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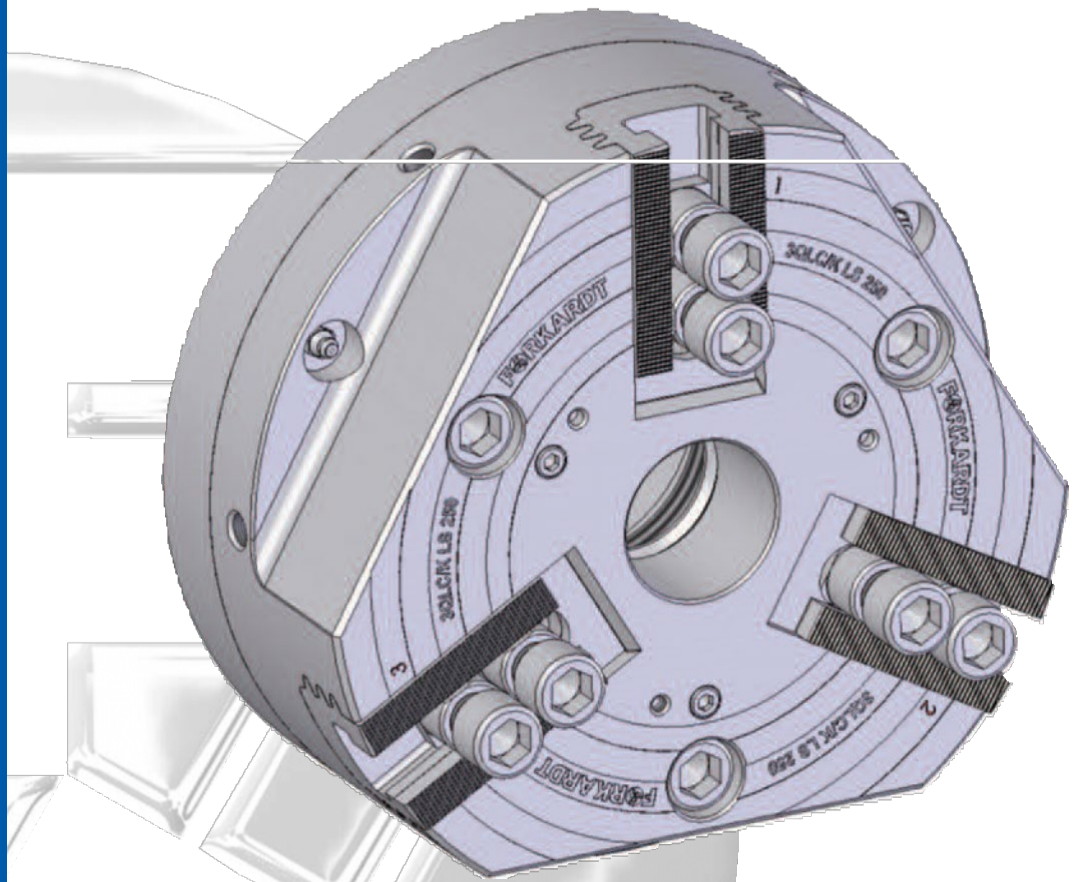
FORKARDT

3QLCLS, 2QLCLS

POWER CHUCK



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1.0 General information on documentation

These operating instructions contain the necessary information for the intended use of the clamping device. They are intended for technically qualified persons.

Qualified persons are:
- Persons who have been instructed as operators in the handling of the feed.
- Persons who have been trained as commissioning and service personnel and are qualified to commission and repair power chucks.

irw For operation, maintenance and repair of the power chucks, the instructions in this operating manual must be read and understood.

The illustrations and information in these operating instructions are subject to technical changes that may be necessary to improve the power chuck.

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1.1 Explanation of the symbols

Safety instructions to avoid danger to life or damage to property are highlighted in these operating instructions by the signal terms and pictograms defined here.

means possible danger. Death, serious bodily injury or considerable damage to property can occur if the precaution is not taken or the safety instruction is not observed.

irw indicates an important note to avoid property damage or undesirable operating conditions.

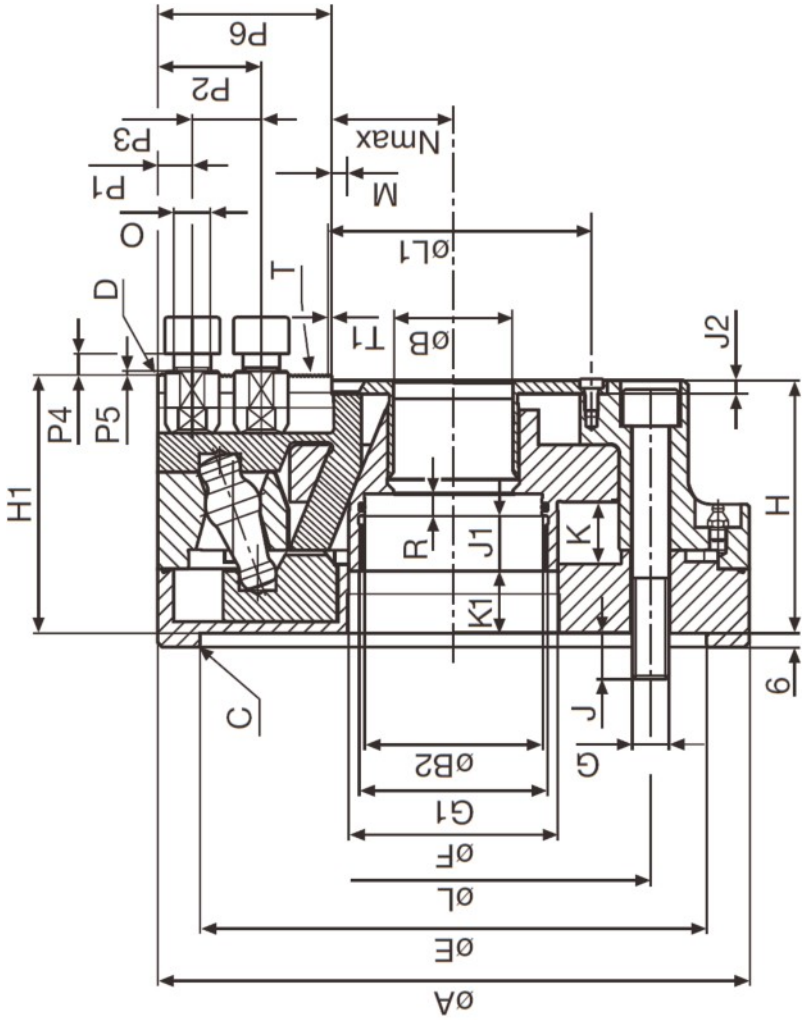
indicates a note on handling or further information.

2.0 Technical data

2.1 Dimensions/performance data 2/3 QLCLS

				Futtergröße			
Typ 2QLC LS / 3QLC LS				160-30	200-41	250-52	315-71
Abmessungen							
Außendurchmesser		øA	mm	162	210	257	320
Bohrung		øB$^{+0.1}$	mm	30	41	52	71
Spindelanschluss		øC	mm	Z5	Z6	Z8	Z11
Backenanschluss zöllig (DIN 6353)		D		S11	S11	S12	S12
Zentrier-Ø Zugrohr		B2^{H7}	mm	42	65	77	93
Zentrierung		E^{H6}	mm	140	170	220	300
Kolben-Ø		F	mm	52	76	91	110
Befestigungsschrauben		G		M10 x 95	M12 x 100	M16 x 110	M20 x 90
Gewindeanschluss		G1		M45 x 2	M68 x 2	M82 x 2	M100 x 2
Abdrückgewinde Schutzbuchse		G2		M4	M5	M6	M6
Futterhöhe		H	mm	93	96	110	120
Futterhöhe		H1	mm	95	98	112	122
Gewindelänge Befestigungsschrauben		J	mm	15,7	19	20	25
Gewindelänge Kolbenanschluss		J1	mm	23,4	24	24	24
Passsitztiefe		J2	mm	5	5	6	6
Kolbenhub		K	mm	20	23	27	32
Kolbenposition		K1	mm	20	23	27	32
Lochkreis- Ø Befestigungsschrauben		L$^{\pm 0.2}$	mm	104,8	133,4	171,4	235
Lochkreis- Ø Schutzbuchse		L1$^{\pm 0.2}$	mm	88	96	120	140
Backenhub		M	mm	8	9,3	10,9	12,9
Backenstellung		N$_{max}$	mm	36	43,7	52,9	70,5
Backenbefestigungsschraube		O		M12	M12	M16	M16
Abstand Backenbefestigungsschraube		P1$_{min}$	mm	6	6	8	8
		P1$_{max}$	mm	14	35	40	58
Abstand Backenbefestigungsschraube		P2$_{min}$	mm	25	25	32	32
		P2$_{max}$	mm	33	49	58	82
Mindestabstand		P3	mm	19	19	24	24
Mindestabstand		P4	mm	10	10	10	10
Abstand Nutenstein/Verzahnung		P5	mm	2,5	2,5	2,5	2,5
Länge Spitzverzahnung		P6	mm	45	61	75,5	89
Backenbreite		Q	mm	35	35	45	45
Nutbreite zöllig		Q1^{H7}	mm	17	17	21	21
Nutbreite metrisch		Q1^{H7}	mm	12	14	16	21
Tiefe		R	mm	6,6	6,6	9,6	9,6
Spitzverzahnung zöllig		T		1/16" x 90°	1/16" x 90°	1/16" x 90°	1/16" x 90°
Backenanschluss metrisch		D		MS12	MS14	MS16	MS21
Spitzverzahnung metrisch		T		1,5 x 60°	1,5 x 60°	1,5 x 60°	1,5 x 60°
Abstand erster Zahn		T1	mm	1,5	1,5	1,5	1,5
Leistungsdaten							
Max. Betätigungskraft	2QLC LS	F$_{max}$	daN	2.400	3.700	4.600	5.700
Max. Spannkraft	2QLC LS	Fsp$_{max}$	daN	3.700	6.000	7.500	10.000
Max. Betätigungskraft	3QLC LS	F$_{max}$	daN	3.500	5.500	7.000	8.500
Max. Spannkraft	3QLC LS	Fsp$_{max}$	daN	5.500	9.000	11.000	15.000
Max. Drehzahl		n$_{max}$	1/min	6.000	5.500	4.000	3.200
Gewicht		G	kg	9	18	31	50
Massenträgheitsmoment			kgm²	0,028	0,09	0,25	0,6
Ident - Nummer							
Zöllige Spitzverzahnung	2QLC LS			D169619000	D169621000	D169622000	D169623000
Metrische Spitzverzahnung	2QLC LS			D169817000	D169818000	D169819000	D169820000
Zöllige Spitzverzahnung	3QLC LS			D169563000	D169565000	D169566000	D169567000
Metrische Spitzverzahnung	3QLC LS			D169813000	D169814000	D169815000	D169816000

**) Limit values for max. speed ** metric splines * inch splines


P6
P2
P3
P1
O
D
T
Nmax
M
øL1
T1
øB
J2
P4
P5
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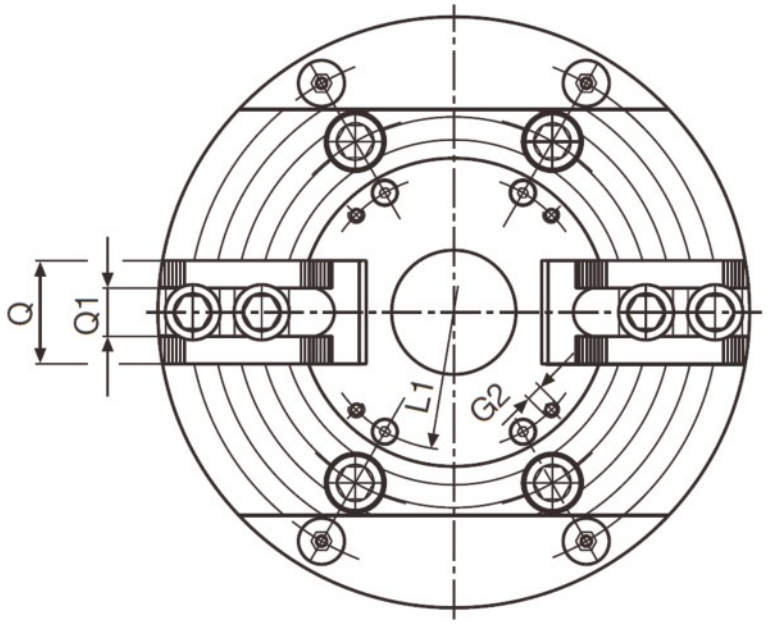
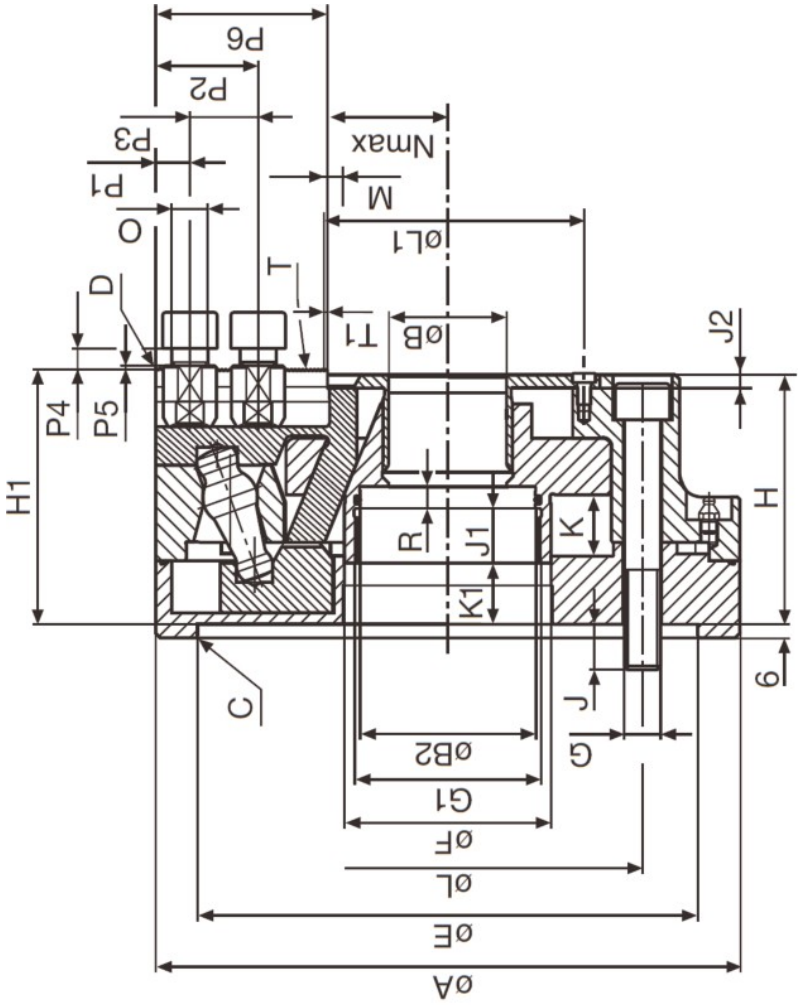
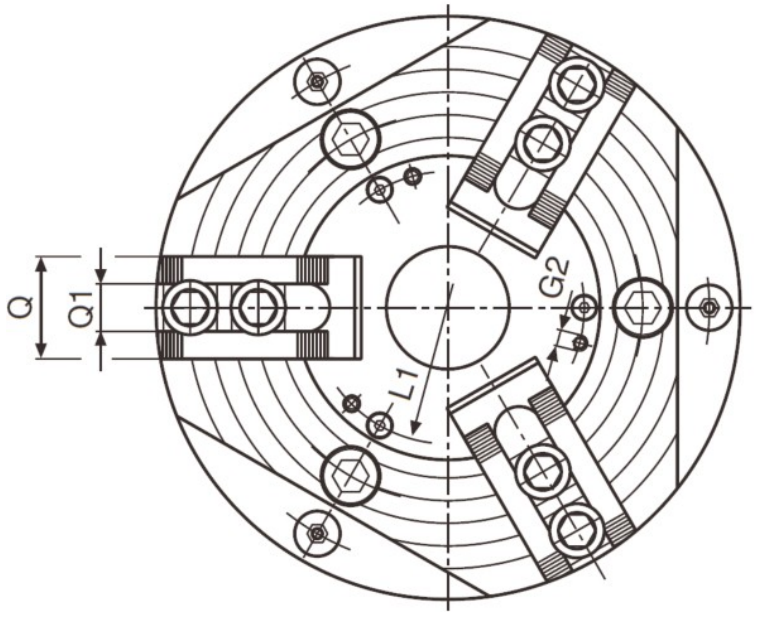

Q
Q1
L1
G2

2.2 3QLCLS with S-jaw connection





3.0 Safety instructions

3.1 General

Power chucks can pose risks if their use and handling do not comply with the safety requirements. The power chuck is built according to the state of the art and is safe to operate. Nevertheless, hazards can arise from this power chuck if it is used improperly or not as intended by unqualified persons.

The following instructions are for your personal safety and to prevent damage to the product described or to the connected devices.

Read these operating instructions before working on the power chuck and observe all safety instructions.
Failure to follow the instructions contained in this manual may result in danger to life, serious personal injury or serious damage to property.

- Only qualified persons may work with power chucks.
- Unauthorised conversions and modifications to the power chuck are not permitted.
- Only use the power chuck when it is in perfect condition.
- Before working on the power chuck, switch off the machine and secure it against being switched on again.
- Only use original components and spare parts from the manufacturer. The use of third-party parts invalidates the warranty.
- Before putting the power chuck into operation, check that all guards are in place.
- The system "lathe - power chuck - workpiece" is largely influenced by the workpiece to be produced, which may result in a residual risk. This residual risk must be assessed by the operator.

The manufacturer accepts no liability for damage caused by non-observance of the operating instructions.

3.2 Intended use

The power chucks may only be used for clamping workpieces on machine tools.
The max. axial force, the max. clamping force and the max. speed of the power chuck must not be exceeded. The necessary clamping force must be determined for the application according to the respective valid rules of technology (e.g. VDI 3106). In case of doubt, or in case of accessories not provided by the manufacturer, the limit values must be approved by the manufacturer or newly determined.

Take into account:
- Variable adhesion coefficients between workpiece and top jaw
- Ratio of clamping diameter and working diameter

- Size of the cutting force on the cutting tool
- Projection of the top jaws from the clamping point
- Decrease in clamping force due to centrifugal force with external tensioning
- The specified max. speed only applies to hard standard top jaws
- For special top jaws, the max. speed and clamping force must be calculated (see clamping force calculation).

Intended use also includes compliance with the conditions for installation, commissioning, operation and maintenance prescribed by the manufacturer.
Any other use is considered improper. The manufacturer is not liable for any damage resulting from this.

3.3 Transport, handling and storage

Report transport damage to the carrier. Report missing parts immediately in writing to the manufacturer.
If the power chuck is not assembled immediately after delivery, it must be stored temporarily in a protected place. When doing so, cover the parts properly and protect them from dust and moisture.

For protection, all bare parts of the power chuck as well as all accessories are provided with a preservative on delivery.

3.4 Operating instructions

In accordance with the regulations of the Employer's Liability Insurance Association, rotating clamping devices must be protected against contact by a suitable cover or safety door.

In the event of faults occurring in the clamping device during operation, the machine must be stopped immediately and may not be started up again until the fault has been rectified.

After switching off the clamping energy, the workpiece can come loose from the clamping device.
For the operation of the clamping device, the local safety regulations and accident prevention regulations of the respective trade association apply.

3.5 Maintenance and servicing

When carrying out maintenance or inspection work, depressurise the clamping device.

At the high speeds common on lathes, the power chuck is exposed to high loads. Occasional collisions between the tool and the power chuck, e.g. during malfunctions in the programme sequence, can damage it.

After a collision, stop the lathe immediately and check the clamping device for damage. Besides easily visible damage, hidden damage can also occur, such as hairline cracks in the chuck body and base jaws. Immediately remove the power chuck from the machine spindle.

In such a case, check the affected parts of the clamping device for cracks using a suitable, non-destructive test method and replace them if damaged.

i&W Only use original parts.

3.6 Safety conditions for power-operated clamping devices

The safety-related conditions for the operation of power-operated clamping devices are defined in the test principles of the trade associations, as well as in the DIN, VDE and VDI guidelines. The individual test conditions are guaranteed by the following measures:

Test condition	Ensured by:
The machine spindle must not start until the minimum clamping pressure has been built up in the clamping cylinder.	Pressure switch in the tension lines
The machine spindle must not start until the tension is within the permissible range of the jaw stroke.	Clamping travel monitoring on the actuating cylinder
The tension can only be released when the machine spindle has stopped.	Standstill monitoring on the machine spindle
If the clamping energy fails, the workpiece remains firmly clamped until the spindle stops.	Unlockable check valves in the actuating cylinder
In case of power failure and return, no change of the switching positions occurs.	Pulse-controlled directional control valve with detented end positions
If the clamping energy fails, a signal is given for automatic or manual spindle stop. At 1/5 of the maximum actuating force, the clamping device used must open and close.	Pressure switch in the tension line

4.0 Assembly

Only use screws of strength class 10.9 during assembly! The only exception is if a different strength class is specified in the drawing (see appendix). Observe the following instructions during assembly:

- Observe the tightening torques for the screws. (Specifications of the screw manufacturer)
- Unscrew the sealing plug from the protective cover (standard) or unscrew the complete chuck cover (special version).
- Attach the chuck to the spindle.
- Connect the tie rod to the chuck with the central screw in the piston.
- Align the power chuck with a dial gauge so that after assembly the impact on the test surfaces of the power chuck does not exceed a value of 0.01 mm.
- Tighten the chuck fastening screws with a torque spanner (see table for tightening torques).
- Check the jaw and piston stroke of the clamping device used. (see assembly)
- Measure the clamping force when the clamping device is at a standstill with a static clamping force measuring device, e.g. FORKARDT SKM 1200/1500, and compare it with the value indicated on the chuck.
- At 1/5 of the maximum actuating force, the clamping device used must open and close.

4.1 Attachment of the top jaws

When attaching the top jaws to the base jaws, pay attention to the marking 1, 2, 3 on the base jaws or associated guides in the chuck body. Attach the top jaw to1 the base jaw of the 1clamping device, etc.
Observe the tightening torque!

Futterbefestigung	100%		80%	70%	60%	45%	
Abmessung	M4	M5	M6	M8	M10	M12	M14
Vorspannung Fv [N]	5700	9300	10560	16940	23100	25200	34650
Anzugsmoment Ma [Nm]	4,4	8,7	12	25	43	56	90

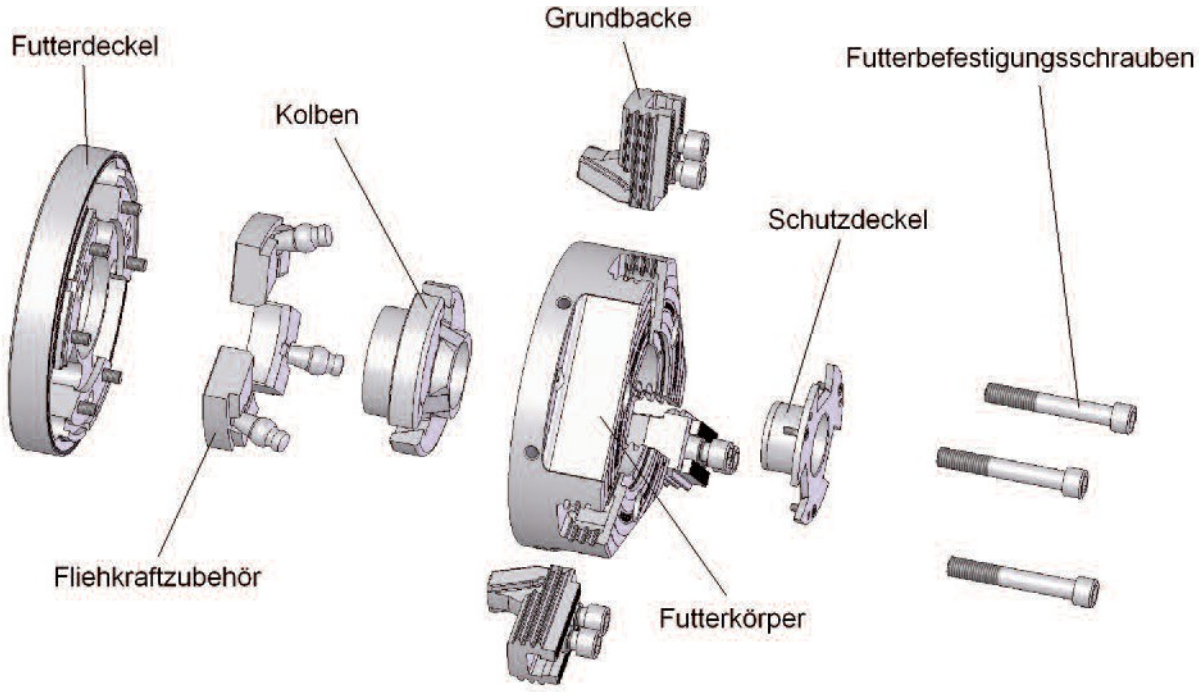
Futterbefestigung	40%							
Abmessung	M16	M20	M22	M24	M27	M30	M33	M36
Vorspannung Fv [N]	42400	66400	83200	95600	126000	154000	192000	224000
Anzugsmoment Ma [Nm]	124	244	332	420	620	840	1120	1480

Backenbefestigung	100%			80%	70%	60%	
Abmessung	M4	M5	M6	M8	M10	M12	M14
Vorspannung Fv [N]	5700	9300	13200	19360	26950	39200	53900
Anzugsmoment Ma [Nm]	4,4	8,7	15	29	50	75	120

Backenbefestigung	50%							
Abmessung	M16	M20	M22	M24	M27	M30		
Vorspannung Fv [N]	74200	116200	145600	167300	220500	269500		
Anzugsmoment Ma [Nm]	155	305	415	525	775	1050		

5.0 Structure and function

5.1 Components of the power chuck



5.2 Function

The power-operated chuck QLCLS was specially developed for the production of parts with difficult geometries at high speeds.
The connection between the power chuck and the workpiece is non-positive, i.e. the force is transmitted by pressing the clamping jaws (base jaws with top jaws) against the workpiece.

Rotating clamping devices are subject to the influence of centrifugal force, which increases with the square of the rotational speed. The centrifugal forces counteract the clamping force in the case of external clamping, and vice versa in the case of internal clamping.

By installing centrifugal weights behind the base jaws, the centrifugal force of the jaw equipment is reduced and a correspondingly higher speed is achieved.
The working pressure on the hydraulic unit must be set so that the maximum actuating force of the clamping device is not exceeded.

6.0 Commissioning

- Check all visible screw connections for tightness.
- Check operating and working pressure.
- Close the safety door, start the machine, let the machine spindle run.
- Carry out an idle stroke of the clamping device, to distribute the grease and to check the function of the clamping device.
- Start the machine and wait for the machine spindle to be switched on according to the machine programme.

The accuracy of the clamping device is shown by its running accuracy when clamping a workpiece repeatedly.

6.1 Commissioning after a longer standstill

- Set the operating and working pressure on the hydraulic unit.
- Carry out the empty stroke of the clamping device to distribute the grease.
- Operate the clamping cylinder several times (forwards, backwards) to bleed the system.
- Check the clamping force at standstill with a clamping force meter, e.g. FORKARDT SKM 1200/1500 on the clamping device.
- Insert and clamp the workpiece.
- Carry out a function check according to the function sequence. Check tensioning and releasing functions.
- Check electrical circuits.
- Put into operation.

7.0 Clamping force

7.1 General

The connection between the power chuck and the workpiece is non-positive, i.e. the force is transmitted by pressing the clamping jaws (base jaws with top jaws) against the workpiece. The contact pressure required to create this frictional connection is referred to as the clamping force.

Various influences act, directly or indirectly, on the tension force:

- Variable adhesion coefficients between workpiece and top jaw
- Ratio of clamping diameter and working diameter
- Size of the cutting force on the cutting tool
- Projection of the top jaws from the clamping point
- Decrease in clamping force due to the centrifugal force of the clamping jaws during external clamping.

Rotating clamping devices are subject to the influence of centrifugal force, which increases with the square of the rotational speed. The centrifugal forces counteract the clamping force with external clamping, with internal clamping it is the other way round. The force of the clamping jaws still available at high spindle speed to hold the workpiece depends on the amount of clamping force available at standstill, the weight of the top jaws and their centre of gravity radius.

7.2 Clamping force $_{FSp}0$

The max. clamping force $_{FSp}0$ can only be achieved under favourable conditions.

Prerequisites are:

- Perfect condition of the power chuck
- Optimum lubrication of all sliding surfaces
- Maximum actuating force
- Short projection of the top jaws
- Standstill n = (0or low speed).

The clamping force at standstill is measured1500, with a static clamping force measuring device, e.g. SKM /.1200
SKM 1200 / 1500 see also leaflet 930.10.02D.

For strength calculations, e.g. for the design of special top jaws, the table value of $_{FSp}0$ can be used.

7.2.1 Operating clamping force

The operating clamping force $_{FSp}$ is the total clamping force (daN) of all clamping jaws in the barrel and represents a minimum value for the usable clamping force under normal operating conditions.

Underneath the

- perfect condition and the
- Sufficient lubrication condition of all sliding surfaces

of the power chuck. In good condition, a power chuck exceeds the calculated value for $_{FSp}$·

The clamping force at standstill results from the power chuck data. However, this value alone is not decisive for operation. The top jaws have a significant influence on the operation of a power chuck. Which top jaw is used depends on the specific individual case.

The clamping force and thus also the speed are influenced by the top jaws. The centrifugal force of the clamping jaws on power chucks can have such a significant influence on the clamping force that this influence must be taken into account at higher speeds.

The centrifugal force generated by the base and top jaws, which reduces the clamping force of the chuck, is counteracted by centrifugal weights via levers in the power chucks type 3 QLCLS, so that the clamping force acting on the workpiece remains approximately constant.

The clamping force $_{FSp0}$ to be applied at standstill must be correspondingly high so that the clamping force required for machining is still available at the selected speed. The influence of the centrifugal weights actuated via levers is taken into account in the Power chucks type QLCLS3 are taken into account by the chuck constant C4.

7.3 Clamping force calculation

For the calculation of the operating clamping force and the actually occurring clamping force loss

$F_{Sp,\ the}$ following calculation formula applies to the power chuck type QLCLS:

$$\mathbf{Fsp = Fspo \pm \Delta Fsp \pm C4 \times n^2}$$

This is the existing clamping force $F_{Sp}0$ at standstill (at speed n =):0

$$\mathbf{Fspo} = \frac{C1}{C2 + a} \times \mathbf{Fax}$$

and the clamping force loss $\Delta\ F_{Sp}$ due to the clamping jaws:

$$\mathbf{\Delta\ Fsp = \pm\ 0{,}0008 \times (C_3 + Ma) \times n^2}$$

+ for internal clamping
– for external voltage

and the influence of the centrifugal weights operated via the levers:

$$\mathbf{\pm\ C4 \times n^2}$$

This results in the operating clamping force

+ for internal clamping

F_{Sp}: A:For the power chuck type QLCLS

– for external voltage

$$\mathbf{Fsp} = \frac{C1}{C2 + a} \times \mathbf{Fax \pm 0{,}0008 \times (C_3 + Ma) \times n^2 \pm C4 \times n^2}$$

a

$$\mathbf{Fsp} = \frac{C1}{C2 + a} \times \mathbf{Fax \pm 0{,}0008 \times (C_3 + Ma) \times n^2 \pm C4 \times n^2}$$

B:For the power chuck type QLCLS

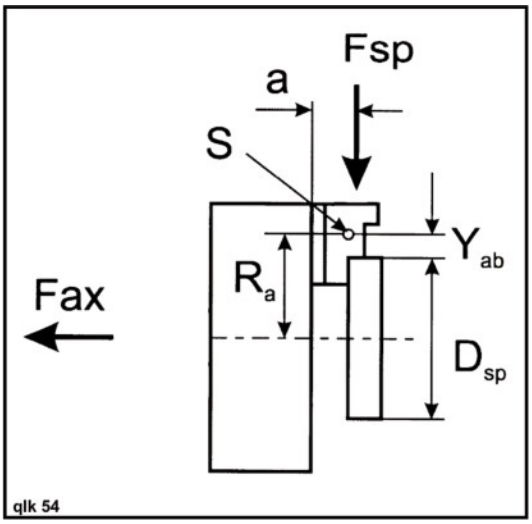
b

The total centrifugal moment Ma is calculated according to:

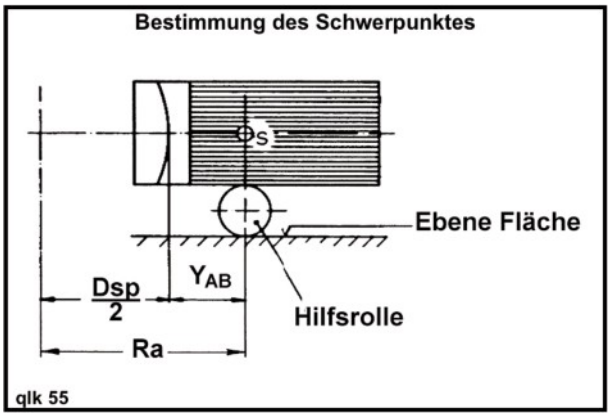
$$\mathbf{Ma} = \frac{\left(\frac{Dsp}{2} \pm Y_{AB}\right) x\ G\ x\ i}{1000}$$

Terms used in the formulas:

F_{Sp} = operating clamping force [daN],
the total clamping force of all jaws during
C1, C2, C3, C4 = Chuck constant
Fax = Max. Actuating force [daN]
n=Speed [min-1]
Ma=Total - centrifugal moment of the clamping jaws [kgm].
Dsp = Clamping diameter [mm]
YAB = centre of gravity distance of the top jaw of clamping diameter [mm]
a=jaw projection [mm]
i=number of clamping jaws
G=Weight of a clamping jaw [kg]
Ra=centre of gravity distance of the top jaw from the chuck centre [mm].



For the respective machining case, it must be checked whether the existing operating clamping force is sufficient.
For special jaws made of soft top jaws or other special top jaws, the actual centrifugal torque must be determined from **the weight** (by weighing) and **the centre of gravity distance Ra**, starting from the chuck centre.



See picture qlk 55.

At high speeds, the soft top jaws must be lightened as much as possible, taking into account a short jaw throat.

Determine the weight and centre of gravity position of the ready-to-use jaws and check whether the remaining operating clamping force of the power chuck is sufficient for the intended machining.

If the calculated operating clamping force $F_{Sp\ is}$ not sufficient for the machining case, the speed must be reduced or the jaw equipment must be made lighter.

The permissible speed of the power chuck with the corresponding top jaws or the clamping force curve must be calculated for each machining case.

7.4 Safety instructions

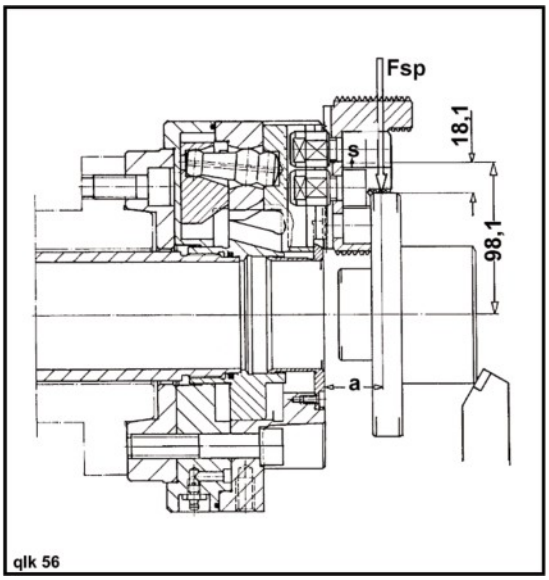
- Check whether the clamping force of the power chuck is sufficient for machining under the selected operating conditions.
- The calculated clamping force values are only achieved when the power chuck is in perfect condition (with freshly lubricated chuck, the clamping force can assume higher values).
- Use light top jaws at high speeds.
- When rotating the power chuck, the operating clamping force must be determined with a dynamic clamping force measuring device, e.g. FORSAVE D.
- Determine the dynamic clamping force loss during each set-up process and ensure that the clamping force is sufficient for the machining task.
- If the clamping force determined with a clamping force meter falls below the calculated value, the power chuck must be relubricated.
- In accordance with the regulations of the Employer's Liability Insurance Association, work with rotating equipment in high speed ranges may only be carried out under a sufficiently dimensioned safety door!

  During the running time of the machine, the safety door must be closed and locked!

7.5Calculation examples

Example 1:

Power chuck type		3QLCLS 250 S12
Max. Actuating force fax	=	7000 daN
Jaw equipment	=	HB 12
Clamping diameterDsp	=	160 mm
Ope rating speedn	=	3500 min-1
Feed constantC1	=	749
Feed constantC2	=	318
Feed constantC3	=	0,29
Feed constantC4	=	0,0002
Jaw unloadinga	=	39 mm
Number of jaws i	=	3



What is the clamping force at standstill when clamping the workpiece (n = 0) and at working speed n = min-13500 ?

Dsp = 160mm
YAB = 18.1mm
Jaw weight G = kg 1,42/ jaw Centre

of gravity radius Ra :

$$Ra = \frac{Dsp}{2} + Y_{AB} = \frac{160}{2} + 18{,}1 = 98{,}1\,mm$$

Total - centrifugal moment Ma :

$$Ma = \frac{Ra \times G \times i}{1000} = \frac{98{,}1 \times 1{,}42 \times 3}{1000} = 0{,}418\ kgm$$

Clamping force at standstill (n =) 0:

$$Fspo = \frac{C1}{C2 + a} \times Fax$$

749

FSp_0 = +318 x 39= 7000daN14686

FSp = -14686 x0,0008 (0.29+0.418) x $+3500^2$ x $0,0002^2 3500^2$

8.0 Maintenance and repair

8.1 Maintenance

Due to the different operating conditions, it is not possible to determine in advance exactly how often maintenance, wear checks or repairs are necessary. This must be determined depending on the degree of load and contamination.

Reference values

Operating hours/period	Inspection body/maintenance instructions
After hours;24 during initial commissioning or repair.	Carry out an idle stroke to lubricate the clamping device. Check the screw connections for tightness.
Weekly	Testing the clamping force when the clamping device is at a standstill with a static clamping force measuring device, z. E.G. FORKARDT SKM 1200/1500.
Weekly	Functional check of the clamping device. Lubricate the clamping device via the grease nipples in the base jaws with the prescribed grease.
If there is an unusual reduction in clamping force or accuracy	Checking the base jaws, of the chuck piston for wear or contamination.

For regular lubrication we recommend FORKARDT - special grease:

Type	Ident no.	Can contents
PF 5	101400084	1 kg
PF 6	101400088	1 kg

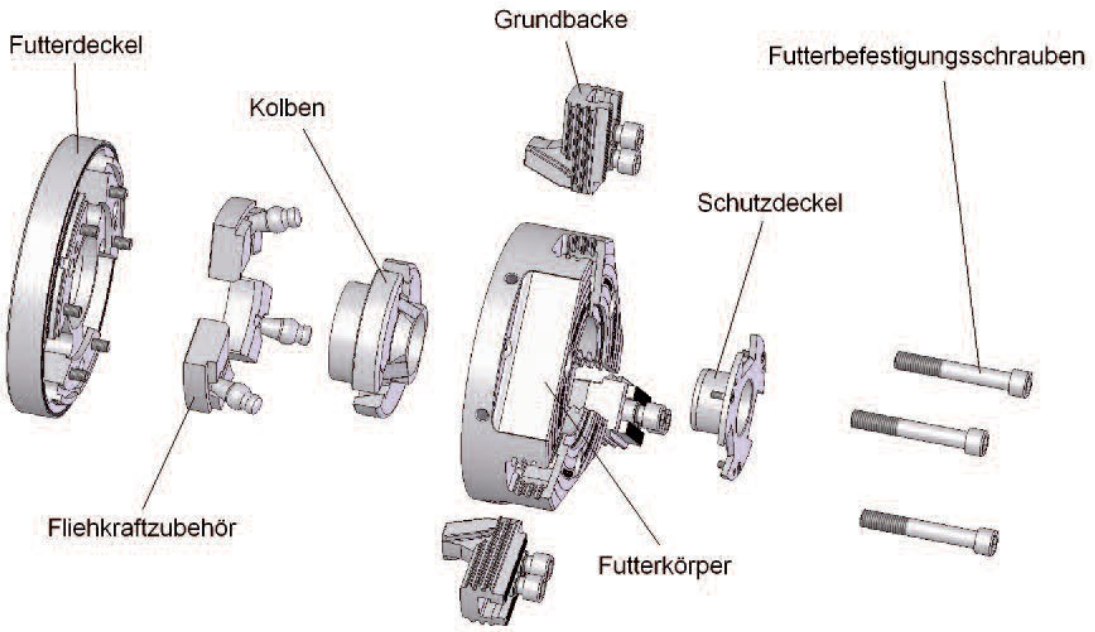
8.1.1 Dismantling the power chuck

- Unscrew the cap screws on the chuck cover from the thread of the chuck body.
- Dismantle protective cover
- Pull off the chuck cover; remove the centrifugal accessories.
- Pull the chuck piston out of the bore and the wedge hooks of the base jaws (the base jaws move inwards in the process).
- Pull the base jaws outwards from the guides of the chuck body.

Clean all parts and check for damage. Replace defective parts. If fixing screws have to be replaced, use the same dimensions and quality. Grease all guides with PF2 before installation.

8.1.2 Reassembly

- Insert1 base jaw into 1guide, etc. Push all jaws inwards.
- Insert the piston from behind into the chuck body and the wedge hook guide of the base jaws (wedge hook guide on the 1piston - jaw 1).
- Fit the centrifugal accessories.
- Put on the chuck cover (make sure the O-ring is seated correctly!) and screw it on.
- Fit the protective cover.
- Check function (piston stroke and jaw stroke)



9.0Troubleshooting

i&w The following table lists measures for troubleshooting in the event of any faults in the tensioning device. After troubleshooting, restart the machine according to the instructions in the chapter "Commissioning".

Problem	Possible cause	Measures
The lathe vibrates strongly.	Unbalance of the cylinder flange or of the intermediate flange Unbalance of the clamping cylinder or clamping device due to incorrect assembly	Concentricity of the clamping cylinder and of the tensioning device and, if necessary, put it in order.
The clamping force is too low.	Contamination Insufficient lubrication	Regrease or disassemble, clean and reassemble with grease.
The concentricity error (with the top jaws removed) is too large.	Top jaws have been interchanged, possibly also the base jaws.	Check and change if necessary.
The piston stroke is not reached.	Drawbar was mounted incorrectly.	Check the installation of the drawbar.

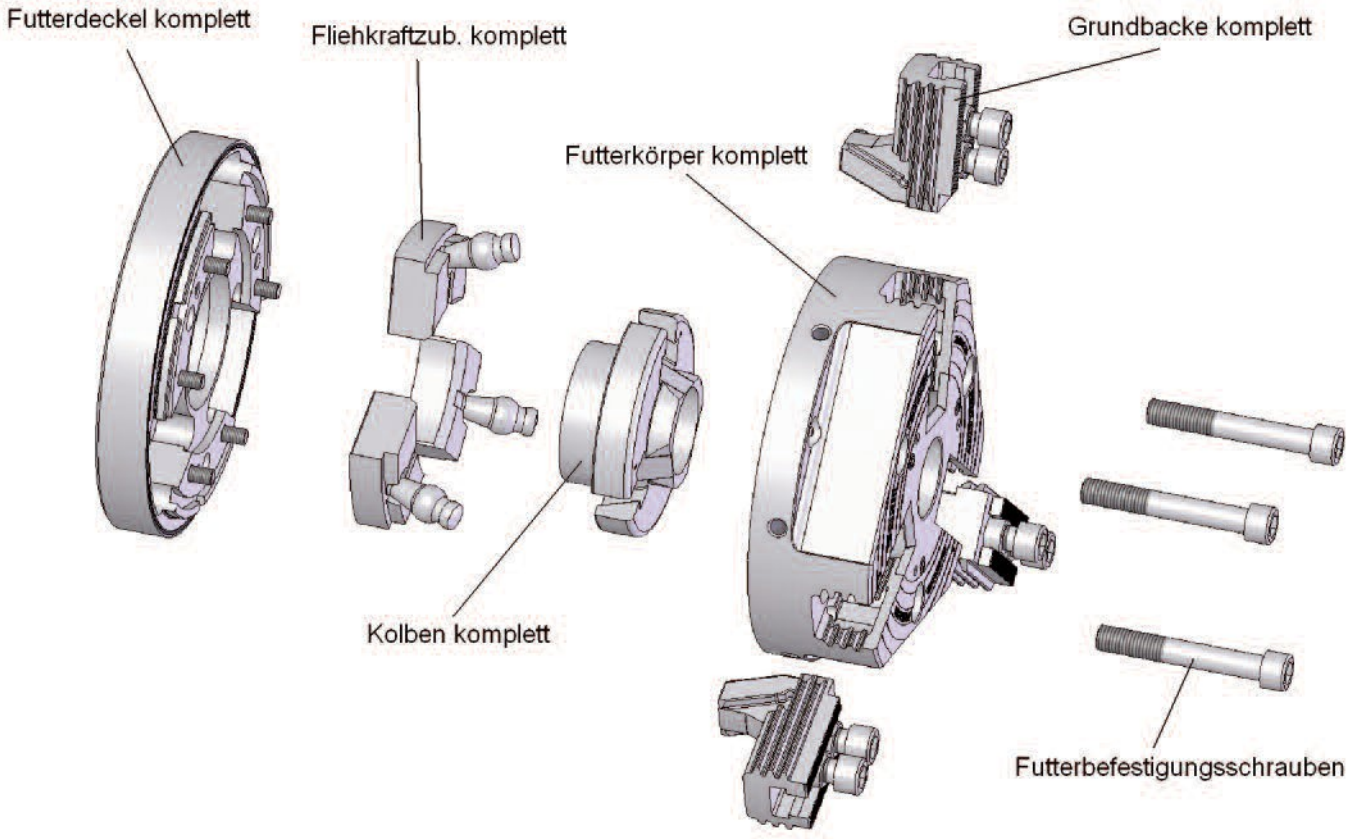
10.0 Spare parts

For safety reasons and to ensure proper functioning, use only original FORKARDT parts.

Manufacturer's warranty only for original FORKARDT parts. There is no claim to product liability for damage caused to our products by the use of third-party parts.

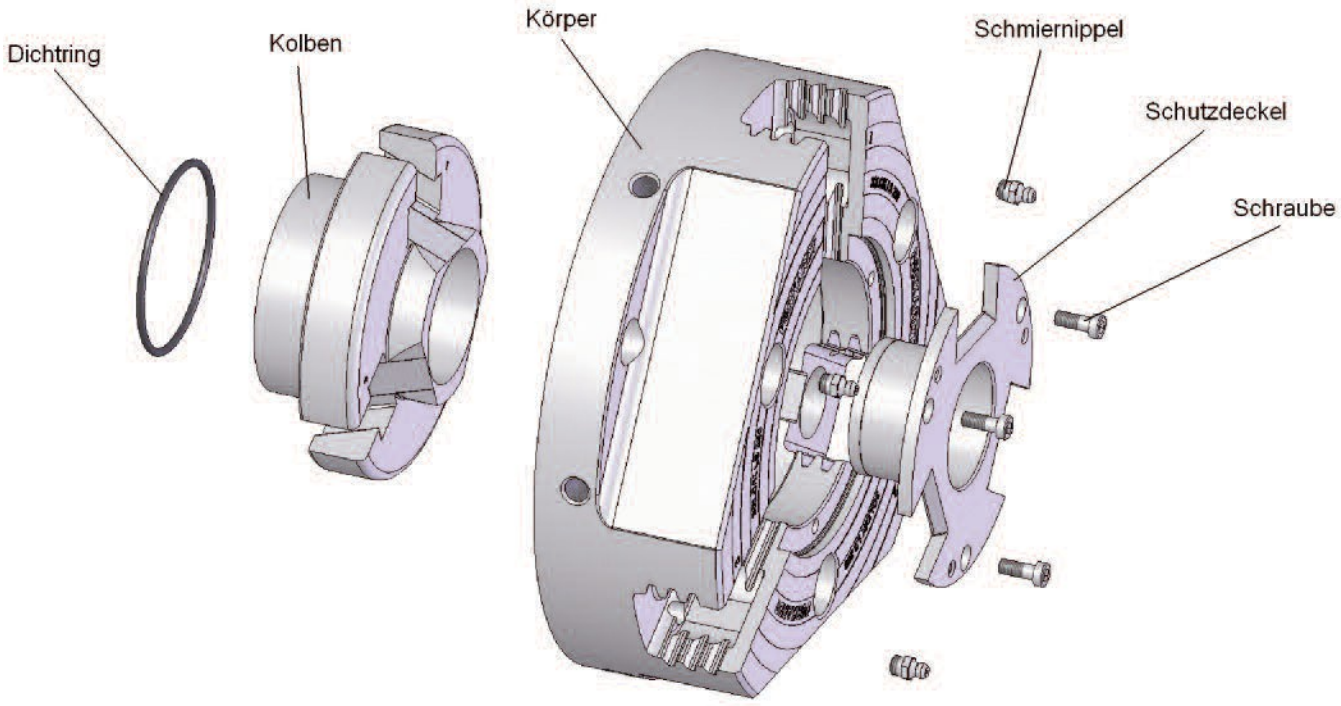
10.1 Assemblies

Futtertyp	Futter - Ø	Backenanschluss	Ident-Nr.	Futterkörper komplett	Futterdeckel komplett	Grundbacke komplett	Fliehkraftzubehör komplett	Futterbefestigungs-schraube komplett
2QLCLS	Ø 160	Zöllige Spitzverzahnung	169619000	181091000	181092000	181090000	181089000	701B010445
		Metrische Spitzverzahnung	169817000			181357000		
3QLCLS		Zöllige Spitzverzahnung	169563000	181087000	180888000	181090000		
		Metrische Spitzverzahnung	169813000			181357000		
2QLCLS	Ø 200	Zöllige Spitzverzahnung	169621000	181074000	181075000	181073000	181071000	701B012440
		Metrische Spitzverzahnung	169818000			181221000		
3QLCLS		Zöllige Spitzverzahnung	169565000	181070000	181072000	181073000		
		Metrische Spitzverzahnung	169814000			181221000		
2QLCLS	Ø 250	Zöllige Spitzverzahnung	169622000	181064000	181065000	181059000	181057000	701B016440
		Metrische Spitzverzahnung	169819000					
3QLCLS		Zöllige Spitzverzahnung	169566000	181056000	181058000	181059000		
		Metrische Spitzverzahnung	169815000					
2QLCLS	Ø 315	Zöllige Spitzverzahnung	169623000	181097000	181098000	181096000	181094000	701B020410
		Metrische Spitzverzahnung	169820000					
3QLCLS		Zöllige Spitzverzahnung	169567000	181093000	181095000	181096000		
		Metrische Spitzverzahnung	169816000					



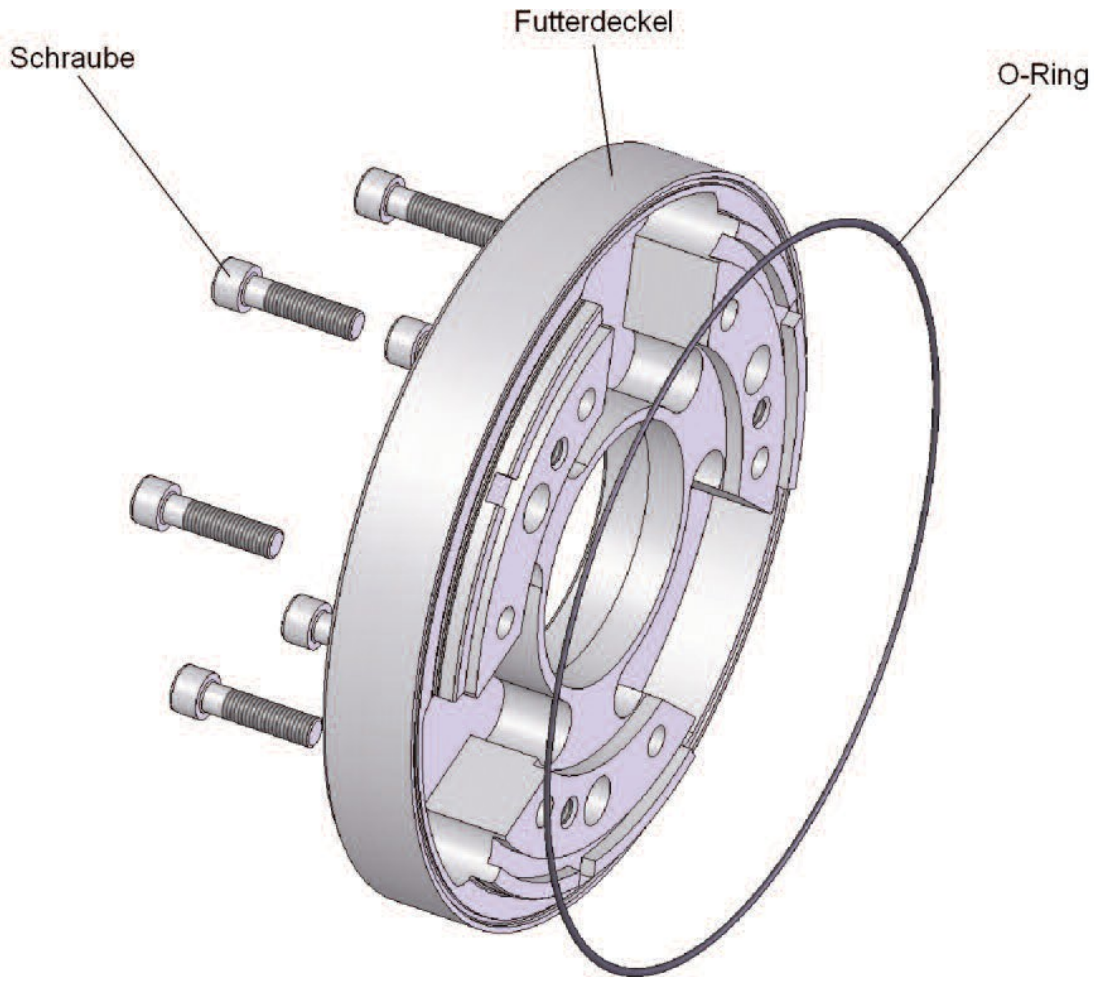
10.2 Assemblies body

Futtertyp	Futter - Ø	Ident-Nr.	Körper	Kolben	Schutzdeckel	Schraube	Schmiernippel	Dichtring
2QLCLS	Ø 160	181091000	169619001	169619002	169619004	701B004030	7097KAM600	711A020039
3QLCLS		181087000	169563001	169563002	169563004			
2QLCLS	Ø 200	181074000	169621001	169621002	169621004	701D005010	7097KAM8x1	711A020055
3QLCLS		181070000	169565001	169565002	169565004			
2QLCLS	Ø 250	181064000	169622001	169622002	169622004	701D006010	7097KAM8x1	711A030112
3QLCLS		181056000	169566001	169566002	169566004			
2QLCLS	Ø 315	181097000	169623001	169623002	169623004	701D006010	7097KAM8x1	711A030127
3QLCLS		181093000	169567001	169567002	169567004			



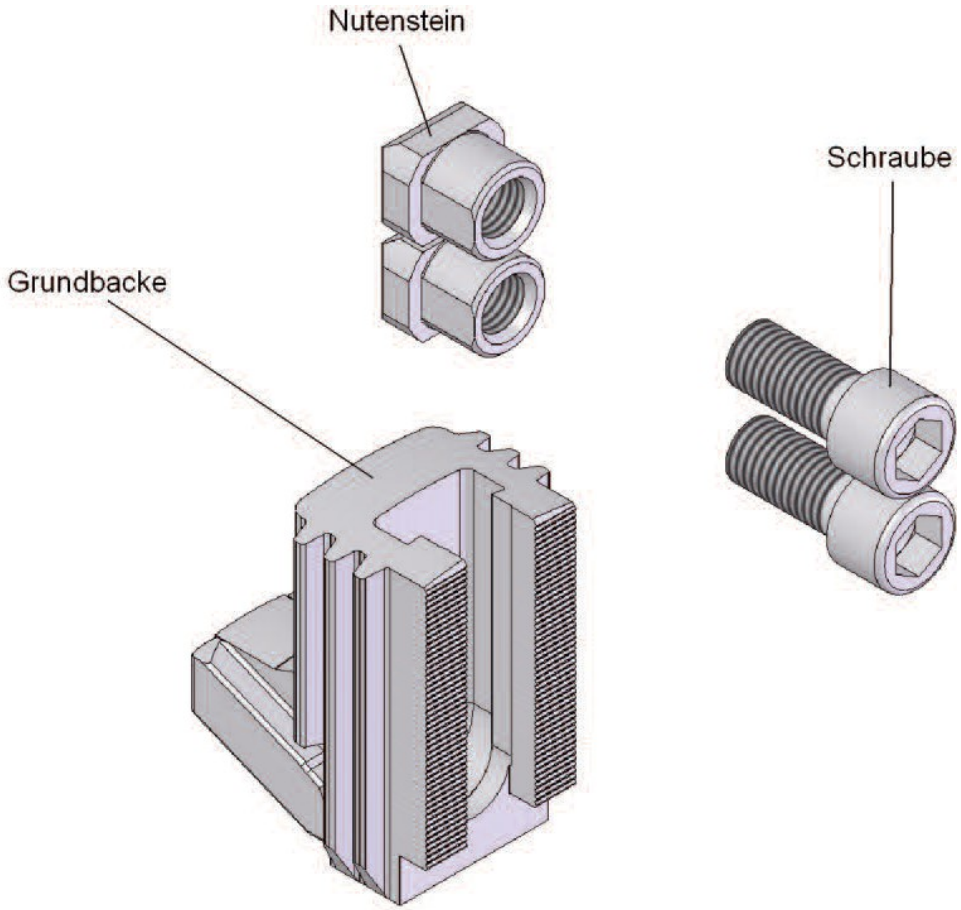
10.3 Assemblies body

Futtertyp	Futter - Ø	Ident-Nr.	Futterdeckel	Schraube	O-Ring
2QLCLS	Ø 160	181092000	169619005	701B010445	711A020093
3QLCLS		180888000	168025005		
2QLCLS	Ø 200	181075000	169621005	701B012440	711A020103
3QLCLS		181072000	169565005		
2QLCLS	Ø 250	181065000	169622005	701B016440	711A020114
3QLCLS		181058000	169566005		
2QLCLS	Ø 315	181098000	169623005	701B020410	711A030196
3QLCLS		181095000	169567005		

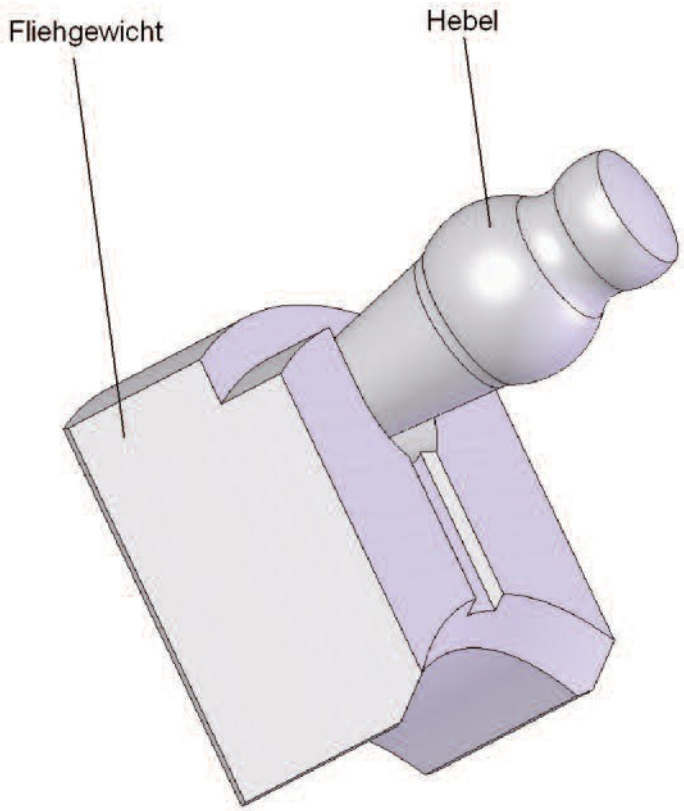


10.4 Assemblies base jaw

Futtertyp	Futter - Ø	Backenanschluss	Ident-Nr.	Grundbacke	Nutenstein	Schraube
2QLCLS	Ø 160	Zöllige Spitzverzahnung	181090000	169563003	153791000	701B012330
		Metrische Spitzverzahnung	181357000	172476003	165797005	701B010330
3QLCLS		Zöllige Spitzverzahnung	181090000	169563003	153791000	701B012330
		Metrische Spitzverzahnung	181357000	172476003	165797005	701B010330
2QLCLS	Ø 200	Zöllige Spitzverzahnung	181073000	169565003	79FN231000	701B012330
		Metrische Spitzverzahnung	181221000	169814003	165784005	
3QLCLS		Zöllige Spitzverzahnung	181073000	169565003	79FN231000	
		Metrische Spitzverzahnung	181221000	169814003	165784005	
2QLCLS	Ø 250	Zöllige Spitzverzahnung	181059000	169566003	79FN232000	701B016330
		Metrische Spitzverzahnung				
3QLCLS		Zöllige Spitzverzahnung	181059000	169566003	79FN232000	701B016330
		Metrische Spitzverzahnung				
2QLCLS	Ø 315	Zöllige Spitzverzahnung	18196000	169567003	79FN232000	701B016330
		Metrische Spitzverzahnung				
3QLCLS		Zöllige Spitzverzahnung	181096000	169567003	79FN232000	701B016330
		Metrische Spitzverzahnung				



10.5 Assemblies Centrifugal accessories



Futter-Ø	Ident-Nr.	Flieh-gewicht	Hebel
160	182110000	174005032	174005033
200	182092000	174025032	174025033
250	182084000	174045032	174045033
315	182105000	174065032	174065033
400	182125000	174085032	40520033

10.6 Customer service

To order spare parts, specify the following data:

Designation
Number of pieces Article number

FORKARDT GERMANY GMBH

Heinrich-Hertz-Strasse
D-406847 Erkrath

Phone +49 2112506334 Mr Neuenfeldt
+49 2112506284 Mr Cordes

Fax +49 2112506236

Declaration of incorporation

in the sense of the **EC Machinery Directive EC-RL /2006 / 42EC**

The manufacturer hereby declares,

FORKARDT Deutschland GmbH
Heinrich-Hertz-Str. 7
D - Erkrath40699

of the partly completed machines with the designations:

Type designation:Power-

operatedthree-jaw chuck

Type: **2/3QLCLS**

- The basic health and safety requirements according to Annex I above are applied and complied with.
- The special technical documentation according to Annex VII B has been prepared.
- The aforementioned specific technical documentation shall be submitted to the competent authority as required.
- Commissioning is prohibited until it has been established that the machine in which the above-mentioned machines are installed complies with the provisions of the Machinery Directive.
- Documentation Officer:

Oskar Weinert
Heinrich-Hertz-Str.
D7 - Erkrath40699

Date/Manufacturer signature: 05.11.2013

Place:Erkrath

.....

(Division Manager Construction Mr Weinert)

Declaration of incorporation no.:QLCLS.D

We are constantly striving for improving our products. The dimensions and specifications may not always correspond to the latest designs, they are therefore not binding.

Innovative technology from FORKARDT

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