



# OPERATING AND MAINTENANCE MANUAL TELESCOPIC HANDLER

FR03 MODELS: 9.60 - 9.70 - 10.65

VERSION: GLS IIIA



Manual code UFR03GA021 rev. A

*Translation of the original instructions*

 **ENGLISH**

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# CHAPTER 1

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**1.**

**GENERAL INFORMATION**

## 1.1 PRELIMINARY INFORMATION

### 1.1.1 DOCUMENT IDENTIFICATION

Identification code:.....UFR03GA021

First published:.....11/2015

Revision index:.....A

### 1.1.2 SYMBOLS USED IN THE MANUAL

To highlight the most relevant information, the manual uses the following graphic expressions:



Useful information for the Customer.



Important information for the operator relating to safety and precautions when carrying out operations.



Health and safety risk and dangers present for exposed people.

### 1.1.3 MANUAL OWNERSHIP

This manual is reserved property. No part of this manual can be reproduced, stored in an archiving system or disclosed to third parties in any form or by any means without the prior written authorisation of FARESIN INDUSTRIES S.p.A.

All violations are punishable by law.

### 1.1.4 VALIDITY

This manual refers to agricultural and industrial type of operating machines: FR03 GLS IIIA and reflects the state of technology at their launch onto the market.

FARESIN INDUSTRIES S.p.A. constantly aims at perfecting all its machines. The manufacturer reserves the right to improve its products at any time, without notice. Any integration to this manual provided by the manufacturer to the user, must be kept together with the original manual, and will be an integral part of it. The manufacturer can be held liable for any content in the Italian version (Original Instructions). Some photos or drawings are inserted solely to indicate a function; therefore, they may not represent the machine referred to in this manual.

Any copy of the manual translated into the language of the country of use is referred to as the "translation of the original instructions".

Any discrepancies between that written in the manual and the actual machine operation can be attributed to an earlier version of the machine prior to the date when the manual was drafted, or to a manual due to be updated according to changes made to the machine.

### **1.1.5 THE IMPORTANCE OF THE MANUAL**

There is a great of information contained in this manual dealing with safety devices and methods for executing particular operations without causing injury to persons or damage to things. Before using this model, read this manual carefully and understand it. Good machine operation depends on the correct application of all instructions contained herein.

### **1.1.6 RECIPIENTS OF THE MANUAL**

This manual is addressed to:

- People in charge of transport;
- Machine operator;
- Maintenance staff;
- Person responsible for final demolition.

### **1.1.7 SAFE-KEEPING OF THE MANUAL**

This manual must be kept inside the machine's driver cabin. A spare copy must be kept by a supervisor in a suitable place and made available to the operators at all times.

If the manual is lost or damaged, or to request an additional copy, contact the Manufacturer directly.

This manual must be kept until the machine is demolished. In the case of transfer of ownership, this manual must accompany the machine along with CE certification. In case of rent, a copy of this manual must accompany the machine for operator use.

### **1.1.8 TERMINOLOGY USED**

#### **USER**

The user is the person, entity or company who purchased the machine and intends to use it for the intended purposes.

#### **DANGER ZONE**

Any zone within and/or near a machine in which the presence of an exposed person poses a risk to her/his safety and health.

#### **EXPOSED PERSON**

Any person who is wholly or partially in a danger zone.

#### **OPERATOR**

The person/s in charge of operating, adjusting and cleaning the machine or performing maintenance on it.

### **SPECIALISED STAFF**

Specifically trained staff who are authorised by the Manufacturer and have particular knowledge of the machine and can therefore safely perform all or some of the following operations:

- special maintenance.

### **AUTHORISED SERVICE CENTRE**

The authorised Service Centre is the structure, legally authorised by the Manufacturer, which has specialised staff who are qualified to perform all the specialised operations concerning assistance, maintenance and repairs.

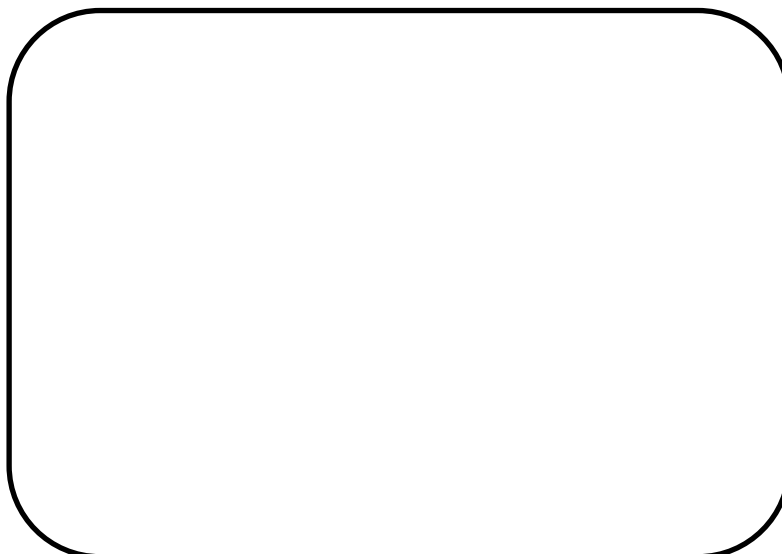
## **1.2 THE MANUFACTURER**

The machine described in this manual is produced exclusively by:

### **FARESIN INDUSTRIES S.p.A.**

Via dell’Artigianato, 36  
36042 Breganze (VI) ITALY  
Tel. + 39 0445 800 300  
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[www.faresinindustries.com](http://www.faresinindustries.com)

## **1.3 THE DEALER**





## 1.4 CE CERTIFICATION

The machine is accompanied by a statement declaring that it complies with the applicable European directives and any technical regulations adopted during its construction.

In attachment I of this section there is a facsimile of the Declaration of Conformity.

## 1.5 OPERATOR TRAINING

### 1.5.1 DRIVING ABILITY



The vehicle must only be used by qualified and authorised staff; the minimum training requirements are:

- a driving license for circulating on roads in the country where the machine is to operate;
- a license for operating a crane or a forklift truck or a participation certificate for courses in operating telescopic handlers.

The operator must be able to read and understand what is described in this manual especially:

- the function of the safety devices supplied with the machine;
- the location and the function of all controls and instruments; the rules for using the machine correctly;
- the user limits of the machine;
- what not to do or avoid.

## 1.6 MACHINE IDENTIFICATION

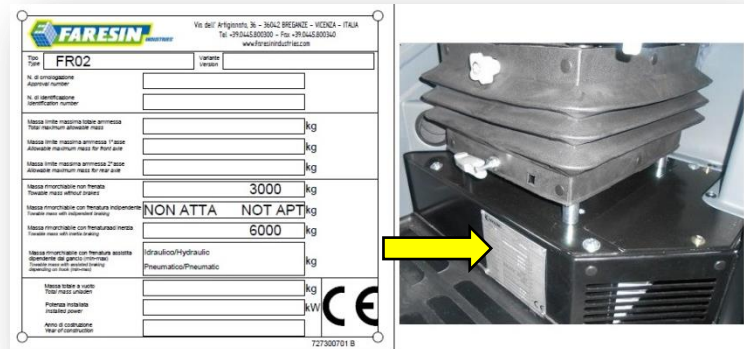
### 1.6.1 TECHNICAL NAME

The machine referred to in this manual can be defined as a "Self-propelled truck with a telescopic boom and interchangeable lifting tool".

The models have different heights and lifting capacity values; the characteristic of each model is defined by its load diagram.

## 1.6.2 IDENTIFICATION PLATE

The identification data of the machine is stated together with “CE” marking on the plate fixed with rivets inside the driver cabin indicated in figure 1 (purely indicative).



The frame number is marked on both the “CE” plate and on the frame itself, at the point indicated in the figure.



The main data of the diesel engine and its serial number are marked on the plate located on the point indicated in the figure.



The plates of all main components not manufactured and/or produced by FARESIN INDUSTRIES (e.g. pumps, axles, etc.) are directly applied on the components themselves, at the points where the respective manufacturers have originally placed them.

## 1.7 NOISE

### 1.7.1 MODEL FR03 GLS IIIA

The machines of the FR03 family version GLS IIIA are fitted with a DEUTZ Stage IIIA 103 kW engine.

The readings of the noise emitted were taken on the more powerful engine.

The measured level of A-weighted equivalent continuous sound pressure emitted by the machine is equal to 92.7 dB (A) and has been detected during the transition test in reverse with an active warning buzzer.

Airborne noise levels were measured in compliance with the UNI EN ISO 11202 standard.

Below are the results read in the various situations measured:

- 75.5 dB (A) equivalent total level measured in the cabin resulting from tests carried out on asphalt;
- 78.2 dB (A) equivalent total level measured in the cabin resulting from transition tests carried out on asphalt;
- 78.8 dB (A) equivalent total level measured during transition tests carried out on asphalt in reverse.

The noise read in accordance with the methods and procedures required by Directive 2000/14:- environment acoustic emission of machinery and equipment intended for outdoor use is as follows:

TYPE FR03 GLS IIIA

Calculated sound power: 99.46 dB

Guaranteed value: 102.02 dB

Limit power allowed: 103.00 dB

## 1.8 VIBRATION

The machine vibration level readings are: (according to UNI EN 1459, the vibrations must be assessed based on EN 13059-2008)

- 0.6746 m/s<sup>2</sup> cabin measurement while the truck moves on asphalt
- 1.840 m/s<sup>2</sup> cabin measurement while the truck moves on dirt

## 1.9 TECHNICAL SPECIFICATIONS

### 1.9.1 MASS OF MACHINE MODEL FR03

Masses with no load of the FR03\* 9.55:

MACHINE	WITHOUT ACCESSORIES	WITH FORKS	WITH BUCKET
Total mass [kg]	10735	11073	11123
1st axis mass [kg]	4270	4415	5616
2nd axis mass [kg]	6465	6658	5507

Masses with no load of the FR03\* 9.70:

MACHINE	WITHOUT ACCESSORIES	WITH FORKS	WITH BUCKET
Total mass [kg]	11000	11338	11388
1st axis mass [kg]	4270	4415	5616
2nd axis mass [kg]	6730	6923	5772

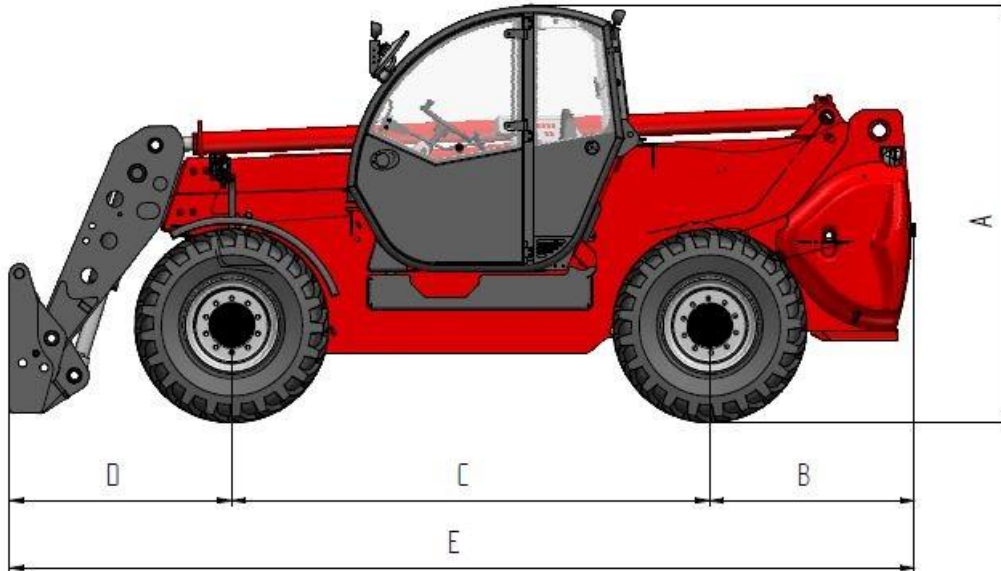
Masses with no load of the FR03\* 10.65:

MACHINE	WITHOUT ACCESSORIES	WITH FORKS	WITH BUCKET
Total mass [kg]	11400	11708	11753
1st axis mass [kg]	4320	4465	5666
2nd axis mass [kg]	7080	7243	6087

\* the values refer to readings taken on the machine with AEOLUS 445/65 - 22.5 wheels.

## 1.9.2 DIMENSIONS OF MACHINE MODEL FR03

Dimensions\*\* with no accessory of the FR03 model:



MODEL	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
9.55 – 9.70	2550	1265	2950	1373	5586
10.65	2550	1265	2950	1673	5886

Width \*\* (from the outer part of the wheel to the outer part of the wheel): **2320mm**

\*\* maximum allowed for the model

### 1.9.3 BRAKING SYSTEMS

- Multi-disk service brakes in oil bath.
- Negative multi-disk parking brake in oil bath with pressure accumulator.

### 1.9.4 TRANSMISSION

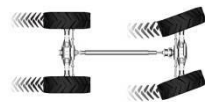
A completely hydrostatic set of elements that allow the machine to move. It consists of the following parts:

- A 85 cm<sup>3</sup> hydrostatic variable displacement pump (connected to the combustion engine with an elastic coupling)
- A 115 cm<sup>3</sup> hydrostatic variable displacement engine, connected directly to the gearbox.
- Two-stage gearbox selectable from the driver seat. The gear can only be selected with the machine stationary.
- Steering differential bridges that allow the transmission of wheel motion. The axles are both oscillating axles, only the front one has a transversal levelling system.
- Electrically controlled reverse gear
- The machine is fitted with adequately sized tyres for the maximum load allowed on the machine. If they should be replaced, always use tyres of the same dimensions and capacity characteristics.

### 1.9.5 STEERING

Three steering modes are possible thanks to the differential bridges:

- With the front wheels only.



- With the front and rear wheels for "concentric" advancement.



- With the front and rear wheels for "crab" advancement.



- “Load sensing” steering.

## 1.9.6 HYDRAULIC SERVICES SYSTEM

The system consists of the following parts:

- A 72 cm<sup>3</sup> variable displacement piston pump for the FR03 model GLS IIIA version.
- Maximum operating pressure 250 bar.

## 1.9.7 DIFFERENTIAL BRIDGES

- Industrial type with epicycloidal reducers and multi-disk brakes in integrated oil bath.
- Front differential with limited sleep (45%)

## 1.9.8 DIESEL ENGINES

The machines are equipped with:

- a DEUTZ engine with 103 kW STAGE IIIA power for the FR03 model GLS IIIA version.

All can reach a transfer speed of 40 km/h

## 1.9.9 COOLING SYSTEM

Air heat exchanger divided into three sections:

- One to cool the coolant liquid of the combustion engine
- One to cool the oil of the hydraulic circuit
- One to cool the air which is subsequently introduced into the combustion chamber

## 1.9.10 TYRES

The machines can be fitted with the following tyres (recommended):

- AEOLUS, 445/65 - 22.5 with load index equivalent to 169 F, operating pressure 7.5 bar (109 psi);
- MITAS, 18 - 22.5 with load index equivalent to 163 A8, operating pressure 4.5 bar (65 psi);

### ATTENTION!

*The tyres indicated in this manual refer to those recommended by the manufacturer.*

*If the tyres are replaced with different brands, refer to the dimensions and load index indicated herein.*

*In this case, the operating pressure of the tyre must be the maximum recommended by the tyre manufacturer.*

*The pressure indicated on the label situated on the mudguard ONLY refers to the tyre fitted by the manufacturer when manufacturing the machine.*



## 1.9.11 DRIVER CABIN



Fixed to the frame by means of vibration-damping mounts, distinguished by:

- Access door
- Large anti-glare glass surfaces
- Anatomic seat adjustable according to the weight and height of the driver fitted with a height-adjustable headrest, tilting armrests and a safety belt
- Heating and defrost system
- Windscreen wiper with washer system

The driver cabin is approved in accordance with the ISO 3449-2005 level II and ISO 3471-2008 (ROPS and FOPS) standards.

According to the above picture (purely indicative) the following areas/parts of the cabin can be identified:

- 1 Quick guide
- 2 Anti roll-over system display
- 3 Right front dashboard
- 4 Right front dashboard
- 5 Steering wheel with control levers
- 6 First right side dashboard
- 7 Control joystick
- 8 Spirit level
- 9 Second right side dashboard
- 10 Climate controls
- 11 Cup holder
- 12 Air circulation vents
- 13 Windscreen wiper system water tank
- 14 Driver's seat
- 15 Pedals



## 1.10 WARRANTY



THE INFORMATION DESCRIBED BELOW FORMS PART OF THE GENERAL WARRANTY CONDITIONS THAT THE CLIENT MUST KNOW.

### 1.10.1 COMMISSIONING AND TESTING THE NEW MACHINE

The distributor, the agent or the client must check the condition of the machine and a Machine Receipt Card must be filled in upon receipt of the machine and sent to FARESIN INDUSTRIES after-sales service in order to validate the warranty.

The Machine Receipt Card must be completed with the required information:

- Full name and address (post code), client telephone number with stamp and signature of the distributor or agent.
- Machine type, serial number and commissioning date.
- any faults and/or defects discovered upon commissioning

The machine receipt card is attached at the end of this manual.

A copy of the Machine Receipt Card must be kept by the dealer or the agent.

### 1.10.2 CONDITIONS, OBLIGATIONS and WARRANTY EXCLUSIONS

#### MACHINE INSPECTION AND MAINTENANCE

The client is obliged to follow indications provided by the manufacturer relating to maintenance, particularly that referring to periodic overhauling and inspections.

Throughout the effective period of the warranty or in any case not later than one year of use, the client must prove that maintenance has been regularly performed on the machine.

Failure to observe these conditions, will invalidate the warranty.

#### WARRANTY CONDITIONS

The warranty provided by FARESIN INDUSTRIES does not include normal wear, general faults or damage caused by improper use or irregular maintenance, with particular reference to overloading or changes to the features of the product.

Moreover, every time maintenance is performed, the duration of use must be indicated by detecting the data on the hour counter that must be kept in good working order.

If used contrary to the instructions provided in the user and maintenance manual, any request for warranty coverage will not be taken into consideration.

The standard warranty will immediately lapse with full rights if the verified fault is caused by one of the following reasons (the following list is not exhaustive):

- If non original FARESIN INDUSTRIES spare parts are used;

- If components or products different from those recommended by the manufacturer have been used;
- If the name, serial numbers or FARESIN INDUSTRIES identification marks are cancelled or altered;
- If the time taken to report a manufacturing problem is too long;
- continuing to use the machine knowing a problem exists
- For any damage caused by a modification made to the machine that is not included in the specifications of FARESIN INDUSTRIES, if lubricants, hydraulic oils or fuel are used that do not correspond to the guidelines provided by FARESIN INDUSTRIES;
- if incorrect repair is carried out, if a user fault by the client exists or if an accident has been caused by third parties.

No warranty request that exceeds the contract period in question will be considered.

#### CONSUMABLES

Each object or component replaced as a result of normal use of the machine is and classified as a consumable item and cannot be covered by the warranty (battery, tyres, windows, windscreen wipers, hoses, hydraulic pipes and filters).

#### ADJUSTMENTS

Any adjustment, whatever it may be, may be necessary at any time. Adjustments are part of the normal conditions of machine use and are not covered by the warranty.

#### CONTAMINATION OF THE FUEL AND HYDRAULIC CIRCUITS

All of the precautions must be taken to make sure that the fuel and hydraulic oil are kept in good condition: it is possible, in some cases, to contaminate the fuel and hydraulic circuits, mainly when the fuels and lubricants are stored in the work site.

Imperfect and irregular cleaning of the tank can also lead to contamination of the fuel circuit, causing damage to parts in contact with the fuel.

FARESIN INDUSTRIES will not accept warranty requests relating to the cleaning of the fuel circuit, the filter, the injection pump or any other equipment in direct contact with fuel or lubricants.

#### COMPONENTS SUBJECT TO WEAR

(runners, bearings, axle boxes, tyres, connections)

These components are, by definition, subject to deterioration during the operation period. Such components are not covered by the warranty.

## EQUIPMENT THAT CAN BE APPLIED TO THE MACHINE

All equipment not fitted with moving parts, actuated by hydraulic or electrical controls or other non-human sources of energy, is not covered by the warranty.

## 1.11 REGULATORY REFERENCES

The machine has been constructed in compliance with the relative European Community Directives and Project Standards applicable at the moment of its introduction on the market.

### LIST OF APPLIED EUROPEAN COMMUNITY DIRECTIVES

- Directive 2006/42/CE on machinery
- Directive 2014/30/EU relating to electromagnetic compatibility (recast).
- Directive 2000/14/CE noise emission in the environment by equipment for use outdoors.

### LIST OF SOME PROJECT REGULATIONS

- EN ISO 12100 “Safety of machinery – General principles for design – Risk assessment and risk reduction”
- EN ISO 4413 “Hydraulic fluid power – General rules and safety requirements for systems and their components”
- EN 1175-2 “Safety of industrial trucks - Electrical requirements - General requirements for internal combustion engine powered trucks”.
- EN 1459 “Safety of industrial trucks – Self-propelled variable reach trucks”.
- EN 349 “Safety of machinery – Minimum gaps to avoid crushing of parts of the human body”.
- EN 13849-1 “Safety of machinery – Safety –related parts of control systems – Part 1 – General principles for design”.
- EN 15000 “Safety of industrial trucks. Self-propelled variable reach trucks – Specification, performance and test requirements for longitudinal load moment indicators and longitudinal load moment limiters”.

## 1.12 ANNEX: CE DECLARATION OF CONFORMITY FACSIMILE



Mod.:CEM66  
Rev.:A  
Data:

### DICHIARAZIONE DI CONFORMITA' CE

(punto A Allegato II Direttiva 2006/42/CE, Allegato II Direttiva 2000/14/CE)

La **FARESIN INDUSTRIES S.p.A.**  
Via Dell’Artigianato, 36 - 36042 Breganze (VI) Italia

DICHIARA SOTTO LA PROPRIA RESPONSABILITA' CHE LA MACCHINA:

Tipo:	FM
Denominazione:	FM
Matricola/Serie:	FM
Anno di costruzione:	2013

### **CARRELLO A BRACCIO TELESCOPICO CON ATTREZZO INTERCAMBIABILE**

E' conforme ai requisiti essenziali di sicurezza indicati dalle seguenti direttive europee:

- Direttiva **2006/42/CE** – Macchine
- Direttiva **2004/108/CE** – Compatibilità elettromagnetica.
- Direttiva **2000/14/CE**– Emissione acustica ambientale delle macchine ed attrezzature destinate a funzionare all’aperto (macchina n.36 Allegato I): la valutazione della conformità è stata eseguita secondo l’ Allegato VI (art. 6.1)dall’organismo notificato : CNR-IMAMOTER – Via Canal Bianco, 28 – 44100 Cassana (FE) – Italia.

La potenza netta installata sul motore diesel è (secondo ISO 14396).....[kW].

Il livello di potenza sonora rilevato è (ref. 1 pW) $L_{WA}$ =.....[dB](A).

Il livello di potenza sonora garantito è (ref. 1 pW) $L_{WA}$ =.....[dB](A).

Il detentore della documentazione tecnica è il Sig. Sante Faresin presso FARESIN INDUSTRIES S.p.A. – Via dell’Artigianato, 36 – 36042 Breganze (VI) – Italia.

Le norme tecniche applicate sono:

UNI EN ISO 12100:2010 – Concetti fondamentali, principi generali di progettazione

UNI EN 982:2009 – Oleoidraulica

UNI EN 11752:2010 – Sicurezza dei carrelli industriali – Requisiti elettrici – Requisiti generali per carrelli equipaggiati con motori a combustione interna

UNI EN 1459:2010 – Carrelli semoventi a braccio telescopico. Sicurezza e stabilità.

UNI EN 1993-1:2005 – Eurocodice 3.Progettazione delle strutture di acciaio.

Breganze, il

Il firmatario  
Sante Faresin

Il Presidente  
*Sante Faresin*

# CHAPTER 2

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**2.**

**SAFETY**

## 2.1 INTENDED USE OF THE MACHINE



The FR03 range of telescopic handlers consists of self-propelled wheeled machines with a single driver seat and one operator, intended to be used on flat or irregular surfaces with the limits of use specified further on.

Thanks to its extensible arm, lifting, transporting and positioning loads is even possible with the use of appropriate and specific terminal tools.

The machine has been designed and built to operate outdoors; however, it can also be used indoors or underground provided that:

- There is the risk of explosion due to an incendiary and/or explosive atmosphere;
- Use in such environments must be for short periods of time and with frequent stops in the open air.

The machine is a complex tool. It must be used by a single operator who is fully trained and in possession of the required qualifications. Conformity and strict compliance with the conditions of use, maintenance and repairs specified by the manufacturer are an essential part of the intended use.

## 2.2 UNINTENDED USE



Unauthorised or improper use refers to using the lift according with working criteria that do not comply with the instructions provided in this manual and which, in any case, are dangerous for the operator and for others.

It is forbidden to use the machine for purposes other than that for which it has been built.

It is forbidden to use the machine beyond the speed limits and lifting capacity for which it is sized.

It is forbidden to use the machine to transport people and/or with non-original interchangeable equipment tools and/or not approved by the manufacturer.

It is forbidden to lift loads on ground that is not level and/or compact and/or with the machine not level (for machines that have this option).



It is forbidden to use the bucket with the boom partially or totally extended during the loading operations.



## 2.3 LIMITS OF USE

The machine is designed and built to work at temperatures ranging between -20°C and +40°C.

The machine is not designed to be used for forestry (the cabin is not tested against the risk of penetration of objects, such as tree branches).

The machine is not designed to be used with crop sprayers that may be carried and/or towed (the cabin is not built with sufficient insulation against toxic substances).



It is forbidden to use the machine with the boom extended and/or raised in case of wind with intensity greater than 12.5 m/s (45 km/h), which correspond to grade 6 on the BEAUFORT scale. Grade 6 on the BEAUFORT scale indicates a wind that causes continuous motion of large branches, which howls along telephone cables and makes it difficult to use umbrellas.



## 2.4 GENERAL REGULATIONS FOR USE

When transporting a load, keep the accessory at a maximum height of 300 mm from the ground.



Avoid, where possible, winding roads. In these cases, move with precaution and very slowly.

Respect the limits imposed by the load diagram referred to the accessory being used. If a different accessory from that delivered with the machine is purchased at a later time, please contact the Manufacturer to obtain the correct load diagram.

If the material to be moved is on a supporting base, before lifting it with the material, verify that it is in good condition and adequate for the weight to be lifted.

Never lift a strapped load with the forks; use the specific accessory. The edges of the forks could in fact cut the lifting cables due to the weight, thereby causing the loss of material. In any case, never lift a load with only one prong of the fork.

When transporting a suspended load from a cable, do not allow it to swing excessively, otherwise, stop immediately and wait for the load to stabilise before proceeding.

When transporting a load with a mobile centre of gravity, such as a liquid, avoid sudden acceleration and braking. Be very careful when the route has a slight gradient.

Immediately after use, place the accessory in a horizontal position and if it seems unstable, prop it with suitable and safe supports to make it stable.

It is forbidden to operate the machine under the influence of alcohol and/or drugs and/or medicine, which alters the physical and mental condition.



## 2.5 WORKING ON SITE



Operate in good physical and mental conditions.

It is forbidden to operate the machine under the influence of alcohol and/or drugs.

It is mandatory to wear a safety belt.

You must wear ear plugs or hearing protection headphones in case of excessive noise. A safety helmet must be worn in case of the risk of objects falling from above even if the driver cabin of the machine has been designed to protect against objects falling from above.

Keep the machine as far as possible from the edges of excavations or the road and always examine the conformation and the condition of the work area in relation to the dimensions of the machine in the various configurations.

Identify the best route toward the work area.

Ground capacity characteristics:

- |   |                          |
|---|--------------------------|
| ○ Turned soils, soft ground, land filled ground | 0-1 kg/cm <sup>2</sup>   |
| ○ Average particle size sand                    | 2-2.5 kg/cm <sup>2</sup> |
| ○ Gravel  | 3-4 kg/cm <sup>2</sup>   |
| ○ Clayey ground                                 | 2-4 kg/cm <sup>2</sup>   |
| ○ Rocky grounds                                 | 10-15 kg/cm <sup>2</sup> |

*The characteristics provided above are approximate and can vary based on the ground and humidity conditions, environmental temperatures and meteorological conditions.*

Always work in conditions with suitable lighting; the standard machine lighting system is not adequate for lighting the work area in poor visibility (evening or night).

Pay special attention near overhead power lines. Always keep a minimum safe distance of 5 metres: from the telescopic boom as well as any lifted load. Risk of electric shock from lightning.

It is forbidden to use the machine with thunderstorms in progress.

Never lift the load over people, and prevent anyone from approaching the work area and passing under the load.

The lighting signals must always work during the work phase and during transfer. This alerts nearby staff of potential danger.

If the manoeuvring visual field is reduced by an environmental situation and/or an obstacle or if several machines are involved in the operations, ask for the assistance of a person for indication and coordination.

Make sure that the windows are always clean, the lighting system works properly and the rear-view mirrors are clean and well positioned; thoroughly clean the instruments. When using the machine, monitor the control instruments at regular intervals so as to promptly detect any anomalies.

Perform slow and progressive movements when raising and lowering the telescopic boom; do not perform operations that exceed the capacity of the machine or the accessory. It is strictly forbidden to increase the counter-balance weight value in any way.



Make sure you have fuel for sufficient autonomy so as to prevent the risk of the engine stopping abruptly, even during a critical manoeuvre.

It is forbidden to climb up or down the machine when it is running.

It is forbidden to move away from the control position while the machine is running.

The signs and signals indicating danger should never be removed, covered or made illegible.

Inspect the work area before operating.

If the work area is near an excavation or is characterised by a steep slope, the machine is at great risk of tipping over.

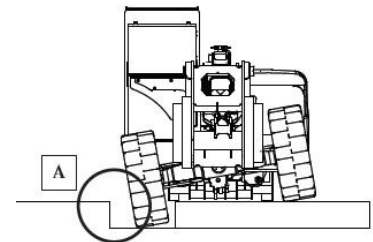
Keep the machine as far away as possible from the excavation edges and road margins.

Before operating the machine, examine the configuration and the conditions of the work area.

Icy surfaces that seem to be a solid base could subside if the temperature rises and compromise the stability of the machine.

## 2.6 MANOEUVRING ON UNEVEN GROUND

When moving on uneven ground, the contact of the wheels with the surface depends on the depth of possible holes and obstacles found along the route. Wheel contact is guaranteed if the difference in level (A) is +/- 15 cm; above this value, the lower wheel remains lifted off the ground.



## 2.7 MANOEUVRING ON A TRANSVERSAL SLOPE

Before operating on ground with a transversal gradient use the outriggers or levelling device (if present) to level the machine.

It is strictly forbidden to lift and/or handle loads on sloped terrain without first having levelled the machine.

Lifting loads with an unlevelled machine is very dangerous and exposes the vehicle and the operator to the risk of tipping over sideways. The machine can only travel on a transversal slope that is **less than or equal to 10%**, with the boom fully retracted and lowered.



## 2.8 MANOEUVRING ON A LONGITUDINAL SLOPE

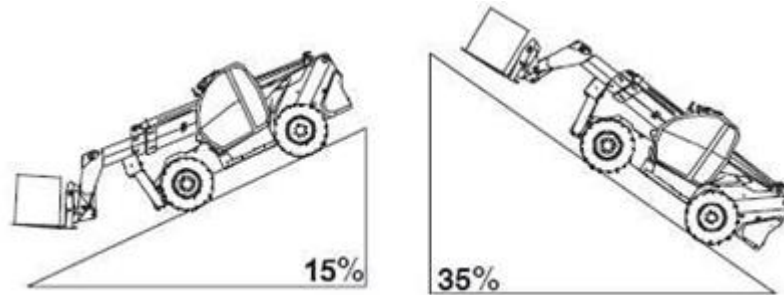
Proceed and brake gently on longitudinal slopes.

The accessory must face downstream when moving without a load.

The accessory must face upstream when moving with a load.

Before setting the load down, verify that the supporting base can withstand the weight in a stable and safe manner.

The maximum gradients that must not be exceeded are shown below.



## 2.9 IN CASE OF TIPPING OVER

If the machine should be about to roll over while being manoeuvred, the operator should remain seated in the cabin. This is in fact the safest place. If the safety belts have been fastened, maximum protection is ensured. After tipping over and when the machine is stationary and stable, the operator should exit from the access door, if possible, otherwise the rear window is to be used as an emergency exit.



## 2.10 PREPARING TO DRIVE



### 2.10.1 ACCESS TO THE DRIVER CABIN

The key allows the door to be unlocked or locked by means of the cylinder present. Turn the key clockwise to unlock and anti-clockwise to lock.

Pull the handle (4) from the outside towards you.



Climb into and out of the driver cabin with your back to the outside, while being careful to have three supporting points:

- The handle on the cabin upright (1)
- The door handle (2)
- The steps (3)

Use the handles (1) (2) to help your movements. Never use the controls and the steering wheel as grips.



Be very careful when the operator has wet hands and/or wet or slippery shoes and/or the steps are wet. Before operating make sure the grip is secure.

Open the cabin door from the inside, press the lever (5) under the opening handle (6).

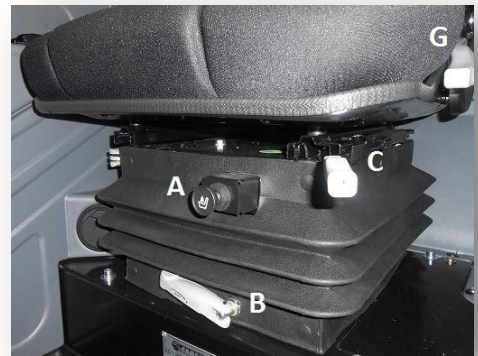


## 2.10.2 ADJUSTING THE DRIVER'S SEAT

The lever on the left of the driver's seat (subsequently marked with G) unlocks the backrest that is pushed forward by a spring inside the seat itself. Resisting with your back adjusts its position. The seat has an adjustable safety belt. The headrest is height-adjustable.



Pulling or pushing the latch (A) in the seat with air suspension adjusts the strength of the suspension according to the weight of the operator. The lever at the base of the seat (B) adjusts the height of the seat. Pull the lever (C) on the front left side of the seat to move the seat forward or backward to the desired position.



Turn the latch (D) in the seat with spring mechanical suspension to adjust the height of the seat. The strength of the suspension is adjusted by rotating the lever (E) at the base of the seat. The force of the suspension can be adjusted this way for operators ranging from 50 to 120 kg. Pull the lever (F) on the front left side of the seat to move the seat forward or backward to the desired position.



### 2.10.3 TIPPING THE SEAT

Press the lever (G) completely to tilt the backrest forward to access the rear compartment where the accessories supplied are housed together with the instruction booklet of the machine and the various equipment installed. The side arm rests can be tilted freely.

The windscreen washer water tank (H) is found on the left side of the seat (with a level indicator).



**Attention!** The seat is fitted with a sensor that is activated when the operator sits and enables the engine to start.

### 2.10.4 SAFETY BELTS

In case of an accident, the properly fastened safety belt offers good protection. The risk of injury is reduced and the chances of survival are increased.

Adjust the driver's seat before fastening the safety belt. Hold the tongue and slowly pull the belt over the pelvis. Insert the tongue (1) into the buckle (2) of the seat until you hear it click. Try to pull the safety belt to make sure it is engaged in the buckle.

Adjust the belt by pulling the flap of the belt with your left hand to tighten it across your body. If the belt is too tight, unhook it and lengthen the left side accordingly and repeat the coupling operation. Release belt by pressing the red button (3). The tongue is expelled.

The belt is adjusted correctly when it is positioned on your pelvis without causing particular discomfort while driving. Using the belt increases the level of operator safety and reduces the risk of accidents. The driver cabin has been designed to support the weight of the machine in case of tipping over (ROPS). Therefore, the safety belt must always be fastened to avoid being thrown out of the cabin and/or being crushed in case of possible tipping over.





*Never try to climb down the machine while it is tipping over. You are safe inside the cabin; the steel structure has been sized to protect the operator inside. Only exit the machine when it is stationary.*

### 2.10.5 ADJUSTING THE STEERING WHEEL

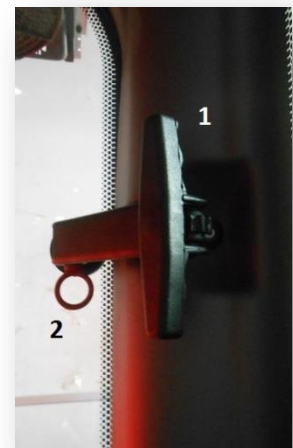
Adjust the position of the steering wheel by rotating the lever (1) upwards until it is released. Move the steering wheel to the most comfortable and safe position and then block it in place by rotating the lever downwards. It is recommended to make these adjustments with the machine stationary and therefore not while driving.



### 2.11 OPENING THE BACK WINDOW



Open the back window of the cabin by pulling the lever (1) until it clicks and then push the window outwards.

In an emergency the back window is used as an emergency exit. Open the window completely only if necessary by pulling the retainer (2) downwards through the preset eyelet.



### 2.12 HEATING AND AIR CONDITIONING

The driver cabin has a heating system that is also used to demist the windscreen. The controls (10) are found under the second dashboard on the right side. The air circulates by means of a fan, the speed of which is adjusted from the knob (2) (level 0: disabled fan, level 3: maximum level of the fan). Heated air, fresh air or cold air comes out from the open air vents depending on the position of the controller and the outdoor climatic conditions. The vents allow the direction of the air flow to be adjusted and can be opened and closed separately. The hot - cold adjustment range is covered by turning the knob between (1):

-  Temperature is reduced
-  Temperature is increased

If applicable, the air conditioning system is activated from the preset button (3). Press the button for the corresponding LED to light up.



There are 6 air circulation vents, 3 at the front of the dashboard (4),



2 on the rear part behind the driver's seat (5)



and 1 near the legs of the operator (6).









The air that circulates through the fan is partly drawn from outside and partly from inside the cabin (recirculated). If you work for long periods with the openings of the cabin closed, it is advisable to refresh the air by opening the window.

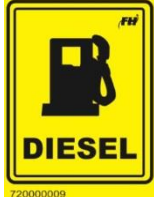




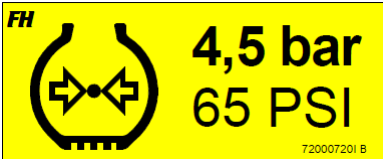
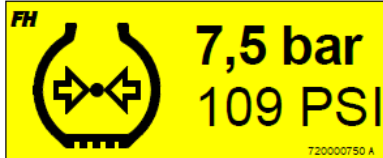

## 2.13 SAFETY DECALS



Below is a list and description of the safety decals on the machine to indicate attention and/or operations that are required in the specific point where the decal is affixed or to indicate the relevant behaviour for operator safety. The safety decals must be intact and legible and must be restored if damaged accidentally. If a decal is affixed on a part that is replaced, a similar decal must be affixed to the new part. Order damaged, illegible and/or removed decals from FARESIN INDUSTRIES by indicating the code for each decal, which is found on each one and if this is not present, that found below with the relevant description.

DECAL	CODE AND DESCRIPTION
	<p>720000001 Label on a yellow background with black writing. Read the manual before operating the machine. Switch the engine off and remove the keys from the panel before performing any maintenance. Pay attention to contact made with overhead power lines. It is forbidden to stand under the raised boom or under suspended loads.</p>
	<p>720000011 Sticker on a yellow background with black writing. Meaning: fasten the safety belts</p>
	<p>720000034 Sticker on a yellow background with black writing. Meaning: lubrication point</p>
	<p>720000013 Sticker on a yellow background with black writing. Meaning: lifting point</p>
	<p>720000012 Sticker on a yellow background with black writing. Meaning: towing point</p>
	<p>720000022 Sticker on a yellow background with black writing. Meaning: anchor point</p>



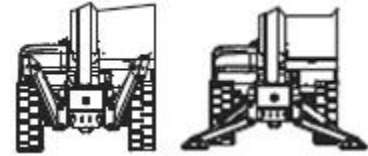
 <p>720000009</p>	<p>720000009 Sticker on a yellow background with black writing. Meaning: diesel tank</p>
 <p>720000015 A</p>	<p>720000015 Sticker on a yellow background with black writing. Meaning: hydraulic oil filling point</p>
	<p>720000010 Sticker on a yellow background with black writing. Meaning: do not climb</p>
 <p>720000046</p>	<p>720000046 Sticker on a yellow background with black writing. Meaning: it is forbidden to thrust and pull with the boom extended</p>
 <p>720000030 B</p>	<p>720000030 Label on a yellow background with black writing. Meaning: battery switch device</p>
 <p>720007201 B</p>	<p>720007201 Sticker on a yellow background with black writing. Meaning: tyre pressure 4.5 bar</p>
 <p>720000750 A</p>	<p>720000750 Sticker on a yellow background with black writing. Meaning: tyre pressure 7.5 bar</p>
	<p>720000031 Label on a yellow background with black writing. Meaning: indication of the boom inclination angle</p>



For each weight category identified, the height and the angle to which it can be lifted can be identified in the diagram or conversely, given a height and an angle, the maximum weight that can be handled can be determined.

Each machine has the specific load diagram either on the window to the right of the driver's seat or in the Quick Guide.

Depending on the symbol on the upper right corner, the load diagram can refer to the machine on wheels or on outriggers (if applicable for the machine model).



## 2.15 ANTI-TIP SYSTEM (LLMI-LLMC)



The anti-tip system, fitted as standard on the machine, allows the operator to work in absolute safety. The system continuously verifies the weight of the lifted and/or handled load in relation to the boom length and inclination. If this exceeds a certain limit, the system immediately blocks any movements that are a hazard to the boom. This is verified by means of a strain gauge cell which measures the bearing load corresponding to the rear axle.

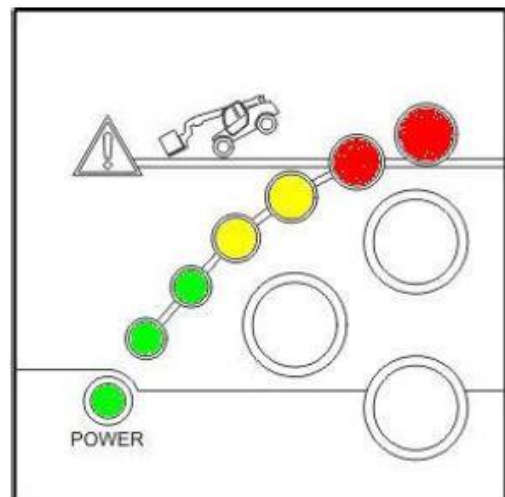
The display of the anti-tip system is found in the cabin on the front part of the driver's seat.

When the machine is switched on, with the boom idle (not extended and lowered completely), device operation is indicated by the "Power" LED going on. The weight control graphic display consists of a number of LEDs on a curved line in a different colour.

The LEDs light up in sequence as the operational limits are reached (0% - 100%).

The colours of the LEDs indicate:

- Green = regular load (2 LEDs)
- Yellow = pre-alarm (2 LEDs)
- Red = alarm (2 LEDs)



An intermittent acoustic signal is emitted when the yellow LED lights up.

When the red LED comes on, all movements of the boom are blocked and the frequency of the acoustic signal increases.

Boom movements that have been inhibited by the anti-tip system during an alarm may have to be temporarily reactivated in order to restore a hazardous situation.

In this case, you must actuate the key (1) on the right front dashboard by turning it to the right. This disconnects the anti-tip system and allows movements that can increase the risk. For this reason, the manoeuvre is enabled by an intentional and maintained command (the operator must know what to do and the command cannot be engaged accidentally), therefore, if released, the key returns to zero and disables the controlled function.



The load diagram of the machine coupled with the fork accessory is always found inside the cabin. All other load diagrams of the accessories compatible with the machine (authorised and/or supplied exclusively by FARESIN INDUSTRIES) are available in the "Accessories" appendix. If the accessories are purchased at a later time (from the dealer or directly from FARESIN INDUSTRIES), the user or the client must make sure to have the diagram relative to the accessory in question, otherwise this must be requested from the dealer or directly from the Manufacturer.

## **2.16 TRANSPORTING THE MACHINE**

### **2.16.1 LOADING AND UNLOADING WITH RAMPS**



The ramps must not be slippery and must be adequate to support the weight of the machine; this is indicated on the CE plate or in this manual.

Before loading or unloading make sure the handling area of the machine and that destined for deposit pose no danger.

All operators must maintain a safe distance to avoid being hit if the machine or some of its parts should fall. Ask a person on the ground to monitor the manoeuvres. Block the wheels of the transport vehicle with wedges. Release the machine from all anchor points to the platform of the transport vehicle. Slowly move the machine, making sure the wheels are centred on the ramps.

### **2.16.2 LOADING AND UNLOADING WITH A CRANE**



The crane must have a load capacity adequate to the weight [kg] of the machine; the weight is indicated on the CE plate or in this manual. The chains or cables must have a minimum unit capacity of 6000 kg; before using them, make sure they are in good condition. Attach the chains to the points on the machine indicated by the decals (code 720000013). Before starting the operations make sure the handling area of the machine and that destined for deposit pose no danger.

Slowly lift the machine as little as required and lower it to the ground as soon as possible.

## 2.17 GENERAL SAFETY WARNINGS



Do not tamper or remove the plates and safety devices installed on the machine.

Tampering with the safety devices and failure to comply with the signs relieves the manufacturer from liability for any damage or injury that may be caused and attributes full responsibility of the person carrying out the actions in respect of the relevant entities.

The driver cabin is approved in accordance with the ISO 3449-2005 level II and ISO 3471-2008 (ROPS and FOPS) standards.

ROPS = tipping resistance

FOPS = resistance to falling objects

The limit on which the cabin structure has been tested is 12500 kg.

If the machine that is being manoeuvred is about to tip over, remain inside the cabin for the best protection.

It is important for the safety belts to always be kept fastened to avoid being thrown out of the machine or being crushed in case of tipping over. The safety belt is adjusted correctly when it is positioned on your pelvis without causing particular discomfort while driving. Using the safety belt increases the sense and level of operator safety by reducing the risk of accidents.

The back window is an emergency exit in all cabin models. **ONLY IF NECESSARY**, simply remove the red retention on the compass opening handle of the window by firmly grasping the ring at one end and pulling it downward.

Once the retainer is removed, simply push the window for it to open completely.

The area under the boom may need to be accessed for maintenance purposes, in which case, make sure the boom cannot drop from its position, not even accidentally. For this purpose, a special metal block is supplied on each machine, which is to be placed manually on the lifting cylinder rod, secured with screws with a hand wheel on the rear side of the machine behind the driver cabin.

Strictly comply with the instructions to position the block defined below:

- Remove the block on the rear of the driver cabin with the two specific bolts supplied with the machine
- Lift the boom to a height where the cylinder rod is slightly longer than the locking device.
- Climb onto the central bridge of the machine while paying attention not to step on the areas marked with the prohibitions and place the blocking device on the cylinder rod
- Insert the two screws in the two end holes and block them in place with the relevant nuts. This prevents the blocking device from moving out of position

- Once it is used and maintenance is completed, remove the block and put it back in the same spot it was taken from.



## 2.18 CHECKING ENGINE START UP

Before starting the engine, make sure the connection to the battery has been enabled using the battery switch in the front left part of the machine. The handling of the F-N-R machine (viewed on the display on the front right dashboard) can be controlled from the control lever on the left side of the steering wheel of joystick, if enabled.



The engine will not start unless the gear control lever is in the neutral "N" position shown on the display.

The machine can distinguish whether the operator is sitting in the driver's seat or not through a sensor inside the driver's seat. In fact, if the operator leaves the driver's seat, the machine will automatically switch to neutral drive and engage the hydrostatic braking and a continuous acoustic signal is emitted until the operator returns to the driver's seat and the control lever is set back into "N" neutral.

For safety purposes it is important to sit correctly during transfers especially when performed at high speed, although the seatbelts are fastened. Despite the timed sensor (2 second intervention delay), there is a risk the machine will brake gradually and inadvertently.



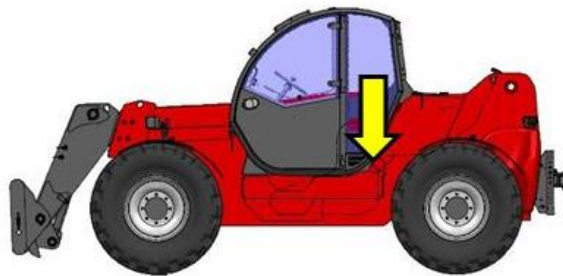
## 2.19 MOVEMENT IN REVERSE DRIVE

When the machine moves in reverse or when the control lever is set to the "R" position, an acoustic signal will be automatically emitted to warn people immediately nearby of the potential danger posed by the machine itself.

## 2.20 REFUELLING THE MACHINE



The diesel tank is found under the driver cabin (indicated by the corresponding sticker). The refuelling filler is located on the left side.



The closing cap has screw closure with a key. Remove the cap by rotating it anti-clockwise and to vice versa to tighten it.

The diesel tank is characterised by an overall capacity of 120 litres (including 30 litres reserve). Do not refill the tank all the way, allowing for fuel expansion in high ambient temperatures.

When the level of fuel drops to the reserve level, the corresponding LED lights up on the display.

- It is forbidden to refuel with the engine running.
- Do not smoke and do not use cellular phones while refuelling.
- Fuel and fuel vapour is explosive - risk of death!
- Comply with the requirements of national laws concerning the use of fuel
- After refuelling, close the cap with the key and cover the lock patch with the cover.
- Never add different types of diesel, such as petrol, alcohol or anything similar.



For further information, see the attached engine manual.\*

\*The engine manual is available on the website of Faresin Industries.

## 2.20.1 FUEL QUALITY (DIESEL)

Only use diesel fuel commonly available on the market, with a sulphur content of less than 0.5%. If the sulphur content is higher, the oil must be changed more frequently. For further information, see the attached engine manual.\*

\*The engine manual is available on the website of Faresin Industries.

## 2.21 STORING THE MACHINE

No particular precaution is required if the machine should be inactive and unused for a long period. It may be appropriate to disconnect the battery. It is best to store it in a closed and dry place.

*In order for the electrical equipment to function correctly, the machine must be stored at a temperature between -20°C and +50°C. It can only be stored at +70°C for short periods, without exceeding 24hrs.*

If it is stored in a dusty environment, it is recommended to:

- Disconnect the supply batteries
- Cover the machine with a sheet

Before using the machine, after an extended period of storage, hook back up any disconnected circuits and check the lubrication of the mechanical components.

## 2.22 MACHINE DEMOLITION



*The machine is built with steel, aluminium and plastic materials: accordingly, most of the material can be recycled efficiently.*

When the machine has been decommissioned, separate the different materials for possible reuse or separate disposal. None of the materials used to build the machine are particularly toxic or dangerous to operator health.

*The lubricating fluids, engine oil, fuel residue and hydraulic oil must be disposed of appropriately (in compliance with laws in force) and not dispersed into the environment.*

*At the end of its service life the machine must be dismantled by competent staff trained in the correct handling methods - and if necessary, the disassembly - of the machine.*

Only use equipment and vehicles suitable for lifting, which comply with standards and legal regulations in force.

## 2.23 USING THE MACHINE

The following information and list of standards must be understood and carried out for full, safe working conditions. Some general behavioural rules and limits of use of the machine are reported in section 2 of the manual



### **2.23.1 DRIVING ABILITY**

The vehicle must only be used by qualified and authorised staff; the minimum training requisites are:

- the road circulation licence recognised in the country where the machine operates; the licence for crane operators; the certificate proving attendance to a course for operating telescopic handlers;
- moreover, the operator must be able to read and understand this manual, namely: the operation of the safety devices fitted on the machine; the location and function of all the controls and instruments; how to use the machine correctly; the limits of use of the machine; what the operator must not do or avoid.

### **2.23.2 RESPONSIBLE USE**

To start the engine, the operator must be sat in the driver seat. Inappropriate procedures can cause unexpected machine movements causing injury to people and damage to objects.

The machine must only be moved with the operator sat in the driver seat.

Never start the engine with electrics in short circuit.

Take care of the machine. If malfunctions or damage to the safety systems arise, immediately inform a supervisor.

Observe the controls and maintenance schedule described in the "Maintenance" chapter.

Do not perform repair or adjustments unless authorised to do with the necessary training.

Do not tamper with the safety devices.

### **2.23.3 RESPONSIBLE DRIVING**

Do not allow people or animals on the machine or inside the driver cabin. Doing so can obstruct the view, reducing safety standards and also provoking accidental use of the controls.

Do not listen to music with headsets whilst operating the machine. This can provoke the loss of concentration and lack of attention during work.

Do not wear loose clothing, chains or belts that can get caught on the control lever or in other parts of the machine.

Do not drive with greasy hands or shoes.

Adjust the seat and steering wheel positions to guarantee a safe and comfortable use of the controls.

Safety belts must always be fastened. Keep a straight position so that parts of the body do not stick out of the cabin.

Do not use controls such as grips for climbing on to or off the machine.

Never transport people unless the machine is equipped for such purpose and provided with a certificate in compliance to the standards for lifting people.

## **2.24 ROAD CIRCULATION**

To circulate on the road, the machine must comply with the road traffic code of the country of operation.

For the necessary information, contact your dealer.

When circulating on the road, observe the road traffic code.

It is forbidden to transport loads on public roads.

It is forbidden to operate the machine under the influence of alcohol and/or drugs.

It is forbidden to operate with the cabin door open.

### **2.24.1 BEFORE MOVING**

Make sure the rotating light is installed correctly and working properly.

Make sure the lighting, signalling, optic and acoustic systems are clean and working properly.

Check the wear of the windscreen wiper brushes and make sure it is working properly.

Make sure the wheels are aligned and that only front wheel drive is set.

Make sure the rear-view mirrors are in good working order.

Make sure there is enough fuel in the tank.

Retract and fully lower the boom.

### **2.24.2 FORWARD DRIVE**

If visibility is poor due to fog, rain, dust etc. reduce the speed and use appropriate lighting.

When passing through limited openings such as archways or gates, make sure there is the minimum space for manoeuvring available.

When manoeuvring at fast speeds, remain correctly seated because the accidental activation of the integrated presence sensor on the seat can provoke sudden and unexpected slowing down of the machine.

### **2.24.3 REVERSE DRIVE**

Before reversing, make sure no bodies or obstacles are within the operating area of the machine.

If your view is obstructed, ask for help from a person on the ground and maintain visual contact with this person.

Make sure windows and rear-view mirrors are kept clean and in good condition.

Avoid long periods of reversing at high speed; scarce manoeuvrability of the driving position reduce safety margins and provoke fatigue.

## 2.24.4 PARKING

Make sure the ground the wheels are standing on is compact and resistant.

Actuate the parking brake switch. Park on flat ground. If the surface seems unsafe or slightly sloping place wedges in front of the wheels. Put the gear in neutral ("N").

If the slope exceeds 15%, block the wheels with wedges. In these conditions the parking brake may not guarantee sufficient brake torque.

Lock the hydraulic controls with the appropriate devices (where required).

Retract and lower the telescopic boom to rest on the ground the accessory in use.

Put the gear shift lever in neutral ("N").

Switch off the engine and extract the ignition key.

Close all windows and lock the door with the key.

Never leave the ignition key inserted when permanently abandoning the machine.

If you need to temporarily leave the driver's seat, place the gear lever in neutral position "N" and engage the parking brake button, whether the engine is running or off.

Never park in places that can obstruct road circulation or can be generally dangerous.



# CHAPTER 3

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## 3 FR03 GLS IIIA CONTROLS AND GENERAL REGULATIONS

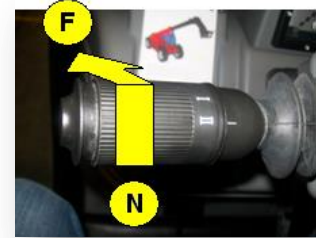
## 3.1 DESCRIPTION OF THE CONTROLS



### 3.1.1 CONTROL LEVERS ON THE STEERING COLUMN

#### 3.1.1.1 LEFT LEVER OF THE STEERING WHEEL (DEVIO)

To enable the forward drive of the machine (F), pull the lever towards the steering wheel and move it forward. The letter "F" will appear on the display on the front right dashboard.



To enable the reverse drive of the machine (R), pull the lever towards the steering wheel and move it back. The letter "R" will appear on the display on the front right dashboard.



Enable the neutral gear (N) by moving the lever to the central position.

The lever controls do not operate when:

- the parking brake is engaged;
- the operator is not sitting in the driver's seat.

Regarding the function of the button at the top of the lever, refer to "Machine Levelling".

Reference will be made throughout the manual to the lever on the left side of the steering wheel called "devio".

*It is only possible to use the lever if the steering mode is with the front wheels only. It is dangerous to change the driving direction when the machine is moving at high speed; the machine suddenly inverts the driving direction; before changing direction, allow the machine to reduce speed to a minimum. When reverse drive is selected an acoustic signal will sound to indicate the risk of danger to any people in the manoeuvring area.*

*Attention! If the operator leaves the driver's seat, the neutral gear "N" is automatically engaged after 2 seconds. The function of the lever disables in "concentric" and/or "crab" drive mode.*



#### 3.1.1.2 LEVER ON THE RIGHT OF THE STEERING WHEEL



##### Lights control

Rotate the lever by holding it from the knurled part until the desired symbol of the rotating part is aligned with the horizontal line of the fixed part. 3 positions are possible:

- Position 0 = lights off
- Position 1 = parking lights on
- Position 2 = low beam lights on



### **High beam lights**

To activate the high beam lights, push the lever forward until it stops in position. The command only works when the ignition is inserted.

### **Hazard lights**

Pull the lever until it stops. The control works even when the ignition is disconnected.

### **Direction indicators**

To enable the indicators:

- a- push the lever up to indicate a left turn
- b- push the lever down to indicate a right turn



### **Windscreen wiper**

Press the crown at the end of the lever to activate the water spraying circuit to wash the front windshield.

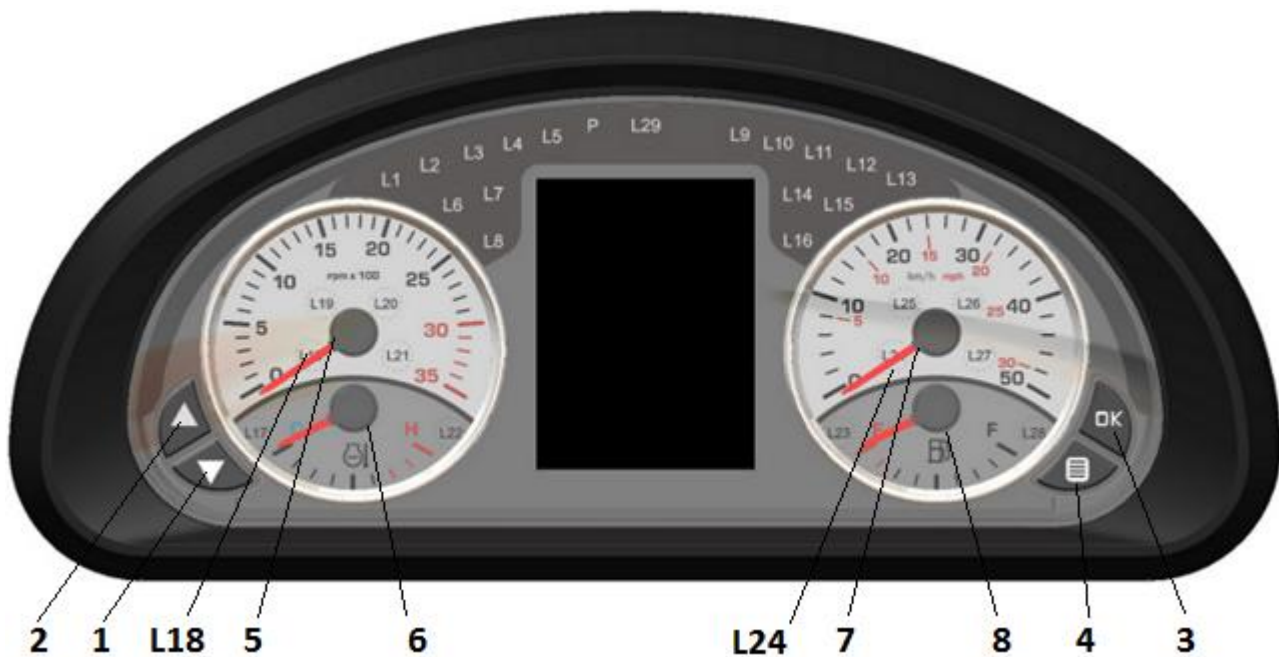


### **Horn**

Sound the horn by pressing the central button at the end of the lever.

### 3.1.2 DESCRIPTION OF THE RIGHT FRONT DASHBOARD

#### 3.1.2.1 ON BOARD COMPUTER



All the information concerning the condition of the machine, the active functions in a given time, the diagnostic messages that indicate a malfunction or fault of some electronically controlled information, in addition to all the information normally available and detectable in a normal automotive dashboard is shown by particular symbols in the display available lighting up and/or disappearing.

Five pages are visible, of which: the first page provides general information and describes the active functions and others that are mainly used for road circulation; other pages are also visible relating to standard and optional work functions and others related to the display configuration and diagnostics. The latter highlight the logic and operating errors of the diesel engine.

Scroll the pages by using the buttons at the sides of the display. You can go from one page to another by entering the menu and using the buttons on the left side of the display.

Below are the guidelines and the relative symbols shown by the different pages of the computer on board.

#### BUTTONS AND INDICATORS KEY:

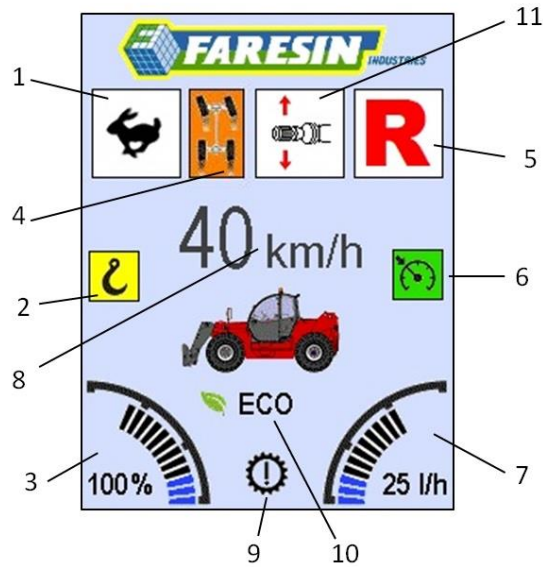
1. Down button
2. Up button
3. OK button
4. Menu button
5. Engine revs analogue indicator
6. Water temperature analogue indicator
7. Vehicle speed analogue indicator
8. Fuel level analogue indicator













LEDS KEY:

- L1. Alternator LED
- L2. Engine oil low pressure LED
- L3. Spark plugs light
- L4. Front axle alignment LED
- L5. Rear axle alignment LED
- L6. Engine error LED
- L7. Engine warning LED
- L8. Left arrow LED
- L9. Agri mode LED
- L10. Oil filter clogged light
- L11. Brake fault LED
- L12. Lowered outriggers LED
- L13. Clogged air filter LED
- L14. Work lights LED
- L15. Enabled PTO LED
- L16. Right arrow LED
- L17. NA
- L18. Lit high beam lights LED
- L19. Seat sensor LED
- L20. Engaged parking brake LED
- L21. Lit parking lights LED
- L22. Coolant liquid high temperature LED
- L23. Fuel reserve LED
- L24. Service LED
- L25. Regeneration required LED
- L26. Particulate filter ash LED
- L27. Hydraulic oil reserve LED
- L28. NA

### 3.1.2.2 MAIN SCREEN

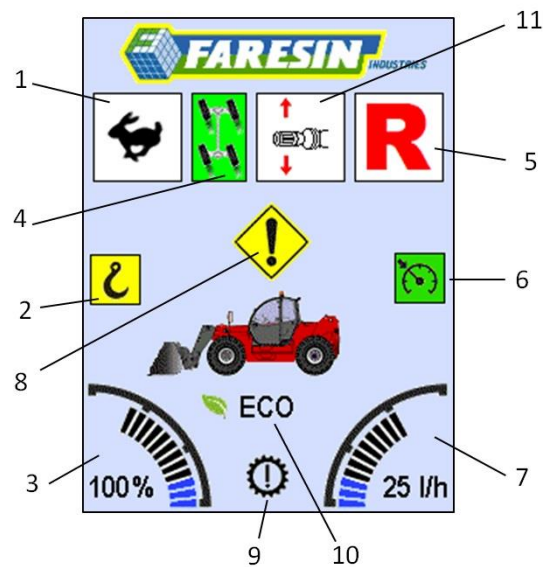


List of icons:

1. Selected mechanical gear indicator (  hare, fast gear;  turtle, slow gear)
2. Winch alarm indicator (it is enabled when there is a load higher than permitted)
3. Engine load visual indicator.
4. Steering mode indicator (crab,  front only,  integral 
5. Selected gear indicator (F - N -R)
6. CRUISE CONTROL indicator (  icon with a grey background if cruise is enabled but the speed has not been set;  icon with a green background if cruise is enabled and the speed has been set)
7. Engine hourly consumption visual indicator
8. Vehicle forward speed digital indicator
9. Transmission errors indicator (a red light  comes on when there are errors)
10. Enabled drive mode indicator (drive mode, handling mode, eco mode and creep mode)
11. Travel mode indicator (  from devio [LH lever of the steering wheel],  from joystick)

Press the UP or DOWN button to go to the "work" page.  
 Press OK for 1.5 seconds to go to the "engine" page.  
 Press MENU to go back to the main menu.

If the SHOVEL mode has been enabled from the selector (see the figure below), the following main screen will be displayed. The anti-roll system is temporarily disabled in shovel mode (only if the boom is low and retracted).



List of icons:

1. Selected mechanical gear indicator (hare, fast gear; turtle, slow gear)
2. Winch alarm indicator (it is enabled when there is a load higher than permitted)
3. Engine load visual indicator
4. Steering mode indicator (crab, front only, integral)
5. Selected gear indicator (F, N, R)
6. CRUISE CONTROL indicator (icon with a grey background if cruise is enabled but the speed has not been set; icon with a green background if cruise is enabled and the speed has been set)
7. Engine hourly consumption visual indicator
8. Enabled “shovel” mode indicator
9. Transmission errors indicator
10. Enabled drive mode indicator (drive mode, handling mode, eco mode and creep mode)
11. Travel mode indicator (from devio [LH lever of the steering wheel], from joystick)

Press the UP or DOWN button to go to the "work" page.

Press OK for 1.5 seconds to go to the "engine" page.

Press MENU to go back to the main menu.

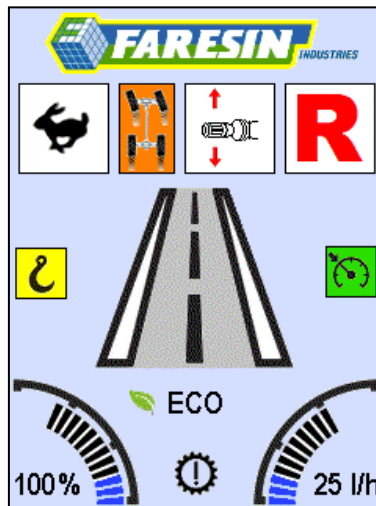
### 3.1.2.3 ENGINE FORWARD DRIVE AND STREET MODE



If the steering selector (see “Steering”) is set to “front steering”, the screen will be displayed in order to select whether to go to STREET MODE or not, meaning with the boom disabled and forward drive only selected from devio (this screen disappears after 15 seconds and goes back to the main screen)

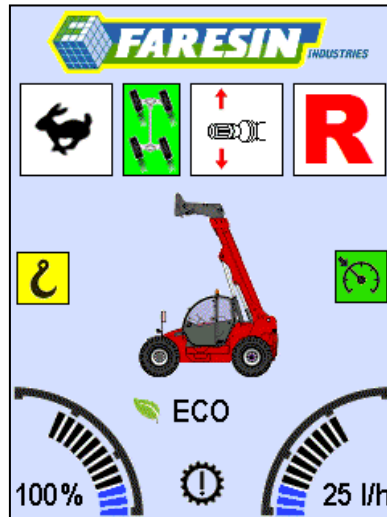


Press OK to go to street mode and for the following screen to be displayed



To exit street mode, simply set the steering selector to “integral/crab steering”. The boom is thus enabled again.

If the forward drive was selected from devio (see “FNR mode”), before accessing street mode by going to crab or integral steering mode, it goes back to the main page. In this case, the following figure will display if the user will operate the machine with the boom lifted. During use of the boom, speed will be limited to approximately 15 km/h .



If the forward drive was selected from the joystick (see “FNR mode”), before accessing street mode by going to crab or integral steering mode, the following screen will be displayed. This screen will be displayed for 15 seconds. Pressing OK will take you back to the main screen with forward drive from joystick. If you wait for the 15 seconds to elapse, it will go back to the main screen and automatically go to forward drive from devio.

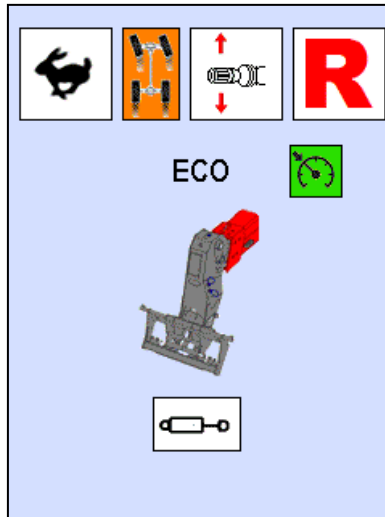


Every time the vehicle is started, it will start in the forward drive mode previously memorised (see “FNR mode”).

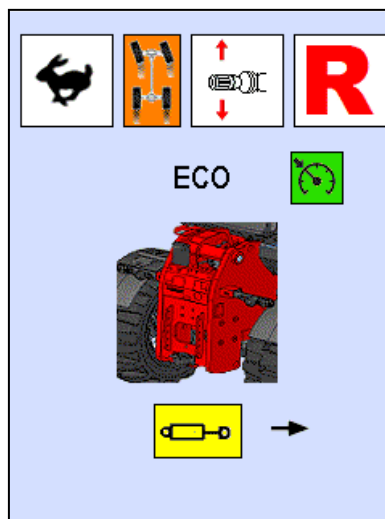


### 3.1.2.4 AGRI WORK MODE

If hydraulic sockets are set up at the rear of the machine, it is possible to use the agri work or agrimode. Press the UP or DOWN arrow from the main screen for the following screen to be displayed, which indicates actual presence of the function.



Press 1 (joystick) to enable agri mode and for the following screen to be displayed



Moving the roller 3 (of the joystick) forward and back, it respectively controls the extraction and retraction of the connected tool piston. The display will show an arrow facing right or left, depending whether the piston is in an extraction or retraction phase.

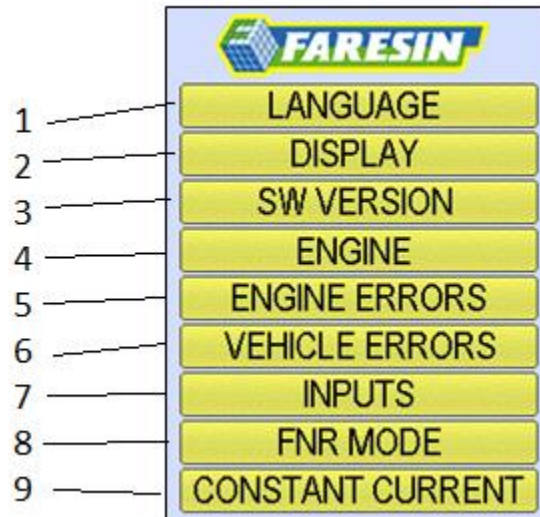
Keeping roller 3 pressed back for 3 seconds enables the floating mode. The screen displays the following symbol next to the symbol of the piston



### 3.1.2.5 MENU PAGE



The “menu” page displays all the pages where the operator can access and view certain information.



Scrolling menu with lateral indicator. The following screens are identified:

1. Language
2. Display
3. Software version
4. Engine
5. Engine errors
6. Vehicle errors
7. Inputs
8. FNR mode
9. Constant flow (optional)

Press the UP button to go to the selection of the previous page.

Press the DOWN button to go to the selection of the next page.

Press OK to enter the selected page.

Press MENU to go back to the "main" page.



### 3.1.2.6 LANGUAGE PAGE



The desired language can be selected from the “language” page.



Press the UP button to go to the next language.

Press the DOWN button to go to the previous language.

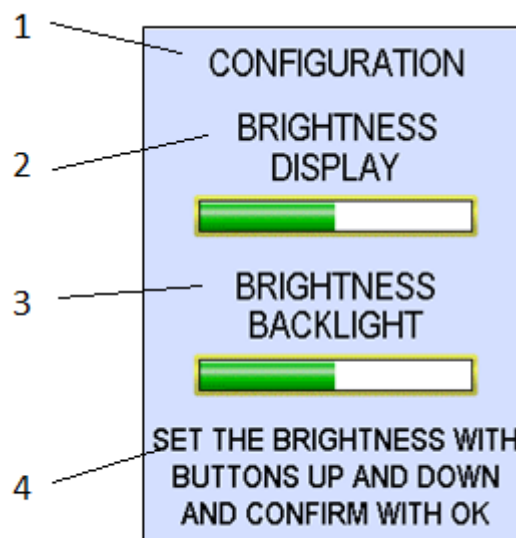
Press OK to confirm the selected language and go back to the menu.

Press MENU to go to the "main" page.

### 3.1.2.7 CONFIGURATION PAGE



The “configuration” page allows you to adjust the brightness of the display and the back-lighting of the dials, the hands and the buttons.



List of icons present:

1. Configuration
2. Display brightness with relative indicator bar
3. Back-lighting (of the dial, hands and buttons) with relative indicator bar.
4. Set the brightness (of the display and back-lighting) from the DOWN and UP button and confirm by pressing OK

The brightness of the display can be increased and decreased on this page by pressing the UP and DOWN button of the instrument panel.

Press OK to go to the back-lighting adjustment of the dial, the hands and the buttons.

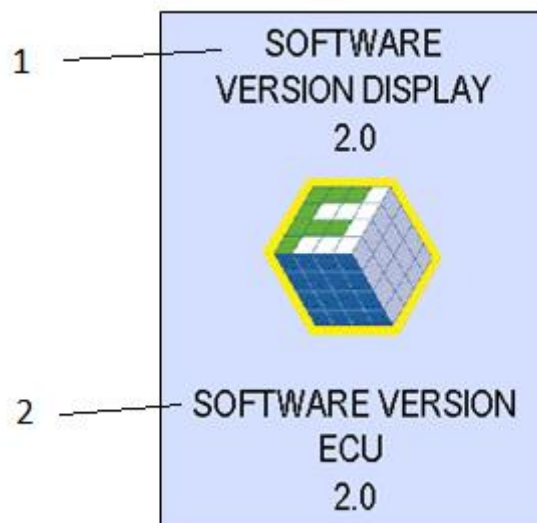
Press OK again to confirm the brightness adjustments and go back to the main menu.

If the MENU button is pressed on the "display parameters" page, you will go back to the "main" page.

### **3.1.2.8 SOFTWARE VERSION PAGE**



The operator can identify the code and revision of the software installed from the sw version page, if the assistance service requires it.



List of icons present:

1. Display software version
2. ECU control unit software version


Press OK to go back to the "main" page.

Press MENU to go back to the "menu" page.



### 3.1.2.9 ENGINE PAGE

The "engine" page provides information about the operating conditions of the DEUTZ 85 kW and 90 kW diesel engine.

	
1	DIESEL RPM      0 rpm
2	ENGINE LOAD      0%
3	OIL PRESSURE      0 bar
4	FUEL PRESSURE      0 bar
5	FUEL RATE      0 l/h
6	WATER TEMP.      0 °C
7	BOOST PRESS.      0 mbar
8	VOLTAGE      0.0 V
9	ENGINE HOURS      0 h

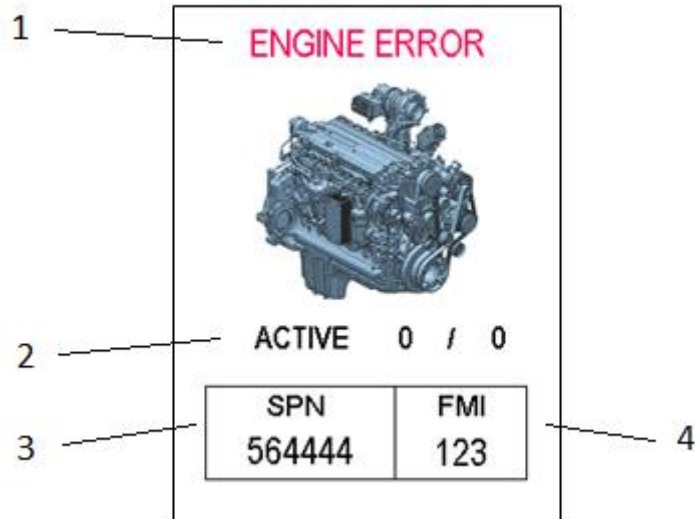
List of data present:

1. Diesel rpm - Engine revs digital indicator
2. Engine load - Engine load use percentage indicator
3. Oil pressure - Engine oil pressure indicator
4. Fuel pressure - Fuel pressure indicator
5. Hourly consumption - Fuel hourly consumption indicator
6. Water temperature - Engine cooling liquid temperature indicator
7. Air pressure - Pressure indicator of the air entering the combustion chamber
8. Voltage - Battery charger indicator
9. Engine hours - Engine operating hours indicator

### 3.1.2.10 ENGINE ERRORS PAGE



The “engine errors” page indicates the error codes detected by the electronic self-diagnostic system of the engine.



List of icons/data:

1. Engine errors
2. Quantitative indication of the errors n/n (n of n)
3. Suspected error number
4. Error identification number

Press the DOWN button to go to the next error

Press the UP button to go to the previous error

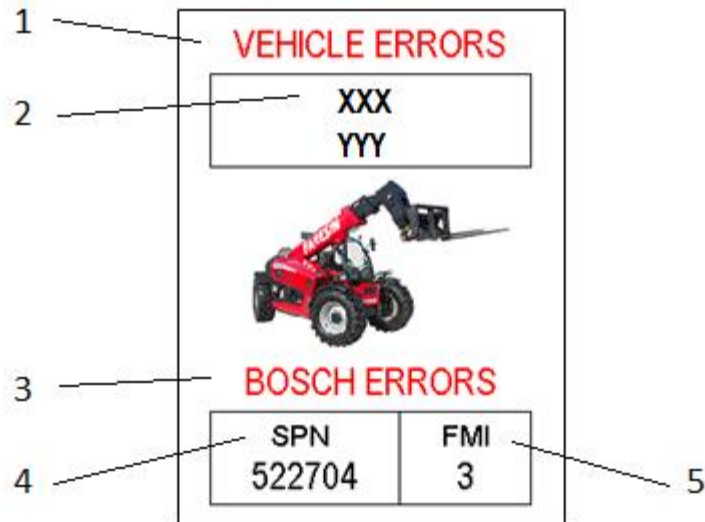
Press OK to go back to the "main" page

Press MENU to go back to the "menu" page.

### 3.1.2.11 VEHICLE ERRORS PAGE



The “vehicle errors” page indicates the error codes detected by the electronic self-diagnostic system of the machine’s control units.



List of icons/data:

1. Vehicle errors
2. Vehicle error description
3. Bosch Errors
4. Bosch suspected error number
5. Bosch error identification number

Press the DOWN button to go to the next Bosch error

Press the UP button to go to the previous Bosch error

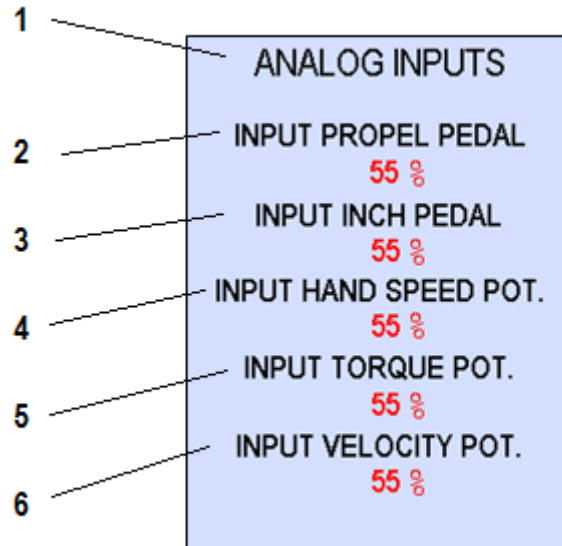
Press OK to go back to the "main" page

Press MENU to go back to the "menu" page.



### 3.1.2.12 **INPUTS PAGE**

The “inputs” pages shows all analogue and digital inputs detected by the machine’s electronic control system.



List of icons/data:

1. Analogue inputs
2. Forward pedal analogue input
3. Inching pedal analogue input
4. Engine rev speed potentiometer analogue input
5. Potentiometer analogue input of torque transferred to the wheels
6. Forward speed potentiometer analogue input

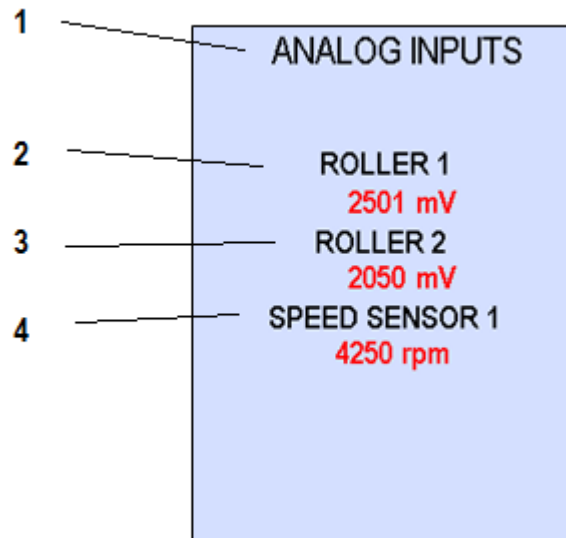
With regard to all analogue inputs, the instant operating percentage of the said device is displayed immediately after.

Press the DOWN button to go to the next page of “analogue inputs”.

Press the UP button to go to the "digital inputs" page.

Press OK to go back to the "main" page

Press MENU to go back to the "menu" page.



List of icons/data:

1. Analogue inputs
2. Roller 1 joystick analogue input
3. Roller 2 joystick analogue input
4. Hydrostatic engine rev speed sensor analogue input

With regard to all analogue inputs, the instant measured value of the said device is displayed immediately after.

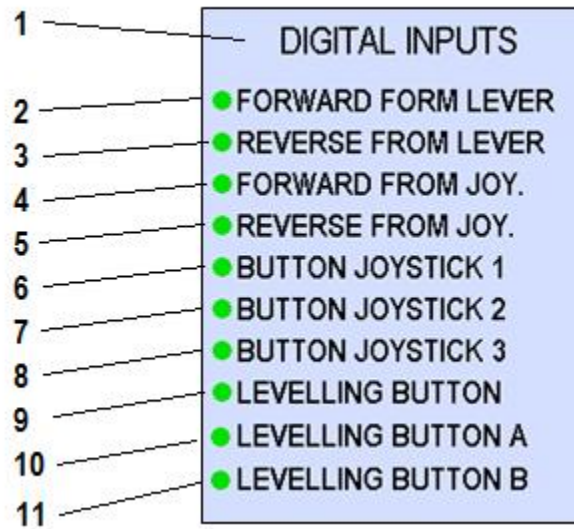
Press the DOWN button to go to the "digital inputs" page

Press the UP button to go to the previous page of "analogue inputs"

Press OK to go back to the "main" page

Press MENU to go back to the "menu" page.





List of icons/data:

1. Digital inputs
2. Forward gear digital input from selector on the steering wheel
3. Reverse gear digital input from selector on the steering wheel
4. Forward digital input from joystick button
5. Reverse digital input from joystick button
6. Digital input button 1 joystick
7. Digital input button 2 joystick
8. Digital input button 3 joystick
9. Digital input levelling button from selector on the steering wheel
10. Digital input levelling button on the "Second right side dashboard" for levelling to the left
11. Digital input levelling button on the "Second right side dashboard" for levelling to the right

Press the DOWN button to go to the "analogue inputs" page

Press the UP button to go to the "analogue inputs" page

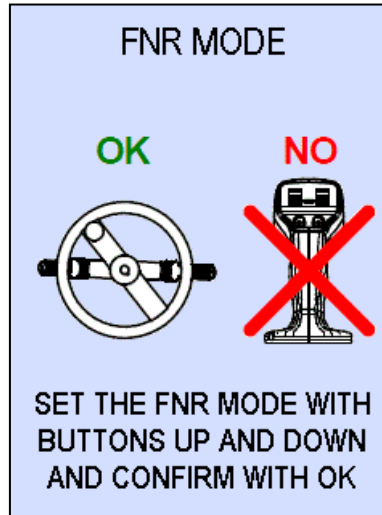
Press OK to go back to the "main" page

Press MENU to go back to the "menu" page.



### 3.1.2.13 **FNR MODE**

The “FNR mode” page enables you to select the travel mode: if from devio or joystick (see “Joystick” paragraph).



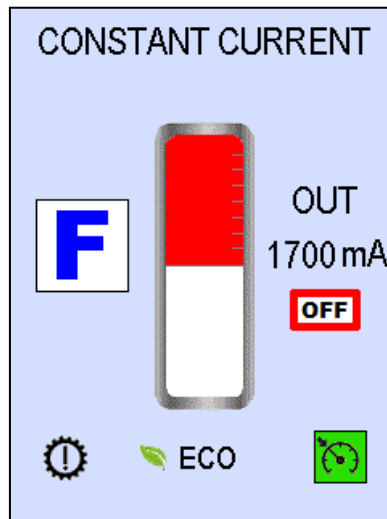
Press the UP and DOWN button to switch between one mode and another.  
Press OK to go back to the "main" page  
Press MENU to go back to the "menu" page.

Once the mode is selected, the corresponding symbol (11) will be displayed on the main screen.

### 3.1.2.14 **CONSTANT FLOW**



The “constant flow” page is an optional function for specific applications where it is convenient to have a fixed flow of oil. Adjustment is carried out from the arrows of the computer on the machine or from the roller joystick (see joystick paragraph), whereas it is enabled from the joystick.



- Press the UP and DOWN buttons (on-board computer) or roller 4 (joystick) to adjust the flow.
- Press OK (on-board computer) to go back to the "main" page
- Press MENU (on-board computer) to go back to the "main" menu
- Press button 5 (joystick) for 3 seconds to enable the function (the symbol goes from **OFF** to **ON** )
- Press button 5 again to disable the function.



### 3.1.2.15 SAFETY WARNINGS

The computer on board can inform the operator about the conditions in which safety is compromised.

If the operator leaves the driver's seat without first engaging the parking brake, the following warning appears (regardless of the displayed page) and an acoustic signal is emitted:



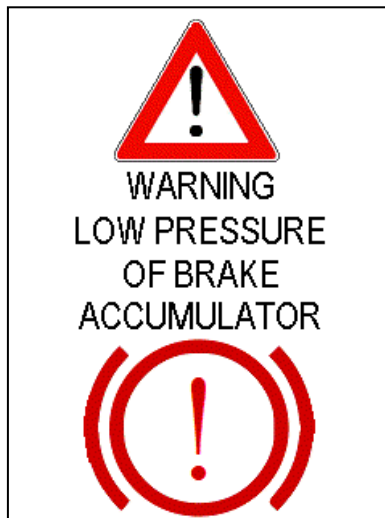
If the quick release command is enabled, the following warning is displayed and an acoustic signal is emitted:



If the maximum speed is exceeded, the following warning is displayed and an acoustic signal is emitted:



If a pressure value lower than that required in the brake circuit storage system is detected, the following warning is displayed and an acoustic signal is emitted:



If the neutral gear “N” is not inserted before ignition, the vehicle does not start and the following warning is displayed:



If the gear is not engaged during a change, the following warning is displayed:



If the operator enables the levelling system (see “Machine levelling”), the following warning is displayed:



If the operator manually enables cleanfix, or if it starts automatically (see “Cleanfix”), the following warning is displayed:





### 3.1.3 RIGHT FRONT DASHBOARD



Selector 1: SHOVEL drive mode control

Selector 2: by-pass key to control the anti-tip control unit

### 3.1.4 FIRST RIGHT SIDE DASHBOARD



The following are found inside this dashboard:

#### Key selector (1) for ignition:

- Position 0 = no supply, instrument/display panel and engine off.
- Position 1 = enabling the instrument/display panel and the switches on the second side dashboard and the upper side dashboard.
- Position 2 = started diesel engine. After starting up the engine, release the key, which will automatically return to position 1.

*The engine can only be started with the drive direction selection lever in the neutral "N" position. When starting up the engine do not insist for more than 5 seconds.*



#### Emergency mushroom button (2):

If pressed in an emergency, it disables all functions of the machine by stopping the diesel engine. Release it by rotating it in the direction indicated by the arrow.

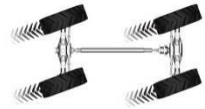


### Steering selector (3):

This allows one of the three possible steering modes to be selected:



- Left position: front and rear steering wheels for "crab" advancement
- Central position: steering front wheels, fixed rear wheels
- Right position: front and rear steering wheels for "concentric" advancement.



*When driving on roads the selector must be placed in the central position and the red mechanical interlock must also be engaged.*

*Moderate speed must be maintained when travelling in cross mode as this movement usually reduces the level of safety.*

### How to align the wheels

Proceed as follows to align the wheels:

- Move the selector (3) to the right and turn the steering wheel until the display shows the wheel alignment icon on a green background in line with the rear wheels.
- Move the selector (3) to the central position and turn the steering wheel until the display shows the wheel alignment icon on a green background in line with the front wheels.



*Align the wheels every time the steering mode is changed, before switching to the new mode and every time before using the machine.*

### Pressure of the servo controls (4)

This measured data is not required in normal machine operation but may indicate the source of an anomaly.



### 3.1.5 SECOND RIGHT SIDE DASHBOARD



The following are found inside this dashboard:

1. Button with integrated activating/deactivating parking brake light
2. Button with integrated enabling/disabling boom suspension light (optional if present)
3. Button with integrated enabling/disabling boom floating mode light (optional if present)
4. Transversal levelling button
5. Button with integrated enabling/disabling set/reset cruise control
6. Button with integrated light of the particulate filter regeneration start (NOT PRESENT)
7. Button with integrated enabling/disabling agri mode light (NOT PRESENT)
8. Button with integrated enabling/disabling heated mirror light (optional if present)
9. Button with integrated enabling/disabling light of the boom additional work lights (optional if present)
10. Button with integrated enabling/disabling CLEAN FIX light (optional if present)
11. Button with integrated light of the mechanical gear change
12. Work mode selector
13. Cigarette lighter
14. Parking brake fault LED
15. Service brake fault LED
16. Hydraulic tow brake fault LED (optional if present)
17. Regeneration is required LED (cannot be executed by the operator; contact the Assistance Service)
18. Engine potentiometer revs
19. Torque control potentiometer
20. Travel speed potentiometer (works in creeper mode)

### 3.1.6 TOP RIGHT SIDE DASHBOARD



A third dashboard is found on the right side of the operator, at the top. A picture is provided below.



The following are found inside the dashboard:

1. Emergency lights – button with integrated light to activate/deactivate all four direction indicators. Also the switch warning light blinks when the device is running.
2. Work lights - button with integrated light to activate/deactivate the work lights on the cabin.
3. Front windscreen wiper - button with integrated light to activate/deactivate the front windscreen wiper. The button has 3 positions: position 0 = off, position 1 = low speed, position 2 = high speed.
4. Rotating light - button with integrated light to activate/deactivate the rotating light
5. Cabin light - press to the right to activate it and to the left to deactivate it.
6. Radio set up.



### 3.1.7 PEDALS

The pedal (1) is the normal vehicle-type of accelerator. It is connected to the engine by means of an electric cable and electronic control. Push the pedal to increase engine speed and release it to reduce speed.

The pedal (2) is the normal vehicle-type of brake. It is hydraulic type and is connected to discs in an oil bath inside the axle by means of pipes. Press the pedal to decrease the speed.

The pedal (2) must be used as a clutch to change the mechanical gear from stationary. To change gear: set to neutral, press the brake pedal all the way down; press the relative button on the dashboard and release the brake. Enter the direction of movement, steer right and left to make it easier to engage the gear; slowly start moving.



*The pedals must always be ready to be actuated with no hindrance. The pedal area must be free from objects that could end up under the pedals.*

*No mats or other floor covering must be used.*

*All pedals must be able to return to their original position with no hindrance.*

*When the machine is moving at fast speed, pushing the brake pedal (2) completely is dangerous for yourself and the machine, in fact:*

- *Pressing the pedal more than necessary can cause sudden braking*
- *Stopping the machine suddenly can cause the load being transported to fall*
- *Sudden braking can cause physical trauma caused by the safety belt that should be fastened.*



### **Combined inching function**

The machine is equipped with an inching function, which allows precision handling operations to be performed. Use this feature by pressing the brake and accelerator pedal simultaneously. Briefly releasing only the brake pedal, the machine moves in a slowly and gradually. The inching function can be used by pressing the brake pedal slightly; if it is pressed completely, the machine stops.

### **Service brake**

Push pedal (2) to slow down or stop the machine; the action is transmitted to the servo brake valve which acts on the brake discs inside the front differential bridges. As an assisted servo brake, the pressure applied on the pedal does not change the braking force very much. Even if pressed slightly, it brakes immediately. The active parts of the parking brake systems are built into the front differential bridge; the service brake also only acts on the front bridge and not on the rear bridge.

Both are disks in oil bath, a system that guarantees long-lasting efficiency, as well as being maintenance-free. It is hydraulically operated. By pushing the pedal, the brake valve box moves sending oil towards the brake box, pressing the brake discs together.

When the pedal is not pressed, the brakes are free. With the machine off, the parking brake is automatically engaged.

In fact, if the vehicle is with the diesel engine off but with the ignition key in position 1, a pressure accumulator in the system guarantees a number of brakes until the relevant low pressure LED on the second right side dashboard lights up. At this point, if the diesel engine is not reactivated or if there is a fault/failure in the hydraulic system, the brakes can no longer guarantee that the machine will be stopped/parked correctly. The same applies to the circuit of the parking brake, where a pressure accumulator guarantees a minimum number of brake releases until the relevant low pressure on the second right side dashboard lights up. The system guarantees that in case of a breakdown or fault, the vehicle moves with a diesel engine switched off and ignition key in position 1.





### 3.1.8 JOYSTICK

The joystick, to the right of the driver's seat, allows you to perform all hydraulic movements of the telescopic boom and the accessory carrier at its end.

The joystick has two operating sides (A and B) on which a number of buttons found. Each button enables/controls a particular function/operation. The joystick can move in four directions: forward, backward, left and right.

Move the joystick forward to lower the boom.



Move the joystick backward to lift the boom.



Move the joystick to the left to swing upwards.



Move the joystick to the right to swing downwards



The operational side A is characterised by the presence of the forward-neutral-reverse (FNR) drive direction control button. To enable this operating side, it is necessary to select “concentric” or “crab” steering, or it is possible to enable it temporarily from the relative page on the dashboard. Operating side B has different functions depending on the operating set from the joystick. The possible modes are:

#### TELE mode (default setting)

Joystick button	Pressure	TELE mode function
5	Brief	No function
	Long	Enabling/disabling the boom service output with constant flow (if provided)
1	Brief	Switching to TELE/AGRI mode
	Long	No function
2	Brief	Enabling/disabling the auxiliary boom socket (if provided)
	Long	No function
Roller 3	Forward	Extension output
	Reverse	Extension retraction
	Backward t>5sec	No function
Roller 4	Forward	Equipment block with quick release
	Reverse	Equipment release with quick release
	Backward t>5sec	No function

**AGRI mode** (optional; can be set from button 1 on the joystick)



Joystick button	Pressure	AGRI mode function
5	Brief	No function
	Long	No function
1	Brief	Switching to TELE/AGRI mode
	Long	No function
2	Brief	No function
	Long	No function
Roller 3	Forward	Enabling the AGRI 1 auxiliary socket (delivery)
	Reverse	Enabling the AGRI 1 auxiliary socket (return)
	Backward t>5sec	Enabling the floating AGRI 1 auxiliary socket
Roller 4	Forward	Enabling the AGRI 2 auxiliary socket (delivery)
	Reverse	Enabling the AGRI 2 auxiliary socket (return)
	Backward t>5sec	Enabling the floating AGRI 2 auxiliary socket



# CHAPTER 4

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## 4

## OPERATING WITH THE MACHINE

## 4.1 START UP

Start the engine by rotating the key selector (1) clockwise from position 0 (engine off) to position 1. In this position, the display of the computer on board is activated and the "Main" page is displayed. Activating the parking lights activates the back-lighting of the buttons on the dashboards. Make sure the "Emergency mushroom" button is not activated.



Wait for the spark plugs preheating LED goes off (preheating of the combustion air). Preheating is only activated automatically when the control unit detects a low outdoor air temperature.



Turn the key to the "Start" position to start the machine. After start-up, release the key and it will automatically return to position 1.

*The engine can only be started with the gear selection lever in the neutral "N" position and if the operator is sitting in the driver's seat.*

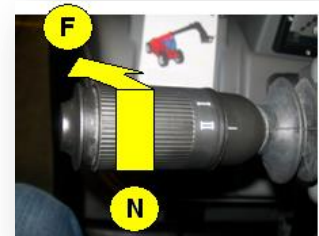
*When starting up the engine do not insist for more than 5-7 seconds.*



## 4.2 FORWARD DRIVE OR REVERSE DRIVE

Enable the forward drive of the machine (F) by pulling the lever towards the steering wheel and moving it forward. The letter "F" will appear on the display on the front right dashboard.

Turn the knob to select the first or second hydraulic gear.



To enable the reverse drive of the machine (R), pull the lever towards the steering wheel and move it back. The letter "R" will appear on the display on the front right dashboard.

Enable the neutral gear (N) by moving the lever to the central position.

The lever controls do not operate when:

- the parking brake is engaged;
- the operator is not sitting in the driver's seat.



*Accelerator, brake, direction indicators, hazard lights, headlights and lights and in general all the function controls required while driving on the road are described in the previous chapters and have the same function and the same importance as the controls for common vehicles to circulate on the roads.*



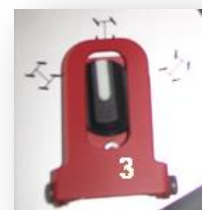
*Attention! If the operator leaves the driver's seat, the neutral gear "N" is automatically engaged after 2 seconds.*

The machine is at a stop when the engine runs at minimum. Gradually press the gas pedal (1) to increase engine speed, release it to reduce speed. Push the pedal (1) to increase engine speed, release it to reduce speed. Push pedal (2) to slow down or stop the machine. The action is transmitted directly to the brakes located inside the front differential bridge.



### 4.3 STEERING

The selector (3) allows you to select one of the three possible steering modes:



- Left position: front and rear steering wheels for "crab" advancing. This mode is indicated when, during work, lateral displacement is required within a limited operating space. The functions of the boom in this operating mode are by default disabled; the operator can enable them from the “Boom enabling” control page.
- Central position: steering front wheels, fixed rear wheels. This mode is indicated during movements, even within the work site but still significant. It is mandatory while moving on the road.
- Right position: front and rear steering wheels for "concentric" advancement. This mode is suitable when a certain degree of manoeuvrability is required even during all the work phases on site.



It


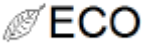




*When driving on roads the selector must be placed in the central position and the red mechanical interlock must also be engaged. Changing gear in this mode is only possible from the lever situated on the left side of the steering wheel.*



## 4.4 SELECTING THE DRIVING MODE

The FR03 GLS IIIA model allows you to choose a specific driving mode and vehicle operation. The following possible modes can be selected from the selector on the second right side dashboard:

- DRIVE 
- ECO 
- HANDLING 
- CREEPER 

**DRIVE mode:** you can change the speed from 0 to 40 km/h with continuous speed variation without torque interruption. The maximum speed is reached at the maximum speed of the diesel engine. This is the suitable mode to make full use of the vehicle performance.

**ECO mode:** you can change the speed from 0 to 40 km/h with continuous speed variation without torque interruption. The maximum speed is reached at a limited speed of the diesel engine (approx. 1800 rpm). It is the suitable mode to drive on the road limiting fuel consumption and improving the acoustic comfort inside the driver's cabin.

**HANDLING mode:** you can change the speed from 0 to 12 km/h with continuous speed variation without torque interruption. Maximum possible torque delivered by the hydrostatic transmission is used. The sensitivity of the electronic accelerator pedal varies to manage movement more easily during the work phases. In this mode the travel speed and the drive torque can be limited by simply actuating potentiometers on the second right side dashboard.

**CREEPER mode:** you can change the speed from 0 to 12 km/h separately from the rotation speed of the diesel engine. This mode allows you to set the rpm of the diesel engine via the specific potentiometer on the second right side dashboard; set the desired maximum travel speed from the specific potentiometer on the second right side dashboard and enable the forward drive from the accelerator pedal. It is the most suitable mode for equipment to be used that require a constant travel speed and a constant oil flow determined by the rpm of the diesel engine.

The FR03 GLS IIIA model is equipped with an electronic ASL (Active Speed Limiter) device, which automatically limits the maximum travel speed of the vehicle when the boom of the lift is raised. If this limit should intervene while driving, the vehicle slows down gradually until a maximum travel speed of 15 km/h is reached.

## 4.5 LEVELLING THE MACHINE



Handling loads and namely lifting or other operations that need to be conducted with the boom partially or completely extended are particularly dangerous if they are carried out with the machine NOT positioned on flat ground (check the flatness with the bubble level in the cabin)



To level the machine:

press the button at the top of the level located to the left of the steering wheel whilst keeping the above button pressed down, press the relative button on the second dashboard on the right-hand side; press the accelerator to modulate the levelling movement speed; an hydraulic cylinder connected to the frame lowers or lifts the frame according to the control launched.

Levelling is only possible if the boom is low, with the engine running in neutral “N”, and the driver is sitting in the driver’s seat. After completing operations related to moving the equipment up and down, the levelling must be manually reset by the operator before starting other activities; use the bubble level to set back the machine to its normal operating conditions.



## 4.6 ACCESSORY COUPLING and RELEASE

The attachment methods described below apply to all approved accessories, compatible with the machine.



- Slowly approach the accessory with the machine, tilting forwards slightly the accessory carrier.



- Slowly lift the boom and attach the accessory.



- Tilt the accessory carrier backwards so that the main structure of the accessory rests against the accessory carrier.





If the accessory carrier is of FARESIN (FH) type and does not have a quick coupling-release system, proceed as follows in order to secure the accessory to the accessory carrier:



- Raise the locking bar on this side of the accessory carrier and turn it until it locks.
- Insert the connection pin supplied with the accessory carrier and turn the locking bar back to position.
- Perform this operation also on the other side of the accessory carrier.

Release the accessory by simply performing the steps described in inverse order.

If the accessory carrier is of FARESIN (FH) type and has a quick release system (optional), simply control the extension of the quick release cylinder (on the accessory carrier) through the relevant joystick control to secure the accessory to the accessory carrier. Release the accessory by simply retracting the cylinder using the joystick control. The cylinder is powered by connecting a power tube to the pressure socket located at the end of the telescopic boom. Once the accessory is attached, the power tube can be left connected to the pressure socket unless the assembled accessory requires it.

*There are “push-pull” quick couplers. Do not insert and release the outlets when the circuit is pressurised: risk of pressurised oil leaking. Perform these operations without actuating the joystick control. When the pressure outlets are not used, close them with their rubber seals. Do not work with the accessory unblocked.*



If the accessory carrier is of EURO type and has a quick release system (standard), simply control the extension of the quick release cylinder (on the accessory carrier) through the relevant joystick control to secure the accessory to the accessory carrier. Release the accessory by simply retracting the cylinder using the joystick control. The cylinder is powered by connecting a power tube to the pressure socket located at the end of the telescopic boom. Once the accessory is attached, the power tube can be left connected to the pressure socket unless the assembled accessory requires it.

*There are “push-pull” quick couplers. Do not insert and release the outlets when the circuit is pressurised: risk of pressurised oil leaking. Perform these operations without actuating the joystick control. When the pressure outlets are not used, close them with their rubber seals. Do not work with the accessory unblocked.*



## 4.7 STACKING

### 4.7.1 HOW TO DRAW A LOAD

Approach the load perpendicularly with the boom retracted and the forks in a horizontal position. If the forks do not have the transversal movement system (optional), engage the parking brake, climb off the machine and move the forks manually making sure they are central with respect to both the load and the machine.





*Attention! Risk of crushing fingers while moving the forks. Pay attention.*

Slowly drive the machine while slightly lifting the forks. Insert the forks fully until they are supporting the load. Lift the boom slightly and tilt the forks backwards (transport position). Tilt the forks enough to stabilise the load preventing it moving forwards in case of sudden braking during transport.

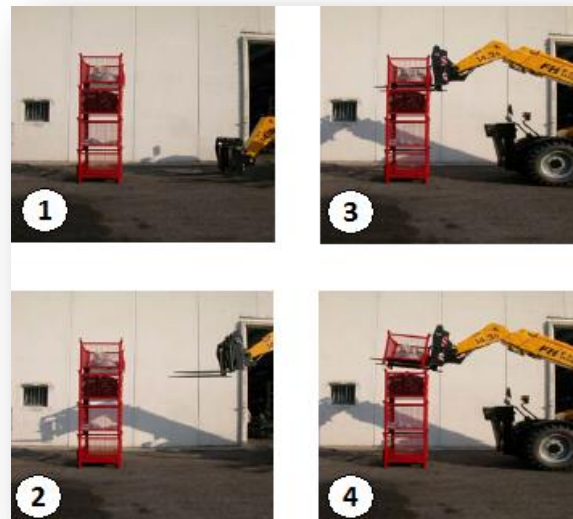


#### 4.7.2 HOW TO DRAW A LOAD FROM ABOVE

Slowly move the machine forward, lifting the forks so as to be positioned vertically under the point from where the load is to be drawn. Insert the forks fully until they are supporting the load. Lift the boom slightly and tilt the forks backwards (transport position). Tilt the forks enough to stabilise the load preventing it moving forwards in case of sudden braking during transport. Move the machine backwards and lower the telescopic boom.



To place a load high up, perform the same operations in inverse order.



## 4.8 LIMITS OF USE

Never lift or transport a load that exceeds the nominal capacity of the machine or the accessory.

Before lifting the load, check its weight and load diagram in the manual. The cabin refers to lifting a load whose centre of gravity (shown on the diagram) is at distance D from the edge of the fork.

If the load has a mobile centre of gravity, with liquids for example, move with precaution as it is not possible to determine a precise rule.



### MACHINE



load that exceeds the machine or the

check its weight and load diagram in the manual with the forks, is at distance D from the

centre of gravity,

### 4.8.1 TRANSPORTING THE LOAD

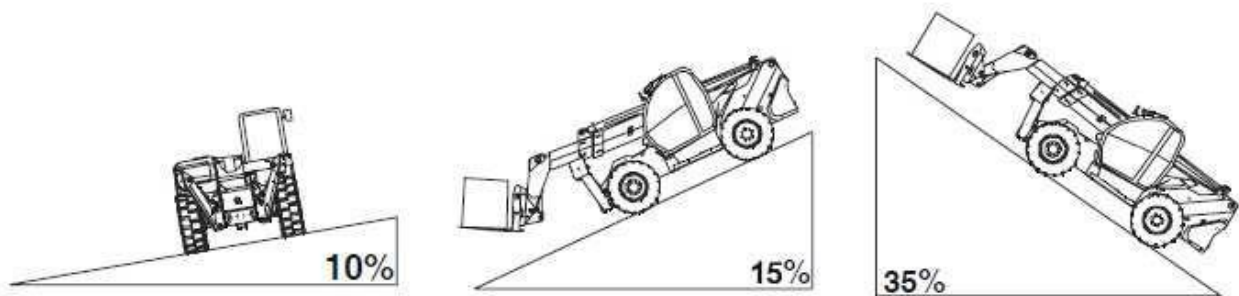
- Make sure you have selected the suitable steering mode



- Fully retract the boom
- Lift the boom slightly and bring the accessory carrier back to lift the load 300 mm from the ground
- Transport the load at a walking pace
- It is forbidden to transport loads on public roads.

## 4.8.2 TRANSPORTING THE LOAD ON A SLOPE

The slope values not to be exceeded are shown in the pictures below. The machine must move with the boom completely lowered and retracted.



## 4.9 WHAT TO DO AND NOT DO



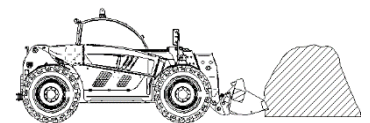
It is forbidden to tow masses with the boom (extended or retracted).



It is forbidden to move masses with the boom extended. It is forbidden to use the bucket on the ground when the boom is extended.



Retract the boom before moving masses.



It is forbidden to level with the bucket moving the machine or the boom backwards.



In case of wind exceeding 12.5 m/sec (45 km/h), interrupt operations with the boom raised.

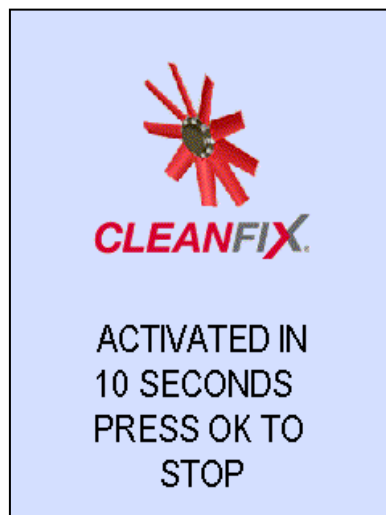


#### 4.9.1 CLEANFIX PROCEDURE

The cleanfix procedure is a function that keeps the surfaces of the radiator clean and efficient. The function is carried out by step inversion of the cooling fan blade and, consequently, inversion of the cooling flow direction.

The cleanfix procedure starts automatically (approximately every 30 minutes of operation) and manually (button 10 on the right side dashboard).

Its start-up is preceded by the following screen: it is enabled within 10 seconds; to stop its start-up, press OK.



During activation, the engine’s speed must be below 1800 rpm.

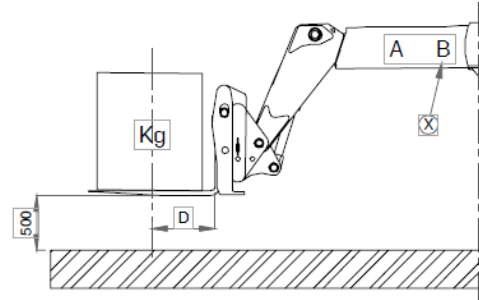


## 4.10 HOW TO VERIFY THAT THE ANTI-TIP DEVICE WORKS CORRECTLY



Proceed as follows to verify that the anti-tip device works correctly:

- Select a load for which the correct weight (kg) is known.
- Position the machine level and align the wheels
- Insert the forks under the load in such a way that the centre of gravity is at a distance D (seen on the load diagram) with respect to the edge of the fork.
- Lift the load to a height of 500 mm from the ground.
- Extend the boom until the anti roll over device intervenes
- Take note of the length of the extended boom (reading the last letter "X" shown on the side of the boom)
- Make sure the letter noted corresponds to the limit indicated on the load diagram available in the cabin.



The tolerance is +/-150 mm in relation to the indications provided in the diagram.

## 4.11 TOWING THE MACHINE



The hydrostatic transmission of the machine and the traction of all four wheels are constantly engaged. Furthermore, when the diesel engine is off, the brakes are engaged.

It is not possible to tow the machine with the engine off without damaging the transmission components, unless it is moved slightly from a dangerous or obstructing area.

If it is necessary to tow the machine for a long distance the negative brake on the front axle needs to be released following the procedure described below.

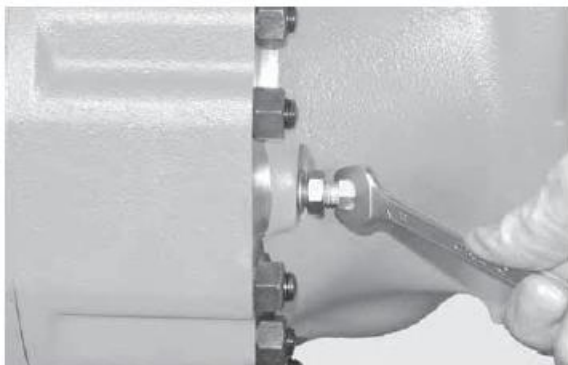
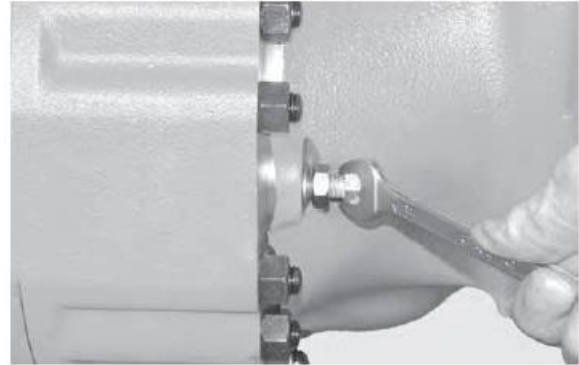
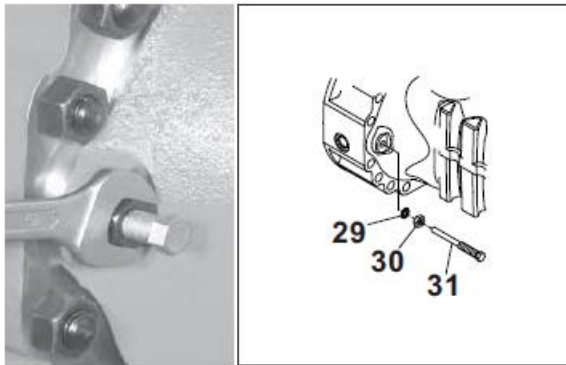
#### 4.11.1 RELEASING THE INTERNAL PARKING BRAKE ON THE AXLE



**Attention:** IMMOBILISE THE WHEELS. Failure to do so can be very dangerous or even fatal for the operator: in fact, the vehicle could move on its own.

Immobilise all four wheels to stop the vehicle from moving once the brake has been released.

Disable the parking brakes by loosening the nuts (30) on the screws (31) to mechanically release the braking unit and move the nuts back by approximately 8mm. Tighten the screws (31) until they reach the pressure plate. Use a key to alternately loosen the screws (31) a 1/4 turn at a time, to press the Belleville washers and free up the brake discs. Attention: tighten with a maximum of 1 turn.



*Attention! High speed and excessive towing distances can generate excessive heat and insufficient lubrication. This damages the axial piston operating unit.*



## 4.11.2 TOWING FOR SHORT DISTANCES

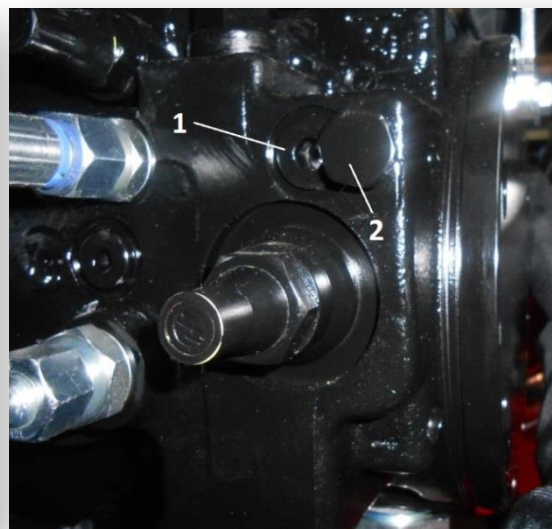
Warning: these operations can only be carried out only with the engine turned off and with the vehicle wheels blocked by means of wedges to prevent the machine from carrying out uncontrolled movements. Danger of crushing.

To tow the machine for short distances, in other words only to move it from a dangerous area or in case it breaks down and becomes a hindrance, proceed as follows:

- Release the negative brake (by following the procedure described above)
- Remove the rear closing guard of the engine compartment



- Release the hydrostatic pump located in the rear part of the engine bonnet by unscrewing screw 1 shown in the figure (using an 8-mm Allen wrench) until it comes in contact with retainer 2.
- Remove the wedges



- Proceed with the towing operation

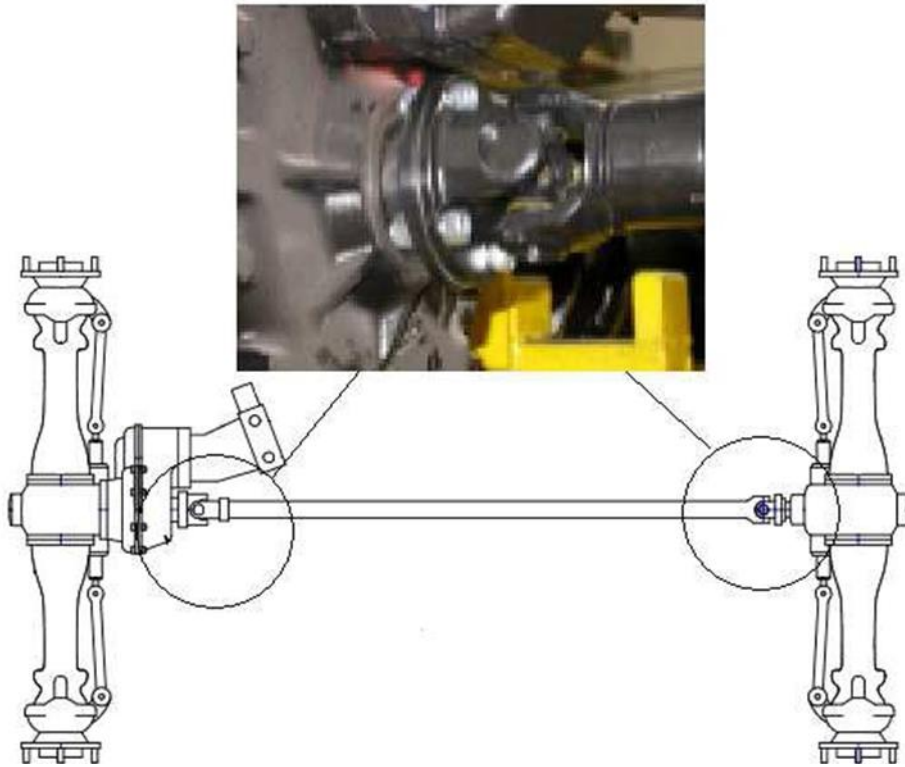
The machine can be towed for short distances (max 200-300 m) and at a maximum speed of 3 km/h.

### **4.11.3 TOWING FOR LONG DISTANCES**

Warning: these operations can only be carried out when the engine is not turning and with the vehicle blocked by means wedges to prevent the machine from carrying out uncontrolled movements. Danger of crushing.

To tow the machine for long distances, proceed as follows:

- Release the negative brake (by following the procedure described above)
- Release the transmission mechanically by releasing the cardan shafts from the gearbox (both the front and rear cardan), securing them to the frame by means of ropes.
- Remove the wedges
- Proceed with the towing operation



# CHAPTER 5

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## 5

## MAINTENANCE FR03 GLS IIIA

## 5.1 GENERAL

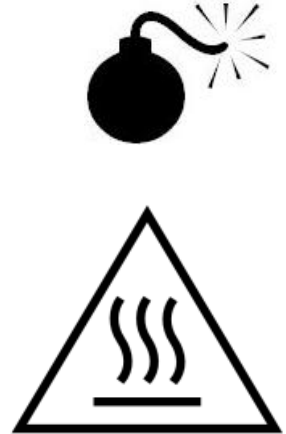


- Park the machine on level ground.
- The work area must be clean and dry.
- Maintenance, repair and adjustment operations must be carried out by qualified and skilled staff with the machine switched off.
- It is forbidden to carry out maintenance when the machine is moving.
- The frequency indicated in this manual must be complied with. Damaged or worn parts must be immediately repaired or replaced.
- Always keep the machine clean from debris and eliminate any grease or oil deposits.
- Isolate the battery if arc welding is to be carried out on the machine or work is to be performed on the wiring system.
- If electric arc welding must be performed, disconnect the transmission control unit inside the general electrical box.
- When arc welding, connect the welder mass to a point in direct contact with the area to be welded avoiding intervention on sliding parts such as joints, bearings, hydraulic cylinders.
- Wear protective glasses and mask when using compressed air for cleaning. Do not direct the jet towards the skin or the eyes.
- Use gloves and glasses when handling detergent liquids and/or lubricants.
- After maintenance and before enabling the machine, make sure that any safety devices removed previously have been restored.
- If the machine must be lifted, make sure it is supported on a solid and safe base.
- When operating under mobile lifted parts (e.g. telescopic boom), block the hydraulic cylinder movements with the spacers and rest them on top of safe and strong supports.

## 5.2 THERMAL RISK

### 5.2.1 JETS OF HOT FLUIDS

After switching the engine off, its mass remains very hot for a certain amount of time depending on the room temperature. To avoid the discharge of jets of hot fluid and vapour, do not remove the radiator cap until the engine is cold. To open, unscrew the cap until it stops and lift it.



### 5.2.2 FLUIDS AND HOT SURFACES

The engine oil, the reducers and the hydraulic system heat up when using the machine. Before touching the machine and the parts of its hydraulic circuit, wait for the ambient temperature to be reached.

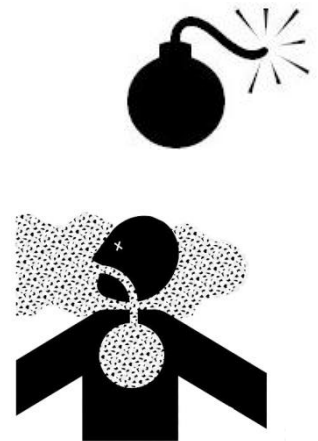
## 5.3 PRESSURISED LIQUIDS

- Splashes of fuel or hydraulic oil can penetrate the skin or enter eyes with serious consequences.
- Release the pressure of the circuits before disconnecting the pipes.
- Before starting up the engine, make sure that all connections are closed correctly.
- Look for any liquid leakages using a piece of cardboard as a shield.
- Protect eyes using a facial mask or glasses.
- In case of injury caused by oil or fuel, immediately seek medical help to remove all traces and prevent infection.



## 5.4 EXHAUST GAS

Engine exhaust fumes are toxic and can be harmful to one's health. When operating in closed environments, make sure there is enough air and equip the machine with suitable purifiers.

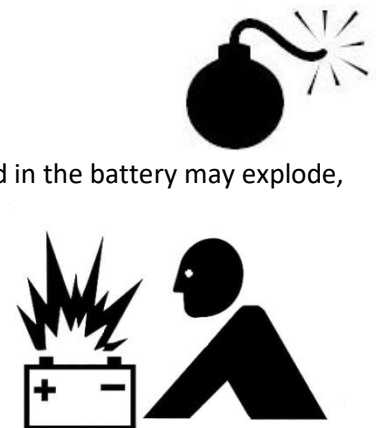


## 5.5 HANDLE THE BATTERY WITH CARE

Under certain conditions the gas produced by the chemical elements contained in the battery may explode, consequently leaking corrosive liquid.

Wear a facial mask and safety glasses.

Charge the battery when the temperature is no less than 15-16°C, otherwise there is the risk of explosion. Check the battery charge only with a voltmeter or a densimeter.



## 5.6 START-UP USING AN EXTERNAL BATTERY

If the engine must be started using an external battery, carefully follow the instructions provided; an incorrect procedure can damage the electronic control units, cause the batteries to explode and the machine to move suddenly.

Two people are required for safe operation, one of whom must always remain seated in the driver's seat. Do not use batteries that have been stored in very cold environments.

## 5.7 IN CASE OF FIRE

If there is enough time, stop the engine by turning the ignition key. Move away from the machine.

Try to put the fire out only if adequate and efficient extinguishing means are available (e.g. an extinguisher).



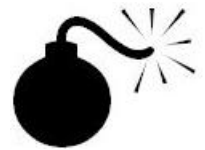
## 5.8 MAINTENANCE WITH THE ENGINE OFF



Perform maintenance with the engine off as follows:

- Lower the telescopic boom
- Run the engine at a minimum without a load for about 1 minute to allow the temperature to drop and be balanced.
- Switch off the engine turning the ignition key to the stop position
- Remove the ignition key.
- Apply a warning note with "Maintenance in course" written on it to the cabin door and its hydraulic controls

## 5.9 MAINTENANCE WITH THE ENGINE ON



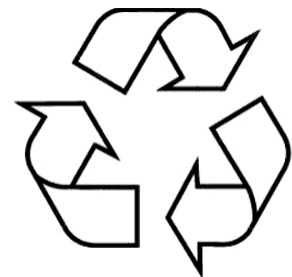
Keep hands, feet and clothing away from moving parts and never leave the machine unattended.

## 5.10 RESPECT THE ENVIRONMENT

The materials used for the machine are a threat to the environment if not disposed of correctly.

Lubricants, fuel, cooling liquid, filters and the battery are considered potentially hazardous waste.

Do not throw this waste on the ground, into drains or in waterways but dispose of it according to local regulations as well as the provisions of the EU regulations concerning environmental protection.





## 5.11 FR03 GLS IIIA MAINTENANCE SCHEDULE

The data sheet below lists all the necessary maintenance operations and the frequency required to maintain the efficiency of the machine. DEUTZ 103 kW Stage IIIA engine.

GROUP	TYPE OF VERIFICATION	FREQUENCY		FREQUENCY OF SCHEDULED MAINTENANCE					
		DAILY	WEEKLY	FIRST INTERVENTION (250 HOURS)	500 HOURS	1000 HOURS	1500 HOURS	2000 HOURS	3000 HOURS
ENGINE	Check the lubricant oil level (top-up if necessary)	X							
	Check the coolant liquid level (top-up if necessary)	X		X					
	Visually inspect the engine seal	X							
	Drain the water from the fuel pre-filter		X						
	Check the condition and tension of the belt			X		X			
	Change the engine oil <sup>1*</sup>			X	X				
	Verify and if necessary replace the fuel pre-filter *				X				
	Replace the engine oil filter/s cartridge *			X	X				
	Replace the fuel filter/s *					X			
	Replace the fuel pre-filter *					X			
	Check the integrity of the exhaust pipe/s		X						
	Replace the auxiliary part belt/s *								X
	Replace the coolant liquid <sub>2*</sub>						X		
	Verify the efficiency of the pre and post heating system <sup>*3*</sup>						X		
	Verify the integrity of the engine air intake pipes *					X			
	Verify the condition of the battery and the cable connections *						X		
	Adjust valve play *							X	
	Verify the engine monitoring *						X		
Verify the engine supports *						X			
RADIATOR	Clean the radiator	X							
	Clean the closing nets	X							

GROUP	TYPE OF VERIFICATION	FREQUENCY		FREQUENCY OF SCHEDULED MAINTENANCE					
		DAILY	WEEKLY	FIRST INTERVENTION (250 HOURS)	500 HOURS	1000 HOURS	1500 HOURS	2000 HOURS	3000 HOURS
ENGINE AIR FILTER	Clean the air filter		X	WHEN SIGNALLED FROM THE COMPUTER ON BOARD					
	Replace the filter primary cartridge					X			
	Replace the secondary filter cartridge					X			
AXLES	Change the axle oil <sup>*/4</sup>			X		X			
	Clean the oil unloading magnetic plug <sup>*</sup>			X		X			
	Clean the oil vent <sup>*</sup>			X		X			
	Greasing		X	X					
GEARBOX	Change the gearbox oil <sup>*</sup>			X			X		
	Clean the oil unloading magnetic plug <sup>*</sup>			X			X		
	Clean the oil vent <sup>*</sup>			X			X		
	Greasing		X	X					
HYDRAULIC SYSTEM	Check the hydraulic oil level	X							
	Check the oil leaks from the hydraulic circuit	X							
	Change the hydraulic oil <sup>*</sup>						X		
	Replace the immersed hydraulic oil filter in intake <sup>*</sup>						X		
	Replace the hydraulic oil filter in return <sup>*</sup>					X			
	Replace the hydrostatic pump filter cartridge <sup>*</sup>			X	X				
	Verify the torque of the clamps and hydraulic pipes <sup>*</sup>					X			
	Replace the oil tank air vent filter						X		
VARIOUS	Safety decals inspection	X							
	Check tyre pressure	X							
	Check the electrical system operation	X							
	Check and verify the boom chain tension <sup>3</sup>		X						
	Verify the torque of the pneumatic nuts		X						
	Verify the torque of the boom runner screws <sup>*</sup>				X		X		
	Replace the boom runners <sup>*</sup>							X	
	Verify the spider screw torque		X						

GROUP	TYPE OF VERIFICATION	FREQUENCY		FREQUENCY OF SCHEDULED MAINTENANCE					
		DAILY	WEEKLY	FIRST INTERVENTION (250 HOURS)	500 HOURS	1000 HOURS	1500 HOURS	2000 HOURS	3000 HOURS
GREASING SYSTEM	Lubricate joints		X						
	Lubricate the boom chains <sup>3</sup>		X						
	Boom surfaces in contact with the runners		X						
	Lubricate the cross and transmission shafts		X						
AIR CONDITIONING	Recharging the air conditioning <sup>1</sup>								X
	Replace the cabin air filter				X				
	Replacing the air conditioning belt <sup>2</sup>								X
	Replacing the evaporator/condenser filter <sup>4</sup>								X

<sup>1</sup>to be performed annually, even if the expected operating hours are not reached

<sup>2</sup>or in any case every 2 years

<sup>3</sup>if applicable

<sup>4</sup>refer to the specific paragraph

\* to be performed by qualified personnel only

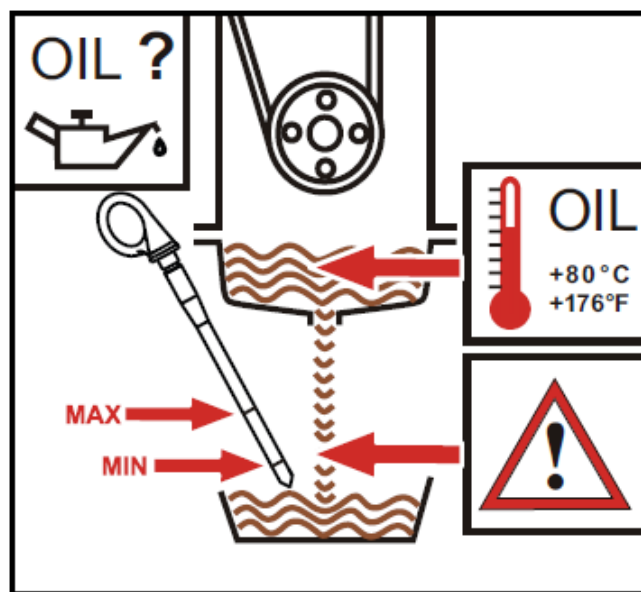
## 5.12 ENGINE



### 5.12.1 CHECK THE ENGINE LUBRICANT OIL LEVEL

Continue only with engine off. It is forbidden to smoke and have open flames. Attention: in case of hot lubricant oil, risk of burns. An insufficient and excessive level of lubricant oil causes engine damage. The oil level should only be verified with the engine stopped and level. If the engine is hot, stop the engine and check the oil level after 5 minutes. The inspection can be performed immediately if the engine is cold. Pull out the dipstick and wipe it with a clean cloth, which leaves no fibres. Insert the dipstick completely. Pull out the dipstick and check that the oil level is between the maximum and minimum.

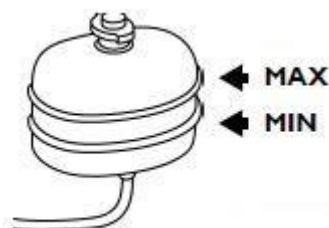
Only top-up if the level is insufficient, through the inlet after removing the relevant cap.



### 5.12.2 CHECK THE COOLING LIQUID LEVEL



Proceed only with the engine stopped and at a low temperature so as to prevent burns. With the engine cold make sure the liquid level in the expansion tank is above minimum. Visually check that the liquid level does not exceed the maximum level. If the level is insufficient, top-up the tank with suitable coolant liquid.



Proper operation is guaranteed and damage is minimised thanks to the water tank having a level sensor. In any case make sure that the liquid level is between minimum and maximum.

Attention! Frequent top-ups require the assistance service to intervene.

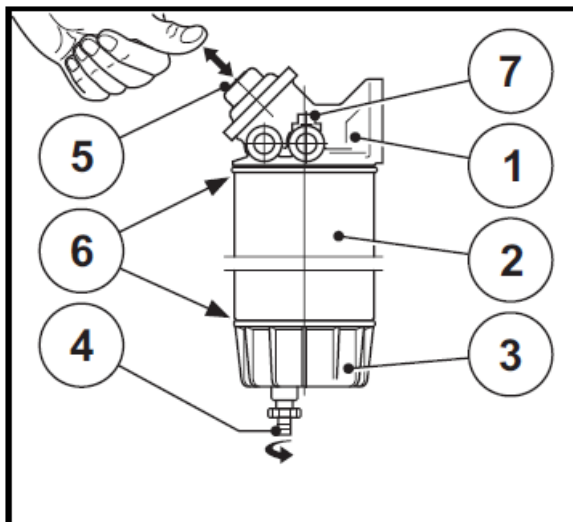
Typical characteristics of the coolant liquid:

- Mix 50% in volume with water
- Density at 20°C 1.131 kg/l
- Boiling point 155°C
- Freezing point -35°C

### 5.12.3 DRAIN THE WATER FROM THE FUEL FILTER/PRE-FILTER



- Continue with engine off;
- Place a container under the filter or pre-filter to collect the liquids;
- Open the drain valve and drain the liquid.
- Unscrew the filtering cartridge (2) together with the water collection container (3).
- Assemble the filtering cartridge (2) together with the water collection container (3). Dampen the sealing surfaces (6) of the filtering cartridge (2) and of the collecting container water (3) with a little fuel.
- Assemble clockwise.
- Open the fuel closing valve and bleed the system.
- Turn the engine on.
- After starting the engine perform a leak test.



1. Fuel pre-filter support
2. Fuel filter cartridge
3. Water collection container
4. Drain valve
5. Fuel delivery pump
6. Sealing surface
7. Vent screw

#### **5.12.4 CHECK THE AUXILIARY PARTS BELT CONDITIONS AND TENSION**



Proceed only with the engine stopped and at a low temperature so as to prevent burns. Make sure the belt is not torn, worn or soiled with lubricants or fuels. Otherwise, contact the assistance service for replacement.

#### **5.12.5 CHECKING THE INTEGRITY OF THE DRAIN PIPE/S**



Visually check that the gas exhaust system is not blocked or damaged. Make sure there are no potential dangerous fumes inside the machine. If necessary, contact the assistance service.

#### **5.12.6 CHANGING THE ENGINE OIL**



*This operation must be carried out by qualified personnel.*

Only proceed with the engine stopped and at a low temperature in order to avoid the risk of burns. Remove the closing sheet used for protection in the lower area of the engine compartment.

- Place a container under the drain plug to collect the spent oil.
- Unscrew the plug and wait for the sump to be emptied completely and then tighten the plug again with a new gasket.
- Top-up through the inlet on the distribution lid with the same type of oil and according to the quantity indicated below.
- Use the dipstick to verify that the level of oil is between the "Min" and "Max" limits.
- Dispose of the spent oil according to the relevant regulations in force.

Use the oil with the specifications below.

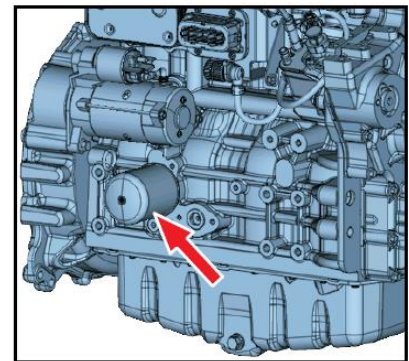
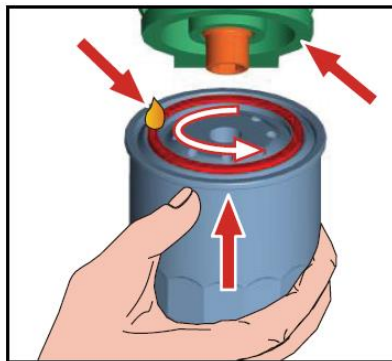
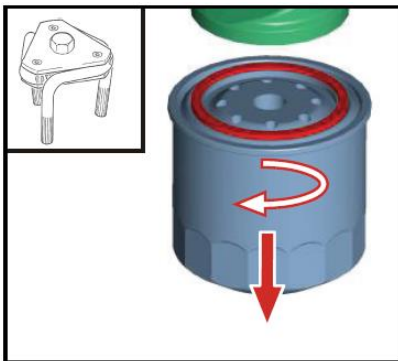
## 5.12.7 REPLACING THE ENGINE OIL FILTER/S



*This operation must be carried out by qualified personnel.*

Only proceed with the engine stopped and at a low temperature in order to avoid the risk of burns. Only use filters with a filtration rating equivalent to that of the previous ones.

- Place a container under the filter support to collect the spent oil.
- Unscrew and remove the filter.
- Thoroughly clean the surfaces of the support in contact with the sealing gasket.
- Moisten the sealing gasket of the new filter with a layer of oil.
- Tighten the new filter by hand on the support until it touches the gasket and then tighten it.
- Dispose of the old filter according to the relevant regulations in force.





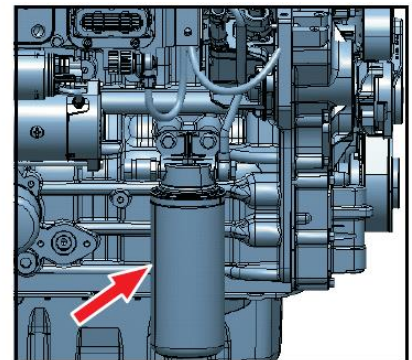
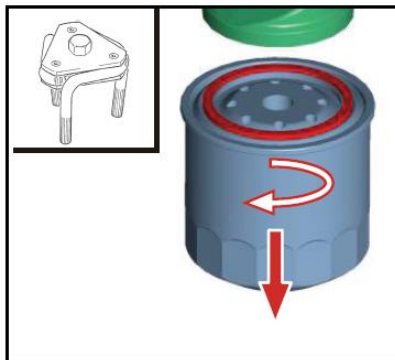
## 5.12.8 REPLACING THE FUEL FILTER/S



*This operation must be carried out by qualified personnel.*

Only proceed with the engine stopped and at a low temperature in order to avoid the risk of burns. Only use filters with a filtration rating equivalent to that of the previous ones.

- Place a suitable collecting basin;
- Disconnect the power cord connections;
- Loosen the drain plug and drain the liquid.
- Remove the filter element;
- Clean any dirt from the sealing surface of the new filtering cartridge and the opposite side of the filter head;
- Verify that the performance of the new filter fulfils the engine requirements;
- Moisten the sealing gasket of the new filter with diesel or engine oil and tighten it with a torque of 10-12 Nm;
- Assemble the drain plug;
- Connect the electrical connections.

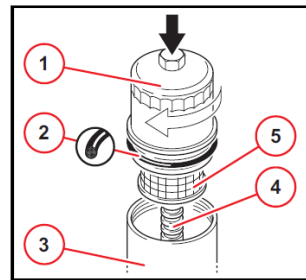
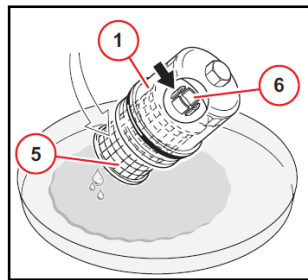
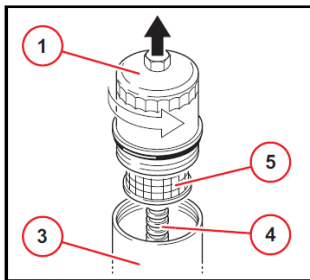


## 5.12.9 REPLACING THE FUEL FILTER CARTRIDGE



*This operation must be carried out by qualified personnel.*

- Stop the engine.
- Loosen the cover by 2-3 turns and wait 30 seconds.
- Unscrew the cover of the filtering cartridge clockwise.
- Disengage the filtering cartridge upwards from the guide in the body.
- Collect any fuel that leaks.
- Slightly bend the sides of the filtering cartridge into the container until the insert is released from the bracket.
- Clean the components.
- Replace the lightly oil the sealing ring.
- Press the new filtering cartridge into the bracket and gently insert it completely into the guide.
- Tighten the cover clockwise (torque 25 Nm).
- Turn the engine on.



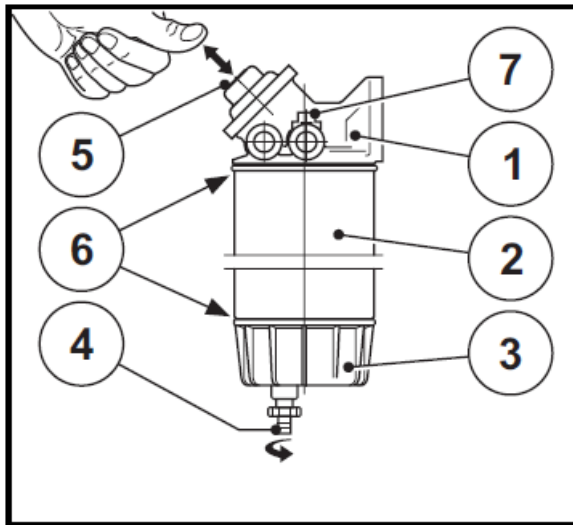
1. Cover
2. Sealing ring
3. Body
4. Guide
5. Filtering cartridge
6. Bracket



## 5.12.10 BLEEDING PROCEDURE

*This operation must be carried out by qualified personnel.*

- Loosen the vent screw.
- Actuate the pump until fuel comes out with no bubbles.
- Collect any fuel that leaks.
- Tighten the vent screw securely.



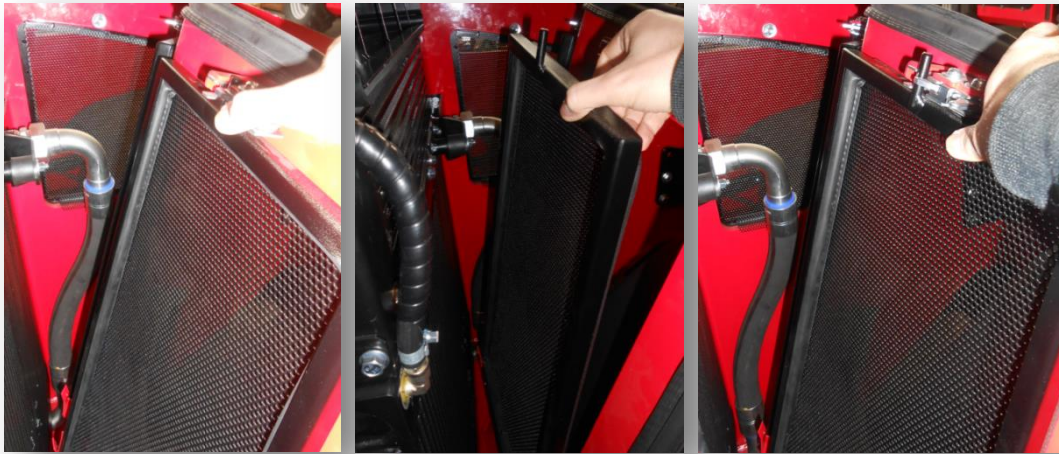
8. Fuel pre-filter support
9. Fuel filter cartridge
10. Water collection container
11. Drain valve
12. Fuel delivery pump
13. Sealing surface
14. Vent screw

## 5.13 HEAT EXCHANGER



Every day the operator must verify that the air inlet surfaces of the radiators have no impurities (dust, mud, straw, etc.). If necessary, clean them with compressed air or pressurised water. If the machine has the "CLEAN FIX" accessory function, it must be regularly used to clean the radiator.

*Attention: The engine compartment must be closed during operation. Hazardous for the operator. Moving compartments.*



If necessary, remove the front grids of the engine compartment and wash them thoroughly. Remove each grid by turning the locking lever clockwise until it clicks. Once it is cleaned, insert it properly in the rails (be careful as the two grids are not the same) and press the grid towards the closure until it stops. Repeat the operation for the second grid.

If necessary, allow the water and impurities to drain by removing the grid below. Once cleaned, reassemble the grid.



## 5.14 CHECKING THE HYDRAULIC OIL LEVEL



Regularly check the level of hydraulic oil in the tank at the right rear part. Open the engine compartment and the indicator on the storage tank is seen. The hydraulic oil must be topped up when the float is at the level indicated by the arrow. A LED in the cab indicates this.

*Attention: operating the machine with an amount of hydraulic oil below the limit value may seriously damage the machine and its components. Only use hydraulic oil recommended by the manufacturer.*



## 5.15 CHANGING THE HYDRAULIC OIL

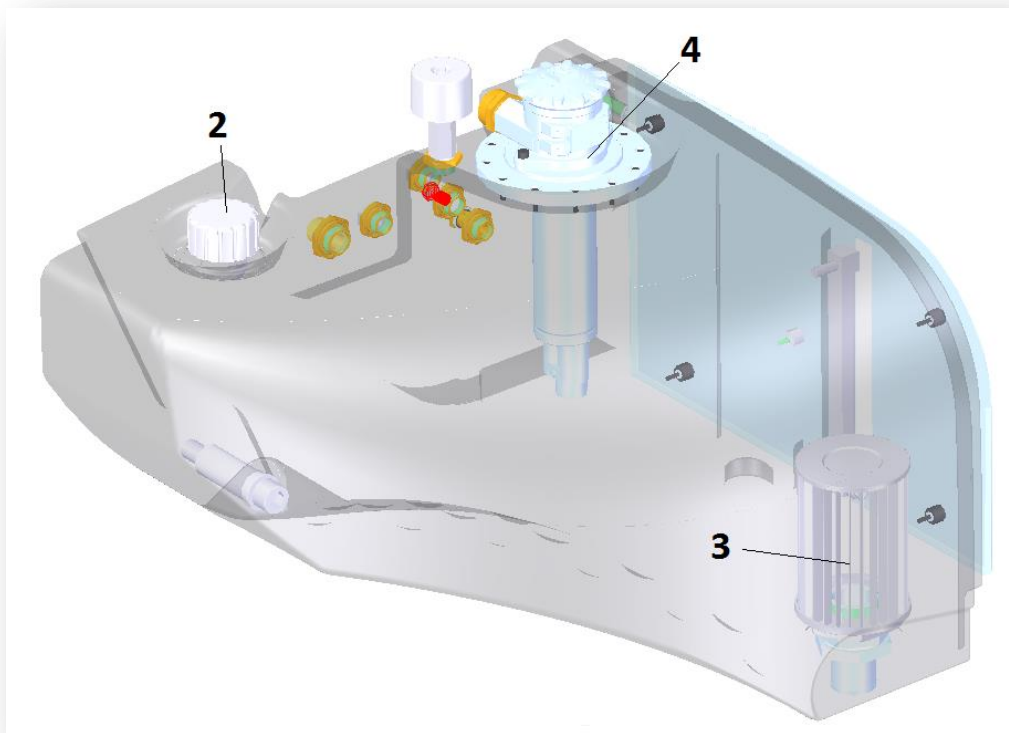


*This operation must be carried out by qualified personnel.*

Proceed as follows to change the hydraulic oil:

1. Remove the lower closing sheet of the engine compartment.
2. Place a container (having an approximate capacity of 160 litres) under the drain plug (1).
3. Unscrew the oil tank cap (2).
4. Unscrew the cap of the pipe and remove it (1).
5. Wait for all the oil to drain.
6. Screw the drain plug (1).
7. Remove and replace the immersed hydraulic oil filter in intake (3) (you must insert your hand into the tank through the hole where the oil filter is installed in return (4) after having removed it).
8. Fill the hydraulic oil tank according to the specifications.
9. Screw the oil tank cap (2).





## 5.16 VISUAL INSPECTION FOR OIL LEAKS IN THE HYDRAULIC SYSTEM



Regularly the operator must visually check for leaks from the hydraulic circuit. Contact the assistance service if the machine has a leak in the hydraulic system.

## 5.17 REPLACING THE RETURN HYDRAULIC OIL FILTER CARTRIDGE



Replace the return hydraulic oil filter cartridge of the oil tank by strictly following the instructions below:

- Unscrew the black cap from the filter (follow the direction indicated by the sticker).
- Lift the filter.
- Replace the filter cartridge.
- Screw the closing cap.





## 5.18 REPLACING THE OIL TANK VENT CARTRIDGE



Replace the vent cap filter cartridge of the oil tank by strictly following the instructions below:

- Remove the screw from the cover.
- Remove the cover.
- Replace the cartridge.
- Set the new cartridge in place.
- Set the cover back in place and tighten the screw.



## 5.19 REPLACING THE HYDROSTATIC PUMP OIL CARTRIDGE/FILTER



*This operation must be carried out by qualified personnel.*

Proceed as follows to replace the hydrostatic pump oil cartridge/filter:

- Remove the filter from the hydrostatic pump by removing the lower closing sheet of the engine compartment.
- Unscrew the filter with a suitable spanner.
- Remove the cartridge or replace the entire filter.
- Moisten the sealing gasket of the new filter with oil.
- Reassemble the filter by tightening it with the spanner.

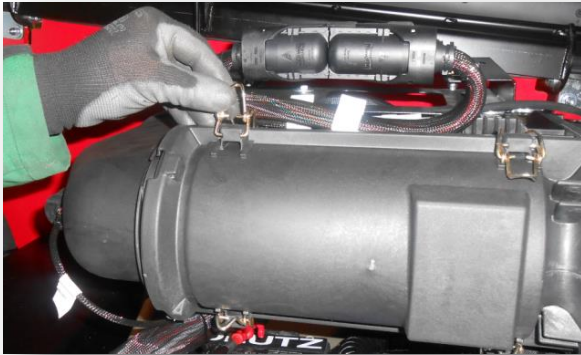


## 5.20 CLEANING AND REPLACING THE ENGINE AIR FILTER CARTRIDGE



Proceed as follows to clean the air filter:

- Release the filter from its seat.
- Remove the cover.
- Remove the primary cartridge and clean it with a jet of compressed air. Replace it, if necessary.
- Remove the secondary cartridge by pulling it from the preset handle and clean it with a jet of compressed air. Replace it, if necessary.
- Set the cartridges back in their seat.
- Set the cover of the filter back in place and recouple the blocks.



## 5.21 REPLACING THE CABIN AIR FILTER



Refer to the following to replace the cabin air filter:

- Remove the cross head screws to remove the closing cover near the windscreen wiper liquid tank in the cabin.
- Lift the cover.
- Remove the filter and clean it with a jet of compressed air. Replace the filter, if necessary.
- Set the filter back in place and close the cover by tightening the screws.

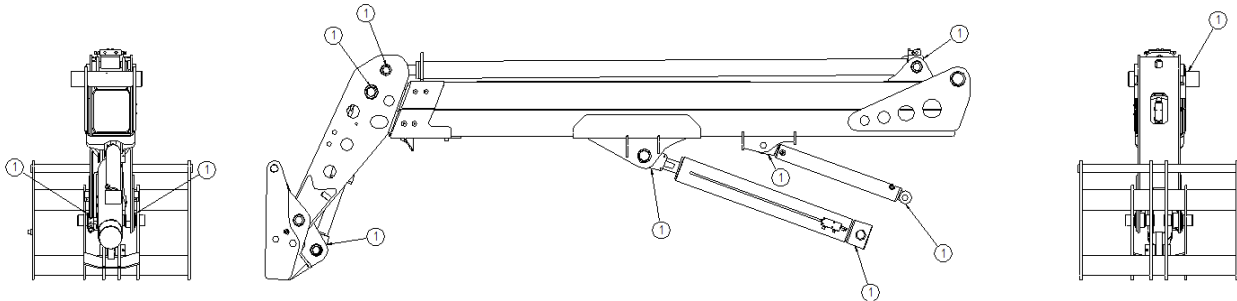




## 5.22 GREASING – LUBRICATION



BOOM MODEL FR03 9.55 – 9.70 - 10.65



Points 1 indicated in the image indicate the greasers to lubricate the areas subject to friction. The different greasers are indicated by specific stickers.

Lubricate the extended sections with the boom lowered completely and after having extended it completely; apply lubricant on the sides of the extended sections using a brush.



## 5.23 LUBRICANT/LIQUID CHARACTERISTICS



### 5.23.1 ENGINE OIL

Use SAE 5W-30 lubricants. Lubrication circuit with a total capacity of 15.5 litres.

### 5.23.2 HYDRAULIC SYSTEM OIL

Use hydraulic oil with the following specifications:

- OIL HV ISO 46

Performance levels:

ISO 6743-4 HV, Afnor NFE 48-062, ISO 11158, DIN 51524 Part 3 HVLP, Afnor NFE 48-603 HV, ASTM D6158, Denison HF-0 / HF-1 / HF-2, Eaton Vickers I-286-S / M-2950-S, Cincinnati Machine P-68 / P-69 / P-70, Afnor NFE 48-690(dry), Afnor NFE 48-691(wet), U.S. Steel 126 / 127 / 136, JCMAS HK, Bosch variable vane pumps, Rexroth RE 90220, Sauer Danfoss 520L0463, General Motors (LS-2) LH-03-1 / LH-04-1 / LH-06-1, SEB 81222.

Amount of oil required in the system 200 litres

### 5.23.3 AXLE OIL

Do not use synthetic or vegetable oil. Use one of the following types of oil with appropriate additives:

- SAE85W90 (API GL4-GL5 MIL-L-2105, MIL- L-2105-B).

Amount of oil in the differential: 11.7 Litres

Amount of oil in the planetary gear (on each side): 1.9 Litres

### 5.23.4 CHANGING THE OIL 357

Use the following lubricants:

- SAE85W90 (API GL4-GL5)

Amount of oil: 2.1 Litres

### 5.23.5 GREASE

Lubricate with the following type of grease:

- Grease MU EP 2 (L-X-BCHC 2 in accordance with ISO 6743-9, KP2K-20 in accordance with DIN 51 825, P-64 in accordance with MAG)

### 5.23.6 COOLANT LIQUID

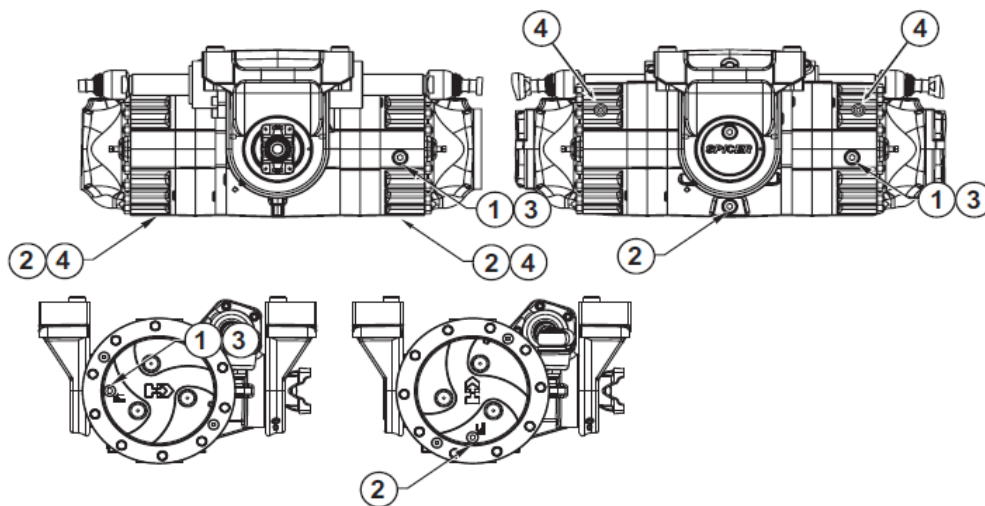
Use a mixture of water and the product that complies with the international specifications SAE J 1034 in a ratio of 50:50.

### 5.24 AXLES



*This operation must be carried out by qualified personnel.*

Refer to the following to replace or check the oil level:



1. Drain plug
2. Drain plug
3. Level inspection plug
4. Brake discs inspection plug



## 5.24.1 CHANGING THE GEARBOX OIL

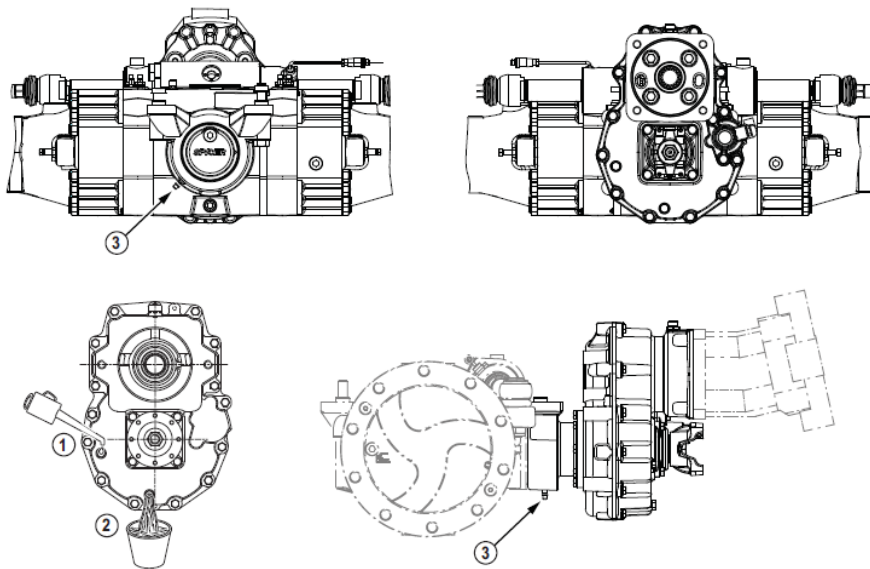


*This operation must be carried out by qualified personnel.*

*Attention: perform all the draining, filling and oil level checks with the axle horizontal.*

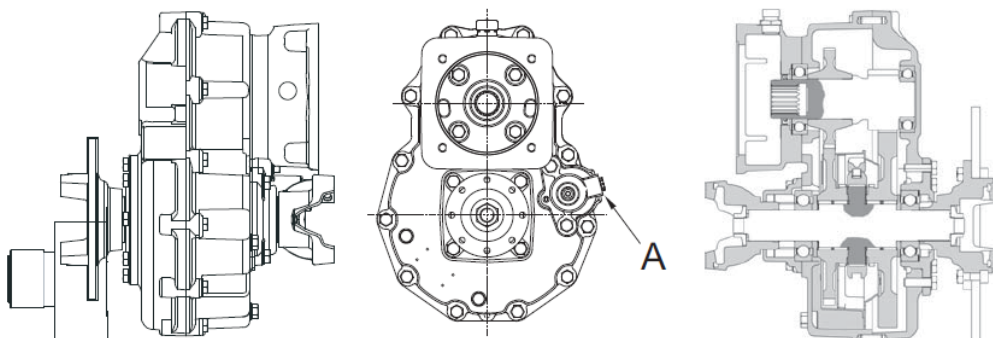
*Important! if the operator hears a metallic sound coming from the axle when braking, immediately change the oil, regardless of the number of hours reached.*

*Access the gearbox by removing the lower central closing sheet in the lower part of the machine and the closing sheet immediately below the boom.*



1. Drain and level inspection plug
2. Drain plug
3. Greaser

The gearbox version is independent:

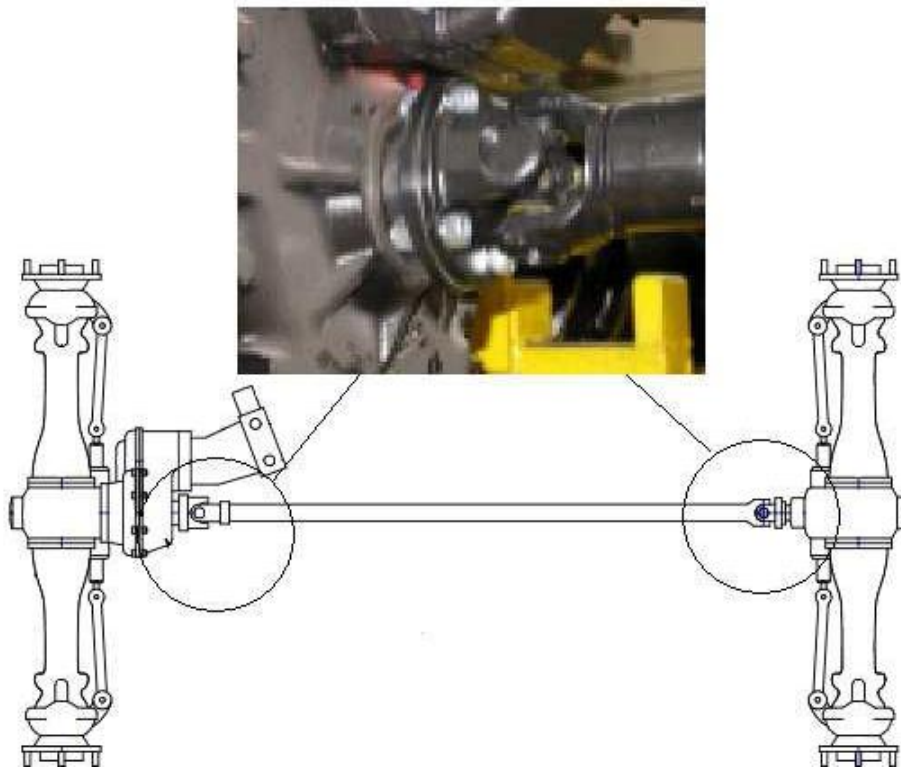


A - hydraulic gear control connector - control pressure of 15-30 bar

## 5.25 TORQUE OF THE SCREWS AND GREASING THE CARDAN SHAFT CROSS



Lubricate the cross at the two ends of the central transmission shaft. Verify the torque of the connection bolts between the cardan shaft and the axles. Access the cardan and cross by removing the closing sheet of the frame in the lower part of the machine. After having implemented the required operations it is mandatory to reassemble the sheet. Attention: the sheet protects the cardan shaft from knocks that could compromise the functionality.



## 5.26 RECHARGING THE AIR CONDITIONING



*This operation must be carried out by qualified personnel.*

Recharge the air conditioner using the couplers present. The air conditioning must be recharged with the machine switched off. Use R134A gas.



## 5.27 CHECKING THE TYRE PRESSURE AND TORQUE OF THE BOLTS



Periodically check the torque of the nuts (1) of the 4 wheels and the tyre pressure. Inflation can pose a risk and it is best to use a gun fitted with an extension pipe so as to be positioned at a safe distance and protected from possible explosion.

*With regard to tyre pressure adjustment and/or replacement, refer to the “tyres” paragraph in “general information, Chap. 1”.*



## 5.28 INSPECTION, RECHARGING AND REPLACEMENT OF THE BATTERY

The battery is the part that enables operation of the machine’s electrical system. Its poor operation can cause problems during machine start-up as well as during use. It is housed inside the front compartment seen in the figure.

### Inspection

Normal inspection of the battery can be carried out by removing the battery holder compartment cover situated on the front part of the machine. You must loosen the four screws to open it.

It is good practice to inspect it regularly (every 50 hours) to check its external conditions.



**Attention!** If it is recharged or replaced or if other operations are carried out that involve removing the contact terminals from the battery and disconnection, ALWAYS wait for minimum 3 minutes from machine shutdown. This interval of time is necessary for the control unit to complete its control cycle after machine shutdown.

**Attention2!** If it is recharged or replaced or if other operations are carried out that involve removing the battery from its housing, it is important to keep in mind that the sulphuric acid contained therein is poisonous and can cause burns. Therefore, as a precaution, it is advisable to work in a ventilated area with adequate protective devices for the face and skin; do not ignite flames in the vicinity and keep children away.

Proceed with the following operations only if you are well aware of your actions.

### Recharging

If you must recharge a flat battery after prolonged inactivity, unintentional discharge or malfunction of the machine’s recharge system, go to a specialised workshop or carry out the operations personally by taking basic precautions to prevent personal injury and keep the battery intact. Operating in a ventilated, protected place away from flames and sparks, disassemble the machine’s battery by loosening the terminals under the plastic protection (see the procedure below to replace the battery) and connect the battery’s poles to the relative charger terminals,



supplying the maximum current corresponding to 10% of the nominal capacity, favouring slow charging for approximately 10 hours or until the absorbed current reduces to values of a few mA and the voltage is approximately 13.5 V. It is not recommended to supply higher currents or quicker charging, which can speed up the process of sulphatation of the plates.

The charging and maintenance operations of the battery can be carried out easily by respecting the basic safety rules and using automatic battery chargers that are able to provide current according to the nominal capacity and start maximum load maintenance after charging.

### **Maintenance**

If prolonged downtime or inactivity of the battery is envisaged, it is possible to connect it to a charge maintenance device without disassembling it from the machine. This will maintain its efficiency and charge load over time. Charge maintenance is obtained by supplying constant voltage current of a few milliamps to the battery for the entire duration of inactivity.

### **Start-up using an external battery**

If the machine must be started from an external battery, pay the utmost attention to the operation since serious risks may occur. Do not proceed if you are not fully aware of the operations to carry out.

Only use batteries of the same voltage and capacity (or higher capacity).

When connecting the cables, DO NOT accidentally make contact between opposite poles in order to prevent sparks or explosions.

The cables must be suitable for the purpose and not worn that minimises resistance.

Follow the procedure below:

1. With the motor of the “donating” machine turned off:
2. Remove the plastic protections from the poles of both batteries (“donating” and “receiving”)
3. Connect the positive poles of both batteries (+ with +//with the red cable)
4. Connect the negative poles of both batteries (- with -//with the black cable)
5. Start the engine of the “donating” machine and run it at medium/high speed
6. Start the engine of the “receiving” machine.
7. With the “receiving” machine running, remove the negative cable first (black/ - with -) followed by the positive cable (red/ + with +) by first disconnecting the pole of the “donating” battery and then the “receiving” battery for both cables.
8. Reassembly the plastic protections on the poles of both batteries

### **Replacement**

If the battery must be replaced due to malfunction or at the end of its service life, it is recommended to contact an authorised workshop for replacement.

If you decide to proceed personally, it is recommended to follow some simple and useful advice:

- Make sure the control panel and any other accessory is off
- Remove the cover as described in the section regarding “inspection”
- Proceed with removing the plastic protections from the poles
- Disconnect the negative terminal first, following by the positive terminal
- Release the retaining belt, lift the battery (the battery weights over 30 kg; two people are recommended for this operation) and remove it



- Clean the battery compartment from any leaves, dirt and oxidation
- Place the new battery (having the same features of the previous one and duly charged) into its housing
- Secure it with the previously removed anchoring systems
- Clean the machine’s terminals thoroughly from any oxidation residues with a damp cloth with water, and dry completely
- Grease the terminals with Vaseline
- Follow the inverse order to connect the positive pole first, followed by the negative pole, tightening the terminals completely (without exaggerating the torque)
- Reassembly the plastic protections on the poles
- Dispose of the old battery according to the laws in force

*The recommended battery must have the following features:*

- Nominal voltage: 12V
- Capacity: 160 Ah

### **Battery disconnection (BATTERY CUT-OFF)**

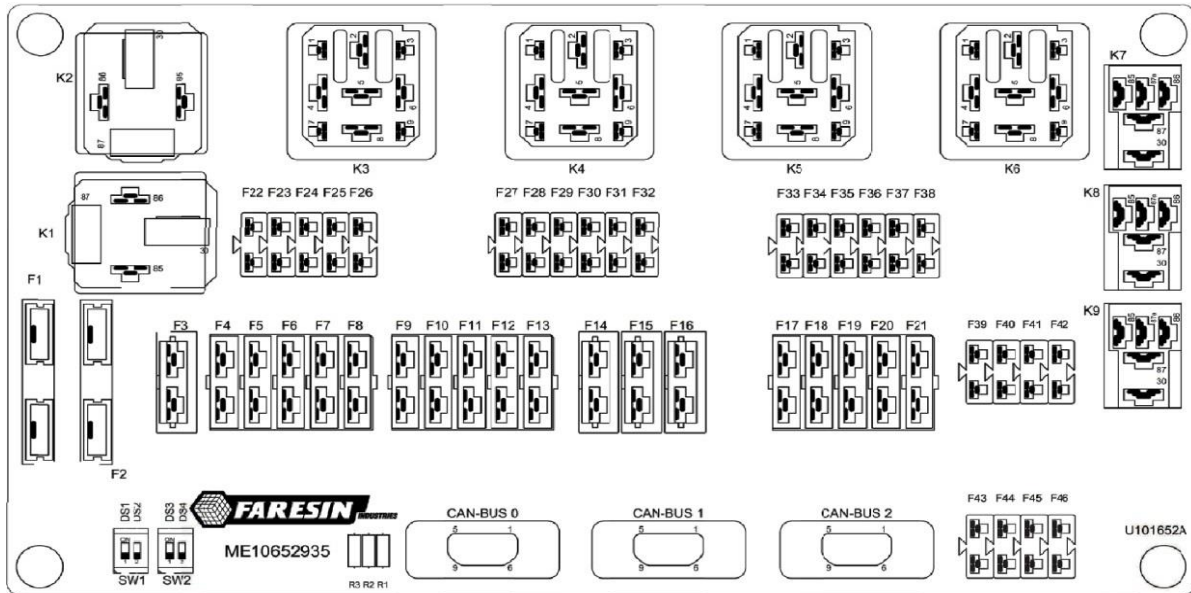
Before operating on any part of the electrical system, you must “disconnect” power supply, or disconnect supply from the battery cut-off lever (see the figure) situated on the side of the battery compartment. The battery’s cut-off is carried out by turning the handle anticlockwise (and clockwise to restart).

Important: only carry out this operation with the engine OFF.

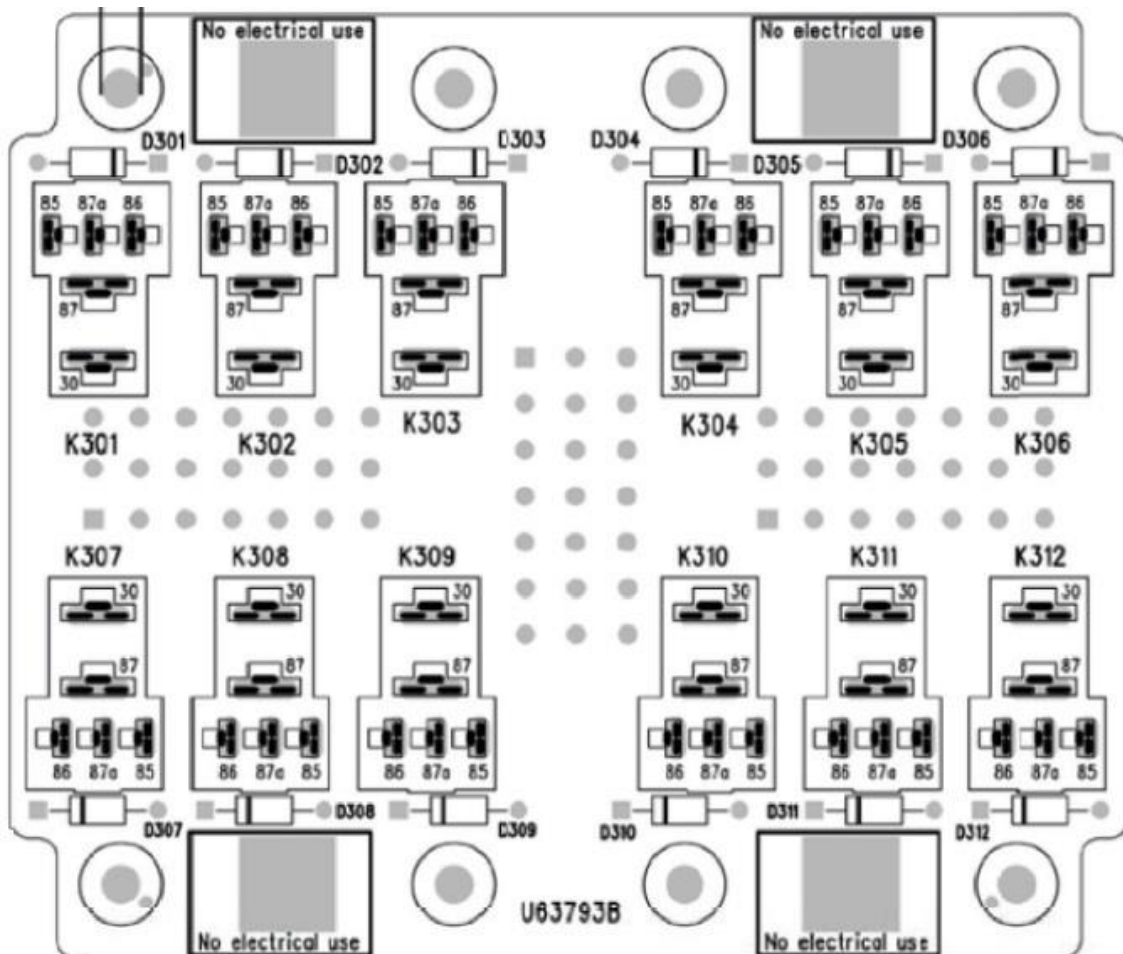


## 5.29 RELAY FUSE HOLDER CARD

### Fuse card



### Relay card





## Fuse key

FUSIBILE	TAGLIA	FUNZIONE	RIFERIMENTO
F1	30A	ALIMENTAZIONE POTENZA ECU MOTORE	1-A4
F2	50A	ALIMENTAZIONE CHIAVE A 1 COMUNE SCHEDA	1-B4
F3	5A	ALIMENTAZIONE CHIAVE A 0 ECU MOTORE	1-B4
F4	15A	ALIMENTAZIONE CHIAVE A 0 VEICOLO	1-B5
F5	7.5A	ALIMENTAZIONE CHIAVE A 0 DISPLAY	5-B3
F6	7.5A	ALIMENTAZIONE MICRO PLC K5	10-A3
F7	20A	ALIMENTAZIONE POMPA GASOLIO	22-A3 / 26-A3
F8	10A	ALIMENTAZIONE PRESA ELETTRICA BRACCIO	4-A4
F9	15A	ALIMENTAZIONE CICALINA E LUCI RETRO	19-A1
F10	10A	ALIMENTAZIONE TERGICRISTALLO ANTERIORE E POSTERIORE	5-A4
F11	15A	ALIMENTAZIONE FARI LAVORO	4-A3
F12	10A	ALIMENTAZIONE SEDILE AD ARIA E CARICA BATTERIE	4-A4
F13	20A	ALIMENTAZIONE ECU SAUER	12-A1
F14	30A	ALIMENTAZIONE POTENZA ECU BOSCH	15-B1
F15	20A	ALIMENTAZIONE CHIAVE A 1 VEICOLO	1-B6
F16	30A	ALIMENTAZIONE VENTILATORE CABINA	6-A3
F17	20A	ALIMENTAZIONE LUCI DI POSIZIONE	2-A3
F18	30A	ALIMENTAZIONE VENTOLE CLIMA	6-C1
F19	DIODO	DIODO VENTING FLOTTANTE	14-D6
F20	DIODO	DIODO VENTING SOSPENSIONE BRACCIO	14-D6
F21	DIODO	DIODO LUCI EMERGENZA	3-B1
F22	15A	ALIMENTAZIONE LUCI ANABBAGLIANTI	2-A4
F23	15A	ALIMENTAZIONE LUCI ABBAGLIANTI	2-A4
F24	7.5A	ALIMENTAZIONE PRESA AGRI, SICUREZZA CESTELLO E SOSPENSIONE BRACCIO	19-A3
F25	10A	ALIMENTAZIONE ACCENDISIGARI	4-A6
F26	10A	ALIMENTAZIONE GIROFARO	4-A6
F27	15A	ALIMENTAZIONE RELE' INTERMITTENZA	3-C1
F28	15A	ALIMENTAZIONE SPECCHI RISCALDATI	5-A3
F29	7.5A	ALIMENTAZIONE SARL	7-A3
F30	15A	ALIMENTAZIONE CLEAN-FIX	6-A7
F31	7.5A	ALIMENTAZIONE CHIAVE A 1 DISPLAY	8-B4
F32	15A	ALIMENTAZIONE +US ECU BOSCH	15-B3
F33	7.5A	ALIMENTAZIONE SELETTORI BENNA-MISCELAZIONE	8-B4
F34	5A	ALIMENTAZIONE +5VDC SAUER	13-C3
F35	20A	ALIMENTAZIONE COMPRESSORE CLIMA	6-C2
F36	7.5A	ALIMENTAZIONE CHIAVE A 1 ECU MOTORE	20-A5 / 23-A6 / 26-A8 / 30-B5
F37	5A	ALIMENTAZIONE ELETTRONICA ECU BOSCH	15-B1
F38	SHUNT	BY-PASS MODALITA' VERRICELLO	7-C2
F39	7.5A	ALIMENTAZIONE SELETTORE MODALITA' STERZATURA	8-B3
F41	SHUNT	ENABLE COMMON-RAIL (NO SE DEUTZ 103 KW 3A)	1-D6
F42	5A	ALIMENTAZIONE CHIAVE A 1 ECU BOSCH	15-B2

## Relay key

RELE'	TIPO	FUNZIONE	BOBINA	CONTATTO N.O.	CONTATTO N.C.
K301	N.O.	RELE' BRACCIO RIENTRATO	7-B6	16-C1	
K302	N.O.	RELE' BRACCIO BASSO ECU BOSCH	12-C4	16-C1	
K303	N.O.	RELE' CLEAN-FIX	10-A4	6-C7	
K304	N.O.	RELE' BLOCCO ANTIRIBALTAMENTO	7-D2	7-C5	
K305	N.C.	RELE' BRACCIO BASSO SARL	7-D7	7-C3	7-C3
K306	N.O.	RELE' ENABLE BRACCIO	13-C5		
K307	N.O.	RELE' OPTION SU BRACCIO	9-C3	19-B4	
K308	N.O.	RELE' PRESA AGRICOLA	9-C4	19-B3	
K309	N.O.	RELE' MARCIA INDIETRO	13-C6	19-B1	
K310	N.O.	RELE' SENSORE SEDILE	12-C3	16-C2	
K311	N.O.	RELE' POMPA GASOLIO	22-B3 / 26-B3	22-B3 / 26-B3	
K312	N.O.	RELE' ENABLE AVVIAMENTO DEUTZ	13-C5	22-B4 / 27-C1 / 29-D5	
K1	N.O.	RELE' CHIAVE A 1 VEICOLO E COMUNE SCHEDA	1-D7	1-B5	
K2	N.O.	RELE' CHIAVE A 1 POWER ECU MOTORE	1-C6	1-A5	
K3		RELE' INTERMITTENZA	3-D2		
K4		RELE' TERGICRISTALLO	5-C5		
K5	MICRO PLC	MICRO PLC CLEAN-FIX, EV. FRENO RIMORCHIO	10-C3		
K6	N.O.	RELE' VENTOLE E COMPRESSORE CLIMATIZZATORE	6-A6	6-B2	
K7	N.O.	RELE' LUCI ANABBAGLIANTI	3-D7	2-B4	
K8	N.O.	RELE' LUCI ABBAGLIANTI	3-D7	2-B4	
K9	N.O.	RELE' LUCI DI POSIZIONE	3-D7	2-B3	

## 5.30 LIST OF TRANSMISSION ERRORS

The list of transmission errors that can be encountered is below: If there is an error, the description from the following will be displayed:

1. Battery low voltage alarm
2. NV status alarm
3. Sensors power supply alarm
4. Display timeout
5. Engine control unit timeout
6. Bosch control unit timeout
7. Joystick roller 1 error
8. Joystick roller 2 error
9. Levelling output error
10. Neutral gear relay output error
11. Forward gear relay output error
12. Reverse gear relay output error
13. Joystick 1 button error
14. Joystick 2 button error
15. Joystick 3 button error
16. Agri 1 output error
17. Agri 2 output error
18. Boom enabling relay output error
19. Roller 1 IN input error
20. Roller 1 OUT input error
21. Roller 2 IN input error
22. Roller 2 OUT input error
23. Services control unit timeout
24. PLC micro timeout

## 5.31 ENGINE ERRORS LIST

The list of engine errors that can be encountered is below (code - description):

SPN	FMI Blinkcode	Error Identification
132	11	Air flow sensor; sensor error
132	11	Air flow sensor; sensor error
132	11	Air flow sensor; sensor error
132	11	Air flow sensor; sensor error
172	2	Sensor ambient air temperature; plausibility error
523006	3	Controller mode switch; short circuit to battery
523006	4	Controller mode switch; short circuit to ground
523923	3	UB1; Short circuit to battery error of actuator relay 1
523924	3	UB2; Short circuit to battery error of actuator relay 2
523925	3	UB3; Short circuit to battery error of actuator relay 3
523926	3	UB4; Short circuit to battery error of actuator relay 4
523927	3	UB5; Short circuit to battery error of actuator relay 5
168	3	Sensor error battery voltage; signal range check high
168	4	Sensor error battery voltage; signal range check low
168	2	Battery voltage; system reaction initiated
168	2	Battery voltage; system reaction initiated
597	2	Break lever main switch and break lever redundancy switch status not plausible
523910	14	Air pump does not achieve air mass flow setpoint
524013	7	Burner operation disturbed
524020	14	Engine power; Not enough oxygen for regeneration
523911	0	Burner dosing valve (DV2); overcurrent at the end of the injection phase
523911	12	Burner dosing valve (DV2); power stage over temperature
523911	3	Burner dosing valve (DV2); short circuit to battery
523911	3	Burner dosing valve (DV2); short circuit to battery
523911	4	Burner dosing valve (DV2); short circuit to ground
523911	11	Burner dosing valve (DV2); short circuit high side power stage
523912	2	Burner dosing valve (DV2) downstream pressure sensor; plausibility error
523912	0	Physical range check high for burner dosing valve (DV2) downstream pressure; shut off regeneration
523912	1	Physical range check low for burner dosing valve (DV2) downstream pressure; shut off regeneration. When burner injector is actuated, the measured pressure does not rise above ca. 1250mbar abs (expected: ca. 2400mbar).
523912	3	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check high
523912	4	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check low
523913	3	Sensor error glow plug control diagnostic line voltage; signal range check high
523913	4	Sensor error glow plug control diagnostic line voltage; signal range check low
523914	5	Glow plug control; open load

523914	12	Glow plug control; power stage over temperature
523914	3	Glow plug control; short circuit to battery
523914	4	Glow plug control; short circuit to ground
1235	14	CAN Bus error passive; warning CAN C
639	14	CAN-Bus 0 "Bus Off-Status"
1231	14	CAN-Bus 1 "Bus Off-Status"
1235	14	CAN-Bus 2 "Bus Off-Status"
102	2	Charged air pressure; system reaction initiated
102	2	Charged air pressure; system reaction initiated
110	3	Sensor error coolant temperature; signal range check high
110	4	Sensor error coolant temperature; signal range check low
110	0	Coolant temperature; system reaction initiated
110	0	Coolant temperature; system reaction initiated
111	1	Coolant level too low
523929	0	Fuel Balance Control integrator injector 1 (in firing order); maximum value exceeded
523930	0	Fuel Balance Control integrator injector 2 (in firing order); maximum value exceeded
523931	0	Fuel Balance Control integrator injector 3 (in firing order); maximum value exceeded
523932	0	Fuel Balance Control integrator injector 4 (in firing order); maximum value exceeded
523933	0	Fuel Balance Control integrator injector 5 (in firing order); maximum value exceeded
523934	0	Fuel Balance Control integrator injector 6 (in firing order); maximum value exceeded
523929	1	Fuel Balance Control integrator injector 1 (in firing order); minimum value exceeded
523930	1	Fuel Balance Control integrator injector 2 (in firing order); minimum value exceeded
523931	1	Fuel Balance Control integrator injector 3 (in firing order); minimum value exceeded
523932	1	Fuel Balance Control integrator injector 4 (in firing order); minimum value exceeded
523933	1	Fuel Balance Control integrator injector 5 (in firing order); minimum value exceeded
523934	1	Fuel Balance Control integrator injector 6 (in firing order); minimum value exceeded
1109	2	Engine shut-off demand ignored
523698	11	Shut-off request from supervisory monitoring function
523717	12	Timeout Error of CAN-Transmit-Frame AmbCon; Weather environments
523603	9	Timeout Error of CAN-Receive-Frame AMB; Ambient Temperature Sensor
3224	2	NOx Sensor; CAN DLC error
3224	9	NOx Sensor; CAN Timeout
3224	2	NOx Sensor; CAN DLC error



3224	9	NOx Sensor; CAN Timeout
523938	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensor calibration for NOX Sensor (SCR-system upstream cat; DPF- system downstream cat)
523939	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensor calibration for NOX Sensor (SCR-system upstream cat; DPF- system downstream cat)
523940	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensor calibration for NOX Sensor (SCR-system upstream cat; DPF- system downstream cat)
3234	9	NOx Sensor; CAN Timeout
3234	2	NOx Sensor; CAN DLC error
3234	9	NOx Sensor; CAN Timeout
523941	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensor calibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)
523942	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensor calibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)
523943	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensor calibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)
523935	12	Timeout Error of CAN-Transmit-Frame EEC3VOL1; Engine send messages
523936	12	Timeout Error of CAN-Transmit-Frame EEC3VOL2; Engine send messages
523212	9	Timeout Error of CAN-Receive-Frame ComEngPrt; Engine Protection
523240	9	Timeout CAN-message FunModCtl; Function Mode Control
523216	9	Timeout Error of CAN-Receive-Frame PrHtEnCmd; pre-heat command, engine command
523793	9	Timeout Error of CAN-Receive-Frame UAA10; AGS sensor service message
523794	9	Timeout Error of CAN-Receive-Frame UAA11; AGS sensor data
523803	9	Timeout Error of CAN-Receive-Frame RxEngPres; Status burner air pump
523766	9	Timeout Error of CAN-Receive-Frame Active TSC1AE
523767	9	Timeout Error of CAN-Receive-Frame Passive TSC1AE
523768	9	Timeout Error of CAN-Receive-Frame Active TSC1AR
523769	9	Timeout Error of CAN-Receive-Frame Passive TSC1AR
523770	9	Timeout Error of CAN-Receive-Frame Passive TSC1DE
523776	9	Timeout Error of CAN-Receive-Frame TSC1TE - active
523777	9	Passive Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
523778	9	Active Timeout Error of CAN-Receive-Frame TSC1TR
523779	9	Passive Timeout Error of CAN-Receive-Frame TSC1TR
523788	12	Timeout Error of CAN-Transmit-Frame TrbCH; Status Wastegate
523605	9	Timeout Error of CAN-Receive-Frame TSC1AE; Traction Control
523606	9	Timeout Error of CAN-Receive-Frame TSC1AR; Retarder
898	9	Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
520	9	Timeout Error of CAN-Receive-Frame TSC1TR; Setpoint

523867	12	Timeout Error of CAN-Transmit-Frame UAA1 on CAN 2; Burner Air Pump Control
523982	0	Power stage diagnosis disabled; high battery voltage
523982	1	Power stage diagnosis disabled; low battery voltage
630	12	Access error EEPROM
630	12	Access error EEPROM
630	12	Access error EEPROM
411	4	Physical range check low for EGR differential pressure
2791	5	Actuator EGR Valve; open load
2791	12	Actuator EGR Valve; power stage over temperature
2791	3	Actuator EGR Valve; short circuit to battery
2791	4	Actuator EGR Valve; short circuit to ground
523612	12	Internal software error ECU
190	0	Engine speed above warning threshold (FOC-Level 1)
190	0	Engine speed above warning threshold (FOC-Level 1)
190	11	Engine speed above warning threshold (FOC-Level 2)
190	14	Speed detection; out of range, signal disrupted
108	3	Sensor error ambient air pressure; signal range check high
108	4	Sensor error ambient air pressure; signal range check low
171	3	Sensor error environment temperature; signal range check high
171	4	Sensor error environment temperature; signal range check low
190	8	Speed detection; out of range, signal disrupted
190	12	Speed detection; out of range, signal disrupted
190	2	Offset angle between crank- and camshaft sensor is too large
190	8	Speed detection; out of range, signal disrupted
190	12	Speed detection; out of range, signal disrupted
703	5	Engine running lamp; open load
703	12	Engine running lamp; power stage over temperature
703	3	Engine running lamp; short circuit to battery
703	4	Engine running lamp; short circuit to ground
975	5	Fan control; open load
975	12	Fan control; internal error
975	3	Fan control; short circuit to battery
975	4	Fan control; short circuit to ground
975	5	Fan control; open load
975	12	Fan control; internal error
975	3	Fan control; short circuit to battery
975	4	Fan control; short circuit to ground
1639	0	Sensor error fan speed; signal range check high



1639	1	Sensor error fan speed; signal range check low
523602	0	Fan control; out of range, system reaction initiated
523602	0	Fan control; out of range, system reaction initiated
97	3	Sensor error water in fuel; signal range check high
97	4	Sensor error water in fuel; signal range check low
94	3	Sensor error low fuel pressure; signal range check high
94	4	Sensor error low fuel pressure; signal range check low
94	1	Low fuel pressure; system reaction initiated
94	1	Low fuel pressure; system reaction initiated
174	0	High low fuel temperature; system reaction initiated
174	0	High Low fuel temperature; system reaction initiated
523619	2	Physical range check high for exhaust gas temperature upstream (SCR-CAT)
523915	0	HCI dosing valve (DV1); overcurrent at the end of the injection phase
523915	12	HCI dosing valve (DV1); power stage over temperature
523915	3	HCI dosing valve (DV1); short circuit to battery
523915	3	HCI dosing valve (DV1); short circuit to battery
523915	4	HCI dosing valve (DV1); short circuit to ground
523915	11	HCI dosing valve (DV1); short circuit high side power stage
523916	2	Sensor HCl dosing valve (DV1) downstream pressure; plausibility error
523916	0	Physical range check high for HCl dosing valve (DV1) downstream pressure; shut off regeneration
523916	1	Physical range check low for HCl dosing valve (DV1) downstream pressure; shut off regeneration
523916	3	Sensor error HCl dosing valve (DV1) downstream pressure; signal range check high
523916	4	Sensor error HCl dosing valve (DV1) downstream pressure; signal range check low
523917	2	Sensor DV1 & DV2 upstream pressure; plausibility error
523917	0	Physical range check high for DV1 & DV2 upstream pressure; shut off regeneration
523917	1	Physical range check low for DV1 & DV2 upstream pressure; shut off regeneration
523917	3	Sensor error DV1 & DV2 upstream pressure; signal range check high
523917	4	Sensor error DV1 & DV2 upstream pressure; signal range check low
523918	2	Sensor DV1 & DV2 upstream temperature; plausibility error
523918	0	Physical range check high for DV1 & DV2 upstream temperature; shut off regeneration
523918	1	Physical range check low for DV1 & DV2 upstream temperature; shut off regeneration
523918	3	Sensor error DV1 & DV2 upstream temperature; signal range check high
523918	4	Sensor error DV1 & DV2 upstream temperature; signal range check low
676	11	Cold start aid relay; open load, relay error.
676	11	Cold start aid relay; open load, relay error.
729	5	Cold start aid relay open load
729	12	Cold start aid relay; over temperature error
523895	13	Check of missing injector adjustment value programming (IMA) injector 1 (in firing order)
523896	13	check of missing injector adjustment value programming (IMA) injector 2 (in firing order)

523897	13	check of missing injector adjustment value programming (IMA) injector 3 (in firing order)
523898	13	check of missing injector adjustment value programming (IMA) injector 4 (in firing order)
523899	13	check of missing injector adjustment value programming (IMA) injector 5 (in firing order)
523900	13	check of missing injector adjustment value programming (IMA) injector 6 (in firing order)
523350	4	Injector cylinder-bank 1; short circuit
523352	4	Injector cylinder-bank 2; short circuit
523354	12	Injector power stage output defect
651	5	Injector 1 (in firing order); interruption of electric connection
652	5	Injector 2 (in firing order); interruption of electric connection
653	5	Injector 3 (in firing order); interruption of electric connection
654	5	Injector 4 (in firing order); interruption of electric connection
655	5	Injector 5 (in firing order); interruption of electric connection
656	5	Injector 6 (in firing order); interruption of electric connection
651	3	Injector 1 (in firing order); short circuit
652	3	Injector 2 (in firing order); short circuit
653	3	Injector 3 (in firing order); short circuit
654	3	Injector 4 (in firing order); short circuit
655	3	Injector 5 (in firing order); short circuit
656	3	Injector 6 (in firing order); short circuit
651	4	High side to low side short circuit in the injector 1 (in firing order)
652	4	High side to low side short circuit in the injector 2 (in firing order)
653	4	High side to low side short circuit in the injector 3 (in firing order)
654	4	High side to low side short circuit in the injector 4 (in firing order)
655	4	High side to low side short circuit in the injector 5 (in firing order)
656	4	High side to low side short circuit in the injector 6 (in firing order)
523615	5	Metering unit (Fuel-System); open load
523615	12	Metering unit (Fuel-System); power stage over temperature
523615	3	Metering unit (Fuel-System); short circuit to battery
523615	4	Metering unit (Fuel-System); short circuit to ground
523615	3	Metering unit (Fuel-System); short circuit to battery
523615	4	Metering unit (Fuel-System); short circuit to ground
1323	12	Too many recognised misfires in cylinder 1 (in firing order)
1324	12	Too many recognised misfires in cylinder 2 (in firing order)
1325	12	Too many recognised misfires in cylinder 3 (in firing order)
1326	12	Too many recognised misfires in cylinder 4 (in firing order)
1327	12	Too many recognised misfires in cylinder 5 (in firing order)
1328	12	Too many recognized misfires in cylinder 6 (in firing order)
1322	12	Too many recognised misfires in more than one cylinder
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
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523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523008	1	Manipulation control was triggered
523008	2	Timeout error in Manipulation control
100	3	Sensor error oil pressure; signal range check high
100	4	Sensor error oil pressure sensor; signal range check low
100	0	High oil pressure; system reaction initiated
100	0	High oil pressure; system reaction initiated
100	1	High oil pressure; system reaction initiated
100	1	High oil pressure; system reaction initiated
175	2	Oil temperature; plausibility error
175	2	Oil temperature; plausibility error
175	0	Oil temperature; out of range, system reaction initiated
175	1	Physical range check low for oil temperature
175	3	Sensor error oil temperature; signal range check high
175	4	Sensor error oil temperature; signal range check low
175	0	Oil temperature; out of range, system reaction initiated
175	0	Oil temperature; out of range, system reaction initiated
1237	2	Override switch; plausibility error
107	3	Sensor error air filter differential pressure; short circuit to battery
107	4	Sensor error air filter differential pressure; short circuit to ground
107	0	Air filter differential pressure; system reaction initiated
523919	2	Sensor air pump pressure; plausibility error
523919	0	Physical range check high for air pump pressure; shut off regeneration
523919	1	Physical range check low for air-pump pressure; shut off regeneration
523919	3	Sensor error air-pump pressure; signal range check high
523919	4	Sensor error air-pump pressure; signal range check low
523920	2	Sensor exhaust gas back pressure; plausibility error
523920	0	Physical range check high for exhaust gas back pressure burner; shut off regeneration
523920	1	Physical range check low for exhaust gas back pressure burner; shut off regeneration
523920	3	Sensor error exhaust gas back pressure burner; signal range check high
523920	4	Sensor error exhaust gas back pressure burner; signal range check low
102	3	Sensor error charged air pressure; signal range check high
102	4	Sensor error charged air pressure; signal range check low
411	0	Physical range check high for differential pressure Venturi unit (EGR)
411	1	Physical range check low for differential pressure Venturi unit (EGR)
411	11	Sensor differential pressure Venturi unit (EGR); plausibility error
411	2	Sensor differential pressure Venturi unit (EGR); CAN signal invalid
411	3	Sensor error differential pressure Venturi unit (EGR); signal range check high
411	4	Sensor error differential pressure Venturi unit (EGR); signal range check low

524025	14	Particulate filter; regeneration not successful
3253	2	Sensor differential pressure (DPF); plausibility error
3251	0	Physical range check high for differential pressure (DPF); shut off regeneration
3251	1	Physical range check low for differential pressure (DPF); shut off regeneration
3253	3	Sensor error differential pressure (DPF); signal range check high
3253	4	Sensor error differential pressure (DPF); signal range check low
523009	9	Pressure Relief Valve (PRV) reached maximum allowed opening count
523470	2	Pressure Relief Valve (PRV) forced to open
523470	2	Pressure Relief Valve (PRV) forced to open
523470	12	Pressure Relief Valve (PRV) forced to open; system reaction initiated
523470	12	Pressure Relief Valve (PRV) forced to open; system reaction initiated
523470	14	Pressure Relief Valve (PRV) is open
523470	11	Pressure Relief Valve (PRV) error; Rail pressure out of tolerance range
523470	11	Rail pressure out of tolerance range
523009	10	Pressure relief valve (PRV) reached maximum allowed open time
523906	5	Electrical fuel pre - supply pump; open load
523906	12	Electrical fuel pre-supply pump; power stage over temperature
523906	3	Electrical fuel pre - supply pump; short circuit to battery
523906	4	Electrical fuel pre - supply pump; short circuit to ground
523450	3	Multiple Stage Switch constant speed; short circuit to battery
523450	4	Multiple Stage Switch constant speed; short circuit to ground
523450	2	Multiple Stage Switch constant speed; plausibility error
523451	3	Multiple Stage Switch engine speed control parameter; short circuit to battery
523451	4	Multiple Stage Switch engine speed control parameter; short circuit to ground
523451	2	Multiple Stage Switch engine speed control parameter; plausibility error
523452	3	Multiple Stage Switch engine torque limitation curve; short circuit to battery
523452	4	Multiple Stage Switch engine torque limitation curve; short circuit to ground
523452	2	Multiple Stage Switch engine torque limitation curve; plausibility error
1176	3	Sensor error pressure sensor upstream turbine; signal range check high
1176	4	Sensor error pressure sensor downstream turbine; signal range check high
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	1	Minimum rail pressure exceeded (RailMeUn3)
523613	0	Rail pressure disrupted
523613	2	Setpoint of metering unit in overrun mode not plausible
523470	7	Maximum rail pressure in limp home mode exceeded (PRV)
157	3	Sensor error rail pressure; signal range check high
157	4	Sensor error rail pressure; signal range check low
523633	11	Nox conversion rate insufficient
523633	11	Nox conversion rate insufficient
523633	11	Nox conversion rate insufficient
3234	11	Nox Sensor downstream of SCR Catalysator; plausibility error "stuck in range"

3224	1	Nox sensor upstream of SCR Catalysator; low signal not plausible
4345	11	Sensor backflow line pressure (SCR); plausibility error
4343	11	General pressure check error (SCR)
4374	13	Pressure stabilisation error dosing valve (SCR)
523723	11	Detection of AdBlue filled SCR system in Init-State
523632	16	Pump pressure SCR metering unit too high
523632	18	Pump pressure SCR metering unit too low
523632	0	Pressure overload of SCR-System
523632	1	Pressure build-up error SCR-System
4365	0	Urea tank temperature too high
3241	0	Sensor SCR catalyst upstream temperature too high; plausibility error
3241	1	Sensor SCR catalyst upstream temperature too low; plausibility error
3361	7	AdBlue dosing valve blocked (SCR)
523720	2	Urea supply module heater temperature; plausibility error
523720	2	Urea supply module heater temperature; plausibility error
523721	2	Urea supply module heater temperature; plausibility error
523721	2	Urea supply module heater temperature; plausibility error
523981	11	Urea-tank without heating function (heating phase)
523330	14	Immobilizer status; fuel blocked
523720	8	Urea supply module heater temperature; signal disrupted
523720	8	Urea supply module heater temperature; signal disrupted
523721	11	Urea supply module temperature measurement not available
523722	8	Urea supply module PWM signal; signal disrupted
523722	8	Urea supply module PWM signal; signal disrupted
523721	8	Urea supply module temperature; signal disrupted
523721	8	Urea supply module temperature; signal disrupted
29	3	Handthrottle; signal out of range, short circuit to battery
91	3	Sensor error accelerator pedal; signal range check high
29	3	Handthrottle; signal out of range, short circuit to battery
29	4	Handthrottle; signal out of range, short circuit to ground
91	4	Sensor error accelerator pedal; signal range check low
29	4	Handthrottle; signal out of range, short circuit to ground
523921	3	Sensor error burner temperature; signal range check high
3532	3	Sensor error urea tank level; signal range check high
523921	4	Sensor error burner temperature; signal range check low
3532	4	Sensor error urea tank level; signal range check low
1079	13	Sensor supply voltage monitor 1 error (ECU)
1080	13	Sensor supply voltage monitor 2 error (ECU)
523601	13	Sensor supply voltage monitor 3 error (ECU)
677	3	Starter relay; short circuit
677	4	Starter relay; short circuit
677	5	Starter relay; no load error
677	12	Starter relay; power stage over temperature
677	3	Starter relay; short circuit
677	4	Starter relay; short circuit
523922	5	Burner shut off valve; open load
523922	3	Burner shut of valve; short circuit to battery
523922	4	Burner shut of valve; short circuit to ground
624	5	SVS lamp; open load

624	12	SVS lamp; power stage over temperature
624	3	SVS lamp; short circuit to battery
624	4	SVS lamp; short circuit to ground
523612	14	Software reset CPU
523612	14	Software reset CPU
523612	14	Software reset CPU
91	11	Plausibility error between APP1 and APP2 or APP1 and idle switch
523550	12	T50 start switch active for too long
172	3	Sensor error intake air; signal range check high
172	4	Sensor error intake air sensor; signal range check low
172	2	Intake air sensor; plausibility error
523921	11	Sensor burner temperature; plausibility error
523921	0	Physical range check high for burner temperature
523921	1	Physical range check low for burner temperature
105	3	Sensor error charged air temperature; signal range check high
105	4	Sensor error charged air temperature; signal range check low
105	0	Charged air cooler temperature; system reaction initiated
105	0	Charged air cooler temperature; system reaction initiated
412	3	Sensor error EGR cooler downstream temperature; signal range check high
412	4	Sensor error EGR cooler downstream temperature; signal range check low
412	2	Sensor exhaust gas temperature Venturi unit (EGR); plausibility error
523960	0	EGR cooler downstream temperature; out of range, system reaction initiated
523960	1	EGR cooler downstream temperature; out of range, system reaction initiated
523960	11	Sensor exhaust gas temperature Venturi unit (EGR); plausibility error
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	7	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	12	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	12	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
4769	2	Sensor exhaust gas temperature downstream (DOC); plausibility error
4766	0	Physical range check high for exhaust gas temperature downstream (DOC)
4766	1	Physical range check low for exhaust gas temperature downstream (DOC)
4769	3	Sensor error exhaust gas temperature downstream (DOC); signal range check high
4769	4	Sensor error exhaust gas temperature downstream (DOC); signal range check low
4768	2	Sensor exhaust gas temperature upstream (DOC); plausibility error
4765	0	Physical range check high for exhaust gas temperature upstream (DOC)



4765	1	Physical range check low for exhaust gas temperature upstream (DOC)
4768	3	Sensor error exhaust gas temperature upstream (DOC); signal range check high
4768	4	Sensor error exhaust gas temperature upstream (DOC); signal range check low
3248	4	Sensor error particle filter downstream temperature; signal range check low
1180	11	Sensor exhaust gas temperature upstream turbine; plausibility error
1180	3	Sensor error exhaust gas temperature upstream turbine; signal range check high
1180	4	Sensor error exhaust gas temperature upstream turbine; signal range check low
4361	0	Physical range check high for urea catalyst upstream temperature
4361	1	Physical range low for urea catalyst upstream temperature
4361	3	Sensor error urea catalyst exhaust gas temperature upstream; signal range check high
4361	4	Sensor error urea catalyst exhaust gas temperature upstream; signal range check low
1761	14	Urea tank level; warning threshold exceeded
3361	3	Urea dosing valve; short circuit to battery
3361	3	Urea dosing valve; short circuit to battery
3361	4	Urea dosing valve; short circuit to ground
3361	4	Urea dosing valve; short circuit to ground
4345	5	SCR heater relay urea return line; open load
4366	5	SCR main relay (secondary side): open load
4343	5	SCR heater relay urea pressure line; open load
4366	5	SCR main relay; short circuit
4366	5	SCR main relay; short circuit
4341	5	SCR heater relay urea supply line; open load
523719	5	SCR heater relay urea supply module; open load
4366	5	SCR Tank heating valve; open load
4243	11	SCR system heater diagnostic reports error; shut off SCR-system
4345	5	SCR heater relay urea return line; open load
4345	3	SCR heater urea return line; short circuit to battery
4345	4	SCR heater urea return line; short circuit to ground
4343	5	SCR heater relay urea pressure line; open load
4343	3	SCR heater urea pressure line; short circuit to battery
4343	4	SCR heater urea pressure line; short circuit to ground
523718	5	SCR main relay (primary side); open load
523718	12	SCR main relay (primary side); power stage over temperature
523718	3	SCR main relay (primary side); short circuit to battery
523718	4	SCR main relay (primary side); short circuit to ground
4341	5	SCR heater relay urea supply line; open load
4341	3	SCR-heater urea supply line; short circuit to battery
4341	4	SCR-heater urea supply line; short circuit to ground
523719	5	SCR heater relay urea supply module; open load
523719	3	SCR heater urea supply module; short circuit to battery
523719	4	SCR heater urea supply module; short circuit to ground
4366	5	SCR Tank heating valve; open load
4366	12	SCR-heater relay urea tank power stage output; over temperature
4366	3	SCR Tank heating valve; short circuit to battery
4366	4	SCR Tank heating valve; short circuit to ground



4375	5	Urea pump motor; open load
4375	3	Urea pump motor; short circuit to battery
4375	4	Urea pump motor; short circuit to ground
523632	0	Urea pump pressure; out of range
523632	1	Urea pump pressure; out of range
523632	0	Urea pump pressure; out of range
523632	1	Urea pump pressure; out of range
523632	3	Sensor error urea pump pressure; signal range check high
523632	4	Sensor error urea pump pressure; signal range check low
4376	5	SCR reversing valve; open load
4376	12	SCR reversing valve; over temperature
4376	3	SCR reversing valve; short circuit to battery
4376	4	SCR reversing valve; short circuit to ground
4365	0	AdBlue-Tank temperature: maximum exceeded
4365	1	DEF-Tank temperature: below minimum
4365	3	Sensor error urea tank temperature; short circuit to battery
4365	4	Sensor error urea tank temperature; short circuit to ground
97	12	Water in fuel level pre-filter; maximum value exceeded
523946	0	Zero fuel calibration injector 1 (in firing order); maximum value exceeded
523947	0	Zero fuel calibration injector 2 (in firing order); maximum value exceeded
523948	0	Zero fuel calibration injector 3 (in firing order); maximum value exceeded
523949	0	Zero fuel calibration injector 4 (in firing order); maximum value exceeded
523950	0	Zero fuel calibration injector 5 (in firing order); maximum value exceeded
523951	0	Zero fuel calibration injector 6 (in firing order); maximum value exceeded
523946	1	Zero fuel calibration injector 1 (in firing order); minimum value exceeded
523947	1	Zero fuel calibration injector 2 (in firing order); minimum value exceeded
523948	1	Zero fuel calibration injector 3 (in firing order); minimum value exceeded
523949	1	Zero fuel calibration injector 4 (in firing order); minimum value exceeded
523950	1	Zero fuel calibration injector 5 (in firing order); minimum value exceeded
523951	1	Zero fuel calibration injector 6 (in firing order); minimum value exceeded
523612	12	ECU reported internal software error
175	2	Oil temperature; plausibility error
523973	14	SCR Tamper detection; de-rating timer below limit 1
523974	14	SCR Tamper detection; de-rating timer below limit 2
523975	14	Urea quality; de-rating timer below limit 1
523976	14	Urea quality; de-rating timer below limit 2
523977	14	Urea tank level; de-rating timer below limit 1
523978	14	Urea tank level; de-rating timer below limit 2
168	0	Physical range check high for battery voltage
168	1	Physical range check low for battery voltage
172	0	Physical range check high for intake air temperature
172	1	Physical range check low for intake air temperature
523980	14	Bad quality of reduction agent detected
523922	12	Over temperature error on burner shut off valve
1180	0	Exhaust gas temperature upstream turbine; out of range, system reaction

		initiated
1180	1	Exhaust gas temperature upstream turbine; out of range, system reaction initiated
523914	5	Glow plug control; open load
523914	11	Glow plug control; internal error
524018	14	DPF was not regenerated, power reduction phase 1 (manual regeneration request)
524022	14	DPF was not regenerated, power reduction phase 2 (manual regeneration request)
524023	14	DPF was not regenerated, warning condition (manual regeneration mode)
190	14	Speed detection; out of range, signal disrupted
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	12	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	11	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
523984	3	UB6; Short circuit to battery error of actuator relay 6
523985	3	UB7; Short circuit to battery error of actuator relay 7
523988	5	Charging lamp; open load
523988	12	Charging lamp; over temperature
523988	3	Charging lamp; short circuit to battery
523988	4	Charging lamp; short circuit to ground
524019	11	Air Pump; air lines blocked
523910	9	Air Pump; CAN communication lost
523910	7	Air pump; CAN communication interrupted no purge function available
523910	12	Air Pump; internal error
523910	0	Air Pump; internal error
523910	0	Air Pump; internal error
523911	7	Burner dosing valve (DV2); blocked closed
524014	1	Air pressure glow plug flush line; below limit
524013	7	Burner operation disturbed
523915	7	HCI dosing valve (DV1); blocked
523915	7	HCI dosing valve (DV1); blocked
524016	11	HFM sensor; electrical fault
524016	2	Air Pump; air flow is not plausible
524016	2	Air Pump; air flow is not plausible
523910	6	Air Pump; over current
523922	7	Shut-off valve: blocked
524021	11	Burner fuel line pipe leak behind Shut-off Valve
523922	7	Shut-off valve: blocked
524017	12	Spark plug control unit (SPCU); internal error

524017	12	Spark plug control unit (SPCU); internal error
523989	0	Fuel Balance Control integrator injector 7 (in firing order); maximum value exceeded
523990	0	Fuel Balance Control integrator injector 8 (in firing order); maximum value exceeded
523989	1	Fuel Balance Control integrator injector 7 (in firing order); minimum value exceeded
523990	1	Fuel Balance Control integrator injector 8 (in firing order); minimum value exceeded
523992	9	Timeout Error of CAN-Receive-Frame DM19Vol1; NOX sensor upstream
523993	9	Timeout Error of CAN-Receive-Frame DM19Vol2; NOX sensor downstream
524038	9	Timeout error of CAN-Receive-Frame ComMS_Sys1TO (error memory Slave); Master-Slave internal CAN message
524039	9	Timeout error of CAN-Receive-Frame ComMS_Sys2TO (error memory Slave); Master-Slave internal CAN message
524040	9	Timeout error of CAN-Receive-Frame ComMS_Sys3TO (error memory Slave); Master-Slave internal CAN message
524041	9	Timeout error of CAN-Receive-Frame ComMS_Sys4TO (error memory Slave); Master-Slave internal CAN message
524042	9	Timeout error of CAN-Receive-Frame ComMS_Sys5TO (error memory Slave); Master-Slave internal CAN message
524043	9	Timeout error of CAN-Receive-Frame ComMS_Sys6TO (error memory Slave); Master-Slave internal CAN message
524045	9	Master-Slave CAN; Message-Counter-Error of CAN-Receive-Frame ComMSMoFOvR
524046	9	Master-Slave CAN; Checksum-Error of CAN-Receive-Frame ComMSMoFOvR
524047	9	Master-Slave CAN; Message-Length-Error of CAN-Receive-Frame ComMSMoFOvR
524048	9	Timeout error CAN message ComMSMoFOvR1TO error memory Slave
524049	9	Message copy error in the Master / Slave data transfer
523788	0	Turbo charger wastegate; CAN Fehler
523788	0	Turbo charger wastegate; CAN Fehler
523788	0	Turbo charger wastegate; CAN Fehler
523788	0	Turbo charger wastegate; CAN Fehler
524024	11	Deviation of the exhaust gas temperature setpoint to actual value downstream (DOC) too high
523995	13	check of missing injector adjustment value programming (IMA) injector 7 (in firing order)
523996	13	check of missing injector adjustment value programming (IMA) injector 8 (in firing order)
523998	4	Injector cylinder bank 2 slave; short circuit
523999	12	Injector power stage output Slave defect
524000	5	Injector 7 (in firing order); interruption of electric connection
524001	5	Injector 8 (in firing order); interruption of electric connection
524000	3	Injector 7 (in firing order); short circuit
524001	3	Injector 8 (in firing order); short circuit
524000	4	High side to low side short circuit in the injector 7 (in firing order)
524001	4	High side to low side short circuit in the injector 8 (in firing order)
2797	4	Injector diagnostics; timeout error of short circuit to ground measurement cyl.

		Bank 0
2798	4	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 1
2798	4	Injector diagnostics; short circuit Bank 0, Bank 1
2798	4	Injector diagnostics; short circuit Bank 0, Bank 1
524035	12	Injector diagnostics; time out error in the SPI communication
524036	12	Injector diagnostics Slave; time out error in the SPI communication
524004	12	Too many recognised misfires in cylinder 7 (in firing order)
524005	12	Too many recognised misfires in cylinder 8 (in firing order)
524069	9	Timeout Error of CAN-Receive-Frame MSMon_FidFCCTO; Master-Slave CAN communication faulty
524052	11	MS ECU reported internal error
524052	11	MS ECU reported internal error
523919	2	Sensor air pump pressure; plausibility error
523920	2	Sensor exhaust gas back pressure; plausibility error
3253	2	Sensor differential pressure (DPF); plausibility error
164	2	Rail pressure safety function is not executed correctly
523922	5	Burner Shut-off Valve; open load
523922	12	Over temperature error on burner shut off valve
523922	4	Burner shut of valve; short circuit to ground
523921	2	Sensor burner temperature; plausibility error
1136	0	Physical range check high for ECU temperature
1136	1	Physical range check low for ECU temperature
1136	3	Sensor error ECU temperature; signal range check high
1136	4	Sensor error ECU temperature; signal range check low
4769	2	Sensor exhaust gas temperature (DOC) downstream; plausibility error
4769	2	Sensor exhaust gas temperature (DOC) downstream; plausibility error
3248	2	Sensor exhaust gas temperature downstream DPF; plausibility error
3248	0	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	0	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	0	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	1	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	1	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	1	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
1188	11	Turbo charger wastegate actuator; internal error
1188	11	Turbo charger wastegate actuator; internal error
1188	13	Wastegate actuator calibration deviation too large, recalibration required
1188	2	Wastegate; status message from ECU missing
1188	7	Wastegate actuator; blocked
1188	11	Turbo charger wastegate actuator; internal error
1188	11	Turbo charger wastegate actuator; internal error
1188	11	Turbo charger wastegate actuator; internal error

524011	0	Zero fuel calibration injector 7 (in firing order); maximum value exceeded
524012	0	Zero fuel calibration injector 8 (in firing order); maximum value exceeded
524011	1	Zero fuel calibration injector 7 (in firing order); minimum value exceeded
524012	1	Zero fuel calibration injector 8 (in firing order); minimum value exceeded
524028	2	CAN message PROEGRActr; plausibility error
524029	2	Timeout Error of CAN-Receive-Frame ComEGRActr - exhaust gas recirculation positioner
524034	5	Disc Separator; open load
524034	12	Disc Separator; power stage over temperature
524034	3	Disc separator; short circuit to battery
524034	4	Disc separator; short circuit to ground
524030	7	EGR actuator; internal error
524031	13	EGR actuator; calibration error
524032	2	EGR actuator; status message "EGRCust" is missing
524033	7	EGR actuator; due to overload in Save Mode
2621	5	Flush valve burner (EPV DPF-System); open load
2621	12	Flush valve burner (EPV DPF-System); power stage over temperature
2621	3	Flush valve burner (EPV DPF-System); short circuit to battery
2621	4	Flush valve burner (EPV DPF-System); short circuit to ground
175	0	Oil temperature; out of range, system reaction initiated
175	0	Oil temperature; out of range, system reaction initiated
411	0	Differential pressure Venturi unit (EGR); warning threshold exceeded
411	1	Differential pressure Venturi unit (EGR); shut-off threshold exceeded
3711	12	Regeneration temperature (PFItRgn LigtOff) not reached; regeneration aborted
524055	4	Spark Plug Control Unit (SPCU); short circuit to ground
523960	0	Exhaust gas temperature EGR downstream; out of range, system reaction initiated
523960	1	Exhaust gas temperature EGR downstream; out of range, system reaction initiated
1180	0	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
1180	1	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
1180	0	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
1180	1	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
524037	5	Ash lamp; open load
84	2	Sensor vehicle speed; plausibility error
524037	3	Ash lamp; short circuit to battery
524037	4	Ash lamp; short circuit to ground
524062	12	EAT-system HMI disrupted
524062	12	EAT-system HMI disrupted
524025	5	DPF system; operating voltage error
524044	9	CAN message ComMS_Sys7 not received from slave
523632	2	Metering control is not performed in time error
524068	2	Master ECU and Slave ECU have been identified as the same types
524052	11	MS ECU reported internal error

523718	5	SCR main relay; open load (only CV56B)
523718	12	SCR main relay; power stage over temperature (only CV56B)
523718	3	SCR main relay; short circuit to battery (only CV56B)
523718	4	SCR main relay; short circuit to ground (only CV56B)
4376	5	SCR reversing valve; open load
4376	12	SCR reversing valve; over temperature
4376	4	SCR reversing valve; short circuit to ground
2659	0	Physical range check high for EGR mass flow
2659	1	Physical range check low for EGR mass flow
2659	11	Exhaust gas recirculation; EGR mass flow; shut-off demand
524057	2	Electric fuel pump; fuel pressure build-up error
2659	2	Exhaust gas recirculation AGS sensor; plausibility error
2659	0	Physical range check high for EGR exhaust gas mass flow
2659	1	Physical range check low for EGR exhaust gas mass flow
2659	12	Exhaust gas recirculation; AGS sensor has "burn off" not performed
2659	2	AGS sensor temperature exhaust gas mass flow; plausibility error
3699	14	Maximum stand-still-duration reached; oil exchange required
3699	2	DPF differential pressure sensor and a further sensor or actuator CRT system defective
3699	2	Temperature sensor us. and ds. DOC simultaneously defect
524114	9	Timeout error of CAN-Transmit-Frame A1DOC
524115	9	Timeout error of CAN-Transmit-Frame AT1S
524116	9	Timeout error of CAN-Transmit-Frame SCR2
524117	9	Timeout error of CAN-Transmit-Frame SCR3
524097	9	Timeout error of CAN-Transmit-Frame DPFBrnAirPmpCtl
524098	9	Timeout error of CAN-Transmit-Frame ComDPFBrnPT
524099	9	Timeout error of CAN-Transmit-Frame ComDPFC0
524100	9	Timeout error of CAN-Transmit-Frame ComDPFHisDat
524101	9	Timeout error of CAN-Transmit-Frame ComDPFTstMon
524105	9	Timeout error of CAN-Transmit-Frame ComEGRMsFlw
524108	9	Timeout error of CAN-Transmit-Frame ComEGRTVActr
524110	9	Timeout error of CAN-Transmit-Frame ComETVActr
524112	9	Timeout ComITVActr
524118	9	Timeout error of CAN-Receive-Frame ComRxCM0
524119	9	Timeout error of CAN-Receive-Frame ComRxCustSCR2
524102	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmpCtl
524103	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmp
524104	9	Timeout error of CAN-Receive-Frame ComRxDPFctl
524106	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw1
524107	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw2
524109	9	Timeout error of CAN-Receive-Frame ComRxEGRTVActr
524111	9	Timeout error of CAN-Receive-Frame ComRxETVActr
524113	9	Timeout error of CAN-Receive-Frame ComRxITVActr
524120	9	Timeout error of CAN-Receive-Frame ComRxSCRHtDiag
524121	9	Timeout error of CAN-Receive-Frame ComRxTrbChActr
524122	9	Timeout error of CAN-Receive-Frame ComRxUQSens
524123	9	Timeout error of CAN-Receive-Frame ComSCRHtCtl
524124	9	Timeout error of CAN-Receive-Frame ComTxAT1IMG
524125	9	Timeout error of CAN-Receive-Frame ComTxTrbChActr



29	3	Handthrottle; signal out of range, short circuit to battery
29	3	Handthrottle; signal out of range, short circuit to battery
29	4	Handthrottle; signal out of range, short circuit to ground
29	4	Handthrottle; signal out of range, short circuit to ground
51	3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	7	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	11	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	12	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	12	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
51	12	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
84	2	Sensor vehicle speed; plausibility error
91	3	Sensor error accelerator pedal; signal range check high
91	4	Sensor error accelerator pedal; signal range check low
91	11	Plausibility error between APP1 and APP2 or APP1 and idle switch
94	1	Low fuel pressure; system reaction initiated
94	1	Low fuel pressure; system reaction initiated
94	3	Sensor error low fuel pressure; signal range check high
94	4	Sensor error low fuel pressure; signal range check low
97	3	Sensor error water in fuel; signal range check high
97	4	Sensor error water in fuel; signal range check low
97	12	Water in fuel level pre-filter; maximum value exceeded
100	0	
100	0	High oil pressure; system reaction initiated
100	1	High oil pressure; system reaction initiated
100	1	High oil pressure; system reaction initiated
100	3	Sensor error oil pressure; signal range check high
100	4	Sensor error oil pressure sensor; signal range check low
102	2	Charged air pressure; system reaction initiated



102	2	Charged air pressure; system reaction initiated
102	3	Sensor error charged air pressure; signal range check high
102	4	Sensor error charged air pressure; signal range check low
105	0	Charged air cooler temperature; system reaction initiated
105	0	Charged air cooler temperature; system reaction initiated
105	3	Sensor error charged air temperature; signal range check high
105	4	Sensor error charged air temperature; signal range check low
107	0	Air filter differential pressure; system reaction initiated
107	3	Sensor error air filter differential pressure; short circuit to battery
107	4	Sensor error air filter differential pressure; short circuit to ground
108	3	Sensor error ambient air pressure; signal range check high
108	4	Sensor error ambient air pressure; signal range check low
110	0	Coolant temperature; system reaction initiated
110	0	Coolant temperature; system reaction initiated
110	3	Sensor error coolant temperature; signal range check high
110	4	Sensor error coolant temperature; signal range check low
111	1	Coolant level too low
132	11	Air flow sensor; sensor error
132	11	Air flow sensor; sensor error
132	11	Air flow sensor; sensor error
132	11	Air flow sensor; sensor error
157	3	Sensor error rail pressure; signal range check high
157	4	Sensor error rail pressure; signal range check low
164	2	Rail pressure safety function is not executed correctly
168	0	Physical range check high for battery voltage
168	1	Physical range check low for battery voltage
168	2	Battery voltage; system reaction initiated
168	2	Battery voltage; system reaction initiated
168	3	Sensor error battery voltage; signal range check high
168	4	Sensor error battery voltage; signal range check low
171	3	Sensor error environment temperature; signal range check high
171	4	Sensor error environment temperature; signal range check low
172	0	Physical range check high for intake air temperature
172	1	Physical range check low for intake air temperature
172	2	Sensor ambient air temperature; plausibility error
172	2	Intake air sensor; plausibility error
172	3	Sensor error intake air; signal range check high
172	4	Sensor error intake air sensor; signal range check low
174	0	High low fuel temperature; system reaction initiated
174	0	High Low fuel temperature; system reaction initiated
175	0	Oil temperature; out of range, system reaction initiated
175	0	Oil temperature; out of range, system reaction initiated
175	0	Oil temperature; out of range, system reaction initiated
175	0	Oil temperature; out of range, system reaction initiated
175	0	Oil temperature; out of range, system reaction initiated
175	1	Physical range check low for oil temperature
175	2	Oil temperature; plausibility error

175	2	Oil temperature; plausibility error
175	2	Oil temperature; plausibility error
175	3	Sensor error oil temperature; signal range check high
175	4	Sensor error oil temperature; signal range check low
190	0	Engine speed above warning threshold (FOC-Level 1)
190	0	Engine speed above warning threshold (FOC-Level 1)
190	2	Offset angle between crank- and camshaft sensor is too large
190	8	Speed detection; out of range, signal disrupted
190	8	Speed detection; out of range, signal disrupted
190	11	Engine speed above warning threshold (FOC-Level 2)
190	12	Speed detection; out of range, signal disrupted
190	12	Speed detection; out of range, signal disrupted
190	14	Speed detection; out of range, signal disrupted
190	14	Speed detection; out of range, signal disrupted
411	0	Physical range check high for differential pressure Venturi unit (EGR)
411	0	Differential pressure Venturi unit (EGR); warning threshold exceeded
411	1	Physical range check low for differential pressure Venturi unit (EGR)
411	1	Differential pressure Venturi unit (EGR); shut-off threshold exceeded
411	2	Sensor differential pressure Venturi unit (EGR); CAN signal invalid
411	3	Sensor error differential pressure Venturi unit (EGR); signal range check high
411	4	Physical range check low for EGR differential pressure
411	4	Sensor error differential pressure Venturi unit (EGR); signal range check low
411	11	Sensor differential pressure Venturi unit (EGR); plausibility error
412	2	Sensor exhaust gas temperature Venturi unit (EGR); plausibility error
412	3	Sensor error EGR cooler downstream temperature; signal range check high
412	4	Sensor error EGR cooler downstream temperature; signal range check low
520	9	Timeout Error of CAN-Receive-Frame TSC1TR; Setpoint
597	2	Break lever main switch and break lever redundancy switch status not plausible
624	3	SVS lamp; short circuit to battery
624	4	SVS lamp; short circuit to ground
624	5	SVS lamp; open load
624	12	SVS lamp; power stage over temperature
630	12	Access error EEPROM
630	12	Access error EEPROM
630	12	Access error EEPROM
639	14	CAN-Bus 0 "Bus Off-Status"
651	3	Injector 1 (in firing order); short circuit
651	4	High side to low side short circuit in the injector 1 (in firing order)
651	5	Injector 1 (in firing order); interruption of electric connection
652	3	Injector 2 (in firing order); short circuit
652	4	High side to low side short circuit in the injector 2 (in firing order)
652	5	Injector 2 (in firing order); interruption of electric connection
653	3	Injector 3 (in firing order); short circuit
653	4	High side to low side short circuit in the injector 3 (in firing order)
653	5	Injector 3 (in firing order); interruption of electric connection
654	3	Injector 4 (in firing order); short circuit
654	4	High side to low side short circuit in the injector 4 (in firing order)

654	5	Injector 4 (in firing order); interruption of electric connection
655	3	Injector 5 (in firing order); short circuit
655	4	High side to low side short circuit in the injector 5 (in firing order)
655	5	Injector 5 (in firing order); interruption of electric connection
656	3	Injector 6 (in firing order); short circuit
656	4	High side to low side short circuit in the injector 6 (in firing order)
656	5	Injector 6 (in firing order); interruption of electric connection
676	11	Cold start aid relay; open load, relay error.
676	11	Cold start aid relay; open load, relay error.
677	3	Starter relay; short circuit
677	3	Starter relay; short circuit
677	4	Starter relay; short circuit
677	4	Starter relay; short circuit
677	5	Starter relay; no load error
677	12	Starter relay; power stage over temperature
703	3	Engine running lamp; short circuit to battery
703	4	Engine running lamp; short circuit to ground
703	5	Engine running lamp; open load
703	12	Engine running lamp; power stage over temperature
729	5	Cold start aid relay open load
729	12	Cold start aid relay; over temperature error
898	9	Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
975	3	Fan control; short circuit to battery
975	3	Fan control; short circuit to battery
975	4	Fan control; short circuit to ground
975	4	Fan control; short circuit to ground
975	5	Fan control; open load
975	5	Fan control; open load
975	12	Fan control; internal error
975	12	Fan control; internal error
1079	13	Sensor supply voltage monitor 1 error (ECU)
1080	13	Sensor supply voltage monitor 2 error (ECU)
1109	2	Engine shut-off demand ignored
1136	0	Physical range check high for ECU temperature
1136	1	Physical range check low for ECU temperature
1136	3	Sensor error ECU temperature; signal range check high
1136	4	Sensor error ECU temperature; signal range check low
1176	3	Sensor error pressure sensor upstream turbine; signal range check high
1176	4	Sensor error pressure sensor downstream turbine; signal range check high
1180	0	Exhaust gas temperature upstream turbine; out of range, system reaction initiated
1180	0	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
1180	0	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
1180	1	Exhaust gas temperature upstream turbine; out of range, system reaction initiated
1180	1	Exhaust gas temperature turbine upstream; out of range, system reaction initiated

1180	1	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
1180	3	Sensor error exhaust gas temperature upstream turbine; signal range check high
1180	4	Sensor error exhaust gas temperature upstream turbine; signal range check low
1180	11	Sensor exhaust gas temperature upstream turbine; plausibility error
1188	2	Wastegate; status message from ECU missing
1188	7	Wastegate actuator; blocked
1188	11	Turbo charger wastegate actuator; internal error
1188	11	Turbo charger wastegate actuator; internal error
1188	11	Turbo charger wastegate actuator; internal error
1188	11	Turbo charger wastegate actuator; internal error
1188	11	Turbo charger wastegate actuator; internal error
1188	13	Wastegate actuator calibration deviation too large, recalibration required
1231	14	CAN-Bus 1 "Bus Off-Status"
1235	14	CAN Bus error passive; warning CAN C
1235	14	CAN-Bus 2 "Bus Off-Status"
1237	2	Override switch; plausibility error
1322	12	Too many recognised misfires in more than one cylinder
1323	12	Too many recognised misfires in cylinder 1 (in firing order)
1324	12	Too many recognised misfires in cylinder 2 (in firing order)
1325	12	Too many recognised misfires in cylinder 3 (in firing order)
1326	12	Too many recognised misfires in cylinder 4 (in firing order)
1327	12	Too many recognised misfires in cylinder 5 (in firing order)
1328	12	Too many recognized misfires in cylinder 6 (in firing order)
1639	0	Sensor error fan speed; signal range check high
1639	1	Sensor error fan speed; signal range check low
1761	14	Urea tank level; warning threshold exceeded
2621	3	Flush valve burner (EPV DPF-System); short circuit to battery
2621	4	Flush valve burner (EPV DPF-System); short circuit to ground
2621	5	Flush valve burner (EPV DPF-System); open load
2621	12	Flush valve burner (EPV DPF-System); power stage over temperature
2659	0	Physical range check high for EGR mass flow
2659	0	Physical range check high for EGR exhaust gas mass flow
2659	1	Physical range check low for EGR mass flow
2659	1	Physical range check low for EGR exhaust gas mass flow
2659	2	Exhaust gas recirculation AGS sensor; plausibility error
2659	2	AGS sensor temperature exhaust gas mass flow; plausibility error
2659	11	Exhaust gas recirculation; EGR mass flow; shut-off demand
2659	12	Exhaust gas recirculation; AGS sensor has "burn off" not performed
2791	3	Actuator EGR Valve; short circuit to battery
2791	4	Actuator EGR Valve; short circuit to ground
2791	5	Actuator EGR Valve; open load
2791	12	Actuator EGR Valve; power stage over temperature
2797	4	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 0
2798	4	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 1

2798	4	Injector diagnostics; short circuit Bank 0, Bank 1
2798	4	Injector diagnostics; short circuit Bank 0, Bank 1
4365	0	AdBlue-Tank temperature: maximum exceeded
4365	1	DEF-Tank temperature: below minimum
4365	3	Sensor error urea tank temperature; short circuit to battery
4365	4	Sensor error urea tank temperature; short circuit to ground
3224	1	Nox sensor upstream of SCR Catalysator; low signal not plausible
3224	2	NOx Sensor; CAN DLC error
3224	2	NOx Sensor; CAN DLC error
3224	9	NOx Sensor; CAN Timeout
3224	9	NOx Sensor; CAN Timeout
3234	2	NOx Sensor; CAN DLC error
3234	9	NOx Sensor; CAN Timeout
3234	9	NOx Sensor; CAN Timeout
3234	11	Nox Sensor downstream of SCR Catalysator; plausibility error "stuck in range"
3241	0	Sensor SCR catalyst upstream temperature too high; plausibility error
3241	1	Sensor SCR catalyst upstream temperature too low; plausibility error
3248	0	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	0	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	0	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	1	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	1	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	1	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
3248	2	Sensor exhaust gas temperature downstream DPF; plausibility error
3248	4	Sensor error particle filter downstream temperature; signal range check low
3251	0	Physical range check high for differential pressure (DPF); shut off regeneration
3251	1	Physical range check low for differential pressure (DPF); shut off regeneration
3253	2	Sensor differential pressure (DPF); plausibility error
3253	2	Sensor differential pressure (DPF); plausibility error
3253	3	Sensor error differential pressure (DPF); signal range check high
3253	4	Sensor error differential pressure (DPF); signal range check low
3361	3	Urea dosing valve; short circuit to battery
3361	3	Urea dosing valve; short circuit to battery
3361	4	Urea dosing valve; short circuit to ground
3361	4	Urea dosing valve; short circuit to ground
3361	7	AdBlue dosing valve blocked (SCR)
3532	3	Sensor error urea tank level; signal range check high
3532	4	Sensor error urea tank level; signal range check low
3699	2	DPF differential pressure sensor and a further sensor or actuator CRT system defective
3699	2	Temperature sensor us. and ds. DOC simultaneously defect

3699	14	Maximum stand-still-duration reached; oil exchange required
3711	12	Regeneration temperature (PFItRgn LigtOff) not reached; regeneration aborted
4243	11	SCR system heater diagnostic reports error; shut off SCR-system
523632	0	Urea pump pressure; out of range
523632	0	Urea pump pressure; out of range
523632	1	Urea pump pressure; out of range
523632	1	Urea pump pressure; out of range
523632	3	Sensor error urea pump pressure; signal range check high
523632	4	Sensor error urea pump pressure; signal range check low
4341	3	SCR-heater urea supply line; short circuit to battery
4341	4	SCR-heater urea supply line; short circuit to ground
4341	5	SCR heater relay urea supply line; open load
4341	5	SCR heater relay urea supply line; open load
4343	3	SCR heater urea pressure line; short circuit to battery
4343	4	SCR heater urea pressure line; short circuit to ground
4343	5	SCR heater relay urea pressure line; open load
4343	5	SCR heater relay urea pressure line; open load
4343	11	General pressure check error (SCR)
4345	3	SCR heater urea return line; short circuit to battery
4345	4	SCR heater urea return line; short circuit to ground
4345	5	SCR heater relay urea return line; open load
4345	5	SCR heater relay urea return line; open load
4345	11	Sensor backflow line pressure (SCR); plausibility error
4360	0	Physical range check high for urea catalyst upstream temperature
4360	1	Physical range low for urea catalyst upstream temperature
4361	3	Sensor error urea catalyst exhaust gas temperature upstream; signal range check high
4361	4	Sensor error urea catalyst exhaust gas temperature upstream; signal range check low
4365	0	Urea tank temperature too high
4366	3	SCR Tank heating valve; short circuit to battery
4366	4	SCR Tank heating valve; short circuit to ground
4366	5	SCR main relay (secondary side): open load
4366	5	SCR main relay; short circuit
4366	5	SCR main relay; short circuit
4366	5	SCR Tank heating valve; open load
4366	5	SCR Tank heating valve; open load
4366	12	SCR-heater relay urea tank power stage output; over temperature
4374	13	Pressure stabilisation error dosing valve (SCR)
4375	3	Urea pump motor; short circuit to battery
4375	4	Urea pump motor; short circuit to ground
4375	5	Urea pump motor; open load
4376	3	SCR reversing valve; short circuit to battery
4376	4	SCR reversing valve; short circuit to ground
4376	4	SCR reversing valve; short circuit to ground
4376	5	SCR reversing valve; open load
4376	5	SCR reversing valve; open load
4376	12	SCR reversing valve; over temperature
4376	12	SCR reversing valve; over temperature



4765	0	Physical range check high for exhaust gas temperature upstream (DOC)
4765	1	Physical range check low for exhaust gas temperature upstream (DOC)
4766	0	Physical range check high for exhaust gas temperature downstream (DOC)
4766	1	Physical range check low for exhaust gas temperature downstream (DOC)
4768	2	Sensor exhaust gas temperature upstream (DOC); plausibility error
4768	3	Sensor error exhaust gas temperature upstream (DOC); signal range check high
4768	4	Sensor error exhaust gas temperature upstream (DOC); signal range check low
4769	2	Sensor exhaust gas temperature downstream (DOC); plausibility error
4769	2	Sensor exhaust gas temperature (DOC) downstream; plausibility error
4769	2	Sensor exhaust gas temperature (DOC) downstream; plausibility error
4769	3	Sensor error exhaust gas temperature downstream (DOC); signal range check high
4769	4	Sensor error exhaust gas temperature downstream (DOC); signal range check low
523006	3	Controller mode switch; short circuit to battery
523006	4	Controller mode switch; short circuit to ground
523008	1	Manipulation control was triggered
523008	2	Timeout error in Manipulation control
523009	9	Pressure Relief Valve (PRV) reached maximum allowed opening count
523009	10	Pressure relief valve (PRV) reached maximum allowed open time
523212	9	Timeout Error of CAN-Receive-Frame ComEngPrt; Engine Protection
523216	9	Timeout Error of CAN-Receive-Frame PrHtEnCmd; pre-heat command, engine command
523240	9	Timeout CAN-message FunModCtl; Function Mode Control
523330	14	Immobilizer status; fuel blocked
523350	4	Injector cylinder-bank 1; short circuit
523352	4	Injector cylinder-bank 2; short circuit
523354	12	Injector power stage output defect
523450	2	Multiple Stage Switch constant speed; plausibility error
523450	3	Multiple Stage Switch constant speed; short circuit to battery
523450	4	Multiple Stage Switch constant speed; short circuit to ground
523451	2	Multiple Stage Switch engine speed control parameter; plausibility error
523451	3	Multiple Stage Switch engine speed control parameter; short circuit to battery
523451	4	Multiple Stage Switch engine speed control parameter; short circuit to ground
523452	2	Multiple Stage Switch engine torque limitation curve; plausibility error
523452	3	Multiple Stage Switch engine torque limitation curve; short circuit to battery
523452	4	Multiple Stage Switch engine torque limitation curve; short circuit to ground
523470	2	Pressure Relief Valve (PRV) forced to open
523470	2	Pressure Relief Valve (PRV) forced to open
523470	7	Maximum rail pressure in limp home mode exceeded (PRV)
523470	11	Pressure Relief Valve (PRV) error; Rail pressure out of tolerance range
523470	11	Rail pressure out of tolerance range
523470	12	Pressure Relief Valve (PRV) forced to open; system reaction initiated
523470	12	Pressure Relief Valve (PRV) forced to open; system reaction initiated
523470	14	Pressure Relief Valve (PRV) is open
523550	12	T50 start switch active for too long



523601	13	Sensor supply voltage monitor 3 error (ECU)
523602	0	Fan control; out of range, system reaction initiated
523602	0	Fan control; out of range, system reaction initiated
523603	9	Timeout Error of CAN-Receive-Frame AMB; Ambient Temperature Sensor
523605	9	Timeout Error of CAN-Receive-Frame TSC1AE; Traction Control
523606	9	Timeout Error of CAN-Receive-Frame TSC1AR; Retarder
523612	12	Internal software error ECU
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	12	ECU reported internal software error
523612	14	Software reset CPU
523612	14	Software reset CPU
523612	14	Software reset CPU
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	0	Rail pressure disrupted
523613	1	Minimum rail pressure exceeded (RailMeUn3)
523613	2	Setpoint of metering unit in overrun mode not plausible
523615	3	Metering unit (Fuel-System); short circuit to battery
523615	3	Metering unit (Fuel-System); short circuit to battery
523615	4	Metering unit (Fuel-System); short circuit to ground
523615	4	Metering unit (Fuel-System); short circuit to ground
523615	5	Metering unit (Fuel-System); open load
523615	12	Metering unit (Fuel-System); power stage over temperature
523619	2	Physical range check high for exhaust gas temperature upstream (SCR-CAT)
523632	0	Pressure overload of SCR-System
523632	1	Pressure build-up error SCR-System
523632	2	Metering control is not performed in time error
523632	16	Pump pressure SCR metering unit too high
523632	18	Pump pressure SCR metering unit too low

523633	11	Nox conversion rate insufficient
523633	11	Nox conversion rate insufficient
523633	11	Nox conversion rate insufficient
523698	11	Shut-off request from supervisory monitoring function
523717	12	Timeout Error of CAN-Transmit-Frame AmbCon; Weather environments
523718	3	SCR main relay (primary side); short circuit to battery
523718	3	SCR main relay; short circuit to battery (only CV56B)
523718	4	SCR main relay (primary side); short circuit to ground
523718	4	SCR main relay; short circuit to ground (only CV56B)
523718	5	SCR main relay (primary side); open load
523718	5	SCR main relay; open load (only CV56B)
523718	12	SCR main relay (primary side); power stage over temperature
523718	12	SCR main relay; power stage over temperature (only CV56B)
523719	3	SCR heater urea supply module; short circuit to battery
523719	4	SCR heater urea supply module; short circuit to ground
523719	5	SCR heater relay urea supply module; open load
523719	5	SCR heater relay urea supply module; open load
523720	2	Urea supply module heater temperature; plausibility error
523720	2	Urea supply module heater temperature; plausibility error
523720	8	Urea supply module heater temperature; signal disrupted
523720	8	Urea supply module heater temperature; signal disrupted
523721	2	Urea supply module heater temperature; plausibility error
523721	2	Urea supply module heater temperature; plausibility error
523721	8	Urea supply module temperature; signal disrupted
523721	8	Urea supply module temperature; signal disrupted
523721	11	Urea supply module temperature measurement not available
523722	8	Urea supply module PWM signal; signal disrupted
523722	8	Urea supply module PWM signal; signal disrupted
523723	11	Detection of AdBlue filled SCR system in Init-State
523766	9	Timeout Error of CAN-Receive-Frame Active TSC1AE
523767	9	Timeout Error of CAN-Receive-Frame Passive TSC1AE
523768	9	Timeout Error of CAN-Receive-Frame Active TSC1AR
523769	9	Timeout Error of CAN-Receive-Frame Passive TSC1AR
523770	9	Timeout Error of CAN-Receive-Frame Passive TSC1DE
523776	9	Timeout Error of CAN-Receive-Frame TSC1TE - active
523777	9	Passive Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
523778	9	Active Timeout Error of CAN-Receive-Frame TSC1TR
523779	9	Passive Timeout Error of CAN-Receive-Frame TSC1TR
523788	0	Turbo charger wastegate; CAN Fehler
523788	0	Turbo charger wastegate; CAN Fehler
523788	0	Turbo charger wastegate; CAN Fehler
523788	0	Turbo charger wastegate; CAN Fehler
523788	12	Timeout Error of CAN-Transmit-Frame TrbCH; Status Wastegate
523793	9	Timeout Error of CAN-Receive-Frame UAA10; AGS sensor service message
523794	9	Timeout Error of CAN-Receive-Frame UAA11; AGS sensor data
523803	9	Timeout Error of CAN-Receive-Frame RxEngPres; Status burner air pump
523867	12	Timeout Error of CAN-Transmit-Frame UAA1 on CAN 2; Burner Air Pump Control

523895	13	Check of missing injector adjustment value programming (IMA) injector 1 (in firing order)
523896	13	check of missing injector adjustment value programming (IMA) injector 2 (in firing order)
523897	13	check of missing injector adjustment value programming (IMA) injector 3 (in firing order)
523898	13	check of missing injector adjustment value programming (IMA) injector 4 (in firing order)
523899	13	check of missing injector adjustment value programming (IMA) injector 5 (in firing order)
523900	13	check of missing injector adjustment value programming (IMA) injector 6 (in firing order)
523906	3	Electrical fuel pre - supply pump; short circuit to battery
523906	4	Electrical fuel pre - supply pump; short circuit to ground
523906	5	Electrical fuel pre - supply pump; open load
523906	12	Electrical fuel pre-supply pump; power stage over temperature
523910	0	Air Pump; internal error
523910	0	Air Pump; internal error
523910	6	Air Pump; over current
523910	7	Air pump; CAN communication interrupted no purge function available
523910	9	Air Pump; CAN communication lost
523910	12	Air Pump; internal error
523910	14	Air pump does not achieve air mass flow setpoint
523911	0	Burner dosing valve (DV2); overcurrent at the end of the injection phase
523911	3	Burner dosing valve (DV2); short circuit to battery
523911	3	Burner dosing valve (DV2); short circuit to battery
523911	4	Burner dosing valve (DV2); short circuit to ground
523911	7	Burner dosing valve (DV2); blocked closed
523911	11	Burner dosing valve (DV2); short circuit high side power stage
523911	12	Burner dosing valve (DV2); power stage over temperature
523912	0	Physical range check high for burner dosing valve (DV2) downstream pressure; shut off regeneration
523912	1	Physical range check low for burner dosing valve (DV2) downstream pressure; shut off regeneration. When burner injector is actuated, the measured pressure does not rise above ca. 1250mbar abs (expected: ca. 2400mbar).
523912	2	Burner dosing valve (DV2) downstream pressure sensor; plausibility error
523912	3	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check high
523912	4	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check low
523913	3	Sensor error glow plug control diagnostic line voltage; signal range check high
523913	4	Sensor error glow plug control diagnostic line voltage; signal range check low
523914	3	Glow plug control; short circuit to battery
523914	4	Glow plug control; short circuit to ground
523914	5	Glow plug control; open load
523914	5	Glow plug control; open load
523914	11	Glow plug control; internal error
523914	12	Glow plug control; power stage over temperature

523915	0	HCl dosing valve (DV1); overcurrent at the end of the injection phase
523915	3	HCl dosing valve (DV1); short circuit to battery
523915	3	HCl dosing valve (DV1); short circuit to battery
523915	4	HCl dosing valve (DV1); short circuit to ground
523915	7	HCl dosing valve (DV1); blocked
523915	7	HCl dosing valve (DV1); blocked
523915	11	HCl dosing valve (DV1); short circuit high side power stage
523915	12	HCl dosing valve (DV1); power stage over temperature
523916	0	Physical range check high for HCl dosing valve (DV1) downstream pressure; shut off regeneration
523916	1	Physical range check low for HCl dosing valve (DV1) downstream pressure; shut off regeneration
523916	2	Sensor HCl dosing valve (DV1) downstream pressure; plausibility error
523916	3	Sensor error HCl dosing valve (DV1) downstream pressure; signal range check high
523916	4	Sensor error HCl dosing valve (DV1) downstream pressure; signal range check low
523917	0	Physical range check high for DV1 & DV2 upstream pressure; shut off regeneration
523917	1	Physical range check low for DV1 & DV2 upstream pressure; shut off regeneration
523917	2	Sensor DV1 & DV2 upstream pressure; plausibility error
523917	3	Sensor error DV1 & DV2 upstream pressure; signal range check high
523917	4	Sensor error DV1 & DV2 upstream pressure; signal range check low
523918	0	Physical range check high for DV1 & DV2 upstream temperature; shut off regeneration
523918	1	Physical range check low for DV1 & DV2 upstream temperature; shut off regeneration
523918	2	Sensor DV1 & DV2 upstream temperature; plausibility error
523918	3	Sensor error DV1 & DV2 upstream temperature; signal range check high
523918	4	Sensor error DV1 & DV2 upstream temperature; signal range check low
523919	0	Physical range check high for air pump pressure; shut off regeneration
523919	1	Physical range check low for air-pump pressure; shut off regeneration
523919	2	Sensor air pump pressure; plausibility error
523919	2	Sensor air pump pressure; plausibility error
523919	3	Sensor error air-pump pressure; signal range check high
523919	4	Sensor error air-pump pressure; signal range check low
523920	0	Physical range check high for exhaust gas back pressure burner; shut off regeneration
523920	1	Physical range check low for exhaust gas back pressure burner; shut off regeneration
523920	2	Sensor exhaust gas back pressure; plausibility error
523920	2	Sensor exhaust gas back pressure; plausibility error
523920	3	Sensor error exhaust gas back pressure burner; signal range check high
523920	4	Sensor error exhaust gas back pressure burner; signal range check low
523921	0	Physical range check high for burner temperature
523921	1	Physical range check low for burner temperature
523921	2	Sensor burner temperature; plausibility error
523921	3	Sensor error burner temperature; signal range check high
523921	4	Sensor error burner temperature; signal range check low

523921	11	Sensor burner temperature; plausibility error
523922	3	Burner shut of valve; short circuit to battery
523922	4	Burner shut of valve; short circuit to ground
523922	4	Burner shut of valve; short circuit to ground
523922	5	Burner shut off valve; open load
523922	5	Burner Shut-off Valve; open load
523922	7	Shut-off valve: blocked
523922	7	Shut-off valve: blocked
523922	12	Over temperature error on burner shut off valve
523922	12	Over temperature error on burner shut off valve
523923	3	UB1; Short circuit to battery error of actuator relay 1
523924	3	UB2; Short circuit to battery error of actuator relay 2
523925	3	UB3; Short circuit to battery error of actuator relay 3
523926	3	UB4; Short circuit to battery error of actuator relay 4
523927	3	UB5; Short circuit to battery error of actuator relay 5
523929	0	Fuel Balance Control integrator injector 1 (in firing order); maximum value exceeded
523929	1	Fuel Balance Control integrator injector 1 (in firing order); minimum value exceeded
523930	0	Fuel Balance Control integrator injector 2 (in firing order); maximum value exceeded
523930	1	Fuel Balance Control integrator injector 2 (in firing order); minimum value exceeded
523931	0	Fuel Balance Control integrator injector 3 (in firing order); maximum value exceeded
523931	1	Fuel Balance Control integrator injector 3 (in firing order); minimum value exceeded
523932	0	Fuel Balance Control integrator injector 4 (in firing order); maximum value exceeded
523932	1	Fuel Balance Control integrator injector 4 (in firing order); minimum value exceeded
523933	0	Fuel Balance Control integrator injector 5 (in firing order); maximum value exceeded
523933	1	Fuel Balance Control integrator injector 5 (in firing order); minimum value exceeded
523934	0	Fuel Balance Control integrator injector 6 (in firing order); maximum value exceeded
523934	1	Fuel Balance Control integrator injector 6 (in firing order); minimum value exceeded
523935	12	Timeout Error of CAN-Transmit-Frame EEC3VOL1; Engine send messages
523936	12	Timeout Error of CAN-Transmit-Frame EEC3VOL2; Engine send messages
523938	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensor calibration for NOX Sensor (SCR-system upstream cat; DPF- system downstream cat)
523939	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensor calibration for NOX Sensor (SCR-system upstream cat; DPF- system downstream cat)
523940	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensor calibration for NOX Sensor (SCR-system upstream cat; DPF- system downstream cat)



523941	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT10GCVol2 information; factors & Sensor calibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)
523942	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT10GCVol2 information; factors & Sensor calibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)
523943	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT10GCVol2 information; factors & Sensor calibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)
523946	0	Zero fuel calibration injector 1 (in firing order); maximum value exceeded
523946	1	Zero fuel calibration injector 1 (in firing order); minimum value exceeded
523947	0	Zero fuel calibration injector 2 (in firing order); maximum value exceeded
523947	1	Zero fuel calibration injector 2 (in firing order); minimum value exceeded
523948	0	Zero fuel calibration injector 3 (in firing order); maximum value exceeded
523948	1	Zero fuel calibration injector 3 (in firing order); minimum value exceeded
523949	0	Zero fuel calibration injector 4 (in firing order); maximum value exceeded
523949	1	Zero fuel calibration injector 4 (in firing order); minimum value exceeded
523950	0	Zero fuel calibration injector 5 (in firing order); maximum value exceeded
523950	1	Zero fuel calibration injector 5 (in firing order); minimum value exceeded
523951	0	Zero fuel calibration injector 6 (in firing order); maximum value exceeded
523951	1	Zero fuel calibration injector 6 (in firing order); minimum value exceeded
523960	0	EGR cooler downstream temperature; out of range, system reaction initiated
523960	0	Exhaust gas temperature EGR downstream; out of range, system reaction initiated
523960	1	EGR cooler downstream temperature; out of range, system reaction initiated
523960	1	Exhaust gas temperature EGR downstream; out of range, system reaction initiated
523960	11	Sensor exhaust gas temperature Venturi unit (EGR); plausibility error
523973	14	SCR Tamper detection; de-rating timer below limit 1
523974	14	SCR Tamper detection; de-rating timer below limit 2
523975	14	Urea quality; de-rating timer below limit 1
523976	14	Urea quality; de-rating timer below limit 2
523977	14	Urea tank level; de-rating timer below limit 1
523978	14	Urea tank level; de-rating timer below limit 2
523980	14	Bad quality of reduction agent detected
523981	11	Urea-tank without heating function (heating phase)
523982	0	Power stage diagnosis disabled; high battery voltage
523982	1	Power stage diagnosis disabled; low battery voltage
523984	3	UB6; Short circuit to battery error of actuator relay 6
523985	3	UB7; Short circuit to battery error of actuator relay 7
523988	3	Charging lamp; short circuit to battery
523988	4	Charging lamp; short circuit to ground
523988	5	Charging lamp; open load
523988	12	Charging lamp; over temperature
523989	0	Fuel Balance Control integrator injector 7 (in firing order); maximum value

		exceeded
523989	1	Fuel Balance Control integrator injector 7 (in firing order); minimum value exceeded
523990	0	Fuel Balance Control integrator injector 8 (in firing order); maximum value exceeded
523990	1	Fuel Balance Control integrator injector 8 (in firing order); minimum value exceeded
523992	9	Timeout Error of CAN-Receive-Frame DM19Vol1; NOX sensor upstream
523993	9	Timeout Error of CAN-Receive-Frame DM19Vol2; NOX sensor downstream
523995	13	check of missing injector adjustment value programming (IMA) injector 7 (in firing order)
523996	13	check of missing injector adjustment value programming (IMA) injector 8 (in firing order)
523998	4	Injector cylinder bank 2 slave; short circuit
523999	12	Injector power stage output Slave defect
524000	3	Injector 7 (in firing order); short circuit
524000	4	High side to low side short circuit in the injector 7 (in firing order)
524000	5	Injector 7 (in firing order); interruption of electric connection
524001	3	Injector 8 (in firing order); short circuit
524001	4	High side to low side short circuit in the injector 8 (in firing order)
524001	5	Injector 8 (in firing order); interruption of electric connection
524004	12	Too many recognised misfires in cylinder 7 (in firing order)
524005	12	Too many recognised misfires in cylinder 8 (in firing order)
524011	0	Zero fuel calibration injector 7 (in firing order); maximum value exceeded
524011	1	Zero fuel calibration injector 7 (in firing order); minimum value exceeded
524012	0	Zero fuel calibration injector 8 (in firing order); maximum value exceeded
524012	1	Zero fuel calibration injector 8 (in firing order); minimum value exceeded
524013	7	Burner operation disturbed
524013	7	Burner operation disturbed
524014	1	Air pressure glow plug flush line; below limit
524016	2	Air Pump; air flow is not plausible
524016	2	Air Pump; air flow is not plausible
524016	11	HFM sensor; electrical fault
524017	12	Spark plug control unit (SPCU); internal error
524017	12	Spark plug control unit (SPCU); internal error
524018	14	DPF was not regenerated, power reduction phase 1 (manual regeneration request)
524019	11	Air Pump; air lines blocked
524020	14	Engine power; Not enough oxygen for regeneration
524021	11	Burner fuel line pipe leak behind Shut-off Valve
524022	14	DPF was not regenerated, power reduction phase 2 (manual regeneration request)
524023	14	DPF was not regenerated, warning condition (manual regeneration mode)
524024	11	Deviation of the exhaust gas temperature setpoint to actual value downstream (DOC) too high
524025	5	DPF system; operating voltage error
524025	14	Particulate filter; regeneration not successful
524028	2	CAN message PROEGRActr; plausibility error



524029	2	Timeout Error of CAN-Receive-Frame ComEGRActr - exhaust gas recirculation positioner
524030	7	EGR actuator; internal error
524031	13	EGR actuator; calibration error
524032	2	EGR actuator; status message "EGRCust" is missing
524033	7	EGR actuator; due to overload in Save Mode
524034	3	Disc separator; short circuit to battery
524034	4	Disc separator; short circuit to ground
524034	5	Disc Separator; open load
524034	12	Disc Separator; power stage over temperature
524035	12	Injector diagnostics; time out error in the SPI communication
524036	12	Injector diagnostics Slave; time out error in the SPI communication
524037	3	Ash lamp; short circuit to battery
524037	4	Ash lamp; short circuit to ground
524037	5	Ash lamp; open load
524038	9	Timeout error of CAN-Receive-Frame ComMS_Sys1TO (error memory Slave); Master-Slave internal CAN message
524039	9	Timeout error of CAN-Receive-Frame ComMS_Sys2TO (error memory Slave); Master-Slave internal CAN message
524040	9	Timeout error of CAN-Receive-Frame ComMS_Sys3TO (error memory Slave); Master-Slave internal CAN message
524041	9	Timeout error of CAN-Receive-Frame ComMS_Sys4TO (error memory Slave); Master-Slave internal CAN message
524042	9	Timeout error of CAN-Receive-Frame ComMS_Sys5TO (error memory Slave); Master-Slave internal CAN message
524043	9	Timeout error of CAN-Receive-Frame ComMS_Sys6TO (error memory Slave); Master-Slave internal CAN message
524044	9	CAN message ComMS_Sys7 not received from slave
524045	9	Master-Slave CAN; Message-Counter-Error of CAN-Receive-Frame ComMSMoFOvR
524046	9	Master-Slave CAN; Checksum-Error of CAN-Receive-Frame ComMSMoFOvR
524047	9	Master-Slave CAN; Message-Length-Error of CAN-Receive-Frame ComMSMoFOvR
524048	9	Timeout error CAN message ComMSMoFOvR1TO error memory Slave
524049	9	Message copy error in the Master / Slave data transfer
524052	11	MS ECU reported internal error
524052	11	MS ECU reported internal error
524052	11	MS ECU reported internal error
524055	4	Spark Plug Control Unit (SPCU); short circuit to ground
524057	2	Electric fuel pump; fuel pressure build-up error
524062	12	EAT-system HMI disrupted
524062	12	EAT-system HMI disrupted
524068	2	Master ECU and Slave ECU have been identified as the same types
524069	9	Timeout Error of CAN-Receive-Frame MSMon_FidFCCTO; Master-Slave CAN communication faulty
524097	9	Timeout error of CAN-Transmit-Frame DPFBnAirPmpCtl
524098	9	Timeout error of CAN-Transmit-Frame ComDPFBnPT
524099	9	Timeout error of CAN-Transmit-Frame ComDPFCO
524100	9	Timeout error of CAN-Transmit-Frame ComDPFHisDat

524101	9	Timeout error of CAN-Transmit-Frame ComDPFTstMon
524102	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmpCtl
524103	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmp
524104	9	Timeout error of CAN-Receive-Frame ComRxDPFctl
524105	9	Timeout error of CAN-Transmit-Frame ComEGRMsFlw
524106	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw1
524107	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw2
524108	9	Timeout error of CAN-Transmit-Frame ComEGRTVActr
524109	9	Timeout error of CAN-Receive-Frame ComRxEGRTVActr
524110	9	Timeout error of CAN-Transmit-Frame ComETVActr
524111	9	Timeout error of CAN-Receive-Frame ComRxETVActr
524112	9	Timeout ComITVActr
524113	9	Timeout error of CAN-Receive-Frame ComRxITVActr
524114	9	Timeout error of CAN-Transmit-Frame A1DOC
524115	9	Timeout error of CAN-Transmit-Frame AT1S
524116	9	Timeout error of CAN-Transmit-Frame SCR2
524117	9	Timeout error of CAN-Transmit-Frame SCR3
524118	9	Timeout error of CAN-Receive-Frame ComRxCM0
524119	9	Timeout error of CAN-Receive-Frame ComRxCustSCR2
524120	9	Timeout error of CAN-Receive-Frame ComRxSCRHtDiag
524121	9	Timeout error of CAN-Receive-Frame ComRxTrbChActr
524122	9	Timeout error of CAN-Receive-Frame ComRxUQSens
524123	9	Timeout error of CAN-Receive-Frame ComSCRHtCtl
524124	9	Timeout error of CAN-Receive-Frame ComTxAT1IMG
524125	9	Timeout error of CAN-Receive-Frame ComTxTrbChActr

# CHAPTER 6

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## 6

## ELECTRICAL SYSTEM DIAGRAM

## **6.1 REQUEST FOR THE ELECTRICAL WIRING DIAGRAM**

Request the wiring diagram by contacting the assistance service and/or the Manufacturer, indicating the reason for the request.

# CHAPTER 7

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7

## HYDRAULIC SYSTEM DIAGRAM

## **7.1 REQUEST FOR HYDRAULIC SYSTEM DIAGRAM**

Request the hydraulic diagram by contacting the assistance service and/or the Manufacturer, indicating the reason for the request.

# CHAPTER 8

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## 8

## SCHEDULED MAINTENANCE COUPONS



## 8.1 IMPLEMENTED SCHEDULED MAINTENANCE COUPONS

Fill in the tables below for each required intervention on the maintenance schedule. The following must be indicated:

- in the "Type of intervention" section, which interval you are referring to, the date, the machine hours (noted from the hour counter),
- in the "executor" section, the name and surname of the assigned executor, name of the executing company, address of the executing company, stamp of the executing company and signature of the executor of the operations indicated in the maintenance schedule.

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____   Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____   Address _____    Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____   Address _____    Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____



TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

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<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

TYPE OF INTERVENTION	EXECUTOR
<input type="checkbox"/> First intervention <input type="checkbox"/> 500 <input type="checkbox"/> 1000 <input type="checkbox"/> 1500 <input type="checkbox"/> 2000 <input type="checkbox"/> 3000  Date ____ / ____ / ____  Machine hours	Name _____  Surname _____  Company _____  Address _____  Stamp _____  Signature _____

## 9 MACHINE RECEIPT CARD

The client is obliged to complete all fields (in block letters) of the table and send it by postal mail or e-mail to Service Faresin.

CHECK	REMARKS
The documentation is included/is complete	
Inclusion of required tools	
Liquid levels	
Any leaks from:	
Engine oil	
Flexible hydraulic pipes	
Cylinders/valves/fittings	
Fuel	
Cooling liquid	
Bridges/reducers	
Loosening cables	
Belt tension	
Functioning controls	
Functioning lights	
Functioning cabin instruments	
Functioning brakes	

Name and surname: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Machine serial number: \_\_\_\_\_

Machine receipt date \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

Dealer: \_\_\_\_\_