

VAHVA GRAPPLES

C, E and KC models

Operating and Safety Manual

Version 1.12.2023 (English)
Translation

VAHVA



The operating and safety instructions as well as the spare parts books of the VAHVA products can be found on the web site:

<https://koneosapalvelu.fi/en/product/grapple-manuals-and-spare-part-catalogues/>

EN



VAHVA käyttö- ja turvallisuusohje sekä varaosakirjat löytyvät sähköisenä internetistä:

<https://koneosapalvelu.fi/tuote/kayttoohjeet-ja-varaosakirjat/>

FI



Bruks- och säkerhetsanvisningar och reservdelskataloger för VAHVAs produkter finns på webben:

<https://koneosapalvelu.fi/tuote/kayttoohjeet-ja-varaosakirjat/>

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1 Introduction

1.1 General

This manual contains the operating and safety instructions of VAHVA grapples.

The manual contains information about the structure and functions of our product that is essential for the proper use and maintenance of the equipment.

For more demanding repair and maintenance work, we recommend contacting Koneosapalvelu or your grapple dealer. Our staff has the experience and specialised tools necessary for carrying out the more challenging jobs.

This manual contains instructions that help you to use the equipment safely and efficiently. Keep the manual easily accessible and available for anyone operating this equipment. If the manual gets lost or dirty, you can order a replacement manual from Koneosapalvelu Oy or from your grapple dealer.

Specific spare parts catalogues, the operating and safety manuals can be found on the manufacturer's website: www.koneosapalvelu.fi

If you sell the grapple, please give this manual to the new owner.

Koneosapalvelu Oy's continuous product development can result in changes in the equipment that are not reflected in this manual. If you need the latest information about your equipment or if you have any questions about this manual, please contact Koneosapalvelu or your grapple dealer.

Regular maintenance and correct operation are the key to ensuring a long service life for the equipment and the safety of the operator. Therefore, please follow the instructions in this manual carefully.

PLEASE NOTE

Incorrect use and maintenance of the equipment can be dangerous and lead to serious injury or death.

Therefore, always observe the instructions provided in this manual when operating and servicing the equipment.



1.2 The intended use of VAHVA grapples

A VAHVA grapple is a piece of equipment intended for loading and handling timber. The C and E models of our VAHVA range are mounted suspended on a rotator, while the KC models are mounted on an excavator with quick coupling. If the model type is E, the grapple is fitted with spikes instead of jaws. The number after the letter E indicates the amount of spikes.

The maximum permissible load of the grapple denotes a load applied evenly on both jaws. See the model-specific maximum load in the Technical Specifications table at the end of the manual.

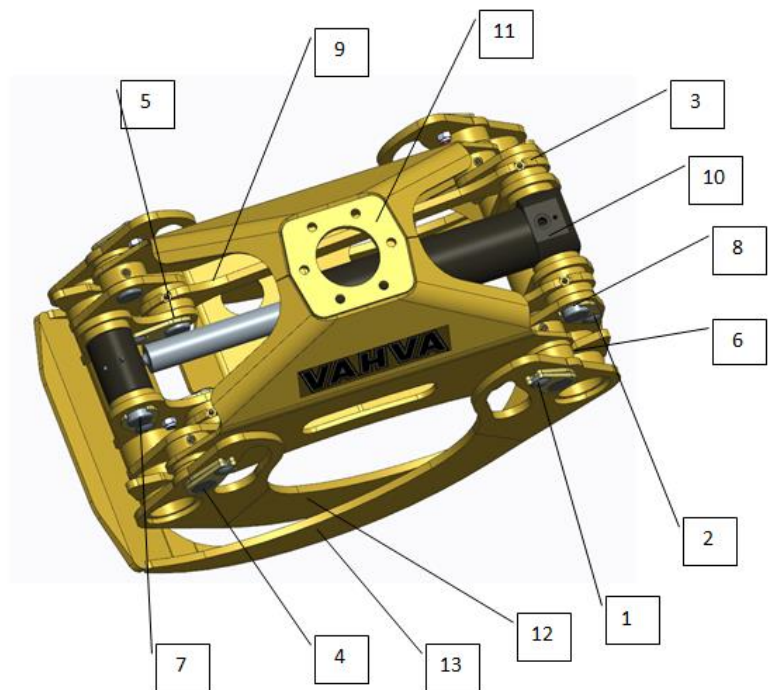
When in use, the possible effect of torque on the structure must be taken into account.

The following accessories are available for the grapples:

- Hose break valve: prevents the jaws from opening suddenly in the event of a hose break.
- Pressure relief valve, if the max. working pressure of the hydraulic system of the machine chassis is more than 250 bar. The warranty is valid only on the condition that the manufacturer’s reference values are observed.
- Load relief valve: ensures that the jaws are evenly opened, even under heavy loads, and prevents the jaws opening suddenly in case of a hose break (KC36 E7 and KC42 E9).
- Demolition jaws for the VAHVA KC36 E7 and the VAHVA KC42 E9 models.
- Gravel jaws for the VAHVA C26 model.
- Steel pipe kit for the VAHVA C21 model, must be used when handling steel pipes

2 Grapple parts

1-2	Screw	8 pcs
3	Bearing bushing	12 pcs
4-8	Pivot pin	7-8 pcs
9	Pushrod	1-2 pcs
10	Hydraulic cylinder	1 pcs
11	Frame	1 pcs
12	Inner jaw	1 pcs
13	Outer jaw	1 pcs



The serial number of the grapple is indicated on the identification plate and the frame of the equipment.

The identification plate is located on the internal wall of the grapple frame.

3 Warranty

The manufacturer grants a 12-month warranty for the grapple from the date of delivery. The warranty applies to broken parts. The warranty is not valid if any of the following conditions is not met:

- The equipment must be operated and serviced only in accordance with this manual.
- Only original parts may be used in the equipment.
- The equipment may only be used for its intended and designated purpose.
- Changes or modifications have been made to the device
- The warranty does not cover indirect damages.

The equipment has been checked at the factory before delivery, and it can be used immediately after the installation inspection. **The warranty is valid only if all maintenance work during the warranty period is carried out according to the schedule specified in this manual.**

4 Safety

4.1 General

If any of the information in this manual is contrary to the local laws and regulations, the local law must be observed.

This grapple may be operated and serviced only by persons who have received appropriate training for this purpose.

Please refer to the safety regulations for the base machine, as well as the safety instructions for using the machine in this chapter and on the machine plates.

4.2 Warnings

The signal word “CAUTION”

is used in this manual with the safety symbol.



The signal word “HAZARD” warns you about the most serious hazard situations. The safety symbols “CRUSHING HAZARD” and “HIGH-PRESSURE HYDRAULIC OIL” are placed near potential

hazard points on the grapple. General safety instructions are given under the “CAUTION” safety signs. The signal word “CAUTION” is used in the safety instructions in this manual.

4.3 Safety labels

Regularly check the condition of all safety labels and ensure that they are in a good condition and visible. Replace any damaged labels.

Label V600324 HIGH-PRESSURE HYDRAULIC OIL

High-pressure hydraulic oil can spurt out from a damaged hose. The oil can easily penetrate skin, which can be lethal. Also protect your eyes in case there is a risk of oil spray. In case of an accident, seek medical treatment or contact the emergency services (call 112).

Never touch any hydraulic hoses or couplings when the machine is running. Never search for hose leaks by hand, and always protect your eyes with safety goggles.

Label V600325 CRUSHING HAZARD

Never stand or work near the jaws of the grapple when the machine is running.

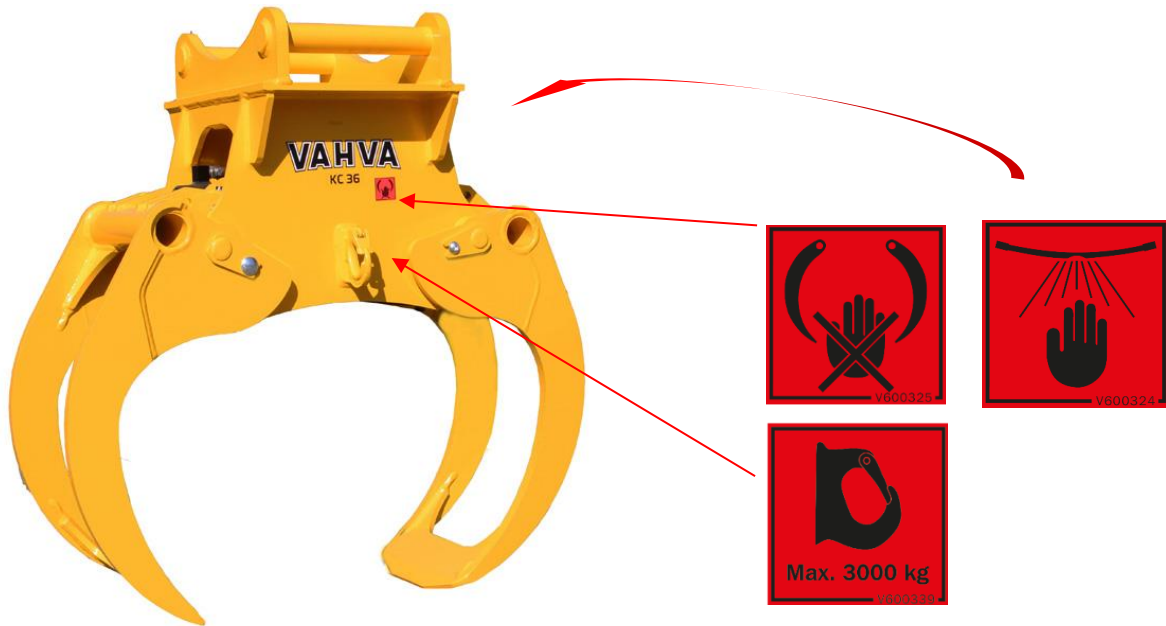
Otherwise, you could get crushed between the grapple jaws. When performing daily maintenance, always switch the engine off, and always lower the loader to the ground, on a stable surface, taking ergonomics into account.

Label V600339 MAXIMUM LOAD

In KC models, the lifting hook has a maximum load of 3,000 kg.

Ensure that the lifting hook is used correctly. The maximum load refers to direct lifting.

During maintenance, check the condition of the lifting hook and the locking latch. Do not lift with a defective hook.



4.4 Follow the safety instructions

Carefully read all the safety instructions in this manual.

Replace any damaged safety labels. Ensure that any new grapple parts have the appropriate safety labels.

Learn how to operate the equipment and its controls correctly. Never allow an untrained person to operate the equipment.

Keep equipment in good working order. Any unauthorised modifications of the equipment can impair its functionality or work safety. The manufacturer is only liable for the original content delivery.

If you notice any cracks or distortions in the structures, stop using the equipment immediately.

When using the equipment, the minimum safety distance is 20 m.

4.5 Before and during use

Before starting work, always check that there are no other persons in the operating area of the equipment, and that there is no risk of personal injury.

Take into consideration the safety distances to any power lines.

Take into consideration the density and the angle of elevation of the ground. Do not level trees against the ground. Always follow the worksite plan.

Never allow anyone to stay within the 20-metre danger zone. Stop the machine immediately if you notice anyone in the danger zone.

Never leave the cab unsupervised if the engine is running.

When handling long items, take into consideration that they cause excess stress and increase the diameter of the danger zone.

Never stand or walk under any items being lifted.

Leave enough space for rotatable, tiltable and horizontally moving parts.

Never exceed the maximum permissible load size of the machine. Do not load trees so that the trees come over the screen or the loading area.



4.6 Safe maintenance

PLEASE NOTE: It is strictly prohibited to perform maintenance on the machine when the engine is running.

Never touch any pressurised hydraulic hoses. Never tighten leaking couplings when the machine is running. High-pressure hydraulic oil is a lethal hazard.

Read more about safe maintenance procedures in Section 6.2 of the manual.

4.7 Working with oils and chemicals

Important: Always take environmental aspects into consideration. Close all couplings with plugs so that no oil can leak into the soil.

Avoid skin contact with oil. Wear protective gloves and eye protection. If any oil gets on your skin, wash it off immediately. Avoid inhaling oil vapours.

Please refer to the safety data sheet of the substance in question.

Keep the hydraulic system clean.

Carefully clean the area surrounding the maintenance site before starting.

PLEASE NOTE: The output and pressure of hydraulic oil must never exceed the maximum value of 250 bar specified for the equipment. Exceeding these values can cause structural defects and damage persons or property.

5 Installation

5.1 Before installation

Make sure that the necessary documentation is available before starting the installation. Clean the work environment and consider work safety. Check that the grapple size is suitable for the base machine. Place the base machine and the grapple on a flat non-slip surface. Make sure that the equipment rests directly on the jaws. Use suitable support under the base if necessary.

5.2 Mechanical mounting

1. Make sure that the mounting surface of the rotator on the frame is clean, straight and free of paint.
2. Install the rotator on the grapple frame. The tightening torque is **300 Nm**.
 - Use M16 12.9 bolts for installation
3. Grease the bearings.
4. Retighten the screws after the first week of work.

5.3 Hydraulic mounting

1. Connect the hoses between the rotator and the hydraulic cylinder. Rotator markings: O = open, at the cylinder rod end, and C = closed, at the opposite end.
2. The cylinder connections, see chapter 9, dimension the hose size according to the output of the base machine.
3. Test the connection.

If necessary, use a protective spiral wrap on the hydraulic hoses.

If the grapple is mounted on a cargo crane or an excavator boom, used to load cargo, the cylinder must be fitted with a double lock valve or a relief valve (hose break valve). The valve is piped to the cylinder.

The maximum operating pressure for the grapple is 250 bar. If necessary, a pressure relief valve must be installed.

6 Maintenance

6.1 General

It is advisable to have any adjustments and repairs that require the use of special tools and expertise to be performed by qualified specialists of Koneosapalvelu or your grapple dealer. Only use original spare parts for grapple maintenance.

Keep consumables and spare parts with you on the site and replenish them immediately whenever you need any accessories. These include hydraulic hoses, for example.

Always observe absolute cleanliness in all maintenance work.

Monitor the operation of the equipment to find any loose or detached sections, hydraulic oil leaks, hose abrasions etc.

Make sure that there is enough hydraulic oil. An insufficient amount of oil will cause malfunctions, damage the pump and ruin the lubricating properties of the oil.

Welding work must always consider the instructions given by the manufacturer of the base machine.

For the base machine, please refer to the maintenance manuals of each machine.

The manufacturer cannot accept liability for any changes in the grapple's structure or hydraulic systems that do not correspond to the original installation.

6.2 Safe maintenance



PLEASE NOTE: Maintenance and repair work may only be carried out by trained technicians or workshops, using appropriate tools and lifting equipment.

PLEASE NOTE: Always turn off the machine before starting any maintenance work.

PLEASE NOTE: Never touch pressurised cylinders or hydraulic hoses, and do not stand near them.

PLEASE NOTE: Never tighten leaking couplings when the machine is running. High-pressure oil spray can be lethal!

Always wear the necessary personal protective equipment (protective gloves, other protective clothing, eye protection etc).

When you perform any work around the grapple, always stop the engine of the base machine, and disconnect power from the main switch, to avoid accidents.

When you leave the machine, lower the grapple firmly on the ground. It is prohibited to work under an under grapple or boom.

Never let anyone inexperienced to enter the cab of the base machine when the grapple is being inspected, serviced or repaired.

Never exceed the operating pressure of 250 bar set by the manufacturer. Never adjust hydraulic pressure without a pressure gauge.

Connect and disconnect the pressure gauge only when the system is not pressurised, if possible.

6.3 Greasing instructions

Never grease the equipment when the machine is running.

Always wear the necessary personal protective equipment (incl. protective gloves, eye protection, protective clothing).

Follow the maintenance instructions, cf. Section 6.5. The right time for greasing is at the end of a shift, or when changing shifts, when the greasing points are warm.

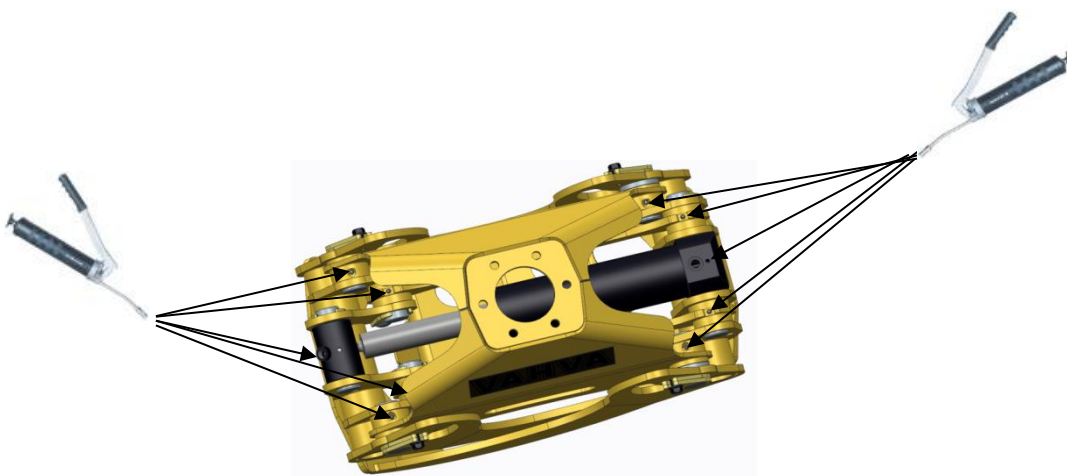
When greasing, the cylinders must be depressurised, making it easier for the grease to reach the object to be lubricated.

When greasing nipples, always clean the ends of the nipples beforehand.

Press the grease into the point until the excess grease is clean.

Never leave empty grease cartridges and hand towels in nature.

Image: Greasing points



6.4 Recommended greases and oils

Lubricating greases

It is recommended to use NLGI 2 or NLGI 0 greases for greasing plain bearings. NLGI 0 grade grease is better suited for use during the cold winter month.

Required DIN and ISO classifications for lubricating greases used

DIN 51502 KPOE-30 (NLGI 0); ISO 6743 ISO-L-XCBFB0 (NLGI 0); DIN 51502 KP2K-20 (NLGI 2); ISO 6743 ISO-L-XBCIB2 (NLGI 2)

Hydraulic oil

Mineral and bio-based oils can be used in Vahva grapples, according to the recommendations of the base machine manufacturer.

- in summer, according to SMR classification: SH 68
- in winter, according to SMR classification: SHS 32
- for year-round use, according to SMR classification: SHS 46

Never mix different types of oils as it causes their properties to deteriorate. In case of any doubt, please contact the oil manufacturer/dealer.

6.5 Scheduled maintenance

This information relates to working under normal conditions. In difficult conditions (e.g. a heavy load, dust) the maintenance intervals must be shortened to suit the conditions.	Before you start working	After work or daily (16 h)	Weekly or every 80 hours	Every 1000 hours	If damaged > repair
Visually inspect -oil leaks -the condition of the structures -pivot pin locks -in KC models, the condition of the lifting hook	x				x
Grease the bearings - push rods (2-4 nipples) - jaw bearings (4 nipples) - hydraulic cylinder bearings (2 nipples)		x	x	x	
Check the pivot pin locks			x	x	x
Check the condition of the hydraulic cylinder arm			x	x	x
Check the hydraulic hoses			x	x	x
Check the bearings				x	x
Check the hydraulic cylinder seals				x	x
Replace lost/damaged safety labels				x	x
Check for any cracks/deformations				x	x

7 Storage and decommissioning of the equipment

7.1 Storage

Important: Protect the environment. Recover the waste oil from the system and dispose of it properly.

Repair any worn or damaged parts. If necessary, install new parts to avoid any unnecessary downtime later

Wash the grapple and spot-paint the worn places to avoid corrosion. Replace any worn or damaged safety labels.

Coat the entire device lightly with an anti-rust agent. Coat the visible part of the cylinder rods in particular.

Grease all grease points (cf. Section 6.5).

Store the equipment in a dry, protected place.

7.2 Dismantling and decommissioning of the grapple

At the end of the service life of the equipment, its parts can mostly be recycled.

The steel parts are completely recyclable and can be utilised as such.

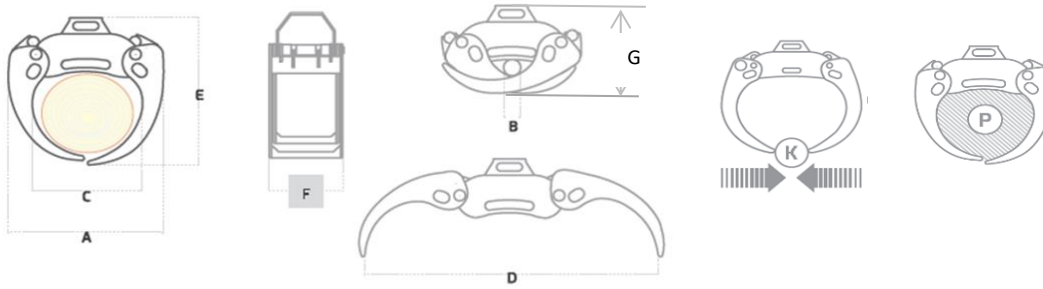
Hydraulic cylinders contain oil; drain the oil and wash it out; other than the gaskets, the cylinders are made of steel. Dispose of waste oil appropriately.

Hydraulic valves also contain some oil, which needs to be drained before recycling. The valve blocks are made of steel.

The bearings of the grapple are made of bronze. They can be recycled as bearing material.

Hydraulic hoses are cut into pieces less than 0.5 m in length and delivered to the hazardous waste management facility or to a hazardous waste collection vehicle.

8 Technical specifications



TECHNICAL INFORMATION												
Description	Weight (kg)	Max. pressure (bar)	P		Max Load (kg)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)
			Area (m²)	Force tip to tip (kN)								
C MODELS												
VAHVA C21 GRAPPLE	128	240	0,21	9,4	3000	820	90	570	1345	799	368	492
VAHVA C26 GRAPPLE	230	250	0,26	19	4000	940	95	605	1600	888	473	604
VAHVA C30 GRAPPLE	238	250	0,30	19	4000	960	95	665	1690	940	475	599
VAHVA C36 GRAPPLE	242	250	0,36	19	4000	1005	95	765	1770	995	475	592
VAHVA C36 HD GRAPPLE	296	250	0,36	19	4000	1005	95	765	1770	995	506	592
VAHVA C42 GRAPPLE	290	250	0,42	23	6000	1115	130	810	2010	1110	535	672
VAHVA C46 GRAPPLE	300	250	0,46	23	6000	1130	130	840	2000	1130	535	666
VAHVA C46 HD GRAPPLE	392	250	0,46	23	6000	1130	130	840	2000	1130	566	665
VAHVA C60 HD GRAPPLE	450	250	0,60	22	6000	1314	151	1043	2300	1230	610	707
VAHVA C80 GRAPPLE	965	250	0,8	34	10000	1585	175	1130	3010	1550	670	670
VAHVA C100 GRAPPLE	1000	250	1,00	31	10000	1695	175	1290	3080	1645	675	990
E MODELS												
VAHVA C21 E4 GRAPPLE	146	240	0,21	9,4	3000	783	90	513	1320	750	427	485
VAHVA C30 E4 GRAPPLE	302	250	0,3	19	4000	955	70	655	1780	978	525	592
VAHVA C36 E7 GRAPPLE	370	250	0,3	19	4000	955	70	655	1780	978	625	591
VAHVA C42 E5 GRAPPLE	470	250	0,42	23	6000	1130	165	840	1955	1125	850	702
VAHVA C46 E4 GRAPPLE	450	250	0,46	23	6000	1180	130	910	2000	1212	595	679
KC MODELS												
VAHVA KC21 GRAPPLE S40/S45	166	240	0,21	9,4	3000	820	90	570	1345	913	375	610
VAHVA KC21 GRAPPLE GJ300	190	240	0,21	9,4	3000	820	90	570	1345	913	375	610
VAHVA KC30 GRAPPLE S45	290	250	0,3	19	4000	960	95	665	1690	1025	475	724
VAHVA KC36 GRAPPLE NTP10	410	250	0,36	19	4000	1005	95	765	1770	1090	506	798
VAHVA KC36 GRAPPLE S60	400	250	0,36	19	4000	1005	95	765	1770	1090	506	820
VAHVA KC36 GRAPPLE CPR8/CPR15	378	250	0,36	19	4000	1005	95	765	1770	938	506	668
VAHVA KC46 GRAPPLE NTP10	500	250	0,46	23	6000	1130	130	840	2000	1195	566	862
VAHVA KC46 GRAPPLE NTP20	560	250	0,46	23	6000	1130	130	840	2000	1195	566	923
VAHVA KC46 GRAPPLE S60	515	250	0,46	23	6000	1130	130	840	2000	1195	566	883
VAHVA KC46 GRAPPLE S70	535	250	0,46	23	6000	1130	130	840	2000	1195	566	916
VAHVA KC46 GRAPPLE CPR8/CPR15	460	250	0,46	23	6000	1130	130	840	2000	1012	566	733
VAHVA KC46 GRAPPLE XR400i	497	250	0,46	23	6000	1130	130	840	2000	1065	566	786
KCE MODELS												
VAHVA KC21 E4 GRAPPLE S40/S45	184	240	0,21	9,4	3000	783	90	513	1320	868	427	600
VAHVA KC30 E4 GRAPPLE S45	350	250	0,3	19	4000	955	95	655	1780	1060	525	716
VAHVA KC36 E7 GRAPPLE NTP10	475	250	0,36	19	4000	955	95	655	1780	1050	625	795
VAHVA KC36 E7 GRAPPLE S60	465	250	0,36	19	4000	955	95	655	1780	1050	625	816
VAHVA KC36 E7 GRAPPLE CPR8/CPR15	541	250	0,36	19	4000	955	95	655	1780	898	625	664
VAHVA KC42 E5 GRAPPLE NTP10	580	250	0,42	23	6000	1130	165	840	1955	1185	850	888
VAHVA KC42 E5 GRAPPLE NTP20	640	250	0,42	23	6000	1130	130	840	1955	1185	850	949
VAHVA KC42 E5 GRAPPLE S60	570	250	0,42	23	6000	1130	130	840	1955	1275	850	909
VAHVA KC42 E5 GRAPPLE S70	615	250	0,42	23	6000	1130	130	840	1955	1300	850	942
VAHVA KC42 E9 GRAPPLE NTP10	720	250	0,42	23	6000	1130	130	840	1955	1315	840	888
VAHVA KC42 E9 GRAPPLE NTP20	780	250	0,42	23	6000	1130	130	840	1955	1315	850	949
VAHVA KC42 E9 GRAPPLE S60	710	250	0,42	23	6000	1130	130	840	1955	1275	850	909
VAHVA KC42 E9 GRAPPLE S70	755	250	0,42	23	6000	1130	130	840	1955	1300	850	942
VAHVA KC42 E9 GRAPPLE S80	867	250	0,42	23	6000	1130	130	840	1955	1300	850	942
VAHVA KC42 E9 GRAPPLE CPR8/CPR15	537	250	0,42	23	6000	1130	130	840	1955	1117	850	759
VAHVA KC46 E4 GRAPPLE NTP10	560	250	0,46	23	6000	1180	130	910	2000	1270	595	867
VAHVA KC46 E4 GRAPPLE NTP20	620	250	0,46	23	6000	1180	130	910	2000	1270	600	928
VAHVA KC46 E4 GRAPPLE S60	550	250	0,46	23	6000	1180	130	910	2000	1360	600	888
VAHVA KC46 E4 GRAPPLE S70	595	250	0,46	23	6000	1180	130	910	2000	1385	600	921
VAHVA ACCESSORIES												
VAHVA C21 BUCKETS	119	250									600	
VAHVA C26 BUCKETS	165	250									770	
VAHVA C36 E7 DEMOLITION JAWS	240	250									750	
VAHVA C42 E9 DEMOLITION JAWS	360	250									950	

Note! Manufacturer reserves the right to change the technical data

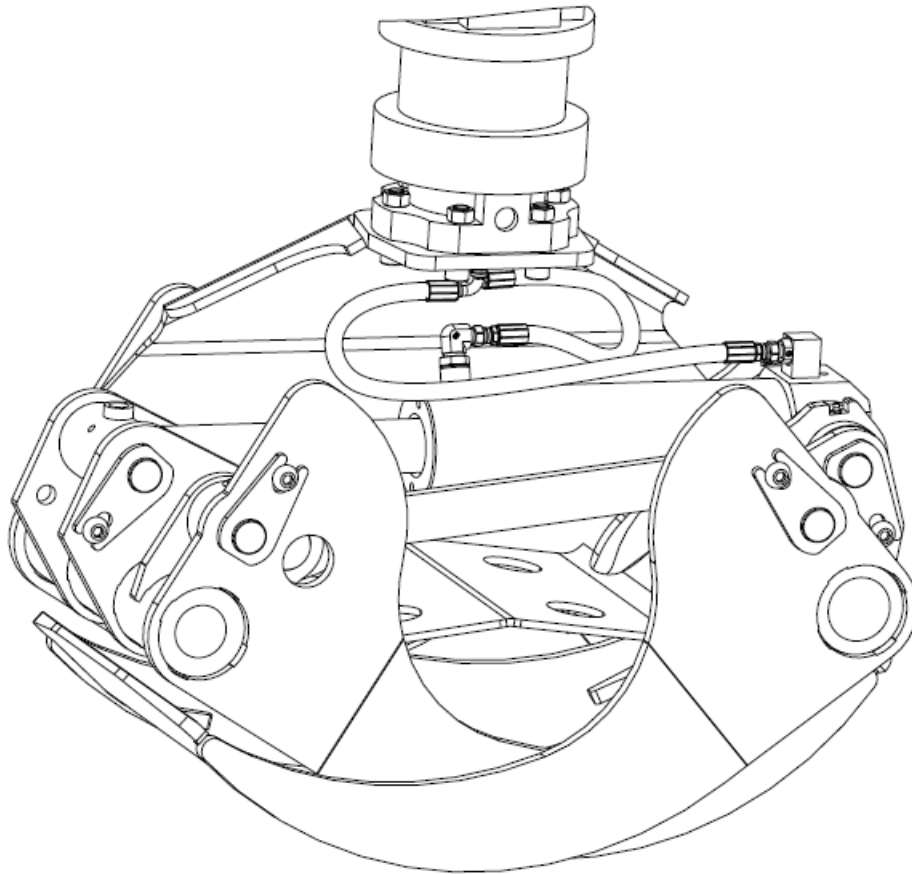
9 Hydraulic hoses in rotator model grapples

MODEL	HYDRAULIC HOSE WITH 2 X REINFORCING MESH	HOSE LENGTH
VAHVA C21	3/8" R2T 98 SAE 100 R2T/DIN 20022	370 mm and 520 mm
VAHVA C26/30/36	1/2" R2T 98 SAE 100 R2T/DIN 20022	500 mm and 580 mm
VAHVA C42/46/60	1/2" R2T 98 SAE 100 R2T/DIN 20022	580 mm and 630 mm

MODEL	EXAMPLE: HOSE CONNECTORS	EXAMPLE: NIPPLES ROTATOR AND CYLINDER
VAHVA C21	CONNECTOR/90-AST/SK/JIC FOR 3/8" HOSE (2 pcs) BANJO CONNECTOR FOR 3/8" HOSE (1 pc) CONNECTOR/STRAIGHT SK/JIC FOR 3/8" HOSE (1 pc)	BASIC CONNECTOR BSP-6 x JIC-6 (1 pc) BANJO BOLT 3/8"R (1 pc) GASKET R3/8 17.2 x 23.9 x 2.1 (2 pcs) BASIC CONNECTOR BSP-8 x JIC-6 (2 pcs)
VAHVA C26/30/36	CONNECTOR/ANGLE 90°/ JIC/UNF-THREAD (2 pcs) CONNECTOR/STRAIGHT SK/JIC FOR 1/2" HOSE (2 pcs)	BASIC CONNECTOR BSP-8 x JIC-10 (3 pcs) ANGLE CONNECTOR 90°, JIC SK x JIC-10 THREAD NUT C6XS (1 pcs)
VAHVA C42/46/60	CONNECTOR/ANGLE 90°/ JIC/UNF-THREAD (2 pcs) CONNECTOR/STRAIGHT SK/JIC FOR 1/2" HOSE (2 pcs)	BASIC CONNECTOR BSP-8 x JIC-10 (3 pcs) ANGLE CONNECTOR 90°, JIC SK x JIC-10 THREAD NUT C6XS

Vahva KC models: hose lengths and connectors on a case-by-case basis.

Image: Grapple pipelines, sectional view.



translation

EC Declaration of Conformity

Manufacturer Koneosapalvelu Oy
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Country Finland
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www www.koneosapalvelu.fi

Hannu Soimasuo (Koneosapalvelu Oy, Teollisuustie 5, 35700 Vilppula), is authorised to compile the technical documentation. It is hereby assured that the grapple:

see original document



complies with the relevant provisions of the Machinery Directive (2006/42/EC).

Vilppula, 24.01.2023

A handwritten signature in blue ink, appearing to read 'Hannu Soimasuo', is written over a faint, light blue horizontal line.

Hannu Soimasuo
managing director