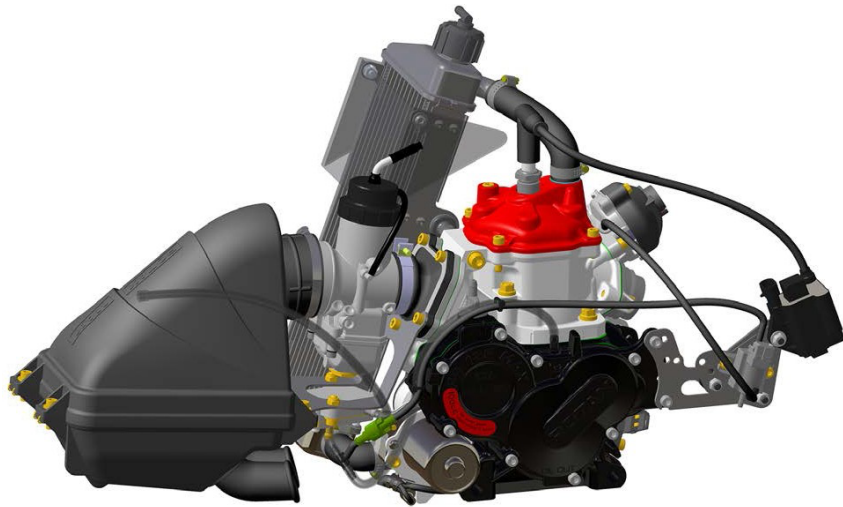


**ROTAX**<sup>®</sup>  
KARTING



# REPAIR MANUAL 修護手冊



*for ROTAX<sup>®</sup>-enginestype*

**125 MAXevo**  
**125 JUNIOR MAX evo**  
**125 MINI MAX evo**  
**125 MICRO MAX evo**

Part no.298061

**BRP-Rotax**  
REPAIR MANUAL 修護手冊

## Chapter 章節: INTRO GENERAL INFORMATION 基本訊息

**Preface** 前言

Before carrying out repair work on the engine, read the Repair Manual carefully.  
If any passages of the Manual are not clearly understood or if you have questions, please contact an authorized Distribution or Service Center for ROTAX®-kart engines.  
在對發動機進行維修工作之前，請仔細閱讀維修手冊。  
如果對手冊中的任何章節有不清楚的理解或者有任何疑問，請聯繫 ROTAX®-kart 發動機的授權分銷或服務中心。

**Contents** 目錄

This Repair Manual contains instructions for all the necessary repair and maintenance work on the ROTAX®-Engine Type 125 MAX evo, 125 Junior MAX evo, 125 Mini MAX evo and 125 Micro MAX evo.  
本維修手冊包含對 ROTAX®-Engine Type 125 MAX evo、125 Junior MAX evo、125 Mini MAX evo 和 125 Micro MAX evo 進行所有必要維修和保養工作的說明。

**Symbols used**

This Manual uses the following symbols to emphasize particular information. This information is important and must be observed.

使用的符號

本手冊使用以下符號來強調特定信息。這些信息很重要，必須遵守

**m WARNING 警告**

**Identifies an instruction, which if not followed may cause injury or endanger the life of the driver, mechanic or third party.**  
此（警告）標識說明：如果不遵守可能會造成傷害或危及駕駛員、技師或其他人的生命

**ATTENTION 注意**

**Denotes an instruction which if not followed may severely damage the engine. Noncompliance might lead to health hazards under certain conditions.**  
表示如果不遵守可能會嚴重損壞發動機。在某些情況下，不遵守可能會導致危害健康。

**ENVIRONMENTAL NOTE 環境相關注意事項**

**Environmental notes give you tips on environmental protection.**  
為您提供有關環境保護的提示。

**NOTE 注意事項**

*Indicates supplementary information which may be needed to fully complete or understand an instruction.*

以下訊息的補充標示，指得是需要完整完成、或完全理解



Denotes a checking operation 表示：操作檢查

**TIP 提示**

This information gives you additional advice and tips  
此信息為你提供額外的建議與技巧

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NOTES 筆記



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REPAIR MANUAL 修復手冊

**Chapter: Chapter 1 GENERAL NOTE**

**第一章 一般注意事項**

**TOPICS IN THIS CHAPTER 本章節主題**

<b>Abbreviations and terms used in this Manual 手冊中的縮寫與術語</b> .....	<b>3</b>
<b>Safety 安全相關事宜</b> .....	<b>4</b>
Safety notice 安全須知 .....	4
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# BRP-Rotax

## REPAIR MANUAL 修復手冊

<b>Purpose</b>	This Repair Manual is based on information and the state-of-knowledge of BRP-Rotax of the product current at the date of issue.
目的	本維修手冊基於發布之日當前產品的 BRP-Rotax 信息和知識狀態。
<b>Documentation</b>	For additional information on engines, maintenance or parts, you can also contact your nearest authorized ROTAX®-Engine distributor.
文件	有關發動機、維護或零件的更多信息，您也可以聯繫離您最近的 ROTAX®-Engine 授權經銷商。
<b>ROTAX® Distributors (經銷商)</b>	ROTAX® Authorized Distributors for Kart Engines. See on web at the official Homepage <a href="http://www.rotax-kart.com">http://www.rotax-kart.com</a> . (請參考左邊這個網址)
<b>Engine serial number</b>	If you have any concerns or questions, always keep your engine serial number ready for questions from your dealer, as the manufacturer makes modifications to the engine for product improvement. The engine number is stamped on the clutch side housing half. See Figure 1.
發動機序號	如果您有任何疑慮或問題，需提供您的發動機序（列）號以便經銷商處理問題甚至會修改發動機以改進產品。 發動機編號印在離合器側的曲軸半箱上。參見圖 1。

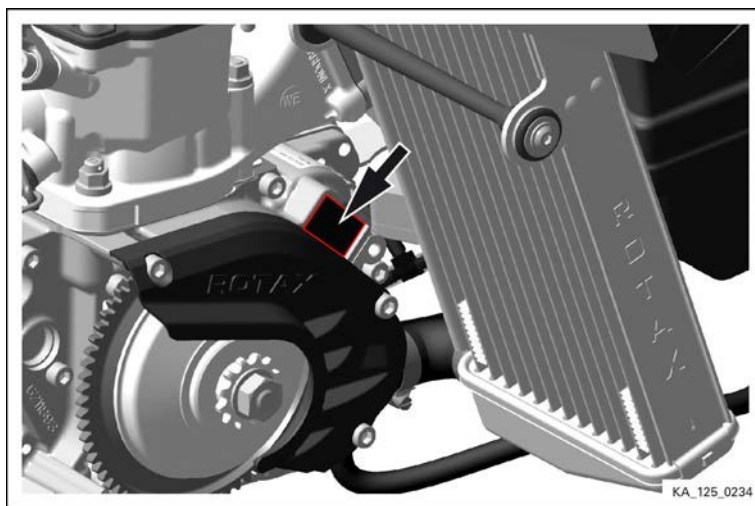


Figure 1.1: Position of the engine serial number

表示：發動機序號位置

**BRP-Rotax**  
REPAIR MANUAL 修復手冊

**ABBREVIATIONS AND TERMS USED IN THIS MANUAL**

本手冊中使用的縮寫和術語

Abbreviations 縮寫	Description 詳述
°C	Degree Celsius (Centigrade) 攝氏度
°F	Degree Fahrenheit 華氏度
rpm	Revolutions per minute 每分鐘轉速
125 MAX evo	see Manual (Type designation) 型號名稱-細節需查閱手冊
125 Junior MAX evo	see Manual (Type designation) 型號名稱-細節需查閱手冊
125 Mini MAX evo	see Manual (Type designation) 型號名稱-細節需查閱手冊
125 Micro MAX evo	see Manual (Type designation) 型號名稱-細節需查閱手冊
INTRO	Introduction ( 介紹 )
IPC	Illustrated Parts Catalog 圖解零件目錄
h	Hours ( 小時 )
OM	Operators Manual ( 操作手冊 )
kg	Kilograms ( 公斤 )
MON	Motor Octane Number ( 高負荷辛烷值 )
n.a.	not available ( 不可以 )
Nm	Newton meter ( 扭力：牛頓米 )
Rev.	Revision ( 修訂版次 )
RON	Research Octane Number ( 低負荷辛烷值 )
RM	Repair Manual ( 維修手冊 )
S/N	Serial Number ( 系列編碼 )
SI	Service Instruction ( 服務說明 )
SL	Service Letter 服務信件
part no.	Part number ( 零件料號 )
V	Volt 伏特 ( 電壓 )

# BRP-Rotax

## REPAIR MANUAL 修復手冊

### SAFETY 安全相關事宜

#### General note 一般注意事項

Although the reading of such information does not eliminate the hazard, the understanding the information will promote its correct use. Always take care by conducting manual work and use safety equipment. The information and components-/system descriptions contained in this Manual are correct at the time of publication. BRP-Rotax, however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on its products previously manufactured. 雖然閱讀這些信息並不能消除危險，但了解這些信息將促進其正確使用。施作過程一定要小心、並使用安全的設備來進行。本手冊中包含的信息和組件/系統說明在出版時是正確的。但是，BRP-Rotax 的政策會堅持對其產品進行持續改進，但不會將這些改進對應在其先前製造的產品上（此非義務）

#### Revision 修訂

BRP-Rotax reserves the right at any time, and without incurring obligation, to remove, replace or discontinue any design, specification, feature or other details. BRP-Rotax 保留隨時刪除、替換或終止任何設計、規格、功能或其他細節的權利，但不承擔任何義務。

**Specifications 規格** Specifications are given in the SI metric system with the USA equivalent in parenthesis. 規格以 SI 公制系統為主，括號中為英制數據(美國使用)。

### SAFETY NOTICE 安全注意事項

#### General note 一般注意事項

#### **m WARNING 警告**

#### **Non-compliance can result in serious injuries or death!**

Comply with the safety advice of the engine and kart manufacturer. 不遵守可能會導致重傷或死亡！請遵守發動機和卡丁車製造商的安全建議。

This information relates to the preparation and use of ROTAX® Kart engines and has been utilized safely and effectively by BRP-Rotax. However, BRP-Rotax disclaims liability for all damage and/or injuries resulting from the improper use of the contents. BRP-Rotax strongly recommend that any service be carried out and/or verified by a highly skilled professional mechanic. 此信息與 ROTAX® Kart 引擎的準備和使用有關，並已被 BRP-Rotax 安全有效地運用。但是 BRP-Rotax 不會對於因使用不當而造成的所有損壞和/或傷害承擔責任。BRP-Rotax 強烈建議由高度熟練的專業技師執行和/或驗證任何服務。

#### Manual 手冊

This Manual has been prepared as a guide to correctly service and maintain all ROTAX® Kart engines.  
This Manual uses technical terms which may be slightly different from the ones used in the Illustrated Parts Catalog.

## Chapter 1



# BRP-Rotax

## REPAIR MANUAL 修復手冊

It is understood that this Manual may be translated into another language. In the event of any discrepancy the English version prevails. 本手冊旨在作為正確保養和維護所有 ROTAX® Kart 發動機的指南。

本手冊使用的技術術語可能與圖解零件目錄中使用的術語略有不同。

本手冊可能會被翻譯成另一種語言。如有任何差異，以英文版本為準。

### Warning 警告

It is your responsibility to be completely familiar with the safety instructions including warnings and cautions described in this Manual. These warnings and cautions advise of specific operating and servicing methods that, if not observed, can cause a serious engine malfunction or cause the engine to lose power which can result in serious injury, damage to equipment or even to death.

It is, however, important to understand that these warnings and cautions are carefully checked. BRP-Rotax can not evaluate and advise the user of all conceivable ways in which service might be done or of the possible hazardous consequences that may occur. 您有責任完全熟悉本手冊中描述的安全說明，包括各警告和注意事項。這些警告和注意事項建議了特定的操作和維修方法，如果不遵守這些方法，可能會導致嚴重的發動機故障或導致發動機失去動力從而導致嚴重的人身傷害、設備損壞甚至死亡。

但是，重要的是要明瞭這些警告和注意事項都必須執行仔細檢查。BRP-Rotax 無法評估和建議用戶所有可能的服務方式或可能發生的危險後果。

### Safety instruction 安全指引

In addition to observing the instructions in our Manual, general safety and accident preventative measures, legal regulations and regulations of any superior authority must be observed.

Where differences exist between this Manual and regulations provided by any authority, the more stringent regulation should be applied.

除了遵守我們手冊中的說明外，還必須遵守一般安全和事故預防措施、法律法規和任何上級機構的規定。如果本手冊與任何權威機構提供的規定存在差異，則應採取較嚴格的規定。

# BRP-Rotax

## REPAIR MANUAL 修復手冊

**Illustration 插圖** The content depicts parts and/or procedures applicable to the particular product at its time of manufacture. It does not include dealer modifications, whether authorized or not by BRP-Rotax, after manufacturing the product. 內容描述了在製造時適用於特定產品的部件或程序。不包括經銷商在製造產品後進行的修改，無論是否由 BRP-Rotax 授權。

**Locking devices 鎖固、固定裝置** Locking devices (e.g. locking tab, self-locking fasteners, etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be replaced. 鎖固裝置（例如鎖定片、自鎖緊固件等）安裝或更換時都必須使用新品。

**Torque wrench tightening 鎖固扭力的實施** Torque wrench tightening specifications must be strictly adhered to. 必須嚴格遵守鎖固扭力規範數值。

### NOTE 注意事項

*If not specified otherwise, the threads are not lubricated when fastened. 如果沒有特別作指定，螺紋在鎖固時不需作潤滑。*

## INSTRUCTION 指引

### General note 一般注意事項

Engines require instructions regarding their application, use, operation, maintenance and repair.

Technical documentation and directions are useful and necessary complementary elements for personal instructions, but can by no means substitute theoretical and practical instructions.

These instructions should cover explanation of the technical context, advice for operation, maintenance, use and operational safety of the engine.

發動機需要有關其應用、使用、操作、維護和維修的說明。

技術文檔和指引是個人指導的有用和必要的補充要素，但絕不能替代理論和實踐指導。

這些說明應包括對發動機的技术背景的解釋、操作、維護、使用和使用安全的建議。

**Safety notice 安全注意事項** In this technical Manual passages concerning safety are especially marked. Pass on safety warnings to other users! 在本技術手冊中，已特別標註了有關安全的段落。將安全警告傳遞給所有用戶！

**Modifications 改裝** Non-approved modifications to the engine and associated components likewise releases BRP-Rotax from its warranty obligations. 對於發動機和相關部件的未經准許的改裝，BRP-Rotax將不進行保修義務。

**Accessories 配件** This engine must only be operated with accessories supplied, recommended and released by BRP-Rotax. Modifications are only allowed after the exceptional advice or approval by the engine manufacturer. 本發動機只能使用 BRP-Rotax 提供、推薦和發布的配件來施作。只有在獲得發動機製造商的特殊建議或准許後，才可進行改裝。

**ATTENTION 注意**

Spare parts must comply with the requirements defined by the engine manufacturer. This is only warranted by use of GENUINE ROTAX® spare parts and/or accessories (see IPC) or suitable equivalent in the manufacturer's opinion. Otherwise, any limited warranty by BRP-Rotax is null and void (see latest Warranty Conditions). Spare parts are available at the authorized ROTAX® Distribution- and Service Center. Any warranty by BRP-Rotax becomes null and void if spare parts and or accessories other than GENUINE ROTAX® spare parts and/or accessories are used (see latest Warranty Conditions). 備用零件必須符合發動機製造商規定的要求。只有使用 GENUINE ROTAX® 備件或配件 ( 參見 IPC ) 或製造商認為合適的等效物才能保證這一點。否則, BRP-Rotax 的任何有限保修均無效 ( 請參閱最新的保修條件 )。備用零件可在授權的 ROTAX® 分銷和服務中心取得。如果使用了 GEN-UINE ROTAX® 備件和/或附件以外的備件或配件, BRP-Rotax 的任何保修將失效 ( 請參閱最新的保修條件 )。

**Tools 工具****ATTENTION 注意**

Use only tools and appliances which are either cited in this Manual or in the Illustrated Parts Catalog of the relevant engine type for exceptional repair work. 特殊維修工作。只可使用本手冊或相關發動機類型的零件圖解目錄中引用的工具和設備來進行

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**Engine 發動機** A fundamental requirement is that on removal of the engine for repair or maintenance purposes it should be secured on the Special Tools part no. 877930 (Trestle support) and part no. 676052 (Trestle adapter) available at your authorized Distributor or Service center for ROTAX® Kart Engines. 基本要求：在出於維修或維護目的而拆卸發動機時，應將其固定在特殊工具：料號 877930(支撐支架)。ROTAX® Kart 發動機的授權經銷商或服務中心提供 676052(轉接支架)。

## TECHNICAL DOCUMENTATION 技術文檔

### General note 一般注意事項

The information contained is based on data and experience that are considered applicable for skilled mechanics under normal conditions.

Due to the fast technical progress and fulfillment of particular specifications of the customers it may occur that existing laws, safety prescriptions, constructional and operational regulations cannot be transferred completely to the object bought, in particular for special constructions, or may not be sufficient.

在正常條件下，以下鎖包含的信息適用於熟練技工的經驗和數據。

由於技術快速的進步和為了滿足特定規格，現有的法律、安全規定、結構和操作規定可能無法完全轉移到所購買的對象上，特別是對於特殊結構，也許不夠使用。

### Status 狀態

The current edition of the Manual is shown at the bottom of the pages or on the front cover. 本手冊當前的版本顯示在頁面底部或封面上。

### Reference 參考

Any reference to a document refers to the latest edition issued by BRP-Rotax, if not stated otherwise. 除非另作言明，對文件的任何參考均以 BRP-Rotax 發布的最新版本為主。

### Illustrations 插圖

The illustrations in this Manual are sketches and show a typical arrangement. They may not represent in full detail or the exact shape of the parts which have the same or similar function. Therefore deduction of dimensions or other details from illustrations is not permitted as the scale may not be 1:1. 本手冊中的插圖是概況圖，顯示基本的典型配置。它們或許無法完整詳細地表示具有相同或相似功能的部件確切形狀。因此，不允許從插圖中來認定尺寸或其他細節，因為比例可能不是 1:1。

### NOTE 注意事項

*The Illustrations and Documents in this Manual are stored in a database and are provided with a consecutive number.*

*This number (e.g. KA\_125MAX\_001) is of no significance for the content.*

本手冊中的插圖和文檔存儲在數據庫中，並提供連續編號。

這些數字對內容沒有意義（例如 KA\_125MAX\_001）

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**USE FOR INTENDED PURPOSE 使用之預期目的**

**Safety note 安全注意事項**

**m WARNING 警告**

**Non-compliance can result in serious injuries or death! 不遵守可能會導致重傷或死亡！**

**Use 用途**

The ROTAX Engine Type 125 MAX has been designed and developed exclusively for use in a Kart. Any other use renders the BRP-Rotax factory limited warranty null and void.

ROTAX 125 MAX型發動機是專為卡丁車而設計和開發。任何其他用途都會導致 BRP-Rotax 工廠有限的保修失效。

**Maintenance and repair conditions**

**保養和維修條件**

Use for intended purpose also includes observation of the operational, maintenance and repair conditions prescribed by the manufacturer. This is a crucial factor concerning the reliability of the engine and can increase the durability of the engine.

遵守製造商規定的操作、維護和維修條件。是關乎發動機可靠性的關鍵因素，可提高發動機的耐用性。

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**TECHNICAL DATA 技術規格**

Engine Type 引擎型式	125 MAX evo / 125 Junior MAX evo / 125 Mini MAX evo / 125 Micro MAX evo
Bore/stroke 內徑/行程	54.00 mm / 54.5 mm
Displacement 排氣量	125.0 cc
Nominal power (max.) 最大功率 125 MAX evo 125 Junior MAX evo 125 Mini MAX evo 125 Micro MAX evo	22 kW at 11500 rpm 17 kW at 8500 rpm 11 kW at 8500 rpm 6 kW at 7500 rpm
Torque (max.) 最大扭矩 125 MAX evo 125 Junior MAXevo125 Mini MAX evo 125 Micro MAX evo	21 Nm at 9000rpm 19 Nm at 8500rpm 13 Nm at 8000rpm 9 Nm at 7500 rpm
Idle speed 怠速轉速	between 1500 and 2000 rpm 介於1500 至2000 rpm
Highest permissible speed 最高轉速 125 MAX evo 125 Junior MAX evo 125 Mini MAX evo 125 Micro MAX evo	13500 rpm (at operation on the track, under load) 12200 rpm (at operation on the track, under load) 11500 rpm (at operation on the track, under load) 10500 rpm (at operation on the track, under load) (賽道上、有負荷的工況)
Ignition unit 點火模組	Contactless, (variable) digital coil ignition 無接觸、可變點火 ( C D I )
Spark plug 火花塞	NGK GR8DI-8 or NGK GR9DI-8
Electrode gap 火花塞電極間隙	<1 mm <1.20 mm for 125 Micro, 125 Mini MAX evo
Fuel 燃油規格	Super, unleaded fuel ( 有鉛或無鉛汽油 )
RON (min.) 汽油最低辛烷值牌號	Min. 95 Octane ( 汽油最低辛烷值牌號 : 95 )
Cooling 冷卻	Liquid cooling: Cooling circuit with integrated coolant pump 水冷 : 迴路與水泵整合
Flow rate of the coolant pump	approx. 22 liters at 11000 rpm

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水泵流量	11000 rpm狀態下，大約22公升
Coolant mixture 冷卻液 混合量	100 % Water (distilled). Drain water after operation in cold condition to prevent freezing.  使用100% 蒸餾水  發動機冷機狀態下，把水漏掉、以避免結凍
Coolant capacity 冷卻液容量	0.6 liter 0.6 公升
Engine lubrication 發動機潤滑油	Oil-in-gasoline lubrication, synthetic 2 Stroke oil 預混合式，二行程合成機油，建議機油如以下括弧內的指定規格  (RO- TAX XPS KART-TEC Oil part no. 29460 and ROTAX SYNMAX Oil recommended).
Mixture ratio ( 機油 ) 混合比率	1:50 (2 % oil) 1:50 (汽油98%, 機油2%)

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Engine Type	125 MAX evo / 125 Junior MAX evo / 125 Mini MAX evo / 125 Micro MAX evo
Lubrication of the differential drive 差速驅動潤滑	SAE Engine oil 15W-40
Engine oil capacity 發動機機油容量	50 ml (for plastic balance gears) 塑膠平衡軸款：50 cc.  100 ml (for steel balance gears)  鋼質平衡軸款：100cc.
Engagement speed 離合器搭接轉速	approx. 4000 rpm 大約 4000 rpm
Power transmission from centrifugal clutch to the rear axle of the kart 從離心式離合器到卡丁車後橋的動力傳輸  (簡譯：傳動方式)	roller chain 滾子鏈
Chain dimension 鍊條尺寸	7.75 x 4.6 x 4.5
Number of teeth of the drive sprocket 驅動鏈輪 ( 前鏈輪 ) 的齒數	11, 12, 13, 14, 15, 16 teeth 11, 12, 13, 14, 15, 16 齒
Weight /dry 乾燥重量	approx 12 kg 約 12公斤  without intake silencer, carburetor, fuel pump, radiator, exhaust and battery 不包含：進氣消音器、化油器、燃油泵、散熱水箱、排氣系統以及電池



## **Chapter: Chapter 2** **MAINTENANCE**

### **TOPICS IN THIS CHAPTER** 本章節主題

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<b>Authorized personnel</b> 授權人員 .....	<b>3</b>
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**Contents** 內容      The information given in the Repair Manual is based on data and experience which are considered to be applicable for a skilled mechanic under normal working conditions. 維修手冊中提供的信息是基於數據和經驗，這些數據與經驗被認為適用於熟練技工在正常工作條件的狀況。

### **Table of contents**表格內容

In this chapter the repair of engine ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo) is described. Some overlapping maintenance instructions are treated as generally valid information at the beginning of this section. 本章介紹了發動機 ROTAX® 125 MAX evo (包括 Junior-、Mini-、Micro MAX evo) 的維修。在本節的開頭，一些重複的維護說明是有效的信息。

**BRP-Rotax**  
REPAIR MANUAL 修復手冊

**Safety notice**  
安全須知

**GENERAL NOTE 一般注意事項**

**m WARNING**

**Non-compliance can result in serious injuries or death! 若不遵守可能會導致重傷或死亡！**  
Besides our instructions in the documentation supplied, also respect the generally valid safety and accident preventive directives and legal regulations. 除了在此提供的文檔中的說明外，一般普及的安全和事故預防指令和法律法規也都應遵守。

**Procedures and limits** 程序與限制

The procedures and limits in this Manual constitute the manufacturers official recommendation for engine maintenance and operation 本手冊中的程序和相關限制就是製造商對發動機維護和操作的官方建議

**Instruction** 操作說明

The guidelines given in the Repair Manual are useful and necessary supplements to training. They, however, cannot substitute competent theoretical and practical personal instruction. 修復手冊中給出的指引是對培訓有效且必要的補充。但絕不能替代理論和實踐指導。

**Modifications** 改造

Non-authorized modifications as well as the use of components and auxiliary components not corresponding to the installation instructions exclude any liability of the engine manufacturer 未經授權的改裝以及使用不符合安裝說明的部件和輔助部件，發動機製造商將不承擔任何責任

**Parts and accessories**  
部件和配件

We particularly emphasize that parts and accessories not supplied as genuine BRP-Rotax parts are not verified for suitability by BRP-Rotax and thus are not authorized for use. Installation and/or use of such products may possibly change or negatively influence the constructive characteristics of the engine. For damages resulting from use of non-genuine parts and accessories manufacturer refuses any liability. 在此特別強調，並非正品 BRP-Rotax 提供的部件和配件因為未經 BRP-Rotax 驗證適用，所以無法授權使用。安裝和/或使用此類產品可能會改變或對發動機的結構特性產生負面影響。對於因使用非原廠部件和配件而造成的損壞，製造商拒絕承擔任何責任

**Special tools** 特殊工具

Maintenance of engines and systems requires special knowledge and special tools. Use only the special tools recommended by BRP-Rotax when disassembling and assembling the engine. 發動機與系統的維護需要特殊知識及特殊工具。拆解和組裝發動機時，只能使用 BRP-Rotax 推薦的專用工具。

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**AUTHORIZED PERSONNEL授權人員**

**General note 一般注意事項** It is a requirement that all organizations or individuals have the required special tooling available and the necessary, training or experience to perform all tasks outlined. 要求所有團隊或個人都配有所需的特殊工具以及經過必要的培訓與經驗來執行本冊所述的所有任務。

**Type-specific training**  
特定型式的培訓

Any task outlined herein may be performed if the organization or individual has met the following conditions: 如果團隊或個人可滿足以下條件，則可以執行本冊所述的所有任務：

<b>Requisite knowledge</b> 必備的知識
<ul style="list-style-type: none"><li>• Experience in performing the task <b>and</b> knowledge of ROTAX® Installation/Operators Manual and Repair Manual執行任務的經驗和 ROTAX® 安裝/操作手冊及修復手冊的知識</li></ul>
<b>Including:</b> 包含：
<ul style="list-style-type: none"><li>• Suitable work environment to prevent contamination or damage to engine parts or modules. 合適的工作環境，以防止污染、損壞發動機零件或模塊。</li><li>• Appropriate tools and fixtures as outlined in the ROTAX® Repair Manual. ROTAX® 維修手冊中概述的適當工具和固定裝置。</li><li>• Reasonable maintenance practices are utilized. 實施合理的維護。</li></ul>

**Information 信息** Maintenance organizations and individuals are encouraged to contact BRP-Rotax through its worldwide distribution network for information and guidance on any of the tasks outlined herein. 在此鼓勵各個團隊或個人通過其全球經銷網絡聯繫 BRP-Rotax，以獲取有關本冊所述的所有任務的信息和指導。

## PROCESS ADVICE 建議的工序

### Safety note 安全注意事項

#### m WARNING 警告

**Non-compliance can result in serious injuries or death! 不遵守可能會導致重傷或死亡！**

When carrying out maintenance and service work, respect without fail the safety regulations. 在進行維護和服務工作時，請務必遵守安全規定。

### Ignition “OFF” 熄火

#### m WARNING 警告

**Non-compliance can result in serious injuries or death! 不遵守可能會導致重傷或死亡！**

This precautionary measure serves to avoid any injuries in case of an unintentional start of the engine. Principally ensure the following at each maintenance event: 1.) Ignition “OFF” and system grounded, 2) Disconnect battery and secure engine against unintentional operation. 以下預防措施用意在於避免在發動機意外啟動時造成任何傷害。在每次維護時，主要確保以下幾點：1.) 點火「關閉」且系統接地，2) 斷開電池並防止發動機意外運行。

### Handling of fluids 流體 (流質) 處理

#### m WARNING 警告

**Non-compliance can result in serious injuries or death! 不遵守可能會導致重傷或死亡！**

Non-compliance with this instruction may cause severe burns or scalding! Hot engine parts! Always allow the engine to cool down to ambient temperature before starting work. 不遵守此說明可能會導致嚴重燒傷或燙傷！發動機部件很燙！在開始工作之前，一定要先讓發動機冷卻至環境溫度。

At maintenance of cooling-, lubricating and fuel system take care without that no contamination, metal chips, foreign material and/or dirt enters the system. 在維護冷卻、潤滑和燃油系統時要小心，不要讓污染物、金屬屑、異物和/或灰塵進入系統內。

**Disassembly 拆解** At disassembly of the engine, mark the components as necessary to avoid any mix-up. Take care of these marks, do not ruin them. 在拆卸發動機時，根據需要將部件作避免混淆的標記。維持好這些標記，不要破壞它們。

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REPAIR MANUAL 修復手冊

**Tool 工具**

**ATTENTION 注意**

In order to avoid mechanical damages, never loosen or tighten screws and nuts with pliers but only with the specified tools. 只可使用指定的工具擰鬆或鎖固螺栓和螺帽。切勿使用鉗子以避免機械損壞

**Safety wiring 安全的接線 (保安部品的更換)**

**ATTENTION 注意**

If during disassembling/reassembling the removal of a safety item (e.g. safety wiring, self-locking fastener, etc.) should be necessary, it must be always replaced by a new one. 如果在拆卸/重新組裝過程中需要拆除保安部品 (例如安全接線、自鎖緊固件等) , 則一定必須更換新品

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## REPAIR MANUAL 修復手冊

### Cleaning of parts 部件的清潔

#### ATTENTION 注意

All metal and synthetic parts are generally washed with suitable cleaning agents. Before using new and unknown cleaning agents check the compatibility of materials. 所有金屬和合成部件都要採用合適的清潔劑作清洗。在使用新的或是未知的清潔劑之前，請先檢查材料的兼容性。

#### Removed parts 關於拆下的部件

Before re-using disassembled parts, clean, check and refit them as per instructions.

拆卸的部件要重新使用之前，請按照說明來清洗、檢查和重新安裝它們。

Use clean screws and nuts only and inspect face of nuts and thread for damage. Check the contact faces and threads for damages. In case of doubt, use new screws and nuts 僅使用乾淨的螺栓和螺帽，並檢查螺帽和螺紋的表面、接觸面和螺紋是否損壞。如有疑慮，就換新的螺栓和螺帽

#### Measurements 部件的量測

When making low tolerance measurements ( $s < 0.1$  mm) and in measuring bearing and housing components, the temperature of the components and their surroundings must be in the range 20 °C - 25 °C (68 °F – 77 °F). Only used certified measuring tools! 在進行精密公差測量 ( $s < 0.1$  mm) 以及測量軸承和軸承座組件時，組件及其周圍環境的溫度必須在 20 °C - 25 °C (68 °F – 77 °F) 的範圍內。且需使用經過認證的測量工具！

#### Nuts 螺帽

Once loosened, **always** replace self-securing nuts! 一旦鬆動，請務必更換新的防鬆螺帽！

#### Sealing rings, O-rings 密封環, O型環

At reassembly of the engine, replace all sealing rings, gaskets, securing elements, O-rings and oil seals. 重新組裝發動機時，所有密封環、墊圈、固定元件、O形環和油封都需更換新品

#### Re-assembly 重新組裝

Before re-assembly check components whether parts are missing. Only use adhesives, lubricants, cleaning agents and solvents indicated in the maintenance instructions. If not respected, damage may be the consequence and no warranty claim. 在重新組裝之前請檢查組件是否缺件。只能使用修復手冊中指定的粘合劑、潤滑劑、清潔劑和溶劑。如果不遵守，可能會導致損壞，並且無法保修索賠。

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REPAIR MANUAL 修復手冊

**CONSUMABLE MATERIALS 耗材**

**General note**

一般注意事項

**ATTENTION 注意**

Use only the specified or **technically equivalent** materials from BRP-Rotax for all maintenance work. When handling chemicals, comply with all the customary regulations and specifications of the producer, including the expiry date and instruction. 所有維護工作只可採用 BRP-Rotax 指定的或等效技術規格的材料來進行。處理化學品時，請遵守生產商的所有制式規定和規範，包括有效期和說明。

**NOTE 注意事項**

*If necessary contact the manufacturer concerning the comparability of the consumable materials. In some cases information can be obtained from the local authorized distributors and service partners for ROTAX engines. 如有必要，請聯繫製造商了解耗材的比對相容性。這通常可從 ROTAX 發動機的當地授權經銷商和服務合作夥伴處獲得信息。*

**NOTE 注意事項**

*Respect the manufacturers instruction concerning the curing time and the expire date of the particular surface sealing compound. 依循製造商關於特定表面密封劑（密封膠）的固化時間和失效日期的說明。*

The materials specified have been tested for a long time and are suitable for all operating conditions indicated by the manufacturer. 原廠設定的材料已通過長時間測試，適用於製造商所規範的所有操作工況。

No.	Part no.	Description, Application	Qty.
1	897651	<b>LOCTITE 243 blue,</b> medium-duty screw securing agent 中強度螺絲緊固劑	10 ml (0.003 US gal.)
2	899788	<b>LOCTITE 648 geen,</b> high strength screw securing agent 高強度型螺絲緊固劑	5 ml (0.001 US gal.)
3	297434	<b>LOCTITE Anti-Seize 15378,</b> for the prevention of fretting corrosion 用於防止微動腐蝕	50 g (0.11 lb)

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4	897161	<b>MOLYKOTE 111</b> REPAIR MANUAL 修復手冊 long-term lubricant for shaft seal 軸封用的長效潤滑劑	100 g (0.22 lb)
5	897330	<b>Lithium-based grease or Dow Corning</b> to prevent leakage current 鋰基潤滑脂或Dow Corning(硅膠) 防止漏電流	250 g (0.55 lb)
6	25473	<b>XPS Kart TEC DD2 Kart Gear oil Lubricant</b> XPS Kart TEC DD2 卡丁車潤滑齒輪油	1000 ml (0.26 US gal)
7	296160	<b>Engine gasket set</b> 發動機墊片套件	1
-	n.a.	<b>Cleaning agents</b> 清潔劑	as required 如有需要



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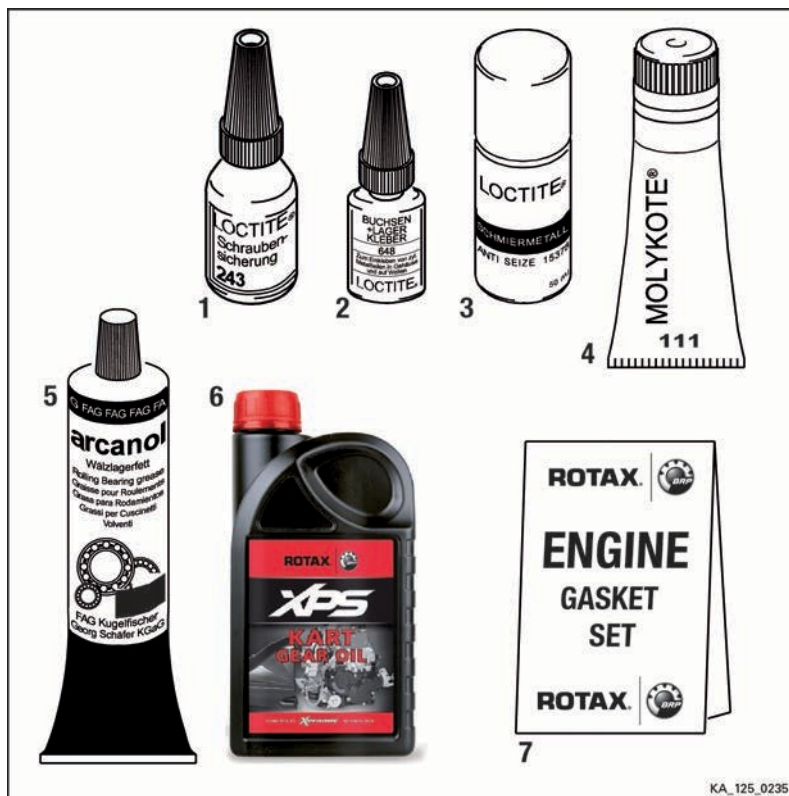
## REPAIR MANUAL 修復手冊

### ATTENTION 注意

**Use only approved cleaning agents (e.g. kerosine, varsol, etc.) for cleaning all metal parts. 清潔所有金屬部件只可使用經認定的清潔劑 (例如煤油、varsol 等)**

Do not use lye-based cold cleaner or degreasing agents. Do not clean coolant or oil hoses with aggressive solutions. Clean off sealing compound residue with sealant remover. Soak combustion chamber, piston and cylinder head with cleaning agent and remove combustion residues with a bronze brush. Very good results have been achieved with "Clenvex 2000". It is a solvent-cold cleaner, free of halogen, on the basis of selected fuel fractions with tensides and is biologically disposable. Never use caustic or corrosive cleaning. 清潔冷卻液或油管請勿使用鹼液冷清潔劑或脫脂劑，勿使用腐蝕性溶液。清除密封殘留膠需使用專用的密封膠去除劑。用清潔劑浸泡燃燒室、活塞和氣缸蓋，並用銅刷清除燃燒殘留物。“Clenvex 2000”這種溶劑型冷清潔劑有非常好的效果，它不含鹵素，基於具有表面活性劑的選定燃料餾分，並且是生物一次性的。切勿使用腐蝕性或腐蝕性清潔劑。

Figure 圖 2.1



**SPECIAL TOOLS 特殊工具**

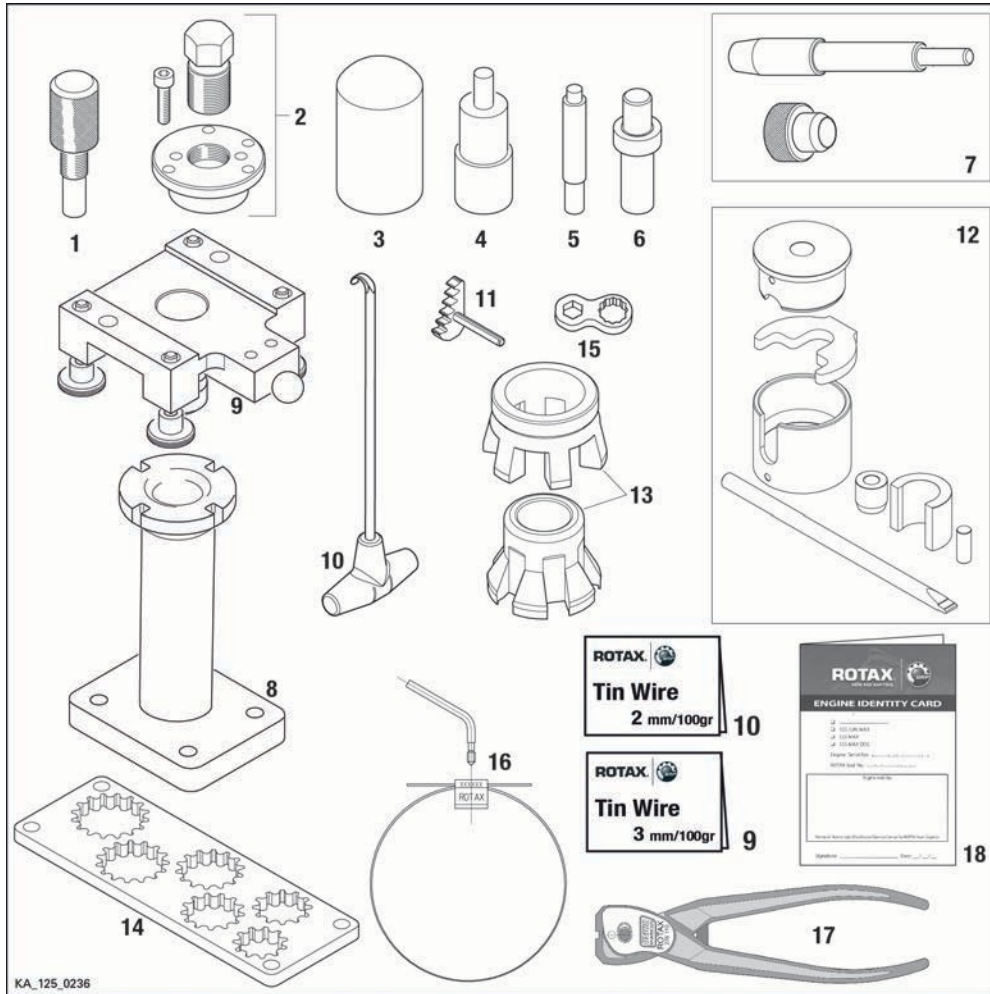


Figure 圖 2.2

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No. 編號	Part no. 料號	Description 說明
1	277381	Fixation tool for crankshaft 曲柄軸固定工具
2	276016	Puller assy.拉拔器總成
3	676010	Insertion sleeve 插入襯套
4	676021	Insertion jig 插入治具
5	676030	Insertion jig 插入治具
6	676040	Insertion tool 插入工具
7	676035	Insertion tool 插入工具
8	877930	Trestle support 支撐架
9	580132	Tin wire 3 mm 100 GR 錫線3 mm 100 GR
10	580130	Tin wire 2 mm 100 GR 錫線2 mm 100 GR
11	676205	Fixation tool assy. MAX 固定用工具總成 MAX.
12	276051	Crankshaft repair jig 曲柄軸維修治具
13	276070	Assembly tool bellow spring exhaust v.排氣彈簧組裝工具
14	277364	Fixation, Tool for sprocket 鏈輪固定工具
15	676110	Wrench adapter 11/8 , 11/8板手轉接器
16	297041	ROTAX SEAL with bar code For authorised distributor only. ( 此項目僅授權經銷商 )
17	276110	ROTAX SEAL CALLIPER For authorised distributors only. ( 此項目僅授權經銷商 )
18	297240	ENGINE IDENTITY CARD 發動機身份識別卡

## INSPECTION AND SERVICING INTERVALS OF THE ENGINE COMPONENTS

### 發動機部件的檢查及維修週期

**Safety note** 安全注意事項

<b>m WARNING 警告</b>		
<p><b>Non-compliance can result in serious injuries or death!</b> 不遵守可能會導致重傷或死亡！</p> <p>All repair and maintenance work must only be carried out by a qualified technician. 所有維修和保養工作只能由合格的技術人員進行</p>		
Points of inspection 檢查重點	Interval Operating hours 作業間隔時間	Chapter Reference 參考章節
Inspection, remedial action 檢查, 補救措施	as indicated 以下所示	
<b>1) General 一般項目</b>		
Inspect spark plug, replace if necessary 檢查火花塞，如有必要就更換	Inspect before every operation of vehicle 車輛運轉之前都要檢查	
Replace spark plug. 更換火花塞	Every 25 hours of operation 每25小時進行一次	
<b>2) Cooling system 冷卻系統</b>		
Check coolant level. 確認冷卻水高度	Inspect before every operation of vehicle 車輛運轉之前都要檢查	
Inspect water pump for sealing, in the event of egress of oil or coolant from the overflow orifice, have the pump repaired by an authorised service center. 檢查水泵的密封性，如果溢流孔有油或冷卻液流出，請由授權服務中心修理。	Inspect before every operation of vehicle 車輛運轉之前都要檢查	
Inspect the cooling water connections on the cooler housing and cylinder head cover for tightness and sealing. 檢查冷卻器外殼和缸頭上的冷卻水連接頭是否有鎖緊且密封。	Inspect before every operation of vehicle 車輛運轉之前都要檢查	

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<p>Inspect the radiator hoses and hose clamps on the engine and radiator for tightness and sealing. 檢查發動機和水箱的軟管與軟管夾是否有鎖緊且密封。</p>	<p>Inspect before every operation of vehicle 車輛運轉之前都要檢查</p>	
<b>3) Carburetor and intake silencer 化油器以及進氣消音器</b>		
<p>Inspect the carburetor connections to the engine and to the intake silencer for tightness. 檢查化油器與發動機和進氣消音器的連接是否有鎖緊。</p>	<p>Immediately after every collision 每有碰撞，須立即處理</p>	
<p>Clean the filter element in the intake silencer and lubricate with air filter oil, replace damaged filter element. 清潔進氣消音器中的濾芯並用空氣濾清器油潤滑，濾芯如損壞就直接更換。</p>	<p>Every 10 hours (depending on the conditions of use) 每10小時進行一次 (依實際使用狀況來斟酌)</p>	

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Points of inspection 檢查重點	Interval Operating hours 作業間隔時間	Chapter Reference 參考章節
<b>Inspection, remedial action</b> 檢查,補救措施	<b>as indicated</b> 以下所示	
<b>4) Fuel system 燃油系統</b>		
Inspect fuel filter for dirt, replace if required. 檢查燃油濾清器·髒了就換掉	Inspect before every operation of vehicle 車輛運轉之前都要檢查	
Inspect fuel screen from the carburetor. 檢查化油器的燃油濾網	Every 10 hours of operation 每運轉10小時進行一次	
<b>5) Exhaust system 排氣管系統</b>		
Inspect exhaust system for sealing and tightness, lubricate with oil to prevent corrosion. 檢查排氣系統的密封性並鎖緊·用油來潤滑以防止腐蝕。	Inspect before every operation of vehicle 車輛運轉之前都要檢查	
Replace the silencer matting in the exhaust system. 更換排氣系統中的消音墊。	Every 10 hours of operation 每運轉10小時進行一次	
<b>6) Outlet control 排氣控制</b>		
Clean the exhaust valve and check for free movement. 清潔排氣閥·確認自由間隙	Every 10 hours of operation 每運轉10小時進行一次	
<b>7) Gearbox 齒輪箱</b>		
Check the oil level, top up if necessary 確認油位·如有不足就加滿。	Every 2 hours of operation 每運轉2小時進行一次	
Renew gear oil. 更換齒輪油	Every 5 hours of operation 每運轉5小時進行一次	
<b>8) Starter drive 啟動驅動器</b>		
Inspect for wear, replace if necessary. 檢查是否磨耗 如有必要就更換	Every 50 hours of operation (depending on the conditions of use) 每運轉50小時進行一次	

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	(依實際使用狀況來斟酌)	
<b>9) Clutch 離合器</b>		
Inspect clutch drum needle bearing for wear, replace if necessary. 檢查離合器鼓、滾針軸承是否磨耗 如有必要就更換	Every 10 hours of operation 每運轉10小時進行一次	
Clean the sealing groove in the starter gear assy. 清潔啟動齒輪內的密封油脂	Every 10 hours of operation 每運轉10小時進行一次	
<b>10) Engine inspection 發動機 ( 整體 ) 檢查</b>		
Engine inspection by authorized service center, replace defective parts. 由具有授權的服務中心檢查發動機，更換有缺陷的零件。	Every 50 hours of operation 每運轉50小時進行一次	

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NOTES 筆記



Chapter 3: 第三章  
**ENGINE 發動機**

**TOPICS IN THIS CHAPTER 本章節主題**

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Removal of the fuel line 燃油管路的拆卸 .....	7
Removal of the Bowden cable 化油器拉索的拆卸 .....	8
Removal of the engine from kart chassis 自卡丁車架拆下發動機 .....	8
Positioning the engine on the trestlemounting plate 發動機放上支架安裝板 ( 拆解台 ) .....	10

**Contents內容**      This chapter describes the disassembly and assembly of the ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo) engine.  
此章節介紹這些發動機的組裝與拆解：ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo)

## SYSTEM DESCRIPTION 系統說明

### Overview 概述

### Engine 發動機

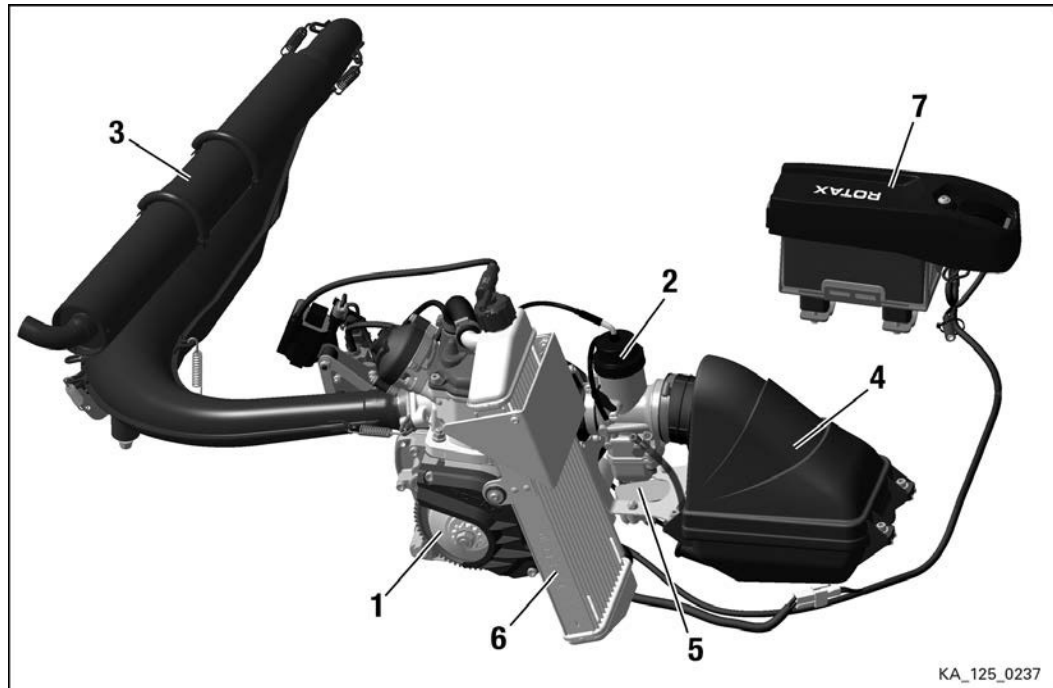


Figure 3.1: Engine components 發動機組件

- |  |                         |
|--|-------------------------|
| 1 Engine 發動機                           | 2 Carburetor 化油器        |
| 3 Exhaust system 排氣系統                  | 4 Intake silencer 進氣消音器 |
| 5 Fuel pump 燃油泵                        | 6 Radiator 冷卻水箱         |
| 7 Battery mounting + ECU<br>電瓶支架 + ECU |                         |

## PREPARATION FOR REMOVAL 拆卸前的準備

Safety instructions 安全指引

### m WARNING 警告

Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work. 在開始任何工作之前，一定要讓發動機冷卻至環境溫度。否則會有嚴重燒傷和燙傷的危險！

## REMOVAL OF THE IGNITION SYSTEM 點火系統的拆卸

Safety instructions 安全指引

### m WARNING

Risk of electric shock! Ignition "OFF" and system grounded! Disconnect negative terminal of battery.

### NOTE 注意事項

When disconnecting the battery be sure to always disconnect the negative terminal before the positive terminal. Remember that when the engine is running the ignition system has a high voltage of 35 kV; the spark plug therefore must not be removed with the engine running. 斷開蓄電池前務必先斷開負極、再斷開正極。請記住：當發動機運行時，點火系統有 35 kV 的高電壓；因此不得在發動機運轉時拆火花塞。

Instruction 指引 See [Figure圖: Battery](#). 電瓶

Proceed as follows to disconnect battery. 依以下步驟移除電瓶的連接

1. Remove the Allen screw with rounded flange head M6x20 (3) with O-ring 5x2 (2).  
拆下內六角螺柱 M6x20(圖示3號件) 以及O型環 5x2 (圖示2號件)
2. Remove the battery cover (1).  
拆下電瓶蓋板 (圖示1號件)
3. Disconnect the negative battery terminal (5).  
拆下電瓶負極端子 (圖示5號件)

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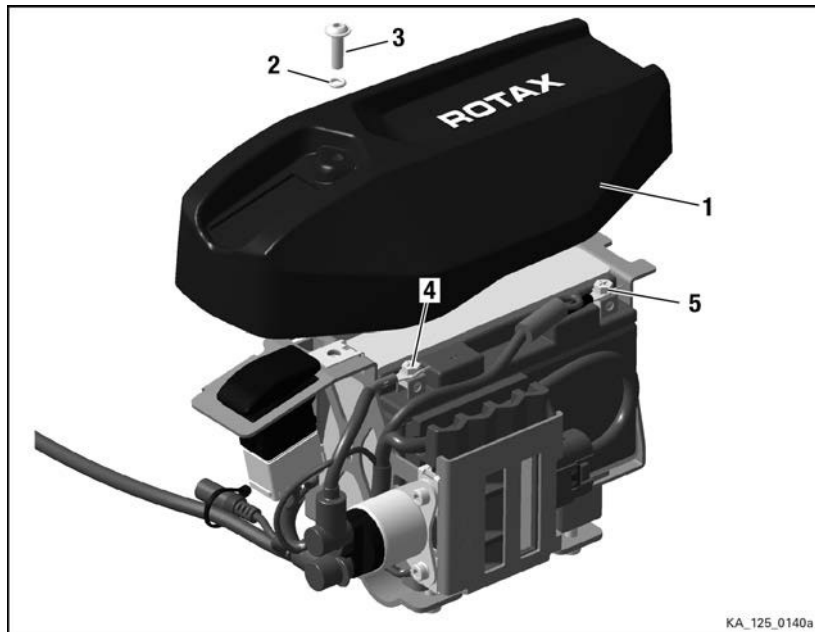


Figure 3.2: Battery 電瓶

- |   |                                       |
|---|---------------------------------------|
| 1 Battery cover 電瓶蓋板                                  | 2 O-ring O型環                          |
| 3 Allen screw with rounded flange head<br>附盤型法蘭的內六角螺栓 | 4 Positive battery terminal<br>電瓶正極端子 |
| 5 Negative battery terminal<br>電瓶負極端子                 |                                       |

**Instruction 指引** See [Figure圖: Ignition system. 點火系統](#)

4. Pull the spark plug connector (1) off the spark plug. Minimum removal force 30 N.  
拔起火花塞連接頭 (圖示1號件) · 最小拔脫力是30牛頓 (約3 kg)
5. Remove the cable tie (11).  
移除配線綁帶 (圖示11號件)
6. Disconnect the plug connections (6) on the ignition coil (2).  
從點火線圈上 (圖示2號件) · 斷開點火線圈接頭 (圖示6號件)
7. Disconnect the plug connection (7) on the solenoid valve (5).  
從電磁閥上 (圖示5號件) · 拔開電磁閥接頭 (圖示7號件)
8. Disconnect the connector (9) for the pick up sensor (3)  
從曲軸角度傳感器 (圖示3號件) · 拔開它的接頭 (圖示9號件)
9. Disconnect the connector (10) for the starter (4).  
從啟動電機 (圖示4號件) · 拔開它的接頭 (圖示10號件)

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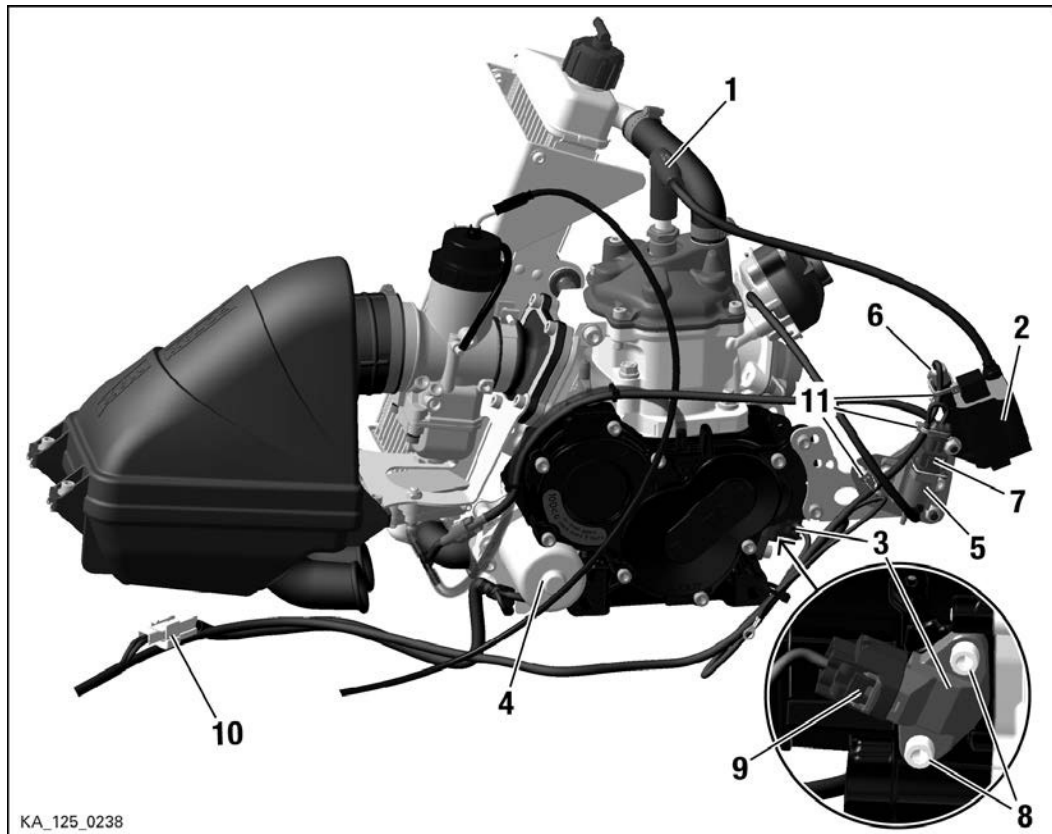


Figure 圖 3.3: Ignition system 點火系統

- |   |                                  |
|---|----------------------------------|
| 1 Spark plug connector 火花塞接頭                  | 2. Ignition coil 點火線圈            |
| 3 Crankshaft positioning sensor (CPS) 曲軸角度傳感器 | 4 Electric starter 啟動電機          |
| 5 Solenoid valve 電磁閥                          | 6 Connector ignition coil 點火線圈接頭 |
| 7 Solenoid connector 電磁閥接頭                    | 8 Allen screw 內六角螺栓 M6x25        |
| 9 CPS connector 曲軸角度傳感器接頭                     | 10 Starter connector             |
| 11 Cable tie (配線的) 綁帶                         | 啟動電機 (配線) 接頭                     |

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## REMOVAL OF THE EXHAUST SYSTEM 排氣系統的拆卸

**General 概要** Proceeds follows to dismantle the exhaust system: 排氣系統的拆卸步驟如下：

Step 步驟	Procedure 程序
1	Removal of the exhaust system. See Chapter 9. 拆卸排氣系統，參考第9章節

## REMOVAL OF RADIATOR WITH CAP ASSY. 水箱與水箱蓋總成的拆卸

**General 概要** Proceeds follows to dismantle the radiator with cap assy.: 水箱總成的拆卸步驟如下：

Step 步驟	Procedure 程序
1	Removal of radiator with cap assy. See Chapter 8. 拆卸水箱與水箱蓋總成，參考第8章節

## REMOVAL OF THE FUEL LINE 燃油管路的拆卸

### Safety 安全

#### instructions 指引

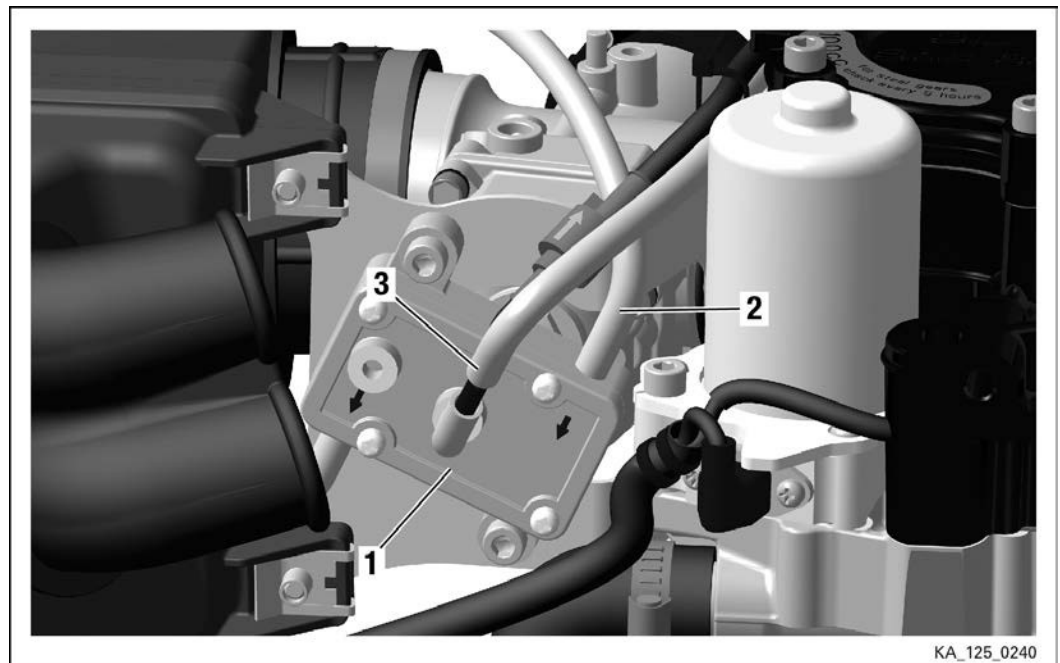
#### **m WARNING 警告**

#### **Danger of explosion and ignition! 具有爆炸和燃燒的危險！**

Overflowing and spoilt gasoline must be absorbed immediately with a binding agent and correctly disposed. Do not work with open flames and sources of ignition. Fuel must not come into contact with hot engine parts or components. 溢出和變質的汽油必須立即用粘合劑吸收並正確處理。不可在明火和火源下工作，燃油不得與發動機或排氣管等發熱的部件接觸，否則可能會引起火災！

**Instruction 指引** Proceed as follows to remove the fuel line: 依照以下的程序來拆解燃油管路

1. Pull off fuel line (2) from the fuel pump (1). 自燃油泵拔起燃油管路



Figure圖 3.4: Fuel components 燃油系統組件

1 Fuel pump 燃油泵

2 Fuel line 燃油管

3 Impulse hose 導壓管

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### REMOVAL OF THE BOWDEN CABLE 化油器 (油門) 拉索的拆卸

**Instruction 指引** Proceed as follows to remove the Bowden cable: 依照以下的程序來拆解化油器 (油門) 拉索

1. Remove the carburetor cover (1). 移除化油器上蓋(1號件)
2. Release the nipple screw from the slide. 由滑蓋鬆開此細長螺紋接頭
3. Disconnect the Bowden cable (2) from the nipple screw (3). 由此細長螺紋接頭(3號件)來拆除化油器拉索(2號件)

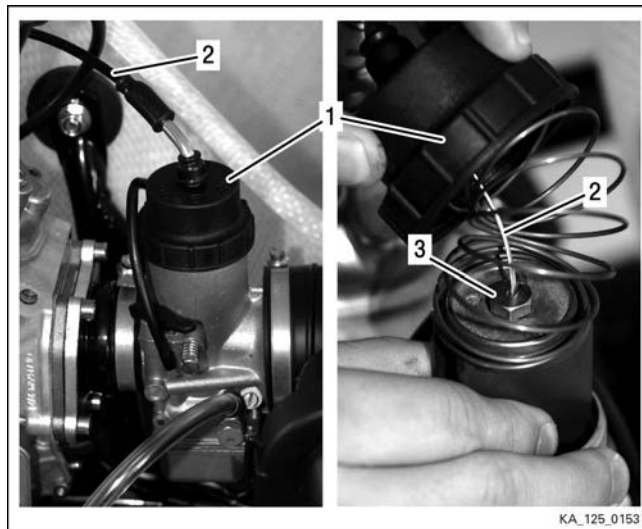


Figure 圖 3.5: Bowden cable 化油器拉索

1 Carburetor cover 化油器上蓋

2 Bowden cable 化油器 (油門) 拉索

3 Nipple screw 細長的螺紋接頭

### REMOVAL OF THE ENGINE FROM KART CHASSIS 自卡丁車架卸下發動機

#### General 概要

Loosen the engine from chassis following the chassis manufacturer's instruction.

Remove both screws (engine clamps) and disconnect all cables.

依照車架製造商的說明，從底盤上鬆開發動機。

卸下兩個螺絲 (發動機夾塊的螺絲) 並斷開所有線纜。

#### NOTE 注意事項

*The engine **must not** be removed from the chassis to repair the following parts:*

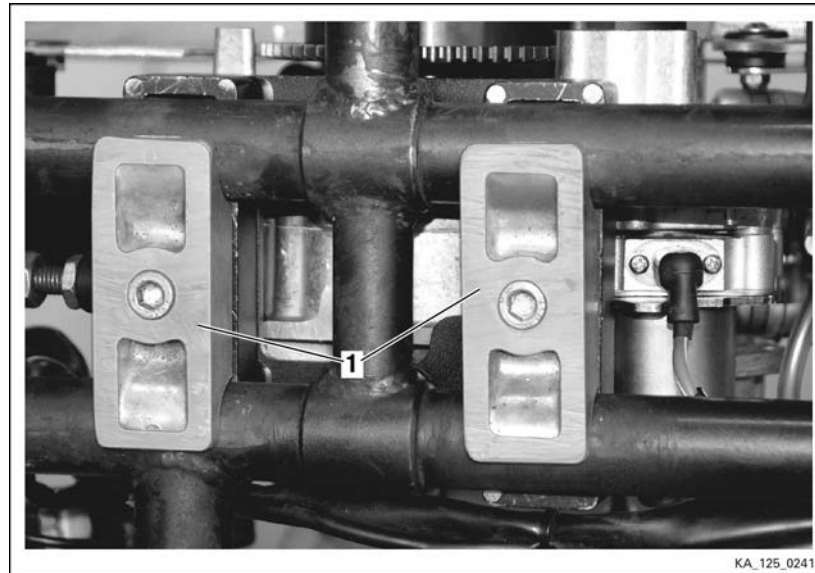
*此發動機不可以在車架上拆解以下的部件：*



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- Centrifugal clutch 離心離合器
- Cylinder with combustion chamber insert and cylinder head cover  
汽缸、燃燒室、缸頭、缸頭蓋
- Exhaust valve 排氣閥
- Reed valve 舌簧閥
- Piston 活塞
- Starter 啟動電機
- Oil Service 換機油



Figure圖 3.6: Engine clamp 發動機夾塊 (Illustration similar此為近似圖)  
1 Engine clamp 發動機夾塊

## POSITIONING THE ENGINE ON THE TRESTLE MOUNTING PLATE 發動機放上支架安裝板 ( 拆解台 )

### General 概要

#### ATTENTION 注意

Do not use flammable liquids and aggressive cleaning agents to clean the engine. 請勿使用易燃液體和腐蝕性清潔劑清潔發動機。

#### ENVIRONMENTAL NOTE 環境注意事項

**Generally comply with standard rules for handling of chemicals. Dispose of chemicals as per local environmental regulations.** 遵守一般的化學品處理標準規則，根據當地環境法規處理化學品。

Cleaning the engine removes fuel and oil residues and other environmentally damaging substances. The waste liquid must be caught and disposed in an environmentally compatible method. 清潔發動機的廢棄燃油及機油殘留物以與其他對環境有害的物質。相關的廢液必須採取符合環境要求的方法收集和處理。

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**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備  
下列是必要的特殊工具

Part no. 料號	Description 說明	Field of application 運用的部位
877390	Trestle mounting plate (trestle support) 支撐架	Engine 發動機
676052	Fixing plate for engine 發動機維修板	Engine 發動機

**Instructions 指引** Proceed as follows to position the engine on the trestle mounting plate:

依此程序來安放發動機到支撐架

1. Engine cleaning. 清潔發動機
2. Unscrew the base plate from the engine, position the engine on the trestle mounting plate, and fix it securely with the 4 fixing screws.  
由底板拆下發動機，將發動機放在支架安裝板上，並牢固地鎖上四個固定螺栓

## Chapter: Chapter 4 章節4

### CYLINDER COMPONENTS 汽缸組成

#### TOPICS IN THIS CHAPTER 本章節主題

<b>System description 系統說明</b> .....	<b>2</b>
<b>Cylinder removal 汽缸的拆卸</b> .....	<b>3</b>
Removal of the spark plug 火花塞的拆卸 .....	4
Removal of the cylinder head cover 缸頭蓋的拆卸 .....	4
Removal of the thermostat 節溫器的拆卸 .....	5
Removal of the combustion chamber insert 內燃燒室的拆卸 .....	6
Removal of the exhaust socket 排氣管座的拆卸 .....	7
Removal of the intake socket and reed valve 進氣管座與舌簧閥的拆卸 .....	8
Removal of the exhaust valve (125MAX only) 排氣閥的拆卸 ( 僅限125 MAX機種 ) .....	9
Removal of the piston 活塞的拆卸 .....	11
<b>Cylinder components inspection 汽缸組件的檢查</b> .....	<b>13</b>
Inspection of cylinder components 汽缸組件的檢查 .....	13
Inspection of piston and piston ring 活塞與活塞環的檢查 .....	14
Inspection of the Piston diameter 活塞外徑的檢查 .....	15
Inspection of the Piston and cylinder sizing 活塞與汽缸內徑尺寸的檢查 .....	16
Inspection of the Piston pin, circlip 活塞銷與卡環的檢查 .....	17
Inspection of the spark plug 火花塞的檢查 .....	18
Inspection of the cylinder head cover 缸頭蓋的檢查 .....	19
Inspection of the combustion chamber insert 內燃燒室的檢查 .....	19
Inspection of the exhaust socket 排氣管座的檢查 .....	20
Inspection of the carburetor flange and reed valve 化油器接口與舌簧閥的檢查 .....	21
Inspection of the exhaust valve (125MAX only) 排氣閥的檢查 ( 僅限125 MAX機種 ) .....	22
<b>Cylinder components installation 安裝汽缸組件</b> .....	<b>23</b>
Installation of exhaust valve (125MAX only) 排氣閥的安裝 ( 僅限125 MAX機種 ) .....	23
Installation of exhaust valve, gasket, valverod housing 排氣閥、墊片、閥殼的安裝 .....	24
Installation of the exhaust valve piston 排氣閥活塞的安裝 .....	25
Installation of piston 活塞的安裝 .....	26
Installation of the cylinder 汽缸的安裝 .....	28

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Installation of the exhaust socket 排氣管座的安裝 .....	30
Installation of the carburetor flange and reed valve 化油器接口與舌簧閥的安裝 .....	31
Installation of combustion chamber insert 內燃燒室的安裝 .....	33
Installation of cylinder head cover 缸頭蓋的安裝 .....	34
Inspection and adjustment of squish gap 擠壓間隙的檢查與調整 .....	36
Installation of spark plug 火花塞的安裝 .....	39

**Contents 內容**      This chapter describes the disassembly and assembly of the cylinder components of the ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo) engine. The description is divided into sections. 本章介紹了 ROTAX® 125 MAX evo (包括 Junior-、Mini-、Micro MAX evo) 發動機汽缸組件的拆卸和組裝。分為幾個部分作描述。

## SYSTEM DESCRIPTION 系統說明

### Overview 概述

Position on the engine 各部件在發動機上的位置

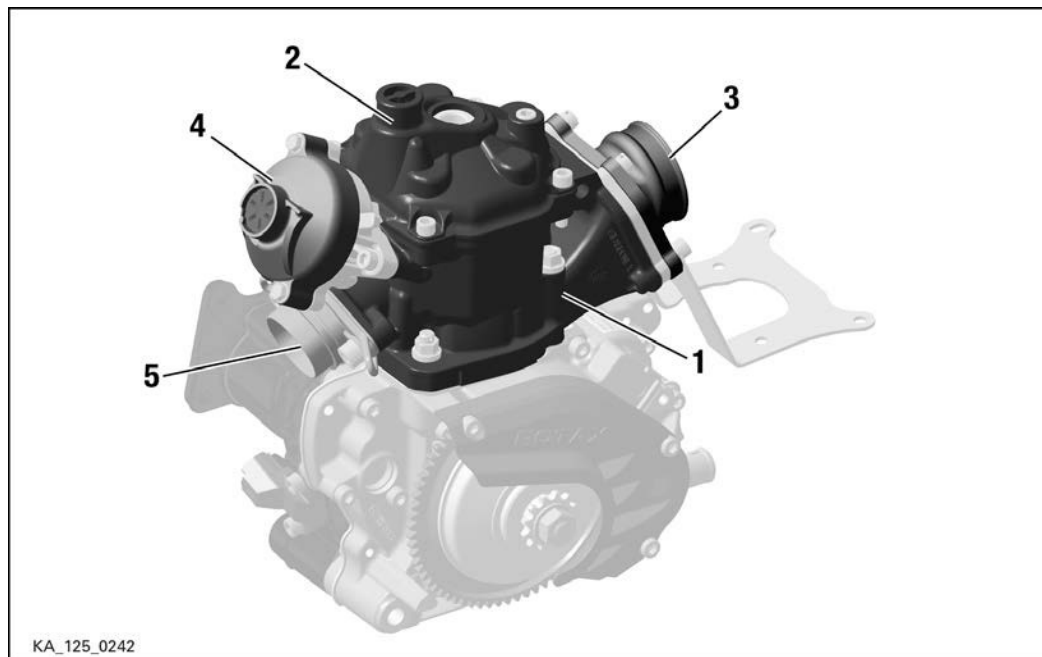


Figure 圖 4.1: MAX evo engine shown in figure 此圖示乃MAX evo 發動機

- |                               |                           |
|-------------------------------|---------------------------|
| 1 Cylinder 汽缸                 | 2 Cylinder head cover 缸頭蓋 |
| 3 Intake socket 進氣管座          | 4 E-Rave cover 電子排氣閥蓋     |
| 5 Exhaust socket assy. 排氣管座總成 |                           |

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**CYLINDER REMOVAL 汽缸的拆卸**

General 概要

**m WARNING 警告**

**Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work. 在開始任何工作之前，一定要讓發動機冷卻至環境溫度。否則會有嚴重燒傷和燙傷的危險！**

**NOTE 注意事項**

*If only the components in the crankcase are to be replaced or inspected, then the cylinder can be removed completely together with the following parts: 如果要更換或檢查曲軸箱中的部件，則可將汽缸連同以下部件完整一套拆下：*

- *Cylinder head cover 缸頭上蓋*
- *Intake socket 進氣管座*
- *E-Rave 電子排氣閥*
- *Exhaust socket assy. 排氣管座總成*
- *Spark plug 火花塞*

*The exhaust socket, carburetor flange and exhaust valve remain installed. 排氣管座、化油器接口、排氣閥，這些不要拆下來*

**Preparation 準備**

The following preparation is required before removal: 拆卸前需先進行以下的準備：

- Removal of the radiator and radiator hoses. See also Chapter 3.  
拆卸水箱和軟管。另見第 3 章。
- Removal of the carburetor and intake silencer. See also Chapter 6.  
拆卸化油器和進氣消音器。另見第 6 章。
- Removal of the exhaust system. See also Chapter 8.  
拆卸排氣系統。另見第 8 章。

**Instructions 指引**

**ATTENTION 注意**

Drain the coolant from the cylinder and invert the engine to prevent entry of water into the crankcase.  
排出汽缸中的冷卻液並翻轉發動機以防止水進入曲軸箱。

**ATTENTION 注意**

Do not damage the piston, piston ring and wall when dismantling these components.  
拆卸這些部件時不要傷及活塞、活塞環和缸壁。

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
676110	Socket set 套筒組	Cylinder 汽缸

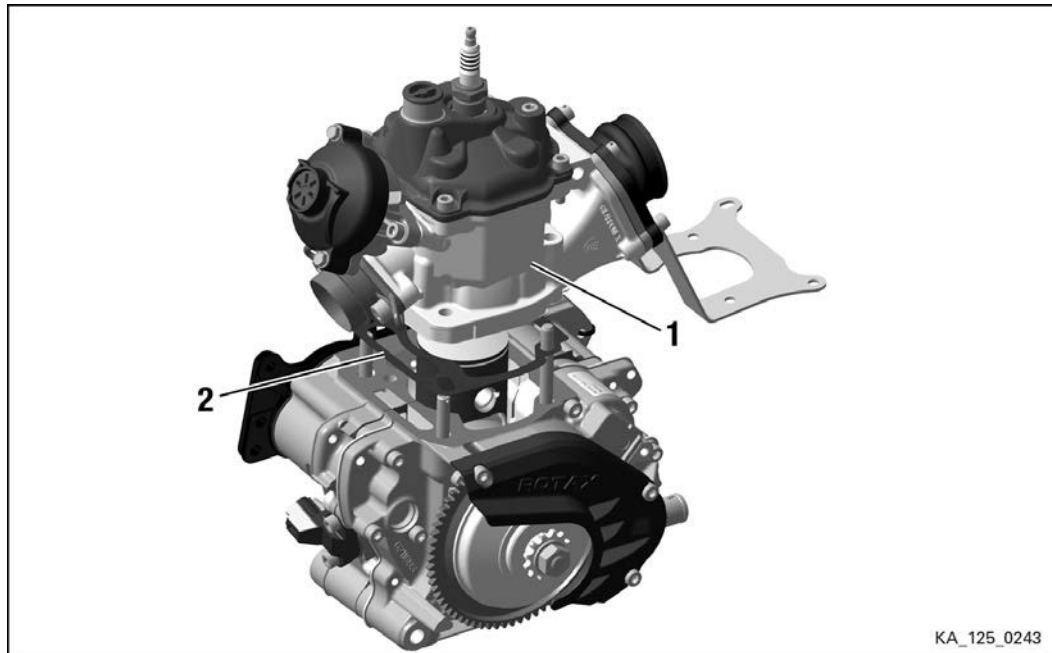
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**Instruction 指引** See [Figure 圖 : Cylinder. 汽缸](#)

Proceed as follows to remove the cylinder: 依以下順序來拆解汽缸

1. Remove the cylinder with the socket set by unscrewing the four M8 collar nuts from the crankcase.  
鬆開四個帶緣的M8螺帽，由曲軸箱拆下汽缸
2. Remove the cylinder (1) from the crankcase. 由曲軸箱上拆下汽缸
3. Remove the cylinder base gasket (2). 拆下汽缸的下墊片



Figure圖 4.2: Cylinder 汽缸

1 Cylinder 汽缸

2 Gasket 汽缸下墊片

### REMOVAL OF THE SPARK PLUG 火花塞的拆卸

**Instruction 指引**

1. Remove the spark plug connector. 拆下 火花塞連接器
2. Remove the spark plug with the spark plug socket. 使用火花塞拆解套筒拆下火花塞

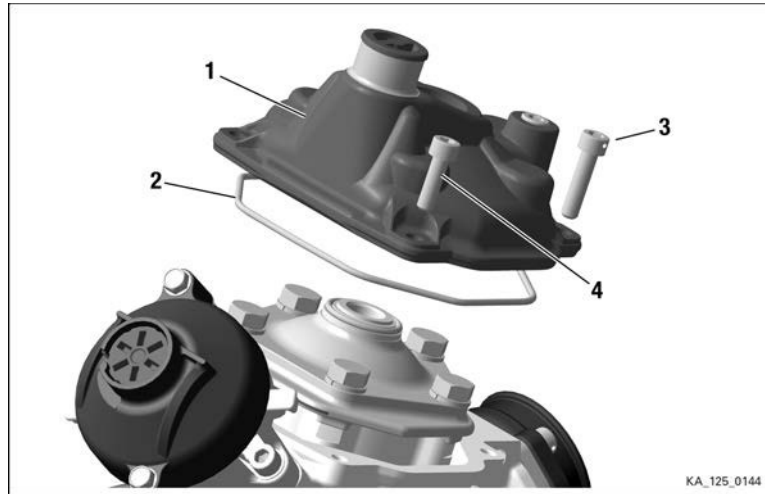
### REMOVAL OF THE CYLINDER HEAD COVER 汽缸頭蓋的拆卸

**Instruction 指引** See [Figure 圖 : Cylinder head cover. 汽缸頭蓋](#)

1. Remove the cylinder head cover (1) by removing the 3 Allen screws (M6x25) (3) and 1 Allen screw M6x16 (4) from the cylinder.  
從汽缸上，拆解內六角螺絲（3個M6x25（下圖3號）·1個M6x16（下圖）4號）以拆下汽缸頭
2. Remove the cylinder head together with the gasket. 缸頭連同缸頭墊片一起拆下來



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Figure圖 4.3: Cylinder head cover 缸頭蓋

1 Cylinder head cover 缸頭蓋

2 O-ring O型環 105x2.5

3 Allen screw 內六角螺栓 M6x25

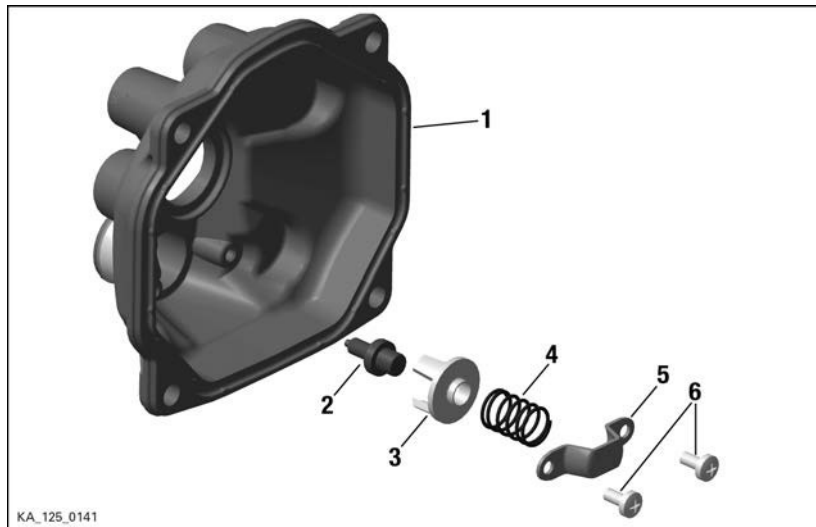
4 Allen screw 內六角螺栓 M6x16

## REMOVAL OF THE THERMOSTAT 節溫器的拆卸

**Instruction 指引** See [Figure圖: Thermostat.節溫器](#)

1. Remove the coolant thermostat from the cylinder head cover (1) by removing the 2 TAPTITE screws M4x8 (6) on the thermostat retaining bracket (5). 拆解節溫器固定支架(5號件)上的 2 個三角柱型自攻螺栓 M4x8 (6號件) · 可從缸頭蓋 (1號件) 拆下節溫器。
2. Remove the compression spring (4). 拆下壓縮彈簧 (4號件)。
3. Remove the thermostat (2) from the thermostat holder (3). 從節溫器支架 (3號件) 拆下節溫器 (2號件)。

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Figure圖 4.4: Thermostat 節溫器

1 Cylinder head cover 缸頭蓋

2 Thermostat, 45 Degree celcius  
節溫器, 規格: 45攝氏度

3 Thermostat holder 節溫器保持器

4 Compression spring 壓縮彈簧

5 Thermostat retaining bracket 節溫器支架

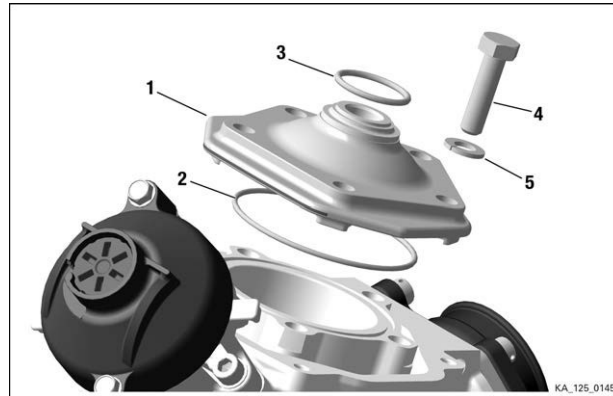
6 TAPTITE screw M4x8 三角柱  
型自攻螺栓 M4x8

## REMOVAL OF THE COMBUSTION CHAMBER INSERT 內燃燒室的拆卸

**Instruction 指引** See [Figure 圖](#) : [Combustion chamber insert](#). 內燃燒室

1. Remove the combustion chamber insert (1) by unscrewing the 5 Hex screws M8x30 (4) with the lock washer (5) crosswise.  
拆鬆5個外六角螺栓以及防鬆墊圈 (M8x30, 4、5號件) , 以拆下內燃燒室
2. Lift away the combustion chamber insert with lower (2) and upper O-rings (3).  
取下內燃燒室的上/下O型環

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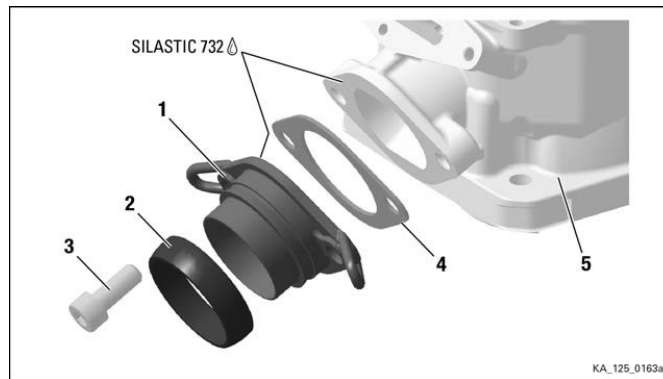
Figure圖 4.5: Combustion chamber insert 內燃燒室

- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 1 Combustion chamber insert<br>內燃燒室 | 2 O-ring 64x2<br>O型環 64x2         |
| 3 O-ring 23.3x2.4<br>O型環 23.3 x 2.4 | 4 Hex. screw M8x30<br>外六角螺栓 M8x30 |
| 5 Lock washer A8<br>防鬆墊圈 A8         |                                   |

## REMOVAL OF THE EXHAUST SOCKET 排氣管座的拆卸

**Instruction 指引** See Figure圖: Exhaust socket. 排氣管座

1. Remove the exhaust socket (1) from the cylinder (5) by unscrewing the 2 Allen. screws (3).  
鬆解2個內六角螺栓 (3號件) · 以自汽缸拆下排氣管座
2. Remove the gasket (4). 拆下墊片 (4號件)



Figure圖 4.6: Exhaust socket 排氣管座

- |                           |                       |
|---------------------------|-----------------------|
| 1 Exhaust socket 排氣套      | 2 Exhaust gasket 排氣墊片 |
| 3 Allen screw 內六角螺栓 M8x20 | 4 Gasket 墊片           |
| 5 Cylinder 汽缸             |                       |

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## REMOVAL OF THE INTAKE SOCKET AND REED VALVE 進氣管座與舌簧閥的拆卸

### Instruction 指引

1. Remove support bracket (3) and intake socket (4) by loosening the 5 Allen screws M6x25 (1) (2). 鬆開 5 個內六角螺栓 M6x25 (1、2號件) · 卸下支撐架 (3號件) 和進氣管座 (4號件)。
2. Remove the reed valve (5) and gasket (6) from the cylinder. 從汽缸拆下舌簧閥 (5號件) 和墊片 (6號件)。

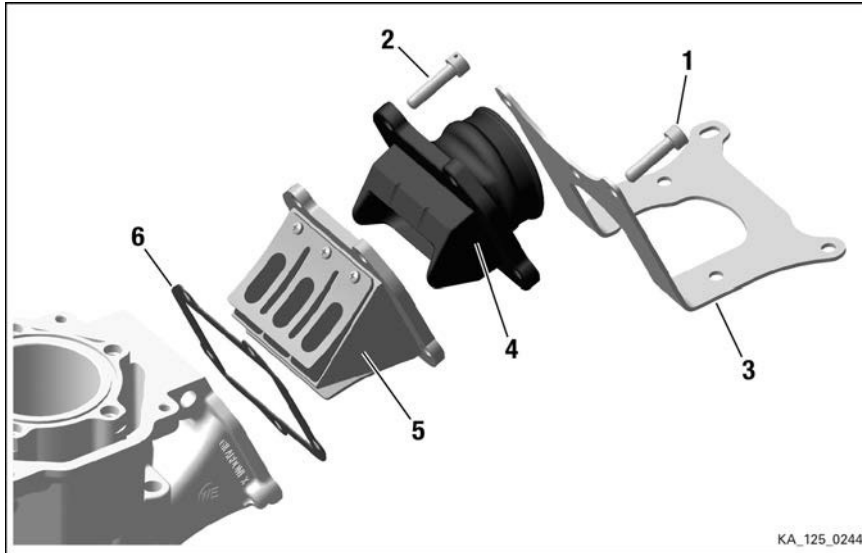


Figure 4.7: Intake socket, Reed valve 進氣管座 · 舌簧閥

1. Allen screw M6x25 with hole for sealing the engine  
內六角螺栓M6x25 帶孔用於密封發動機
- 2 Allen screw 內六角螺栓 M6x25
- 3 Support bracket 支撐架
- 4 Intake socket 進氣管座
- 5 Reed valve assy. 舌簧閥總成
- 6 Gasket 墊片

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## REMOVAL OF THE EXHAUST VALVE (125 MAX ONLY) 排氣閥的拆卸 ( 僅限125 MAX 機種 )

### General 概要

The engine has an electronically controlled magnet valve which is opening and closing at a certain rpm defined by the ECU. The opening rpm can be set to following: 此發動機有一個電子控制的電磁閥，開啟和關閉的轉速是由ECU來定義與控制。開啟轉速可設置如下：

- 7900 rpm if the additional ground cable on the battery box is disconnected. 如果電池盒上的附加接地線斷開，則為 7900 rpm。
- 7600 rpm if the additional ground cable is connected to the battery box. 如果將附加接地線連接到電池盒，則為 7600 rpm。

The closed valve improves the performance in the low and mid range. In the upper rpm range the valve opens to reduce flow resistance of the exhaust gases. For a detailed explanation please visit our website and watch our animated video that will explain the function in detail: <https://www.rotax-kart.com/de/Community/Videos/Rotax-125-MAX-evo-Engines/124-Rotax-E-RAVE>

閥門的關閉可以提高中低轉速的性能。在較高的轉速範圍內，閥門打開可以減少廢氣的流動阻力。如需詳細說明，請觀看我們的網站詳細解釋功能的動畫視頻：

<https://www.rotax-kart.com/de/Community/Videos/Rotax-125-MAX-evo> - 發動機/124-Rotax-E-RAVE

**Instruction 指引** See [Figure圖: Exhaust valve \(RAVE\) 電子排氣閥](#)

Proceed as follows to remove the exhaust valve: 依以下步驟拆解排氣閥

1. Release the adjustment screw (1) with the O-ring (2).  
鬆開調節栓以及O型環 ( 圖示1、2號件 )
2. Remove the 2 TAPTITE screws M5x25(3).  
拆卸 M5x23 三角柱型自攻螺栓 ( 圖示3號件 )
3. Remove the valve cover (4) and the compression spring (5).  
拆卸閥蓋 ( 下圖4號件 ) 以及壓縮彈簧 ( 下圖5號件 )
4. Lift away the outer hose spring(6).  
拉起外管彈簧 ( 下圖6號件 )
5. Unscrew the exhaust valve piston(7).  
擰開排氣閥活塞 ( 下圖7號件 )
6. Remove the inner hose spring (9) from the bellows (8), push out the valve bellows from the valve piston. 從波紋管 (8號件) 上拆下內軟管彈簧 (9號件)，從閥門活塞上推出閥門波紋管。
7. Release the valve rod housing (10) from the cylinder with the 2 Allen screws M6x25 (11) with spring washers (12). Remove the gasket(13). 鬆開2 個帶彈簧墊圈的內六角螺栓 M6x25 (11 號件) 以鬆開汽缸上的閥桿外殼 (10號件)。拆下墊片 (13號件)。
8. Remove the exhaust valve (14) with O-ring (16) and stud (15).  
拆卸排氣閥 ( 14號件 ) 連同O型環 ( 16號件 ) 以及螺樁 ( 15號件 )

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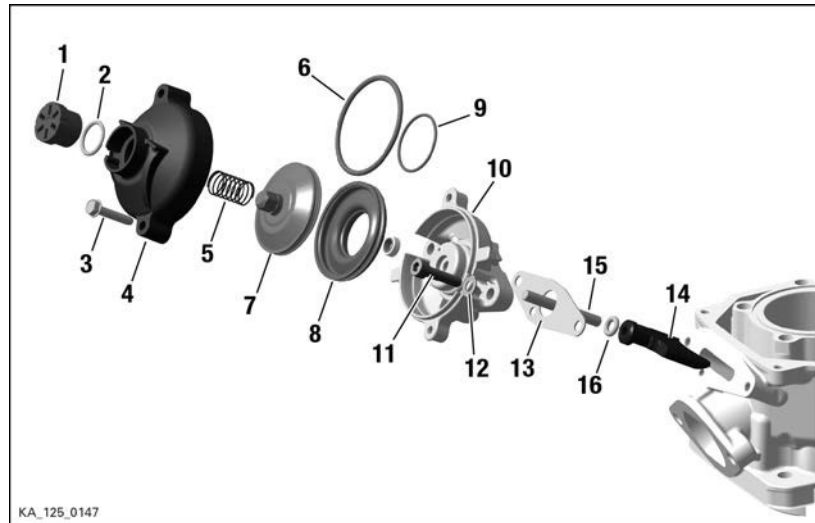


Figure 4.8: Exhaust valve (RAVE) 電子排氣閥

- |  |  |
|--|--|
| 1 Adjustment screw 調節栓                               | 2 O-ring 15.9-2.3 O型環                        |
| 3 TAPTITE screw 三角自攻螺栓 M5x25                         | 4 Valve cover 閥蓋                             |
| 5 Compression spring 48.5/0.8 mm<br>壓縮彈簧 48.5/0.8 mm | 6 Hose spring 134-3.0-0.65 外管彈簧 134-3.0-0.65 |
| 7 Exhaust valve piston 排氣閥活塞                         | 8 Bellows 波紋管                                |
| 9 Hose spring 70-1.7-0.3 外管彈簧                        | 10 Valve rod housing assy. 閥桿外殼              |
| 11 Allen screw 內六角螺栓 M6x25                           | 12 Spring washer 彈簧墊圈 B6                     |
| 13 Gasket 墊片   | 14 Exhaust valve 排氣閥                         |
| 15 Stud 螺樁 M6x25                                     | 16 O-ring 6x2.5 RED O型環 6x2.5 紅              |

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## REMOVAL OF THE PISTON 活塞的拆卸

**General 概要** See [Figure圖: piston 活塞](#).

**ATTENTION 注意**

In order to protect the piston pin circlip from unintentional loss, a suitable clean cloth should be used to cover the open cylinder bore in the crankcase.

為防止活塞銷卡環意外遺失，應使用合適且乾淨布蓋住曲軸箱中敞開的汽缸開口。

**ATTENTION 注意**

Always support the piston with the hand in order to avoid a bending moment or damage of the surface. 過程中請始終用手支撐活塞，以避免受到彎曲力或表面損壞

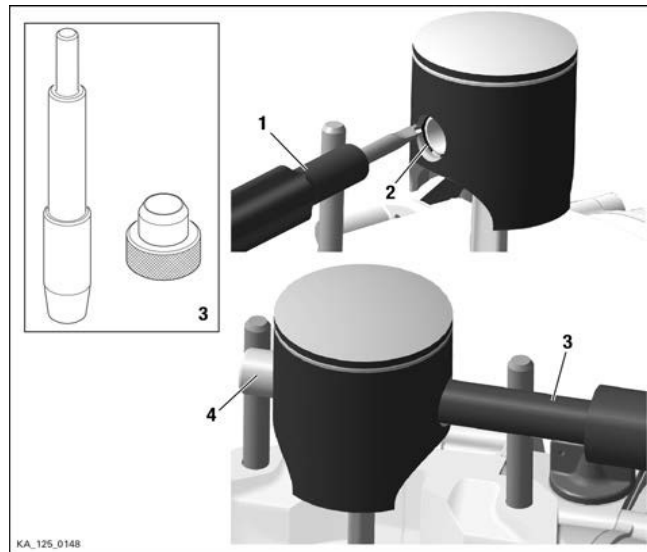
**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
676035	Insertion tool 活塞銷壓入工具	Piston 活塞
976380	Circlip puller 活塞銷卡環 拉出器	Circlip 活塞銷卡環

**Instructions 指引** Proceed as follows to remove the piston: 依以下步驟拆解活塞

1. Pull out the circlip (2) with the circlip puller (1). Use safety goggles to protect your eyes!  
使用活塞銷卡環拉出器 (下圖1號件) 將活塞銷卡環拉出。建議使用安全護目鏡保護眼睛
2. Press the piston pin (4) out of the piston with the point of the special tool (3).  
使用特殊工具 (下圖3號件) 壓出活塞銷 (下圖4號件)

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Figure圖 4.9: Piston 活塞

1 Circlip puller 活塞銷卡環拉出器

2 Circlip 活塞銷卡環

3 Special tool part no. 676035  
特殊工具 料號：676035

4 Piston pin 活塞銷



## CYLINDER COMPONENTS INSPECTION 汽缸組件的檢查

### General 概要

#### ATTENTION 注意

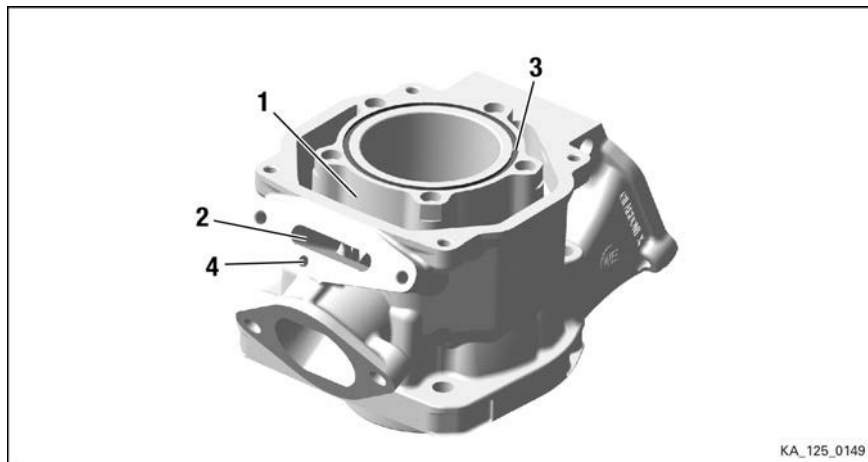
Components, which have reached or exceeded their wear limits, must be replaced. Components, which are found to be defective in the context of the visual inspection and might influence the engine's performance, must also be replaced. 已達到或超過磨損極限的部件必須更換。在目視檢查中發現有缺陷並可能影響發動機性能的部件也必須更換。

### INSPECTION OF CYLINDER COMPONENTS 汽缸組件的檢查

**Instructions 指引** See [Figure圖: Cylinder. 汽缸](#)

**Preparation 準備** The following preparation is required before removal. 拆解前須先進行以下的準備。

1. Remove lime deposits (1) from the water cooling of the cylinder. 清除汽缸水道(1)內的沉積物。
2. Clean combustion residues from the exhaust valve and slider duct (2). 清除排氣閥和滑塊管道 (2) 上的燃燒殘留物。
3. Clean O-ring groove (3). 清潔O型環(3)的環溝
4. Inspect all threads. 檢查所有的螺牙
5. All sealing surfaces must be clean and smooth 確保所有的表面必須乾淨且平整
6. Inspect the cylinder bore for abnormal wear. 檢查汽缸搪孔是否有異常磨損。
7. Inspect the impulse bore (4). 檢查導壓孔 ( 下圖4位置 )



Figure圖 4.10: Cylinder 汽缸

1 Water duct 水道

2 Exhaust valve port 排氣閥口

3 Groove for O-ring O型環的溝槽

4 Impulse bore 導壓孔

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## INSPECTION OF PISTON AND PISTON RING 活塞與活塞環的檢查

**Instructions** 指引 See [Figure圖: Piston and piston ring](#). 活塞與活塞環

1. Inspect the piston for cracks and signs of piston seizure. 檢查活塞是否有裂痕或活塞卡死跡象。
2. Inspect the bore of the piston pin for damage and wear. 檢查活塞銷孔是否損壞或磨損。
3. Inspect the piston pin ring groove for defects. 檢查活塞的銷環槽是否有缺陷。
4. Check free of movement of the piston ring in the ring groove. 檢查活塞環在環槽中是否會移動。

**NOTE 注意事項**

*If carbon prevents free movement of the piston ring, the ring groove can be cleaned out with a discarded piston ring. 如果積碳阻礙了活塞環的自由移動，可以用廢棄的活塞環來清潔環槽。*

5. Measure the piston ring clearance in the ring groove with a feeler gauge (1). 採用厚薄規(1) 測量環槽中的活塞環間隙。

**NOTE 注意事項**

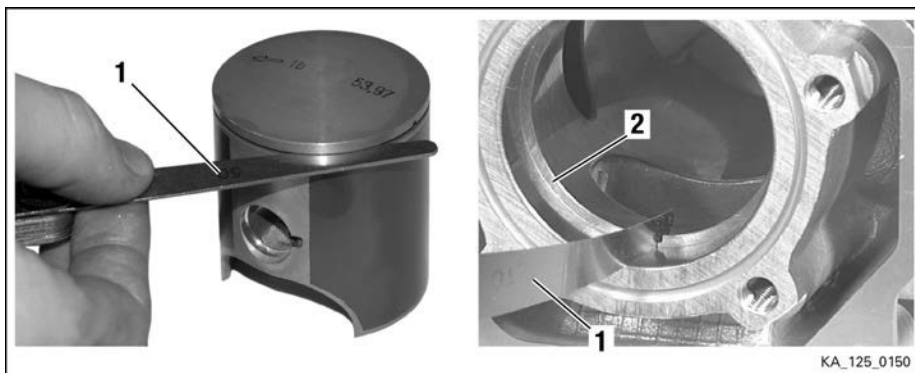
*If the piston ring clearance has reached the wear limit of 0.1 mm, the piston must be replaced. 如果活塞環間隙已達到 0.1 毫米的磨損極限，則必須更換活塞。*

6. Remove the piston ring from the piston, insert it approx. 10 mm from top into the cylinder (use the piston to do so) and check ring-end gap by means of a feeler gauge. 從活塞上取下活塞環，將活塞環置入汽缸頂部伸入約 10 mm (使用活塞來頂活塞環) 並使用厚薄規來檢查環端間隙。
7. Measure clearance with a feeler gauge. 使用厚薄規來量測此間隙

**NOTE 注意事項**

*If the wear limit of 0.8 mm has been reached the piston ring must be replaced. 如果已達到 0.8 毫米的磨損極限，則必須更換活塞環。*

8. Check the piston ring locking pin for wear. 檢查活塞環定位銷是否有磨損。



Figure圖 4.11: Piston and piston ring 活塞與活塞環

1 Feeler gauge 厚薄規

2 Piston ring 活塞環

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## INSPECTION OF THE PISTON DIAMETER 活塞外徑的檢測

### Instructions 指引

1. Measure the piston diameter with a micrometer (1). Conditions of measurement: room temperature = 20 °C, measuring point 20 mm from the lower edge of the piston, perpendicular to the piston pin axis.

使用千分尺 (下圖1號件) 測量活塞外徑。

測量條件：室溫 = 20 °C · 測量點距活塞下緣 20 mm · 需垂直於活塞銷軸。

2. Determine the piston to cylinder clearance. The wear limit is 0.08 mm.

使用過的活塞與汽缸間隙。磨損極限為 0.08 mm

### NOTE 注意事項

*The piston clearance of a new piston/cylinder pairing should be 0.04 - 0.05 mm*

*新品的活塞與汽缸的配對間隙，是 0.04 - 0.05 mm*

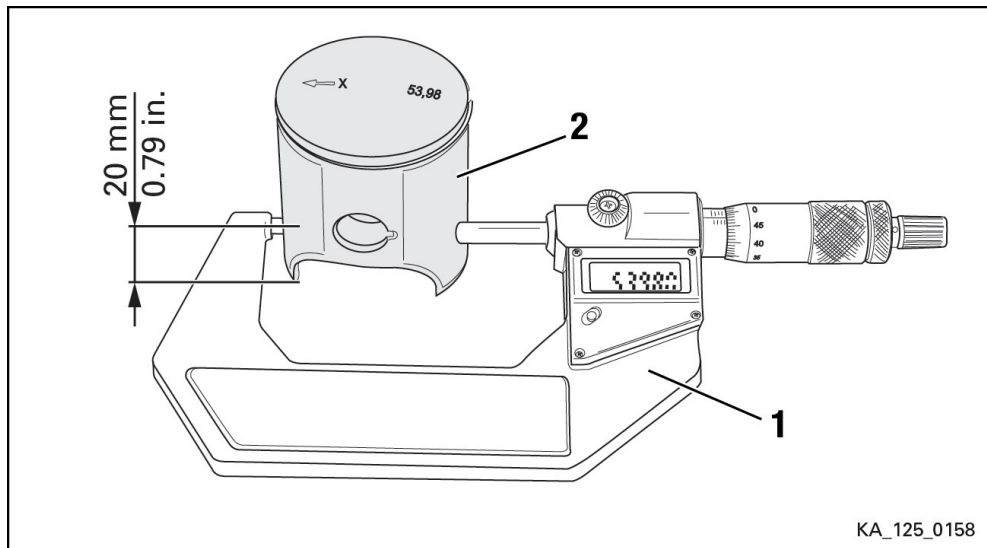


Figure 圖 1.12: Piston diameter 活塞外徑

1 Micrometer 千分尺    2. Piston 活塞

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### INSPECTION OF THE PISTON AND CYLINDER SIZING 活塞與汽缸(內徑)尺寸的檢查

#### General 概要

#### NOTE 注意事項

*Every new piston has the size classification and a production letter printed on the top of the piston (piston crown).*

每個新活塞都有尺寸分類和生產字母，都印在活塞頂部（活塞頂）。

#### NOTE 注意事項

*Every new cylinder has the size classification stamped on the upper sealing surface.*

每個新汽缸的上密封面上都印有尺寸分類。

#### Measuring the cylinder diameter:

汽缸內徑的量測：

1. Measure the cylinder diameter 10 mm below the upper edge of the cylinder. This dimension indicates the selection of the matching piston. If the dimension has reached the wear limit of 54.045 mm, the cylinder must be replaced.

從汽缸上緣往下方 10 mm 處，測量汽缸內徑。該尺寸表示汽缸匹配與活塞的尺寸。磨損極限是 54.045 毫米，如果尺寸已達到這個限度，就必須更換汽缸。

2. Measure the piston diameter as described in chapter 4 "Inspection of the piston diameter" and install a piston to match the required clearance at 0.060 mm +/- 0.005 mm between piston and cylinder.

按照第 4 章“活塞直徑的檢查”中的說明來測量活塞直徑，活塞和汽缸之間所需的匹配間隙是 0.060 mm +/- 0.005 mm。

Cylinder classification 汽缸分級 (分類)

Cylinder labeling 汽缸分級標記	Cylinder dimension 汽缸內徑尺寸
"A"	54.000 - 54.010 mm
"AB"	54.010 - 54.015 mm
"B"	54.015 - 54.025 mm

Piston classification "f" I 類型活塞

Piston labeling 活塞分級標記	Tolerance field (mm) 公差範圍	Minimum dimension (mm) 最小尺寸	Maximum dimension (mm) 最大尺寸
"f" 53.95	+0.005 / -0.025 mm	53.925	53.955
"f" 53.96	+0.005 / -0.025 mm	53.935	53.965
"f" 53.97	+0.005 / -0.025 mm	53.945	53.975
"f" 53.98	+0.005 / -0.025 mm	53.955	53.985
"f" 53.99	+0.005 / -0.025 mm	53.965	53.995

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Piston classification "h" h類型活塞

Piston labeling 活塞分級標記	Tolerance field (mm) 公差範圍	Minimum dimen- sion (mm) 最小尺寸	Maximum dimen- sion (mm) 最大尺寸
"h" 53.94	+0.015 / -0.015 mm	53.925	53.955
"h" 53.95	+0.015 / -0.015 mm	53.935	53.965
"h" 53.96	+0.015 / -0.015 mm	53.945	53.975
"h" 53.97	+0.015 / -0.015 mm	53.955	53.985
"h" 53.98	+0.015 / -0.015 mm	53.965	53.995

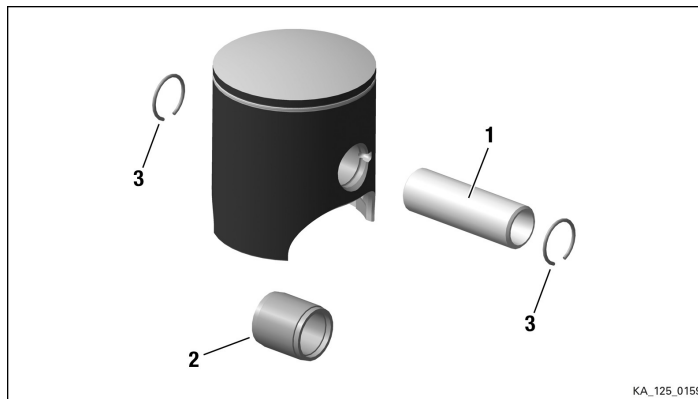
### INSPECTION OF THE PISTON PIN, CIRCLIP 活塞銷、卡環的檢查

Instructions 指引 See Figure圖: Piston pin, circlip. 活塞銷、卡環

1. Inspect the piston pin (1) for wear and discoloration.  
檢查活塞銷 (1號件) 是否磨損或變色。
2. Check the needle cage (2) for cracks and abrasion.  
檢查滾針軸承 (2號件) 是否有裂痕或磨損。
3. The circlips (3) are replaced at every repair. Notice the position of the circlip.  
每次維修時都要更換活塞銷卡環 (3號件)。並注意卡環的位置。

#### NOTE 注意事項

*Direction of circlips is up or downside direction. 卡環的方向，採取朝上或朝下來組裝。*



Figure圖 1.13: Piston pin 活塞銷, circlip 活塞銷卡環

1 Piston pin 活塞銷

2 Needle cage 籠型滾針軸承

3 Circlip 活塞銷卡環

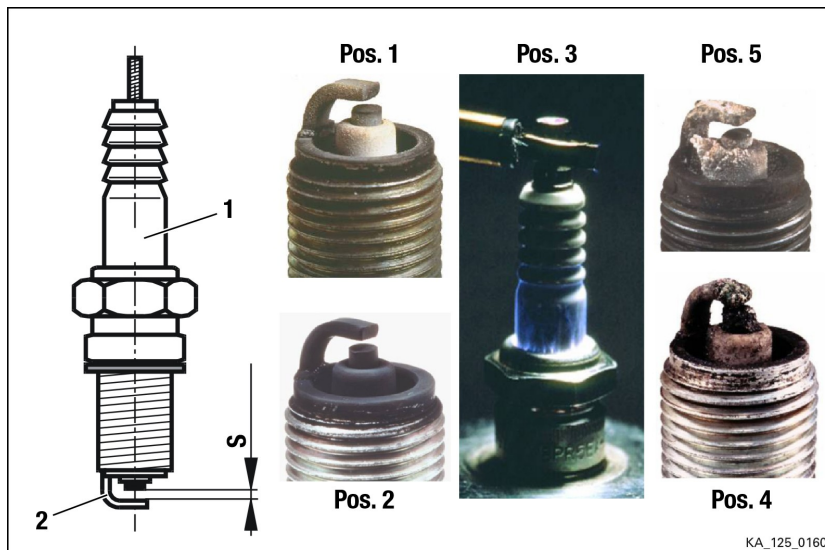
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## INSPECTION OF THE SPARKPLUG 火花塞的檢查

**Instructions 指引** See **Figure 圖 : Sparkplug 火花塞**.

1. Inspect spark plug connector for cracks, burn-off, dampness and fouling. 檢查火花塞接頭是否有裂痕、燒損、潮濕或積垢。
2. Visual inspection of the spark plug for carbonization, oil fouling and discoloration of the electrode. 目視檢查火花塞的電極有無碳化、油污、變色。
  - Pos. 1 = normal 樣本1 = 正常
  - Pos. 2 = fouled 樣本2= 油氣過濃
  - Pos. 3 = insulator breakage 樣本3= 絕緣體破損
  - Pos. 4 = melted electrode 樣本4= 電極熔損
  - Pos. 5 = oil carbon /deposits 樣本5= 積油成炭/沈積過度
3. Check the electrode gap of the spark plug with a feeler gauge and adjust if required to  $s = 0.45 \text{ mm}$  to  $0.7 \text{ mm}$ .  
使用厚薄規來調整電極間隙:  $0.45 \sim 0.7 \text{ mm}$

**ATTENTION 注意**  
Pay attention to the electrode gap, mentioned in the technical regulation! Bending the electrode can cause damage or misfire.



Figure圖 1.14: Spark plug 火花塞

1 Spark plug 火花塞

2 Electrode 電擊

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### INSPECTION OF THE CYLINDER HEAD COVER 缸頭蓋的檢查

Instructions 指引

See Figure圖: Cylinder head cover. 缸頭蓋 (汽缸頭上蓋)

1. Inspect cylinder head cover for cracks (visual inspection).  
檢查汽缸頭上蓋是否有裂痕 (目視檢查)
2. Inspect the contact surfaces of the two O-rings (1 and 2) for good condition (max. depth of wear 0.05 mm).  
檢查兩個 O 型圈 (1 和 2 號件) 的接觸面是否完好 (最大磨損深度 0.05 mm)。

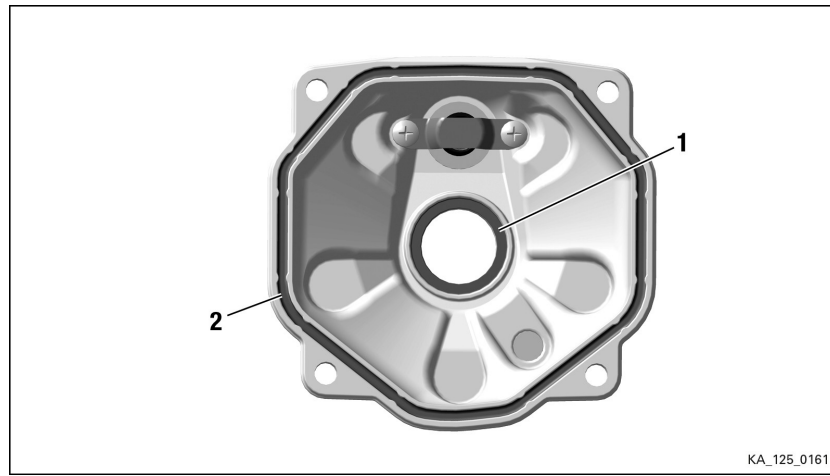


Figure 1.15: Cylinder head cover 汽缸頭上蓋

1, 2 O-ring contact area O型環裝配溝

### INSPECTION OF THE COMBUSTION CHAMBER INSERT 內燃燒室的檢查

Instructions 指引 See Figure圖: Combustion chamber insert. 內燃燒室

**NOTE 注意事項**

*The sealing area of the combustion chamber insert is slightly tapered from  $\varnothing$  63 mm. 此內燃燒室的密封區域從  $\varnothing$  63 mm 開始逐漸變細。*

1. Clean combustion residues and lime deposits from the outer area (1) of the combustion chamber. 清除燃燒室外部區域 (圖示1) 的燃燒殘留物和沉積物。
2. Inspect combustion chamber insert for cracks (visual inspection). 檢查汽缸頭上蓋是否有裂痕 (目視檢查)
3. Make sure that spark plug thread (3) is in good condition. 確保火花塞螺紋 (圖示3) 狀況良好。
4. Inspect sealing surfaces for flatness and damage. 檢查密封面是否平整或損壞。

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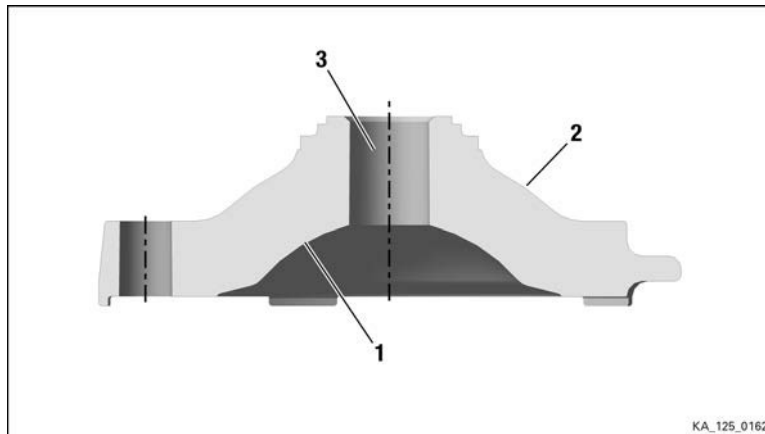


Figure 圖 4.16: Combustion chamber insert 內燃燒室

- 1 Combustion chamber 燃燒室                      2 Outside area 外部區域  
3 Spark plug thread 火花塞螺牙

---

## INSPECTION OF THE EXHAUST SOCKET 排氣管座的檢查

**Instructions 指引** See Figure 圖: Exhaust socket. 排氣管座

1. Inspect the exhaust socket for damage or deformation.  
檢查排氣管座是否損壞或變形。
2. Inspect exhaust gasket (2) for wear and replace if applicable.  
檢查排氣墊片 (2號件) 是否損壞，如果是則更換。

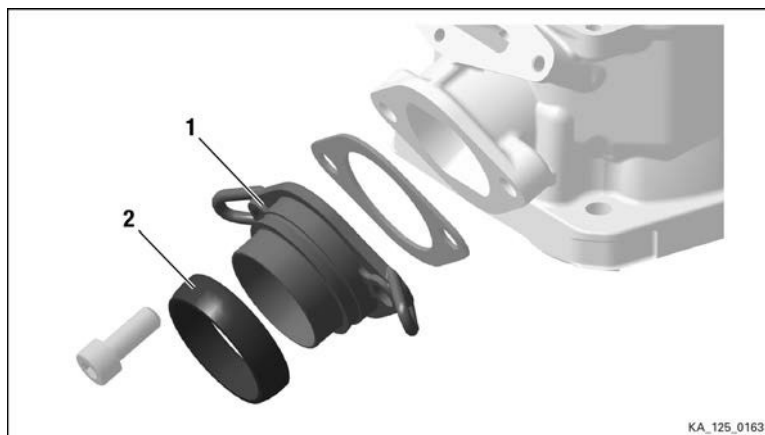


Figure 圖 4.17: Exhaust socket 排氣管座

- 1 Exhaust socket (ball) 排氣管座 (球型)    2 Exhaust gasket 排氣墊片



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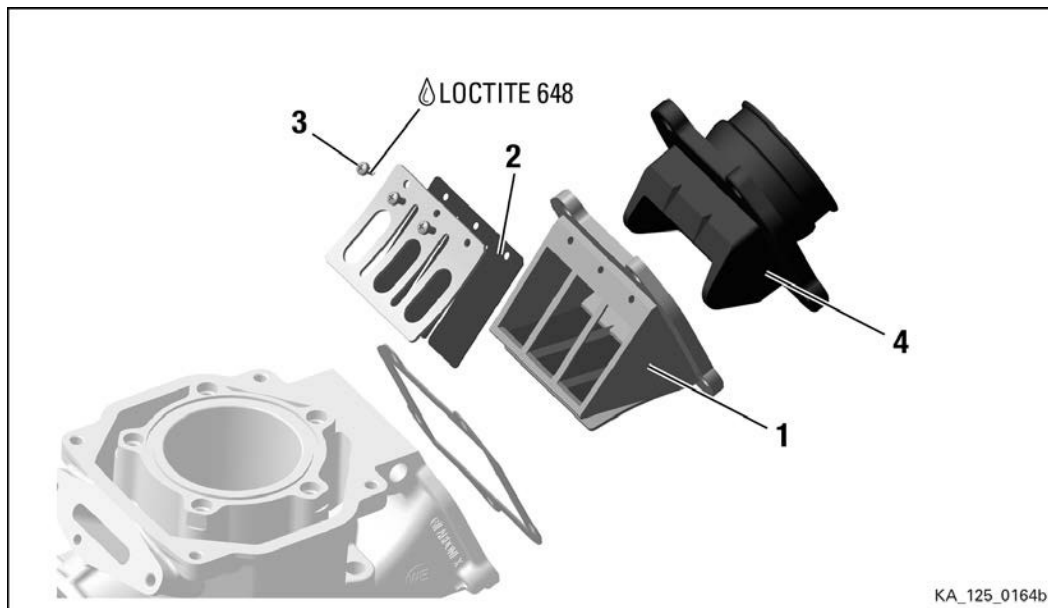
**INSPECTION OF THE CARBURETOR FLANGE AND REED VALVE 化油器接口與舌簧閥的檢查**

**General 概況**



**Instructions 指引** See Figure圖 : Carburetor port and valve guide. 化油器接合口和導閥

1. Inspect rubber lining of reed valves (1) for perishing (if applicable replace complete reed valve). 檢查舌簧閥 (1號件) 的橡膠內襯是否損壞 ( 如果是 , 就更換整個舌簧閥 ) 。
2. Check the two reed petal (2) for cracks or damage. 查兩個簧片 (2) 是否有裂痕或損壞。
3. Check the oval head screw M3x6 (3) for secure seating. (LOCTITE 648 Tightening torque 1.5 –2 Nm (13-18 in.lb)). 檢查橢圓頭螺栓 M3x6 (3) 是否牢固。( 塗覆LOCTITE 648 , 鎖固扭力 1.5 –2 Nm (13-18 in.lb) ) 。
4. Inspect carburetor flange (4) for cracks, porosity or swelling and replace if applicable. 檢查化油器接口 (4) 是否有裂痕、孔隙或膨脹 , 如果是就更換。



Figure圖 4.18: Carburetor port and valve guide 化油器接合口和導閥。

1 Reed valve assy. 舌簧閥總成

2 Reed petal 簧  
閥片

3 Oval head screw 圓頭螺栓 M3x6

4 Intake socket  
進氣管座

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**INSPECTION OF THE EXHAUST VALVE (125 MAX ONLY) 排氣閥的檢查 ( 僅限125 MAX機種 )**

**Instructions 指引** See following figure. 參見下圖

**Preparation 準備** The following preparation is required before removal. 拆卸前須先進行以下的準備

1. Clean oil or oil deposits from all parts with a suitable cleaning agent. 用合適的清潔劑清潔所有零件上的油或油漬物。
2. Check the smooth movement of the exhaust valve (1) in the cylinder, if applicable remove carbon deposits on the outlet valve and in the cylinder. 檢查汽缸內排氣閥 (1號件) 的運動是否順暢。如果是，清除排氣閥和汽缸內的積碳。
3. Inspect condition of O-ring (2). 檢查 O 型環 (2號件) 的狀況。
4. Check that the impulse bore in the valve rod housing (3) is open. 檢查閥桿外殼 (3號件) 中的導壓孔是否打開。
5. Inspect bellow (5) for cracks or porous areas and replace if applicable. 檢查波紋管 (5號件) 是否有裂痕 或已穿孔，如果是則更換。
6. Inspect exhaust valve piston (6) for cracks or deformation by caused overheating and re- place if applicable. 檢查排氣閥活塞 (6號件) 是否因過熱而破裂或變形，如果是則請更換。
7. Inspect valve cover (7) for cracks or deformation caused by overheating. 檢查閥蓋 (7號件) 是否有因過熱引起的裂痕或變形。

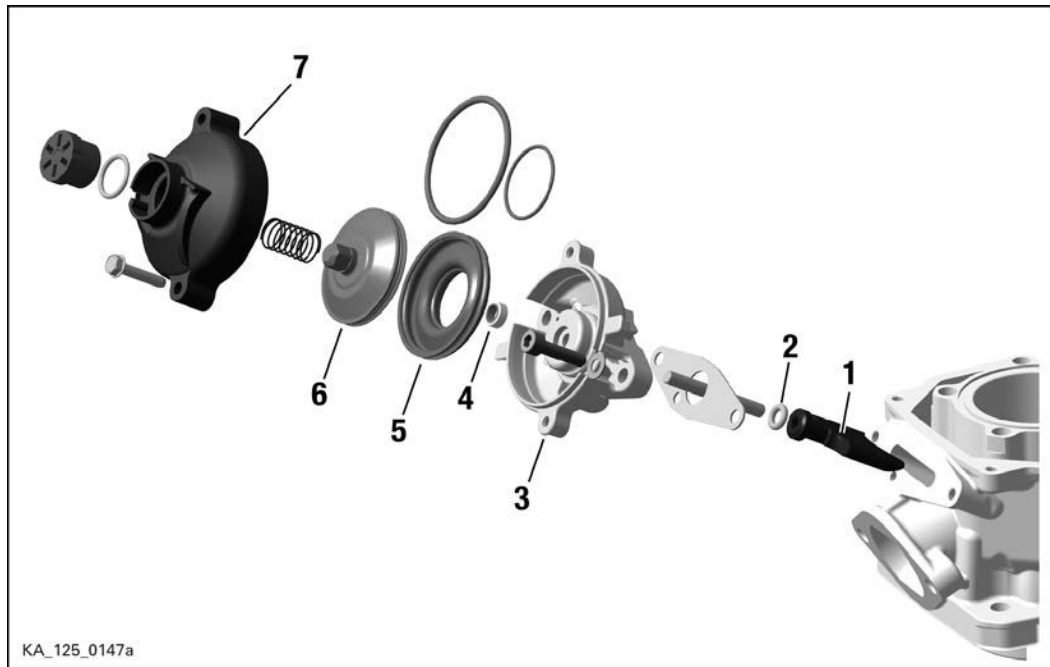


Figure 4.19: Exhaust valve 排氣閥

1 Exhaust valve 排氣閥  
3 Valve rod housing 閥桿外殼  
5 Bellow 波紋管  
7 Valve cover 閥蓋

2 O-ring RED O型環 紅色  
4 Oil seal 油封  
6 Valve piston 閥門活塞

## CYLINDER COMPONENTS INSTALLATION 安裝汽缸組件

### INSTALLATION OF EXHAUST VALVE (125 MAX ONLY) 安裝排氣閥 ( 本篇限於125 MAX )

**NOTE 注意事項**

*Make sure that the components are installed in their correct position. 確保組件安裝在正確的位置。*

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具與設備

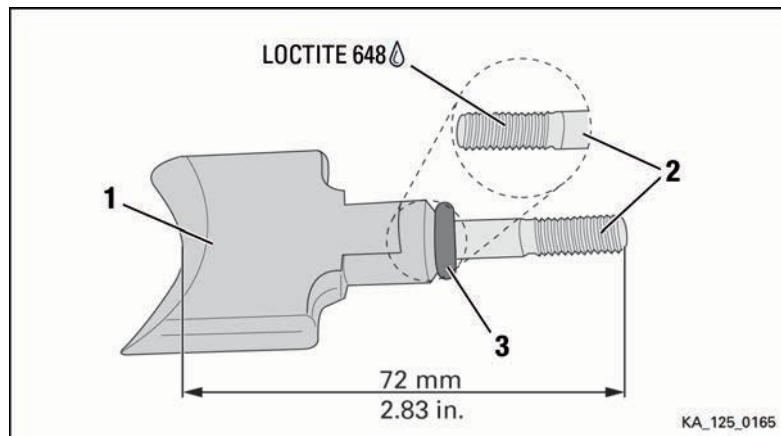
Part no. 料號	Description 內容	Use 施作
899788	LOCTITE 648 ( 膠 )	Stud bolt ( 螺樁 螺栓 )
276070	Installation tool 安裝工具	Valve bellows spring 閥門波紋管彈簧

**Instruction 指引** See [Figure圖: Exhaust valve. 排氣閥](#)

Proceed as follows to install the exhaust valve: 排氣閥的安裝如以下程序：



1. Lock exhaust valve (1) and stud M6x52.5 (2) with LOCTITE 648.  
使用 LOCTITE 648 來加固排氣閥 (1號件) 和螺樁 M6x52.5 (2號件)。
2. Wipe away the surplus LOCTITE. 擦掉多餘的LOCTITE膠。
3. Make sure the bolt is screwed in completely. Tightening torque 10 Nm (90 in.lb).  
確保螺柱完全鎖入。鎖固扭力 = 10 Nm (90 in.lb)。



Figure圖 4.20: Exhaust valve 排氣閥

1 Exhaust valve 排氣閥

2 Stud 螺樁 M6x52.5

3 O-ring O型環 6x2.5 RED 紅色

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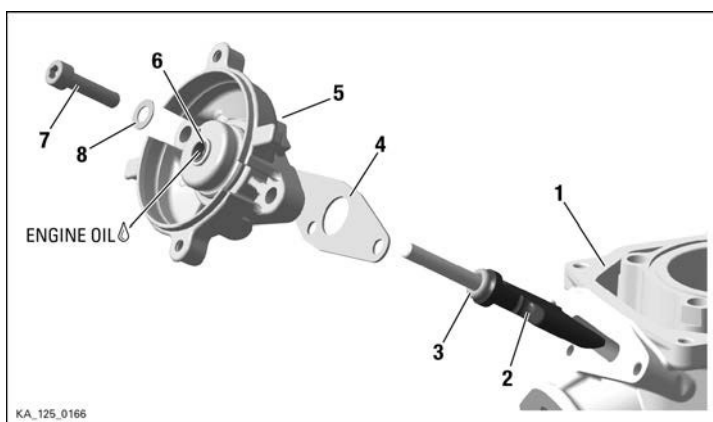
## INSTALLATION OF EXHAUST VALVE, GASKET, VALVE ROD HOUSING

### 排氣閥、墊片、閥桿的安裝

#### Instructions 指引

See [Figure: Exhaust valve](#). gasket, valve rod housing 排氣閥·墊片·閥桿殼

1. Insert exhaust valve into the slot in the cylinder head (1). Pay attention on the installation direction and make sure that the valve is not ranging into the exhaust port! 將排氣閥插入缸頭(1號件)的溝槽中。注意安裝方向·確保閥沒有滑進排氣口!
2. Position the gasket (4), making sure that the impulse bore on the cylinder is not covered. Note the installation direction! 放置墊圈(4號件)·過程中需確保汽缸上的導壓孔未被遮蓋。注意安裝方向!
3. Insert the valve rod housing (5). Coat both side of oil seal (6) with Engine oil and insert into the valve rod housing. 插入氣門桿殼(5號件)。在油封(6號件)的兩側塗上發動機機油·然後插入氣門桿殼。
4. Screw in 2 Allen screws M6x25 (7) and spring washers (8) onto the cylinder (1) and tighten. 將2個內六角螺栓M6x25(7號件)和彈簧墊圈(8號件)鎖到汽缸上(1號件)上並鎖緊。
5. Check the movement of the exhaust valve. 檢查排氣閥的運動狀況是否正常。
6. Tighten Allen screws (7). Tightening torque 10 Nm (90 in.lb). 內六角螺栓(7號件)鎖固扭力10 Nm (90 in.lb)。



Figure圖 4.21: Installation direction of exhaust valve 排氣閥安裝方向

- |                                 |                          |
|---------------------------------|--------------------------|
| 1 Cylinder head 汽缸頭             | 2 Exhaust valve 排氣閥      |
| 3 O-ring O型環 6x2.5 RED紅         | 4 Gasket 墊片              |
| 5 Valve rod housing assy. 閥桿殼總成 | 6 Oil seal 油封 6x11x3/4.5 |
| 7 Allen screw 內六角螺栓 M6x25       | 8 Spring washers 彈簧墊圈 B6 |

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### INSTALLATION OF THE EXHAUST VALVE PISTON 排氣閥活塞的安裝

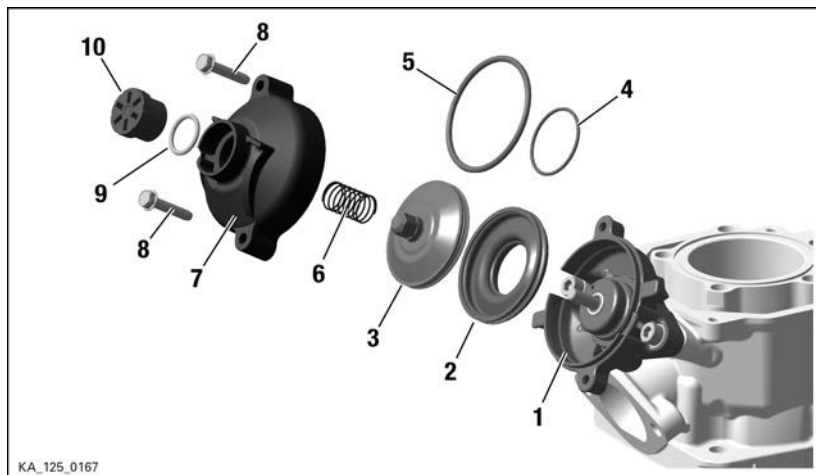
#### General 概況

In order to protect the piston pin circlip from unintentional loss in the crankcase, a suitable clean cloth should be used to cover the open cylinder bore. 為防止活塞銷卡環在曲軸箱中遺失的意外，應使用合適的乾淨布蓋住打開的汽缸口。

#### Instruction 指引

See [Figure圖: Exhaust valve piston](#). 排氣閥活塞

1. Degrease the valve rod housing (1), bellows (2) and exhaust valve piston (3).  
對閥桿外殼 (1號件)、波紋管 (2號件) 和排氣閥活塞 (3號件) 進行去除油脂。
2. Pull the small hose spring (4) over the bellows. 將小軟管彈簧 (4號件) 拉到波紋管上。
3. Fit the bellows over the valve rod housing (1). The bead of the bellows must engage in the groove in the valve rod housing. 將波紋管安裝在閥桿外殼 (1號件) 上。波紋管的捲邊必須嵌入閥桿外殼的凹槽中。
4. Tighten the exhaust valve piston (3) into the valve rod housing (1). Tightening torque 1.2 Nm (10.6 in.lb)  
將排氣閥活塞 (3號件) 鎖到閥桿外殼 (1號件) 中。鎖固扭力 1.2 Nm (10.6 in.lb)
5. Tension the large hose spring (5) with installation tool part no. 276070. 使用料號276070安裝工具 拉緊大軟管彈簧 (5號件)。
6. Insert compression spring (6). 插入壓縮彈簧 (6號件)。
7. Tighten the valve cover (7) with 2 TAPTITE screw M5x25 (8). 用 2 個三角柱型自攻螺栓 M5x25 (8號件) 鎖緊閥蓋 (7號件)。
8. Insert the O-ring 15.9-2.3 (9) into the valve cover. 將 O 型環 (9號件) 置入閥蓋。
9. Turn the adjustment screw (10) into the valve cover (7). 將調節栓 (10號件) 旋入閥蓋 (7號件)。



Figure圖 4.22: Exhaust valve piston 排氣閥活塞

1 Valve rod housing assy. 閥桿殼總成

3 Exhaust valve piston 排氣閥活塞

5 Hose spring 管束彈簧134-3.0-0.65

7 Valve cover 閥蓋

9 O-ring O型環 15.9-2.3

2 Bellow 波紋管

4 Hose spring 軟管彈簧70-1.7-0.3

6 Compression spring 壓縮彈簧48.5/0.8 mm

8 TAPTITE screw 三角柱型自攻螺栓 M5x25

10 Adjustment screw 調整栓

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## INSTALLATION OF PISTON 活塞的安裝

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
676035	Installation tool 安裝工具	Piston 活塞
n.a.	Engine oil 發動機機油	Piston pin 活塞銷

### NOTE 注意事項

*Cover your eyes with safety goggles during this work!*

*進行此工作時，請戴上護目鏡！*

*Mount the piston with the locking pin of the piston ring facing the intake port.*

*安裝活塞時，以活塞環的鎖銷面向進氣口。*

### NOTE 注意事項

*The piston pin is fixed in the piston with two circlips (left and right).*

*活塞銷有兩個固定在活塞內（左/右）的卡環。*

### ATTENTION 注意

**Always use new circlips. Used or previously installed circlips have too little tangential tension, and they may twist and work their way out of the groove in the piston. 一定要使用全新的卡環。舊卡環的切向張力太小，它們可能會扭曲並從活塞的凹槽中跳出來。**

### NOTE 注意事項

*For easier installation we recommend installing one circlip before installing the piston.*

*為便於安裝，我們建議在安裝活塞之前先安裝一個卡環。*

**Instruction 指引** See [Figure 圖: Piston pin](#). 活塞銷

Proceed as follows to install the piston pin: 活塞銷的安裝如以下步驟

1. Coat the piston pin needle cage (2) with Engine oil. 用發動機的機油塗抹活塞銷滾針軸承 (2號件)。
2. Insert the piston pin needle cage (2) into the upper connecting rod eye. 將活塞銷滾針軸承 (2號件) 插入上連桿小端的孔眼。
3. Mount the piston (3) and piston pin (4) on the con rod. 將活塞 (3號件) 和活塞銷 (4號件) 安裝到連桿上。
4. Place the new circlip (1) flat on a level surface. 將新的活塞銷卡環 (1號件) 平放在平面上。

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5. Push the mounting sleeve (5) with the circlip over it. 把卡環推到安裝套筒 (5) 的上端面。
6. Push the circlip deeper into the mounting sleeve with the tapered side of the installation tool (6). 使用安裝工具 (6號件) 的錐形側將卡環更深地推入安裝套筒 (5號件)。
7. Rotate the installation tool and continue to push the mounting sleeve until the circlip locks into the mounting sleeve groove. 旋轉安裝工具並繼續推動安裝套筒，直到卡環鎖定到安裝套筒凹槽中。
8. Place the installation tool with the cutout of the circlip down on the piston (3). 將安裝工具的卡環，開口朝下放在活塞 (3號件) 上。
9. Protect the piston with your hand and press into the piston with the hook ring. 用手保護活塞並用鉤環壓入活塞。

**NOTE 注意事項**

*The installation tool centers itself in the piston pin. 安裝工具以活塞銷為來對心。*

**NOTE 注意事項**

*Check that the circlip is correctly seated in the piston. 檢查活塞銷卡簧是否正確安裝在活塞中。*

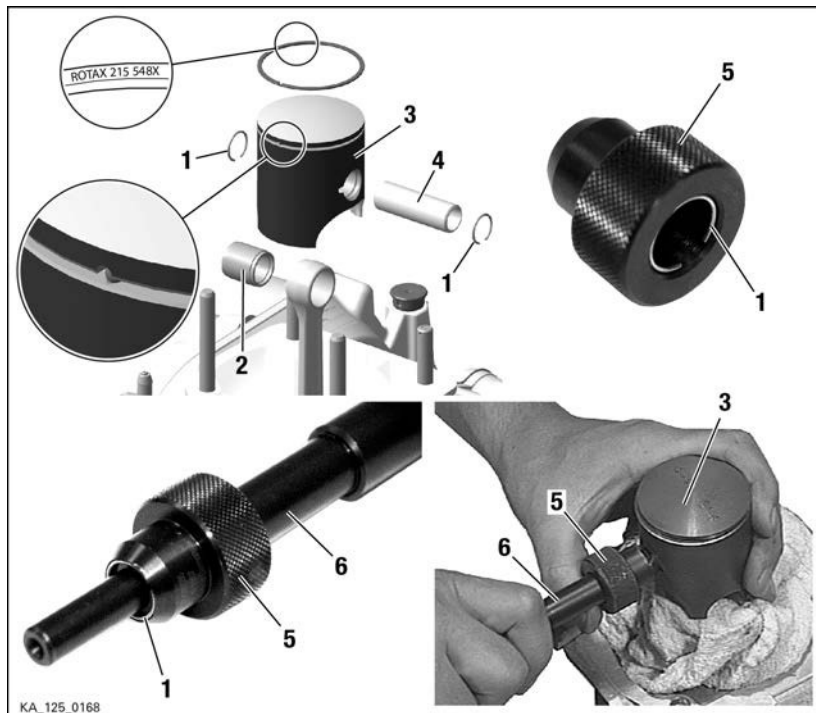


Figure 4.23: Piston pin

- |                        |                                  |
|------------------------|----------------------------------|
| 1 Circlip 活塞銷卡環        | 2 Needle cage 滾針軸承 K 15x19x20    |
| 3 Piston 活塞            | 4 Piston pin 15x10x12.5x45.6 活塞銷 |
| 5 Mounting sleeve 安裝套筒 | 6 Installation tool 安裝工具         |

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## INSTALLATION OF THE CYLINDER 汽缸的安裝

### General 概況

**ATTENTION 注意**

**Use only the piston/cylinder pairings specified by the table in Chapter 4 Section 3.2. All other combinations may lead to engine damage. 一定要採用第 4 章第 3.2 節中的表格指定的規格來配對活塞/氣缸。所有其他組合都可能導致發動機損壞。**

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
897651	LOCTITE 243	Stud bolts 螺樁

**Instructions 指引** Proceed as follows to install the cylinder head: 缸頭的安裝如下程序

See Figure 圖: Cylinder head. 缸頭

1. Coat the stud bolts (1) on the longer thread end with LOCTITE 243 and screw into the crankcase. Tightening torque 5 Nm (44.25 in.lb). 雙頭螺樁的長螺紋端 (1號件) 塗抹 LOCTITE 243 膠並鎖入曲軸箱。鎖固扭力 5 Nm (44.25 in.lb)。
2. Position new cylinder base gasket (0.2 mm) (4). Determine the correct thickness of the base gasket (see Chapter 4 Section: Squish gap measurement) to adjust the squish gap to the correct value. 放置新品汽缸底座墊圈 (0.2 mm) (4號件)。確定底座墊圈的正確厚度 (參見第 4 章: 擠壓間隙測量) 以將擠壓間隙調整到正確值。
3. Coat cylinder bore and piston (2) with Engine oil. 採用發動機的機油塗抹汽缸孔和活塞 (圖示2)。
4. Press piston ring into the piston with two fingers. 用兩根手指將活塞環壓入活塞。

**ATTENTION 注意**

**Do not damage the gasket. 不要讓墊片受損**

5. Position the cylinder (3) over the piston. 將汽缸 (3號件) 放在活塞上。
6. Screw cylinder crosswise to the crankcase with the four studs. Tightening torque 24 Nm (18 ft.lb). 交叉順序鎖緊四個固定汽缸與曲軸箱的雙頭螺樁。鎖固扭力 24 Nm (18 ft.lb)。



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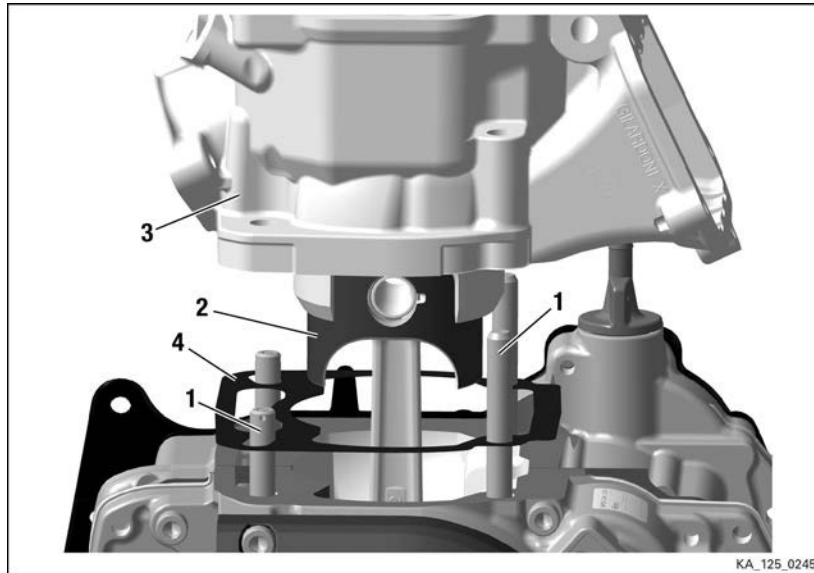


Figure 4.24: Cylinder head 缸頭

1 Stud bolts 螺椿

2 Piston 活塞

3 Cylinder 汽缸

4 Gasket 墊片

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## INSTALLATION OF THE EXHAUST SOCKET 排氣管座的安裝

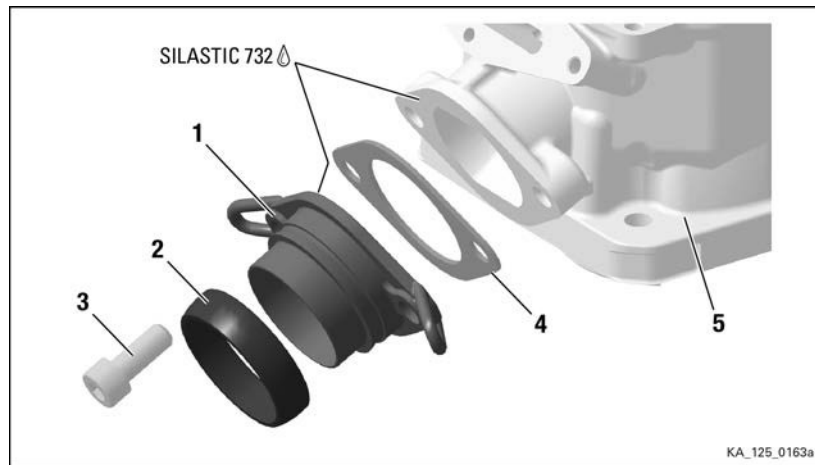
**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
297386	SILASTIC 732	Gasket 墊片

**Instructions 指引** See [Figure圖: Exhaust socket 排氣管座](#).

Proceed as follows to install the exhaust socket: 依照以下程序安裝排氣管座

1. Coat both sides of the gasket with SILASTIC. 用 SILASTIC 塗覆在墊片的兩側。
2. Fasten the exhaust socket (1) to the cylinder (5) with a new gasket (4) and 2 Allen screws M8x20 (3). Tightening torque 20 Nm (177 in.lb). 使用新品墊圈 (4號件) 和 2 個內六角螺栓 M8x20 (3號件) 將排氣管座 (1號件) 固定到汽缸 (5號件) 上。鎖固扭力 20 Nm (177 in.lb)。
3. Check that the exhaust port is tightly seated on the cylinder. 檢查排氣口是否牢固地被固定在汽缸上。



Figure圖 4.25: Exhaust socket 排氣管座

- |                               |                       |
|-------------------------------|-----------------------|
| 1 Exhaust socket assy. 排氣管座總成 | 2 Exhaust gasket 排氣墊片 |
| 3 Allen screws 內六角螺栓 M8x20    | 4 Gasket 墊片           |
| 5 Cylinder 汽缸                 |                       |

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## INSTALLATION OF THE CARBURETOR FLANGE AND REED VALVE

### 化油器接口及蛇簧閥的安裝

#### Special tools 特殊工具

Part no. 料號	Description 說明	Field of application 運用的部位
899788	LOCTITE 648	Screw locking 螺栓的緊固

**Instructions 指引** See [Figure: Carburetor flange and reed valve](#) 化油器接口以及舌簧閥

Proceed as follows to install the exhaust socket: 依照以下程序安裝排氣管座

#### ATTENTION 注意

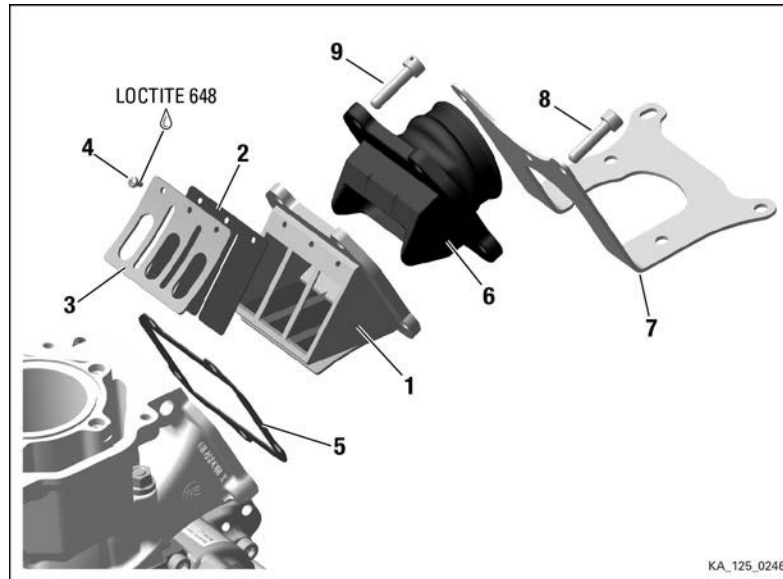
The reed petal mounted on the reed valve must be fixed in precisely the correct installation position. Incorrect positioning of this valve leads to disturbed running of the engine due to incomplete combustion. 安裝在舌簧閥上的舌簧片必須精確固定在正確的安裝位置。如果該閥的定位出錯，會導致不完全燃燒而干擾發動機正常運行。

#### ATTENTION 注意

The reed petal is bent, not flat. It must be fixed with the concave facing the valve guide. If the valve guide with the correctly fitted reed valve is held up to the light, it must not be possible to see through it. 舌簧閥片是彎曲的而不是平的。必須將凹面朝向導閥來固定。如果是正確安裝的簧片閥的導閥對著光線，則一定不會漏光。

1. Attach the reed petal (2) and the valve detent (3) to the valve guide using recessed head screws (4). Use LOCTITE 648 to lock the screws. 用凹頭螺栓 (4號件) 將舌簧片 (2號件) 和檔片 (3號件) 連接到導閥。使用 LOCTITE 648 膠來加固螺栓。
2. Position the gasket (5) on the cylinder. 將墊片 (5號件) 放在汽缸上。
3. Position the reed valve (1) and intake socket (6) and fasten together with the support bracket (7) using 5 head screws M6x25 (8)(9). Tightening torque 7 Nm (62 in.lb). 先將簧片閥體 (1號件) 和進氣管接口 (6號件) 定位好，並使用 5 個 M6x25 內六角螺栓 (8,9號件) 與支撐架 (7號件) 固定在一起。鎖固扭力 7 Nm (62 in.lb)。

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Figure圖 4.26: Carburetor flange and reed valve 化油器接口與舌簧閥

- |                           |   |
|---------------------------|---|
| 1 Reed valve 簧片閥體         | 2 Reed petal 舌簧片  |
| 3 Valve detent 檔片         | 4 Recessed head screw M3x6 凹頭螺栓   |
| 5 Gasket 墊片               | 6 Carburetor flange 化油器接口   |
| 7 Support bracket 支撐架     | 8 Allen screw M6x25, with hole for sealing the engine (有孔的內六角螺栓·密封發動機用) |
| 9 Allen screw 內六角螺栓 M6x25 |   |

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## INSTALLATION OF COMBUSTION CHAMBER INSERT 內燃燒室的安裝

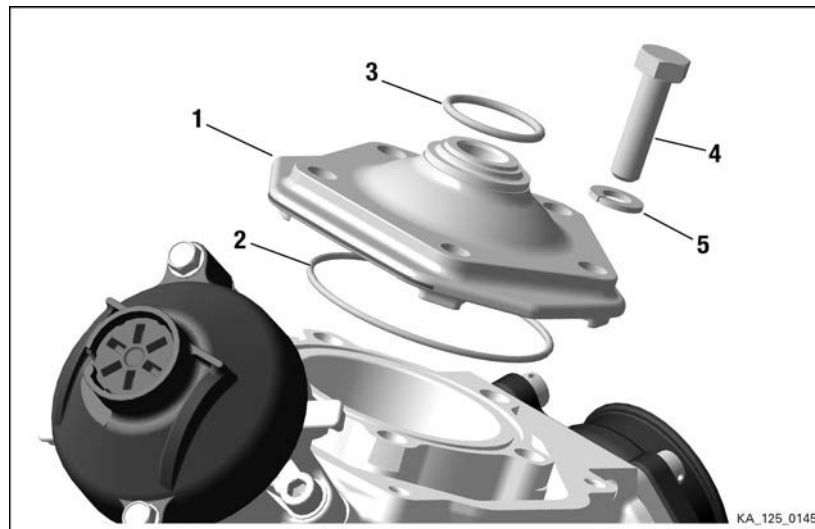
**General 概況**      **NOTE 注意事項**

*Note the installation position of the combustion chamber insert (1) - "Made in Austria" points to the exhaust port. 注意：內燃燒室 (1) 的安裝 - "Made in Austria" 這個標誌需指向排氣口。*

**Instructions 指引** See [Figure圖: Combustion chamber insert. 內燃燒室](#)

Proceed as follows to install the combustion chamber insert and cylinder head cover:  
請依照以下步驟安裝內燃燒室以及缸頭蓋板

1. Position O-ring (2) in the groove of the cylinder. 將 O 型環 (2 號件) 定位在汽缸的凹槽中。
2. Tighten combustion chamber insert (1) crosswise with 5 hex screws (4) and with lock washers (5) to 5 Nm initially, ensuring that the O-ring (2) is not crushed. Tighten to tightening torque 30 Nm (22 ft.lb). 初步用交叉方式將 5 個外六角螺栓和防鬆墊圈 (4、5 號件) 將內燃燒室 (1) 鎖緊至 5 Nm，確保 O 型環 (2 號件) 不被壓破。第二步再施以扭力 30 Nm (22 ft.lb) 來鎖緊。



Figure圖 4.27: Combustion chamber insert 內燃燒室

- |                                  |                             |
|----------------------------------|-----------------------------|
| 1 Combustion chamber insert 內燃燒室 | 2 O-ring 64x2<br>O 型環       |
| 3 O-ring O 型環 23.3x2.4           | 4 Hex. screw M8x30<br>外六角螺栓 |
| 5 Lock washer 防鬆墊圈               |                             |

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## INSTALLATION OF CYLINDER HEAD COVER 缸頭蓋的安裝

### Special tools 特殊工具

The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
897651	LOCTITE 243	Screw locking 螺栓防鬆用

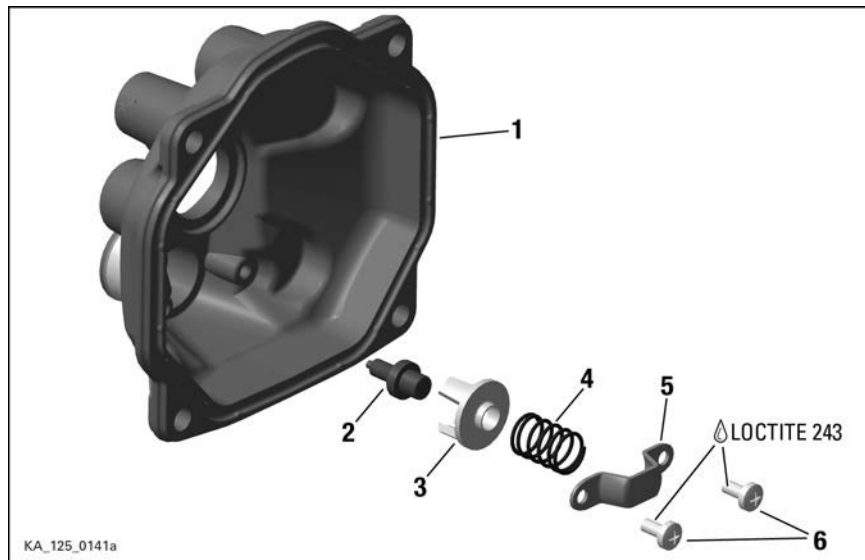
**Preparation 準備** The following preparation is required before installation: 安裝前需先進行以下的準備

- Installation of the coolant thermostat: 安裝冷卻節溫器

**Instructions 指引** See [Figure圖: Coolant thermostat. 冷卻節溫器](#)

Installation of the coolant thermostat: 安裝冷卻節溫器

1. Install thermostat (2) with collar nut M8 (3), compression spring (4) and thermostat retaining bracket (5) with 2 screws (6). Lock screws with LOCTITE 243. 使用 M8 間隔螺帽、壓縮彈簧、節溫器固定支架以及 2 個防鬆螺柱(3、4、5、6 號件) 來安裝節溫器 (2 號件)。用 LOCTITE 243 膠來鎖固螺絲



Figure圖 4.28: Coolant thermostat 冷卻節溫器

- |                                       |  |
|---------------------------------------|--|
| 1 Cylinder head cover red 缸頭蓋 (紅色)    | 2 Thermostat 45 degree celcius 節溫器 (45攝氏度) |
| 3 Collar nut 間隔螺帽 M8                  | 4 Compression spring 壓縮彈簧                  |
| 5 Thermostat retaining bracket 節溫器保持架 | 6 TAPTITE screw 三角柱型自攻螺柱 M4x8              |

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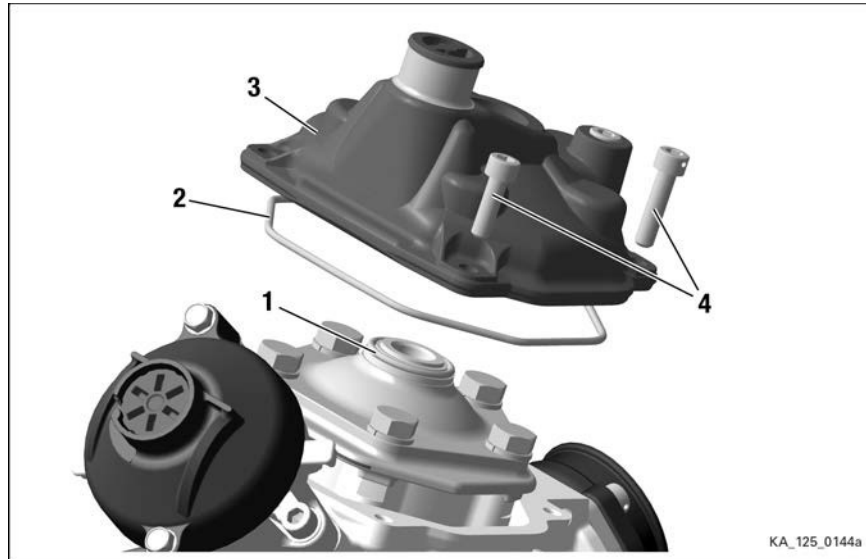
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**Instructions 指引** See [Figure: Combustion chamber insert](#). 內燃燒室

Proceed as follows to install the combustion chamber insert: 請依照以下步驟安裝內燃燒室

2. Position O-ring (1) on the combustion chamber insert. 將(1號件)O型環放置在內燃燒室頂
3. Grease the O-ring (2) lightly to ensure that it adheres better to the groove of the cylinder head cover, otherwise fix it with sealant (Silastic). 塗抹薄油在(2) O 型環以確保其妥善地粘附在缸頭蓋的內凹槽中。粘附方式也可選用密封膠 (Silastic) 來作。
4. Insert O-ring (2) into the groove of the cylinder head cover (3). 將 O 形環 (2號件) 放入缸頭蓋 (3號件) 的凹槽中。
5. Tighten the cylinder head cover (3) crosswise with 4 Allen screws M6x25 (4). Tightening torque 10 Nm (90 in.lb). 4 個內六角螺栓M6x25 (4號件)採用交叉順序來鎖緊缸頭蓋 (3號件)。  
鎖固扭力 10 Nm (90 in.lb)。

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Figure圖 4.29: Combustion chamber insert 內燃燒室

1 O-ring O型環 23.3x2.4

2 O-ring O型環 64x2

3 Cylinder head cover red 缸頭蓋  
(紅色)

4 Allen screw M6x25  
內六角螺栓

## INSPECTION AND ADJUSTMENT OF SQUISH GAP 擠壓間隙的檢查與調整

### General 概況

### NOTE 注意事項

*The gap between the piston (at the TDC of the piston) and the combustion chamber insert (= "squish gap") is partly responsible for the power characteristics of the engine and responsible for smooth running. 活塞 (在活塞的 TDC 位置) 和內燃燒室之間的間隙 (=“擠壓間隙”) 決定了大部分的發動機功率輸出特性並確保平穩運行。*

### NOTE 注意事項

*The smaller the squish gap the higher the engine compression. This means that the engine response to the feed from the carburetor becomes more critical under changing operating conditions (temperature, air pressure, humidity). 擠壓間隙越小，發動機的壓縮比越高。這意味著在不斷變化的運行條件 (溫度、氣壓、濕度) 下，化油器的供油對於發動機的響應變得更加關鍵。*



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### Special tools 特殊工具

The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 內容	Use 施作
580130	Solder 錫線 2 mm	Combustion chamber 燃燒室
580132	Solder 錫線 3 mm	Combustion chamber 燃燒室
n.a.	Vernier caliper 游標卡尺	Solder 錫線

**Instructions 索引** See [Figure: Squish gap measurement](#). 擠壓間隙的量測

1. Rotate crankshaft by hand until the piston is approx. 5 mm below TDC.
2. 用手來轉動曲軸、直到趨近TDC ( 活塞上止點 ) 以下的5mm
3. Right thickness of solder 合適的錫線厚度  
2.0 mm (for 125 MAX only ) 2.0mm (只針對125 MAX)  
3.0 mm (for 125 Junior MAX only) 3.0mm (只針對125 Junior MAX)  
bend as shown in the Figure: “Squish gap measurement” and insert through the spark plug thread into the combustion chamber until the solder is in contact with the cylinder wall.  
The squeeze edge must always be measured in the direction of the axis of the piston pin. Divergent measurements will show a wrong result! 如下圖所示來折彎進行“擠壓間隙測量”，通過火花塞螺牙通道引入燃燒室，直到錫線（錫料）與汽缸壁接觸。在導引錫線的過程中必須始終沿活塞銷軸線方向測量擠壓邊緣。如果採取不同的測量將顯示錯誤的結果！
4. Rotate the starter gear assembly by hand over the TDC position. 徒手旋轉啟動齒輪組件，讓活塞越過TDC的位置。

#### NOTE 注意事項

This will squeeze the solder between the piston and the combustion chamber insert. 這(手法)將會擠壓活塞和燃燒室之間的錫料。

5. Remove the solder from the combustion chamber and measure the thickness at the very end (= “squish gap”) of the crushed end of the solder with a vernier calliper. 從燃燒室中取出錫料，用游標卡尺測量錫料壓碎端的最末端 (=“擠壓間隙”) 的厚度。

#### NOTE 注意事項

A vernier calliper with an accuracy of min. 1/100 mm is required for this measurement. 游標卡尺的精度可達微米(min)。此測量精度需達到 1/100 mm

#### ATTENTION 注意

The squish gap must be within the specified tolerance. 擠壓間隙必須在設定的公差範圍內。

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**You find the latest valid regulation on:** 可以在以下位址找到最新的設定：  
<http://www.rotax-kart.com/de/Max-Challenge/MAX-Challenge/Regulations>.

#### NOTE 注意事項

**We recommend setting a squish gap in the upper tolerance range of the relevant model.** 我們建議採用公差上限值來設置擠壓間隙。(各機種的設定不同)

#### NOTE 注意事項

**The squish gap can be set to a different thickness with cylinder base gaskets. Cylinder base gaskets are available 0.2 mm (0.008 in.), 0.3 mm (0.01 in.), 0.4 mm (0.015 in.), 0.5 mm (0.02 in.) and 0.8 mm (0.03 in.) thick.**

擠壓間隙可以採取不同的厚度的汽缸底部墊片來作差異設置。汽缸底部墊片有以下的厚度選擇：0.2 mm (0.008 in.)，0.3 mm (0.01 in.)，0.4 mm (0.015 in.)，0.5 mm (0.02 in.) and 0.8 mm (0.03 in.)

#### Engine model: 125 MAX – EXAMPLE

以125 MAX這款為例

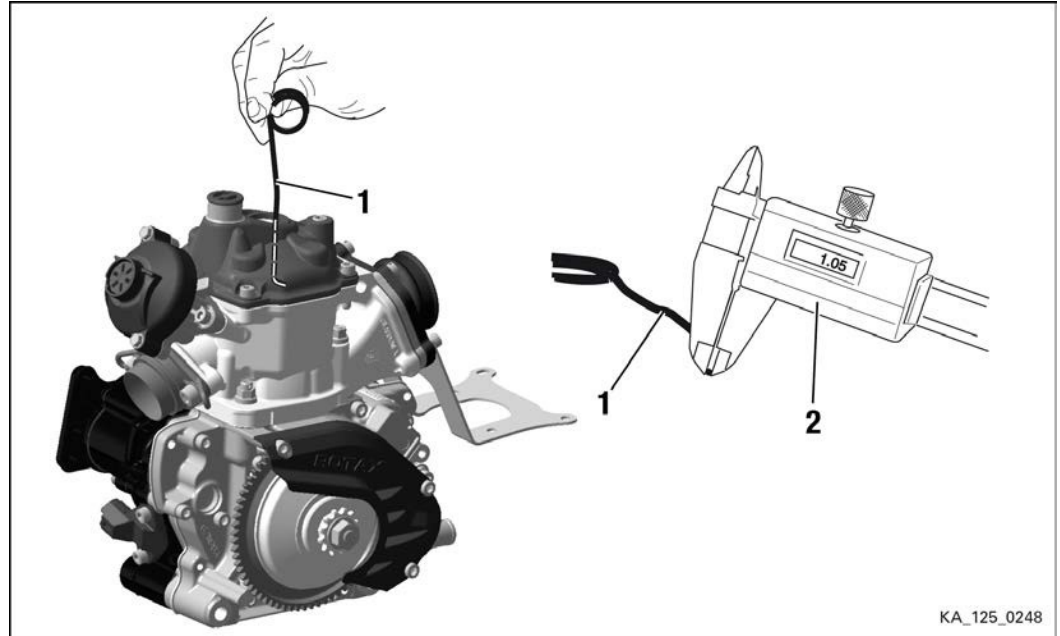
*A cylinder base gasket 0.5 mm thick has been installed. With this cylinder base gasket a squish gap of 0.8 mm was measured. A cylinder base gasket 0.8 mm thick is required to set the required value, e.g. 1.1 mm. 假設已安裝了0.5 mm厚的汽缸底墊片，這時候量測到0.8 毫米的擠壓間隙。如果擠壓間隙值要調整為1.1mm，那就需要改採用0.8 mm 厚的汽缸底墊片來設置。*

*Of course a 0.5 mm and a 0.3 mm seal can be installed. 當然，也可以採用0.5+0.3 mm，安裝兩個汽缸底墊片這種方式來達成0.8mm*

*If it is necessary to install a cylinder base gasket with a different thickness, the cylinder can be completely removed by unscrewing the four studs. Follow the instructions in section "Installation of the cylinder". 如果需要安裝不同厚度的汽缸底墊片，可以拆下四個螺樁將汽缸完全拆下。按照“汽缸的安裝”一節中的指引進行操作。*

*Keep in mind that the gasket will settle and reduce the squish over time. 請記住，隨著時間的推移，墊圈會沉壓（變薄）。*

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Figure圖 4.30: Squish gap measurement 擠壓間隙量測

1 Solder 錫線

2 Vernier caliper 游標卡尺

## INSTALLATION OF SPARK PLUG 火花塞的安裝

**Instructions**指引 Proceed as follows to install the spark plug: 請依以下步驟安裝火花塞

1. Screw in spark plug hand-tight and use tightening torque to tighten it with 27 Nm (20 ft.lb).  
用手擰緊火花塞、再以 27 Nm (20 ft.lb) 鎖緊。

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NOTES 筆記

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**Chapter: Chapter 5**  
**CRANKCASE 曲軸箱**

**TOPICS IN THIS CHAPTER 本章節主題**

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<b>Remove water pump and compensating wheels 拆下水泵與平衡輪</b> .....	<b>6</b>
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Assembly of crankshaft, water pump shaft and balance shaft 曲軸、水泵軸以及平衡軸的組裝 .....	42
Assembly of the crankcase 曲軸箱的組裝 .....	44
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**Contents 內容**      This chapter describes the disassembly and assembly of the crankcase of the ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo) engine. 本章介紹 ROTAX® 125 MAX evo (包括 Junior-、Mini-、Micro MAX evo) 發動機曲軸箱的拆卸和組裝。

**SYSTEM DESCRIPTION 系統說明**

Overview

概況

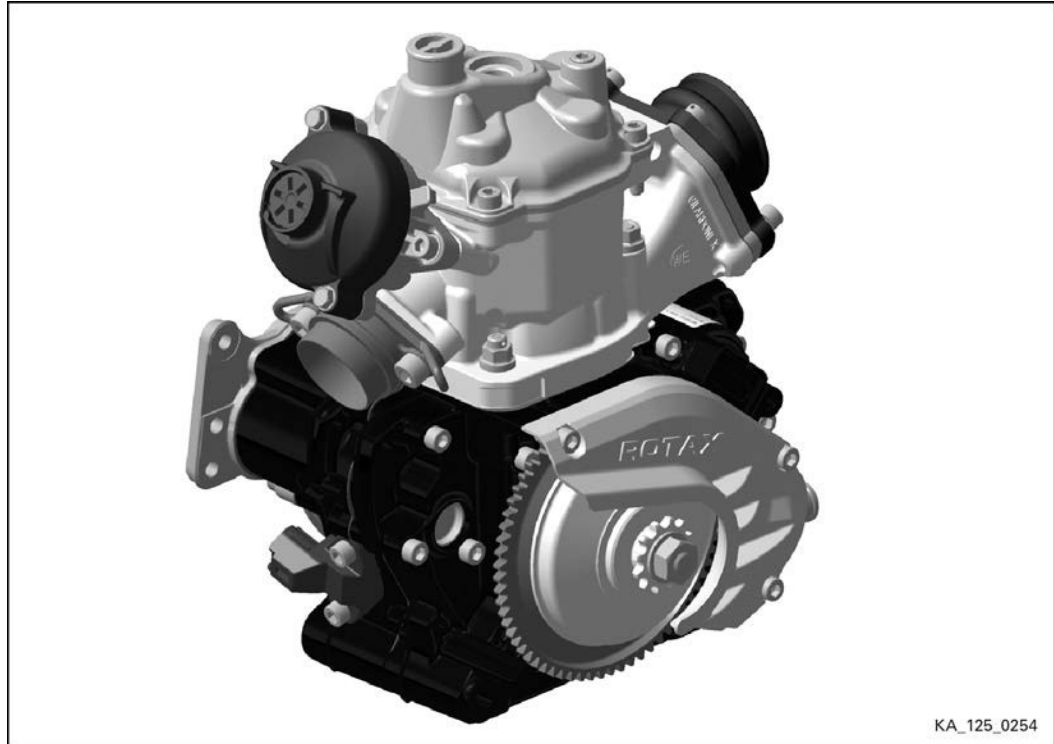


Figure 圖 5.1: Position on the engine 發動機上的所在位置

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### Overview 概況 Components of crankcase 曲軸箱的組成

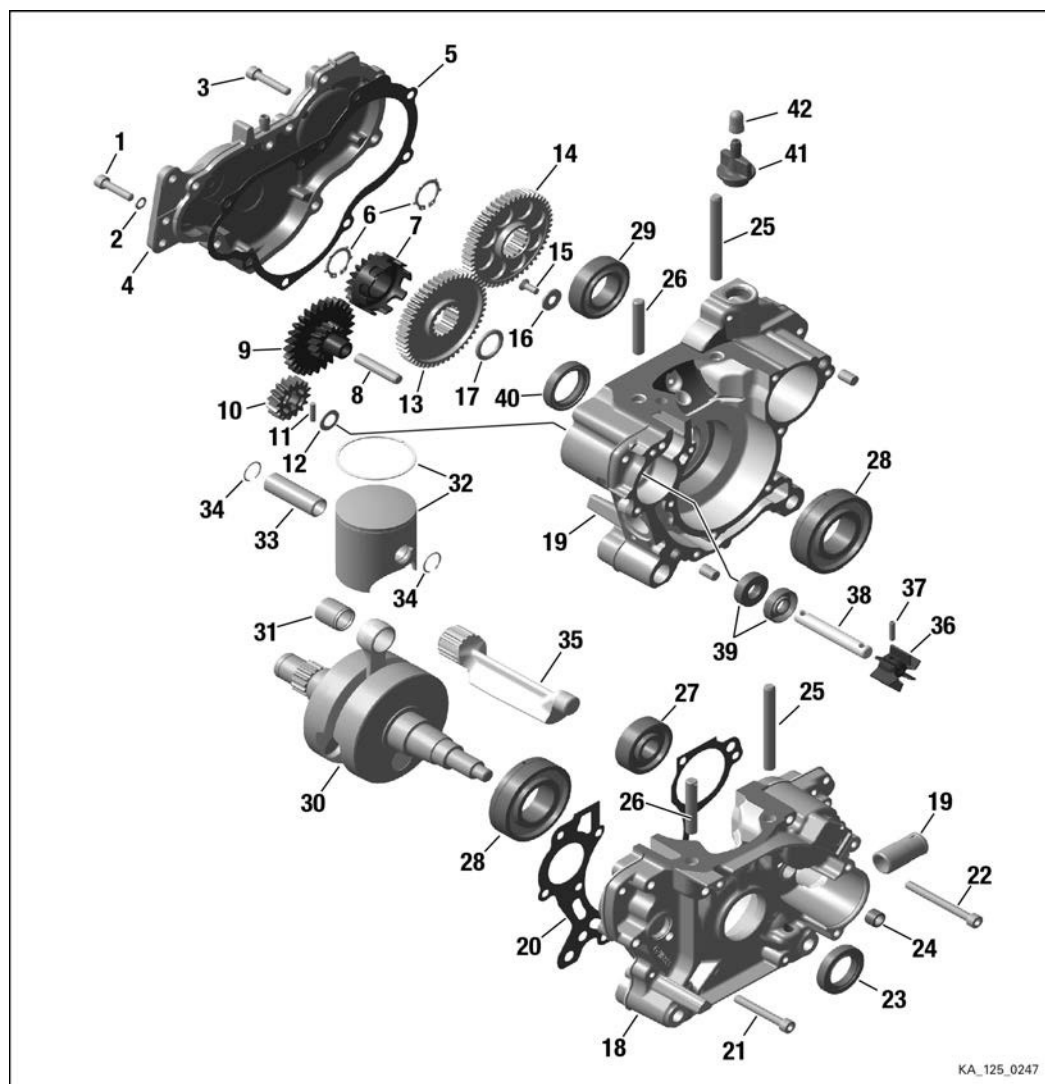


Figure 5.2

- |   |  |
|---|--|
| 1 Allen screw 內六角螺栓 M6x25               | 2 Sealing ring 密封環 A 6x10                    |
| 3 Allen screw 內六角螺栓 M6x30               | 4 Gearbox cover 齒輪箱蓋                         |
| 5 Gasket 墊片                             | 6 Retaining ring with lug 凸耳固定環 2 0x1.2      |
| 7 Water pump gear 19 T 水泵齒輪 19齒         | 8 Locating pin 定位銷 8 small M6x40             |
| 9 Idle gear 28/13 T 惰齒輪 28/13齒          | 10 Water pump pinion 水泵齒輪 16 T               |
| 11 Needle pin 針銷 4x15.8                 | 12 Thrust washer 止推墊圈 10.1/17/1              |
| 13 Balance gear (crankshaft) 平衡齒輪 (曲軸側) | 14 Balance gear (balance shaft) 平衡軸齒輪 (平衡軸側) |

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15 Countersunk screw 沉頭螺栓 M5x12	16 Thrust washer 止推墊圈
17 O-ring O型環 18x3.5	18 Crank case assy. Black 曲軸箱總成. 黑
19 Crank case assy. 曲軸箱總成	20 Gasket 墊片
21 Allen screw M6x45 內六角螺栓	22 Allen screw M6x60 內六角螺栓
23 Oil seal AS 25x38x7 油封	24 Needle bushing 滾針襯套 8x12x8
25 Stud M8x57/20 螺樁 ( 雙頭螺栓 )	26 Stud 螺樁 M 8x28/20 ( 雙頭螺栓 )
27 Ball bearing 滾珠軸承 6302	28 Ball bearing 滾珠軸承 6206
29 Ball bearing 滾珠軸承 6005	30 Crankshaft assy. 曲軸總成
31 Needle cage 滾針軸承 K 15x19x20	32 Piston assy. 活塞總成
33 Piston pin 活塞銷 15x10x12.5x45.6	34 Circlip 15 卡環
35 Balance shaft 平衡軸	36 Impeller ( 水泵 ) 葉輪
37 Dowel 定位銷 4x16	38 Water pump shaft 水泵軸
39 Oil seal A 油封 10x26x7	40 Oil seal 油封 AS 28x38x7
41 Air vent screw M18x1.5 排氣螺栓	42 Closure cap for impulse joint 導壓接頭密封蓋



## REMOVAL OF THE CRANKCASE 曲軸箱的拆卸

### Safety information 安全訊息

**Preparation 準備** The following preparation is required before removal: 拆卸前需先進行以下的準備

#### **m WARNING 警告**

**Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work. 在開始任何工作之前，一定要讓發動機冷卻至環境溫度。否則會有嚴重燒傷和燙傷的危險！**

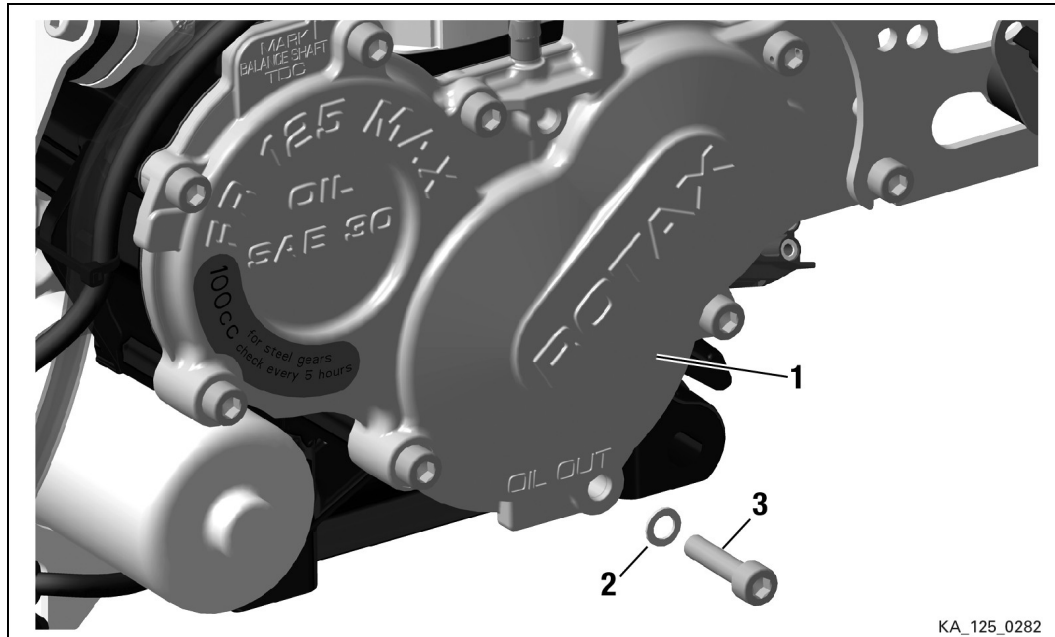
1. Removal of ignition system. See also Chapter 3). 拆卸點火系統。另見第 3 章 )
2. Removal of the fuel line. See also Chapter 3). 拆卸燃油管路。另見第 3 章 )。
3. Positioning the engine on the trestle mounting plate. See also Chapter 3). 將發動機定位在支架安裝板上。另見第 3 章 )。
4. Drain oil. See also Chapter 4). 洩放機油。另見第 4 章 )。
5. Removal of cylinder head. See also Chapter 4). 拆卸汽缸頭。另見第 4 章 )。
6. Removal of carburetor. See also Chapter 6). 拆卸化油器。另見第 6 章 )。
7. Removal of starter. See also Chapter 7). 拆卸啟動器。另見第 7 章 )。
8. Removal of radiator. See also Chapter 8). 拆卸水箱。另見第 8 章 )。

### DRAIN OIL 洩放機油

**Instruction 指引** See [Figure 圖: Drain oil](#). 洩放機油

1. Remove the Allen screw (3) with gasket (2) from the crankcase and gearbox case. 從曲軸箱和齒輪箱蓋拆下帶墊圈 (2號件) 的內六角螺栓 (3號件)。
2. Drain the oil into a suitable vessel and dispose of it in the proper manner. 將機油排入合適的容器中並以適當的方式處理。

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Figure圖 5.3: Drain oil 洩放機油

- |  |                                 |
|--|---------------------------------|
| <p>1 Gearbox cover 齒輪箱蓋</p> <p>3 Allen screw 內六角螺栓 M6x25</p> | <p>2 Sealing ring 密封圈 A6x10</p> |
|--|---------------------------------|

## REMOVE WATER PUMP AND COMPENSATING WHEELS 拆下水泵與平衡輪

### Special tools 特殊工具

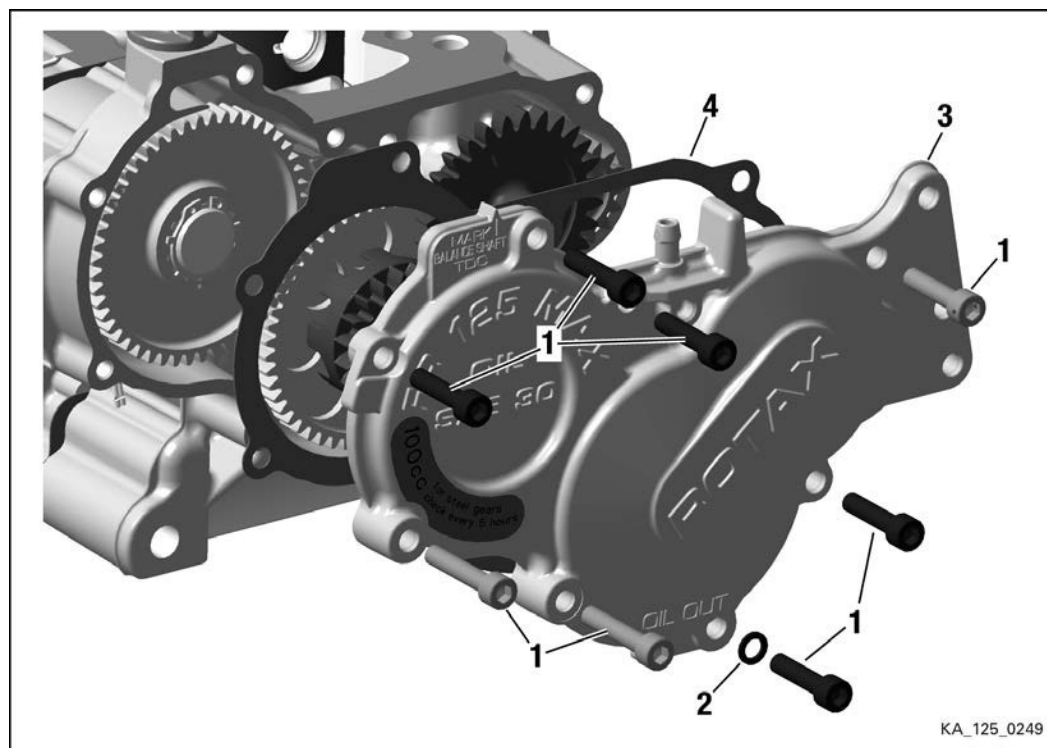
The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 內容	Use 施作
n.a.	Circlip pliers 卡環鉗	Drive wheel 驅動輪
n.a.	Hot-air gun 熱風槍	Compensating wheels 平衡輪

**Instructions 指引** See [Figure 圖 : Gearbox cover](#). 齒輪箱蓋

1. Unscrew and remove Allen screws (1). 拆鬆、並拆下內六角螺栓 ( 1號件 )
2. Remove gear cover (3) with gasket (4). 拆下齒輪蓋 ( 3號件 ) 以及墊片 ( 4號件 )

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Figure圖 5.4: Gearbox cover 齒輪箱蓋

1 Allen screws 內六角螺栓

2 Sealing ring A 6x10  
密封圈

3 Gear cover 齒輪蓋

4 Gasket 墊片

**Instruction 指引** See [Figure 圖: Water pump and balance shaft](#). 水泵與平衡軸

3. Remove water-pump pinion (2) and idle gear (1). 拆下水泵齒輪(2號件)以及惰齒輪(1號件)
4. Remove needle pins (3) and thrust washer (4) from the water-pump shaft. 從水泵軸上拆下針銷(3號件)與止推墊圈(4號件)
5. Remove retaining ring (5) with circlippliers. 使用卡環鉗拆下凸耳固定環(5號件)
6. Remove the drive gear (6) from the crankshaft. 從曲軸上拆下驅動齒輪(6號件)
7. Heat balance gear (8,7) evenly with hot air if they do not move freely and remove them from crankshaft or balance shaft. 如果平衡齒輪(8,7號件)不好取下, 則用熱風槍均勻加熱它們, 然後將它們從曲軸或平衡軸上拆下。
8. Remove O-ring (9) from the crankshaft. 從曲軸上拆下O型環

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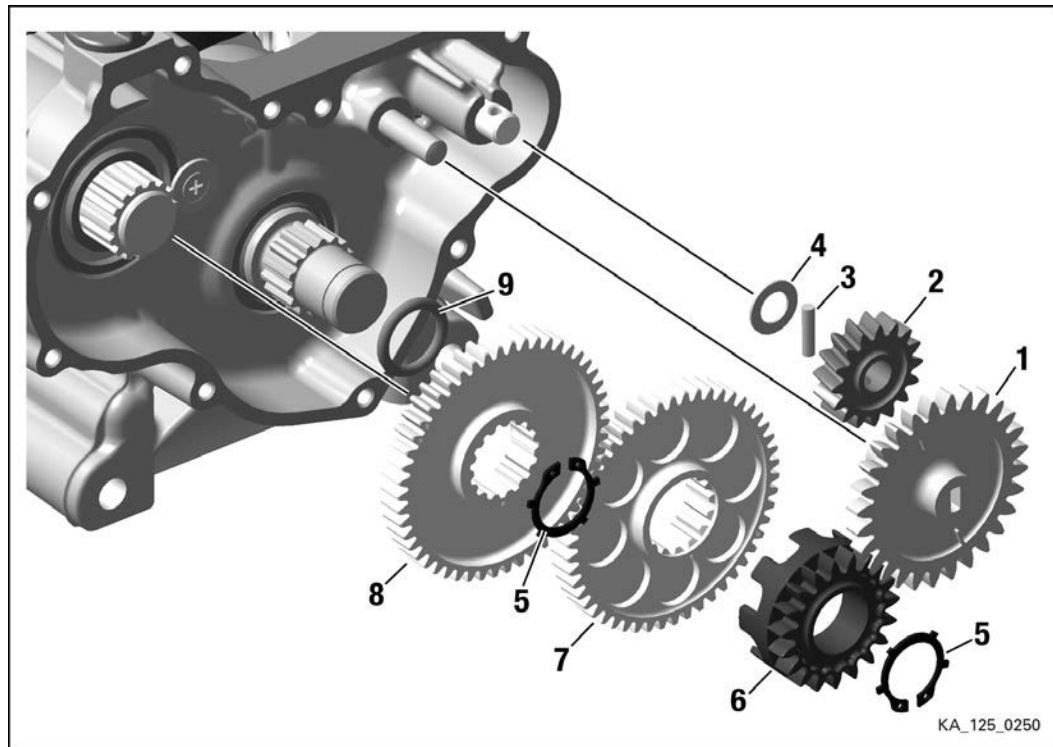


Figure 圖 5.5: Water pump and balance shaft 水泵與平衡軸組

- |  |                              |
|--|------------------------------|
| 1 Idle gear 惰齒輪 28/13 T                | 2 Water pump pinion 16T 水泵齒輪 |
| 3 Needle pin 針銷 4x15.8                 | 4 Thrust washer 止推墊圈         |
| 5 Retaining ring with lug 凸耳固定環 20x1.2 | 6 Water pump gear 19 T 驅動齒輪  |
| 7 Balance gear 平衡齒輪 50 T               | 8 Balance gear 50T<br>平衡齒輪   |
| 9 O-ring O型環 18x3.5                    |                              |

## DISASSEMBLING THE CRANKCASE 拆解曲軸箱

### Special tools 特殊工具

The following special tools and equipment are required: 需要以下的特殊工具或設備

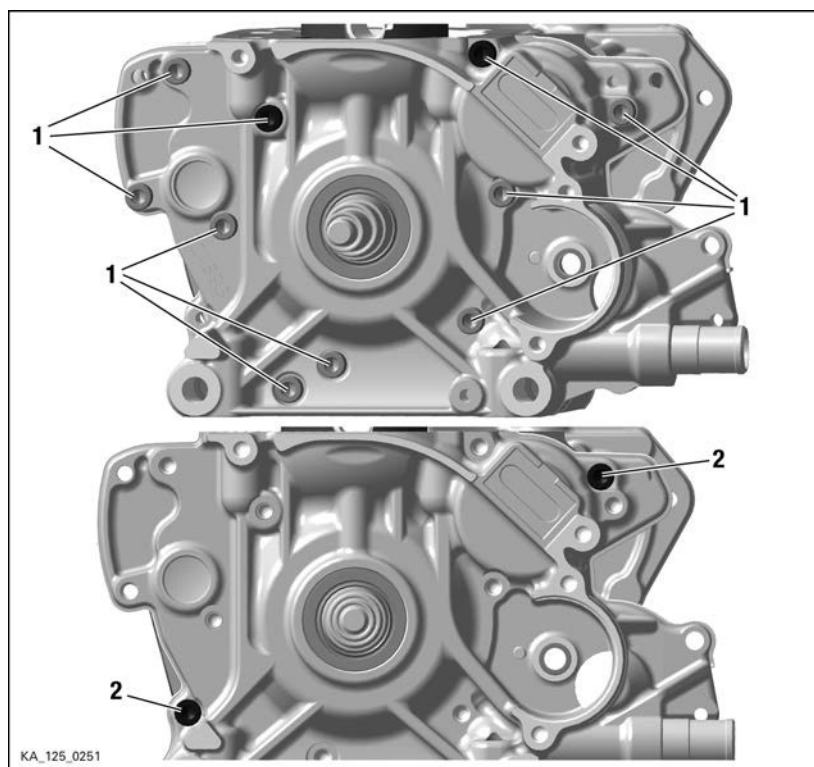
Part no. 料號	Description 說明	Field of application 運用的部位
276016	Puller assembly 拉拔器總成	Case halves 曲軸半箱
n.a.	Plastic hammer 塑料錘	Crankshaft 曲軸

Instructions 指引 See [Figure 圖: Crankcase.曲軸箱](#)

### NOTE 注意事項

*Use two hex. screws to separate the case halves 使用兩個六角螺栓頂分曲軸箱為兩半*

1. Unscrew all M6 case bolts and remove them. 拆鬆並卸下所有的曲軸箱上的M6螺栓
2. Remove engine housing from trestle mountingplate. 從安裝支架上拆下發動機外殼。
3. Screw Allen screws (1,2) evenly into the extraction thread and press the case halves evenly apart. 將內六角螺栓 (1,2號件) 均勻得鎖入螺紋中，然後將曲軸兩半箱均勻地推開。



Figure圖 5.6: Crankcase 曲軸箱

1,2 Allen screws 內六角螺栓

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**Instruction 指引** See **Figure圖: Balance shaft.平衡軸**

4. Remove gasket (2) from the case half (1). 從曲軸半箱 (1號件) 上拆下墊圈 (2號件)。
5. Remove water-pump shaft (4). 拆下水泵軸(4號件)
6. Remove balance shaft (3) from the case. 從曲軸半箱上拆下平衡軸(4號件)

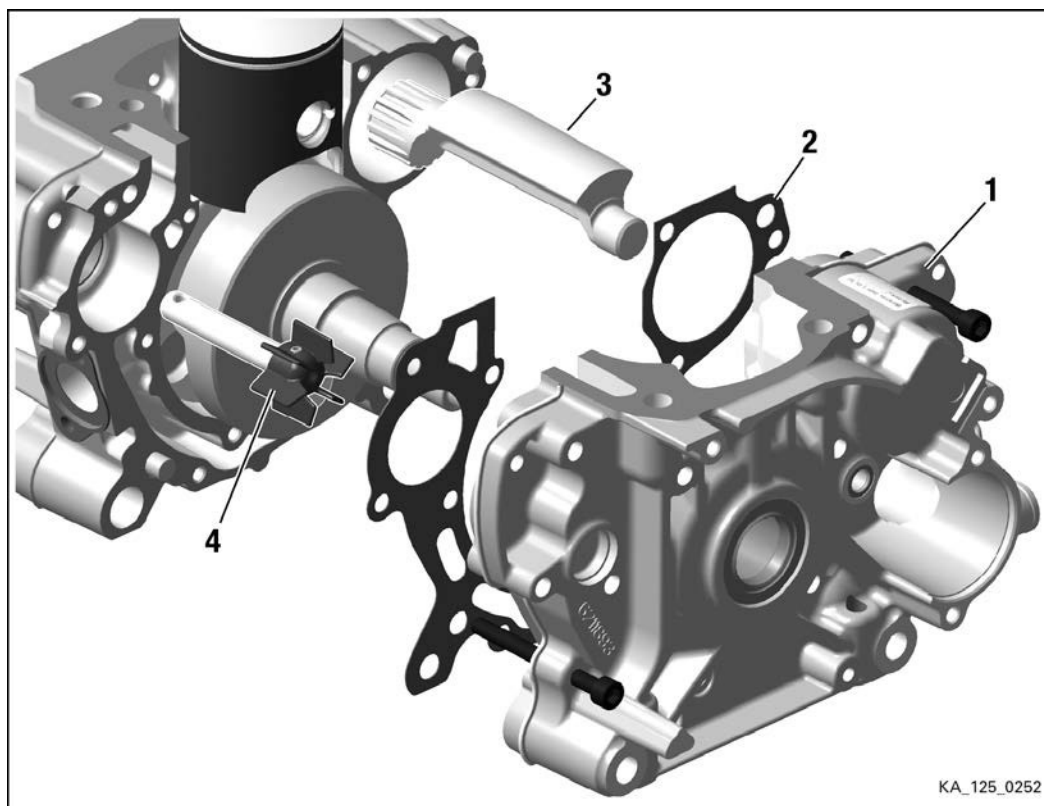


Figure 圖 5.7: Balance shaft 平衡軸

1 Crankcase half 曲軸半箱

2 Gasket 墊片

3 Balance shaft 平衡軸

4 Water pump shaft 水泵軸

7. Gently tap the crankshaft (1) with the plastic hammer (3) to remove the crankshaft from the case half (2). 用塑料錘 (3號件) 輕輕敲擊曲軸 (1號件) · 以從曲軸半箱 (2號件)拆下曲軸。

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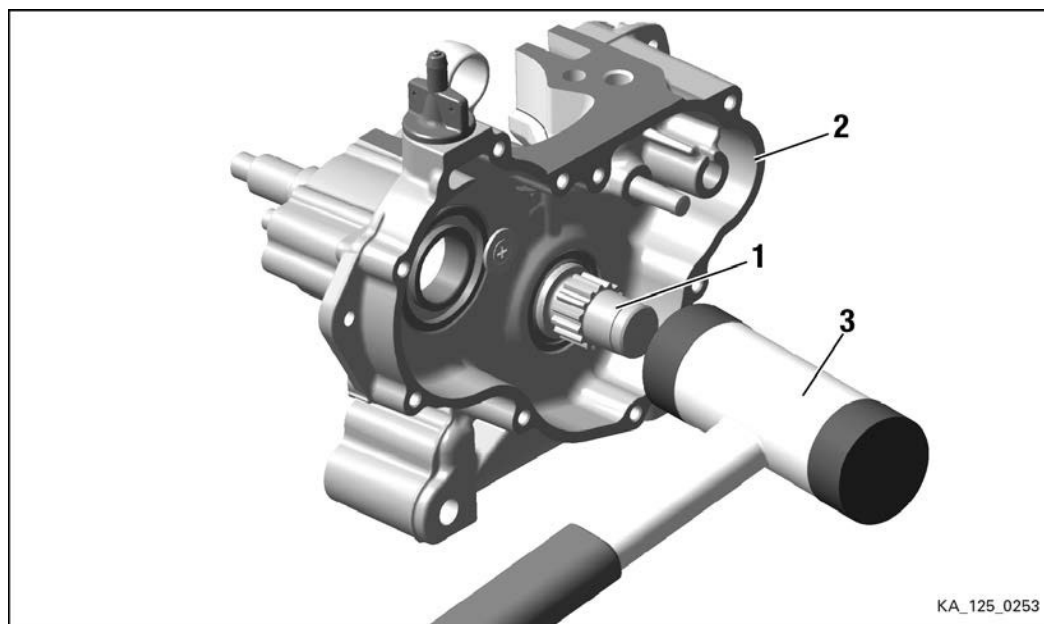


Figure 圖 5.8: Crankcase 曲軸箱

1 Crankshaft 曲軸

2 Crankcase half 曲軸半箱

3 Plastic hammer 塑料錘

## REMOVING BEARING AND OIL SEAL FOR SHAFT 拆卸軸上的軸承以及油封

### Special tools 特殊工具

The following special tools and equipment are required: 需要以下的特殊工具或設備

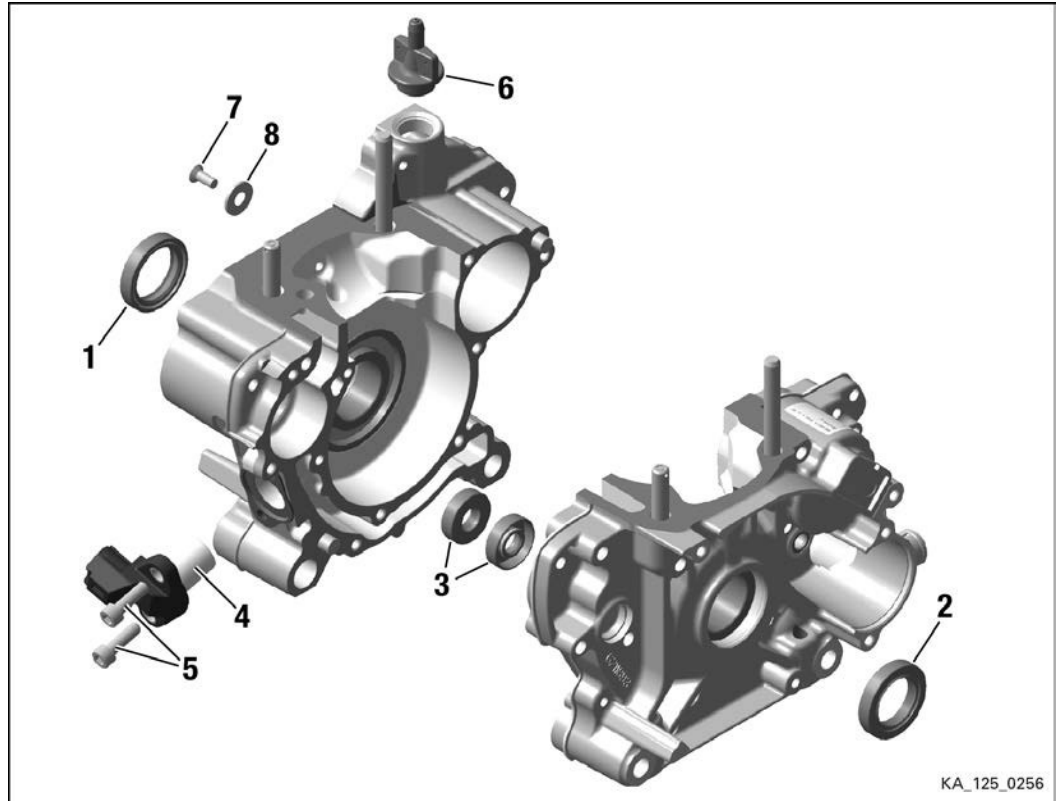
Part no. 料號	Description 內容	Use 施作
n.a.	Convection oven 烤箱	Case halves 曲軸半箱
676030	Installation tool 安裝工具	Needle bearing 滾針軸承

**Instructions 指引** See [Figure 圖 : Bearing and oil seal for shaft](#). 軸上的軸承以及油封

1. Remove oil seal (1) and (2) from the two halves with suitable tools. 採用合適的工具從曲軸箱半箱拆下油封 (1號和2號件)。
2. Remove oil seals (3) from water pump with suitable tools. 採用合適的工具拆下油封 (3號件)
3. Remove pick up sensor (4) for the ignition system by removing the two Allen screws (5). 使用兩個內六角螺柱 (5號件) 來拆下點火系統的曲軸角度傳感器 (4號件)。

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4. Remove air vent screw (6). 拆下排氣螺栓(6號件)。
5. Remove countersunk screw (7) and thrust washer (8). 拆下沉頭螺栓 (7號) 和止推墊圈 (8號件)。
6. Heat the two halves of the case to approx. 150 °C in the convection oven until the bearing can be tapped gently out. 在烤箱中將兩個曲軸半箱加熱至大約150攝氏度。直到軸承可以被輕輕敲出為止。



Figure圖 5.9: Bearing and oil seal for shaft 軸上的軸承以及油封

1 Oil seal 油封 AS 2 8x38x7

3 Oil seal 油封 A 10x26x7

5 Allen screw 內六角螺栓 M6x20

7 Countersunk screw 沉頭螺栓 M5x12

2 Oil seal 油封 AS 25x38x7

4 Pick up sensor 曲軸角度傳感器

6 Air vent screw 排氣螺栓 M18x1.5

8 Thrust washer 止推墊圈



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**m WARNING 警告**

**Danger of severe burns and scalds! 有嚴重燒傷和燙傷的危險!**  
Wear heat-resistant gloves during this process! 在此過程中戴上耐熱手套!

**Clutch end case half 離合器側的曲軸半箱**

**Instruction 指引** See [Figure: Clutch end case half](#). 離合器側的曲軸半箱

7. Remove case half (1) from the convention oven and drop onto a flat wood board. This releases the ball bearing (2) of the crankshaft and the ball bearing (3) from the case. 從烤箱中取出曲軸半箱 (1) 並放在平坦的木板上。可以將曲軸的滾珠軸承 (2號件) 和滾珠軸承 (3號件) 從半箱中取出來。
8. Invert the case half and remove the needle bushing (5) with the installation tool (4). 翻轉曲軸半箱並用安裝工具 (4號件) 拆下滾針軸套 (5號件)。

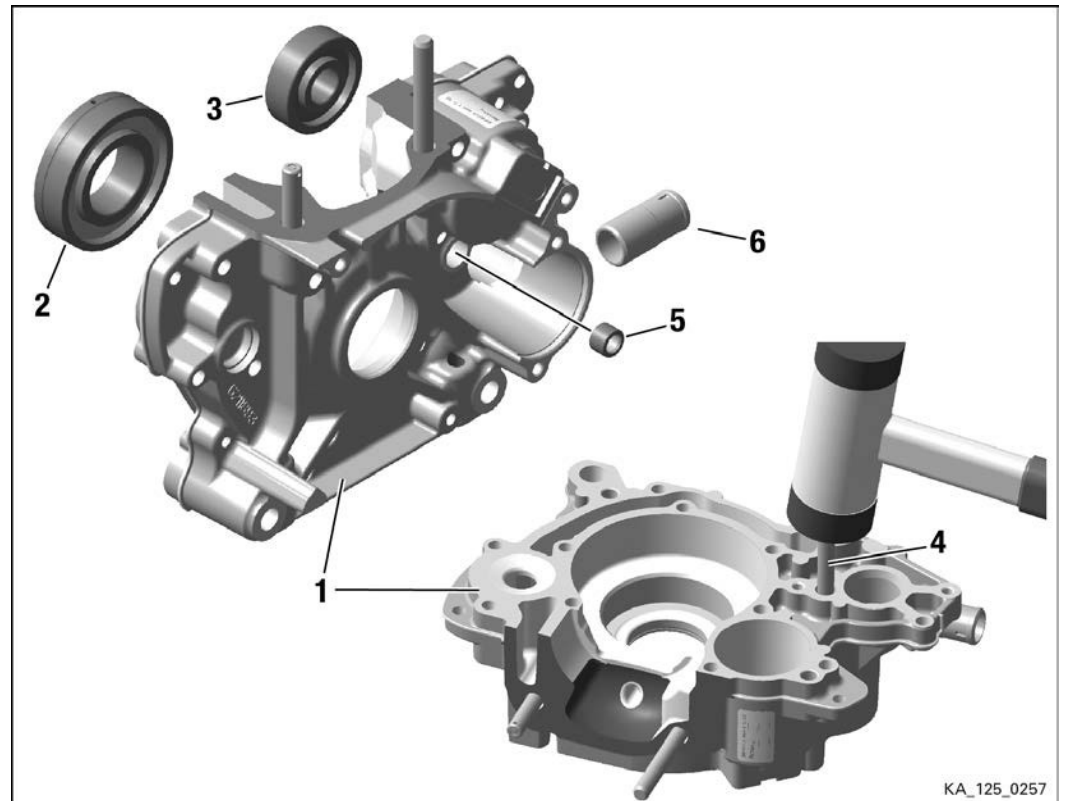


Figure 圖 5.10: Clutch end case half 離合器側的曲軸半箱

1 Crank case assy. 曲軸箱總成

2 Ball bearing 滾珠軸承 6206

3 Ball bearing 滾珠軸承 6302

4 Installation tool 安裝工具 part no. 676030

5 Needle bushing 滾針軸套 8x12x8

6 Tube 管子

### Ignition end case half 點火系統側的曲軸半箱

#### NOTE 注意事項

The wooden board must have cutouts for the two dowels (1) and the locating pin (2) to form a flat base for the case half. 這個治具木板必須有兩個銷釘 (1號件) 和定位銷(2號件)的切口，此木板形成一個平坦的底座可以放置曲軸半箱。

If it is necessary to replace the locating pin (2), it can be removed from the hot case with a pipe wrench. 如需更換定位銷(2號件)，可在箱子是熱的時候，用管鉗將其拆下。

Instruction 指引 See [Figure圖: Ignition sidecrankcase. 點火系統側的曲軸半箱](#)

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9. Remove case half (3) from the convection oven and drop onto a flat wood board with the case split pane. This removes the ball bearing (4,5) from the crankshaft and the balance shaft. 從烤箱中取出曲軸半箱 (3) 並放在平坦的木板上。可以將曲軸和平衡軸的滾珠軸承 (4,5號件) 拆下來。
10. Allow both crankcase halves to cool to room temperature (20 °C) (274 °F).將兩個曲軸半箱冷卻至室溫 (20 °C) (274 °F)。

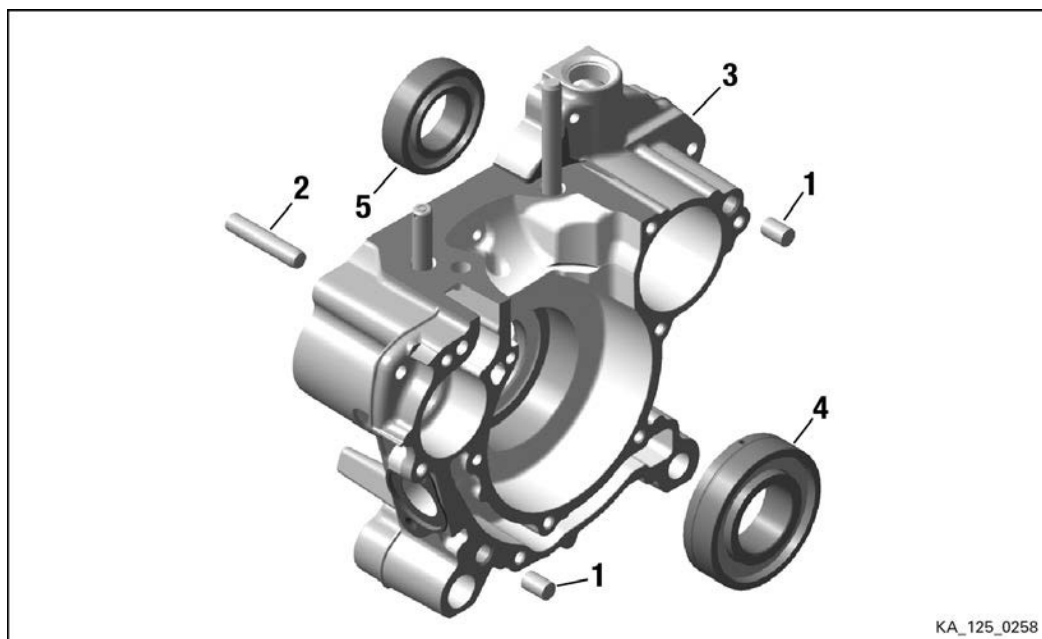


Figure 圖 5.11: Ignition side crankcase 點火系統側的曲軸半箱

- |                          |                                  |
|--------------------------|----------------------------------|
| 1 Pin 銷釘 8x12            | 2 Locating pin 定位銷 8 small M6x40 |
| 3 Crankcase assy. 曲軸箱總成  | 4 Ball bearing 滾珠軸承 6206         |
| 5 Ball bearing 滾珠軸承 6005 |                                  |

## INSTALLATION OF THE CRANKSHAFT REPAIR KIT 曲軸維修套件包的安裝

### DISASSEMBLING OF THE CRANKSHAFT 拆解曲軸

#### Safety instructions 安全指示

**m WARNING 警告**

**Non-compliance can result in serious injuries or death!**

不遵守可能會導致重傷或死亡！

Be particularly careful when working with a tool such as a hydraulic press, and follow the instructions of the manufacturer. All repair and maintenance work must only be carried out by a qualified technician. Generally speaking, we advise to read manuals carefully and follow the instructions. 使用液壓機等工具時要特別小心，並遵循製造商的說明。所有維修和保養工作只能由合格的技術人員進行。一般來說，我們建議仔細閱讀手冊，並按照說明操作。

#### NOTE 注意事項

*The parts of the crankshaft repair kit are paired together and must therefore be exclusively used together. 曲軸維修套件的零件是成對的，因此必須成對專用。*

#### NOTE 注意事項

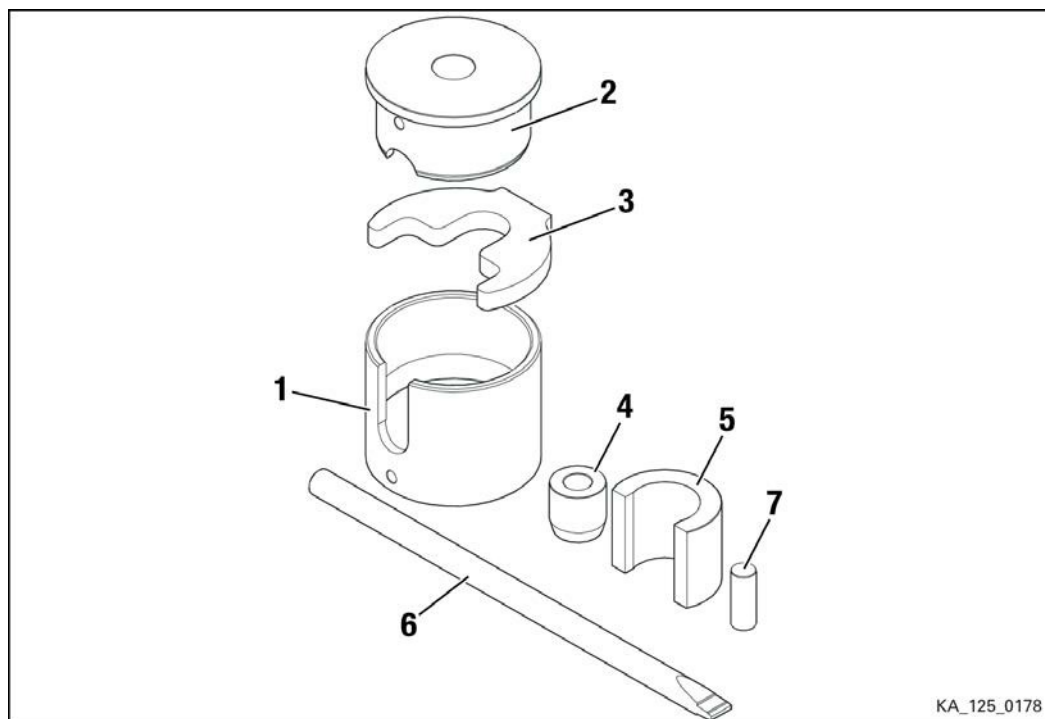
*Before disassembling the crankshaft, clean the parts thoroughly with a cleaning agent (grease-free). 在拆卸曲軸之前，用清潔劑徹底清潔零件(去除油脂)。*

#### Special tools 特殊工具

The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
n.a.	Press 油壓機	Crankshaft disassembling 曲軸拆解
n.a.	Dial gauge 數位量尺	Crankshaft measurements 曲軸量測
276051	crankshaft repair jig 曲軸維修治具	Crankshaft 曲軸

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Figure圖 5.12: Crankshaft repair jig 曲軸維修治具

Part	Part no. 料號	Function 功能
1	276051	Bottom section of the repair jig 曲軸拆解治具底座-襯底
2		Top section of the repair jig 頂部的維修夾具
3		Thrust plate 推板
4		Sleeve 襯套
5		Thrust ring 止推環
6		Crowbar 撬棒
7		Thrust pin/old piston pin 指推銷 / 舊的活塞銷

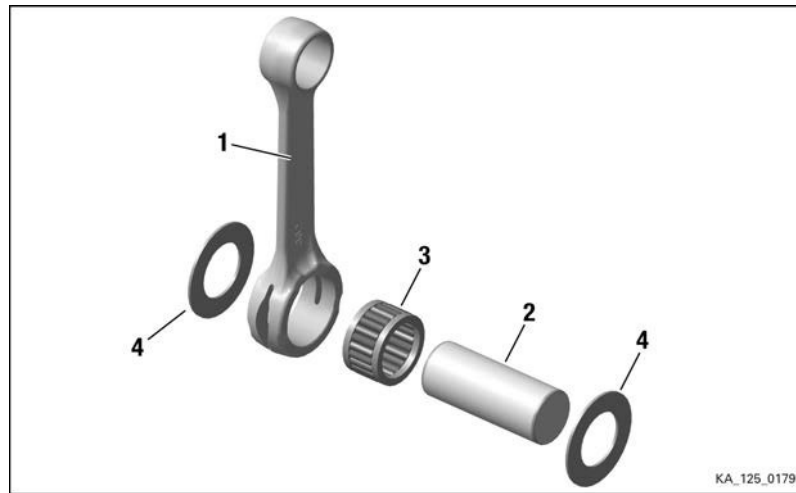
**NOTE 注意事項**

*Con rod parts are not part of the crankshaft repair jig (part no. 276051).*  
連桿零件不屬於曲軸維修夾具的一部分

*The crankshaft repair kit (con rod) is available at your ROTAX® Dealer.*  
曲軸維修套件 (連桿) 可在您的 ROTAX® 經銷商處購得。

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Part 部件	Part no. 料號	Description 描述
685011		Crankshaft repair kit (1x) 曲軸修復包
consisting of: 組成		
1	217431	Con rod (1x) 連桿
2	221162	Con rod pin (1x) 連桿銷
3	232884	Needle bearing (1x) 滾針軸承
4	227731	Thrust washers (2x) 止推墊圈



Figure圖 5.13: Con rod parts 連桿部件

1 Con rod 連桿

2 Con rod pin 連桿銷

3 Needle bearing 滾針軸承

4 Thrust washer (2x) 止推墊圈

**Instructions 指引**

See [Figure圖 : Disassembling of the crankshaft.](#) 拆解曲軸

**NOTE 注意事項**

*Position the con rod above the bore of the bottom of the crankshaft repair jig. Otherwise the con rod pin, the crankshaft half or the bottom section may be damaged. 將連桿置於曲軸修理夾具底部孔的上方。否則連桿銷、曲軸半部或底部可能會損壞。*

1. Push thrust plate (2) between the two halves of the crankshaft. 將止推板(2號件)推入曲軸的兩半配重塊之間。

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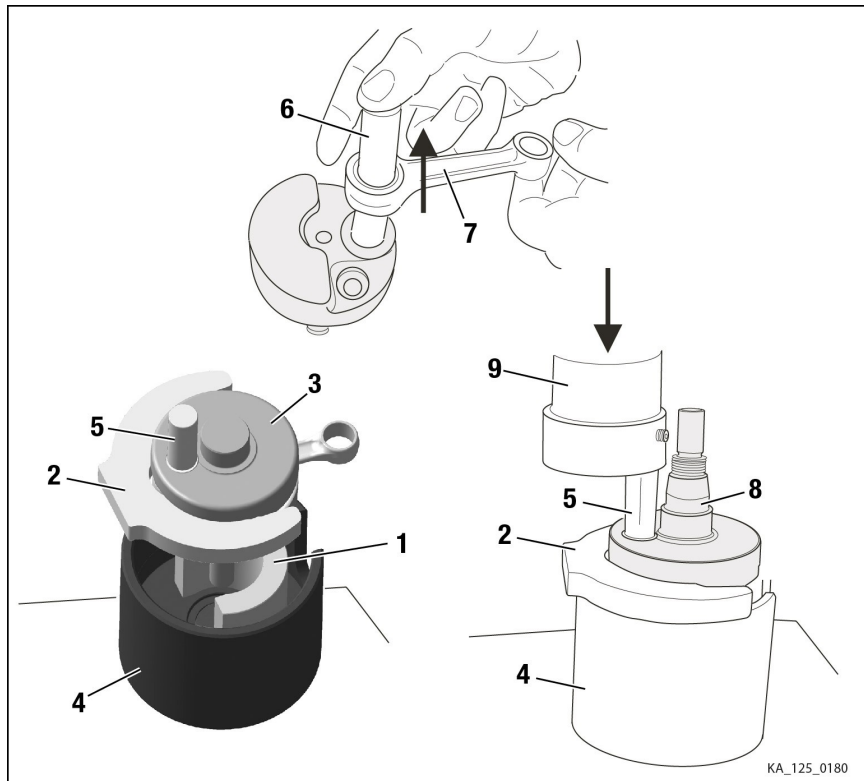
2. Position the crankshaft on the thrust plate (3) on bottom section of the tool (4) and make sure that the crankshaft matches the bore in the bottom section at the crankshaft repair jig (4). 將曲軸放在襯底工具 (4號件) 底部的止推板 (3號件) 上，並確保曲軸與曲軸襯底夾具 (4號件) 底部的孔相匹配。
3. Position the thrust pin (5) on the connecting rod pin and press the crankshaft apart. 將止推銷 (5號件) 放在連桿銷上，然後將曲軸壓開。

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**NOTE 注意事項**

Take an available con rod pin (6) and push the old con rod (7) with needle bearing and thrust washer onto the con rod pin. Note the installation instructions. 取一個堪用的連桿銷 (6號件) 並將帶有滾針軸承和止推墊圈的舊連桿 (7號件) 推到連桿銷上。請注意安裝說明。

4. Take the gearbox-end of the crankshaft half (8) and repeat the procedure. 取出齒輪箱測的半部曲軸半 (8號件) 並重複該步驟。



Figure圖 5.14: TYPICAL – Disassembling of the crankshaft 拆解曲軸

- |                        |  |
|------------------------|--|
| 1 Thrust ring 止推環      | 2 Thrust plate 止推板                                       |
| 3 Crankshaft half 曲軸半部 | 4 Bottom section of the crankshaft repair jig 曲軸拆裝襯底治具底座 |
| 5 Thrust pin 推銷        | 6 Con rod pin 連桿銷  |
| 7 Con rod 連桿           | 8 Drive side of the crankshaft half 曲軸半部<br>_ 驅動側        |
| 9 Press 壓件             |  |



## INSPECTION OF THE CRANKSHAFT 檢查曲軸

### General 概況

- Thoroughly clean the crankshaft with a grease-free cleaning agent.  
採用不含油脂的清潔劑徹底清潔曲軸。

### Instructions 指引 See Figure圖: Crankshaft measurements. 曲軸的量測

1. Inspect the crankshaft for visible damage and traces of wear: 檢查曲軸是否有明顯的損壞和磨損痕跡：
  - Cone/centered thread 錐形特徵/中心螺紋
  - Bearing seats 軸承座
  - Running surface of the bearing 軸承的接觸表面
  - Contact surface of the shaft seals 軸封的接觸面
  - Woodruff key groove 鍵槽

### Measuring the crankshaft 曲軸的量測

2. Measure values for the two main bearing seats (CS01), the bearing surface of the clutch (CS02) and of the piston pin(CS03). 測量兩個主軸承座 (CS01)、離合器 (CS02) 和活塞銷 (CS03) 軸承表面的各項規格值。
3. Determine the axial play of the con rod bearing (CS04) using a feeler gauge. 使用塞規確定連桿軸承 (CS04) 的軸向遊隙。
4. Check the specific dimension (CS07). 檢查具體尺寸 ( CS07 ) 。
5. Determine the radial clearance of the connecting rod bearing (CS05). 確定連桿軸承 ( CS05 ) 的徑向遊隙。
6. Check the run out of the crankshaft (CS06). 檢查曲軸 (CS06) 的跳動量。

#### **NOTE 注意事項**

*If one of the wear limits CS01 or CS02 is reached, the complete crankshaft must be replaced. 如果達到磨損極限 CS01 或 CS02 之一，則必須更換整個曲軸。*

#### **NOTE 注意事項**

*If one of the wear limits CS03, CS04 or CS05 is reached, BRP-Rotax recommends use of the applicable repair kit. See also Chapter 5 Figure: Con rod parts. 如果達到磨損極限 CS03、CS04 或 CS05 其中之一，BRP-Rotax 建議選用適當的維修套件來處置。另請參閱第 5 章圖：連桿部件。*

#### **NOTE 注意事項**

*If the maximum approved stroke (CS06) of the crankshaft is exceeded, the crankshaft must be realigned. See also Chapter 5 Figure: Crankshaft measurements. 如果超過曲軸的最大允許行程 (CS06)，則必須重新調整曲軸。另請參見第 5 章圖：曲軸測量*

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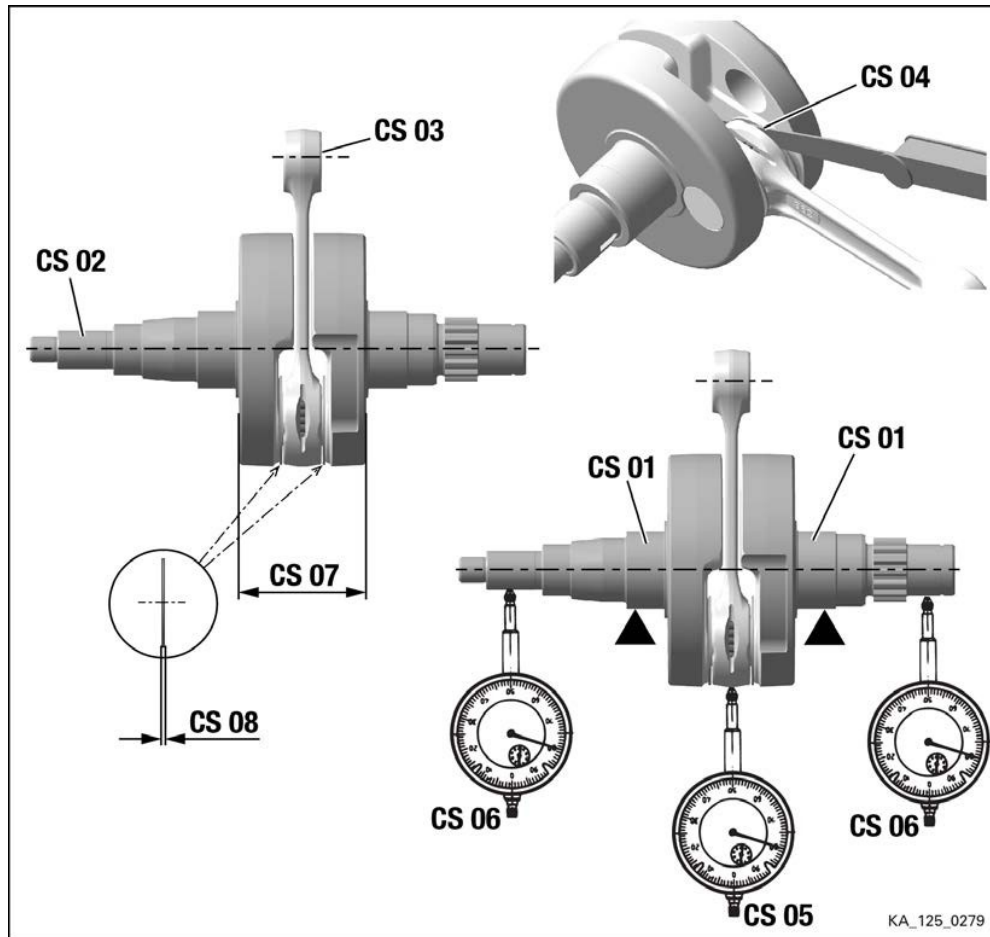


Figure 5.15

Description 描述	Code 代碼(上圖)	New dimension 新尺寸	Wear limit 磨耗極限
Main bearing seat 主軸承座	CS01	29.980 mm - 29.995 mm	29.94 mm
Clutch bearing seat 離合器軸承座	CS02	14.98 mm - 15.003 mm	14.95 mm
Piston pin bearing seat 活塞銷軸承座	CS03	18.99 mm - 19.005 mm	19.015 mm
Conrod bearing axial play 連桿軸承的軸向偏擺	CS04	1.0 mm	1.3 mm
Conrod bearing radial play 連桿軸承的徑向偏擺	CS05	0.05 mm	0.08 mm
Stroke of crankshaft 曲軸行程	CS06	0.0 mm - 0.015 mm	0.03 mm

# BRP-Rotax

## REPAIR MANUAL 修復手冊

Description 描述	Code代碼(上圖)	New dimension 新尺寸	Wear limit 磨耗極限
Distance of crank webs 曲軸配重塊的跨距	CS07	48.95 mm - 49.05mm	49.05 mm
Trust washer thickness 止推墊圈厚度	CS08	1.0 mm	0.85 mm

### HAFT NOT IN SPECIFICATION 曲軸超標的處理方法

#### General NOTE 注意事項

*If the crankshaft is not 100% aligned or exceeds the tolerance, the crankshaft must be re-aligned. See CS07. 如果曲軸未 100% 正準或超出公差，則必須重新校準曲軸。參見 CS 07。*

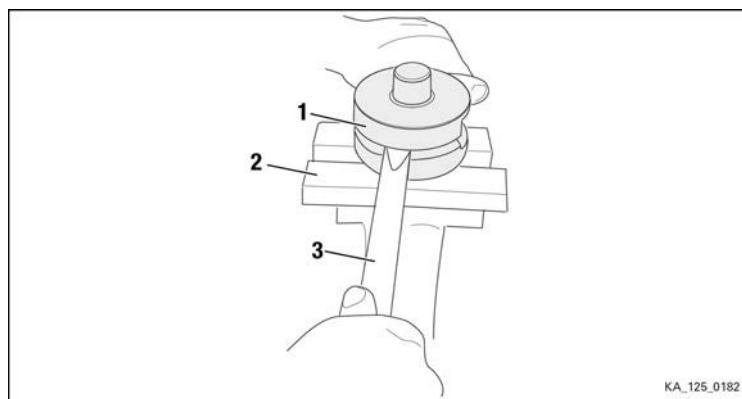
#### Special tools 特殊工具

The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
276051	Crankshaft repair jig 曲軸維修治具	Crankshaft 曲軸
n.a.	Vise 台鉗	

#### Instructions 指引 See Figure 圖: Aligning the crankshaft. 曲軸的校準

- To align the crankshaft, clamp the drive end or engine end of the crankshaft half (1) in a vise (2). Use a soft material to cover the crankshaft inside the vise to protect the surface. 1. 校準曲軸的方法：將曲軸驅動端的半部 (1號件) 或發動機端夾在台鉗 (2號件) 中。使用柔軟的材料覆蓋台鉗內與外，以保護曲軸
- Use the lever (3) to lift up the upper half of the crankshaft. 使用用撬桿 (3號件) 抬起曲軸的上半部分。



Figure圖 5.16: Aligning the crankshaft 曲軸校準

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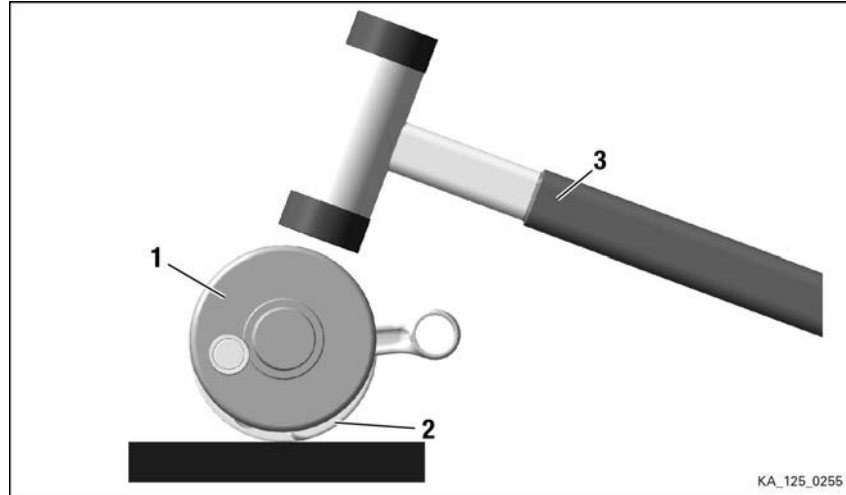
## REPAIR MANUAL 修復手冊

1 Crankshaft half 曲軸半邊

2 Vise 台鉗

3 Crowbar 撬棒

3. The crankshaft can be aligned to the external diameter of the crankshaft webs with target strokes of an aluminum hammer. 可以使用鋁錘來校正曲軸的行程以及配重塊的外徑。



Figure圖 5.17: Aluminum hammer 鋁錘

1 Crankshaft half 曲軸半邊

2 Crankshaft 曲軸

3 Aluminum hammer 鋁錘

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## CRANKSHAFT – ASSEMBLY 組裝曲軸

### General 概況

### NOTE 注意事項

*Clean the bore for the connecting rod pins of the gearbox-side crankshaft half with a cleaning agent (grease-free). 使用清潔劑清洗 (去脂) 曲軸半箱齒輪箱側的連桿銷孔。*

### Special tools 特殊工具

The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
n.a.	Press 油壓機	Crankshaft 曲軸
276051	Crankshaft repair jig 曲軸維修用 冶具	Crankshaft 曲軸
899788	LOCTITE 648	Crank pin 曲軸銷

**Instructions** 指引 See [Figure 圖 : Crankshaft assembly](#). 曲軸的組裝

1. Apply LOCTITE 648 to the inside of the crank pin bore in both crankshaft halves. 使用LOCTITE 648 塗抹到兩個曲軸半箱的曲柄銷孔內部。

### NOTE 注意事項

Remove excess LOCTITE after pressing in, otherwise adjacent parts may be damaged. 壓入後，去除多餘的LOCTITE膠，否則可能會損壞相鄰的部件。

2. Insert the new con rod pin (5) into the crankshaft bore. 將新的連桿銷 (5號件) 插入曲軸孔中。
3. Place the sleeve (6) over it. 將套管 (6號件) 放在上面。

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### NOTE 注意事項

Transfer the new con rod from the old con rod pin to the pressed-in (new) con rod pin in the crankshaft repair jig. (note the installation position). 使用曲軸維修治具，使用舊的連桿銷來壓入（新）的連桿銷。（注意安裝位置）。

4. Position the drive end crankshaft half (3) on the thrust plate (2) and press the new con rod pin (5) into the crankshaft until the con rod pin stops moving, then remove the sleeve (6). 將驅動端的半部曲軸 (3號件) 放在止推板 (2號件) 上，並將新連桿銷 (5號件) 壓入曲軸，直到連桿銷停止移動，然後拆下套筒 (6號件)。

### 5 NOTE 注意事項

Before positioning the con rod on the pressed-in con rod pin check for: 在新的連桿在壓入連桿銷的工序之前，請檢查：

- no corrosion damage – 不可有腐蝕損壞
- no dirt or dust particles – 不可有污垢或灰塵顆粒
- check that all bearing needles are present- 檢查軸承上所有的滾針狀態，必須完好

Slide the new crankshaft assy. (3) with cage from the con rod pin (mounting device) onto the pressed-in con rod pin (5). 將新的曲軸總成 (3號件) 連同止推板導滑放上安裝治具(4號件)，壓入連桿銷 (5號件)。

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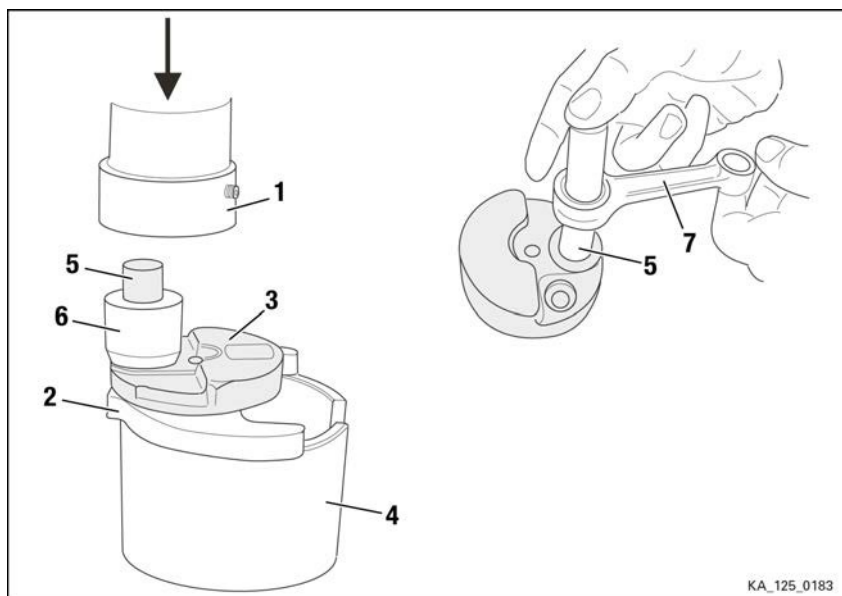


Figure 圖5.18: Crankshaft assembly 組裝曲軸

- |                                    |  |
|------------------------------------|--|
| 1 Press 油壓機                        | 2 Thrust plate 止推板                         |
| 3 Drive end crankshaft half 曲軸驅動半端 | 4 Bottom section of the repair jig 襯底的維修治具 |
| 5 Con rod pin 連桿銷                  | 6 Sleeve 套管                                |
| 7 Crankshaft 曲軸                    |  |

**Instructions 指引** See [Figure 圖: Crankshaft assembly](#). 組裝曲軸

- Slide the gearbox-end crankshaft half (1) into the bottom section of the tool (2). 將齒輪箱端的半曲軸 (1號件) 導滑入治具 (2號件) 的底部。
- Clean the drive end crankshaft web hole with cleaning agent (grease-free). 使用清潔劑清洗驅動端曲軸配重塊的內孔 (去脂)。
- Coat the hole with LOCTITE 648. 在孔內塗上 LOCTITE 648。

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**NOTE 注意事項**

Remove excess LOCTITE, otherwise the con rod may be damaged. 施作後，去除多餘的 LOCTITE膠，否則可能會損壞連桿。

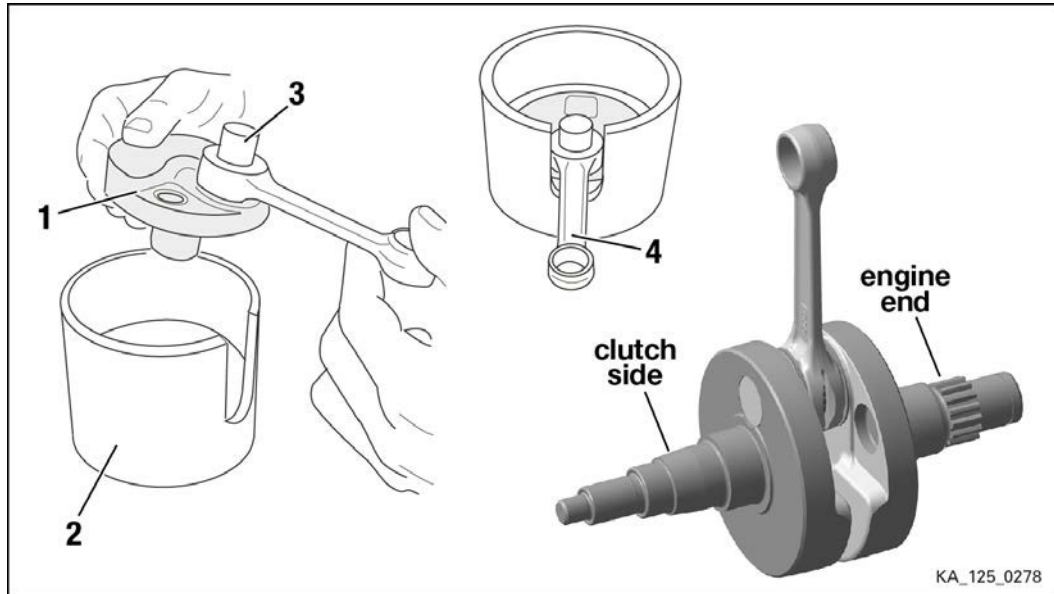


Figure 5.19

1 Crankshaft half (engine end) 曲軸半端  
(發動機側)

3 Con rod pin 連桿銷

2 Bottom section of the repair jig  
襯底的維修治具

4 Con rod 連桿

9. Slide the drive-end crankshaft half (1) into the top section of the repair jig (2) 將驅動端的半曲軸 (1號件) 導滑入維修治具 (2) 的頂部。
10. Hold the crankshaft half as shown in following Figure and push the top section of the tool (3) into the bottom section of the tool (2). 如下圖所示，握住半曲軸並將工具 (3號件) 的頂部推入襯底治具 (2號件)。

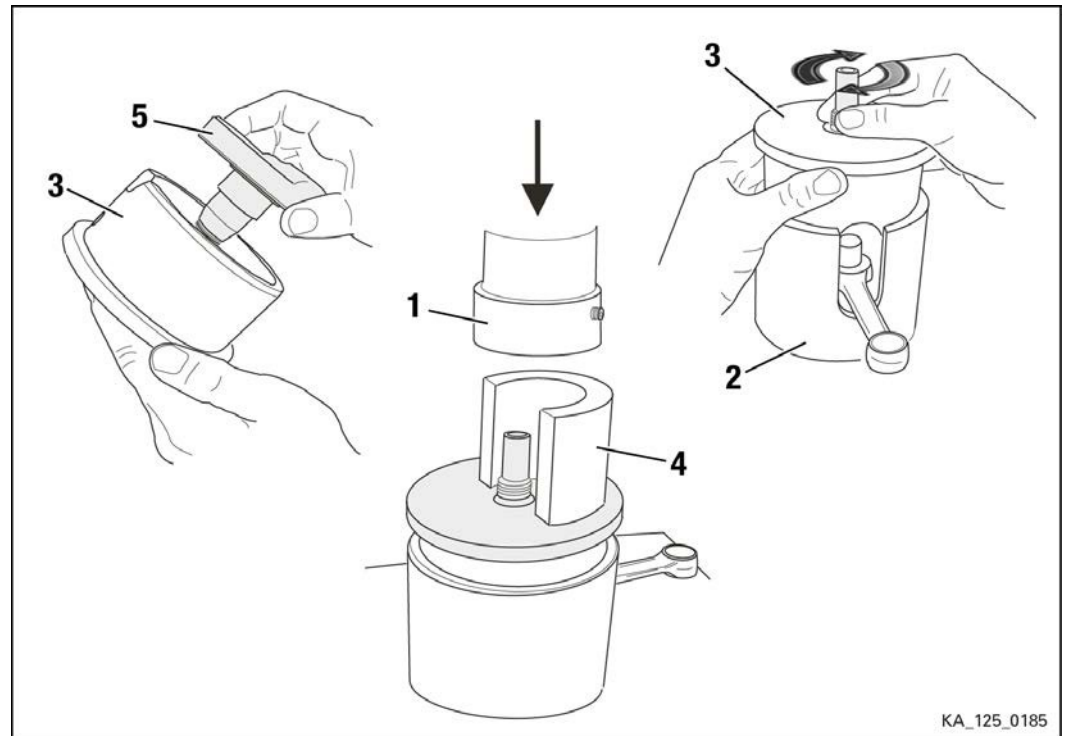
**NOTE 注意事項**

A rotary movement of the con rod makes it easy to align the web hole with the con rod pin. 採取輪轉連桿的方式，可以很容易地將配重塊內孔與連桿銷對正。

11. Position the thrust ring (4) on the top section of the repair jig and press the two crankshaft halves together (until the crankshaft pin is aligned with the crankshaft web). 將止推環 (4) 放在組裝治具的頂部並將兩個半曲軸壓在一起 (直到曲軸銷端面與曲軸配重塊對齊)。



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Figure 圖 5.20: Crankshaft assembly 組裝曲軸

1 Press stamp  
油壓機

3 Top section of the repair jig  
頂部的維修治具

2 Bottom section of the repair jig  
襯底的維修治具

4 Thrust ring  
止推環

## CRANK CASE INSPECTION 檢查曲軸箱

### INSPECTION OF WATER PUMP DRIVE 水泵驅動系統的檢查

**General 概況**      **NOTE 注意事項**

*If the edges of the idle gear teeth (1) or the water pump pinion (2) show signs of wear, both gears must be replaced. 如果惰齒輪 (1 號件) 或水泵小齒輪 (2 號件) 的邊緣出現磨損跡象，則兩個齒輪都必須更換。*

**Instructions 指引**    See [Figure: Water pump drive](#). 水泵驅動系統的檢查

1. Inspect water pump gear (1), idle gear (2) and water pump pinion (3) for cracks (visual inspection). 目視檢查水泵齒輪 (1 號件)、惰齒輪 (2 號件) 和水泵小齒輪 (3) 是否有裂痕。
2. Inspect the teeth of the idle gear (2) and the water pump pinion (3) for wear. 檢查惰齒輪 (2 號件) 和水泵小齒輪 (3 號件) 的齒形是否磨損。
3. Inspect the hole and the two axial surfaces of the idle gear (2) for signs of wear. 檢查惰齒輪 (2 號件) 的軸孔以及兩個軸向表面是否有磨損跡象。

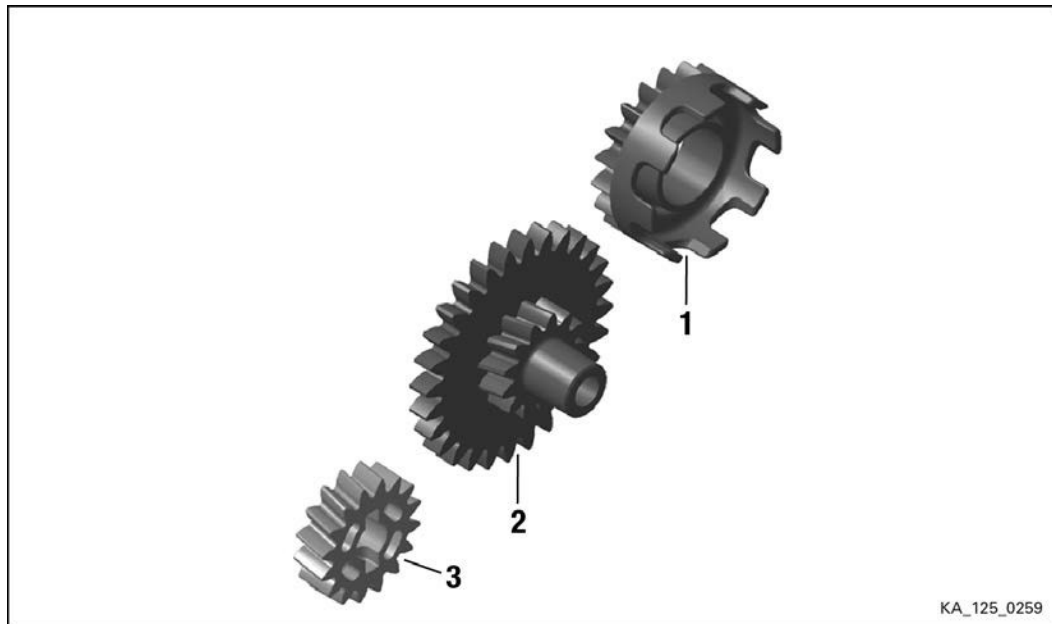


Figure 圖 5.21: Water pump drive 水泵驅動(系統)

1 Water pump gear 水泵齒輪 19 T

2 Idle gear 惰齒輪 28/13 T

3 Water pump pinion 水泵小齒輪 16 T

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### INSPECTION OF WATER PUMP SHAFT 水泵軸的檢查

**Instruction 指引** See [Figure 圖 : Water pump shaft](#). 水泵軸

1. Check the water pump shaft in the areas around the two shaft seal rings; if it is excessively worn it must be replaced. 檢查水泵軸的兩端密封圈附近區域；如果過度磨損，則必須更換。
2. Check the impeller for damage and/or any abnormal deformation, and replace it if necessary. 檢查水泵葉輪有無損壞或異常變形，必要時更換。

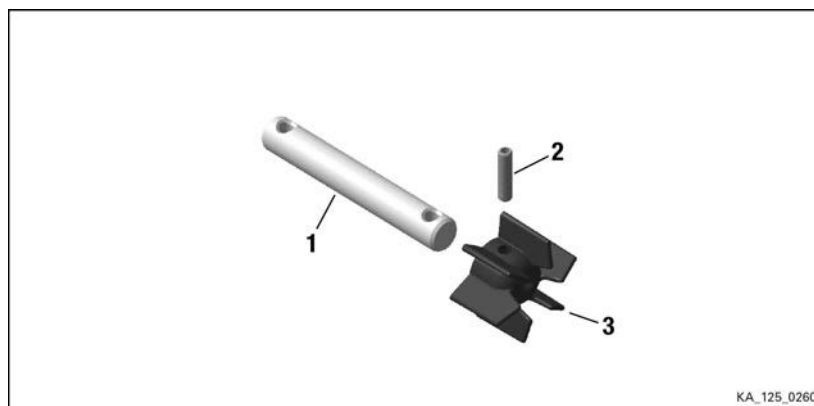


Figure 圖 5.22: Water pump shaft 水泵軸

1 Pump shaft 水泵軸

2 Dowel 定位銷 4x 16

3 Impeller 水泵葉輪

### INSPECTION OF BALANCE SHAFT DRIVE 平衡軸系統的檢查

**General 概況** **NOTE 注意事項**

*If one of the balance wheels has cracks or if backlash of the balance wheels at the spline can be seen, both balance wheels must be replaced. 如果其中任一平衡軸齒輪有裂痕或可以看到花鍵處有間隙，則兩個齒輪都必須一併更換。*

**Instructions 指引** See [Figure 圖: Balance shaft drive](#). 平衡軸驅動(系統)

1. Check balance gears (1) for cracks. 檢查平衡齒輪 (1號件) 是否有裂痕。
2. Place balance gears on the spline, the balance shaft or crankshaft and inspect balance gears for backlash at the spline. 將平衡齒輪放在花鍵、平衡軸或曲軸上，並檢查平衡

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齒輪在花鍵處的齒隙。

3. Check outer teeth of the two balance gears for signs of wear. If the teeth of one of the balance gears shows signs of wear, both balance gears must be replaced. 檢查兩個平衡齒輪的外齒是否有磨損跡象。如果其中一個平衡齒輪的齒形出現磨損跡象，則兩個平衡齒輪必須一併更換。
4. Inspect condition of O-ring (2). 檢查O型環 (2號件) 的狀況。

#### NOTE 注意事項

The balance gears (1) and the O-ring (2) should be replaced at least every 50 operating hours. 這對平衡軸齒輪(1號件)以及O型環(2號件)須在運轉50小時以內進行換新。

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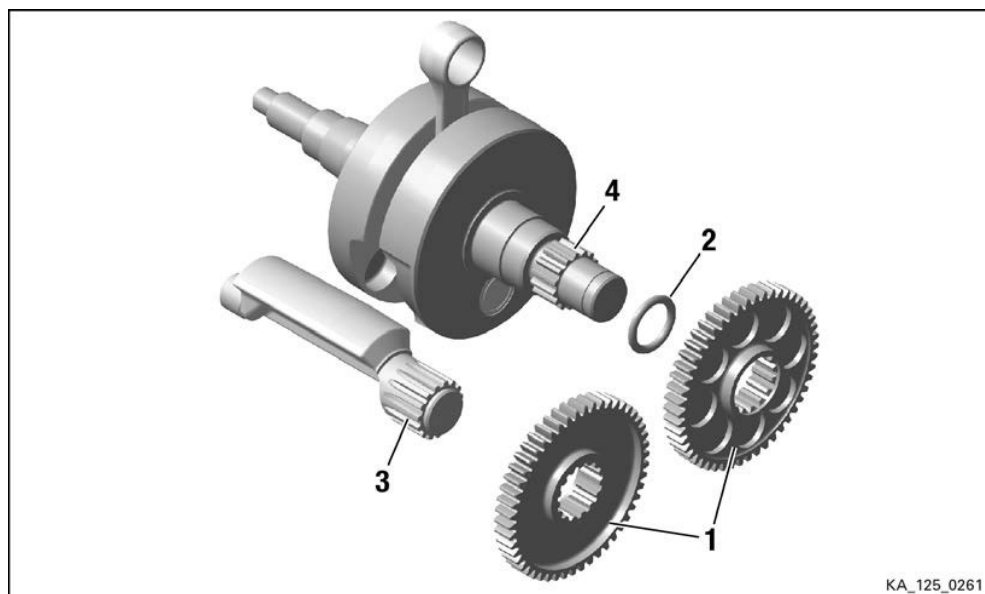


Figure 圖 5.23: Balance shaft drive 平衡軸驅動 (系統)

1 Balance gear 平衡軸齒輪 50 T

2 O-ring 18x3.5  
O型環

3 Balance shaft 平衡軸

4 Crankshaft assy.  
曲軸總成

### INSPECTION OF BALANCE SHAFT 平衡軸的檢查

#### General 概況

#### NOTE 注意事項

*If one of the wear limits BS10 or BS11 is reached, the balance shaft must be replaced. 如果達到磨損極限 BS10 或 BS11 其中之一，則必須更換平衡軸。*

#### Instructions 指引 See Figure 圖 : Balance shaft 平衡軸

1. Inspect the groove (3) for the locking ring for damage and wear. 檢查固定環的凹槽 (3號件) 是否損壞和磨損。
2. Check the diameter of the bearing seats BS10 and BS11 for wear. 檢查軸承座 BS10 和 BS11 的直徑是否磨損。

Description 內容	Code 編碼	New dimension 新尺寸	Wear limit 磨耗極限	Measured value 量測數值
Main bearing seat 主軸承座	BS10	14.96 mm - 14.99 mm	14.94 mm	
Clutch bearing seat 離合器軸承座	BS11	24.97 mm - 24.99 mm	24.94 mm	

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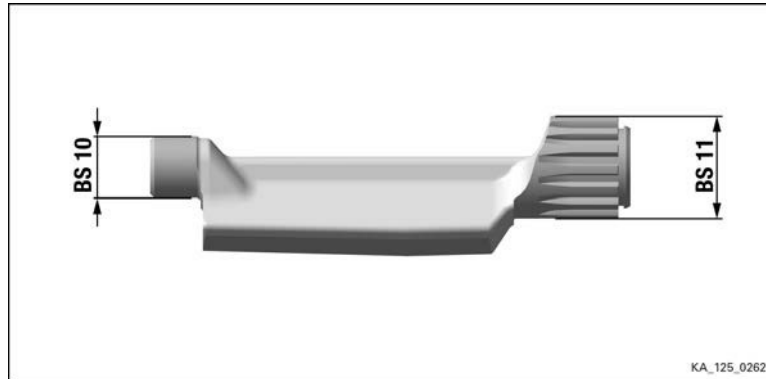


Figure 圖 5.24: Balance shaft 平衡軸

### INSPECTION OF THE HOUSING HALVES 曲軸箱半箱的檢查

**Instructions 指引** See Figure 圖: Crankcase. 曲軸箱

1. Clean both case halves with commercial detergents. 使用清潔劑清潔兩個曲軸半箱。
2. Check both halves (1) for cracks and damage (visual inspection). 目視檢查兩個曲軸半箱 (1號件) 是否有裂痕或損壞。
3. Check sealing surfaces (2) for damage (visual inspection). 目視檢查密封面 (2號位置) 是否損壞。
4. Check threads (3) for cleanliness and clearance. 檢查螺紋 (3號位置) 的清潔度與間隙。
5. Check that lubrication holes (4) are open and clean with compressed air as required. 檢查潤滑孔 (4號位置) 是否暢通並根據需要採用壓縮空氣清潔。

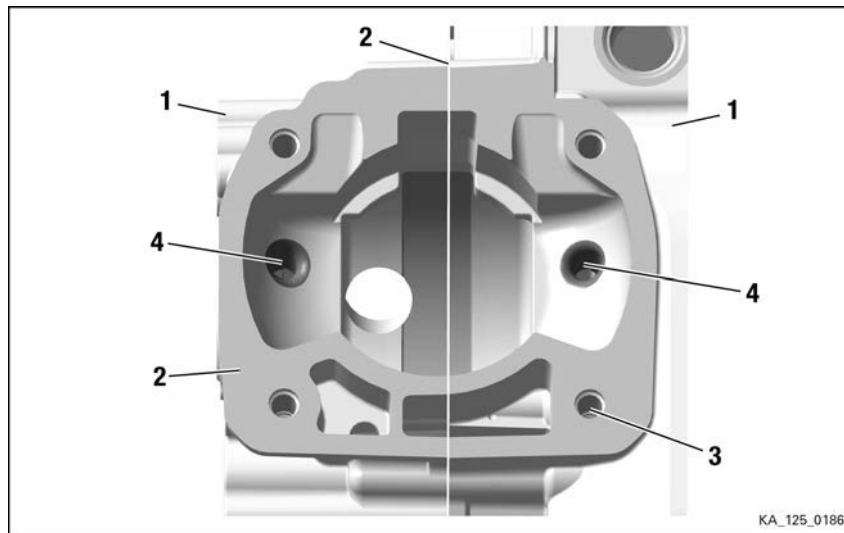


Figure 圖 5.25: Crankcase 曲軸箱

1 Case halves 曲軸半箱

3 Thread 螺牙

2 Sealing surfaces 密封面

4 Main bearing lubrication hole 主軸承潤滑孔

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**CRANK CASE – ASSEMBLY 組裝曲軸箱**

**General 概況**

**NOTE 注意事項**

*Always replace old gaskets, circlips, O-rings and oil seals with new ones after disassembling. 每次拆解後，一定都要把舊的墊片、卡環、O型環、墊片更換掉*

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 內容	Use 施作
n.a.	Convection oven or heating plate 烤箱或是加熱平板	Case halves 曲軸半箱
676030	Installation tool 安裝工具	Needle bearing 滾針軸承
676010	Mounting sleeve 支撐套管	Shaft seal 軸封
676021	Installation tool 安裝工具	
n.a.	2-stroke engine oil 二衝程機油	Shaft seal 軸封
n.a.	MOLYCOTE 111	Shaft seal 軸封

**INSTALLATION OF OIL SEAL, BALL BEARING AND NEEDLE BUSHING**

**油封、滾珠軸承與滾針襯套的安裝**

<b>m WARNING 警告</b>
<b>Danger of severe burns and scalds! 有嚴重燒傷和燙傷的危險!</b>
Wear heat-resistant gloves during this process! 在此過程中戴上耐熱手套!

**Instruction 指引** See [Figure 圖: Oil seal installation](#). 油封的安裝

1. Heat both crankcase halves to 150 °C (302 °F) in the convection oven. 使用烤箱將兩個半曲軸箱加熱至 150 °C (302 °F)。
2. Remove case half from the convection oven and drop onto a flat wood board with the case split pane. 從烤箱中取出曲軸半箱，然後將兩半箱分離、放在平坦的木板上。
3. Coat the oil seal AS 28x38x7 (1) with engine oil in the area between the sealing lip and dust lip. 使用發動機的機油塗抹油封 AS 28x38x7 (1 號件) 密封唇和防塵唇之間的區域。
4. Press in the oil seal for shaft to the stop with the mounting sleeve (part no. 676010) from inside to outside so the open end of the oil seal for shaft is directed inward. 用安裝套筒 ( 部件號 676010 ) 從內向外將軸油封壓入到位，軸油封的開口端朝內。

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**NOTE 注意事項**

The oil seal for shaft can also be installed from outside to inside if the crankshaft is installed. 如果已安裝了曲軸，也可以從外到內來安裝軸油封。

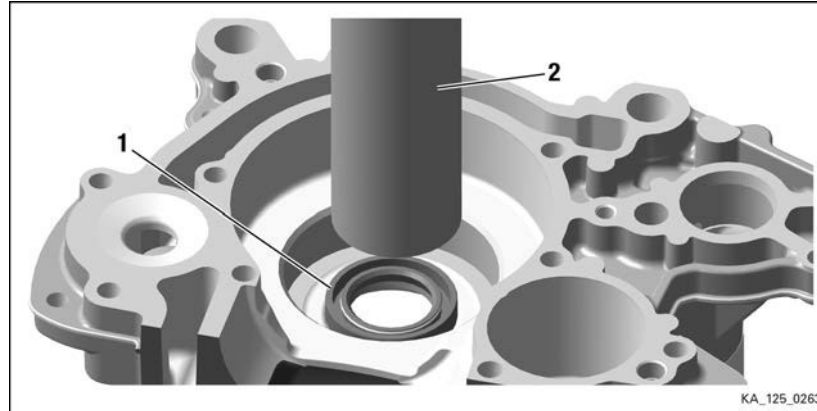


Figure 圖 5.26: Oil seal installation 油封的安裝治具

1 Oil seal 油封 AS 28x38x7

2 Mounting tool part no. 676010 組裝工具

**Instruction 指引** See [Figure 圖](#) : Ball bearing. 滾珠軸承

5. Slide the ball bearing (1) of the crankshaft into the crankcase half to the limit stop so the closed side of the cage is facing to the crankshaft. 將曲軸的滾珠軸承 (1) 導滑入曲軸半箱直到停住為止，使保持架的軸承封閉側面向曲軸。

**NOTE 注意事項**

The labeling of the ball bearing must be visible! 滾珠軸承的標籤必須可被看到！

6. Slide the ball bearing (2) of the balance shaft into the crankcase half to the limit stop so the closed side of the cage is facing to the balance shaft. 將平衡軸的滾珠軸承 (2) 導滑入曲軸半箱直至停住為止，使軸承保持架的封閉側面向平衡軸。



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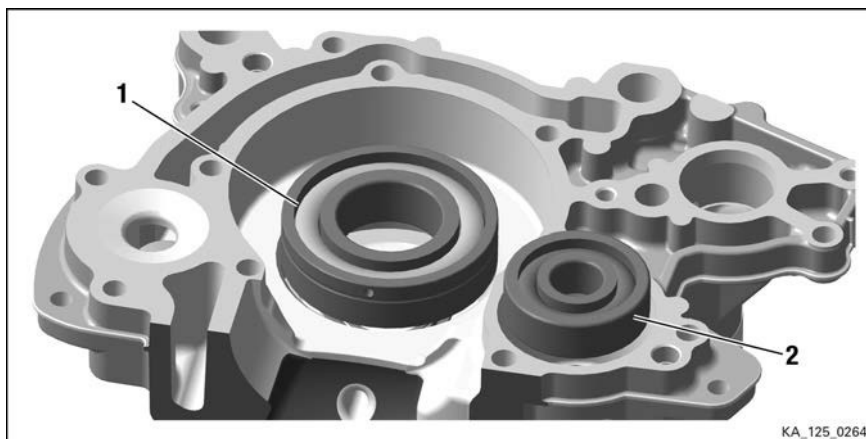


Figure 圖 5.27: Ball bearing 滾珠軸承

1 Ball bearing 滾珠軸承 6206

2 Ball bearing 滾珠軸承 6302

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**Instruction 指引** See [Figure 圖](#) : Needle bushing. 滾針襯套

1. Press in the needle bushing 8x12x8 (1) to the limit stop with the installation tool (2) (part no. 676030) so the label on the needle bearing is facing outwards. 使用安裝工具 (2號件) (料號 676030) 將滾針襯套 8x12x8 (1號件) 壓入限位擋塊，使滾針襯套的標籤朝外。
2. Allow the crankcase halves to cool in this position. 到此，讓半曲軸箱冷卻。

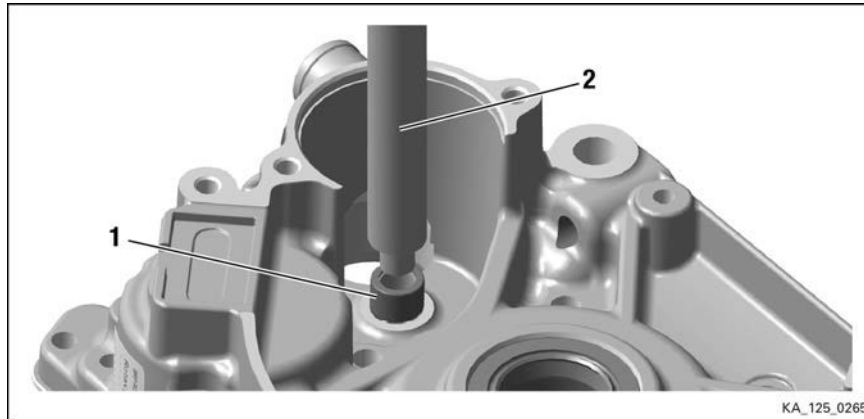


Figure 圖 5.28: Needle bushing 滾針襯套

1 Needle bushing 滾針襯套 8x12x8

2 Installation tool (part no. 676030) 安裝工具

## INSTALLATION OF BALL BEARING AND OIL SEAL FOR CRANKCASE

### 曲軸箱內的滾珠軸承及油封的安裝

#### **m WARNING 警告**

**Danger of severe burns and scalds! 有嚴重燒傷和燙傷的危險!**

**Wear heat-resistant gloves during this process! 在此過程中戴上耐熱手套!**

**Instruction 指引** See [Figure 圖 5.29](#): Ball bearing, oil seal 滾珠軸承、油封

1. Remove case half from the convection oven and drop onto a flat wood board with the case split pane. 從對流烤箱中取出兩個曲軸半箱，然後將半箱分離、放在平坦的木板上。
2. Slide the ball bearing (1) of the balance shaft into the crankcase half to the limit stop so the closed side of the cage is facing the balance drive. 將平衡軸的滾珠軸承 (1號件) 導滑入半曲軸箱，放到底為止，使軸承的封閉這一側向著平衡軸的傳動位置。
3. Install the thrust washer (2) and countersunk screw (3) with the phase of the lock washer pointing to the countersunk screw. 安裝止推墊圈(2號件)和沉頭螺栓(3號件)，墊圈的防鬆面向著沉頭螺栓來組裝。

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4. Coat the oil seal (4) for the ignition end crankcase half with oil in the area between the sealing lip and dust lip. 針對曲軸箱半部的點火端面的油封(4號件)·密封唇和防塵唇之間的區域塗上油(發動機機油)。
5. Press in the oil seal (4) to the limit stop with the insertion sleeve (5) (part no. 676010) so the open end of the oil seal for shaft is directed to the balance drive. 使用油封壓入治具(5號件)(料號 676010)將油封(4號件)壓入到底為止·使軸用油封的開口端向著平衡軸傳動面。

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### NOTE 注意事項

The oil seal for shaft can also be installed from outside to inside if the crankshaft is installed. 如果已安裝了曲軸，也可以從外到內安裝曲軸油封。

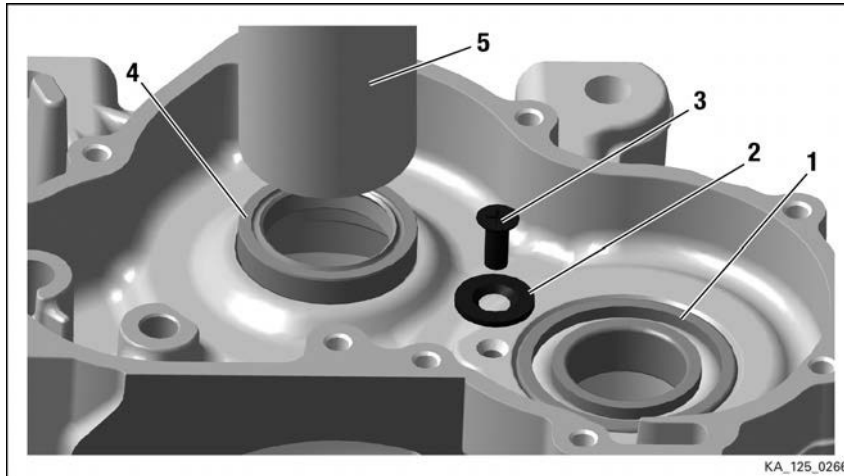


Figure 圖 5.29: Ball bearing, oil seal 滾珠軸承、油封

- |   |                          |
|---|--------------------------|
| 1 Ball bearing 滾珠軸承 6005                    | 2 Thrust washer 止推墊圈     |
| 3 Countersunk screw 沉頭螺栓 M5x12              | 4 Oil seal 油封 AS 28x38x7 |
| 5 Insertion sleeve (part no. 676010) 油封壓入治具 |                          |

**Instruction 指引** See [Figure 圖](#) : Insertion jig. 壓入治具

6. Rotate crankcase half. 旋轉半曲軸箱。
7. Slide the ball bearing (1) of the crankshaft into the crankcase half to the limit stop so the closed side of the cage is facing to the crankshaft. 將曲軸的滾珠軸承 (1) 導滑入曲軸半箱，放到底為止，使油封的封閉側向著曲軸。
8. Grease the two oil seals for shaft (10x26x7) with MOLYCOTE 111 in the area of the sealing lip. 使用MOLYCOTE 111 潤滑兩個軸 (10x26x7) 油封的密封唇區域。
9. Press in the first oil seal for shaft to the limit stop with the Insertion jig (3) (part no. 676021) so the closed end of the oil seal (2) for shaft is visible. 使用壓入夾具 (3號件，料號 676021) 將第一個軸油封壓入到底部為止，軸油封 (2號件) 的封閉端是朝上可視的。
10. Grease the installed oil seal for shaft with MOLYCOTE 111. 用 MOLYCOTE 111 潤滑已安裝的

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軸油封。

11. Press in the second oil seal for shaft to the limit stop with the installation tool (8) (part no. 676021) so the open end of the oil seal (4) for shaft is visible. 使用安裝工具 (8號件，料號 676021) 將第二個軸油封壓入到底部為止，軸油封 (4) 的開口端是朝上可視的。
12. Allow the crankcase halves to cool in this position. 到此，讓半曲軸箱冷卻。

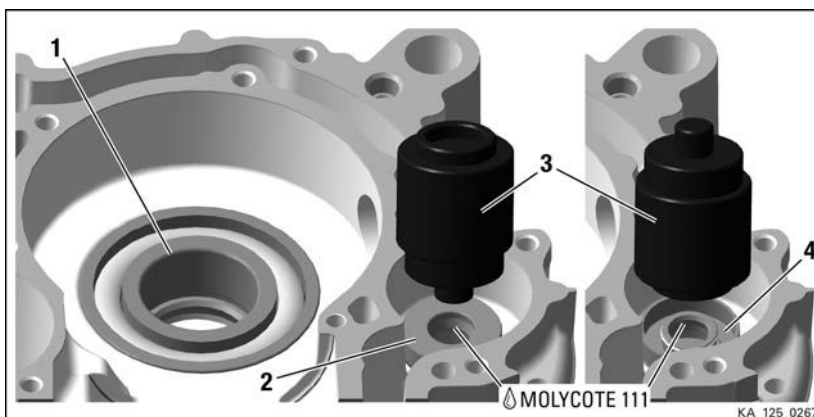


Figure 圖 5.30: Insertion jig 壓入治具

- |                          |  |
|--------------------------|--|
| 1 Ball bearing 6206 滾珠軸承 | 2 Oil seal 油封 10x26x7                  |
| 3 Insertion jig 壓入治具     | 4 Oil seal 油封 10x26x7 (open end 端面開放式) |

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**ASSEMBLY OF CRANKSHAFT, WATER PUMP SHAFT AND BALANCE SHAFT**  
曲軸、水泵軸以及平衡軸的組裝

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
n.a.	Convection oven 烤箱	Case half 半曲軸箱
297434	LOCTITE Anti-Seize LOCTITE 防卡劑	Balance shaft, crankshaft 平衡軸·曲軸

**Instruction 指引** See [Figure圖: Crankshaft, Balancs shaft, Water pump shaft 曲軸·平衡軸·水泵軸](#)

1. Coat main bearing seats of the crankshaft (1) with LOCTITE Anti-Seize. 使用 LOCTITE 防卡劑塗抹曲軸 (1號件) 的主軸承座。
2. Insert the crankshaft assy. (1) as shown on the picture into the crankcase half. 插入曲軸總成。(1) 如圖所示進入曲軸半箱。
3. Coat bearing seats of the balance shaft (2) with LOCTITE Anti-Seize. 使用LOCTITE防卡劑塗抹在平衡軸 (2號件) 的軸承座。
4. Insert the balance shaft (2) as shown on the picture into the crankcase half. 如圖所示·將平衡軸 (2號件) 插入曲軸半箱。
5. Insert the water pump shaft (3) as shown on the picture into the crankcase half. 如圖所示將水泵軸 (3號件) 插入曲軸半箱。
6. Position new gasket (4) as shown on the picture into the crankcase half. 如圖所示將新墊片 (4號件) 放定入曲軸半箱。

**NOTE 注意事項**

Adjustment of the clearance of the crankshaft is not required. 不需要調整曲軸的間隙。

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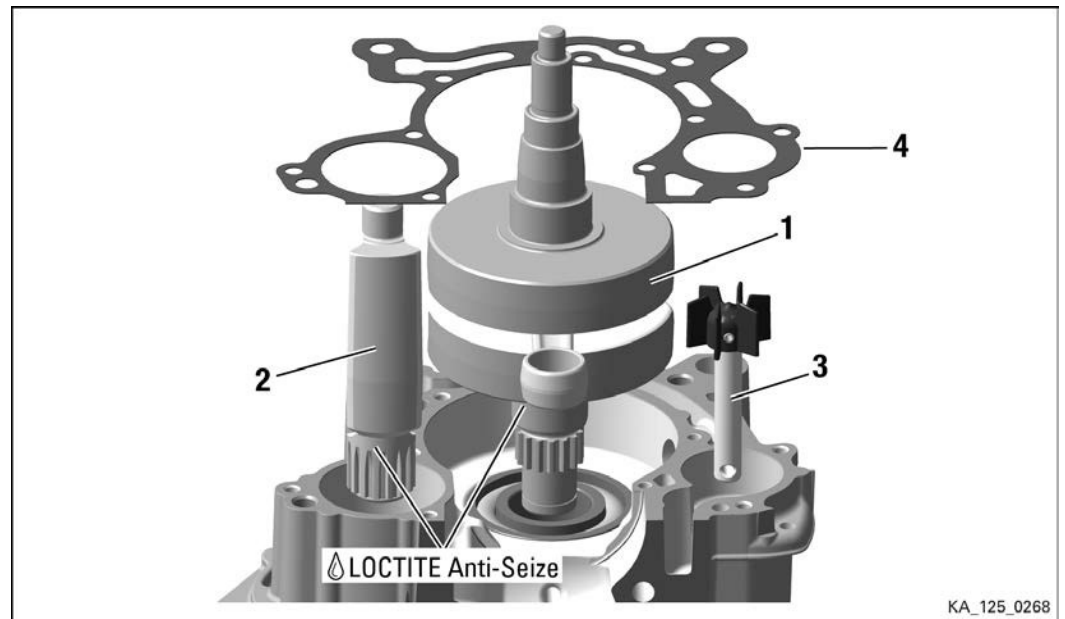


Figure 圖 5.31: Crankshaft, Balance shaft, Water pump shaft 曲軸 · 平衡軸 · 水泵軸

- |                         |                     |
|-------------------------|---------------------|
| 1 Crankshaft assy. 曲軸總成 | 2 Balance shaft 平衡軸 |
| 3 Water pump shaft 水泵軸  | 4 Gasket 墊片         |

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## ASSEMBLY OF THE CRANKCASE 曲軸箱的組裝

### General 概況

### NOTE 注意事項

*When using new studs for the assembly of the cylinder, first screw the long side of the threaded studs into the housing and secure them with LOCTITE 243. 使用新螺柱組裝氣缸時，首先將螺柱的長邊旋入曲軸箱中，並用 LOCTITE 243 將其固定。*

*Tightening torque 10 Nm. 鎖固扭力 10 Nm。*

When using new housing halves insert new dowel pins! 使用新的曲軸半箱時，採用新的定位銷！

### Instruction 指引

#### ATTENTION 注意

**Pay attention on the different lengths of the Allen. screws! 注意，內六角螺栓有不同的長度**

Tighten the Allen. screws crosswise, start in the middle of the housing. 採用交叉順序的方式，從殼體的中間開始來鎖固這些內六角螺栓。

1. Insert a new housing gasket part no. 650494 included in the gasket set part no. 296160. 安插一個新的外殼墊圈，料號650494 包含在墊圈組的料號中 296160。
2. Mount both housing halves together with 8 Allen screws M6x45 and 2 Allen screws M6x60 (see mounting plan) together. 使用 8 個內六角螺栓 M6x45 和 2 個內六角螺栓 M6x60 (參見安裝圖) 將兩個曲軸半箱安裝在一起。  
Tightening torque 10 Nm. 鎖固扭力 10 Nm。
3. Let the Crankcase assy. cool down. 讓曲軸箱總成冷卻。
4. Attach the crankcase assy. on trestle mounting plate with 4 attachment screws. 用 4 個連接螺栓把連接曲軸箱總成連接在支架安裝板上。



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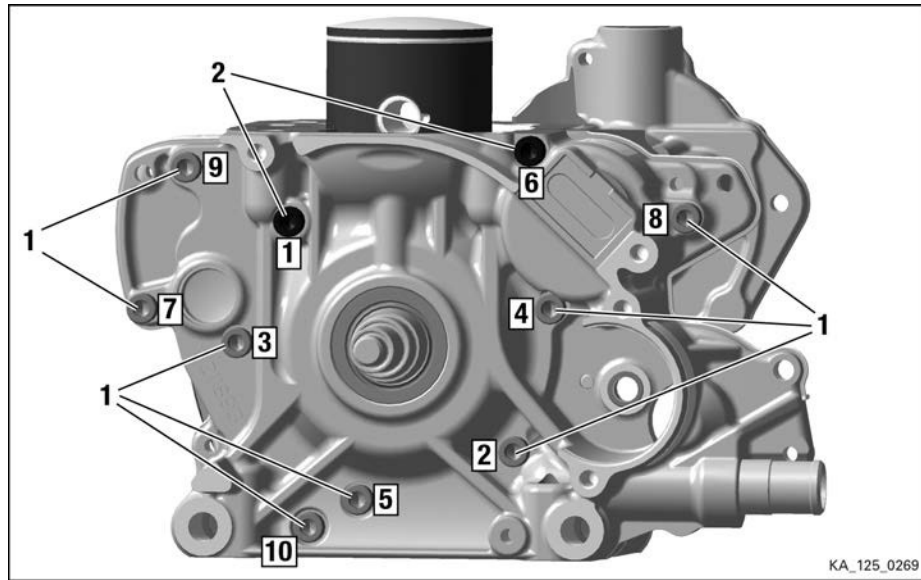


Figure 圖 5.32: Mounting plan 安裝圖1-10

1 Allen screw 內六角螺栓 M6x45

2 Allen screw 內六角螺栓 M6x60

5. Cut off the protruding section of the crankcase gasket with a sharp knife at the cylinder base surface. 用鋒利的刀片切掉曲軸箱密封墊片凸出汽缸基面的部分。

## **INSTALLATION OF CRANKCASE ASSY. 曲軸箱總成的安裝**

### **Final tasks 最終任務**

1. Install cylinder assy. See Chapter 4). 安裝氣缸總成。 (見第 4 章)。
2. Install balance drive and centrifugal clutch. See Chapter 7). 安裝平衡傳動和離心離合器。 (見第 7 章)。
3. Take the engine off the assembly stand. See Chapter 3). 從組裝架上取下發動機。 (見第 3 章)。
4. Install the engine in the kart chassis. See Chapter 3). 在卡丁車底盤上安裝發動機。 (見第 3 章)。
5. Filling the gear housing with oil. See Chapter 7). 齒輪箱注油。 (見第 7 章)。
6. Install the fuel line. See Chapter 3). 安裝燃油管路。 (見第 3 章)。
7. Install the exhaust system. See Chapter 9). 安裝排氣系統。 (見第 9 章)。
8. Install the carburetor and air filter. See Chapter 6). 安裝化油器和空氣濾清器。 (見第 6 章)。
9. Install the water pump hoses. See Chapter 8). 安裝水泵軟管。 (見第 8 章)。
10. Install the ignition system. See Chapter 3). 安裝點火系統。 (見第 3 章)。

## **INSTALLATION OF BALANCE AND WATER-PUMP SHAFT DRIVE**

### **平衡軸與水泵驅動系統的安裝**

**Instruction 指引** See [Figure 圖: Crankcase](#). 曲軸箱

1. Insert the O-ring (1) in the crankshaft groove. 將 O 型環 (1 號件) 放入曲軸的溝槽中。
2. Rotate crankshaft to TDC. 把曲軸旋轉到 TDC 的位置
3. Slide the balance gear (4) with hub collar outwards on the crankshaft until the markings (6) on the crankshaft and the balance gear match. 將帶有轉接環的平衡軸齒輪 (4 號件) 在曲軸上向外滑動，直到曲軸上的標記 (6) 與平衡齒輪匹配。
4. Slide the balance shaft gear (5) with hub collar inwards on the balance shaft until the markings (6) on the balance shaft and the balance gear match. 將帶有的轉接環平衡軸齒輪 (5 號件) 在平衡軸上向內滑動，直到平衡軸上的標記 (6) 與平衡齒輪匹配。

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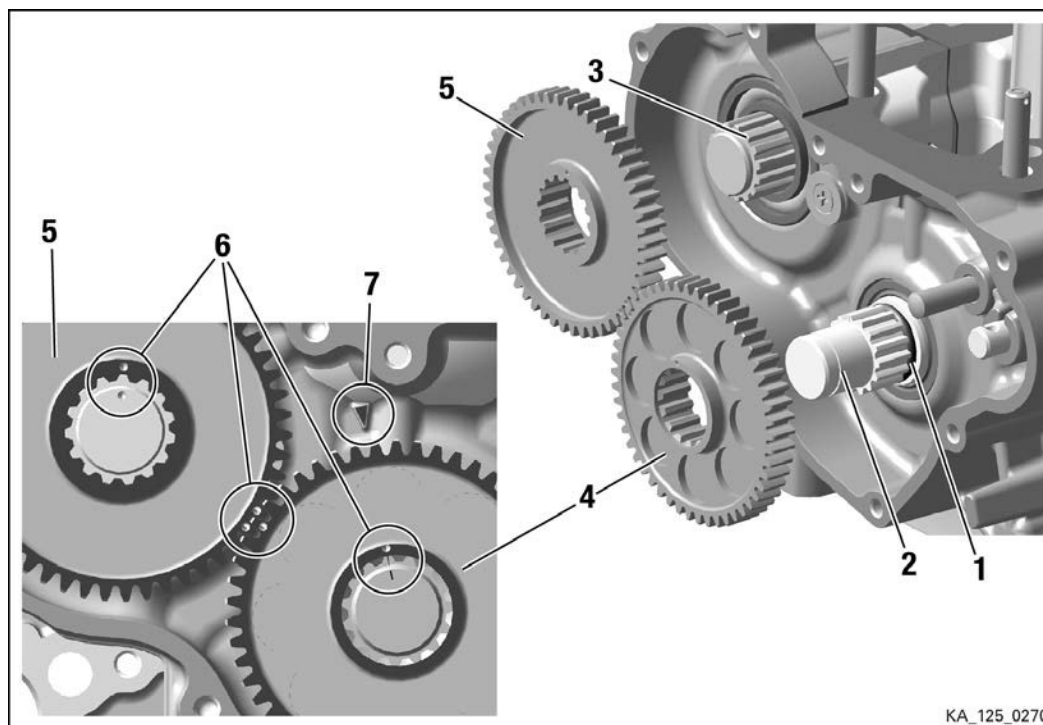


Figure 圖 5.33: Crankcase 曲軸箱

- |                                 |                            |
|---------------------------------|----------------------------|
| 1 O-ring O型環 18x3.5             | 2 Crankshaft 曲軸            |
| 3 Balance shaft 平衡軸             | 4 Balance gear 平衡軸齒輪       |
| 5 Balance shaft gear 平衡軸齒輪      | 6 Positioning marking 定位記號 |
| 7 TDC position marking TDC的位置記號 |                            |

**Instruction 指引** See [Figure 圖 : Idle gear](#). 舵齒輪

5. Slide the water pump gear (1) onto the crankshaft. 將水泵齒輪導滑入曲軸

**ATTENTION 注意**

**Do not bend the Retaining ring during installation.** 安裝過程中，不要掰折檔環  
Install a new Retaining ring on the balance shaft and crankshaft 安裝曲軸和平衡軸的時候，要用新的檔圈

6. Check that the retaining ring (2) is correctly seated in the grooves of the balance shaft and crankshaft. 檢查卡環 (2) 是否正確安裝在平衡軸和曲軸的凹槽中。
7. Install the thrust washer (3), needle pin (4) and water pump pinion (5) on the water-pump shaft. 在水泵軸上安裝止推墊圈(3號件)、針銷(4)和水泵小齒輪(5)

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8. Check the seating of the needle pin (4) in the cutout in the water pump pinion. 確認針銷 (4號件) 在水泵小齒輪切口中的位置。
9. Install the idle gear (7) on the cylindrical pin in the case. 將惰齒輪 (7號件) 安裝在曲軸箱的圓柱銷上。

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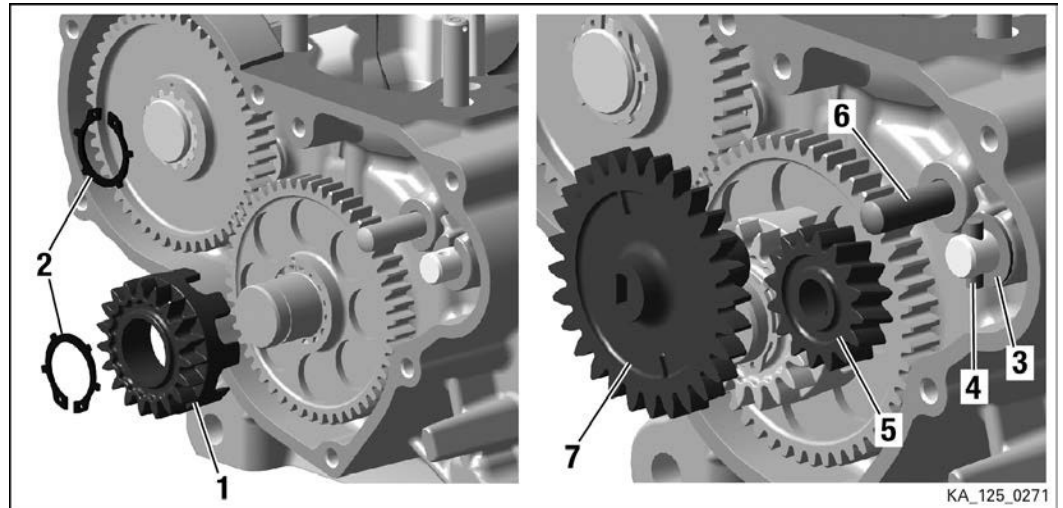


Figure 5.34: Idle gear 惰齒輪

- |                                |  |
|--------------------------------|--|
| 1 Water pump gear 水泵齒輪 19 T    | 2 Retaining ring with lug 凸耳固定環 20x1.2 |
| 3 Thrust washer 止推墊圈 10.1/17/1 | 4 Needle pin 4x15.8 針銷                 |
| 5 Water pump pinion 水泵小齒輪 16 T | 6 cylindrical pin 圓柱銷                  |
| 7 Idle gear 惰齒輪 28/13 T        |  |

10. Position new gasket (1) on the case. 放置新的墊片(1號件)在齒輪箱蓋上
11. Screw on gear cover (2) with 6 Allen screws M6x25 (4) with sealing ring A 6x10 (3) and 2 Allen screws M6x30 (5). Tightening torque 10 Nm (90 in. lb). 採用 6 個帶密封環 A 6x10 (3號件) 的內六角螺栓 M6x25 (4號件) 和 2 個內六角螺栓 M6x30 (5號件) 鎖緊齒輪箱蓋 (2號件) 。鎖固扭力 10 Nm (90 in. lb) 。

**NOTE 注意事項**

Use sealing ring A6x10 to seal the oil drainage plug and oil level plug. 使用密封圈 A6x10 密封放油塞和油位塞。

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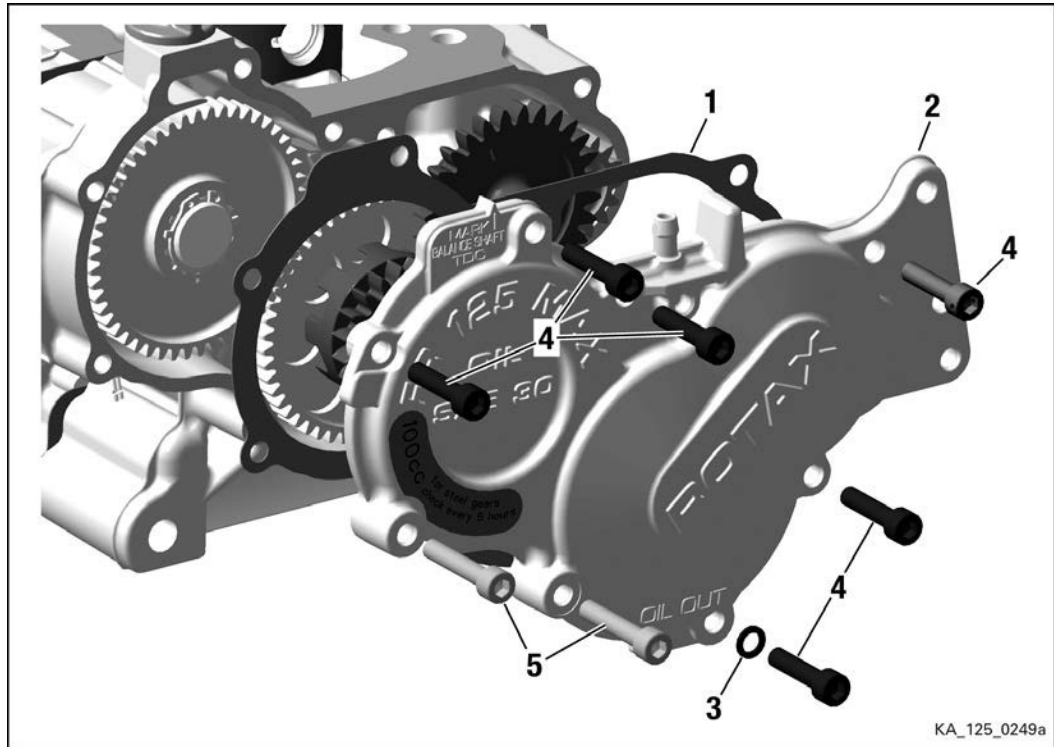


Figure 圖 5.35

- |                           |                           |
|---------------------------|---------------------------|
| 1 Gasket 墊片               | 2 Gearbox cover 齒輪箱蓋      |
| 3 Sealing ring 密封圈 A 6x10 | 4 Allen screw 內六角螺栓 M6x25 |
| 5 Allen screw 內六角螺栓 M6x30 |                           |

## Chapter 章節: Chapter 6

# CARBURETOR AND INTAKE SILENCE 化油器 及 進氣消音器

### TOPICS IN THIS CHAPTER 本章節主題

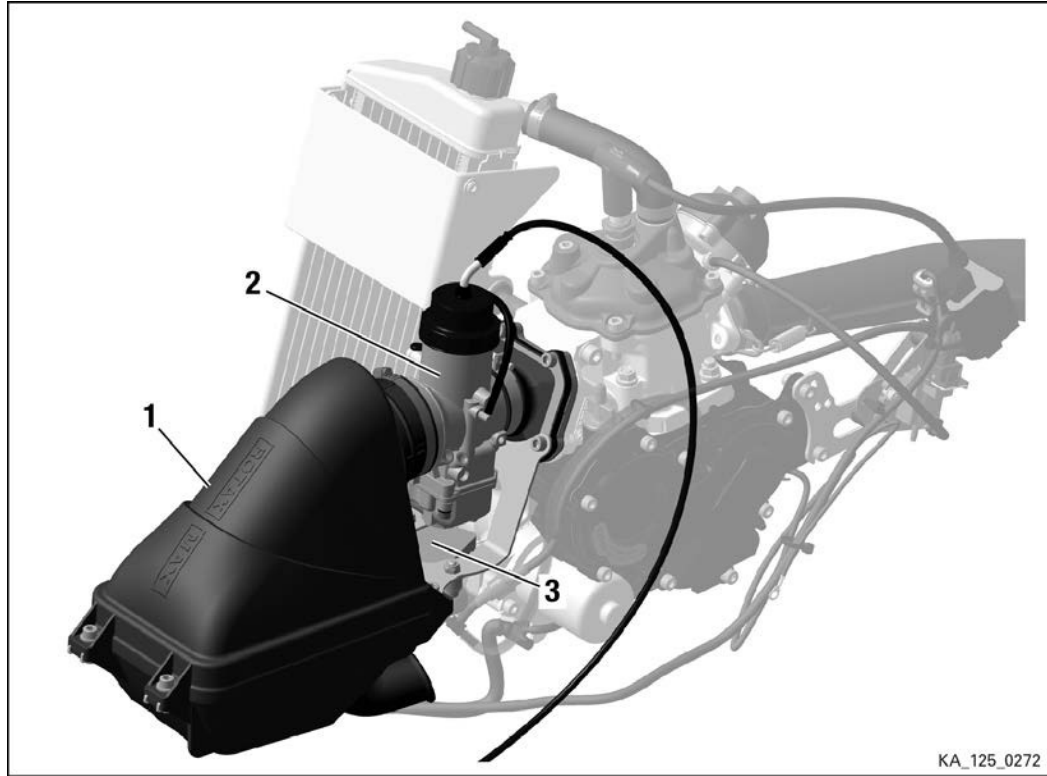
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<b>Removal of the carburetor and intake silencer</b> 化油器與進氣消音器的拆卸 .....	3
Removal of the carburetor and intake silencer 化油器與進氣消音器的拆卸.....	3
Removal of the fuel pump 燃油泵的拆卸.....	5
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<b>Carburetor and intake silencer – inspection of components</b> 化油器與進氣消音器 – 零件的檢查 .....	9
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**Contents** 內容      This chapter describes the removal and installation of the carburetor and intake silencer assembly for the ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo) engine. 本章介紹 ROTAX® 125 MAX evo ( 包括 Junior- 、Mini- 、Micro MAX evo ) 發動機化油器與進氣消音的拆卸、組裝與安裝。

## SYSTEM DESCRIPTION 系統說明

### Overview 概述

Position on engine 在發動機上的位置



Figure圖 6.1: Position on engine, TYPICAL (Figure shows 125 MAX evo engine)

在發動機上的位置 (圖示的是125 MAX evo 發動機)

1 Intake silencer 進氣消音器

2 Carburetor 化油器

3 Fuel pump 燃油泵



## REMOVAL OF THE CARBURETOR AND INTAKE SILENCER

### 化油器與進氣消音器的拆卸

#### Safety Instructions 安全指引

#### **m WARNING 警告**

#### **Danger of severe burns and scalds! 有嚴重燒傷和燙傷的危險！**

Always allow the engine to cool down to ambient temperature before starting any work. 在開始任何工作之前，一定要讓發動機冷卻至環境溫度。

#### **m WARNING 警告**

#### **Danger of explosion and ignition! 具有爆炸和燃燒的危險！**

Overflowing and spoilt gasoline must be absorbed immediately with a binding agent and correctly disposed. Do not work with open flames and sources of ignition. Fuel must not come into contact with hot engine parts or components. 溢出和變質的汽油必須立即用粘合劑吸收並正確處理。不可在明火和火源下工作，燃油不得與發動機或排氣管等發熱的部件接觸，否則可能會引起火災！

#### Preparation 準備工作

The following preparations should be carried out before removing the components: See [Figure: Carburetor and intake silencer](#). 拆卸組件前應準備以下工作：見圖：化油器與進氣消音器。

1. Pull off fuel pipe between the fuel tank and fuel pump from the fuel pump (4) and seal it with a screw. 從燃油泵(4號件)拔下燃油箱和燃油泵之間的燃油管，並用螺栓密封。
2. Remove the Bowden cable. See also Chapter 3). 拆下化油器(油門)拉索。另見第3章)。

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**REMOVAL OF THE CARBURETOR AND INTAKE SILENCER 化油器與進氣消音器的拆卸**

**Instruction 指引** See **Figure 圖: Carburetor and intakesilencer.** 化油器 與 進氣消音器

**ATTENTION 注意**

**Fuel may spill out when removing the carburetor.** 拆卸化油器時，燃油可能會溢出

**ENVIRONMENTAL NOTE 環境注意事項**

**Protect the environment! 保護環境！**

Use a container to collect the fuel from the carburetor.

化油器中的燃料要用容器收集起來(不可任意洩流)。

To remove the carburetor and intake silencer the following steps are required: 要拆下化油器和進氣消音器，需執行以下步驟：

1. Remove the fuel line (1) between the fuel pump (4) and the carburetor. 拆下連接在燃油泵(4號件)與化油器(3號件)之間的燃油管(1號件)
2. Remove the impulse line (2). 拆下導壓管 (2號件)。
3. Loosen the hose clamp (7). 拆鬆水管的管夾(7號件)。
4. Loosen 3 Allen screws (5) and remove the carburetor (3) along with the intake silencer (8), support bracket (6) and fuel pump(4). 鬆開 3 個內六角螺栓 (5號件) 並將化油器 (3號件) 連同進氣消音器 (8號件)、支架 (6號件) 和燃油泵 (4號件) 一起拆下。

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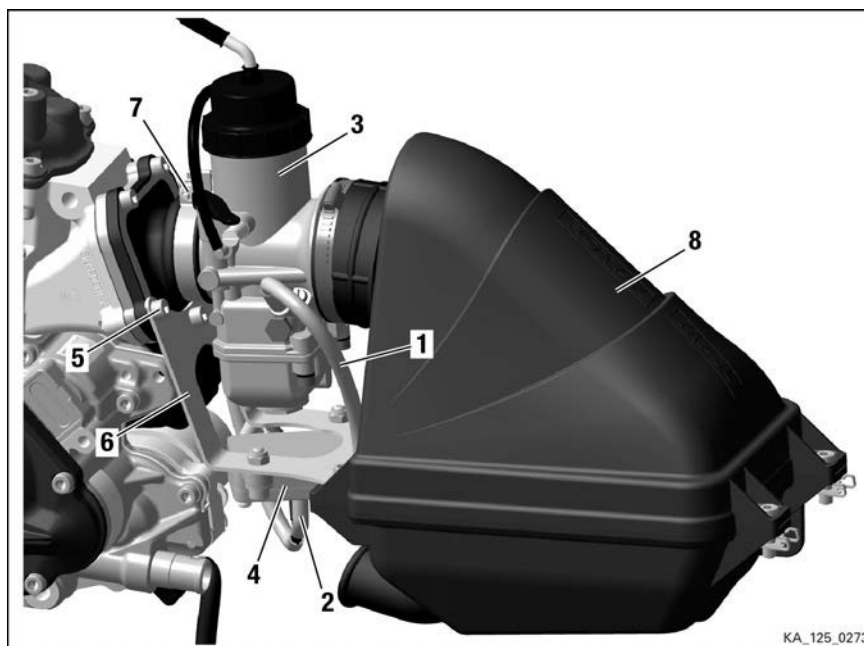


Figure 圖 6.2: Carburetor and intake silencer 化油器 與 進氣消音器

1 Fuel line to the carburetor 連到化油  
器的燃油管

3 Carburetor 化油器

5 Allen screw 內六角螺栓 M6x25

7 Pipe clamp 管夾 51

2 Impulse line  
導壓管

4 Fuel pump  
燃油泵

6 Support bracket  
支撐架

8 Intake silencer  
進氣消音器

## REMOVAL OF THE FUEL PUMP 燃油泵的拆卸

**Instruction 指引** See [Figure 圖 : Fuel pump](#). 燃油泵

To remove the fuel pump the following steps are required: 拆下燃油泵，需執行以下步驟：

1. Loosen 2 Allen screws M6 with washers fixed by lock nuts. 鬆開 2 個M6內六角螺栓，墊圈由防鬆螺帽固定。
2. Remove the fuel pump (1) from the support bracket (2). 從支撐架(2號件)拆下燃油泵 (1號件)。

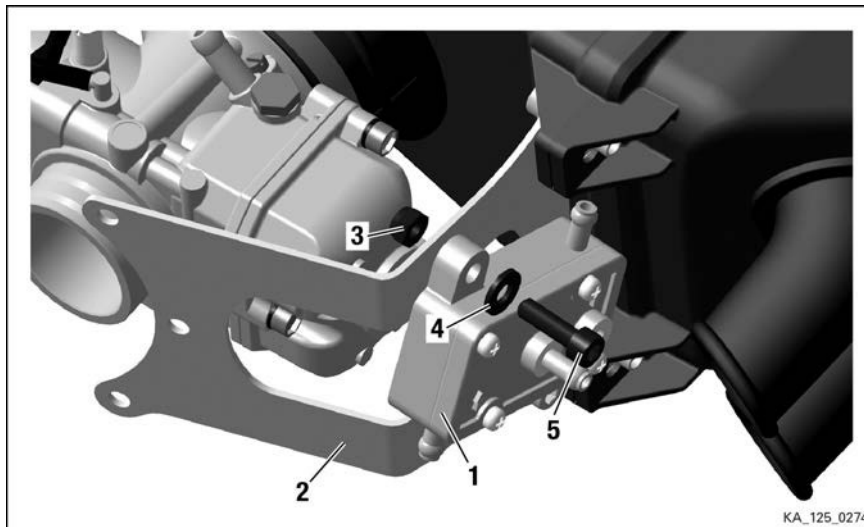


Figure 圖 6.3: Fuel pump 燃油泵

- |                           |                       |
|---------------------------|-----------------------|
| 1 Fuel pump 燃油泵           | 2 Support bracket 支撐架 |
| 3 Lock nut 防鬆螺帽 M6        | 4 Washer 墊圈 6.4       |
| 5 Allen screw 內六角螺栓 M6x20 |                       |

## DISASSEMBLY OF THE CARBURETOR 化油器的拆解

1. Disassembly of the carburetor to the parts shown in [Figure: Carburetor](#) and clean them with fuel. 化油器拆解後並使用燃油清洗。分解圖如：化油器

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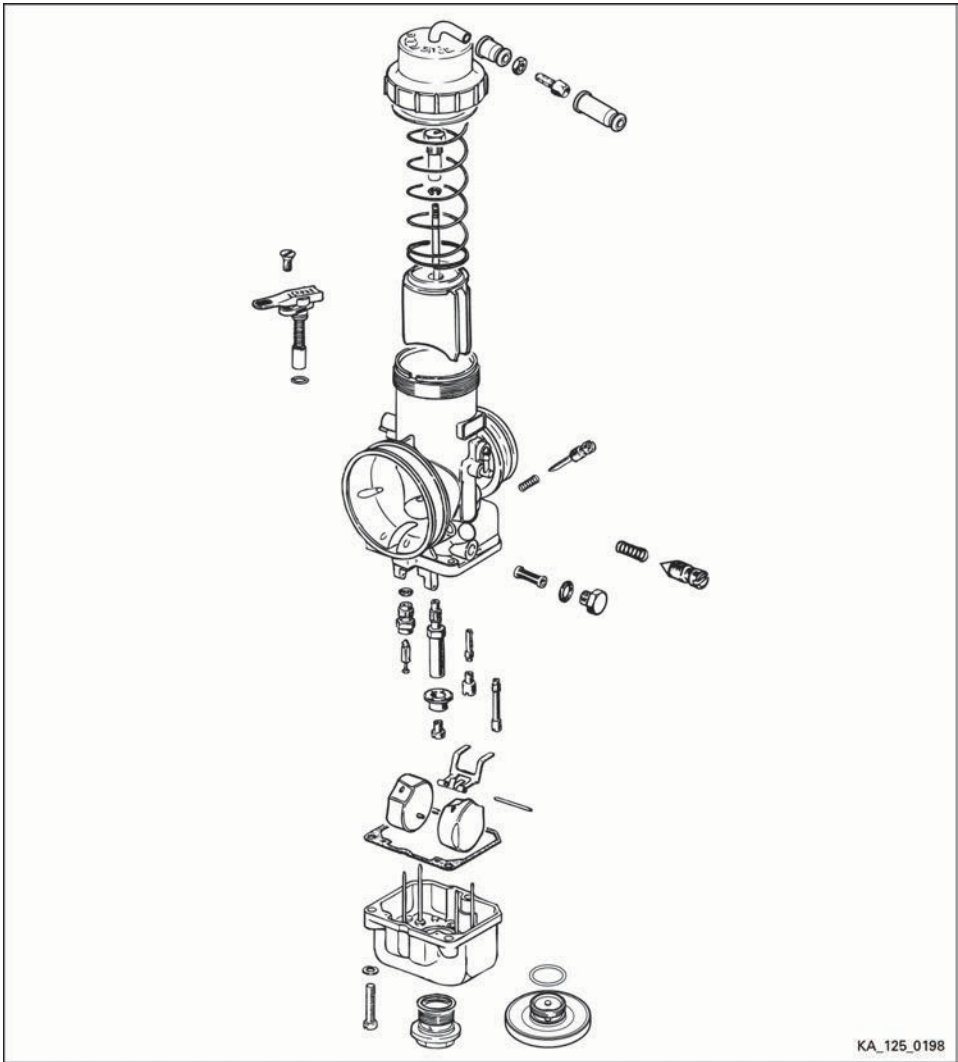


Figure 圖 6.4: Carburetor 化油器

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**DISASSEMBLY OF THE INTAKE SILENCER 進氣消音器的拆解**

**Intake silencer 進氣消音器** See [Figure 圖: Intake silencer. 進氣消音器](#)

1. Disassemble the intake silencer to the parts shown in following Figure. 進氣消音器分解如下圖所示的零件。

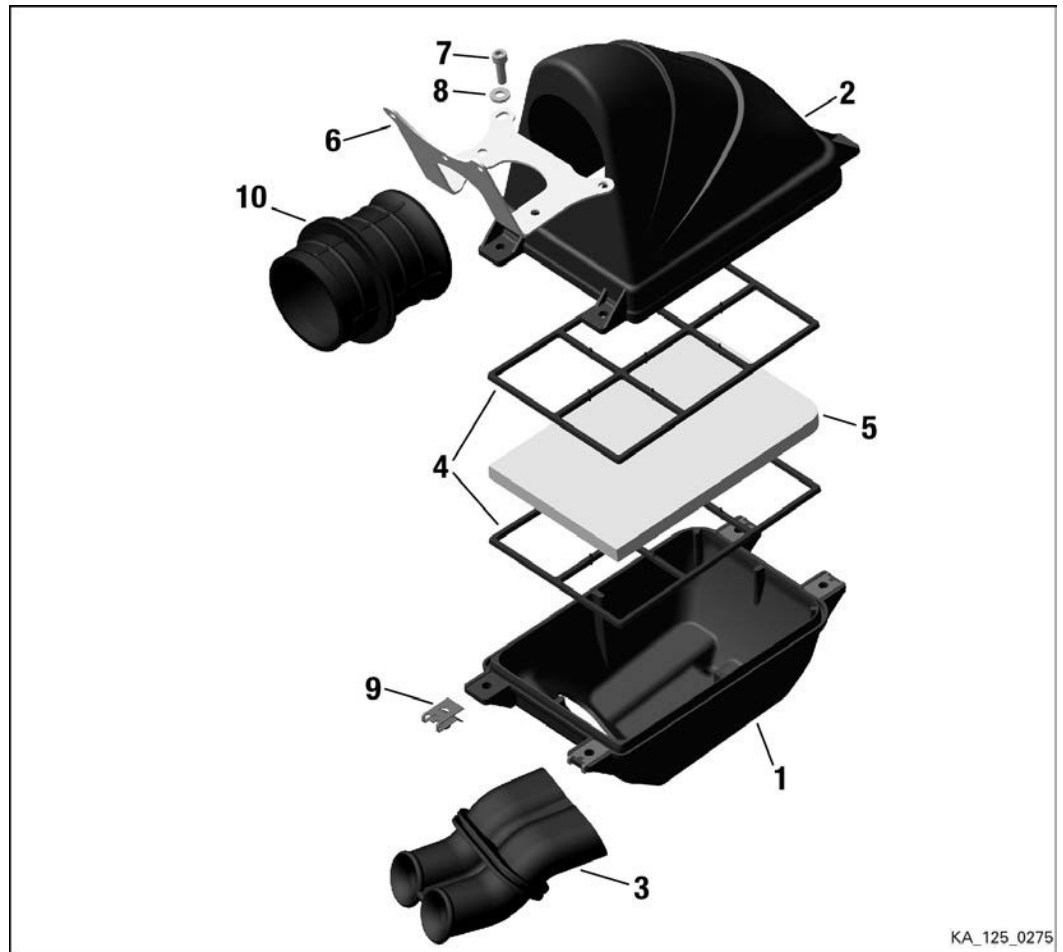


Figure 圖 6.5: Intake silencer 進氣消音器

1 Intake silencer case  
進氣消音器外殼

3 Intake silencer tube 進氣消音管

5 Filter element 濾芯支架

7 Washer 墊圈 6.4

9 Nut 螺帽 M6

2 Intake silencer cover  
進氣消音器上蓋

4 Filter element support/holder 濾芯支架/保持器

6 Support bracket 支撐架

8 Allen screw 內六角螺栓 M6x20

## CARBURETOR AND INTAKE SILENCER – INSPECTION OF COMPONENTS

### 化油器和進氣消音器 – 分件檢查

In the case of problems with the fuel supply the carburetor should be checked:  
First the components should be cleaned and then inspected. 如果燃油供應出現  
問題，就該檢查化油器：首先應清潔部件，然後再檢查部件狀態。

### INSPECTION OF THE CARBURETOR 化油器的檢查

**Instruction 指引** See [Figure 圖](#) : Carburetor. 化油器

1. Clean the fuel filter (1) and make sure that it is in good condition. 清潔燃油濾清器 (1號件) 並確保其狀況良好。
2. Blow compressed air through the holes in the carburetor housing (2) and the jets (3, 4, 5, 6 and 7) and make sure that there is no pollution to have an easy and free flow. 將壓縮空氣通過化油器外殼 (2號件) 上的孔和噴嘴 (3, 4, 5, 6 和 7) 吹入，確保沒有被污染堵塞，壓縮空氣的流動不受限。
3. Check that the clip (8) is tightly seated on the jet needle (9). 檢查扣夾 (8號件) 是否牢固地固定在主油針 (9號件) 上。

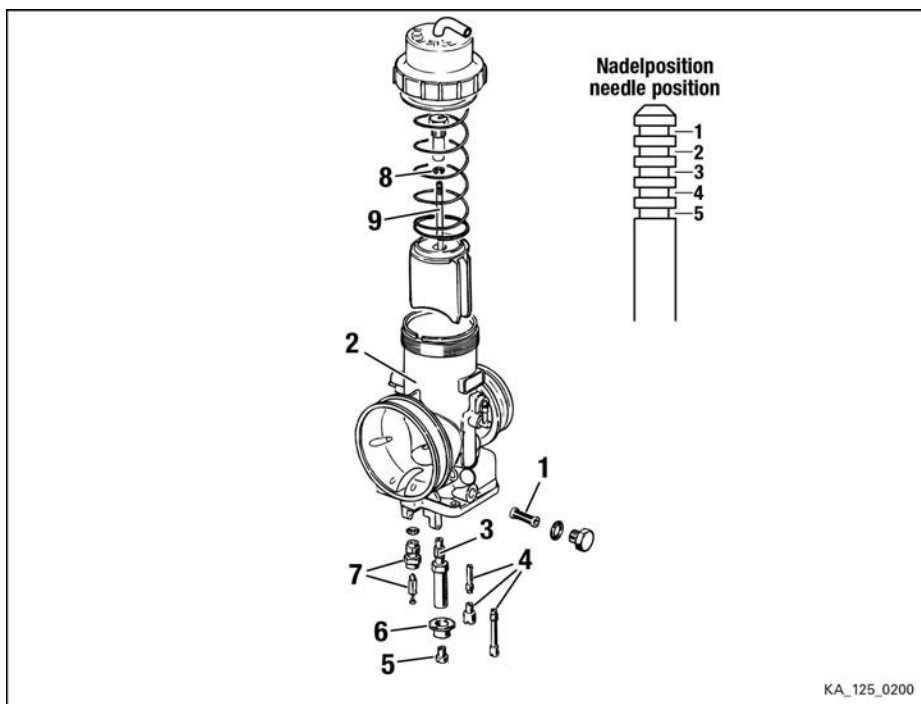


Figure 圖 6.6: Carburetor 化油器

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- |  |                                   |
|--|-----------------------------------|
| 1 Fuel filter 燃油濾芯   | 2 Carburetor housing 化油器外殼        |
| 3 Needle jet 啟動油針 DP 267                                   | 4 Idling and starter jets 怠速與啟動油嘴 |
| 5 Main jet 主油嘴   | 6 Main jet cup 主油嘴蓋               |
| 7 Needle valve 針閥 150 (standard<br>標準件) 200 (optional 選配件) | 8 Clip 扣環                         |
| 9 Jet needle 主油針 K 57                                      |                                   |
-



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### INSPECTION OF THE FUEL PUMP 燃油泵的檢查

#### General 概況

#### NOTE 注意事項

*Only the complete membrane and gasket set of the fuel pump can be replaced. 燃油泵的完整隔膜和墊圈組只能更換新品。*

Fuel pump gasket set: Part no. 296165 燃油泵墊片組：料號 296165

#### Instruction 指引

See [Figure圖: Fuel pump.燃油泵](#)

1. Check the condition of the impulse pipe (1), fuel line (2) and fuel overflow line (3) and in case of doubt replace them. 檢查導壓管 (位置1)、燃油管路 (位置2) 和燃油溢流管路 (位置3) 的狀況，如有問題就換掉。

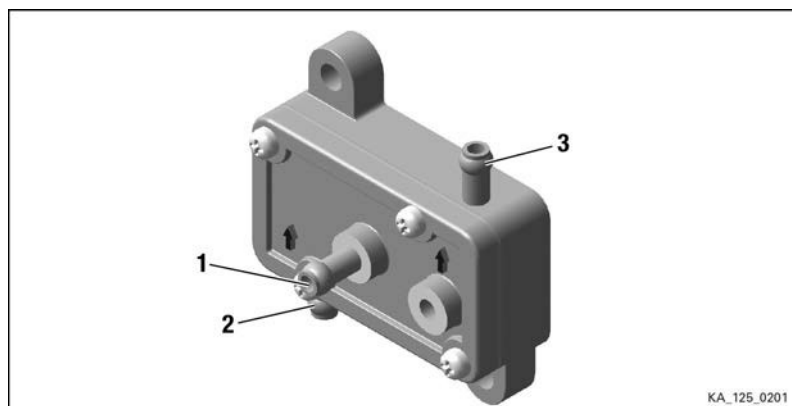


Figure 圖 6.7: Fuel pump 燃油泵

1 Impulse pipe 導壓管

2 Fuel line (from fuel tank) 燃油管(連結燃油箱)

3 Fuel line (to carburetor) 燃油管 (連結化油器)

### INSPECTION OF THE INTAKE SILENCER 進氣消音器的檢查

#### General 概況

#### ATTENTION 注意

**A damaged filter element must be replaced immediately. Otherwise dirt particles can enter the intake and cause damage to the engine. 濾芯如果損壞就必須立即更換。否則灰塵顆粒會進入進氣口並損壞發動機。**

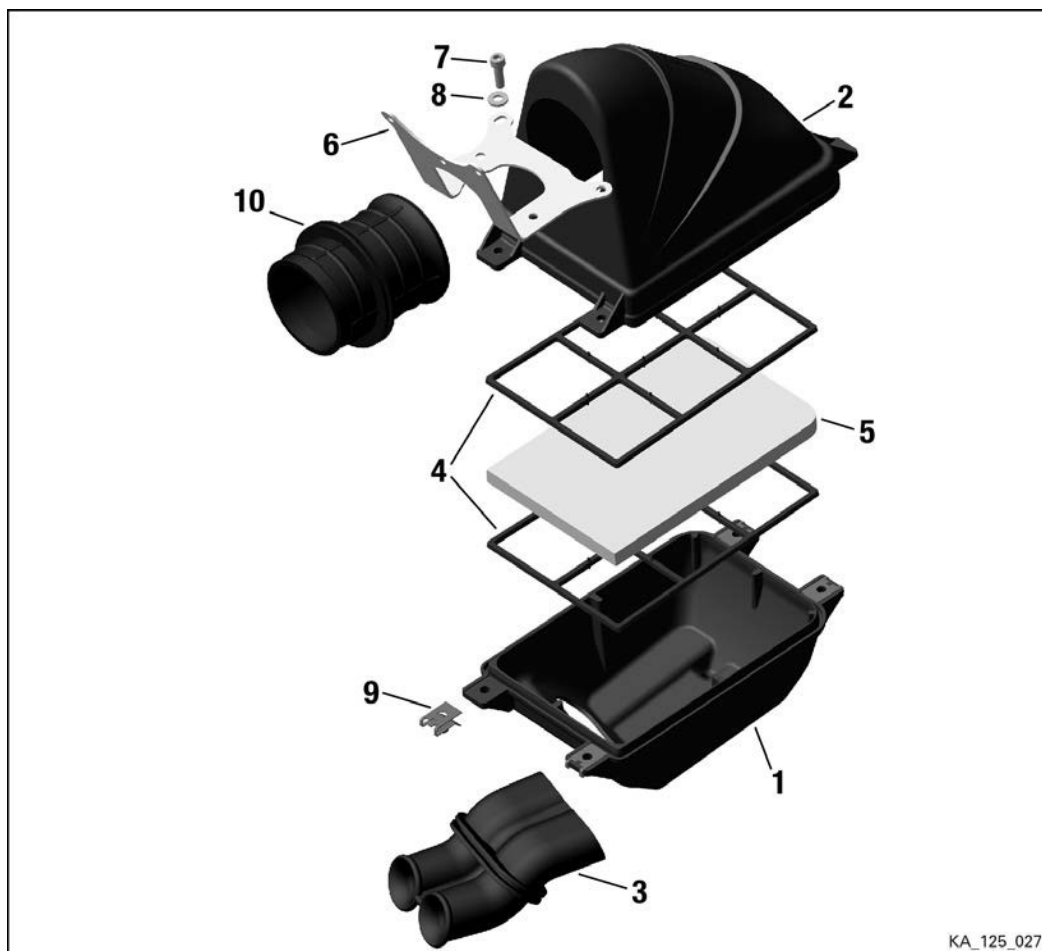
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**Instruction 指引** See [Figure 圖 : Intake silencer](#). 進氣消音器

1. Inspect the silencer case (1) and silencer cover (2) for cracks. 檢查消音器外殼(1號件)和消音器上蓋 (2號件) 是否有裂痕。
2. Inspect the intake silencer tube (3) and carburetor socket (10) for cracks or porosity. 檢查進氣消音器管 (3號件) 和化油器套管 (10號件) 是否有裂痕或孔隙。
3. Clean the filter element (5) with filter cleaner and oil it afterwards slightly with air filter oil. 用過濾器清潔劑清潔濾芯 (5號件) , 然後上一些空氣濾清器油。
4. Inspect the filter element (5) and filter element holders (4) for cracks. 檢查濾芯 (5號件) 和濾芯支架 (4號件) 是否有裂痕。

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Figure 圖 6.8: Intake silencer 進氣消音器

- |                                |  |
|--------------------------------|--|
| 1 Intake silencer case 進氣消音器外殼 | 2 Intake silencer cover 進氣消音器上蓋          |
| 3 Intake silencer tube 進氣消音管   | 4 Filter element support/holder 濾芯支架/保持器 |
| 5 Filter element 濾芯支架          | 6 Support bracket 支撐架                    |
| 7 Washer 墊圈 6.4                | 8 Allen screw 內六角螺栓 M6x20                |
| 9 Nut 螺帽 M6                    |  |

## **INSTALLING THE CARBURETOR AND INTAKE SILENCER**

### **安裝化油器與進氣消音器**

#### **ASSEMBLY OF CARBURETOR 化油器的組裝**

**Instruction 指引    NOTE 注意事項**

*Use ROTAX® gasket set, part no. 293834. 使用 ROTAX 原廠墊圈套件, 料號 : 293834 。*

1. Assemble the components in the opposite succession as you disassembled them. See also Chapter 6) section: Disassembly of the carburetor 按照拆解組件的相反的順序來進行組裝。另見第 6 章 ) 部分 : 化油器的拆卸。 .

#### **ASSEMBLY OF FLOAT HOUSING 浮筒艙室的組裝**

**General 概況    NOTE 注意事項**

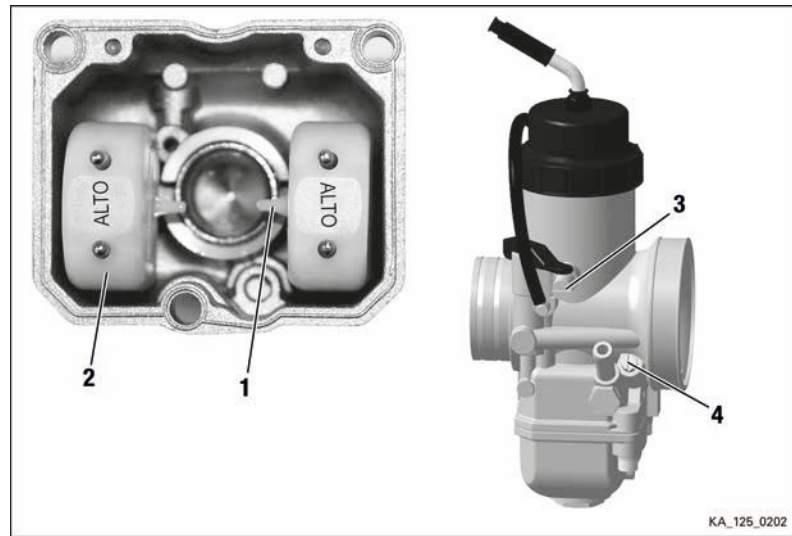
*The tips of the bracket must be at the same height. Adjust them if necessary. In this check the float chamber should not have been fitted. 浮筒艙室內部的 “翹翹板” 的兩邊端緣高度必須相同。請將浮筒取出再進行檢查,如果此支架端緣不等高,請作調整。*

**Instruction 指引**    The following steps are required to install the float housing: 採用以下步驟安裝浮筒艙 :

See [Figure 圖 : Float chamber 浮筒艙](#)

1. Check the position of the float attachment (1) in its installed state. 確認浮筒配件(1號件)在安裝狀態下的位置。
2. When the floats (2) are inserted you should be able to see the word "ALTO" on their top surfaces. 插入浮筒 (2號件) 後, 應該能夠在其頂面上看到 “ALTO”字樣。
3. Install and adjust the Bowden cable in accordance with the operating instructions. 按照操作說明安裝且調整 油門拉索。
4. Set the idle adjuster screw (3) and adjustment screw kit (4). 設置怠速調節螺栓 (3號件) 和混合比調節螺栓(4號件)。

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Figure圖 6.9: Float chamber 浮筒艙

1 Float attachment 浮筒配件

2 Float 4.0 浮筒 4.p

3 Adjustment screw 調整螺栓

4 Adjustment screw kit 混合比調整螺栓

## ASSEMBLY OF INTAKE SILENCER 進氣消音器的組裝

### General 概況

### NOTE 注意事項

*Before assembly, first immerse the filter element in filter oil. Squeeze out excess oil. 組裝前，先將濾芯浸入濾油中。然後將多餘的油擠出。*

**Instruction 指引** The following steps are required to install the intake silencer: 用以下步驟安裝進氣消音器：

1. Assemble the components in the opposite succession as you disassembled them. See also Chapter 6. section: Disassembly of the intake silencer. 按照分解組件的相反的順序來進行組裝。另請參見第 6 章：進氣消音器的拆卸。

## **INSTALLATION OF FUEL PUMP, CARBURETOR 安裝燃油泵 及 化油器**

### **Safety instructions 安全指引**

#### **m WARNING 警告**

##### **Danger of explosion and ignition! 具有爆炸和燃燒的危險！**

Overflowing and spoilt gasoline must be absorbed immediately with a binding agent and correctly disposed. Do not work with open flames and sources of ignition. Fuel must not come into contact with hot parts such as engine or exhaust since this may cause a fire!. 溢出和變質的汽油必須立即用粘合劑吸收並正確處理。不可在明火和火源下工作。燃油不得與發動機或排氣管等發熱的部件接觸，否則可能會引起火災！

### **NOTE 注意事項**

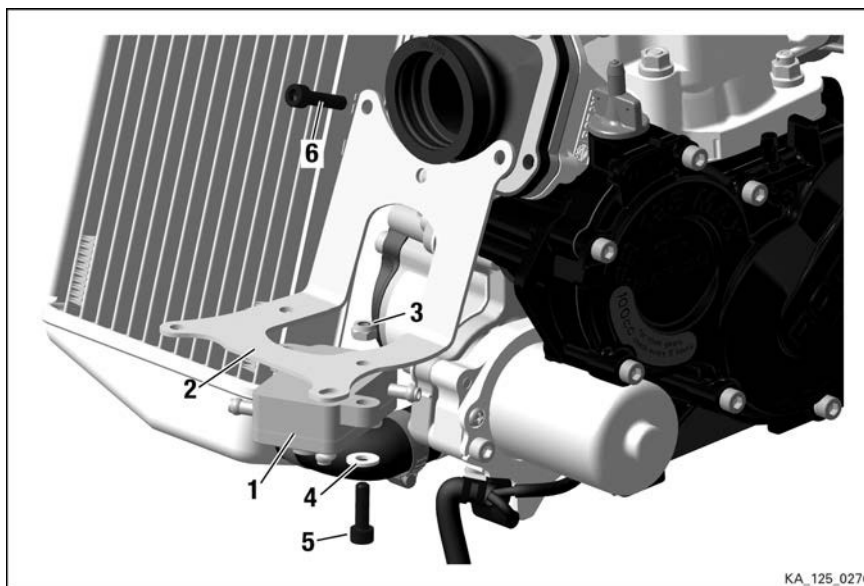
*When assembling the parts make sure that the pipes are connected to the correct terminal! 組裝零件時，要確保管子連接到正確的端位！*

**Preparation 準備** The following preparations should be carried out before installing the components:  
安裝組件前應進行以下準備工作：

#### **Installation of fuel pump 安裝燃油泵**

- Install the fuel pump with two M6x20 cylinder screws and new lock nuts with washers onto the support bracket. Tightening torque 10Nm (89 in. lb) 使用兩個 M6x20 圓柱螺栓和帶墊圈的防鬆螺帽(新品)將燃油泵安裝到支撐架上。鎖固扭力 10Nm (89 in. lb)
- Install support bracket with fuel pump onto the carburetor flange using 3 Allen screws M6x25. Tightening torque 7 Nm (62 in.lb). 使用 3 個 M6x25 內六角螺栓將帶有燃油泵的支撐架安裝到化油器接口上。鎖固扭力 7 Nm (62 in. lb)。

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Figure圖 6.10: Fuel pump 燃油泵

1 Fuel pump 燃油泵

3 Lock nut 防鬆螺帽 M6

5 Allen screw 內六角螺栓 M6x20

2 Support bracket 支撐架

4 Washer 墊圈 6.4

6 Allen screw 內六角螺栓 M6x25



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## REPAIR MANUAL 修復手冊

**Instruction 指引** To install the carburetor and intake silencer the following steps are required: 用以下步驟安裝化油器與進氣消音器

See **Figure圖: Carburetor and intake silencer**. 化油器與進氣消音器

1. Pull the hose clamp (3) over the carburetor flange. 將管夾 (3) 拉到化油器接口上。
2. Push the carburetor (1) onto the carburetor flange (2) and fasten the hose clamp (3). 將化油器 (1號件) 推到化油器接口 (2號件) 上並將管夾 (3號件) 鎖固。
3. Secure the intake silencer (4) with the hose clamp (5) on the carburetor. 用化油器上的管夾 (5號件) 固定進氣消音器 (4號件)。
4. Secure the intake silencer on the support bracket (6). 將進氣消音器固定在支架(6號件) 上
5. Check the Bowden cable (11) for wear, especially where it bends. Bends can cause the throttle to be stuck in fully open. See Chapter 9. 檢查油門拉索 (11號件) 是否磨損，尤其是彎曲處。彎曲會導致節氣門卡在全開狀態。見第 9 章
6. Connect the fuel feed line (9) and Bowden cable (11) to the carburetor. 將燃油管 (9號件) 和油門拉索 (11號件) 連接到化油器。
7. Connect the impulse pipe (10). 接上導壓管(10號件)

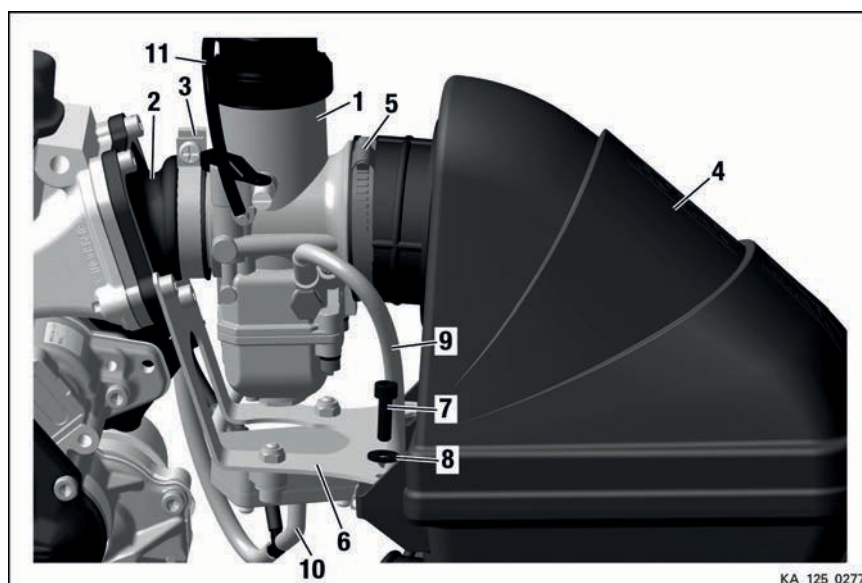


Figure 圖 6.11: Carburetor and intake silencer 化油器與進氣消音器

- |  |                           |
|--|---------------------------|
| 1 Carburetor 化油器   | 2 Carburetor flange 化油器接口 |
| 3 Hose clamp 管夾  | 4 Intake silencer 進氣消音器   |
| 5 Hose clamp 管夾 51   | 6 Support bracket 支撐架     |
| 7 Allen screw 內六角螺栓 M6x25                                    | 8 Washer 墊圈 6.4           |
| 9 Fuel feed tube/line 燃油供油管                                  | 10 Impulse pipe 導壓管       |
| 11 Bowden cable (loosely, not mounted in fig. 油門拉索 (鬆的·沒固定住) |                           |

Chapter 章節: Chapter 7  
**CENTRIFUGAL CLUTCH, PRIMARY AND BALANCE DRIVE**  
**離心式離合器, 主傳動與平衡驅動**

**TOPICS IN THIS CHAPTER 本章節主題**

<b>System description 系統說明</b> .....	<b>2</b>
<b>Removal of the clutch and startergear assy 拆卸離合器及啟動齒輪總成</b> .....	<b>4</b>
Removal of the centrifugal clutch assy 離心式離合器總成的拆卸 .....	4
Removal of the electric starter 啟動電機的拆卸 .....	4
Removal of the clutch drum 離合器鼓的拆卸 .....	5
Removal of the sprocket 鏈輪的拆卸 .....	7
Removal of the starter gear assy 啟動齒輪總成的拆卸 .....	8
<b>Inspection of clutch and startergear assy 檢查離合器與啟動齒輪總成</b> .....	<b>11</b>
Inspection of the clutch drum 離合器鼓的檢查 .....	11
Inspection of the needle cage and sprocket 滾針軸承與鏈輪的檢查 .....	11
Inspection of the starter reduction gear assy 啟動減速齒輪總成的檢查 .....	12
Inspection of the electric starter 啟動電機的檢查 .....	13
Inspection of the clutch and startergear assy 離合器及啟動齒輪總成的檢查 .....	14
Electric starter repair kit 啟動電機的維修套件包 .....	15
Disassembling of electric starter 啟動電機的拆解 .....	16
Assembling of electric starter 啟動電機的組裝 .....	17
<b>Installation of clutch and startergear assy 安裝離合器及啟動齒輪總成</b> .....	<b>18</b>
Installation of the starter reduction gear assy 啟動減速齒輪總成的安裝 .....	18
Installation of the starter gear assy 啟動電機總成的安裝 .....	19
Assembly of the clutch drum 離合器鼓的組裝 .....	21
Installation of the sprocket 鏈輪的安裝 .....	21
Installation of bearing sleeve (for sprockets with 11 teeth only) 軸承襯套的安裝(僅適用於11齒鏈輪).....	22
Installation of the clutch drum 離合器鼓的安裝 .....	23
Installation of the electric starter 啟動電機的安裝 .....	26
<b>Filling gearbox with oil 注入齒輪油</b> .....	<b>28</b>

**Contents 內容**      This chapter describes the disassembly and assembly of the centrifugal clutch and the primary and balance drive for the ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo) engine. The description is broken down into subsections. 本章介紹了 ROTAX® 125 MAX evo (包括 Junior-、Mini-、Micro MAX evo) 發動機的離心式離合器以及主傳動和平衡傳動的拆解和組裝。拆分為各個小節來講解。

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**SYSTEM DESCRIPTION 系統說明**

**Overview 概況**

Position on engine 發動機上的位置

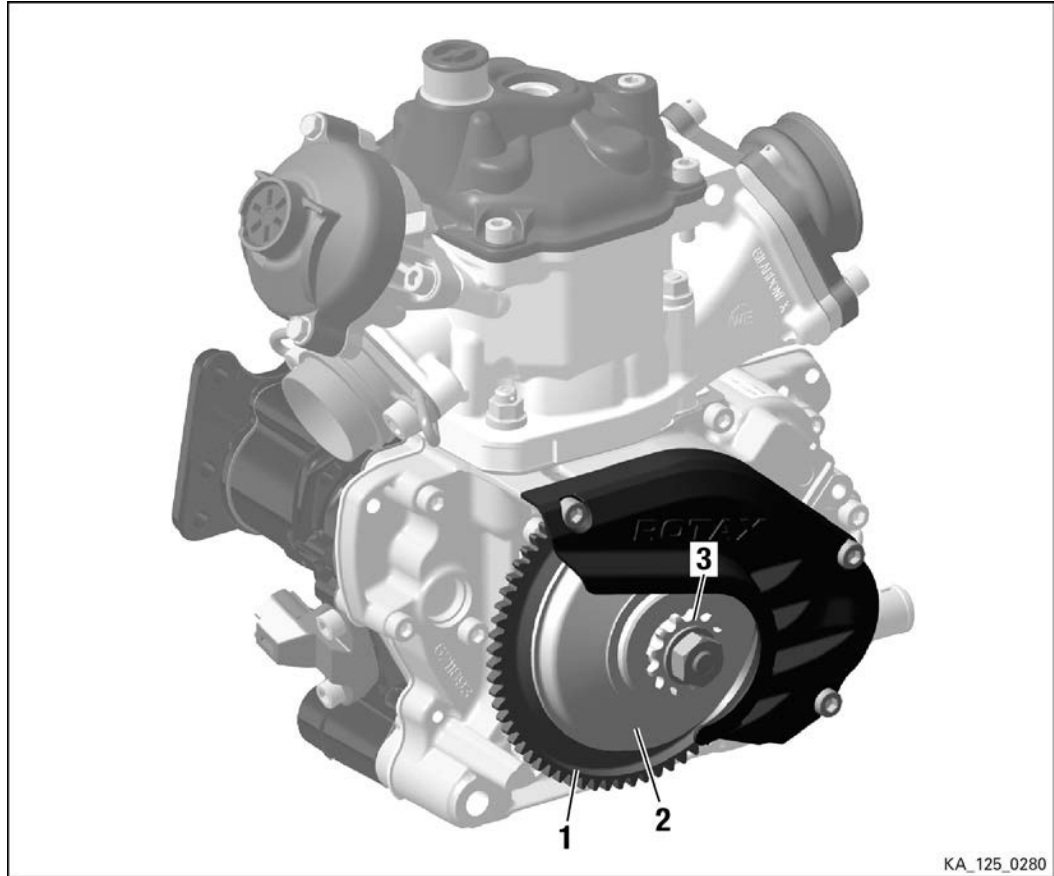


Figure 圖 7.1: Clutch and starter gear assy. 離合器與啟動電機總成

1 Starter gear assy. 啟動電機總成

2 Clutch drum 離合器鼓

3 Sprocket 鏈輪



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## REPAIR MANUAL 修復手冊

### Overview 概況

### Components of clutch and starterassy. 離合器與啟動電機總成

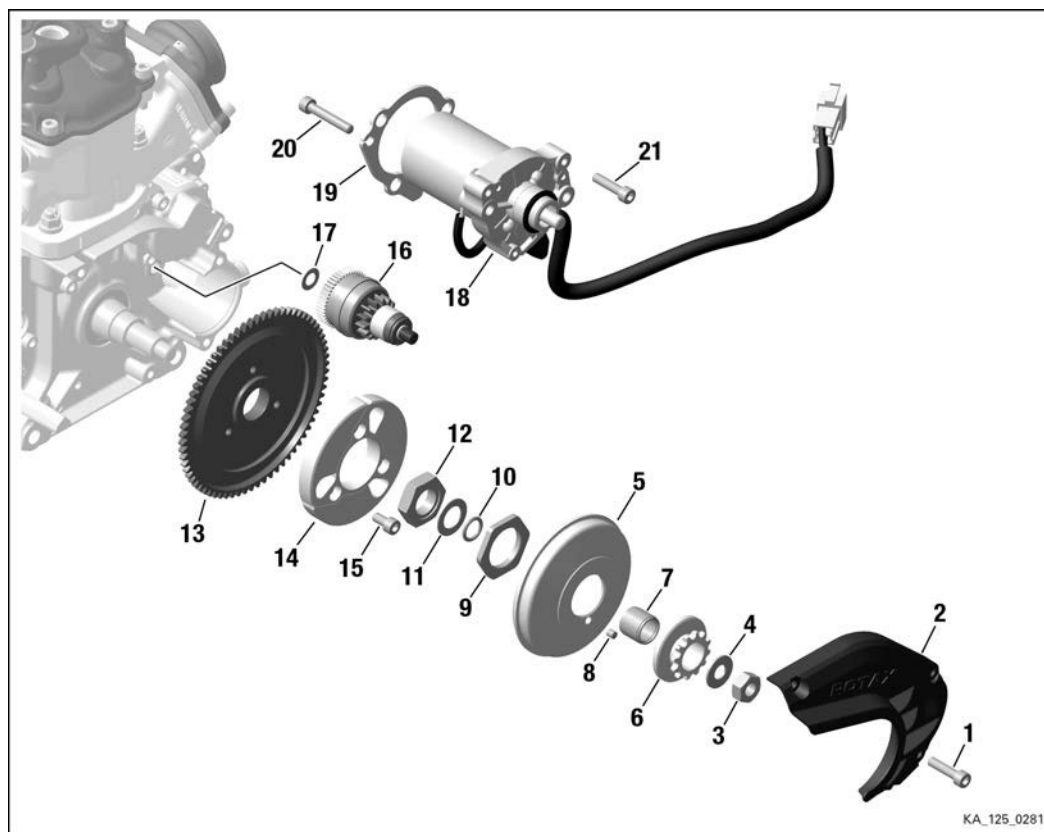


Figure 圖 7.2

- |   |  |
|---|--|
| 1 Allen screw 內六角螺栓 M6x25   | 2 Chain protection 鏈條保護蓋               |
| 3 Hex. nut 六角螺帽 M10x1   | 4 Thrust washer 止推墊圈                   |
| 5 Clutch drum 離合器鼓  | 6 Sprocket 鏈輪                          |
| 7 Plain bearing 滑動軸承 / (11T sprockets 鏈輪) or needle cage 滾針軸承 (all other sprockets) | 8 Needle pin 針銷 5x5                    |
| 9 Hex. Nut 六角螺帽 28x1  | 10 O-ring O型環                          |
| 11 Thrust washer 止推墊圈 15.2  | 12 Hex. Nut 六角螺帽 M20x1.5               |
| 13 Starter gear 啟動齒輪  | 14 Clutch 離合器                          |
| 15 Allen screw 內六角螺栓 M6x12  | 16 Starter reduction gear assy. 啟動減速齒輪 |
| 17 Thrust washer 止推墊圈 8.5   | 18 Electric starter 啟動電機               |
| 19 Starter support 啟動電機支架   | 20 Allen screw 內六角螺栓 M6x35             |

## REMOVAL OF THE CLUTCH AND STARTER GEAR ASSY. 離合器與啟動電機的拆卸

### REMOVAL OF THE CENTRIFUGAL CLUTCH ASSY. 離心離合器總成的拆卸

Safety instructions 安全指引

#### m WARNING 警告

**Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work.** 在開始任何工作之前，一定要讓發動機冷卻至環境溫度。否則會有嚴重燒傷和燙傷的危險！

#### m WARNING 警告

**Danger of explosion and ignition! 具有爆炸和燃燒的危險！**

Overflowing and spoiled gasoline must be absorbed immediately with a binding agent and correctly disposed. Do not work with open flames and sources of ignition. Fuel must not come into contact with hot engine parts or components. 溢出和變質的汽油必須立即用粘合劑吸收並正確處理。不可在明火和火源下工作，燃油不得與發動機或排氣管等發熱的部件接觸，否則可能會引起火災！

### REMOVAL OF THE ELECTRIC STARTER 啟動電機的拆卸

Instruction 指引 See [Figure: Electric starter 啟動電機](#)

1. Disconnect electrical connection from the starter. 斷開啟動電機的連接電線。
2. Remove the electric starter (1) completely by unscrewing 2 Allen screws M6x35 (3) from the crankcase and gearbox case. 從曲軸箱和變速箱箱體拆下 2 個內六角螺栓 M6x35 (3) 來卸下啟動電機 (1 號件)。

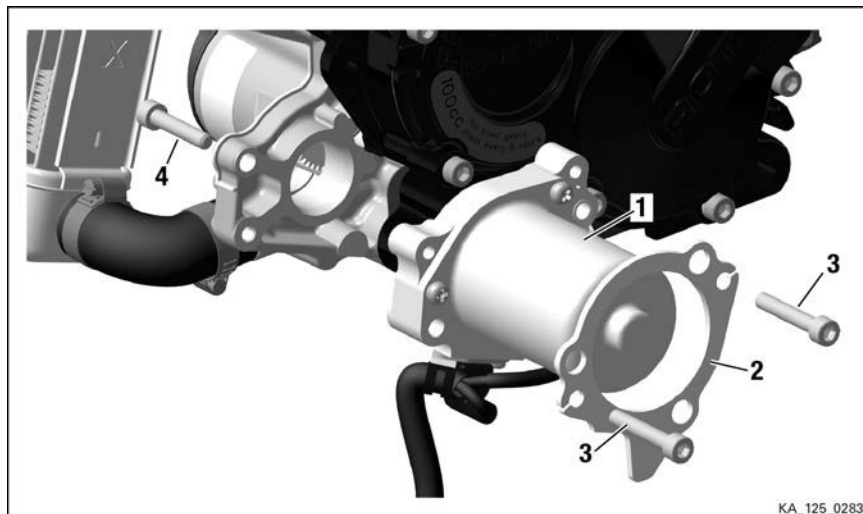


Figure 圖 7.3: Electric starter 啟動電機

1 Electric starter 啟動電機  
3 Allen screw 內六角螺栓 M6x35

2 Starter support 電機托架  
4 Allen screw 內六角螺栓 M6x30

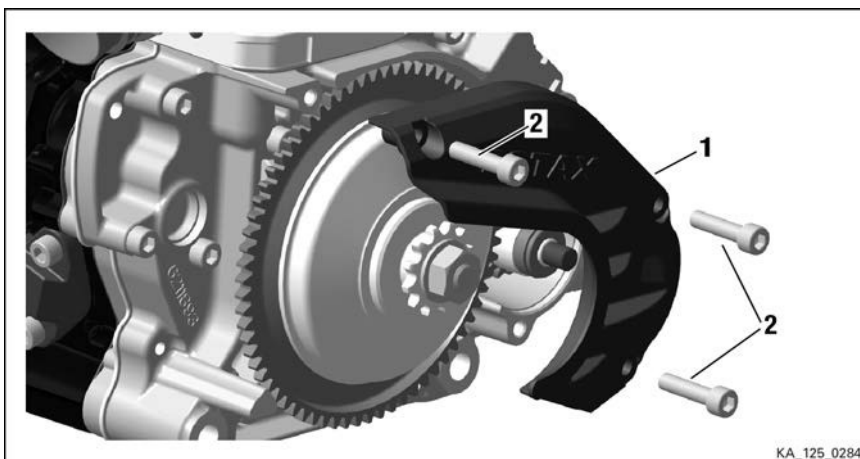
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## REMOVAL OF THE CLUTCH DRUM 離合器鼓的拆卸

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 內容	Use 施作
277381	Locking tool 卡位工具	Spark plug thread 火花塞螺牙
676205	Fixation tool assy. 固定工具總成	Starter gear assy. 啟動齒輪總成

**Preparation 準備** • Remove the chain protection (1). 拆下鍊條保護蓋(1號件)



Figure圖 7.4: Cover 蓋板

1 Chain protection 鍊條保護蓋

2 Allen screw 內六角螺栓 M6x25

### Instructions 指引

1. Remove the spark plug. 拆下火花塞。
2. Preferred method 1: screw in fixation tool for crankshaft (1) into the spark plug hole to the limit stop. 首選方法一：將曲軸固定工具(1號件)旋入火花塞孔內，鎖到底為止。
3. Method 2: insert fixation tool assembly (2) (part no. 676205) in the starter gear assembly. 方法 2：將固定工具總成 (2號件) (料號 676205) 插入啟動齒輪組件中。

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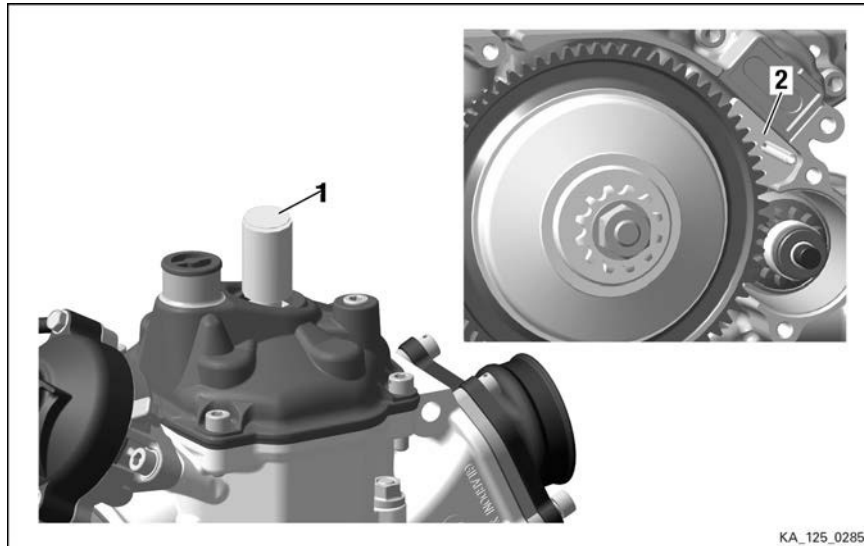


Figure 圖 7.5

1 Fixation tool for crankshaft 曲軸固定工具 2 Fixation tool assy. 固定工具總成

4. Unscrew and remove hex nut (1). 拆鬆並移除六角螺帽(1號件)
5. Remove thrust washer (2), clutch drum with sprocket (3), needle cage (4) O-ring (5) and thrust washer 15.2 (6). 拆下止推墊圈 (2號件)、帶鏈輪 (3號件) 的離合器鼓、滾針軸承 (4號件) O型環 (5號件) 和止推墊圈 15.2 (6號件)。

**NOTE 注意事項**

*With the sprocket with 11 teeth a plain bearing is used instead of the needle cage (4). It is pressed into the sprocket. 關於11齒鏈輪，是使用滑動軸承(4號件)代替滾針軸承。它是被採用壓配的方式與鏈輪結合。*



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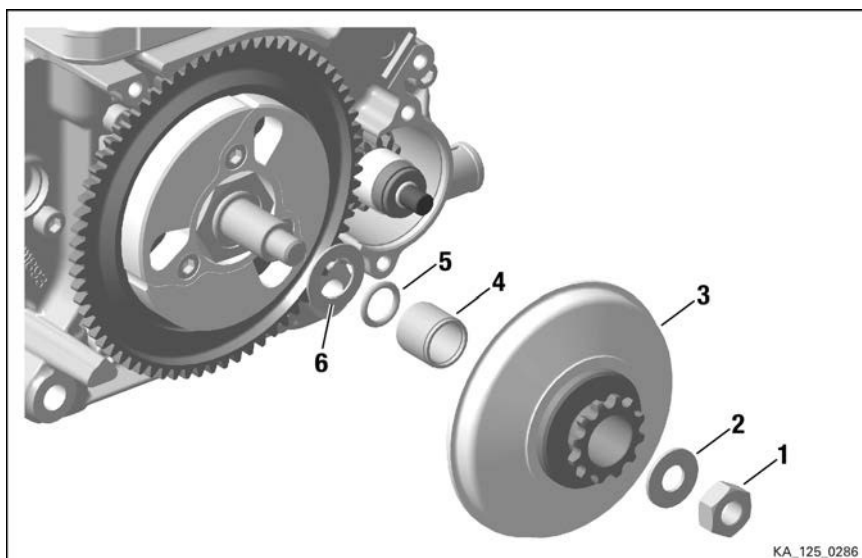


Figure 圖 7.6

- |                       |   |
|-----------------------|---|
| 1 Hex. nut M10x1 六角螺帽 | 2 Thrust washer 止推墊圈                    |
| 3 Clutch drum 離合器     | 4 Needle cage 滾針軸承 / Plain bearing 滑動軸承 |
| 5 O-ring O型環          | 6 Thrust washer 止推墊圈15.2                |

## REMOVAL OF THE SPROCKET 鏈輪的拆卸

**Instruction 指引** See [Figure 圖 : Fixation tool 固定工具](#)

1. Fix fixation tool for sprocket (1) in a vise. 將鏈輪(1號件)的固定工具固定在台鉗上。
2. Insert clutch drum (4) with installed sprocket (2) into the corresponding toothed cutout. 將裝有鏈輪(2號件)的離合器鼓(4號件)插入相應的齒型切口口中。
3. Unscrew the hex nut (5) for the sprocket. 拆下鏈輪的六角螺帽(5號件)。
4. Remove the sprocket from the clutch drum. 從離合器鼓拆下鏈輪。

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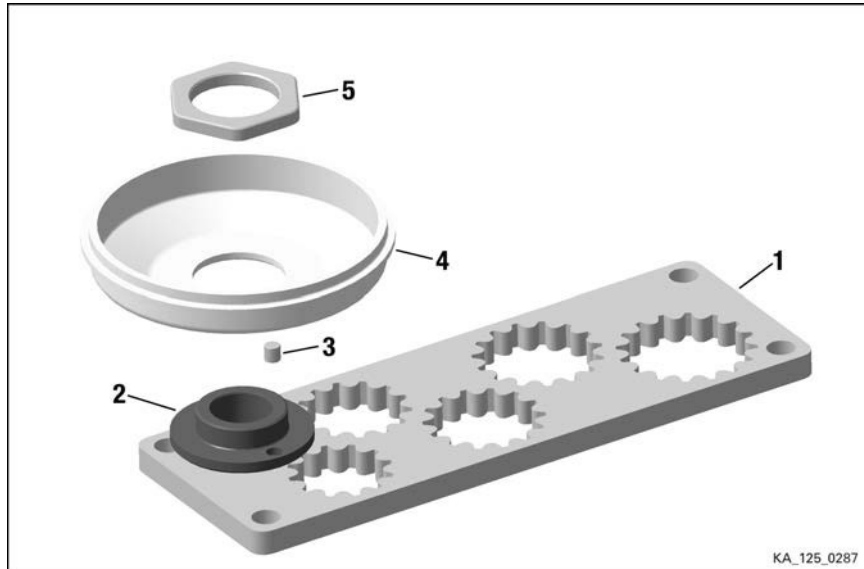


Figure 圖 7.7: Fixation tool 固定工具

- |                      |                    |
|----------------------|--------------------|
| 1 Fixation tool 固定工具 | 2 Sprocket 鏈輪      |
| 3 Needle pin 針銷5x5   | 4 Clutch drum 離合器鼓 |
| 5 Hex. Nut 六角螺帽      |                    |

## REMOVAL OF THE STARTER GEAR ASSY. 啟動齒輪總成的拆卸

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
276016	Puller assy. 拉拔器	Starter gear assy. 啟動齒輪總成
277381	Fixation tool 固定工具	Spark plug thread 火花塞螺牙
676205	Fixation tool assy. 固定工具總成	Starter gear assy. 啟動齒輪總成

**Instructions 指引** Proceed as follows to remove the starter gear assy.: 按照以下步驟拆下啟動齒輪總成：

1. Method 1: screw in fixation tool for crankshaft (1) into the spark plug thread to the limit stop.  
方法一：將曲軸固定工具(1號件)旋入火花塞螺紋，鎖到底為止。
2. Method 2: insert fixation tool assy. (2) (part no. 676205) in the starter gear assy.  
方法二：在啟動齒輪總成中插入固定工具總成 (2號件) (零件號 676205)。

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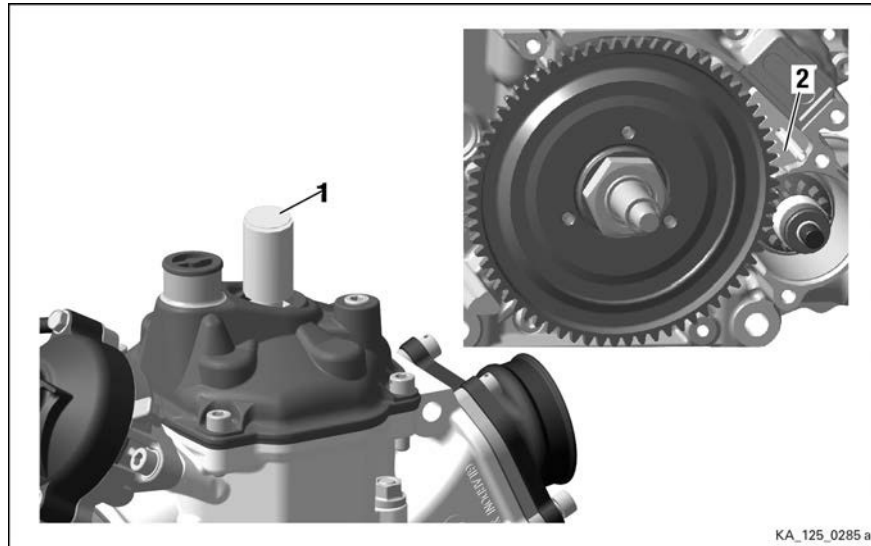


Figure 圖 7.8: Fixation tool 固定工具

- 1 Fixation tool (crankshaft) 曲軸固定工具      2 Fixation tool (starter gear) 啟動電機固定工具

3. Remove the clutch (3). 拆下離合器(3號件)
4. Unscrew hex. nut M20 (4). 拆下M20六角螺帽(4號件)

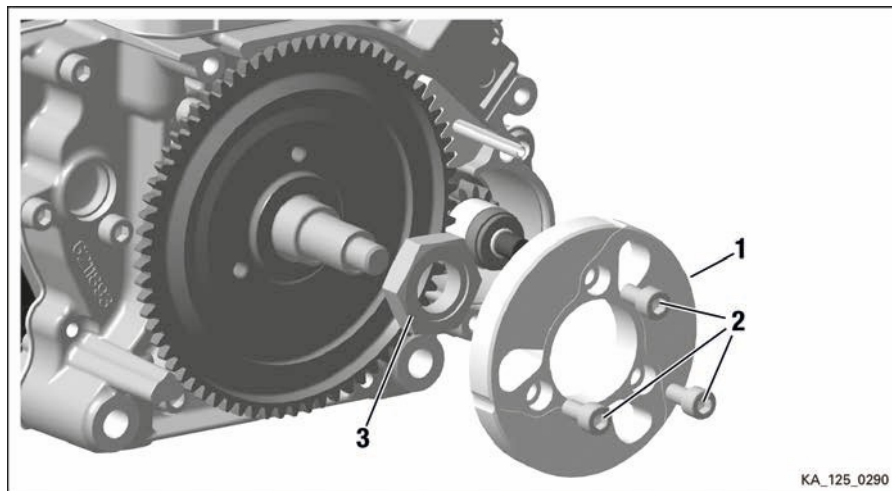


Figure 圖 7.9: Clutch 離合器

- 1 Clutch 離合器      2 Allen screw 內六角螺栓M6x12  
3 Hex. nut 六角螺帽M28x1

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5. Fasten the puller assy. (1) to the starter gear assembly with 3 Allen screws M6x60 (2).  
採用 3 個內六角螺栓 M6x60 (2號件) 將拉拔器總成(1號件)鎖緊到啟動齒輪總成上。

**NOTE 注意事項**

Make sure the screws do not touch the housing. Do not screw them in too far. 確保螺栓不接觸拉拔器的外殼。鎖的時候注意不要將它們的跨距拉太遠。

6. Pull out starter gear assy. (3). 拉出啟動齒輪總成(3號件)。
7. Remove starter reduction gear assy. (4) with the thrust washer (5) below.  
拆下啟動機減速齒輪總成(4號件)以及下面的止推墊圈 (5號件)。

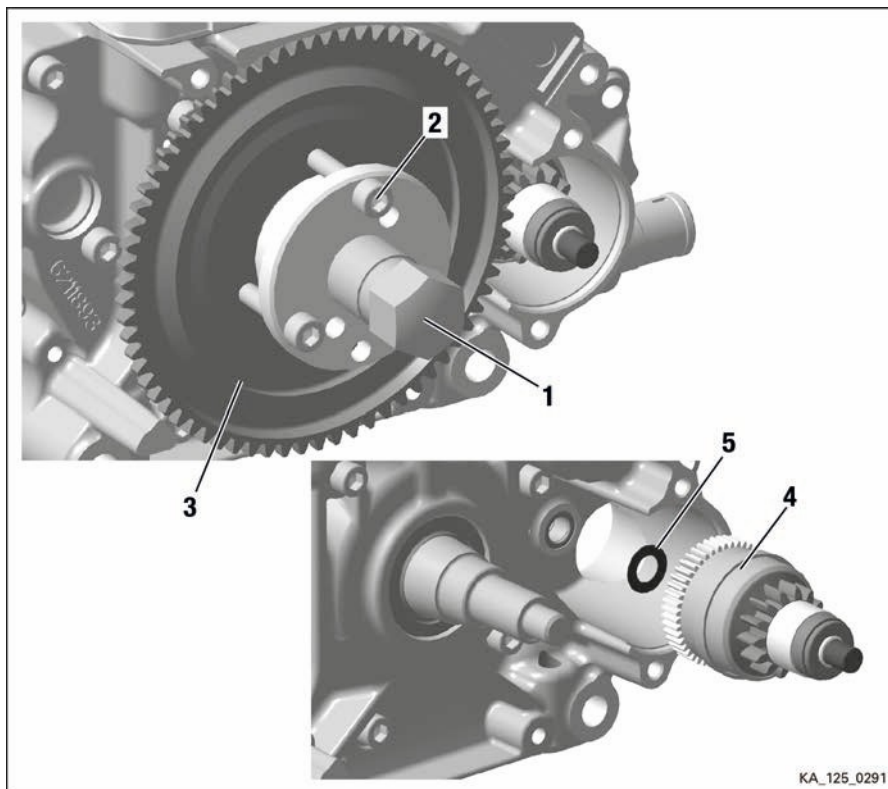


Figure 圖 7.10: Starter gear assy. 啟動齒輪總成

- |                             |                                 |
|-----------------------------|---------------------------------|
| 1 Puller assy. 拉拔器總成        | 2 Allen screws 內六角螺栓 M6x60      |
| 3 Starter gear assy. 啟動齒輪總成 | 4 Starter reduction gear 啟動減速齒輪 |
| 5 Thrust washer 止推墊圈        |                                 |

## **INSPECTION OF CLUTCH AND STARTER GEAR ASSY. 離合器鼓以及啟動電機的檢查**

### **INSPECTION OF THE CLUTCH DRUM 離合器鼓的檢查**

**General 概況** If the clutch drum starts to tumble when the engine is idling with a sprocket with 11 teeth, this indicates a worn out bearing. Please replace the bearing immediately. 鏈輪齒數為11的設定狀態下，如果在發動機怠速運轉時，離合器鼓就開始轉動，就表示軸承已磨損。請立即更換軸承。

#### **Instructions 指引**

1. Inspect clutch drum for signs of wear and replace if applicable. 檢查離合器鼓是否有磨損跡象，如果是就換掉。

### **INSPECTION OF THE NEEDLE CAGE AND SPROCKET 滾針軸承與鏈輪的檢查**

**Instructions 指引** See [Figure: Clutch drum, plain bearing / needle cage, sprocket](#) 離合器鼓, 滑動軸承 / 滾針軸承, 鏈輪

1. Inspect the thrust washers (2) and (3) for signs of wear and replace if applicable. 檢查止推墊圈(2號件)和(3號件)是否有磨損跡象，如果是就換掉。
2. Inspect the needle cage (4) or bearing sleeve for signs of wear and replace if applicable. 檢查滾針軸承(4號件)或滑動軸承是否有磨損跡象，如果是就換掉。
3. Inspect the teeth of the sprocket (5) for wear (compare) and replace if applicable. 檢查鏈輪 (5號件)的齒是否磨損 (與新件作比較) 如果是就換掉。

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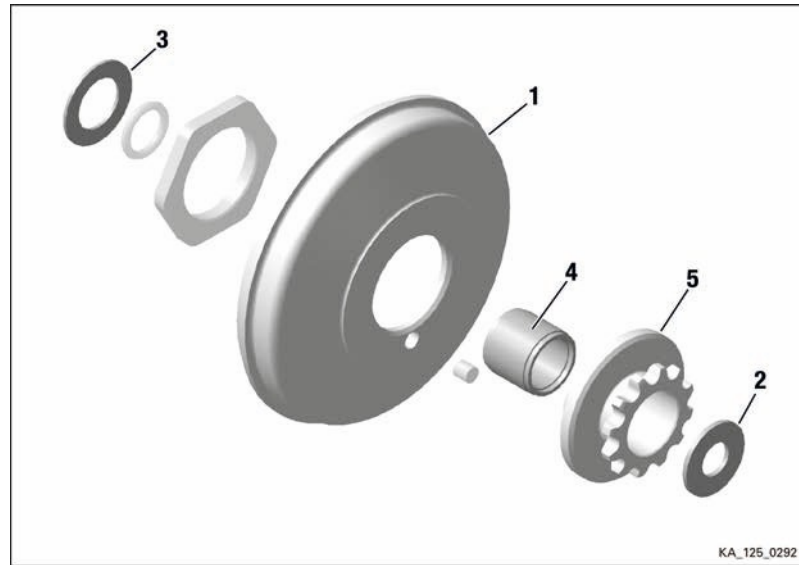


Figure 圖 7.11: Clutch drum, plain bearing / needle cage, sprocket 離合器鼓, 滑動軸承 / 滾針軸承, 鏈輪

1 Clutch drum 離合器鼓

3 Thrust washer 止推墊圈15.2

5 Sprocket 鏈輪

2 Thrust washer 止推墊圈

4 Plain bearing / needle cage  
滑動軸承 / 滾針軸承

## INSPECTION OF THE STARTER REDUCTION GEAR ASSY. 啟動減速齒輪總成的檢查

### General 概況

### NOTE 注意事項

*In one direction of rotation the two gear wheels can be rotated together, in the other direction of rotation the two gears move apart and finally lock. 在某個旋轉方向狀態，兩個齒輪可以一起旋轉，在另一個旋轉方向的時候，兩個齒輪則會分開而且卡住。*

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**Instructions 指引** See [Figure: Starter reduction gear assy.](#) 啟動減速齒輪總成

1. Clean starter reduction gear assy. (1). 清潔啟動減速齒輪總成(1號件)。
2. Inspect the gear wheels (2) for wear. 檢查輪齒 (2號件) 是否磨損。
3. Inspect the operation of the starter reduction gear assy. 檢查啟動減速齒輪總成的運轉情況。

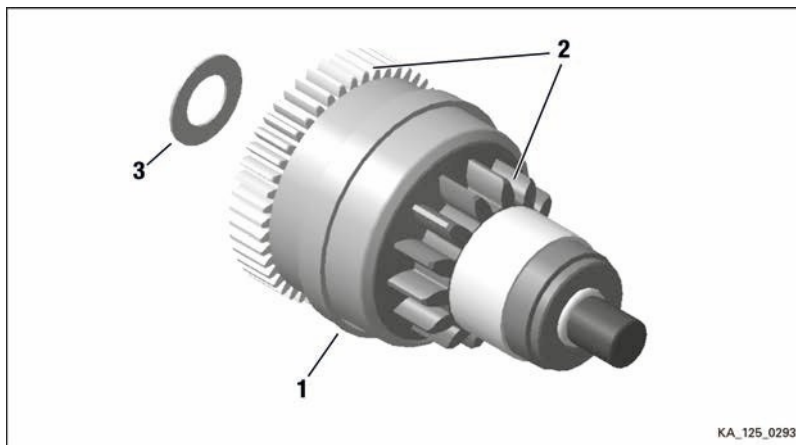


Figure 圖 7.12: Starter reduction gear assy. 啟動減速齒輪總成

- 1 Starter reduction gear 啟動減速齒輪      2 Gear wheels 輪齒  
3 Thrust washer 止推墊圈

## INSPECTION OF THE ELECTRIC STARTER 啟動電機的檢查

### General 概況

### NOTE 注意事項

*If the electric starter is malfunctioning, the cause is generally that the two carbon brushes are worn or defective. In this case all parts in the electric starter repair kit must be renewed. 如果啟動電機發生故障，一般原因是兩個碳刷磨損或損壞。在這種情況下，必須更換啟動電機維修套件包中的所有部件。*

**Instructions 指引** See [Figure 圖 : Electric starter](#) 啟動電機

1. Check starter cable (1). 確認啟動電機的電纜線狀況(1號件).

### NOTE 注意事項

*If the starter cable is faulty, the starter cable assy. can be replaced. 如果啟動電機的電纜線有故障，那就換掉。*

2. Inspect parts of the electric starter. 檢查啟動電機的零件。
3. Check teeth (2) for deformation and wear. 檢查齒 (2號件) 是否變形和磨損

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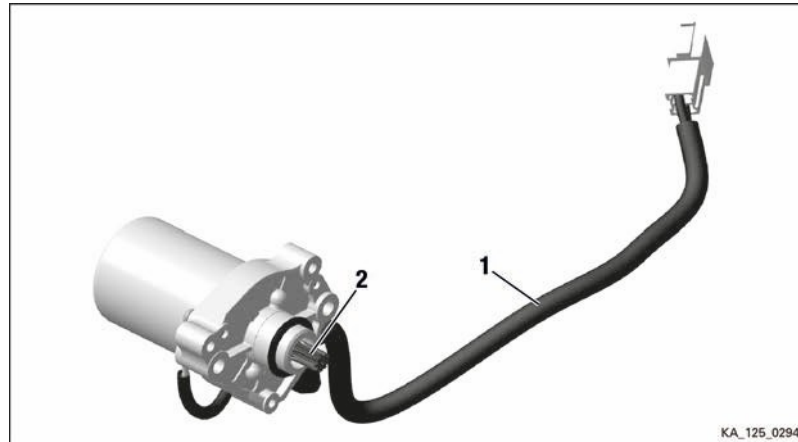


Figure 圖 7.13: Electric starter 啟動電機

1 Starter cable 啟動電機電纜線

2 Teeth 電機的齒輪

**INSPECTION OF THE CLUTCH AND STARTER GEAR ASSY. 離合器與啟動齒輪的檢查**

**Instructions** 指引 See [Figure 圖 : Clutch and starter gear assy. 離合器與啟動齒輪總成](#)

1. Check the hole (1) in the clutch (2). 檢查離合器(2號件)上的孔 (1)。
2. Check the teeth of the starter gear assy. (3) for damage or deformation. 檢查啟動齒輪總成(3號件)的齒部外觀是否有損壞或變形。
3. Remove LOCTITE residue from the taper (4) of the starter gear assy. . 從曲軸的啟動齒輪總成組裝錐形面(4號位置)上清除LOCTITE膠的殘留物。

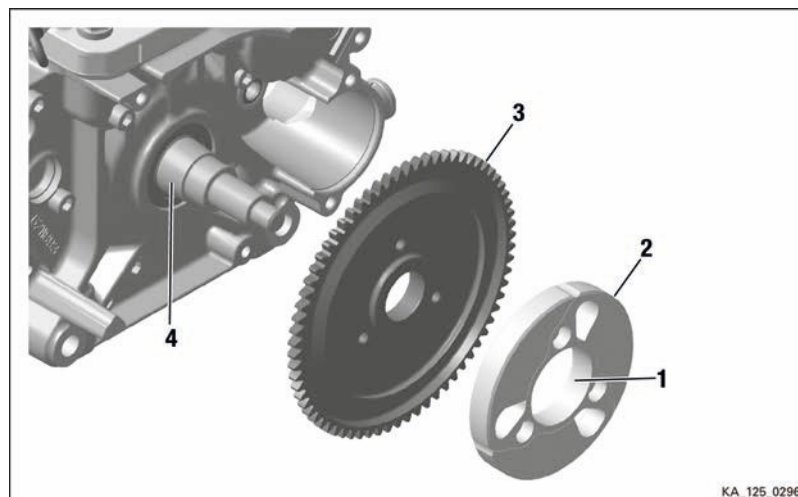


Figure 圖 7.14: Clutch and starter gear assy. 離合器與啟動齒輪總成

1 Clutch hole 離合器孔

2 Clutch 離合器

3 Starter gear 啟動電機

4 Taper 錐



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**ELECTRIC STARTER REPAIR KIT 啟動電機維修套件包**

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 內容	Use 施作
281262	Electric starter repair kit 啟動電機維修套件包	Electric starter 啟動電機

**Instructions 指引** See [Figure 圖 : Electric starter 啟動電機](#)

1. Remove the starter housing from the crankcase and gearbox case by unscrewing 2 Allen screws. 2拆下2個內六角螺栓，以從曲軸箱和變速箱殼拆下啟動機外殼。
2. Disconnect electrical connection (5) from the starter (4). 從啟動電機(4號件) 斷開電纜的連接 (5號件)。
3. Unscrew the starter housing screws (8). 拆下啟動器外殼螺栓(8號件)。

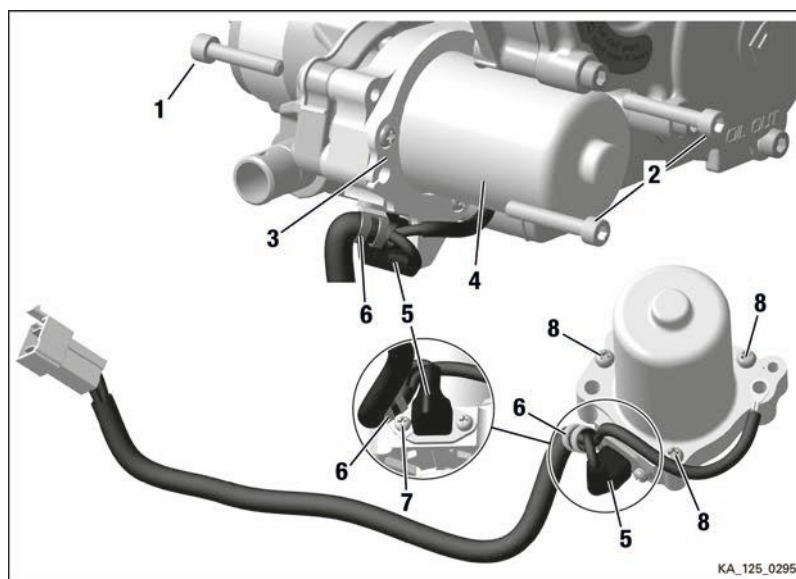


Figure 圖 7.15: Electric starter 啟動電機

1 Allen screw 內六角螺栓 M6x30

3 Starter support 啟動電機支撐架

5 Pick up sensor 曲軸角度傳感器

7 Allen or TAPTITE screw M6x20

內六角 或 三角柱型自攻螺栓 M6x20

2 Allen screw 內六角螺栓M6x35

4 Electric starter 啟動電機

6 Starter cable 啟動電纜線

8 Starter housing screws 啟動電機外殼螺栓

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## DISASSEMBLING OF ELECTRIC STARTER 啟動電機的拆解

**Instructions 指引** See [Figure: Electric starter disassembly](#) 拆解啟動電機

### NOTE 注意事項

*Take care not to loose the spring-loaded sliding contacts. 注意不要鬆開有預載彈簧的滑動觸點。*

1. Secure the rotor shaft with a suitable tool. 使用合適的工具來固定轉子軸。
2. Pull out solenoid housing. 拉出電磁閥外殼。
3. Pull the rotor shaft from the starter motor support. 從啟動電機支架上拉出轉子軸。
4. Unscrew the bracket for the positive contact. 拆下正極觸點的支架。
5. Press out the rubber grommet. 壓出橡膠墊圈。
6. Extract the positive contact by pulling it inwards through the plastic ring. 通過塑料環向內拉出正極觸點。

### NOTE 注意事項

*If necessary, unscrew the rubber seal and the ground pole from the starter support and clean them. 如有必要，從啟動器支架上拆下橡膠密封件和接地極並清潔它們。*



Figure 圖 7.16: Electric starter disassembly 拆解啟動電機總成

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## ASSEMBLING OF ELECTRIC STARTER 啟動電機的組裝

### Instructions 指引 NOTE 注意事項

*The brushes must contact the slip ring correctly. 碳刷必須正確接觸滑轉環。*

1. Inspect the carbon brushes and replace if necessary with new parts (ROTAX® part no. 281262). 檢查碳刷，必要時更換新零件 ( ROTAX® 料號 281262 ) 。
2. Insert the plastic ring in the starter motor support so that it does not rotate. 將塑料環插入啟動電機支架中，使其不旋轉。
3. Insert the positive contact from inside through the plastic ring and the cutout in the starter motor support. 將正極觸點穿過塑料環從內部並由啟動電機支架中的切口插入。
4. Secure the plastic ring with two Phillips head screws and washers. The fixing provides the ground contact. 用兩個十字頭螺栓和墊圈固定塑料環。以供接地。
5. Install the rubber grommet over the positive contact. 在正極觸點上安裝橡膠墊圈。
6. Secure the bracket on the starter motor support. 將支架固定在啟動電機支架上。
7. Insert the coil springs in the cutouts of the plastic ring, press the brushes against them. 將螺旋彈簧插入塑料環的切口中，再將碳刷壓上。
8. Carefully insert the rotor shaft. 小心地插入轉子軸。
9. Fill the starter motor support with LOCTITE 5910 in the region of the positive. This protects the fragile carbon brushes from vibration. 在正極區域用 LOCTITE 5910 填充啟動電機支架。這可以保護脆弱的碳刷免受振動。
10. Insert the O-ring into the starter motor support. 將O型環插入啟動電機支架。
11. Hold the rotor shaft with a suitable tool and secure the solenoid housing on the starter motor support. 用合適的工具固定轉子軸，並將電磁閥外殼固定在啟動電機支架上。

## INSTALLATION OF CLUTCH AND STARTER GEAR ASSY.

### 安裝離合器及啟動齒輪總成

#### General 概要

Follow the sequence exactly. The starter reduction gear assy. cannot be installed after insertion of the starter gear assy. 嚴格按照順序。插入啟動齒輪總成後，將無法安裝啟動電機減速齒輪總成。

### INSTALLATION OF THE STARTER REDUCTION GEAR ASSY. 啟動機減速齒輪總成的安裝

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
897330	Lithium-based grease	Starter drive

**Instruction 指引** See [Figure 圖 : Starter reduction gear assy.](#) 啟動機減速齒輪總成

1. Lubricate starter reduction gear assy. (1) with lithium-based grease in the area of the two bearing seats and the two gears. 使用鋰基潤滑脂潤滑啟動機減速齒輪總成(1號件)內的兩個軸承座和兩個齒輪。
2. Slide the thrust washer 8.1/150.5 (2) and starter reduction gear assy. (1) into the bearing seat in the housing together. 將止推墊圈 8.1/150.5 (2號件) 與啟動機減速齒輪總成 (1號件)同時導入曲軸箱體的軸承座內。

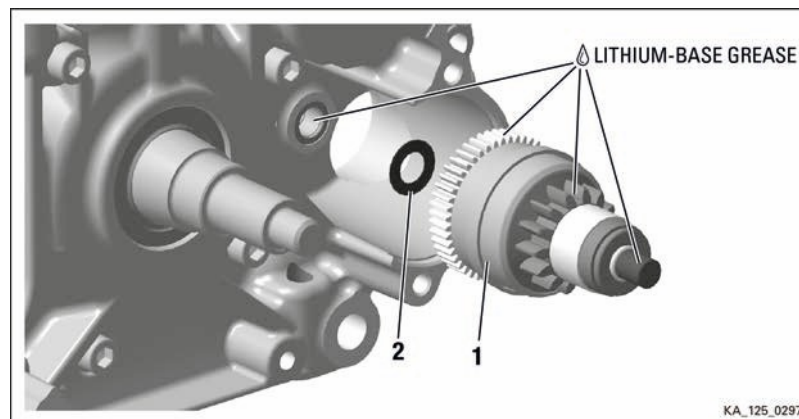


Figure 圖 7.17: Starter reduction gear assy. 啟動機減速齒輪總成

1 Starter reduction gear 啟動機減速齒輪 2 Thrust washer 止推軸承

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**INSTALLATION OF THE STARTER GEAR ASSY. 啟動電機齒輪總成的安裝**

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
277381	Locking tool (crankshaft) 曲軸卡位工具	Spark plug thread 火花塞螺牙
676205	Fixation tool assy. 固定工具總成	Starter gear assy. 啟動齒輪總成
899788	LOCTITE 648	Starter gear assy. 啟動齒輪總成
897651	LOCTITE 243	Starter drive 啟動齒輪驅動

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**Instructions**  
指引

1. Preferred version 1: screw in fixation tool for crankshaft (1) into the spark plug thread till the end stop. 首選方法一：將曲軸固定工具(1號件)旋入火花塞孔內·鎖到底為止

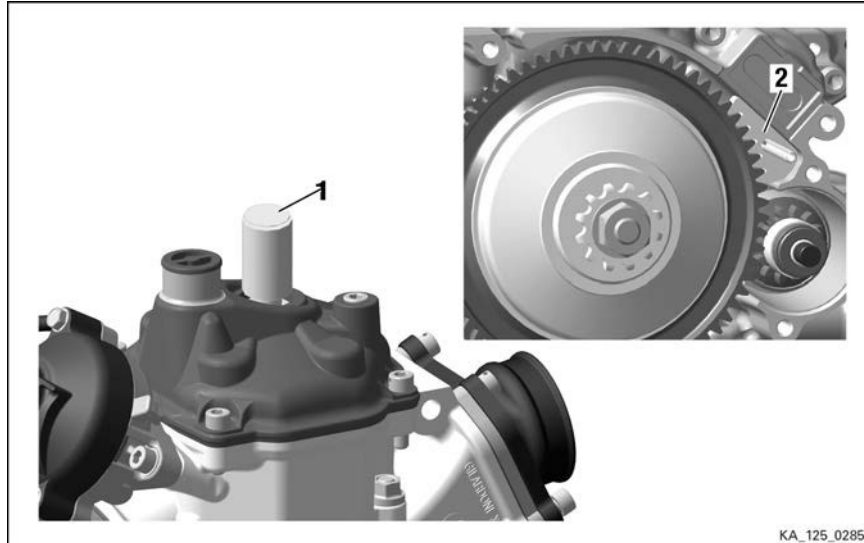


Figure 圖 7.18: Fixation tools 固定工具

1 Fixation tool (crankshaft) 曲軸固定工具

2 Fixation tool (starter gear) 啟動齒輪固定工具

2. Version 2: insert fixation tool assy. (3) into the starter gear assy. (1). 方法 2：將固定工具總成 (3號件) 插入啟動齒輪組件(1號件)中。
3. Lubricate taper of starter gear assy. (1) with LOCTITE 648. 使用LOCTITE 648潤滑啟動齒輪總成(1號件)的錐面。
4. Install starter gear assy. (1) onto crankshaft and tighten with hex. nut M28x1 SW 30 H=4.6 (2). Tightening torque 120 Nm (89 ft. lb). 安裝啟動齒輪總成(1號件) 到曲軸上並用六角螺帽 M28x1 SW 30 H=4.6 (2號件)鎖緊。鎖固扭力 120 Nm (89 ft. lb)。
5. Wipe away the surplus LOCTITE. 擦去多餘(溢出)的LOCTITE膠。
6. Install the clutch (4) with 3 Allen screws M6x12 (5) and secure with LOCTITE 648. Tightening torque 17 Nm (150 in.lb).用3個內六角螺栓 M6x12 (5號件) 安裝離合器 (4號件) 並塗覆 LOCTITE 648 加固。鎖固扭力為 17 Nm (150 in. lb)。

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## REPAIR MANUAL 修復手冊

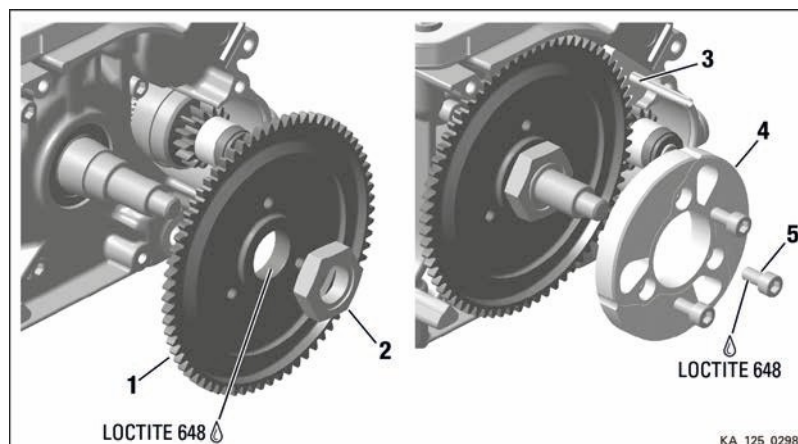


Figure 圖 7.19: Starter gear assy. 啟動齒輪總成

- |   |                      |
|---|----------------------|
| 1 Starter gear assy. 啟動齒輪總成             | 2 Hex. nut 六角螺帽M28x1 |
| 3 Fixation tool (starter gear) 啟動齒輪固定工具 | 4 Clutch 離合器         |
| 5 Allen screw 內六角螺栓 M6x12               |                      |

### ASSEMBLY OF THE CLUTCHDRUM 組裝離合器鼓

#### INSTALLATION OF THE SPROCKET 鏈輪的安裝

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
944231	Locating/locking device 定位 / 固定裝置	Clutch drum 離合器鼓
277362	Locating/locking device 定位 / 固定裝置	Clutch drum 離合器鼓
899788	LOCTITE 648	Hex. Nut 六角螺帽

**Instruction 指引** See Figure 圖: Fixation tool 固定工具

1. Fix fixation tool for sprocket (1) in a vise. 將鏈輪(1號件)的固定工具固定在台鉗上。
2. Remove LOCTITE residue from the clutch drum (4) and the hex. nut (5). 清除離合器鼓與六角螺帽(4、5號件)上的LOCTITE殘膠。
3. Position clutch drum (4) on the sprocket (2) with needle pin (3). 使用針銷(3號件)將離合器鼓(4號件)定位在鏈輪(2號件)上。
4. Tighten hex. nut (5) and secure with LOCTITE 648. Tightening torque 100 Nm (74 ft.lb). 旋緊六角螺帽 (5號件) 並以 LOCTITE 648 加固。鎖固扭力100 Nm (74 ft.lb)。

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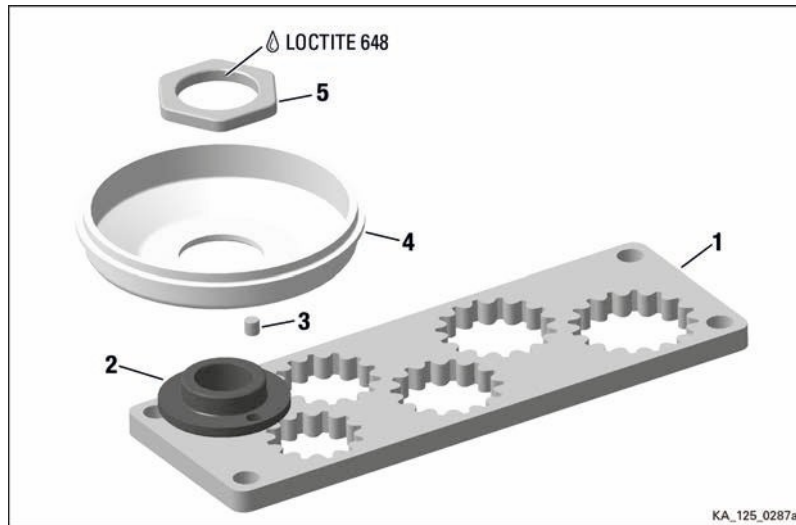


Figure 圖7.20: Fixation tool 固定工具

- |                      |                    |
|----------------------|--------------------|
| 1 Fixation tool 固定工具 | 2 Sprocket 鏈輪      |
| 3 Needle pin 針銷      | 4 Clutch drum 離合器鼓 |
| 5 Hex. nut. 六角螺帽     |                    |

## INSTALLATION OF BEARING SLEEVE (FOR SPROCKETS WITH 11 TEETH ONLY)

### 軸承襯套的安裝(僅適用於11齒的鏈輪)

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
676040	Installation tool	Sprocket

**Instruction 指引** See [Figure: Installation of bearingsleeve 軸承襯套的安裝](#)

1. Put the new bearing sleeve (1) with the beveled edge (2) down onto the clutch drum with sprocket (11 teeth) and press with installation tool (part no. 676040) until end stop. 將帶有斜緣(特徵2)的新軸承襯套(1號件) 放在已配置鏈輪 (11齒)的離合器鼓上，然後用安裝工具(料號 676040) 壓配到底為止。





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- Instruction 指引**
1. Lubricate crankshaft with lithium based grease in the running area of the needle cage (4). 在曲軸滾針軸承(4號件)的工作範圍內，塗覆鋰基潤滑脂潤滑。
  2. Position thrust washer 15.2 (6) and O-ring (5) on the crankshaft. 將止推墊圈 15.2 (6號件) 和 O型環 (5號件) 裝上曲軸。
  3. Lubricate the needle cage (4) with lithium based grease and position on crankshaft. 用鋰基潤滑脂潤滑滾針軸承(4號件) 並定位放上曲軸。
  4. Slide clutch drum (3) onto the crankshaft. 將離合器鼓 (3號件) 導滑到曲軸上。
  5. Lubricate the crankshaft with LOCTITE 243 in the thread area of the hex. nut. 塗覆 LOCTITE 243 在六角螺帽要組裝的曲軸螺紋區域。
  6. Tighten hex. nut (1) with thrust washer (2) (machined side towards the clutch drum). Tightening torque 35 Nm (26 ft.lb). 旋緊六角螺帽(1號件) 和止推墊圈 (2號件) (加工面朝向離合器鼓)。鎖固扭力35 Nm (26 ft.lb)。
  7. Remove fixation tools for crankshaft and/or the starter gear assy. 拆下曲軸/啟動齒輪總成的固定工具。

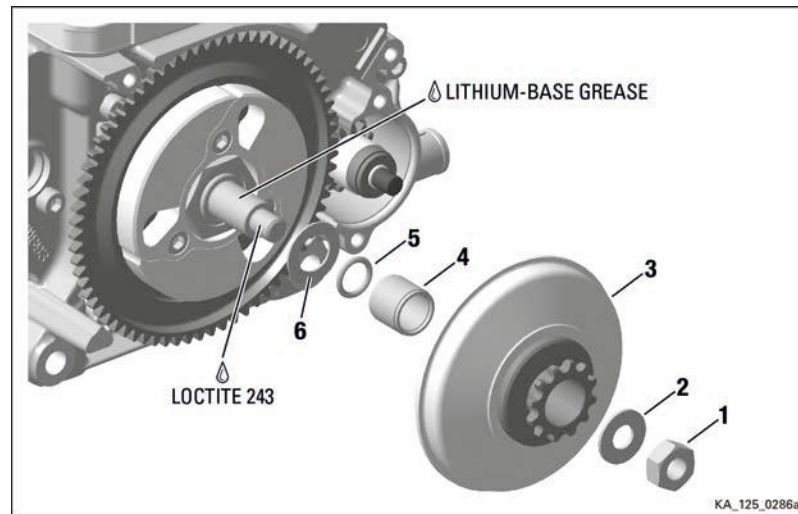


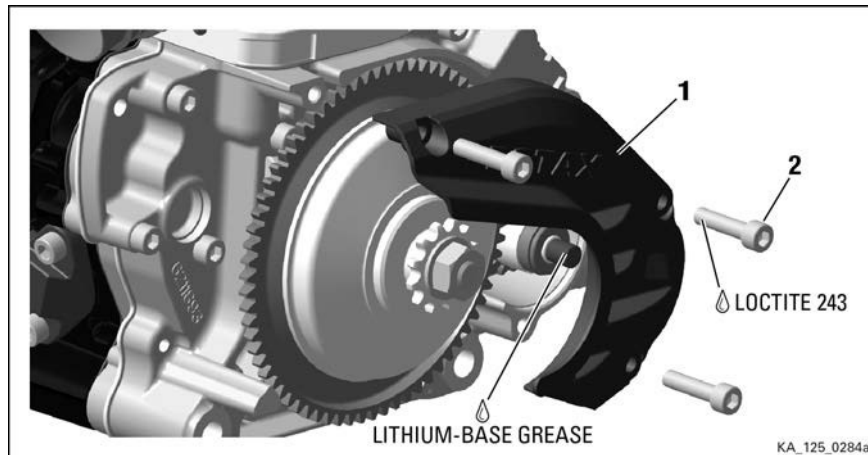
Figure 圖 7.22: Clutch drum 離合器

- |                                     |                           |
|-------------------------------------|---------------------------|
| 1 Hex. Nut 六角螺帽                     | 2 Thrust washer 止推墊圈      |
| 3 Clutch drum with sprocket 離合器鼓含鏈輪 | 4 Needle cage 滾針軸承        |
| 5 O-ring O型環                        | 6 Thrust washer 止推墊圈 15.2 |

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8. Lubricate starter reduction gear assy. in the area shown in the following figure.依圖所示的區域潤滑啟動電機減速齒輪總成。
9. Install chain protection with 3 Allen screws M6x25. Tightening torque 5 Nm (44 in. lb). 使用3個 M6x25 內六角螺栓安裝鏈條護蓋。鎖固扭力 5 Nm (44 in. lb)。
10. Install spark plug. Tightening torque 24 Nm (18 ft. lb). 安裝火花塞。鎖固扭力 24 Nm (18 ft. lb)。

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Figure圖 7.23: Chain protection 鏈條護蓋

1 Chain protection 鏈條護蓋

2 Allen screw 內六角螺栓 M6x25

## INSTALLATION OF THE ELECTRIC STARTER 啟動電機的安裝

### Instructions 指引

1. Lubricate O-ring (2) on the center of the electric starter (1). 潤滑啟動電機(1號件) 中心的O型環 (2號件)。

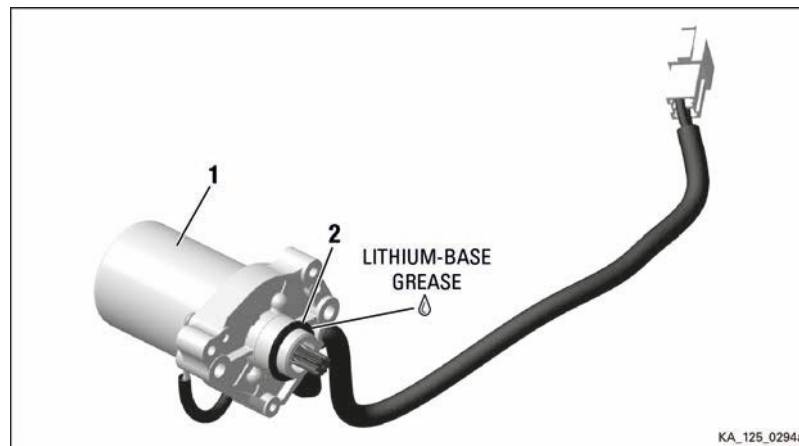


Figure 圖 7.24

1 Electric starter 啟動電機

2 O-ring O型環

2. Install starter support (2) with electric starter (1) using 2 Allen screws M6x35 (5). Tightening torque 10 Nm (89 in. lb). 使用 2 個 M6x35 內六角螺栓(5號件)鎖固裝有啟動電機(1) 的啟動器支架(2號件)。鎖固扭力10 Nm (89 in. lb)。

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### NOTE 注意事項

Push the electric starter (1) into the centering of the housing (3) by rotating it back and forth until the teeth of the electric starter are meshed with the teeth of the starter reduction gear assy. 將啟動電機 (1號件) 前後旋推，直到啟動電機的齒與啟動器減速齒輪組件的齒嚙合，可將其推入外殼(3位置) 的中心。

### NOTE 注意事項

Do not forget to put on the ground cable (6). 不要忘記接上地線 (6號件)。

3. Tighten Allen screw M6x30 (4) on the opposite side of the electric starter (1). Tightening torque 10 Nm (89 in. lb). 旋緊啟動電機 (1號件) 另一側的內六角螺栓 M6x30 (4)。鎖固扭力 10 Nm (89 in. lb)。

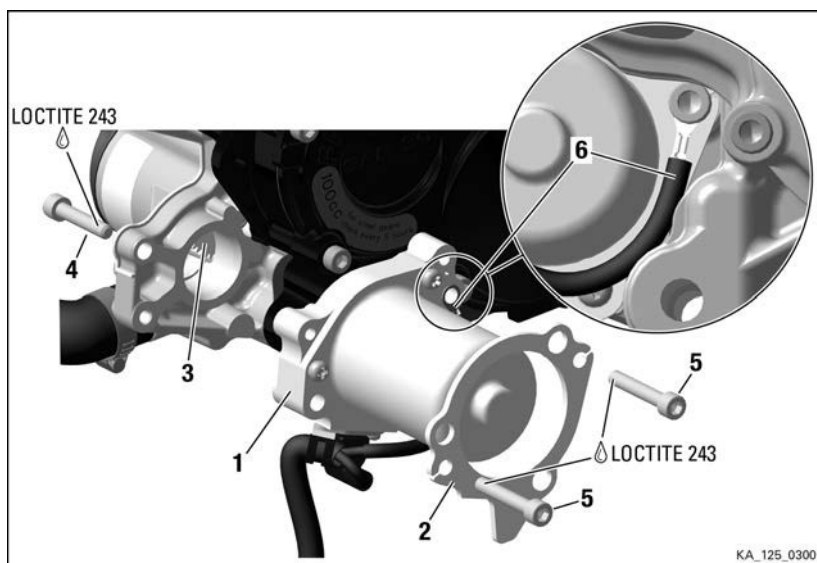


Figure 圖7.25

1 Electric starter 啟動電機  
3 Centering of housing 殼體中心  
5 Allen screw 內六角螺栓 M6x35

2 Starter support 啟動電機支架  
4 Allen screw 內六角螺栓 M6x30  
6 Ground cable 接地線

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**FILLING GEARBOX WITH OIL 注入齒輪油**

**General 概況**

**NOTE 注意事項**

Take a measuring cup and fill with 100 ml of XPS® KART TEC GEAR OIL 取一個量杯，裝入 100 毫升 XPS® KART TEC 齒輪油

**Special tools 特殊工具**

The following special tools/equipment are required: 需要以下特殊工具/設備：

Part no. 料號	Description 說明	Field of application 運用的部位
25473.	XPS® KART TEC GEAR OIL	Gearbox

**Instructions 指引** See [Figure 圖](#) : Adding oil 加注機油

1. Remove air vent screw (1). 拆下通氣螺栓 (1號件)。
2. Add the specified volume of gear oil (100 ml) through the filling hole (2) in the housing. 通過外殼上的加注口孔(2號件) 添加指定體積的齒輪油 (100 ml)。
3. Use sealing rings A6x10 for the Allen screws (3 = oil drain plug). 3號件洩油塞的內面需使用密封環 A6x10。
4. Screw in the vent screw (1) hand-tight. 用手旋緊通氣螺栓(1號件)。

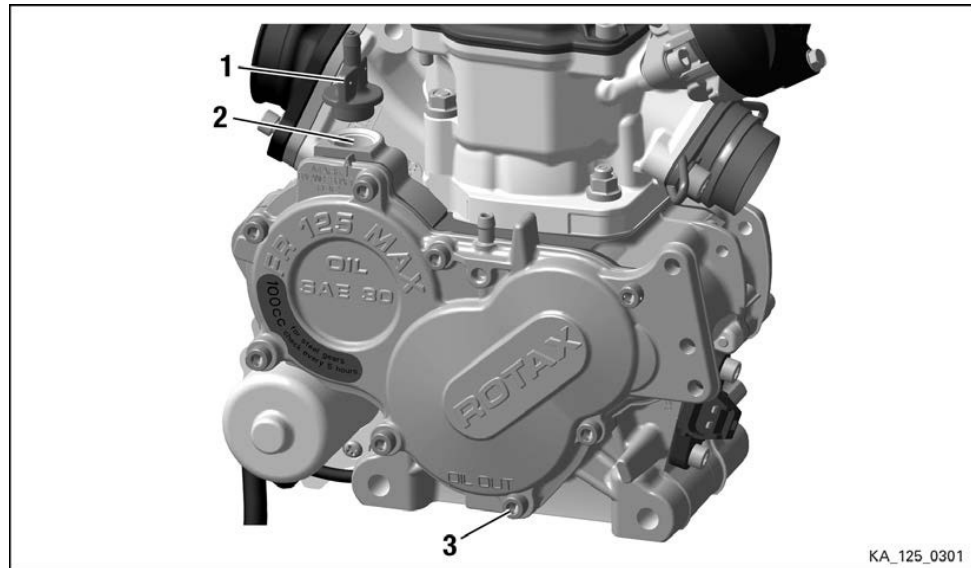


Figure 圖 7.26: Adding oil 加注機油

1 Air vent screw 通氣螺栓

2 Filling hole 加注口

3 Oil drain plug 洩油塞

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REPAIR MANUAL

NOTES 筆記

**Chapter: Chapter 8**  
**COOLING SYSTEM 冷卻系統**

**TOPICS IN THIS CHAPTER 本章節主題**

<b>System description 系統說明</b> .....	<b>2</b>
<b>Removal of radiator 拆卸水箱</b> .....	<b>4</b>
Removal of the cooling water hose 冷卻水管的拆卸 .....	4
<b>Inspection of cooling system 檢查冷卻系統</b> .....	<b>6</b>
Radiator – inspection of components 檢查水箱的組件.....	6
<b>Installing the radiator 安裝水箱</b> .....	<b>7</b>
Installation of the cooling water hoses 冷卻水管的安裝 .....	7
Installation of the radiator on engine 安裝水箱上發動機 .....	9
<b>Final tasks 最終任務</b> .....	<b>10</b>

**Contents 內容**      This chapter describes the removal and installation of the cooling system for the ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo) engine. The description is broken down into subsections. 本章分為幾個小節，介紹了 ROTAX® 125 MAX evo (包括 Junior-、Mini-、Micro MAX evo) 發動機冷卻系統的拆卸和安裝。





**SYSTEM DESCRIPTION 系統說明**

Overview  
概述

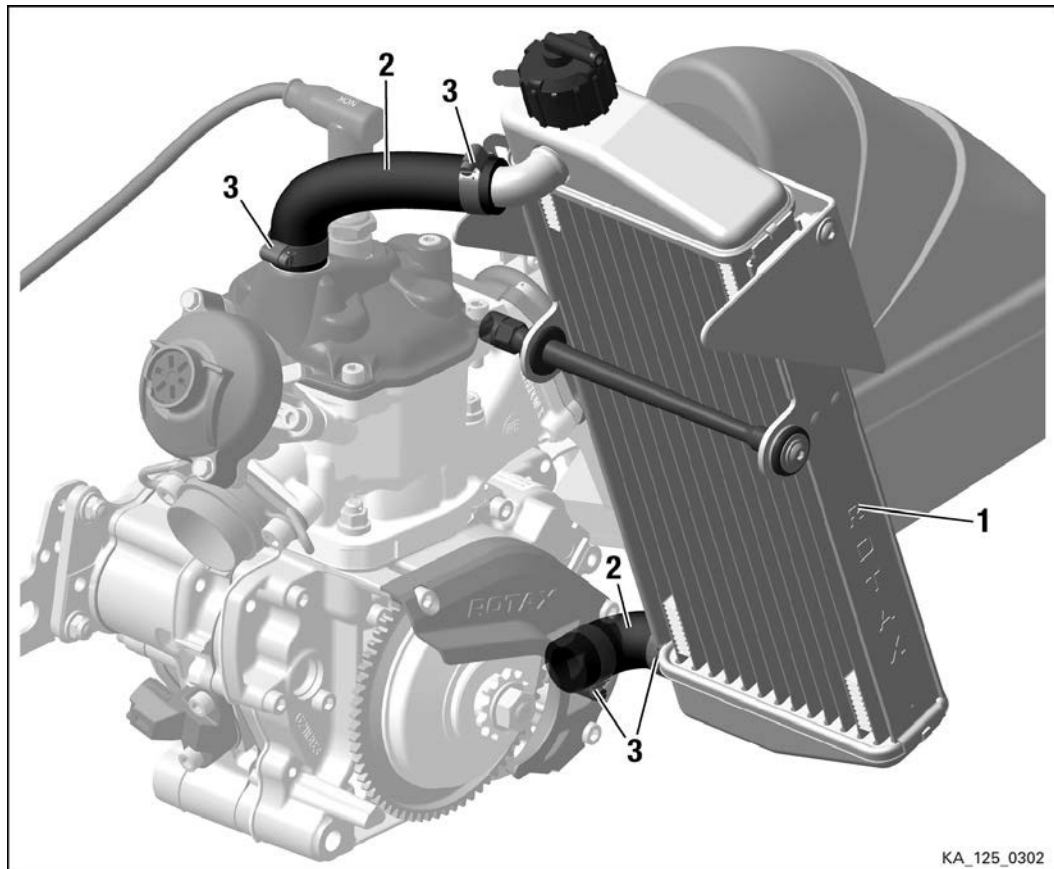


Figure 圖 8.1: Radiator 水箱

1 Radiator 水箱

2 Cooling water hose 冷卻水管

3 Hose clamp. 水管夾

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**Overview 概述**

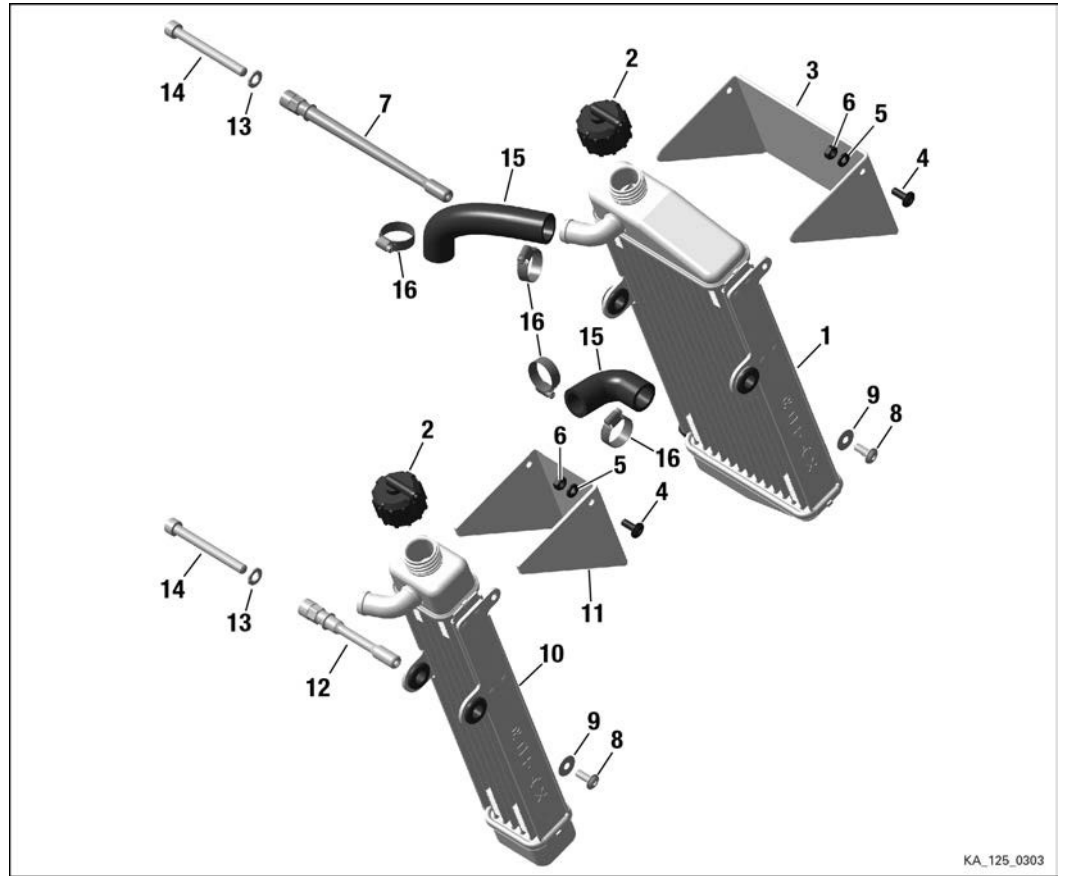


Figure 圖 8.2: Radiator 水箱

- |   |  |
|---|--|
| 1 Radiator水箱 (Max evo, Junior evo, Mini evo)            | 2 Radiator cap with gasket 水箱蓋含墊片                        |
| 3 Windshield 遮風板 (Max evo, Junior evo, Mini evo)        | 4 Allen screw 內六角螺栓 M6x16 with rounded flange head 包含圓墊圈 |
| 5 Washer 墊圈6.4  | 6 Lock nut 防鬆螺帽M6  |
| 7 Radiator bracket 水箱支架 (Max evo, Junior evo, Mini evo) | 8 Allen screw 內六角螺栓M6x20 with rounded flange head 包含圓墊圈  |
| 9 Washer 墊圈6.2  | 10 Radiator水箱 (Micro evo)                                |
| 11 Windshield 遮風板(Micro evo)                            | 12 Radiator bracket 水箱支架 (Micro evo)                     |
| 13 Lock washer 防鬆墊圈A8                                   | 14 Allen screw內六角螺栓 M8x75                                |
| 15 Cooling water hose NW 18                             | 16 Clamp 管夾16-25   |

## REMOVAL OF RADIATOR 拆卸水箱

### Safety instructions 安全指引

**m WARNING 警告**

**Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work.** 在開始任何工作之前，一定要讓發動機冷卻至環境溫度。否則會有嚴重燒傷和燙傷的危險！

**Preparation 準備** The following preparations should be carried out before removing the components: 拆卸組件前應進行以下工作準備：

1. Open the radiator cap. 打開水箱蓋

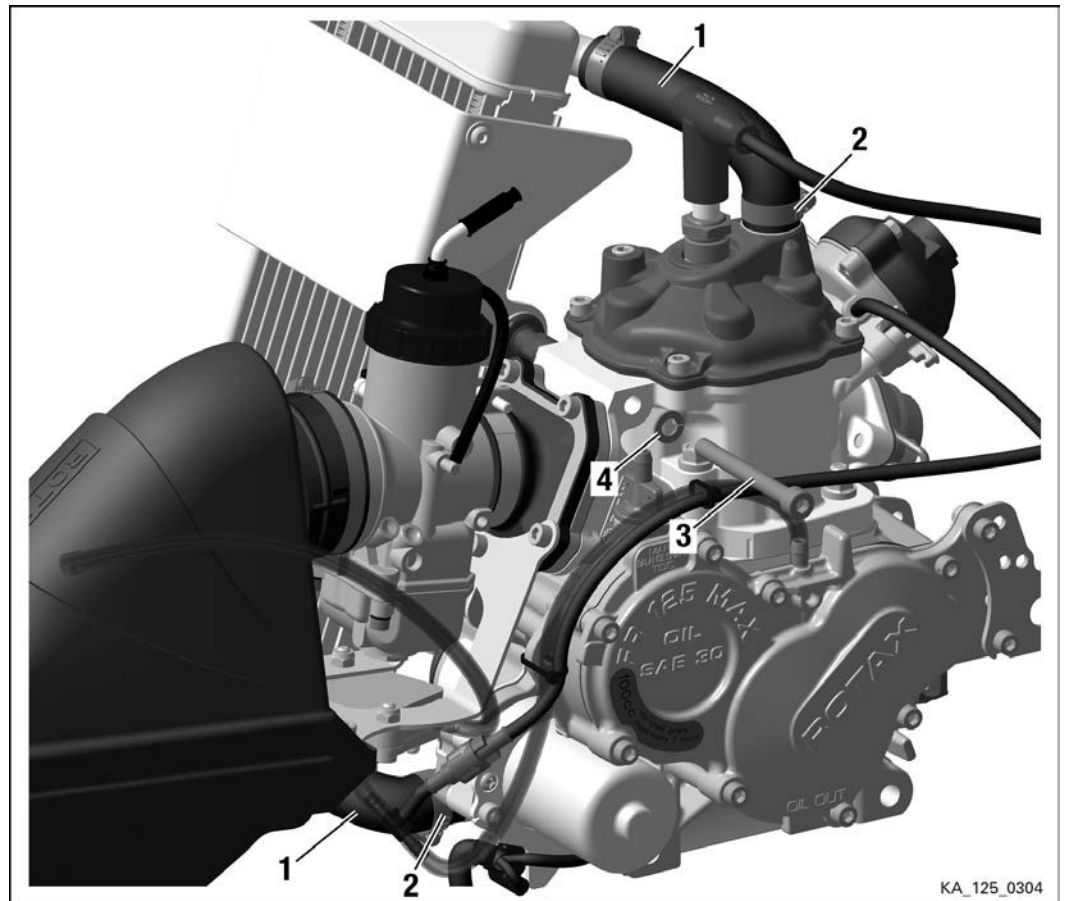
### REMOVAL OF THE COOLING WATER HOSE 拆卸冷卻水管

**General 概況**      **NOTE 注意事項**

*Collect the coolant in a suitable vessel 需將冷卻液收集在合適的容器中*

**Instructions 指引** See [Figure: Cooling water hoses](#) 冷卻水管

1. Loosen the engine side of the hose clamps (2) of the cooling water hoses (1). 鬆開發動機側的冷卻水管 (1號件) 的軟管夾 (2號件)。
2. Pull off the radiator with cooling water hose from the bottom 90° elbow and drain coolant. 從底部 90° 彎頭拉出仍附帶冷卻水管的水箱然後排放冷卻液。
3. Pull of cooling water hose at the cylinder head cover. Unscrew the hose clamp and pull the cooling water hose from the port. 拆下缸頭蓋的冷卻水管。擰下軟管夾並從端口拉出冷卻水管。
4. Loosen Allen screw M8x75 (3) with lock washer (4) and remove water radiator with radiator bracket from the engine. 鬆開具有防鬆墊圈 (4號件) 的內六角螺絲 M8x75 (3號件) 並從發動機上拆下帶水箱支架的水箱。



Figure圖 8.3: Cooling water hoses 冷卻水管

1 Hoses 水管

3 Allen screw 內六角螺栓 M8x75

2 Hose clamps 水管夾

4 Lock washer 防鬆螺栓 A8

## INSPECTION OF COOLING SYSTEM 檢查冷卻系統

### RADIATOR – INSPECTION OF COMPONENTS 水箱 – 各分件的檢查

**Instruction** 指引 See [Figure圖: Radiator](#). 水箱 (散熱器)

#### **NOTE** 注意事項

*If some of the cooling fins are slightly bent, they may be gently bent back into shape. 如果有些水箱的散熱片稍微彎曲變形，可能有機會小心扳彎恢復原狀。*

1. Use compressed air to remove dirt from the cooling fins of the radiator. Never use a high-pressure cleaner. 可使用壓縮空氣來清除水箱散熱片上的污垢。但切勿使用高壓水槍。
2. Visual check of the radiator assy. for any cracks or other damage. 目視檢查水箱是否有裂縫或其他損傷。
3. Check that the radiator cap gasket is in perfect condition. 檢查水箱蓋墊圈是否完好。
4. Check the cooling water hoses for porosity and leakage. 冷卻水軟管有沒有孔隙或洩漏。
5. Check the radiator's windshield for cracks and damage (visual check). 目視檢查水箱擋風板是否有裂痕或損壞。
6. Check the rubber grommets for wear and cracks. 檢查橡膠墊圈有無損耗或裂痕。

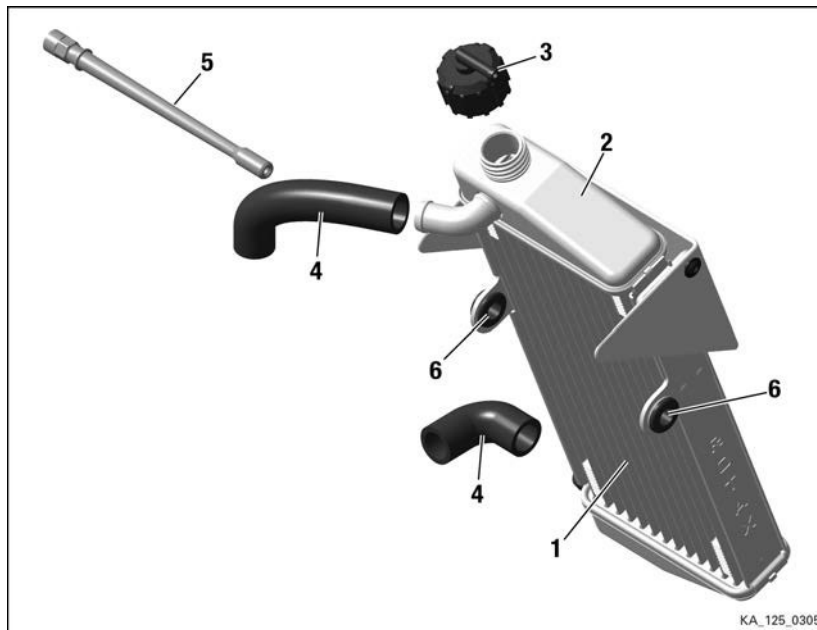


Figure 圖 8.4: Radiator, typical 水箱 一般款

1 Cooling fins 冷卻鱗片

3 Radiator cap 水箱蓋

5 Radiator bracket 水箱支架

2 Radiator 水箱 (散熱器)

4 Cooling water hose 冷卻水管

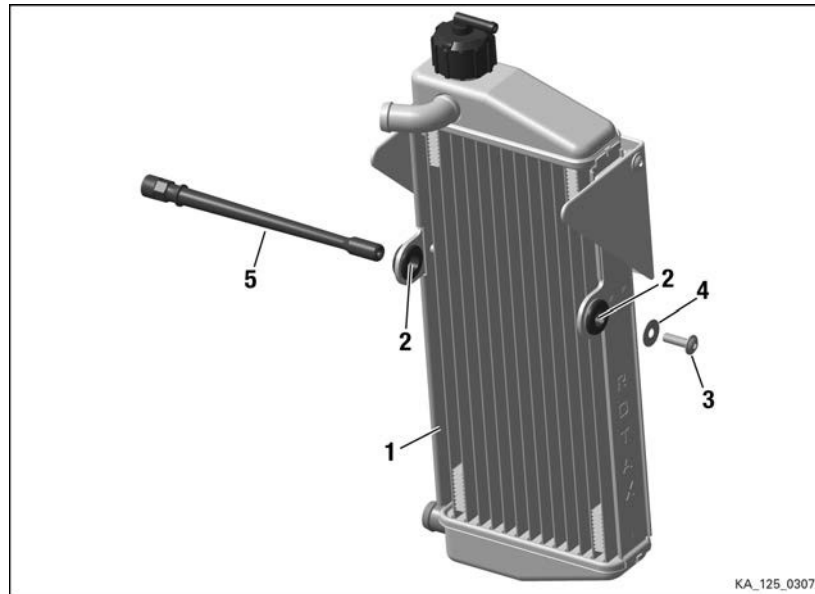
6 Rubber grommet 橡膠墊圈

## INSTALLING THE RADIATOR 安裝水箱

### INSTALLATION OF THE COOLING WATER HOSES 水箱的安裝

#### Preparation 準備

1. Mount radiator bracket (5) on radiator through the holes with rubber grommets and tighten with Allen screw M6x20 and washer. 將水箱支架(5號件)穿過帶有橡膠墊圈的孔，安裝到水箱上，並用內六角螺絲 M6x20 和墊圈 6.2 鎖緊。



Figure圖 8.5: Preparation for radiator installation 水箱的預裝

- |  |                       |
|--|-----------------------|
| 1 Radiator 水箱  | 2 Rubber grommet 橡膠墊圈 |
| 3 Allen screw M6x20 with rounded flange head 內六角螺栓M6x20包含圓墊圈 | 4 Washer 墊圈 6.2       |
| 5 Radiator bracket 水箱支架                                      |                       |

2. Fit the cooling water hoses (1) to the radiator connection (2) and align with the port on the engine, then tighten the hose clamps (3) to make it watertight. 安裝冷卻水管(1號件)到水箱接頭(2號件)並對插上發動機上的端口，再擰緊管夾(3號件)使其不漏水。

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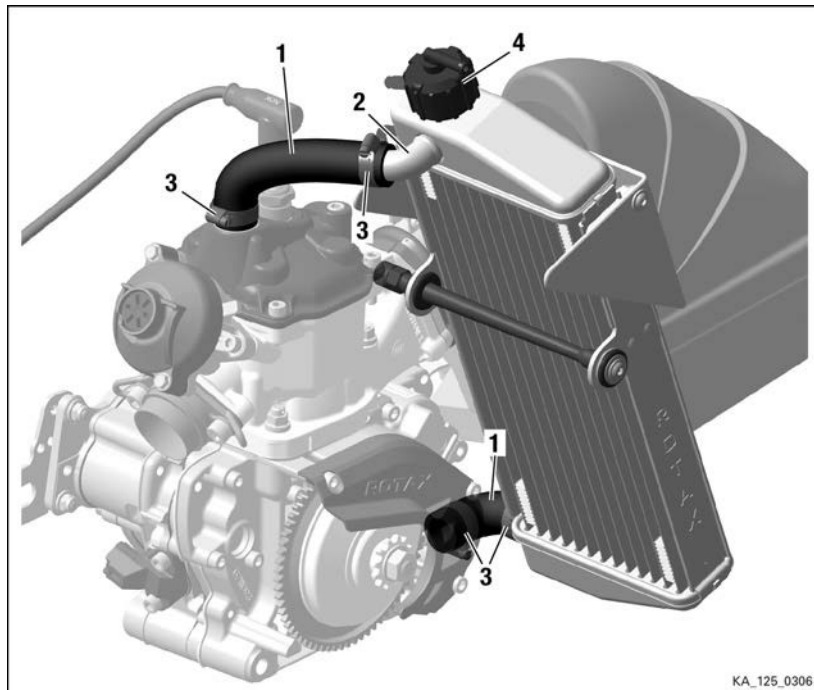


Figure 圖 8.6: Installation of cooling water hoses 冷卻水管的安裝

1 Cooling water hoses 冷卻水管

2 Radiator connection 水箱連接頭

3 Hose clamps 水管夾

4 Radiator cap 水箱蓋



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## INSTALLATION OF THE RADIATOR ON ENGINE 將水箱安裝上發動機

**Instructions 指引** See [Figure 圖: Installation of the radiator on engine 水箱安裝上發動機](#)

1. Install radiator with pre-mounted radiator bracket (3) on engine and tighten with Allen screw M8x75 (2) and Lock washer A8 (1). Tightening torque 24 Nm (18 ft. lb). 將已預裝水箱支架 (3號件) 的水箱安裝在發動機上，並用內六角螺栓 M8x75 (2號件) 和防鬆墊圈 A8 (1號件) 鎖固。鎖固扭力 24 Nm (18 ft. lb)。

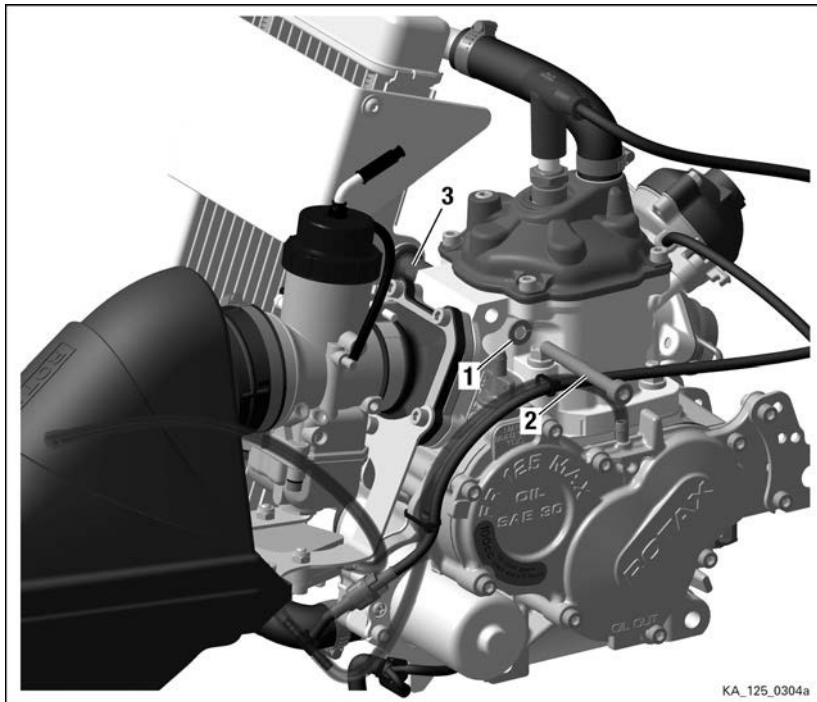


Figure 圖 8.7: Installation of the radiator on engine 水箱安裝上發動機

1 Lock washer 防鬆螺帽 A8

2 Allen screw 內六角螺栓 M8x75

3 Radiator with radiator bracket 含水箱托架的水箱

## **FINAL TASKS 最終任務**

### Instructions 指引

1. Using a funnel, pour the specified amount of coolant into the filling opening of the radiator. 使用漏斗，依指定用量將冷卻液倒入水箱加注口。
2. Close the radiator cap. 關上水箱蓋。
3. Check that the cooling system is leak-free by warming up the engine. 採取預熱發動機的方式，確認冷卻系統沒有洩漏。
4. Add some more coolant if necessary. 如有必要，再添加一些冷卻液。

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**REPAIR MANUAL**

**Chapter: Chapter 9 EXHAUST**  
**SYSTEM 排氣系統**

**TOPICS IN THIS CHAPTER 本章節主題**

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<b>Removal of the exhaust system 拆卸排氣系統</b> .....	<b>4</b>
Checking the exhaust system 點檢排氣系統.....	5
Disassembling the exhaust system 拆解排氣系統 .....	5
Assembling the exhaust system 組裝排氣系統 .....	6
Installation of the exhaust system 安裝排氣系統 .....	7
<b>Preparation for installation 安裝前的準備</b> .....	<b>8</b>
Removing the engine from the trestle mounting plate 從安裝支架板拆下發動機 .....	8
Installation of the engine on kart chassis 在卡丁車架上安裝發動機 .....	8
Installation of the fuel line 安裝燃油管路 .....	8
Installation of the bowden cable 安裝油門拉索 .....	9
Installation of the ignition system 安裝點火系統.....	9
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**Contents 內容**      This chapter describes the removal and installation of the exhaust system module of the ROTAX® 125 MAX evo (incl. Junior-, Mini-, Micro MAX evo) engine. The description is divided into sections. 本章分為幾個部分，介紹了 ROTAX® 125 MAX evo (包括 Junior-、Mini-、Micro MAX evo) 發動機排氣系統模塊的拆卸和安裝。

## SYSTEM DESCRIPTION 系統說明

### Overview 概述

Position on the engine 在發動機上的位置

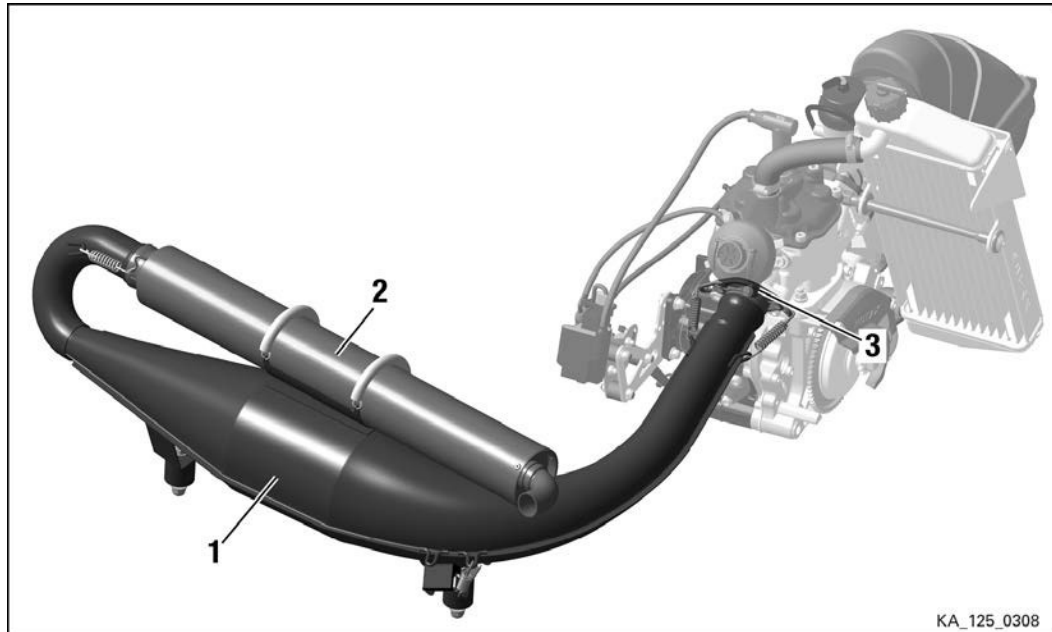


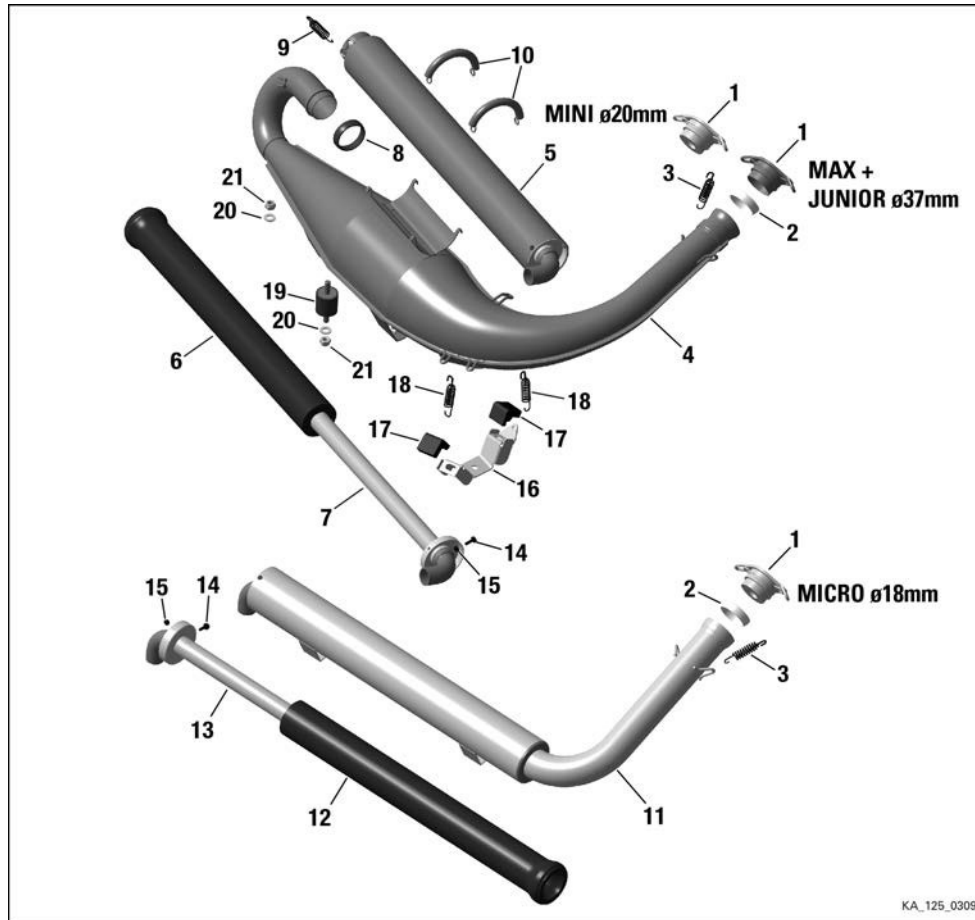
Figure 圖 9.1

- 1 Exhaust muffler assy. 排氣消音器總成      2 Silencer assy. 消音器總成  
3 Exhaust socket assy. 排氣口總成

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### Overview 概述 Exhaust system 排氣系統



Figure圖 9.2

- |                                      |                                      |                             |
|--------------------------------------|--------------------------------------|-----------------------------|
| 1 Exhaust socket assy. 排氣口總成         | 2 Exhaust gasket 排氣墊片                | 3 Spring stainless 不鏽鋼彈簧    |
| 4 Exhaust muffler assy. 排氣消音器總成      | 5 Silencer assy. 消音器總成               | 6 Isolating mat 隔音墊         |
| 7 Perforated tube assy. 打孔管總成        | 8 Exhaust gasket 排氣墊片                | 9 Spring stainless 不鏽鋼彈簧    |
| 10 Tension springs 張力彈簧              | 11 Silencer assy. 消音器總成 MICRO        | 12 Isolating mat 隔音墊, MICRO |
| 13 Perforated tube assy. 打孔管總成 MICRO | 14 Washer 8.4 stainless 不鏽鋼墊圈, MICRO | 15 Lock nut 防鬆螺帽 M8, MICRO  |
| 16 Retaining plate 保持板               | 17 Rubber buffer 緩衝橡膠                | 18 Spring stainless 不鏽鋼彈簧   |
| 19 Rubber buffer 緩衝彈簧                | 20 Washer 8.4 stainless 不鏽鋼墊圈 8.4    | 21 Lock nut 防鬆螺帽 M8         |

## REMOVAL OF THE EXHAUST SYSTEM 拆卸排氣系統

### Safety instructions 安全指引

**m WARNING 警告**

**Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work. 在開始任何工作之前，一定要讓發動機冷卻至環境溫度。否則會有嚴重燒傷和燙傷的危險！**

**Special tools 特殊工具** The following special tools and equipment are required: 需要以下的特殊工具或設備

Part no. 料號	Description 說明	Field of application 運用的部位
251680	Spring hook 彈簧勾	Tension spring 張力彈簧

**Instruction 指引** Proceeds follows to dismantle the exhaustsystem: 拆卸排氣系統的步驟如下：

1. Disconnect tension springs (3) with spring hooks from the exhaust socket (2). 從排氣出口(位置2)上取下帶有彈簧鉤的拉簧(3)。
2. Loosen the nuts M8 with washer on the rubber buffer and remove the exhaust system. 鬆開緩衝橡膠上帶墊圈的M8螺帽，以拆下排氣系統。
3. Take care about the exhaust gasket between exhaust socket and exhaust system, replace if worn out. 注意排氣系統與排氣口之間的墊片，如有損壞就更換。

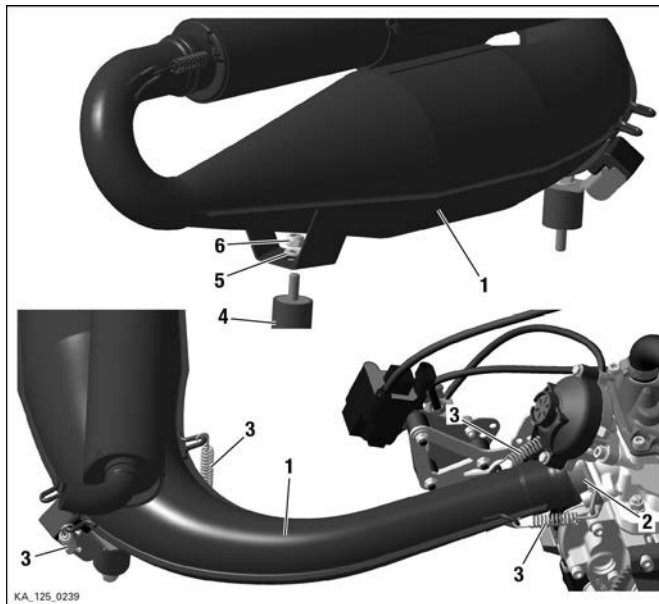


Figure 圖 9.3

1 Exhaust muffler assy. 排氣消音器總成

3 Spring 彈簧

5 Washer 墊圈 8.4

2 Exhaust socket assy. 排氣口總成

4 Rubber buffer 橡膠彈簧 30x30xM8

6 Lock nut 防鬆螺帽 M8

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### CHECKING THE EXHAUST SYSTEM 點檢排氣系統

#### ATTENTION 注意

**A worn isolating mat has a major engine damage as result! 破損的隔音墊會導致嚴重的發動機損壞！**

**Instructions 指引** See Figure 圖

1. Check exhaust system for cracks, bending or other damages. Replace if necessary. 檢查排氣系統是否有裂痕、彎曲或其他損壞。必要時更換。
2. Clean the ball socket of combustion residue and inspect for wear. 清除 球型接頭的燃燒殘留物並檢查損耗情況。
3. Check that the cover rivets are tightly seated. 檢查蓋子的鉚釘是否牢固就位。
4. Check exhaust gasket for cracks and inspect for wear. Replace if necessary. 檢查排氣墊圈是否有裂痕或損耗。必要時更換。
5. Check rubber buffer for cracks and inspect for wear. Replace if necessary. 檢查緩衝橡膠是否有裂痕並檢查損耗情況。必要時更換。
6. Check the retaining plate for cracks and inspect for wear. 檢查固定板是否有裂痕或損耗。

### DISASSEMBLING THE EXHAUST SYSTEM 拆解排氣系統

**General 概況** **NOTE 注意事項**

*If the exhaust system noise increases, then the silencer baffle mat should be replaced. 如果排氣系統噪音變大，就該更換消音器擋板。*

**Instructions 指引** See Figure 圖 : Exhaust system. 排氣系統

1. Disassembly the exhaust muffler assy. and the silencer assy. Using the exhaust springs tool (part no .251680), remove exhaust springs. Remove the exhaust gasket. 拆解排氣消聲器總成和消音器總成。使用排氣彈簧工具(料號 0.251680)卸下排氣彈簧，再拆下排氣墊圈。
2. Remove hex. collar screw M4x12 with lock nut from the silencer assy. 拆下消音器總成上的外六角帶防鬆螺帽的 M4x12 長套螺栓。
3. Remove old isolating mat. 拆掉舊的隔音墊

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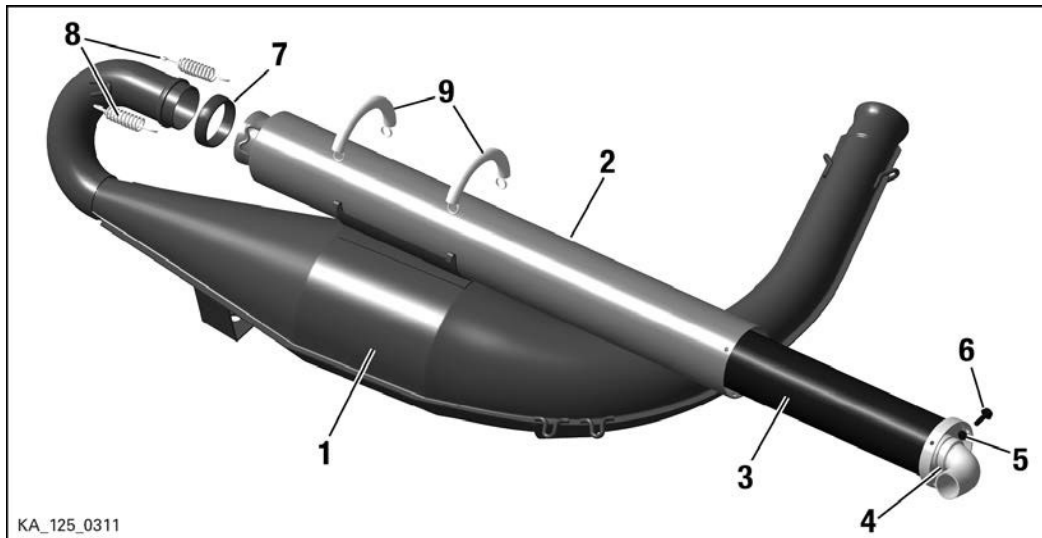
**ASSEMBLING THE EXHAUST SYSTEM 組裝排氣系統**

**Instructions 指引** See [Figure 圖 : Exhaust system](#). 排氣系統

1. Roll up new isolating mat (3) on the inside silencer assy. (2). 使用新的隔音墊(3號件) , 捲起放進消音器總成(2號件)的內部。
2. Put both into the exhaust system. 將兩者都一起放入排氣系統。
3. Install cover with Allen screw M4x12 (6) and new lock nut M4 (5). 使用內六角螺絲 M4x12 (6號件) 和新的防鬆螺帽 M4 (5號件) 安裝蓋板。
4. Install a new exhaust gasket(7). 安裝新的排氣墊圈 (7號件)。
5. Make sure front exhaust pipe end is properly aligned inside ball socket. Install 3 exhaust spring (8) 確保排氣管前端與球型接頭安穩對齊。再安裝3個排氣彈簧 (8號件)。



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Figure圖 9.4: Exhaust system 排氣系統

- |                                 |                              |
|---------------------------------|------------------------------|
| 1 Exhaust muffler assy. 排氣消音器總成 | 2 Silencer assy. 消音器總成       |
| 3 Isolating mat 隔音墊             | 4 Perforated tube assy 尾管總成. |
| 5 Lock nut 防鬆螺帽 M4              | 6 Allen screw 內六角螺栓M4x12     |
| 7 Exhaust gasket 排氣墊圈           | 8 Spring stainless 不鏽鋼彈簧     |
| 9 Tension spring 張力彈簧           |                              |

## INSTALLATION OF THE EXHAUST SYSTEM 安裝排氣系統

**Instructions 指引** For installation of the exhaust system, see latest Installation Manual for the engine type 125 MAX evo. 有關排氣系統的安裝，請參閱 125 MAX evo 型發動機的最新安裝手冊。

## PREPARATION FOR INSTALLATION 安裝前的準備

### Safety instructions 安全指引

#### ATTENTION 注意

Clean and inspect disassembled parts and assemble them in accordance with the instructions. All screws and nuts must always be clean. Inspect surfaces and threads for damage. In case of doubt use new screws and nuts. 清洗並檢查拆卸相關零件，然後按照說明進行組裝。所有螺栓和螺帽一定必須清洗並檢查表面和螺紋是否損壞。如有疑慮就使用新品。

### REMOVING THE ENGINE FROM THE TRESTLE MOUNTING PLATE

#### 從支架安裝板拆下發動機

**Instructions 指引** Proceed as follows to remove the engine from the trestle mounting plate: 依照以下步驟從支架安裝板拆下發動機：

1. The engine is removed in reverse order of positioning. 按照與安裝步驟的相反順序拆下發動機。  
See also Chapter [Positioning the engine on the trestle mounting plate](#). 另請參閱[將發動機放置在支架安裝板]的章節。

### INSTALLATION OF THE ENGINE ON KART CHASSIS 在卡丁車上安裝發動機

#### Safety instructions 安全指引

#### m WARNING 警告

**Non-compliance can result in serious injuries or death! 不遵守可能會導致重傷或死亡！**  
Before installing the engine on the chassis the Installation and Operators Manual for the engine and the installation instructions of the chassis manufacturer must be read and understood. 在將發動機安裝到底盤上之前，必須閱讀並理解發動機的安裝和操作手冊以及底盤製造商的安裝說明。

For the Installation of the engine on kart chassis, see latest current Installation and Operators Manual of the engine type 125 MAX. 有關在卡丁底盤上安裝發動機的信息，請參閱 125 MAX 型發動機的最新安裝和操作手冊。

### INSTALLATION OF THE FUEL LINE 安裝燃油管路

#### Safety instructions 安全指引

#### m WARNING 警告

**Non-compliance can result in serious injuries or death! 不遵守可能會導致重傷或死亡！**  
When handling with fuel, do not smoke or allow open flames. Gasoline and gasoline vapor are highly flammable and explosive under certain conditions. 處理燃料時不可吸煙或使用明火。汽油和其蒸氣在某些條件下高度易燃且易爆。

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**m WARNING 警告**

**Risk of fire and explosion! 有火災和爆炸危險！**

Make sure that fuel will not splash onto hot engine components or equipment.

需確保燃油不會濺到發動機熱的部件或設備上。

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**Instructions 指引** Proceed as follows to install the fuel line: 按照以下步驟安裝燃油管路：

1. The installation of the fuel line is identical to the removal, but in reverse order.  
燃油管路的安裝與拆卸相同，但順序相反。

See also [Removal of the fuel line](#) 另見[燃油管路的拆卸] 章節

### INSTALLATION OF THE BOWDEN CABLE 安裝油門拉索

**Instructions 指引** Proceed as follows to install the bowden cable: 按照以下步驟安裝油門拉索

1. The installation of the bowden cable is identical to the removal, but in reverse order.  
油門拉索的安裝與拆卸相同，但順序相反。

See also [Removal of the Bowden cable](#) 另見[油門拉索的拆卸] 章節

### INSTALLATION OF THE IGNITION SYSTEM 安裝點火系統

**General 概況** See [Figure 圖 : Ignition unit](#). 點火系統

#### NOTE 注意事項

*On the sand-cast model the pick up for the ignition unit is fastened to the housing with 2 M6x16 cyl. screws. On the die-cast model the pick up for the ignition unit is fastened to the housing with 2 M6x16 TAPTITE screws (= self-tapping screw). 在重力鑄造 (砂模) 型的曲軸箱殼體，點火系統的曲軸角度傳感器採用 2 個 M6x16 圓柱螺栓來鎖曲軸箱殼。在壓鑄型號的曲軸箱殼體，曲軸角度傳感器則是採用 2 個 M6x16 TAPTITE 三角柱型螺栓 (= 自攻螺栓) 來鎖曲軸箱殼。*

#### NOTE 注意事項

*If the two TAPTITE screws are installed in a previously used housing, make sure that the screws are correctly positioned in the previously tapped threads in the housing. 如果兩個三角柱型自攻螺栓安裝在以前使用過的曲軸箱殼中，請確保仍使用原規格的三角柱型自攻螺栓*

**Instructions 指引** Proceed as follows to install the ignition system: 按照以下步驟安裝點火系統：

1. Position the pick up on the housing with the wiring harness terminal pointing in the direction of the gearbox. 把曲軸角度傳感器放到曲軸箱的位置上，線束端子指向變速箱的方向。
2. Fasten the pick up for the ignition system with the two cyl. screws or TAPTITE screws to the specified tightening torque of 10 Nm (90 in.lb). 使用圓柱螺栓或是三角柱型自攻螺栓鎖緊固定點火系統的曲軸角度傳感器接頭，鎖固扭力是 10 Nm (90 in.lb)。

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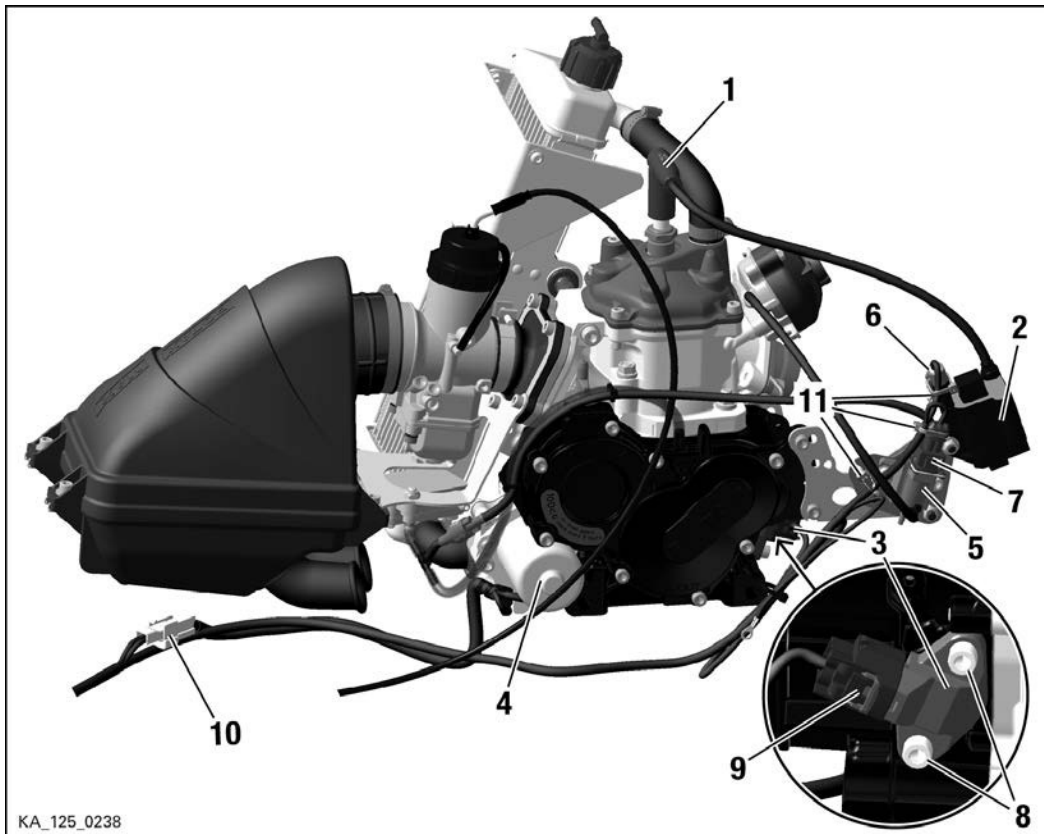


Figure 圖 9.5: Ignition unit 點火裝置

- |   |                                  |
|---|----------------------------------|
| 1 Spark plug connector 火花塞接頭                  | 2 Ignition coil 點火線圈             |
| 3 Crankshaft positioning sensor (CPS) 曲軸角度傳感器 | 4 Electric starter 啟動電機          |
| 5 Solenoid valve 電磁閥                          | 6 Connector ignition coil 點火線圈接頭 |
| 7 Solenoid connector 電磁閥接頭                    | 8 Allen screw 內六角螺栓M6x25         |
| 9 CPS connector 曲軸角度傳感器接頭                     | 10 Starter connector 啟動電機接頭      |
| 11 Cable tie (配線的) 綁帶                         |                                  |

## INSTALLATION OF THE EXHAUST SYSTEM 安裝排氣系統

**Instructions 指引** For installation of the exhaust system, see latest Installation Manual for the engine type 125 MAX evo. 有關排氣系統的安裝，請參閱125 MAX evo型發動機的最新安裝手冊。

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