WX210
WX240

HYDRAULIC EXCAVATOR

Service manual

Print No. 9-91270 English

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Service manual

Section 0 Safety Instructions

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PREFACE

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To the reader

The Technical Manual (TM) has been written for the **repair specialist**. It provides important information on carrying out repair work expertly.

Please go carefully through the **Technical Manual** as well as the Owner's Manual for the **hydraulic excavator** before starting any repair work. Use the **Technical Manual** as well as the **Owner's Manual** and **spare-parts list** as a reference book and source of information even if you are familiar with hydraulic excavator technology.

Using the Technical Manual, the experienced construction machine mechanic can carry out any necessary repairs expertly.

Handling

The Technical Manual is divided into eight sections and covers the originally delivered version of the machine. Any additions or modifications undertaken at a later date are not described in this manual.

- Introduction
- Safety Instructions
- Technical Data and Special Tools
- Description of Functioning
- Performance Testing
- Troubleshooting
- Repair Instructions
- Annex

The **Safety Instructions** section describes the recommended procedures to be observed in order to prevent any risk of accidents to the operator and to the personnel responsible for the works and for machine servicing measures.

The **Description of Functioning** section provides technical information on operating the main devices and systems.

The **Technical Data and Special Tools** section lists service data, conversion tables and special tools and servicing materials required.

The **Performance Testing** section gives the information required for carrying out performance testing.

The **Troubleshooting** section contains information on detecting faults in the machine.

The **Repair Instructions** section gives the technical information needed to carry out servicing and repair work on the machine, describes the equipment needed for servicing works, and provides information on maintenance standards, removal and installation procedures, and dismantling and assembly procedures.

The required information can easily be found by referring to the table of contents.

For reasons of clarity, some of the illustrations are presented in simplified form. Differences from the actual version at the hydraulic excavator are therefore possible if this adds to the clarity of the information.

Repair

Carry out any necessary repair work as soon as possible. This reduces repair costs and increases the availability of your hydraulic excavator.

When doing any work on the hydraulic excavator, always observe the instructions given in the Technical Manual and in the Owner's Manual.

Extensive works not described in the Technical Manual will gladly be executed for you by the O&K after-sales service.

Always use **original spare parts** only.

Further information material

Please consult the following documents in addition to this Manual:

- Owner's Manual
- Spare-parts catalogue

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Warnings and symbols

The following signs are used in the Technical Manual to designate exceptionally important information:

Precautionary rules and measures designed to protect the operator and other persons from life-threatening hazards or injury and to prevent extensive damage to property.

Information and precautionary measures designed to prevent damage to the machine and other property.

Risks resulting from failure to observe the safety instructions

This hydraulic excavator has been built in accordance with state-of-the-art standards and recognized safety regulations.

Nevertheless, its use may constitute a risk if it continues to be operated despite damage being suspected or having occurred, or if it is inexpertly repaired.

There is then a risk of

- **life-threatening injury**
- **irreparable damage to the machine and other assets.**

The hydraulic excavator must be stopped immediately if suspected damage or damage that has occurred affects the safety of the operator, other persons at the excavator deployment site, or other assets. All components are carefully coordinated. Trouble-free operation and a long service life are assured only if original spare parts are used.

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SAFETY INSTRUCTIONS

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Personal safety instructions

Observe the safety instructions

- **Read carefully through all safety instructions attached to the machine and observe them; read all safety instructions in this manual in addition.**
- **Safety instruction stickers/plates must be affixed, maintained and replaced when necessary.**
- **If a safety instruction sticker/plate or this manual is damaged or missing, obtain a replacement from your dealer. The procedure is the same as when ordering spare parts (it is essential to quote the machine type and the serial number).**
- **Familiarize yourself with the correct, safety-oriented procedure for operating the machine and its control elements.**
- **Allow only trained, qualified and authorized persons to operate the machine.**
- **Keep the machine in good working order.**
- **Unauthorized modifications to the machine may affect its efficiency and/or safety and reduce its service life.**
- **The instructions given in this Safety Instructions section are designed to show the fundamental safety procedures for the machine. However, they cannot cover all hazardous situations with which you may be confronted. If in doubt, consult your immediate superior before operating the machine or carrying out servicing work.**

Protection from noise

Sustained effects of noise may lead to impaired hearing or deafness.

Wear appropriate ear protectors such as earplugs or muffs for protection from disturbing or intolerable noise.

Preparing for emergencies

Be prepared for the event of a fire breaking out or an accident occurring.

Keep the first-aid box and the fire extinguisher readily accessible at all times.

Read the instructions for operating the fire extinguisher and learn how to use it properly.

Stipulate emergency procedures for the event of fire or accidents.

Keep the emergency numbers of doctors, emergency services, hospitals and the fire service in the immediate vicinity of the phone.

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Wearing protective clothing

Wear close-fitting clothing and protective equipment suited to the work.

You need:

- **a safety helmet**
- **safety footwear**
- **goggles or face guard**
- **protective gloves**
- **ear protectors**
- **reflective clothing**
- **waterproof clothing**
- **respirator or filtering mask.**

Ensure that you wear the right equipment and clothing for the job.

- **Never take risks.**
- **Never wear loosely fitting clothing, jewellery or other objects that might get caught on operating levers or other machine components.**

Safe operation demands the operator's complete attention. Never wear headphones to listen to the radio or to music while operating the machine.

□

Safety instructions before starting work

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Checking the machine

Before starting up the machine each day or before each shift, give the outside of the machine a careful visual inspection to prevent damage and injury.

- **Check the machine for superficial damage.**
- **Check before starting work that all covers and caps are closed and locked.**

Fig. 1

Keeping the working area clean

Clean the working area before starting work.

- **Remove any objects that might endanger the mechanics or persons in the working area.**
- **Keep your cab clean and cleared; loose items may disturb the machine operation.**

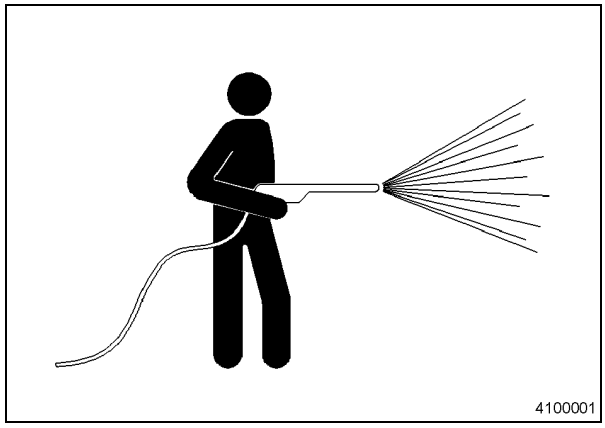

Fig. 2

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Using grab handles and steps

Falls are one of the main causes of injury.

- **Always face the machine when entering or leaving it, and use only the aids provided, e.g. steps and handrails.**
- **Never use operating elements as grab handles.**
- **Never jump down from the machine.**
- **Never climb up onto or down from a moving machine.**
- **Watch for slippery platforms, steps and handles when leaving the machine.**

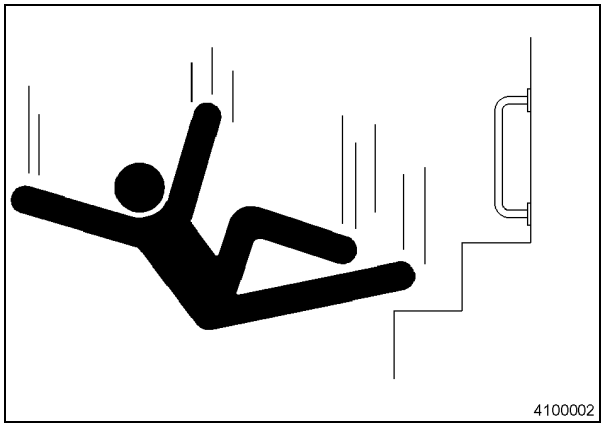

Fig. 3

Adjusting the operator's seat

A seat that is poorly adjusted with respect to the operator or the working conditions may result in premature operator fatigue and thus in faulty operation.

- **The seat must be adjusted with any change of machine operator.**
- **The operator must be able to depress the pedals completely and move the control levers effortlessly with his back resting against the backrest.**

If that is not possible, move the seat forward or back and check the setting again.

Consult the relevant section in the Owner's Manual.

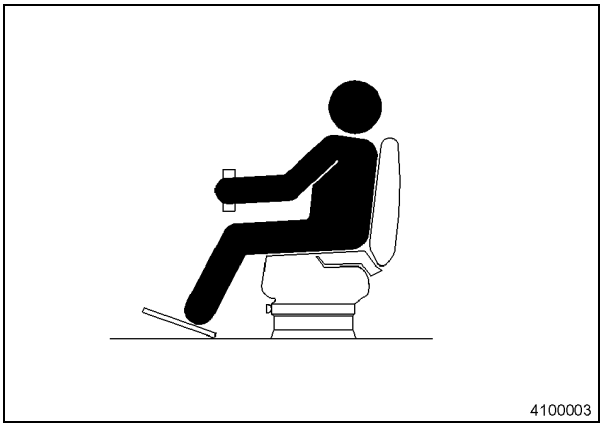

Fig. 4

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Applying the safety belt

If the machine overturns, the operator may be injured and/or thrown out of the cab. He may be severely injured or even crushed to death by the overturning machine.

- **Before operating the machine, check the belt fabric, the closure and the fastening components carefully. If one of the parts is damaged or worn, replace the safety belt or the components before starting up the machine.**
- **Always remain seated and keep the safety belt fastened while operating the machine. This will help minimize the risk of injury in the event of an accident.**

The safety belt must be replaced after any serious accident even if it appears to be undamaged.

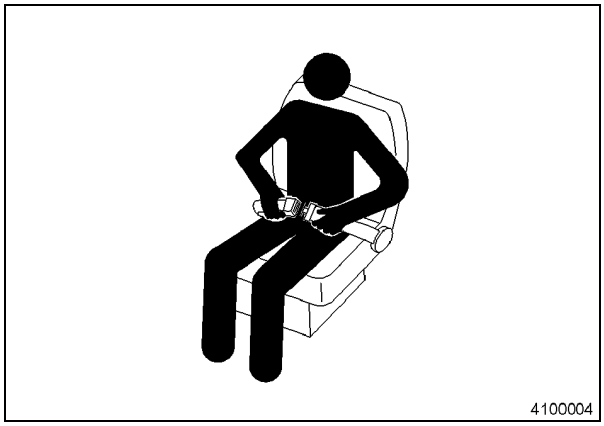

Fig. 5

Working from the operator's seat only

Starting up the engine incorrectly may cause the machine to make unexpected movements that might lead to severe, even fatal, injury.

- **Always start up the engine from the operator's seat only.**
- **Never start the engine by short-circuiting the starter.**
- **After starting up the engine, check that all driving levers, driving pedals and control levers are in neutral position.**

Never take passengers on the machine

Passengers on the machine may suffer injury e.g. from foreign bodies or through being thrown off.

- **Only the operator is allowed onto the machine. Never take passengers.**
- **Passengers also obstruct the operator's view so that the machine is no longer safely operated.**

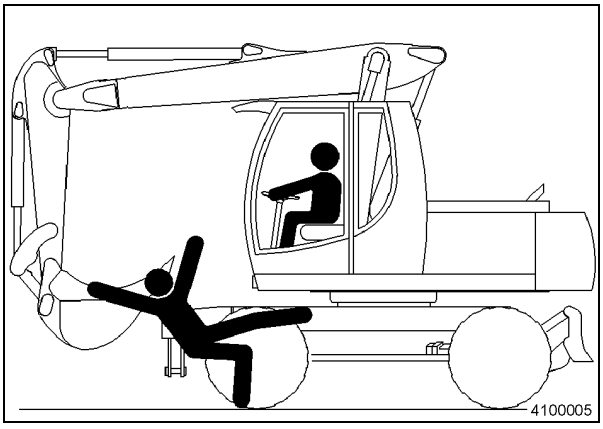

Fig. 6

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Safety instructions for machine operation

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Before setting off

Remove any soil, mud, snow, ice, grease and oil from your working footwear before operating the machine. You might otherwise slip from steps and pedals and thus initiate inadvertent movements.

Adjust the driver's seat and the mirror before setting off.

Close the front window and the cab door.

If the machine is equipped with a restraining belt for the operator, fasten the belt.

Before setting off, sound the horn to warn any persons in the immediate vicinity.

Never allow other persons to travel with you on the machine.

Note the position of the working equipment

Never drive with the working equipment extended, as that may impair the stability of the machine. Bring the working equipment as close as possible to the machine.

Taking care during operation

If the front equipment or another part of the machine collides with a higher obstacle, e.g. a bridge, both the machine and the other object are damaged, and persons may be injured.

Take care to prevent the boom or stick from colliding with higher obstacles.

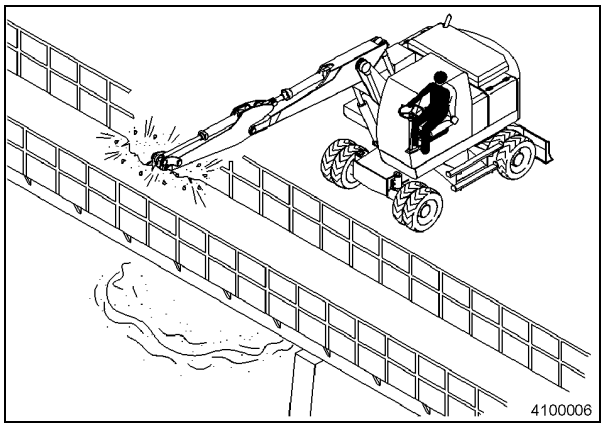

Fig. 7

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Service manual

Section 1 Technical Data and Special Tools

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WX210 - WX240

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SERVICE DATA GENERAL

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Foreword

Anyone involved with commissioning, operating, inspecting and servicing for this construction machine must read through and acquaint himself with the

"OPERATING MANUAL"

and especially the Section

"FUNDAMENTAL SAFETY INSTRUCTIONS"

before starting work.

The Part Numbers given in the sections are not to be used when ordering spare parts. They are only intended to identify the component being referred to.

When ordering spare parts, use only the Part Numbers given in the spare parts lists.

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The "Service Data" contains details which are important to the service staff. Data included in other parts of the general documentation have been left aside.

The set of documents for this construction machine includes:

Operating manual

Spare parts list

"Technical Handbooks" (THB) and "Service Information" bulletins (SI) are, furthermore, to be considered as supplements to the general documentation.

Data regarding auxiliary units for operating ancillary or special systems, as well as data on machines produced only in small numbers, have not been included.

Filling quantities are only approximate figures intended to help in stockholding the various fluids and agents. Each unit has appropriate checking systems, e.g. dipstick or checking screws, with which the exact filling level can be checked.

Technical characteristics

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Prospectuses in Annex

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Data sheet for cylinders

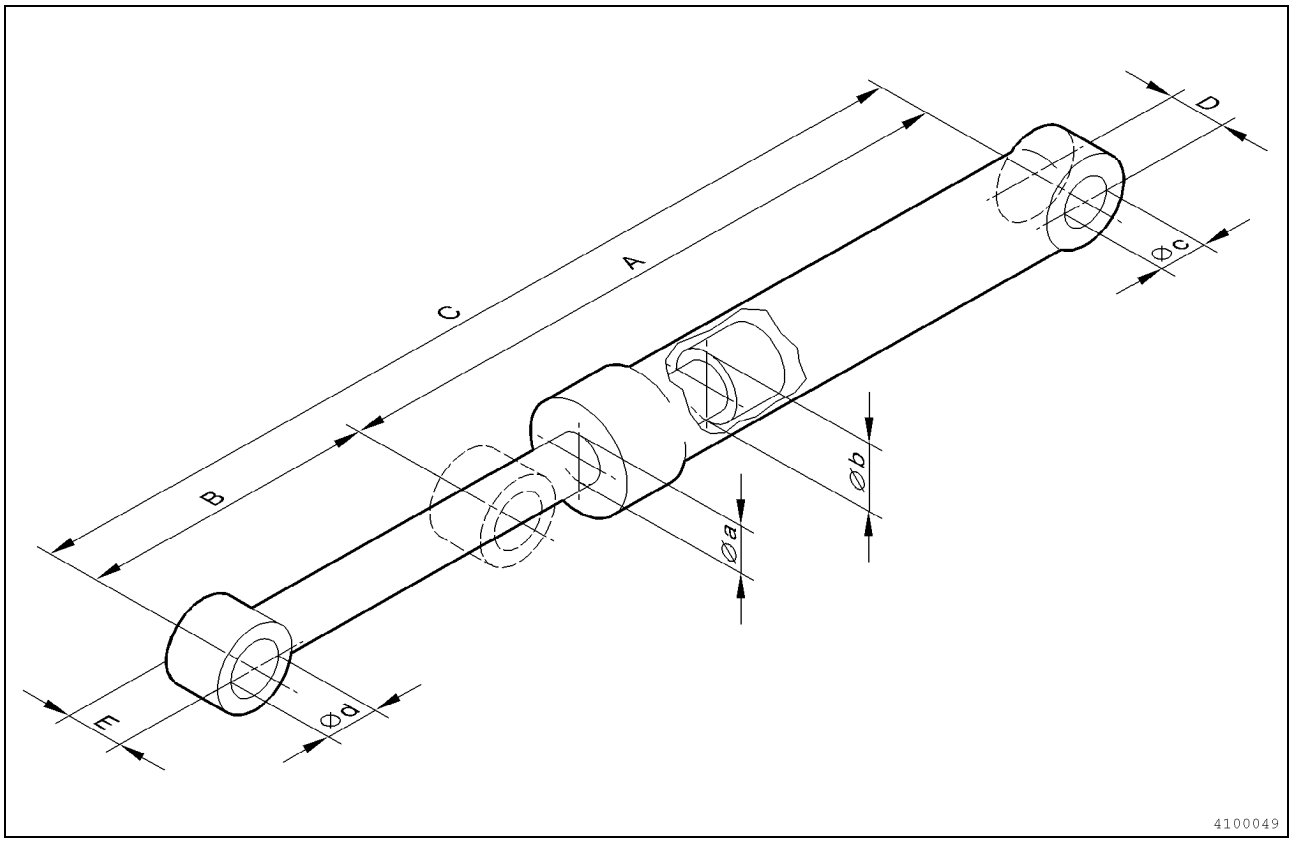
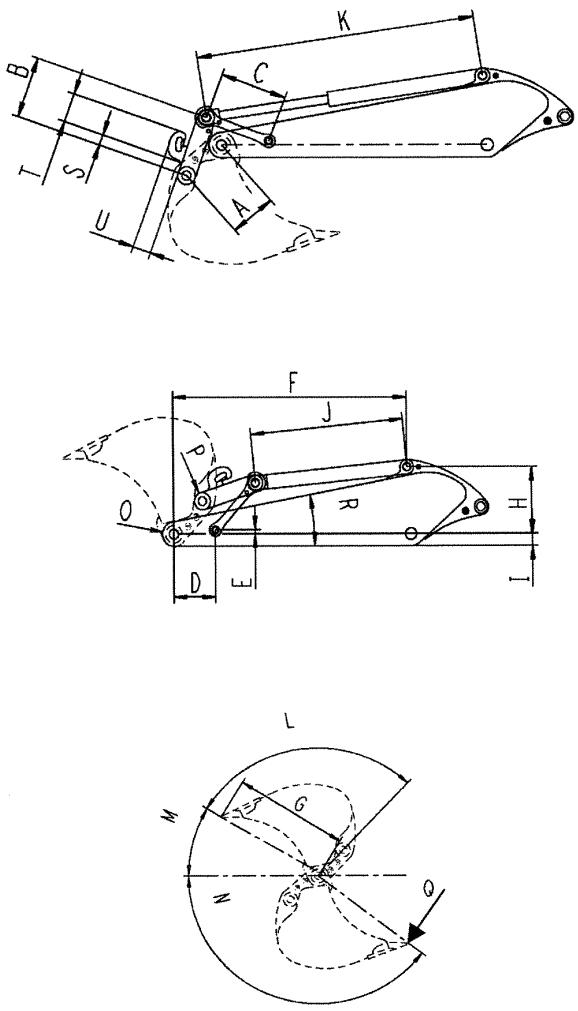


Fig. 1

WX210	P/N	Piston	Piston rod	Length	Stroke	Length	Cylinder barrel		Piston rod	
							Eye	Width	Eye	Width
		∅ b	∅ a	A	B	C	∅ c	D	∅ d	E
Monoblock boom	7211 3778	135	85	1050±1.8	630±1.8	1680±3.6	$90^{+0.25}_{+0.05}$	$116^{0}_{-0.5}$	$100^{+0.25}_{+0.05}$	$106^{0}_{-0.5}$
Boom adjusting	7210 4531	135	85	1565±1.8	985±1.8	2550±3.6	$90^{+0.25}_{+0.05}$	$116^{0}_{-0.5}$	$100^{+0.25}_{+0.05}$	$106^{0}_{-0.5}$
Stick cylinder	7210 4546	135	95	1975±1.8	1400±1.8	3375±3.6	80	$116^{0}_{-0.5}$	80	$116^{0}_{-0.5}$
Bucket cylinder	7211 3790	115	80	1660±1.8	1075±1.8	2735±3.6	$70^{+0.25}_{+0.05}$	$96^{0}_{-0.5}$	$80^{+0.25}_{+0.05}$	$96^{0}_{-0.5}$
Neck	33 27 103	180	100	1360	745	2105	$110^{+0.457}_{+0.370}$	126±1.2	$110^{+0.457}_{+0.370}$	$126_{-0.5}$

WX240	P/N	Piston	Piston rod	Length	Stroke	Length	Cylinder barrel		Piston rod	
							Eye	Width	Eye	Width
		∅ b	∅ a	A	B	C	∅ c	D	∅ d	E
Monoblock boom	7211 2074	145	90	1630±1.8	1050±1.8	2680±3.6	$90^{+0.25}_{+0.05}$	$116^{0}_{-0.5}$	$100^{+0.25}_{+0.05}$	$106^{0}_{-0.5}$
Boom adjusting	7210 4481	145	90	1565±1.8	985±1.8	2550±3.6	$90^{+0.25}_{+0.05}$	$116^{0}_{-0.5}$	$100^{+0.25}_{+0.05}$	$106^{0}_{-0.5}$
Stick cylinder	7210 4471	145	95	1975±1.8	1400±1.8	3375±3.6	$90^{+0.25}_{+0.05}$	$123^{0}_{-0.5}$	$90^{+0.25}_{+0.05}$	$123^{0}_{-0.5}$
Bucket cylinder	7211 1697	125	85	1665±1.8	1075±1.8	2740±3.6	$80^{+0.25}_{+0.05}$	$123^{0}_{-0.5}$	$80^{+0.25}_{+0.05}$	$123^{0}_{-0.5}$
Neck	33 26 713	185	100	1360	745	2105	$110^{+0.457}_{+0.370}$	126±1.2	$110^{+0.457}_{+0.370}$	$126^{0}_{-0.5}$

Bucket-induced protrusion



Löffelanschluss-Bild-01

			WX 210	WX 240
A	distance of pins	[mm]	450 (440)	465
B	link length	[mm]	595	610
C	rocker arm length	[mm]	630	652
K	extended bucket cyl.	[mm]	2735	2740
S	load hook position	[mm]	110	92
T		[mm]	290	290
U		[mm]	165	160
D	coordinates of rocker arm	[mm]	415	461
E		[mm]	30	42
F	coordinates of bucket cylinder	[mm]	2528	2560
H		[mm]	726	682
I	to bottom plate	[mm]	122	125
J	retracted bucket cyl.	[mm]	1660	1665
O	stick end radius	[mm]	110	110
P	link end radius	[mm]	80	80
R	stick angle	[°]	11,2	10,4
M	opening angle	[°]	33	32
N	closing angle	[°]	142,8	142,5
Q	max. bucket force	[kN]	130,2	156,5
	reference for M, N, Q			
L	bucket angle	[°]	100	100
G	teeth radius of bucket	[mm]	1450	1450

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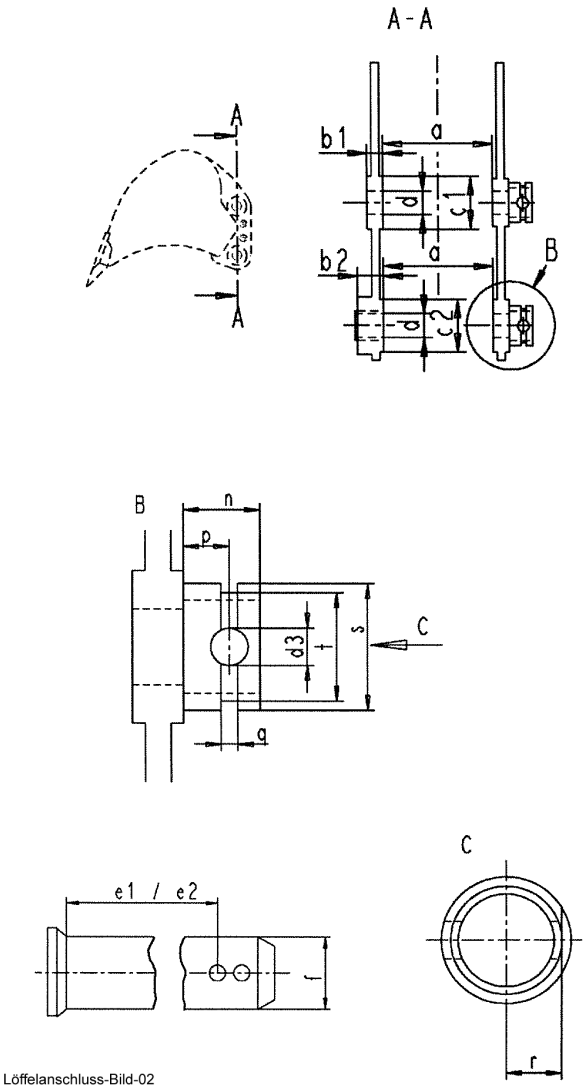

Löffelanschluss-Bild-02

			WX 210	WX 240
a	bucket interface width	[mm]	307	409
b 1	thickness of hubs	[mm]		
b 2	thickness of special hub	[mm]		
c1	diameter hub (linkage)	[mm]	180	180
c2	diameter hub (stick)	[mm]	190	190
d	hole diameter for pin	[mm]	80 E9	90 E9
f	pin diameter	[mm]	80	90
e 1	length of linkage pin	[mm]	449	567
e 2	length of stick pin	[mm]	497	621
n	height of ring	[mm]	45	45
p	distance of hole	[mm]	27	27
q	groove width	[mm]	10	10
d 3	hole diameter for pin	[mm]	22	22
s	outside diameter of ring	[mm]	120	130
t	diameter of groove	[mm]	109	119
r	distance of flat	[mm]	54,5	59,5

TEXT-02-21-24

SI- and Additional Units

40000206-en

Quantities of Space and Mass

Quantity	Symbol	Unit			Conversion		Explanation Remark
		old	new		for exact calculation	for rough calculation (appr. 2% inexact)	
			SI - Units	Selection of additional units			
Length	l	mm, cm, dm, m, km	m	mm, km			
Area	A	mm^2, cm^2, dm^2, m^2	m^2	mm^2, cm^2			
Volume	V, Vn	mm^3, cm^3, dm^3, m^3, l	m^3	mm^3, cm^3, dm^3, l			
Mass	m	mg, g, kg, Mg=t, (kp s^2/m)	kg	mg, g, Mg, t			
Density	ρ	g/cm^3, kg/dm^3, (kp s^2/m^4)	kg/m^3	g/cm^3, kg/dm^3			
Inertia moment	J	kp m^2 (kp m s^2)	kg m^2	Mg m^2	1 kp m s^2 = 9,81 kg m^2	1 kp m s^2 = 10 kg m^2	
Specific volume	v	m^3/kg, m^3/t	m^3/kg	m^3/Mg			

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Time related Quantities

Quantity	Symbol	Unit			Conversion		Explanation Remark
		old	new		for exact calculation	for rough calculation (appr. 2% inexact)	
			SI - Units	Selection of additional units			
Time	t	s, min, h, d = day	s	ms, min, h, d			
Frequency	f	Hz	Hz				1 Hz 1/s
Rate of revolutions	n	U/min	1/s	1/min			s = min/60
Speed	v	m/s, km/h	m/s	km/h			
Acceleration	a	m/s²	m/s²				
Volume flow	V	m³/s, m³/min, m³/h	m³/s	m³/min, l/h			
Mass flow	m	kg/s, kg/min, kg/h	kf/s				
Heat flow	Φ	(kcal/h)	W	kW, MW	1kcal/h = 1.163W	1kcal/h = 1.2W	1W = 1J/s = 1Nm/s
Specific fuel and oil consumption	b, b_s	kg/PSh g/PSh	kg/J	g/(kWh)	1g/(PSh) = 1.359g/(kWh)	1g/(PSh) = 1.36g/(kWh)	

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Quantities of force, energy and power

Quantity	Symbol	Unit			Conversion		Explanation Remark
		old	new		for exact calculation	for rough calculation (appr. 2% inexact)	
			SI - Units	Selection of additional units			
Force	F	(dyn, p)	N (Newton)	MN, kN, mN	1kp = 1kg x 9,81m/s² = 9,81N	1kp = 10N	1N = 1kg x 1m/s² = 1kg m/s²
Pressure (of Fluids)	P, Pi, P_e, $P_ü$, P_u	(kp/cm², at, atm) (mWS, Torr) (mmHg)	N/m² Pa (Pascal)	bar, mbar	1kp/cm² = 0.981bar 1 atm = 1.013bar 1mWS = 0.098bar	1 kp/cm² = 1bar 1mWS = 0.1bar	1 N/m² = 1Pa 1Pa = 10^{-5}bar 1bar = 10^5 N/m²
Mechanical stress	σ, τ	(kp/cm²) (kp/mm²)	N/m², pa	N/mm²	1 kp/mm² = 9.81N/mm² 1kp/cm² = 9.81N/cm²	1 kp/mm² = 10N/mm² 1kp/cm² = 10N/cm²	1N/m² = 1Pa
Energy	W	(kpm)	J (Joule)	MJ, kJ, kW h	1kpm = 9.81J	1kpm = 10J	3.6MJ = 1kWh 1J = 1NM = 1Ws
Heat capacy	Q	(cal, erg)	J (Joule)	MJ, kJ, kW h	1 kcal = 4.19kJ		3.6MJ = 1kWh 1J = 1NM = 1Ws
Power	P	(PS), W	W	kW, MW	1PS = 0.735499 kW 1kW = 1.359622 PS	1PS = 0.74kW 1kW = 1.39 PS	1W = 1J/s = 1Nm/s
Torque, bending moment	M	(kp m)	Nm	Ncm	1kpm = 9.81Nm	1kpm = 10Nm	

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Conversions Tables Part 1

40000207-en

Conversion for units of length

Length	in	ft	yd	mile	UK n mile	cm	m
1 inch	1	0.0833	0.0278			2.54	0.0254
1foot	12	1	0.3333	0.00019	0.00016	30.48	0.3048
1 yard	36	3	1	0.00057	0.00049	91.44	0.9144
1 statute mile	63360	5280	1760	1	0.86842		1609.3
1 UK nautic mile	72960	6080	2026.7	1.15151	1		1853.2
1 cm	0.3937	0.0328	0.0109			1	0.01
1 m	39370	3.2808	1.0936	0.00062	0.00054	100	1

Conversion for units of area

Area	in²	ft²	yd²	sqmile	acre	cm²	m²
1 square inch	1	0.0069				6.4516	
1 square foot	144	1	0.1111			929.03	0.0929
1 square yard	1296	9	1		0.00021	8361.3	0.8361
1 square mile				1	460		
1 acre		43560	4840	0.00156	1		4046.9
1 cm²	0.1550					1	0.0001
1 m²	1550.0	10.764	1.1960			10000	1

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