properly marked
    - Bright colors or highly visible warnings are present at sharp edges and circuit boxes etc.
  - At time of activation the motor is running smoothly (consistent speeds, frequency noise, no smell of burning)
  - Unit runs quietly (relatively)
  - Gear-motor input values agree with the Type-Plate

Configuring the Unit Zero Point



A zero-point marking can be applied to the unit output dial and housing if needed for reference. However, the general starting point of the unit will start with the keyway of the input shaft pointing up where the **unit**'s cam will be in the middle of its dwell portion.

Modes of Operation for a mechanical or fixed cam indexer.

- There are two modes of operating a mechanical or fixed cam indexer. The first mode is continuous or synchronous and the second mode is intermittent or asynchronous. The second mode is commonly called cycle on demand.
- An "Application Data Sheet" was recorded during the sizing and selection of the indexer for your application. The data sheet shows the mode of operation for you application along with other parameters such as parts per minute, motion time and distance, dwell time and inertias of the load. You should have a copy of this document for the commissioning.

Continuous or synchronous mode

When operating in a continuous mode the brake is released and the motor is started either with a motor starter or with a Variable Frequency Drive (VFD)

NOTICE	The VFD is not manufactured by CAMCO. Refer to documentation supplied by the manufacturer for installation instructions.

The VFD allows adjustment to the speed of the motor. The output of the indexer is moved intermittently by the internal cam while the motor and camshaft run constantly. The brake is used to stop the indexer either for a normal stop or emergency stop.

Cycle on demand mode.

Cycle on Demand consists of a single complete 360 degree turn of the camshaft followed by a stopping of the indexer cam shaft in the middle of its dwell portion. For a Type 2 indexer one complete cycle is one half or 180 degree turn of the cam shaft. Once all machine operations have completed the cycle is repeated. A VFD cycling drive or brake motor can be used to start and stop the indexer in dwell. A cycle is initiated by an operator or the PLC. The sensor on the **unit** detects the target on the cam shaft as the camshaft turns into the dwell position. The sensor sends a signal to the PLC/VFD to stop the motor. It may be necessary to advance the mounting position of the sensor to assure the indexer stopping point. See section 7.2.1 Setting the Proximity/sensor Switch.

Cycle on demand mode - Reversing directions.

Cycle on Demand mode with reversing directions is a variation of the standard mode but the output direction is reversed after each cycle. This application requires two sensors to properly stop the indexer camshaft when moving in opposite directions. It may be necessary to advance the mounting position of the sensor to assure the indexer stopping point. See section 7.2.1 Set Proximity/sensor Switch.

Brake Motor Use and Wiring

Please refer to your order to determine what motor and brake voltage options were ordered. Inspect motor name plate. This should agree with order information.

Single Voltage Same As Motor

The brake of the brake motor is used to stop the motor and the **unit**. The brake is spring loaded and electric power must be applied to release it. The brake can be configured to release when AC power is applied to the motor and actuate when AC power is removed from the motor. This is the most common option and uses an internal relay and rectifier to control the brake.

Dual Voltage – Different AC or DC

The brake also can be configured to be controlled separate from the motor, requiring a separate and possibly different AC voltage from the motor voltage. Also, the separate brake control configuration can be configured to have 24VDC supply control the brake.

Variable Frequency Drive Use and Wiring

The VFD allows adjustment to the speed of the motor and increase or reduce the motion time in seconds. A VFD cycling drive can be used to start and stop the indexer in dwell. Wire the VFD per the manufacturer's instructions. If a brake is supplied and a VFD is also used then the motor and brake must be operated separately.

Recommissioning

⚠ WARNING	The following hazards may be present during this Life-Phase of the unit.

⚠ WARNING	Recommission introduces the hazard of unsafe operation. Make sure only authorized personnel are present for recommissioning and unit-hazard-areas are visually inspected.

- Please also verify the following items:
    - No damage to mounting surfaces/plates
    - No arbitrary equipment (used for repairs etc.) left unattended on the dial plate or near the unit
    - All other complimentary machinery has been tested and is fully operational
    - All safety equipment is operational and active
- Once all hazards have been addressed and visual inspection passed proceed with normal commissioning procedures

7 Operation

7.1 Operating and display elements

⚠ DANGER	The following hazards may be present during this Life-Phase of the unit

HAZARDS

- Interference: Serious to fatal injury can result from rotating parts striking loading equipment (tooling) due to incorrect installation of loading equipment or the unit itself
    - Properly size and adjust tooling and perform a soft run (turn unit by hand as described in section 5.3.2.4.) prior to operation to check for any places of interference

- Change in Operation Parameters: Changes in operation parameters can result in serious to fatal injury if not performed correctly
  - Only allow operation parameter changes by authorized personnel
  - Properly inform and train all relevant staff on the changes
  - Review safety protocols and equipment parameters to ensure they still apply
- Motor-Brake Failure: Serious to fatal injury can result in the event of motor-brake failure; the unit will continue to index without a brake to perform a proper e-stop in emergencies
  - Conduct regular inspections and tests on the motor brake in a controlled atmosphere
  - Personnel should only be present in the area of operation if the unit is stationary and all power has been locked out.

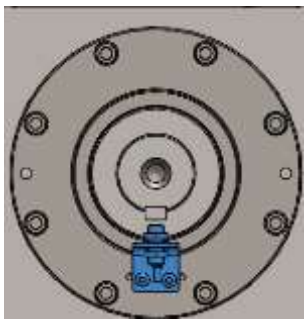
7.2 Operation of the machine

The unit is designed as a incompleted machine and is to be treated as a component to a complete machine, incomplete machines or equipment

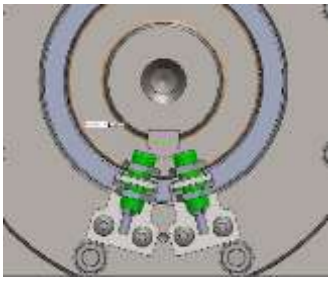
Safe operation and control of this unit are the ultimate responsibility of the end user/owner

Setting the Proximity/sensor Switch (1 and 2 switch option)

The single (1) proximity/sensor switch (Item #39) is attached to the side opposite reducer. The switch is set as shown and the indexer should stop in the center of the dwell (key pointing up). If the key does not point up when the indexer is stop then loosen the two screws that hold the switch bracket in place and remount the bracket into a new location. There are several location screw holes on the indexer housing arranged in an arc pattern. Advance the location of the bracket in a direction that is opposite the direction of cam shaft rotation. For example if the cam shaft is rotating clockwise advance the bracket to the left (in the counter clockwise direction). If double (2) switches are used (reversing application) then they will both have to be mounted in new positions, the left switch further over to the left and the right switch further over to the right.



Single Switch



Double Switch

Operation Personnel Workstations

Workstations are determined and placed by the end user/owner. Coherent operation is the ultimate responsibility of the end user/owner

8 Service and Maintenance

If it is necessary to remove safety installations, these must be installed again and checked for proper function immediately on completion of the work.

Observe the setting, maintenance and inspection operations prescribed in the operating manual, including information on the replacement of parts/parts of the equipment! Observe the specified intervals! This work may only be carried out by specially trained and authorised specialist personnel.

In order that safety can be assured during work on the machine or on the technical installation, all types of power supply (electric, pneumatic) must be switched off and secured to prevent switching on with the machine at standstill! Pressurised systems must be relieved!

During installation work above head height, use the provided or other safe access ladders and working platforms. Do not use machine parts as climbing aids! When working at great heights, take measures to prevent falling, e.g. in the form of railing or safety harnesses!

Always securely retighten all screw fittings loosened during service and maintenance work**!**

Carry out starting and stopping operations for all work as described in the operating manual!

Regular inspection and maintenance of the machine is of great importance. It reduces the occurrence of malfunctions and increases the operational safety.

Dispose of process media, cleansing agents and replaced parts in a safe and environmentally friendly manner! Observe the manufacturers' instructions for hazardous substances!

8.1 Cleaning the machine

Do not allow liquids to come into contact with live parts!

In order that safety can be assured during work on the machine or on the technical installation, all types of power supply (electric, hydraulic, pneumatic) must be switched off and secured to prevent switching on with the machine at standstill! Pressurised systems must be relieved!

In order to avoid the risk of injury, do not reach into the running machine. Moving parts and parts behind guards may only be cleaned with the machine switched off and secured to prevent restarting.

The machine must be kept clean at all times during operation. This means also keeping the floor clean, clearing away packaging materials, chemicals, etc. and not leaving tools lying around.

Do not use compressed air to clean the machine. This can result in increased wear and malfunctions. Use only a soft brush in combination with a vacuum cleaner for cleaning. A cloth moistened with alcohol can also be used.

Remove oil, fuel or protective agents from the machine, and in particular from connections and screw fittings, before starting service and maintenance work! Do not use aggressive cleansing agents! Use lint-free cleaning cloths!

After cleaning, inspect all supply lines for leaks, loose connections, signs of abrasion and damage! Remedy faults discovered immediately!

In addition, observe the instructions in the suppliers' documentation.

Keep all handles, steps, railings, stands, platforms and ladders clean at all times!

8.2 Maintenance schedule

Work on the technical (electrical, hydraulic, pneumatic) equipment of the machine may only be carried out by qualified personnel!

Carry out welding, flame cutting and grinding work on the machine only when this is expressly permitted. Before starting welding, flame cutting and grinding work, clean the machine and its environment of dust and inflammable substances and ensure adequate ventilation! There is a risk of fire and explosion!

The spare and wear parts indicated in the technical documentation must be replaced immediately in the event of damage.

Maintenance overview

Various inspection and maintenance operations have to be carried out during the period of machine operation. The corresponding intervals to be observed are indicated in the maintenance schedule. The maintenance intervals for outsourced parts indicated in the annexed suppliers' documentation must also be observed.

The maintenance intervals should be shortened if the machine is operated under more arduous operating and ambient conditions.

Operation		**Interval**	
P = Inspect	E = Adjust	T = Daily	H = every 6 months
R = Clean	N = Retention	W = Weekly	J = Annually
S = Lubricate	A = Replace	M = Monthly	

Component/inspection	**Type of inspection**	**Operation**	**Interval**	**Remarks**

Warning pictograms Inspect for damaged or missing pictograms	Visual inspection	P	T	
Electrical equipment: Inspect cables and leads for: Secure connection, damage, marking Inspect the protective earth system for continuity Inspect actuators for damage, marking	Visual inspection	P	t	
Hydraulic equipment Oil level visible in sight glass (Item #21)	Visual inspection	P	T	

Operation		**Interval**	
P = Inspect	E = Adjust	T = Daily	H = every 6 months
R = Clean	N = Retention	W = Weekly	J = Annually
S = Lubricate	A = Replace	M = Monthly	

Component/inspection	Type of inspection	Operation	Interval	Remarks
General machine condition Inspect for corrosion, stability, wear, damage and faults	Visual inspection	P	T	

Gearmotor Check

Check the motor for signs of external damage once per year. Check the motor brake after every 10,000 hours of operation. Refer to the supplier's manual for details.

HDE Lubrication

Oil Change Intervals

An oil change is required every 6000 hours of operation, or every 3 years whichever occurs first.
It may be necessary to change the oil more often if enviromental conditions are severe, such as rapid rise and fall in temperature of the indexer housing (which is accompanied by sweating of the inside walls with a resulting formation of sludge).

NOTICE	The magnetic drain plug should be visually inspected at oil change time for metallic chips that might indicate failure of one of the internal components.

Recommended Oil and Quantity

Lubricating oil should be high quality, well-refined petroleum oils or synthetic lubricants with extreme pressure additives. They may be subjected to high operating temperatures, so they must have good resistance to oxidation. ISO 220 grade oils with EP additives such as MOBILGEAR 630 (Exxon-Mobil) or OMALA 220 (Shell Oil).

MODEL	OIL CAPACITY (l)
HDE1200M	25
HDE1200S	32

Grease

Bearings should be greased with NGLI #2 bearing grease (such as MOBILGREASE XHP222) at least twice per year. Do not over lube since the excess grease will eventually fall into the indexer oil reservoir.

8.3 Malfunctions

CAMCO suggests that it is best to completely remove and secure all tooling from CAMCO's HDE Series Index Drive prior to inspecting or performing repairs. Lock out and tag out all electrical equipment. Realistically, removing all tooling from CAMCO's HDE Series Index Drive is prohibitive. Tooling should be removed only as necessary in order to complete the procedures.

Symptom: Indexer appears inaccurate

1. Check if unit stops in dwell. See the assembly drawing for your unit for keyway position in dwell. Also refer to cycle cam and limit switch function in this manual.
2. Is the output shaft backlash-free in dwell? Be sure to disconnect all other devices from the indexer output including an overload clutch. All indexers must be backlash-free in dwell (see Symptom: Looseness in Dwell).
3. How is the unit being checked? CAMCO uses a computer controlled checking machine to check each index against a theoretical perfect index. Contact the factory for assistance. CAMCO keeps inspection reports for units with special accuracy (units required to be within closer tolerances than standard).

Symptom: Looseness in one dwell only

1. Followers are worn and need replacing.
2. Follower wheel is damaged and needs rework or replacement.

Symptom: Looseness in all dwells

1. Camshaft is loose in bearings. Check for end play in input shaft. Adjust shims on bearing caps. See individual service manual for preload setting procedures.
2. Cam is loose on shaft. Usually repaired at the factory.
3. Cam is broken. (This rarely happens and is an indication of an overload application or a jam).
4. Unit was very heavily overloaded and all bearings loosened up. Factory rework required.
5. All followers are worn. Rebuilding by factory is best remedy.
6. Output shaft to follower wheel connection is loose. Factory repair is recommended.
7. Customer output member connection loose. Tighten output member and dowel in place.

Symptom: Indexer is noisy

1. Check if output is backlash-free in dwell.
2. Check for excess looseness in motion. Cam or follower could be broken
3. Is the noise from the reducer rather than the indexer?
4. Occasionally AC controls can excite the motor and drive to vibrate audibly. Change the PWM carrier frequency to be 12 khz or more.
5. Are input and output connections backlash free?
6. Is the unit overloaded? Loads can change over a period of time due to wear.
7. Is the unit support (base) rigid?
8. The unit could be overheated and have loose preload.
9. Is there sufficient oil in the unit? Is oil used consistent with CAMCO specifications?

Symptom: Premature wear of cam followers

1. Actual forces on the unit could be greater than calculated due to loose input or output.
2. Lack of oil or wrong oil used (See Lubrication section of Index Drive Service).
3. Frequent or severe overloads.
4. Improper input systems (where there is not a constant velocity input) will cause an erratic output or excessive output vibration. This will result in forces several times higher than calculated (see input recommendations).
5. Defective cam or follower wheel assembly.

Symptom: Output movement is noisy and erratic

1. Input does not run at a constant velocity. The prime objective of a good input connection to an Index Drive is to maintain a constant shock free velocity (see input recommendations). Motor running too slowly could also cause an erratic output.
2. Output connections loose, flexing, or winding up. Check all connections (see recommended output connections).
3. Excessive friction drag on output. Disconnect indexer and investigate friction torque.
4. Unit is overloaded due to excessive speed or loads. Contact your Sales Agent to check data sheet application loads and speeds. Decrease speed.
5. Unit could be internally damaged. Check other symptoms.
6. Unit support is not rigid. Check rigidity of index drive mount with an indicator. Stiffen support or decrease speed.

8.4 Spare and wear parts

Input Oil Seal Replacement Consideration

Usually all tooling can be left in place when replacing oil seals. Removal of some portions of the drive package might be required. See the section titled "Oil Seal Replacement" in this manual for complete details.

Cam Follower Replacement Consideration

If the machine builder has provided access to the cam followers, the tooling does not need to be removed. Cam followers can be replaced from the top center. See the section titled "Cam Follower Replacement" in this manual for complete details.

Input Shaft and/or Cam Replacement Consideration

The assistance of a CAMCO trained serviceman is recommended.

Follower Wheel and/or Output Bearing Replacement Consideration

The assistance of a CAMCO trained serviceman is recommended.

BEFORE STARTING:

CAMCO uses either Red Perma-Lok®, #HM118 or Green Perma-Lok®, #HM160 to secure most screws and set screws.Exceptions are removable covers, etc. If you encounter a fastener that is difficult to remove, apply heat to the screw and remove while still warm.

⚠ CAUTION	Localized heat can distort the part. Do not overheat any item.

⚠ CAUTION	Oil dry or other oil collecting products such as paper towels will be required to keep the work area safe and clean

TOOLS:
Repair of any CAMCO HDE Series Index Drive requires the following special tools

Air Impact Wrench - 700 Nm max setting
Torque Wrench - 700 Nm max setting
Slide Hammer

Unit	Retainer screw	Dowel dia	Dowel Length	Push out screw size	Push out screw length	Pull In screw size	Pull In screw length
HDE1200M						same as retainer	
HDE1600M						same as retainer	
HDE2000M						same as retainer	

TORQUE REQUIREMENTS FOR TIGHTENING SCREWS:
The included table provides torque specification for Metric Socket Head Cap Screws (SHCS).

Metric Socket Head Cap Screw	
Thread Size	Torque (Nm)
M6	16
M8	39
M10	76
M12	136
M14	210
M16	325
M20	640

Table 3 - Required torque tightening values

Table 1 lists the required torque tightening values for a Metric12.9 grade. Torque values are for lubricated threads coated only with a residual film of oil, as received from the manufacturer installed into steel parts. Fastener lengths should be at a minimum 1.5 times the screw thread diameter.

⚠ CAUTION	Replace any lost or damaged screws with screws of identical grade, pitch and length

8.5 Disassembly

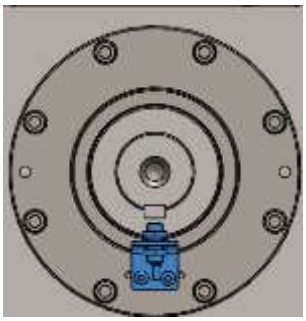
1. Remove only those structural members and fixtures required to gain access to front cover (Item #8) of the index drive.

2. Drain oil and flush with solvent. Retain any chips or broken pieces as these may aid in diagnosis. Dispose or recycle waste oil and solvent properly. Oil dry or other oil collecting items such as paper towels will be required to keep the work area safe and clean.
3. Oil may be drained by removing the magnetic drain plug (Item #20). Small metal fillings are collected by this plug. Clean them off before reinstalling the plug.
4. Alternatively, oil may be drained by removing the breather (Item #22) and pumping the oil from the unit's sump.
5. Remove SHCSs and Cover (Item #7).

⚠ WARNING	CAMCO's HDE Series Index Drives cannot be moved manually when fully assembled. During the Inspection and repair, the motor drive package may be required to rotate the indexer. Some safe means for running the motor at extremely low speeds is needed. The motor brake if present must be released using electric power. Use extreme caution when operating a live motor during inspection and repair. Manually rotating the motor. An alternative to using a live powered motor is to turn the motor by turning the motor fan. Make sure the motor brake is electrically released or use the lock out set screw to keep it released. Remove the motor fan cover and carefully turn the motor using the motor fan blades – turn several of the blades all at the same time.

8.6 Inspection

1. While slowly rotating input, inspect the cam track (Item #8) surface to determine if the cam must be replaced. Inspect for a rough, matted or rippled surface, gouge marks, pitting and other imperfections.
2. Slowly turn the unit and **STOP** the Index Drive in a mid-dwell position as shown.



2.1. Check for pre-load of the two cam followers in dwell. Grasp the cam followers that straddle the cam rib (Item #11). Try to rotate them. If they rotate they should be replaced.

2.2. Repeat 2 and 2.1 for next dwell position

2.3. Visually observe the surface of the outer shell. Inspect followers for damage or radial looseness. Radial looseness of the outer shell should not exceed 0.025 mm Do not confuse radial looseness of the outer shell with axial end play. Axial end play of 0.8 to 1.5 mm is acceptable. If axial end play of the outer shell exceeds 1.5 mm the followers should be replaced.
NOTE: Cam followers are replaced as added insurance against later failure. When in doubt, replace the cam followers.

3. Broken cam followers indicate possible damage to the follower wheel. Remove any broken cam followers. See the section titled "Cam Follower Replacement", in this Service Manual. Inspect the cam follower hole in the follower wheel for damage, and to determine whether the cam follower stud hole is "wallowed out", elongated, oval, etc. Using the nominal size of the follower stud as a guide, verify a press fit between the stud and the hole of 0.013 to 0.025 mm for the lower third of the hole depth.
4. Wobbling of the output or grinding noises during each index indicate damage to the output bearing (Item #2). Further inspection requires removal of the follower wheel.
5. Replace cam followers if loose in dwell or if the outer shell is visibly damaged. See the section titled "Cam Follower Replacement" in this Service Manual.
6. Replace the cam if imperfections are noted. This is best done by CAMCO personnel.
7. Replace the follower wheel if holes are oversized. This is best done by CAMCO personnel.

8.7 Oil seal replacement

CAMCO recommends replacing the input oil seals (Item #19) anytime the input is disassembled regardless of whether they are damaged or not. After being in service for sometime, the sealing lip can become brittle and easily crack. To replace the oil seal on the reducer side of the index drive, remove the reducer and additional drive equipment as necessary to gain access to the seal. See the reducer and other manufacturers' Service Manuals for instructions on removing this equipment. On the other side of the index drive, remove the proximity/sensor switch bracket or other equipment as necessary to gain access to the oil seal.

Oil seal removal

1. To remove the oil seal (Item #12), use a sharp punch and punch two (2) diametrically opposed holes through the case of the seal. Install sheet metal screws into the holes.
2. Use a Slide Hammer or Pliers (Vise Grips,) to grip the sheet metal screws to pull out the existing seal.

⚠ CAUTION	Do not drill holes in the case of the seal. Chips will get into the unit and they cannot be easily removed. A punched hole provides a better "bite" when installing sheet metal screws into the metal case

Oil seal installation

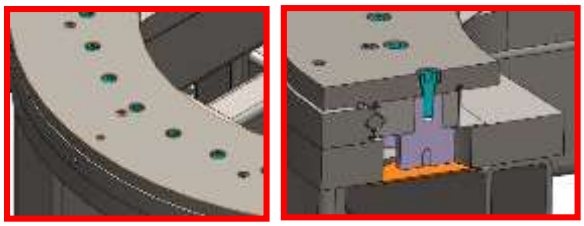
1. Check new seal for damage.
   - Do not use an oil seal with a sealing lip that is turned back, cut or damaged.
   - Also, if the outer face or outside diameter is bent or otherwise damaged, replace the oil seal.
2. Check the input shaft for surface nicks,burrs or a groove from the sealing lip. Look for a spiral machine mark that can damage the seal lip.

- An input shaft with a groove from the sealing lip can be repaired with a Speedi-Sleeve, or similar product. Consult the manufacturer for installation instructions.
- Alternatively, the input shaft could be replaced instead of repaired.

3. Check the end of the input shaft and remove any burrs or sharp edges. The end of the shaft should be chamfered.
4. Check splines and keyways for burrs or sharp edges.
5. Wrap the input shaft with plastic shim stock as a temporary sleeve to guide and protect the sealing lip.
6. Check the sealing lip direction. Make sure the new seal faces the same direction as the original. CAMCO's standard practice is to mount the seal so the lip faces the lubricant or fluid to be sealed.
7. Pre-lubricate the sealing element by wiping the surface with the lubricant being retained. Apply a thin layer of "General Electric Silicone Rubber RTV-6" or equivalent to the cartridge bore as a sealant. When the seal in pressed into place a bead of sealant will form at the back edge of the steel case and prevent any leakage around the outside edge of the seal.
8. Whenever possible use an installation tool that has been specifically manufactured for installing the seal.
   - Installation tools should have an outside diameter .25 mm smaller than the bore size. The bore should be .13 mm larger than the shaft size, and the face of the tool should be relieved so that pressure is applied only near the outside diameter of the seal.
   - During installation press the seal flush to the cartridge face to avoid cocking the seal in the bore. This also positions the seal correctly on the shaft.
9. When an installation tool cannot be manufactured, install the seal by tapping uniformly around the seal with a soft hammer. Avoid cocking the seal and make sure the face of the seal is square to the bore.

8.8 Cam follower replacement

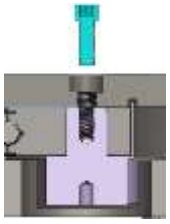
Cam follower removal



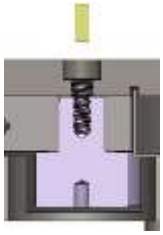
If the machine builder has provided access to the cam follower retainer screws then the tooling does not have to be removed. Otherwise the support structure and fixtures can be removed as necessary, or the support structure and fixtures can be lifted one to two meters above the unit and supported by appropriate scaffolding. CAMCO recommends using professional machinery riggers. The assistance of a CAMCO trained serviceman is recommended. The cam follower (Item #5) is retained in the inner race of the output bearing with an interference fit. An retainer screw attached to the stud end of the cam follower is added as an extra means to retain the cam follower. The head of this screw is located inside a counterbore of the index ring (Item #6) which is tapped for a larger screw. This large screw will be inserted in the counterbore and turning the screw will remove the cam follower. A same sized screw as the retainer screw but longer is used insert the new cam follower.

Unit	Retainer screw	Dowel dia	Dowel Length	Push out screw size	Push out screw length	Pull In screw size	Pull In screw length
HDE1200	SHCS M12 X 1.75	10mm	30	SHCS M16X2.0	90	same as retainer	90

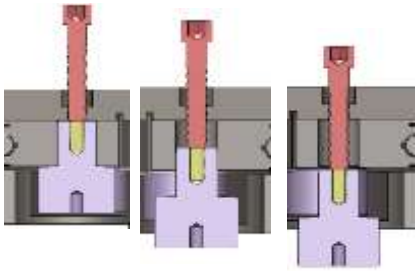
1. Rotate the index drive until the cam follower that will be replaced is aligned with the back of the indexer. (Side closest to the name plate - opposite the cam.) Do all cam follower replacement at this position.
2. Remove the cam follower access cover. Use heat to break the Loctite if necessary.
3. Remove the retainer screw from the cam follower.



4. Drop a dowel smaller than the retainer screw and longer than the screw tap depth.



5. Insert the push out screw into the retainer screw clearance hole.
6. Use the push out screw to push out the cam follower.



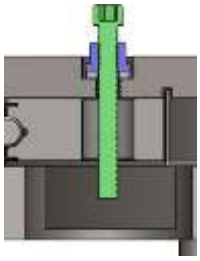
7. Remove the dowel from the cam follower.
8. Dispose of old cam follower per local codes.
9. Inspect each cam follower stud hole for roundness and size. The cam follower stud hole must be an interference fit. The cam follower holes must be -.013 to -0.025 mm for the entire length of the hole. Check the follower holes for roundness. These holes should be round within .013 TIR of a mm to permit reuse of the follower wheel. These holes may be worn-out due to overloads.

NOTICE	Do not use a follower wheel with oversized or egg shaped cam follower stud holes. The replacement parts will fail prematurely.

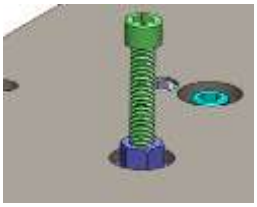
Cam follower insertion

1. Attach jam nut and washer to pull in screw.

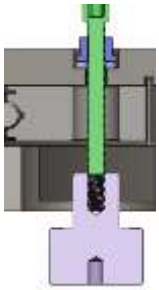
2. Thread them to the very top of the screw.



3. Insert the pull in screw into the cam follow retaining screw counter bore.

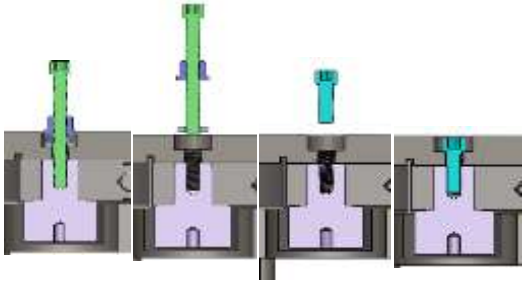


4. Clean cam follower stud and attach cam follower by hand to pull in screw. Thread the screw as deep as possible.



5. Use hex wrench to keep pull in screw from turning. It will move up during this sequence. Use closed wrench turn the jam nut and pull cam follower in to the stud hole.

6. Once the cam follower is completely in remove the closed wrench from the jam nut.
7. Use the hex wrench to remove the pull in screw from the cam follower.
8. Store the pull in screw, jam nut and washer.
9. Install retaining screw into cam follower.
10. Use Red Perma-Lok® and torque the socket head cap screw tospecification. The tightening torque depends on the size of the cam follower. See the table titled "Torque Requirements for Tightening Screws" in this manual for tightening torque.
11. Repeat steps to install all cam followers.



9 Shutdown, Storage and Disposal

9.1 Shutdown

After disconnection of the media supply lines, pay attention that no leaks occur that could result in hazards for persons and/or the environment!

Dispose of process media, cleansing agents and replaced parts in a safe and environmentally friendly manner! Observe the manufacturers' instructions for hazardous substances!

Observe the following points:

1. All electrical components must be completely disconnected from the power supply and discharged before removal.
2. Disconnect hydraulic and pneumatic equipment completely from the power supply and relieve pressurised systems!
3. The removal of springs or parts under mechanical load should be performed with particular care so that the mechanical energy stored in these parts does not result in injuries.
4. Batteries and rechargeable batteries that may be used in the installation must be disposed of separately in accordance with the local waste disposal regulations.
5. Furthermore, the information on outsourced parts indicated in the annexed suppliers' documentation must also be observed.

9.2 Storage conditions

Store the machine in such a way that damage is avoided**.**

Store the machine together with all the individual parts, as otherwise important parts might be missing when the machine is put into operation again**.**

Storage

Pay attention to the following points for the storage of the machine:

- Protect parts susceptible to corrosion (bare metal)

- Store the machine only in dry rooms

9.3 Disposal

Ensure a safe and environment-friendly disposal of the materials used. Observe prevailing national regulations!

10. ANNEX

Declaration of Incorporation

Declaration of Incorporation of Partly-Completed-Machine11 in accordance with Directive 2006/42/EC, Annex II B

DE-STA-CO
-
-
-

Hereby declare that the machinery

Designation	:
Modell, Type	:
Function	:
Serial Number	:

Is not machinery ready for use as defined in Directive 2006/42/EC, but is intended to be incorporated into or assembled with other machinery or other partly completed machinery or equipment.

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC, Annex II A.
The partly completed machinery conforms also with all other relevant directives.

The Essential Health and Safety Requirements specified in Annex I, (1) apply. These requirements are fulfilled during manufacturing of the partly completed machine.
The relevant technical documentation is compiled in accordance with Annex VII Part B.

We undertake, in response to a reasoned request by the national authorities, to transmit relevant information on the partly completed machinery in electronic form.

The following EU directives have been applied:

Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 (Directive 2004/108/EC relating to electromagnetic compatibility)

The following harmonized standards have been applied:

DIN EN ISO 12100:2010 Safety of machinery - Basic concepts, general principles for design
Part 1: Basic terminology, methodology (ISO 12100:2010)
DIN EN ISO 12100:2010 Safety of machinery - Basic concepts, general principles for design -
Part 2: Technical principles (ISO 12100:2010)

The following is authorized to compile the relevant technical documentation:

NORD DRIVESYSTEMS

GETRIEBEBAU NORD

Member of the NORD DRIVESYSTEMS Group

Getriebebau NORD GmbH & Co. KG

Getriebebau-Nord-Str. 1 . 22941 Bargteheide, Germany . Fon. +49(0)4532 289 - 0 . Fax +49(0)4532 289 - 2253 . info@nord.com

EC Declaration of Conformity

in the meaning of the regulation 2006/95/EC Annex III, 2004/108/EC Annex IV, 2009/125/EC Annex VI, 2011/65/EC Annex VI

Getriebebau NORD GmbH & Co. KG hereby declares

that the single- and three-phase asynchronous motors from the product series

- **SK 63*[1]/*[2] to SK 315*[1]/*[2] *[3]**

1) Power code: S, SA, SX, M, MA, MB, MX, L, LA, LB, LX, R, X, Y, A, W optionally supplemented by: H, P
2) Pole number labelling: 2, 4, 6, 8, ...
3) Additional options

comply with the following regulations:

Low Voltage Directive	**2006/95/EC**
EMC- Directive	**2004/108/EC**
Eco-design Directive	**2009/125/EC (Ordinance (EC) No. 640/2009 and 4/2014)**
RoHS Directive	**2011/65/EU**

Applied standards:

EN 60034-1:2010+Cor.:2010	EN 60034-2-1:2014	EN 60034-5:2001+A1:2007
EN 60034-6:1993	EN 60034-7:1993+A1:2001	EN 60034-8:2007+A1:2014
EN 60034-9:2005+A1:2007	EN 60034-11:2004	EN 60034-14:2004+A1:2007
EN 60034-30-1:2014	EN 55011:2009+A1:2010	EN 61000-6-3:2007+A1:2011
EN 61000-6-4:2007+A1:2011	EN 60204-1:2006+A1:2009+Cor.:2010	EN 50581:2012

Initial labelling was carried out in 1996.

Bargteheide, 30.04.2015

U. Küchenmeister
Managing Director

pp F. Wiedemann
Head of Motors Division

Getriebebau NORD GmbH & Co. KG
Rudolf-Diesel-Str. 1, D-22941 Bargteheide / Postfach 1262, D-22934 Bargteheide
Tel. 04532/401-0, Telefax 04532/401-253

MANUFACTURER'S DECLARATION

in accordance to the EC-Machine guideline 98/37, appendix II B

We herewith declare that the delivered drive-components

Nomenclature

Gear Units and Geared Motors

are intended to be built into a machine and that it is prohibited to put the machine into operation until it has been ascertained that it corresponds to the EC-guideline.

Applied harmonized standards:	DIN EN ISO 12100	Part 1 and Part 2
	DIN EN 294	
	DIN EN 60034	Part 6 and Part 7 (VDE 0530)
	DIN EN 60034	Part 1 and Part 5 (VDE 0530)
	DIN EN 60204	(VDE 113)

Bargteheide, January 1, 2009
Date

Signature

Getriebebau NORD
GmbH & Co. KG
Rudolf-Diesel-Straße 1
Postfach 1262 – 22934 Bargteheide
D - 22941 Bargteheide
Telefon 0 45 32 / 40 10
Telefax 0 45 32 / 40 12 53

Signature

This delcaration is not a guarantee of characteristics in the sense of the product liability law.
The safety regulations of the maintenance instructions have to be observed.

EC Declaration of Conformity

Translation of the original text

900260810

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the

motors of the series	DT.. / DV.. / DR.. DFT.. / DFV.. / DFR.. DA**S**.. DR..J.. MT.. / MFT.. / MV.. /MFV..
possibly in connection with Gear units of the series	R..; RE**S** F.. K..; KE**S** W.. **S**.. H.. VARIMOT® VARIBLOC®
are in conformity with	
Low Voltage Directive	2006/95/EC
ErP Directive	2009/125/EC 7)
Applied harmonized standards:	EN 60034-1:2010 EN 60034-5:2001/A1:2007 EN 60664-1:2007

7) Products that are covered by this Directive meet the requirements of Commission Regulation (EC) No. 640/2009 from July 22, 2009.

Bruchsal	14.11.2014	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents with same address as manufacturer

11. Declaration of Incorportation

The distributor,

Messrs	**DE-STA-CO Europe GmbH**
	Hiroshimastraße 2
	61440 Oberursel
Manufacturer:	USA/France

hereby declares that the products

Model No.:	HDE1200M and HDE1200S
Serial No.:	
Year of construction:	2015

is an incomplete machine as defined by the Machinery Directive 2006/42/EC, and that the following fundamental requirements in accordance with Annex I of this Directive are applicable and observed:

Annex I, Articles:
1.1.3, 1.1.5, 1.1.6, 1.3.1, 1.3.2, 1.3.4, 1.5.4, 1.6.1, 1.6.4, 1.7.2, 1.7.3, 1.7.4.3

The technical documents in accordance with Annex VII B of the Machinery Directive 2006/42/EC have been drawn up for the above-mentioned incomplete machine.

The following harmonised standards (or parts thereof) were applied:

EN ISO 12100-1:2003+A1:2009	EN ISO 14121-1:2007
EN ISO 12100-2:2003+A1:2009	

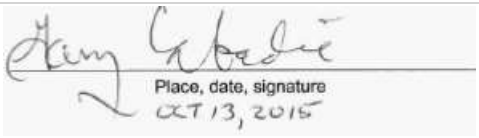
The technical documents for the incomplete machine will be supplied to the national agencies in electronic form in response to a justified request.

Note:
Commissioning is forbidden until the machine into which this incomplete machine is to be incorporated complies with the provisions of Directive 2006/42/EC.

Name and address of the person authorised to compile the technical documentation in accordance with Annex VII B:

Lou M. Wozniak	see company address above
- Name -	- Address -

Function of the signatory

Gary Labadie, Product Manager		
Name, position		Place, date, signature OCT 13, 2015

NOTES:

DE-STA-CO CAMCO Products
1444 South Wolf Road
Wheeling, IL 60090 USA
ph: 847-459-5200
toll-free: 800-645-5200
fax: 847-459-3064
CAMCO@destaco.com

ISO 9001:2000 Registered

DE-STA-CO Headquarters
Auburn Hills, Michigan USA
248-836-6700
marketing@destaco.com
www.destaco.com

DE-STA-CO Europe Germany
+49-6171-705-0
europe@destaco.com

DE-STA-CO Asia
Thailand
+66-2-326-0812
info@destaco.com

DE-STA-CO South America Brazil
0800-124070
samerica@destaco.com

This publication is for information purposes only and should not be considered a binding description of the product except is confirmed in writing by DE-STA-CO CAMCO Products