

**OPTUM® 270 CVT  
OPTUM® 300 CVT  
TIER 4B (FINAL)  
Tractor**

*PIN ZFEM01001 and above*

**SERVICE MANUAL**

Part number 48193161

English

November 2017

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## **SERVICE MANUAL**

**OPTUM® 270 CVT - [ZFEM01001 - ZGEM02931], OPTUM® 270 CVT - [ZGEM02932 - ZGEM04528], OPTUM® 270 CVT - [ZGEM04529 - ], OPTUM® 300 CVT - [ZFEM01001 - ZGEM02931], OPTUM® 300 CVT - [ZGEM02932 - ZGEM04528], OPTUM® 300 CVT - [ZGEM04529 - ]**

## Link Product / Engine

Product	Market Product	Engine
OPTUM® 270 CVT - [ZFEM01001 - ZGEM02931]	North America	F4DFE617M*B001
OPTUM® 270 CVT - [ZGEM02932 - ZGEM04528]	North America	F4DFE617M*B001
OPTUM® 270 CVT - [ZGEM04529 - ]	North America	F4DFE617M*B001
OPTUM® 300 CVT - [ZFEM01001 - ZGEM02931]	North America	F4DFE617L*B002
OPTUM® 300 CVT - [ZGEM02932 - ZGEM04528]	North America	F4DFE617L*B002
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## INTRODUCTION

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## INTRODUCTION

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## Foreword - How to use and navigate through this manual

This manual has been produced by a new technical information system. This new system is designed to deliver technical information electronically through web delivery (eTIM), DVD, and paper manuals. A coding system called SAP has been developed to link the technical information to other Product Support functions, e.g., Warranty.

Technical information is written to support the maintenance and service of the functions or systems on a customer's machine. When a customer has a concern on their machine it is usually because a function or system on their machine is not working at all, is not working efficiently, or is not responding correctly to their commands. When you refer to the technical information in this manual to resolve that customer's concern, you will find all the information classified using the SAP coding, according to the functions or systems on that machine. Once you have located the technical information for that function or system, you will then find all the mechanical, electrical or hydraulic devices, components, assemblies, and sub assemblies for that function or system. You will also find all the types of information that have been written for that function or system: the technical data (specifications), the functional data (how it works), the diagnostic data (fault codes and troubleshooting), and the service data (remove, install adjust, etc.).

By integrating SAP coding into technical information, you will be able to search and retrieve just the right piece of technical information you need to resolve that customer's concern on his machine. This is made possible by attaching 3 categories to each piece of technical information during the authoring process.

The first category is the Location, the second category is the Information Type and the third category is the Product:

- LOCATION - the component or function on the machine, that the piece of technical information is going to describe (e.g., Fuel tank).
- INFORMATION TYPE - the piece of technical information that has been written for a particular component or function on the machine (e.g., Capacity would be a type of Technical Data describing the amount of fuel held by the fuel tank).
- PRODUCT - the model for which the piece of technical information is written.

Every piece of technical information will have those three categories attached to it. You will be able to use any combination of those categories to find the right piece of technical information you need to resolve that customer's concern on their machine.

That information could be:

- the procedure for how to remove the cylinder head
- a table of specifications for a hydraulic pump
- a fault code
- a troubleshooting table
- a special tool

## Manual content

This manual is divided into Sections. Each Section is then divided into Chapters. Contents pages are included at the beginning of the manual, then inside every Section and inside every Chapter. An alphabetical Index is included at the end of each Chapter. Page number references are included for every piece of technical information listed in the Chapter Contents or Chapter Index.

Each Chapter is divided into four Information types:

- Technical Data (specifications) for all the mechanical, electrical or hydraulic devices, components, assemblies or sub-assemblies.
- Functional Data (how it works) for all the mechanical, electrical or hydraulic devices, components, assemblies or sub-assemblies.
- Diagnostic Data (fault codes, electrical and hydraulic troubleshooting) for all the mechanical, electrical or hydraulic devices, components, assemblies or sub-assemblies.
- Service Data (remove disassemble, assemble, install) for all the mechanical, electrical or hydraulic devices, components, assemblies or sub-assemblies.

## Sections

Sections are grouped according to the main functions or a systems on the machine. Each Section is identified by a number (00, 35, 55, etc.). The Sections included in the manual will depend on the type and function of the machine that the manual is written for. Each Section has a Contents page listed in alphabetic/numeric order. This table illustrates which Sections could be included in a manual for a particular product.

SECTION	PRODUCT					
	Tractors					
	Vehicles with working arms: backhoes, excavators, skid steers, ....					
	Combines, forage harvesters, balers, ....					
	Seeding, planting, floating, spraying equipment, ....					
	Mounted equipment and tools, ....					
00 - Maintenance	X	X	X	X	X	
05 - Machine completion and equipment	X	X	X	X	X	
10 - Engine	X	X	X	X		
14 - Main gearbox and drive	X	X	X	X		
18 - Clutch	X	X	X			
21 - Transmission	X	X	X	X		
23 - Four wheel drive (4WD) system	X	X	X	X		
25 - Front axle system	X	X	X	X		
27 - Rear axle system	X	X	X	X		
29 - Hydrostatic drive	X	X	X	X		
31 - Power Take-Off (PTO)	X		X			
33 - Brakes and controls	X	X	X	X		
35 - Hydraulic systems	X	X	X	X		
36 - Pneumatic system	X	X	X	X		
37 - Hitches, drawbars and implement couplings	X		X	X		
39 - Frames and ballasting	X	X	X	X	X	
41 - Steering	X	X	X	X		
44 - Wheels	X	X	X	X		
46 - Steering clutches						
48 - Tracks and track suspension	X	X	X			
50 - Cab climate control	X	X	X	X		
55 - Electrical systems	X	X	X	X	X	
56 - Grape harvester shaking						
58 - Attachments/headers			X			
60 - Product feeding			X			

## INTRODUCTION

61 - Metering system				X	
62 - Pressing - Bale formation			X		
63 - Chemical applicators				X	
64 - Chopping			X		
66 - Threshing			X		
68 - Tying/Wrapping/Twisting			X		
69 - Bale wagons					
70 - Ejection			X		
71 - Lubrication system	X	X	X	X	X
72 - Separation			X		
73 - Residue handling			X		
74 - Cleaning			X		
75 - Soil preparation/Finishing					
76 - Secondary cleaning / Destemmer					
77 - Seeding				X	
78 - Spraying				X	
79 - Planting				X	
80 - Crop storage / Unloading			X		
82 - Front loader and bucket	X	X			
83 - Telescopic single arm	X	X			
84 - Booms, dippers and buckets	X	X			
86 - Dozer blade and arm	X	X			
88 - Accessories	X	X	X	X	X
89 - Tools	X	X	X	X	X
90 - Platform, cab, bodywork and decals	X	X	X	X	

## Chapters

Each Chapter is identified by a number e.g. Engine - Engine and crankcase - 10.001. The first number is identical to the Section number i.e. Chapter 10.001 is inside Section 10, Engine. The second number is representative of the Chapter contained within the Section.

### CONTENTS

The Chapter Contents lists all the technical data (specifications), functional data (how it works), diagnostic data (fault codes and troubleshooting), and service data (remove, install, adjust, etc.), that have been written in that Chapter for that function or system on the machine.

### Contents

	ENGINE	
	ENGINE - Engine and crankcase – 10.001	
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FUNCTIONAL DATA		
ENGINE - Engine and crankcase - Dynamic description (10.001 - C.30.A.10)		6
SERVICE		
ENGINE - Engine and crankcase - Remove (10.001 -F.10.A.10)		8
DIAGNOSTIC		
ENGINE - Engine and crankcase - Troubleshooting (10.001 - G.40.A.10)		10

### INDEX

The Chapter Index lists in alphabetical order all the types of information (called information units) that have been written in that Chapter for that function or system on the machine.

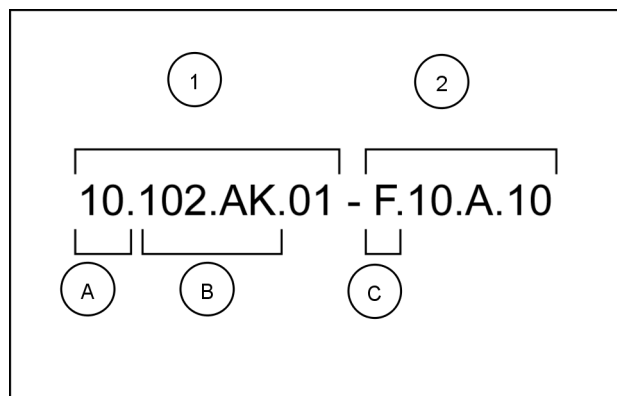
### Index

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ENGINE - Engine and crankcase - Troubleshooting (10.001 - G.40.A.10)		10

## Information units and information search

Each chapter is composed of information units. Each information unit has the SAP code shown in parentheses. This indicates the function and type of information in that information unit. Each information unit has a page reference within that Chapter. The information units provide a quick and easy way to find just the right piece of technical information you are looking for.

Example information unit	Engine block cover - Front – Remove (10.102.AP.01 - F.10.A.10)					
Information Unit SAP code	10	102	AK	01	F	10.A.10
SAP code classification	Engine	Pan and covers	Engine block cover	Front	Service data	Remove



NHIL12GEN0070A 1

Navigate to the correct information unit you are searching for by identifying the function and information type from the SAP code.

- **(1)** Location and **(2)** Information type.
- **(A)** corresponds to the sections of the service manual.  
**(B)** corresponds to the chapters of the service manual. After **(B)** there may be some additional information. In this case it shows “.01”, which represents the “Front” block cover. These options may be front/rear, left/right, hydraulic/mechanical etc.  
**(C)** corresponds to the type of information listed in the chapter contents: Technical Data, Functional Data, Diagnostic, or Service.  
**(A)** and **(B)** are also shown in the page numbering on the page footer.  
 THE REST OF THE CODING IS NOT LISTED IN ALPHANUMERIC ORDER IN THIS MANUAL.
- You will find a table of contents at the beginning and end of each section and chapter.  
 You will find an alphabetical index at the end of each chapter.
- By referring to **(A)**, **(B)** and **(C)** of the coding, you can follow the contents or index (page numbers) and quickly find the information you are looking for.

## Page header and footer

The page header will contain the following references:

- Section and Chapter description

The page footer will contain the following references:

- Publication number for that Manual.
- Version reference for that publication.
- Publication date
- Section, chapter, and page reference e.g. 10.102 / 9



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## **Foreword - Important notice regarding equipment servicing**

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The manufacturer reserves the right to make improvements in design and changes in specifications at any time without notice and without incurring any obligation to install them on units previously sold. Specifications, descriptions, and illustrative material herein are as accurate as known at time of publication but are subject to change without notice.

In case of questions, refer to your CASE IH Sales and Service Networks.

## Torque

**NOTE:** In the metric tables, nominal sizes M4 through M8 hardware torque specifications are shown as a Newton meters (pound-inches) numerical value.

Nominal sizes M10 through M24 hardware torque specifications are shown as a Newton meters (pound-feet) numerical value.

### Metric hex head (non-flange) hardware

Plain (PLN) – an unplated hardware finish with residual manufacturing oils

Zinc-dichromate (ZND) – a yellow colored chemical plating formula yellow applied to the hardware

Nominal size	Class (CL) 8.8 bolt and Class (CL) 8 nut	Class (CL) 10.9 bolt and Class (CL) 10 nut	Locknut CL 8 w/CL 8.8 bolt	Locknut CL 10 w/CL 10.9 bolt
	PLN and ZND	PLN and ZND	ZND	ZND
	N·m (lb in)	N·m (lb in)	N·m (lb in)	N·m (lb in)
M4	3.5 (31)	5.0 (44)	1.4 (13)	2.8 (25)
M5	7.0 (62)	10 (88)	2.9 (26)	5.5 (49)
M6	11.8 (104)	17 (150)	4.9 (43)	9.4 (83)
M8	28.8 (255)	41.3 (366)	11.9 (105)	23 (204)
	N·m (lb ft)	N·m (lb ft)	N·m (lb ft)	N·m (lb ft)
M10	57 (42)	82 (60)	24 (17)	45 (33)
M12	100 (74)	143 (105)	41 (30)	79 (38)
M14	159 (117)	227 (168)	66 (48)	125 (92)
M16	248 (183)	354 (261)	102 (75)	195 (144)
M18	352 (260)	487 (359)	145 (107)	268 (198)
M20	500 (369)	690 (509)	206 (152)	380 (280)
M24	865 (638)	1195 (882)	357 (263)	657 (485)

### Metric flange head hardware

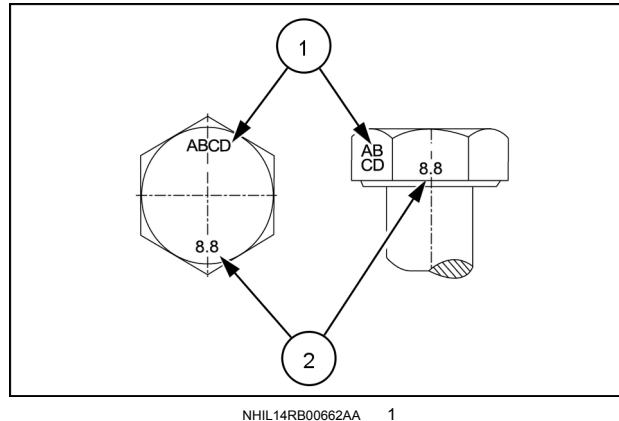
Plain (PLN) – an unplated hardware finish with residual manufacturing oils

Zinc-dichromate (ZND) – a yellow colored chemical plating formula yellow applied to the hardware

Nominal size	Class (CL) 8.8 bolt and Class (CL) 8 nut	Class (CL) 10.9 bolt and Class (CL) 10 nut	Flange locknut CL 8 w/CL 8.8 bolt	Flange locknut CL 10 w/CL 10.9 bolt
	PLN and ZND	PLN and ZND	ZND	ZND
	N·m (lb in)	N·m (lb in)	N·m (lb in)	N·m (lb in)
M4	3.8 (34)	5.5 (49)	4.2 (37)	6.1 (54)
M5	7.7 (68)	11 (97)	8.5 (75)	12 (106)
M6	13 (115)	18.7 (166)	14.3 (127)	20.6 (182)
M8	31.7 (281)	45.5 (403)	35 (310)	50 (443)
	N·m (lb ft)	N·m (lb ft)	N·m (lb ft)	N·m (lb ft)
M10	63 (47)	90 (66)	69 (51)	99 (73)
M12	110 (81)	157 (116)	121 (89)	173 (128)
M14	175 (129)	250 (184)	193 (142)	275 (202)
M16	272 (201)	389 (287)	299 (221)	428 (316)
M18	387 (286)	535 (395)	426 (315)	589 (435)
M20	550 (406)	759 (560)	605 (447)	835 (616)
M24	951 (702)	1315 (970)	1046 (772)	1447 (1067)

## Identification markings

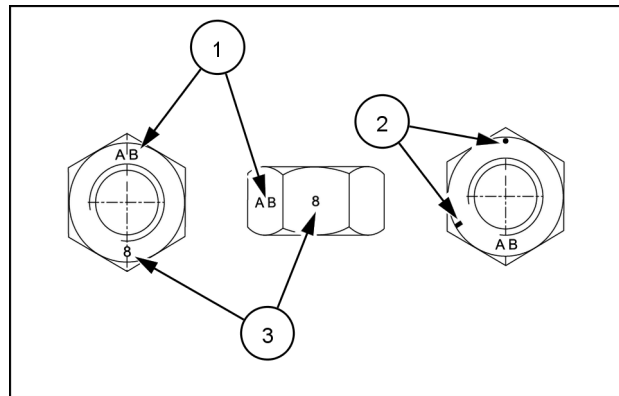
### Metric hex head, flange hex head and carriage bolts, Classes (CL) 5.6 and upward



**Metric bolt identification markings**

1. Manufacturer's identification
2. Property class

### Metric hex nuts and locknuts, Classes (CL) 05 and upward



**Metric hex nut identification markings**

- (1) – Manufacturer's identification
- (3) – Property class
- (2) – Clockwise type markings indicate property class and may include manufacturer identification (if applied), Example: property marks **240°** apart (shown) at the eight o'clock position indicate a Class 8 property, and marks **300°** apart at the ten o'clock position indicate a Class 10 property.

**NOTE:** In the Imperial units tables, the nominal sizes, **1/4 (0.25) in (inch)** and **5/16 (0.3125) in (inch)** hardware torque specifications are shown as a Newton meters (pound-inches) numerical value.  
Nominal sizes **3/8 (0.375) in (inch)** through **1 (1.0) in (inch)** hardware torque specifications are shown as a Newton meters (pound-feet) numerical value.

### Inch hex head (non-flange) hardware

Plain (PLN) – an unplated hardware finish with residual manufacturing oils

Zinc-dichromate (ZND) – a yellow colored chemical plating formula yellow applied to the hardware

Nominal size	SAE Grade (GR) 5 bolt and nut	SAE Grade (GR) 8 bolt and nut	Locknut GR B w/ GR 5 bolt	Locknut GR C w/ GR 8 bolt
	PLN and ZND	PLN and ZND	ZND	ZND
	N·m (lb in)	N·m (lb in)	N·m (lb in)	N·m (lb in)
<b>1/4 (0.25) in</b>	13 (115)	18 (159)	7.2 (64)	10 (89)
<b>5/16 (0.3125) in</b>	27 (239)	38 (336)	14.9 (132)	21 (186)
	N·m (lb ft)	N·m (lb ft)	N·m (lb ft)	N·m (lb ft)
<b>3/8 (0.375) in</b>	47 (35)	67 (49)	26 (19)	37 (27)
<b>7/16 (0.4375) in</b>	76 (56)	107 (79)	42 (31)	59 (44)
<b>1/2 (0.50) in</b>	116 (85)	164 (121)	64 (47)	90 (67)
<b>9/16 (0.5625) in</b>	167 (123)	236 (174)	92 (68)	130 (96)
<b>5/8 (0.625) in</b>	231 (170)	326 (240)	127 (94)	179 (132)
<b>3/4 (0.75) in</b>	410 (302)	578 (426)	226 (166)	318 (234)
<b>7/8 (0.875) in</b>	660 (486)	931 (687)	363 (267)	512 (378)
<b>1 (1.0) in</b>	989 (729)	1396 (1030)	544 (401)	768 (567)

### Inch flange head hardware

Plain (PLN) – an unplated hardware finish with residual manufacturing oils

Zinc-dichromate (ZND) – a yellow colored chemical plating formula yellow applied to the hardware

Nominal size	SAE Grade (GR) 5 bolt and nut	SAE Grade (GR) 8 bolt and nut	Flange locknut GR F w/ GR 5 bolt	Flange locknut GR G w/ GR 8 bolt
	PLN and ZND	PLN and ZND	ZND	ZND
	N·m (lb in)	N·m (lb in)	N·m (lb in)	N·m (lb in)
<b>1/4 (0.25) in</b>	14 (124)	20 (177)	15.4 (136)	22 (195)
<b>5/16 (0.3125) in</b>	29 (257)	42 (372)	32 (283)	46 (407)
	N·m (lb ft)	N·m (lb ft)	N·m (lb ft)	N·m (lb ft)
<b>3/8 (0.375) in</b>	52 (38)	74 (54)	57 (42)	81 (9)
<b>7/16 (0.4375) in</b>	84 (62)	118 (87)	92 (68)	130 (96)
<b>1/2 (0.50) in</b>	127 (94)	180 (133)	140 (103)	198 (146)
<b>9/16 (0.5625) in</b>	184 (136)	259 (191)	202 (150)	285 (210)
<b>5/8 (0.625) in</b>	254 (187)	358 (264)	279 (206)	394 (290)
<b>3/4 (0.75) in</b>	450 (332)	636 (469)	495 (365)	700 (516)
<b>7/8 (0.875) in</b>	725 (535)	1024 (755)	798 (589)	1126 (831)
<b>1 (1.0) in</b>	1088 (802)	1536 (1133)	1197 (882)	1690 (1246)

Click on the image link below for the full  
version of the service manual

