Customer: **Wärtsilä Nederland B.V.**
Order No.: **2005411931**
Pleiger Ref. No.: **VMR-502242**

TECHNICAL DOCUMENTATION

Table of Contents

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D-58423 Witten
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PLEIGER

Electrically Operated Control Valves Electrical Motor Drive

MOV - 81
MOV - S - 81
MOV - 3 - 81

Types

Single-seat valve in straight-way form
Type MOV-81
Dimension sheet EK-413

Seat valve in straigth-way form with noise attenuating cone
Type MOV-S-81
Dimension sheet EK-413

Three-way valve
Type MOV-3-81
Dimension sheet EK-414

Construction

Straight-way valves up to DN 200 with shrunk seats, beginning with DN 250 with screwed seats

cone characteristics linear or equi-percentage different Kv values are possible at equal nominal width

three-way valves with screwed-in double-seat bushes with linear characteristics of flow and disk cones

inserted stuffing-box flanges

cast housing

driven by spur gearing with linear actuator

4 drive sizes, having different positioning forces are available

E-motors for 50 or 60 Hz AC and three-phase voltages

drives with emergency manual operation and mechanical position display

drive covered with steel cover

Materials

Valve housing:	PN10/16 GG20 PN25/40 GS-C-25 other materials, such as special steel cast, chromium-nickel steel, gun metal, bronze, etc. and hard rubber lining on request
Valve seats:	W. No. 1.4401 for three-way valves DN 65-200 W. No. 1.4410 or bronze G Sn Bz 10 other materials on request
Valve conel:	W. No. 1.4401 for straight-way valves DN 125-350 and three-way valves DN 250-350 W. No. 1.4410 or bronze G Sn Bz 10 other materials on request
Valve spindle:	W.-Nr. 1.4401 or bronze AlBz 10Ni other materials on request
Stuffing-box packing:	PTFE, silkyam (reinforced) orpure graphite
Housing:	steel casting GS-C-25

Technical Data

Overall length:	according to DIN 3300	
Flanges:	PN 10	DIN 2532
	PN 16	DIN 2533
	PN 25	DIN 2544
	PN 40	DIN 2545
Operating pressures:	according to DIN 2401	
Differential pressures:	in accorddance with tables EK-413 and EK-414	
Positioning ratio:	1:50	
Positioning - speed:	normal 25 mm/min; 50 mm/min possible	
Strokes:	DN 15- 50	25 mm
	DN 65- 100	35 mm
	DN 125-175	50 mm
	DN 200	58 mm
	DN 250-350	65 mm
Installing position:	vertical to horizontal	
Electrical data:	according tables „electrical Drive Data"	

Additional Equipment

Soft seal in the cone
cone with multi-hole sleeve
ribbed stuffing-box
spindle sealing by bellows W. No. 1.4571

General

The motor valves are used as electrically operated continuous control elements (control valves) and as on-off controller for the control of gaseous and liquid agents. The control is established by means of two-point or three-point controllers as a function of temperature, pressure, quantity etc. or manually with push-button or switch.

Construction and Operation

-Straight-way valves in single-seat construction.
Dimension sheet EK-413
with cooling rib assembly or bellows sealing, respectively.
Dimension sheet EK-425

- Three-way valves.
Dimension sheet EK-414
with cooling rib assembly or bellows sealing, respectively.
Dimension sheet EK-419

- 4 different drives (1.2 kN; 4.5 kN; 12 kN; 24 kN) are optionally available to meet the operational requirements.

The switching-off at the end position is established for straightway valves in the closing position torque-dependent, and in

the opening position travel dependent, with an additional limit switch, being torque dependent, wired in parallel, for three-way valves in both end positions, torque dependent.

In addition, a further free travel dependent limit switch with switch-over contact is provided.

The valve position is indicated by a pointer at the drive spindle and a scale at the housins.

For the analog remote transmission of the valve position, the installation of 2 potentiometers is possible.

In addition, a further travel dependent limit switch can be installed. The built-in electro motor (a) drives the linear actuator via a spur gear. In the last gear (b) of the geartrain, a bushing with internal thread is shrunk in, which runs in ball bearings. In this thread runs the upper part of the push-rod (d), provided against torsion by a key and groove.

When the gear is driven, the push-rod and the valve spindle performs a push / pull motion, depending on direction of rotation.

On power failure, the final control element can manually be actuated.

The gear ist dustproof separated from the electrical components in an aluminium pressure housing. Terminals, motor, limit switch and potentiometers are easily accessible by removing of the steel cover

Electrical and technical drive data

Data for regulating operation: The motors are designed for intermittent duty S4 acc. to VDE 530 with a relative duty cycle of 30%.
switching frequency max. 600/h
minimum pulse duration: 250 ms
minimum pulse pause: 40 ms

Electrical wiring: at the terminal via cable sorewings according to DIN 89280

Power supply: normally
230 V- 50 or. 60 Hz, single-phase-AC,
or
380 V- 50 or. 60 Hz three-phase current
other supply voltages on request

Type of protection: DIN 40050 · IP 65

Allowable ambient temperature: - 20 to + 60°C

Limit switch: torque dependent switches max. 230 V
ohmic load max. 10 A
inductive load max. 5 A
travel dependent switches max. 230 V
ohmic load max. 5 A
inductive load max. 3 A
electric bulb max. 1 A

Potentiometer: max. 50 V, 100 mA

Motor data

Drive 1,2 kN

Positioning time	mm/min	25	50	25	50	30	60
Voltage	Volt	single-phase AC current 230 V 50 Hz		three-phase 400 V 50 Hz		three-phase 440 V 60 Hz	
Rated current	mA	29		15		14,3	
Power consumption	Watt	6,6		9,9		9,35	
Power output	Watt	2,4		3,1		3,1	
Rotational speed motor	U/min	500		500		600	

Drive 4,5 kN

Positioning time	mm/min	25	50	25	50	30	60
Voltage	Volt	single-phase AC current 230 V 50 Hz		three-phase 400 V 50 Hz		three-phase 440 V 60 Hz	
Rated current	mA	135	160	110	80	100	100
Power consumption	Watt	28	32	35	32	35	45
Power output	Watt	5,3	12	10	16	12	19
Rotational speed motor	U/min	1350	2700	1350	2700	1620	3240

Drive 12 kN without brake

Positioning time	mm/min	25	50	25	50	30	60
Voltage	Volt	single-phase AC current 230 V 50 Hz		three-phase 400 V 50 Hz		three-phase 440 V 60 Hz	
Rated current	mA	320	700	210	290	220	265
Power consumption	Watt	60	130	75	120	80	138
Power output	Watt	22	72	28	63	28	85
Rotational speed motor	U/min	1300	2750	1300	2750	1600	3300

Antrieb 24 kN without brake

Positioning time	mm/min	25	50	25	50	30	60
Voltage	Volt	single-phase AC current 230 V 50 Hz		three-phase 400 V 50 Hz		three-phase 440 V 60 H	
Rated current	mA	660	930	400	700	342	640
Power consumption	Watt	145	206	163	337	180	370
Power output	Watt	67	110	75	215	88	235
Rotational speed motor	U/min	1350	2700	1350	2750	1560	3300

Connection Diagrams

AC	2/2 way valve	RTA-264
	3/2 way valve	RTA-265
Three-phase current:	2/2 way valve	
	linear actuator 1,2 + 4,5 kN	RTA-264/3
	linear actuator 12 + 24 kN	RTA-264/4
	3/2 way valve	
	linear actuator 1,2 + 4,5 kN	RTA-265/3
	linear actuator 12 + 24 kN	RTA-265/4

Installation

"These actuator valves shall be mounted with the drive towards the top. For any other position ask before ordering."

The pipes have thouroughly to be cleaned prior to assembling, in order to prevent a later damage to the seats and cones.

The installation of a dirt tr,ap in front of each control valve is strongly recommended.

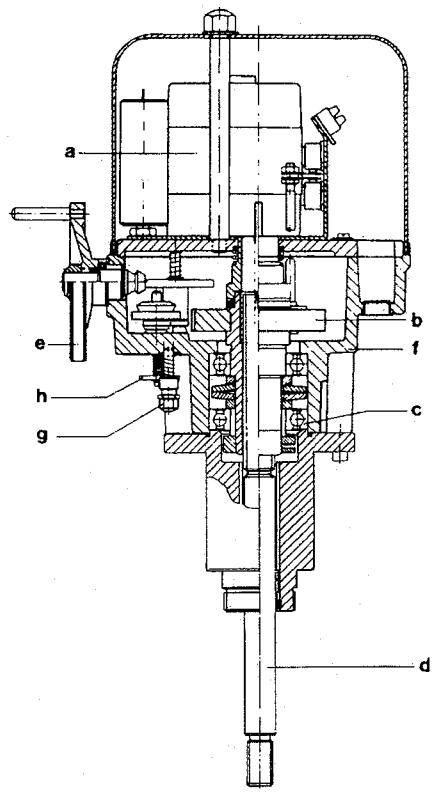
On mounting of straight-way and angle valves pay attention to the direction of arrow on the valve housing.

Mix and partitioning valves are provided with the figures 1,2 and 3 on their connecting flanges. Observe the correct installation in accordance with piping diagram.1 is always the joint connection, whereas to 2 and 3 the incoming or leaving part streams are connected.

The wiring and connecting of the electrical circuitry has to be performed in accordance with the regulations for the installation of power plants and with the respective wiring diagrams.

Start-up and Adjustment instructions

For start-up of the valve place the drive by means of the hand wheel (e) in the middle of the positioning travel, switch on power and give short AC pulses to the drive; watch whether the push rod (d) moves into the correct direction. Otherwise, exchange the motor connections at the terminal strips 2 + 3.



Drive 1.2 kN and 4.5 kN

Operate manually only with the motor at standstill.

For this purpose press the bolt (f) mounted below at the drive housing with the hexagonal head into the housing until the spring lever (h) engages into the notch of the bolt. Hereby rotate the handwheel (e) a little bit. On rotating of the handwheel ciockwise, the push spindle is extended rotating ccw draws the spindle in. On pressing of spring lever (h) in the direction of the valve shaft the bolt jumps out on its own and the drive is switched back to motor drive.

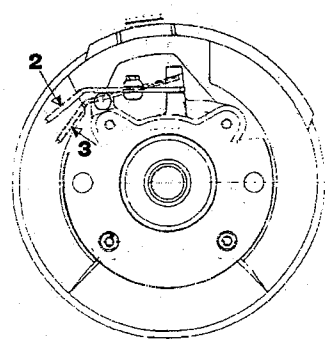
Drive 12 kN and 24 kN

Change over to hand-operating:

Push hand disengaging lever into direction -1- (at the time turn hand wheel slightly if necessary), then swivel hand disengaging lever above the hexagon screw into direction -2-.
Now hand operating position is locked.

Change over to motor drive:

Swivel hand disengaging lever into direction - 3 - and release. All further engaging proceedings will occur automatically with starting up of the motor.



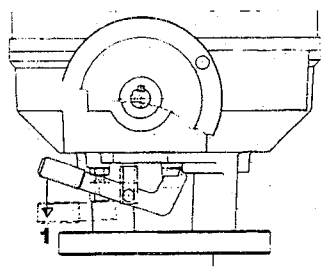


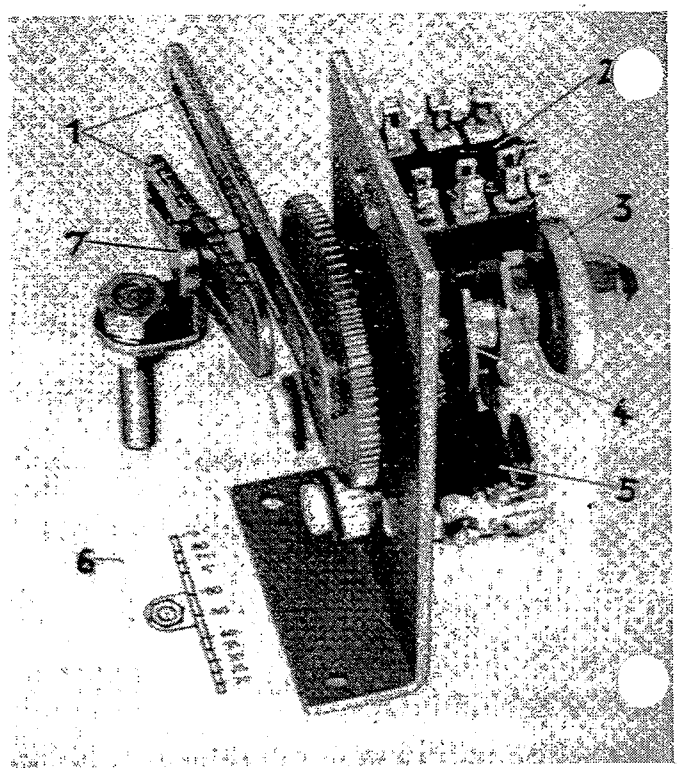
Figure travel dependent switch and message devices

With the end position reached with extended push spindle, the two slotted levers (1) are parallel. A'ter loosening of the nut, the carrier bolt (7) can be moved into the slot of the lever allowing the stroke of the drive to be adjusted by means of the auxiliary scale. After this being done, re-fasten the bolt. In this position, the potentiometers (5) (in case there are any) have to be in the end position. They can be adjusted by rotating the slider.

After that move the drive by the required travel for 2/2 valves or the possible travel for 3/2-way valves in the opposite direction the potentiometer will then turn into the other end position.

For the adjustment of the travel dependent limit switch "S 3" for the limiting of the travel in the position open, the knurled head nut (4) has to be loosened. Adjust the cam washer (4) to make the switch shut off. The second built-in travel dependent switch "S 4" and another possible "S 5" may freely be adjusted inbetween the two end positions. Re-fasten the knurled head nut after the switches being adjusted.

The switches provided for the end positioning are factory adjusted. The torques of the load dependent switches are fixed and can not be changed.



1 Slotted levers; the lower one is marked for the set travel
2 Travel-dependent switches
3 Knurled nut
4 Cam disks
5 Potentiometer for position indication
6 Scale for setting the travel
7 Connection bolt

Maintenance

Valve assembly

Re-fasten the screws and flange connections at the housing after start-up of the installation as the sealings are settling a bit at the beginning. The maintenance of the stuffing-box is also important. In case of leakage, the stuffing-box gland has to be fastened at once. If this is no longer possible, the stuffing-box has to be re-packed.

Take care to use the right material, depending on the agent, the temperature etc. Keep the part of the spindle being in contact with the stuffing-box always clean and grease at regular intervals with a suitable grease. If the sealing surfaces at the seat and the cone are damaged by dirt or foreign particles, no longer giving a tight seat, they can be ground with a fine emery paste. With valves having PTFE inserts in the cone, the latter can easily be replaced.

Drive

Grease the drive at normal operating conditions every three years, at higher loads after approx. 200 000 double strokes with "Fett Klüber Structoris P 00" or a similar grease.

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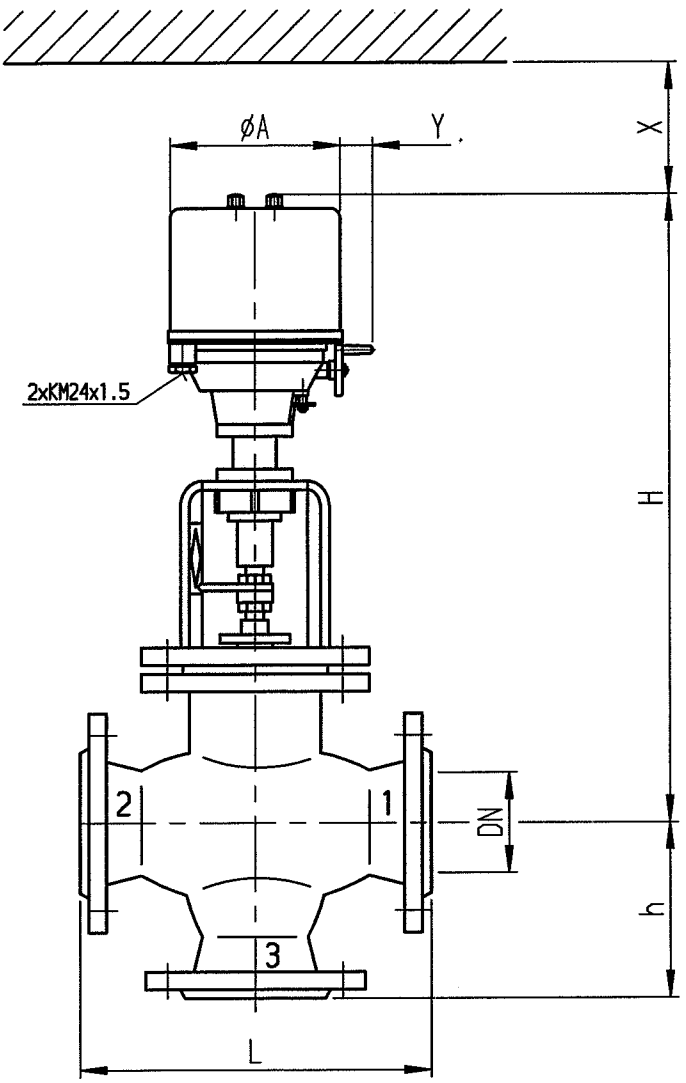
PLEIGER Maschinenbau GmbH & Co.KG	**Maßblatt / DIMENSION SHEET** **Motor-Misch- und Teilungsventil Typ : MOV-3-81** **KVS-Tabelle 1** **MIXING AND DISTRIBUTING MOTOR VALVE TYP : MOV-3-81** **KVS-TABLE 1**	58423 Witten Germany DRWG.No. / Zchg.Nr.: EK-414 INDEX: b

Einbau:

Ventil nur mit Antrieb
nach oben einbauen.
Andere Einbaulagen bitte bei
Anfrage / Bestellung angeben !

Installation:

The actuator of valves shall
be mounted upwards. Please,
indicate other built-in situations
with inquiry / order !



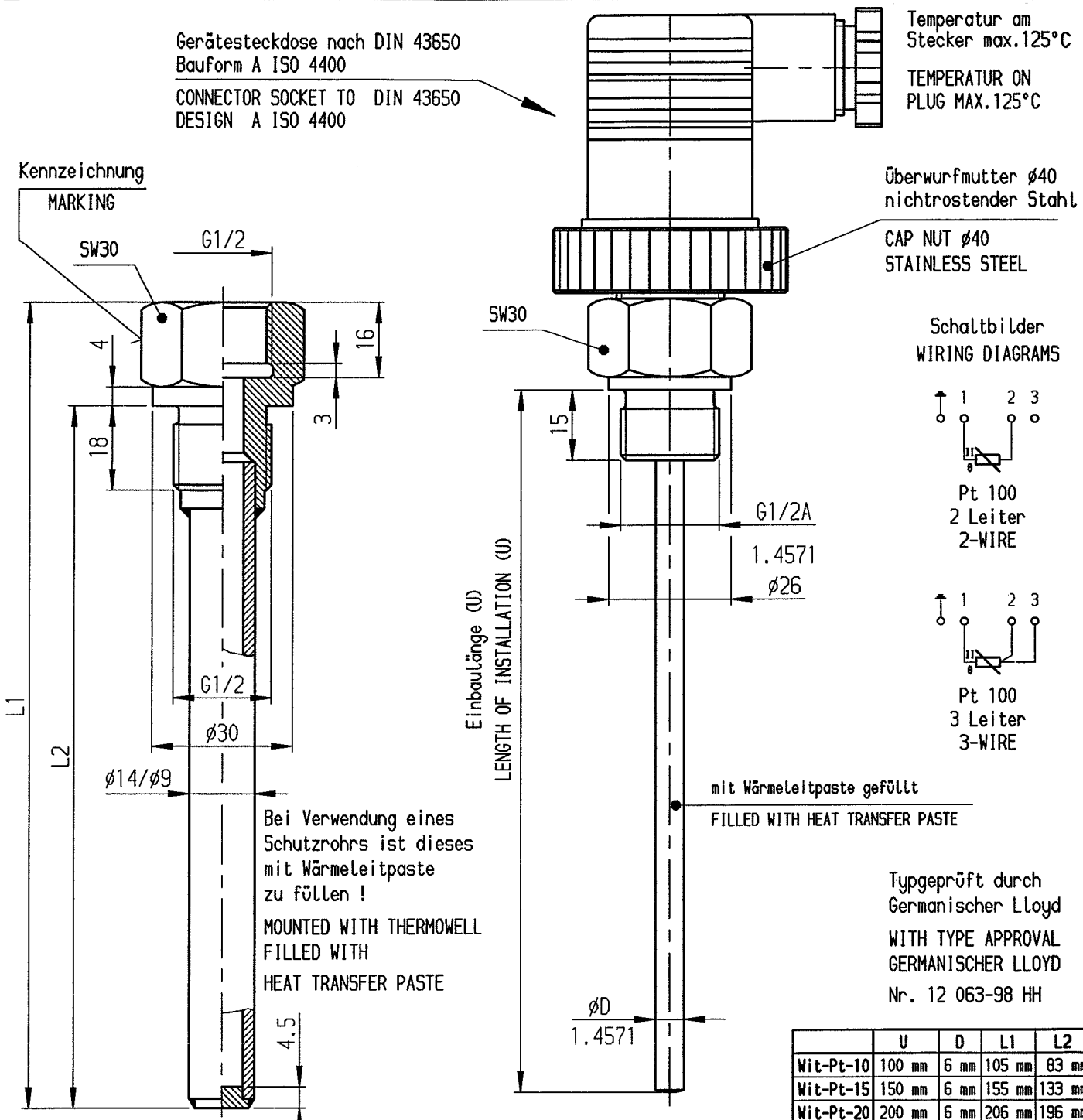
Flansch nach Anforderung
FLANGE DRILLING ACC. TO REQUEST

DN		15	20	25	32	40	50	65	80	100	125	150	175	200	250	300	350	400
Antrieb 1.2 kN / DRIVE 1.2 kN P max. bar		9.4	9.4	9.4	5.8	5.2	3.4	1.9	1.2	-	-	-	-	-	-	-	-	-
Antrieb 4.5 kN / DRIVE 4.5 kN P max. bar		-	-	55.4	35.8	32	21	12.7	8.4	5.5	3.4	2.4	1.8	-	-	-	-	-
Antrieb 12 kN / DRIVE 12 kN P max. bar		-	-	-	-	-	-	35.5	23.3	15.5	9.7	6.8	5	3.8	2	1.3	-	-
Antrieb 24 kN / DRIVE 24 kN P max. bar		-	-	-	-	-	-	-	-	31.3	19.8	14	10.3	7.9	4.0	2.8	2	1.5
L		130	150	160	180	200	230	290	310	350	400	480	550	600	730	850	980	1100
H	1.2 kN	514	514	514	541	541	541	624	624	-	-	-	-	-	-	-	-	-
	4.5 kN	-	-	514	541	541	541	624	624	624	717	742	787	-	-	-	-	-
	12 kN	-	-	-	-	-	-	702	702	724	795	820	865	900	948	978	-	-
	24 kN	-	-	-	-	-	-	-	-	-	949	974	1019	1054	1102	1132	1206	1251
h		172	172	172	197	197	197	145	155	175	200	240	275	300	455	530	595	600
A	1.2+4.5 kN	170	170	170	170	170	170	170	170	170	170	170	170	-	-	-	-	-
	12 kN	-	-	-	-	-	-	188	188	188	188	188	188	188	188	188	-	-
	24 kN	-	-	-	-	-	-	-	216	216	216	216	216	216	216	216	216	216
Y	1.2+4.5 kN	42	42	42	42	42	42	42	42	42	42	42	42	-	-	-	-	-
	12+24 kN	-	-	-	-	-	62	62	62	62	62	62	62	62	62	62	62	62
X	1.2+4.5 kN	130	130	130	130	130	130	130	130	130	130	130	130	-	-	-	-	-
	12 kN	-	-	-	-	-	-	140	140	140	140	140	140	140	140	140	-	-
	24 kN	-	-	-	-	-	-	-	185	185	185	185	185	185	185	185	185	185

SUBJECT TO MODIFICATION / Änderungen vorbehalten		
DIN A4	DATE / Datum	NAME / Name
DRAWN / Gezeichn.	26-APR-2002	BUMANN
APPROVED / Gepr.	26-APR-2002	BLASK

INDEX	REVISIONS / Änderungen	DATE / Dat.	NAME / Name
/	/	/	/
b	Einbau-Text neu	30-SEP-2003	BUMANN
a	neues Layout	03-MAY-2002	BUMANN

PLEIGER Maschinenbau GmbH & Co.KG	**Maßblatt / DIMENSION SHEET** **Wiederstandsthermometer mit GL-Zulassung** **RESISTANCE THERMOMETER WITH GL-APPROVAL**	58423 Witten Germany DRWG.No. / Zchg.Nr. EK-435 INDEX c



	U	D	L1	L2
Wit-Pt-10	100 mm	6 mm	105 mm	83 mm
Wit-Pt-15	150 mm	6 mm	155 mm	133 mm
Wit-Pt-20	200 mm	6 mm	206 mm	196 mm

Zusatzinformationen für Wiederstandsthermometer

Schutzgrad	IP65
Klassifikation	typgeprüft durch Germanischer Lloyd
Vibrationsbeständigkeit	4g
Meßbereich	-40 °C bis +160°C
Ansprechzeit	50%=3.7 s
(bei SR ø6mm)	90%=8.8 s

Additional informations for Resistance thermometer

Protective system	IP 65
Classifikation	with type approval Germanischer Lloyd
stability against vibrations	4g
Range of Measurement	-40 °C to +160°C
Time of respond	50%=3.7 s
(at prot.tube ø6 mm):	90%=8.8 s

Einbauhinweise

Um die Kabelanschlußrichtung zu verändern, kann der Stecker in Schritten von 90° gedreht werden.
ACHTUNG : Rändelmutter am Widerstandsthermometer nicht lösen!
Der Einsatz eines Schutzrohres verlängert die Ansprechzeit!

Hints for installation

To change the direction of cable connection you can turn the plug in steps of 90°.
ATTENTION : Please do not loosen the nut on the resistance thermometer.
The using of an protecting tube will extend the time of respond.

SUBJECT TO MODIFICATION / Änderungen vorbehalten		
DIN A4	DATE / Datum	NAME / Name
DRAWN / Gezeichn.	29-APR-2002	BUMANN
APPROVED / Gepr.	25-NOV-2002	BLASK

INDEX	REVISIONS / Änderungen	DATE / Dat.	NAME / Name
c	Überwurfmutter von ø29 in ø40 geändert	22-NOV-2004	BUMANN
b	Wit-Pt-20 neu	25-NOV-2002	BUMANN
a	Zeichnung kompl. überarbeitet	08-NOV-2002	BUMANN
/	Zeichnung in CAD	29-APR-2002	BUMANN

MOTORVENTIL MOV-3-81 (SCHUBANTRIEB 1,2 UND 4,5 kN)
MOTOR VALVE MOV-3-81 (LINEAR ACTUATOR 1,2 AND 4,5 kN)

HZ = Heizwiderstand
heating resistor

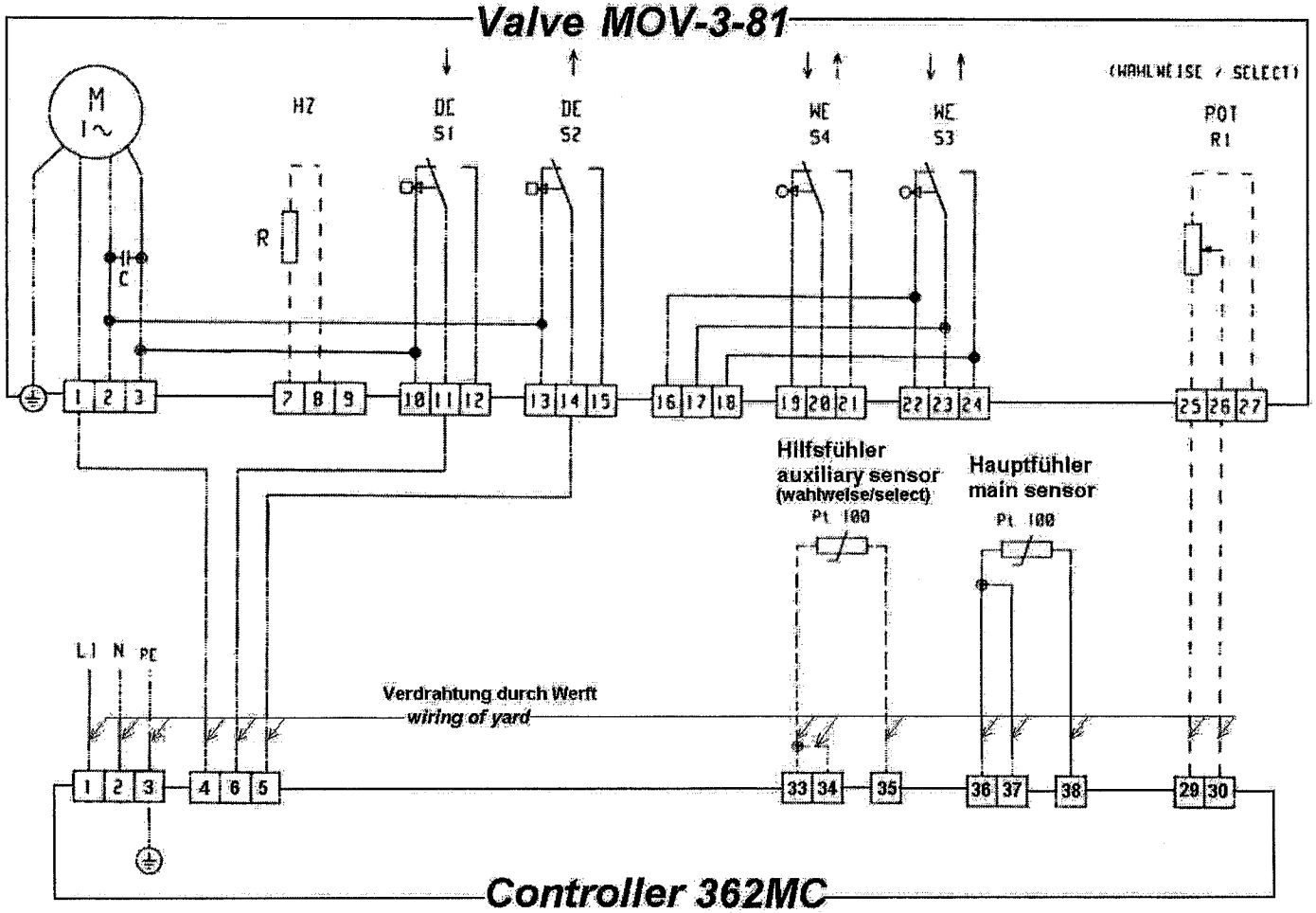
DE = Drehmomentabhängiger Schalter
torque-dependent switch

WE (S3) = Wegabhängiger Schalter für Stellwegbegrenzung
travel-dependent switch for limitation of travel

WE = Wegabhängiger Schalter
travel-dependent switch

POT = Potentiometer für Stellungsanzeige
potentiometer for position indication

Valve MOV-3-81



Controller 362MC

in case of wrong direction of the motors at the motor valve, that means in case of inverse function, the connections at the terminals 1|4|4 have to be exchanged

Daten für Regelbetrieb
Motoren sind für Aussetzbetrieb S4 nach VDE 0530 mit 30% relativer Einschaltdauer ausgelegt.
Schalthäufigkeit max. 600 /h
minimale Impulsdauer 250 ms

Data for regulating operation
The motors are designed for intermittent duty S4 acc. to VDE 0530 with a relative duty cycle of 30%.
switching frequency max. 600 /h
minimum pulse duration 250 ms

	Änderung	Datum	Name		Datum	Name
a		10.01.2001	Hille	ges.		
b						
c				ges.		
d						

PLEIGER
Maschinenbau GmbH & Co. KG
Postfach 3263 · 58423 WITTEN
Im Hammertal 51 · 58456 WITTEN

RTA-268/3D/MC

Zeichn.-Nr.:

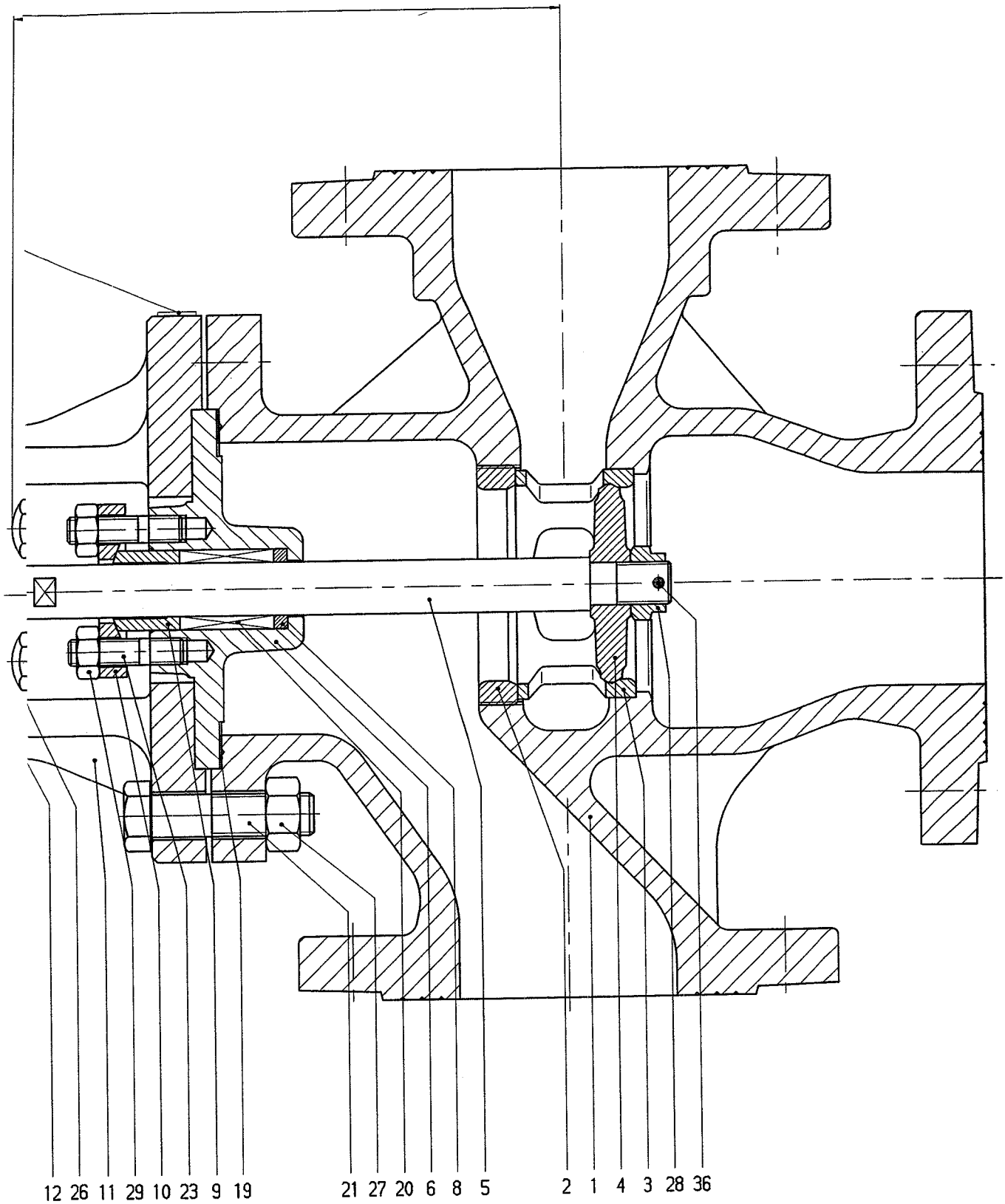
Ort:

Anlage:

Projektbez.:

Auftrag:

Bl: 1



INDEX	REVISIONS / Änderungen	NO. / Nr.	DATE / Dat.	NAME / Name
d	Positionen Kegel-Spindelbefestigung geändert	o.N	9-MAR-95	KUMP
c	Verdrehsicherung im Antrieb	o.N	17-DEC-90	HACK
b	Pos. 28 und 36!	2.2355	10-SEP-90	HACK
a	Neue Positionierung	2.2157	22.01.81	Striebeck

DESIGNED BY CAD-SYSTEM AND APPROVED WITHOUT SIGNATURE / Zeichnung mit CAD-System erstellt und gültig ohne Unterschrift

SCALE / Maßstab	DIN A1	DATE / Datum	NAME / Name	MATERIAL / Werkstoff
1 : 1	DRAWN / Gezeichn.	20-APR-90	HACK	/
	APPROVED / Gepr.	x	x	

DESIGNATION / Bezeichnung
Motor-Mischventil
DN 80 PN10-40
Motor-mixing-valve
dn80 pn10-40

Pleiger Maschinenbau GmbH & Co KG
Postfach 32 63
D-5843 WITTEN

DRWG.No. / Zchg.Nr. MOV-3-80-17 | INDEX d

Freimaßtoleranzen nach DIN 7168 mittel					
	Über	0.5 bis 6 +/- 0.1	Über	120.0 bis 315 +/- 0.5
	Über	6.0 bis 30 +/- 0.2	Über	315.0 bis 1000 +/- 0.8
	Über	30.0 bis 120 +/- 0.3	Über	1000.0 bis 2000 +/- 1.2

Paßmaß	Abmaß	Gegenüberstellung Oberflächen Reihe 2 DIN 3141	DIN 150 1302
		~	▽
		▽	√ Rz 100
		▽▽	√ Rz 25
		▽▽▽	√ Rz 6.3
		▽▽▽▽	√ Rz 1

PARTS LIST MOV-3-100-65/2 DATE: 16.01.06

DREIW.MOTORVENT. DN100/THREE WAY MOTOR VALVE PAGE: 1
DWG.-NO.: MOV-3-80-17

ITEM	PART- NO.	DESIGNATION	QTY.	MATERIAL
000	9295400500	UNTERBAU DN100/VALVE SECTION KVS LIST 1;	1,000	
015	9291060200	SKALA/SCALE	1,000	ALU-BL.
016	9156960150	TYPENSCHILD/NAME PLATE	1,000	NIRO V4A
025	6911600030	NUTMUTTER/GROOVE NUT M45X1,5	1,000	ST
030	6004390990	SECHSKANTMUTTER/HEX. NUT M12	1,000	4
033	6014760010	HALBRUNDKERBNAGEL/HALF ROUND NOTCHED PIN	5,000	V2A
035	4787020910	SCHUBANTRIEB/SLIDING GEAR	1,000	

*** E N D E DER S T Ü C K L I S T E ***

PARTS LIST 9295400500 DATE: 16.01.06

UNTERBAU DN100/VALVE SECTION KVS LIST 1; PAGE: 1
DWG.-NO.: MOV-3-80-17

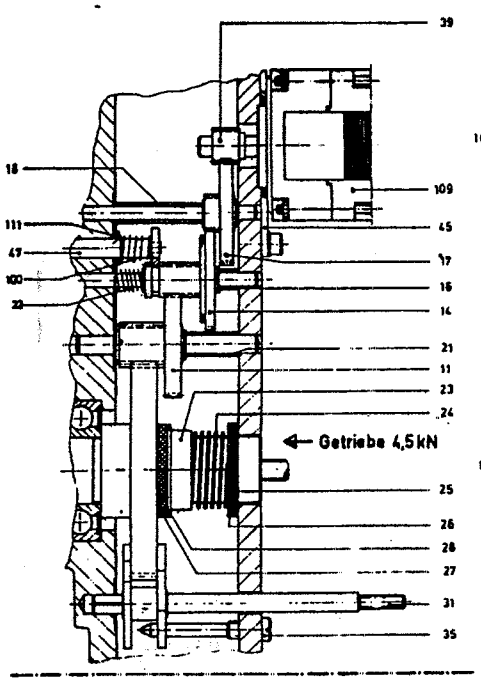
ITEM	PART- NO.	DESIGNATION	QTY.	MATERIAL
001	9201211110	VENTILGEHÄUSE/VALVE CASING	1,000	GG-25
002	9227300170	VENTILSITZ/VALVE SEAT	1,000	CUAL10NI
003	9261705970	SITZBÜCHSE/SEAT BUSHING	1,000	G-CUAL10NI
005	9233205170	KEGEL-SPINDELBEFESTIG./CONE-SPINDLE MOUNTING	1,000	
006	9211210310	STOPFBUCHSFLANSCH/STUFFING BOX FLANGE	1,000	GG-25
008	9270401360	RING/RING	1,000	PTFE
009	9261205670	STOPFBUCHSE/STUFFING BOX	1,000	CUAL10NI
010	9265123700	STOPFBUCHSBRILLE/STUFFING BOX GLAND	1,000	C35
011	9292034200	STÄNDER/COLUMN	1,000	GGG-40.3
012	9266202600	KUPPLUNG/COUPLING	1,000	ST37K
014	9291057100	ZEIGER/POINTER	1,000	RRST 14-4
019	6990200180	DICHTUNG/SEALING 165X140X1	1,000	CENTEL. 3820
020	6990600210	PACKUNGSRING/SEALING PACKING	7,000	PTFE
021	6009311530	SECHSKANTSCHRAUBE/HEX. HEAD BOLT	8,000	8.8
023	6009390860	STIFTSCHRAUBE/STUD M10X30	2,000	V4A
024	6009331010	SECHSKANTSCHRAUBE/HEX. HEAD BOLT M5X10	2,000	8.8

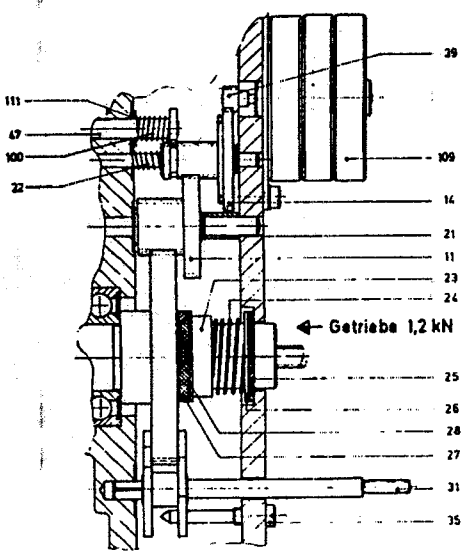
PARTS LIST 9295400500 DATE: 16.01.06

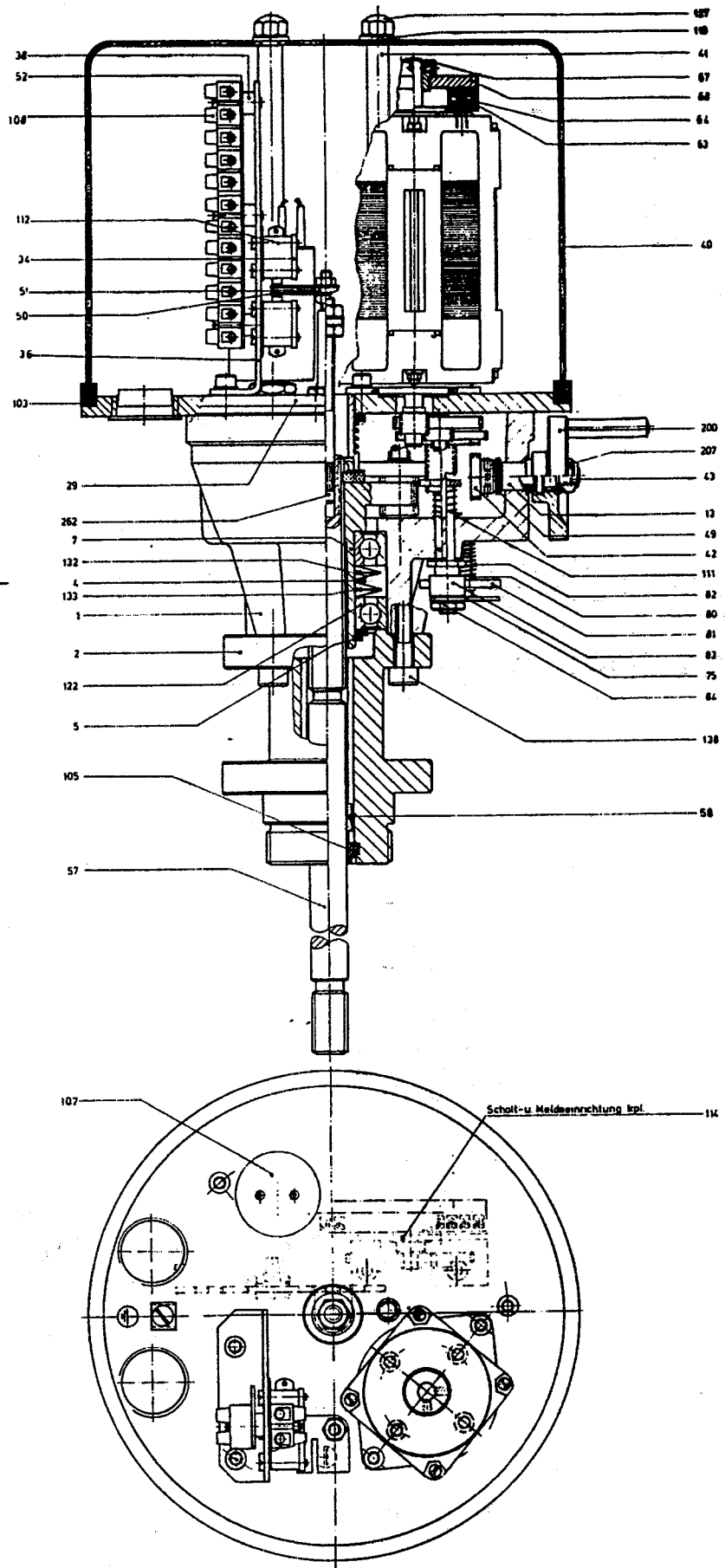
UNTERBAU DN100/VALVE SECTION KVS LIST 1; PAGE: 2
DWG.-NO.: MOV-3-80-17

ITEM	PART- NO.	DESIGNATION	QTY.	MATERIAL
026	6004391020	SECHSKANTMUTTER/HEX. NUT M16X1,5	1,000	04
027	6009340270	SECHSKANTMUTTER/HEX. NUT M16	8,000	8
029	6009340330	SECHSKANTMUTTER/HEX. NUT M10	2,000	V4A
100	6992500300	PLASTIKSTOPFEN/PLASTIC PLUG DN100	3,000	

*** E N D E DER S T Ü C K L I S T E ***







PLEIGER

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Ersatzteilliste für Schubantrieb

4,5 kN/A

spare parts list for linear actuator

Pos. Nr. *item-no.*	Stück *req. qty*	Benennung *designation*	Zeichnungs-Nr. *order-no.*	Norm *norm*
1	1	Gehäuse *housing*	3,5kN-100.010-1	
2	1	Flansch *flange*	1,2kN-100.020-1A	
4	1	Ausgleichscheibe *compensation washer*	20x28x0,5	DIN 988
5	1	Sicherungsring, verstärkt *circlip, reinforced*	A 20 x 1,75 Sd	
7	1	Abtriebswelle *output shaft*	1,2kN-120.010	
11	1	Rad III kpl. *gear wheel III compl.*	3,5kN-120.020	
13	1	Lagerbuchse *bearing bushing*	1,2kN-180.010	
14	1	Rad II kpl. *gear wheel II compl.*	1,2kN-120.030	
16	1	Distanzrohr *spacer*	3,5kN-120.036	
17	1	Rad I kpl. *gear wheel I compl.*	3,5kN-120.040	
18	1	Distanzrohr *spacer*	3,5kN-120.045	
21	1	Distanzrohr *spacer*	3,5kN-120.025	
22	1	Druckfeder *compression spring*	1,2kN-120.035	
23	1	Hülse *sleeve*	3,5kN-120.070	
24	1	Druckfeder *compression spring*	08-120.080	
25	1	Filzscheibe *felt washer*	08-120.090	
26	1	Scheibe *washer*	08-120.100	
27	1	Schmierfilz *grease felt*	08-120.110	
28	1	Scheibe *washer*	08-120.120	
29	1	Deckel *cover*	3,5kN-130.010-1A	
31	1	Schaltstange kpl. *switch rod compl.*	1,2kN-140.010	
34	2	Schaltertraverse *switch traverse*	500N-150.020	
35	1	Führungsschraube *guide screw*	3,5kN-140.020	
36	1	Montageblech (ohne Schalter/Klemmen) *assembly plate*	1,2kN-150.010-1	
38	3	Distanzrohr *spacer*	1,2kN-150.035	
39	1	Motorritzel *motor pinion*	3,5kN-160.030	
40 oder	1 1	Haube, kurz (128,5) *hood, short* Haube, lang (168) *hood, long*	1,2kN-170.010-1A 1,2kN-170.010-1B	
41	2	Haubenbolzen	D10-100.04	

Pos. Nr. *item-no.*	Stück *req. qty*	Benennung *designation*	Zeichnungs-Nr. *order-no.*	Norm *norm*
		hood bolt		
42	1	Zahnrad *gear wheel*	1,2kN-180.040	
43	1	Welle *shaft*	1,2kN-180.020	
45	1	Motorflansch *motor flange*	3,5kN-160.020	
47	1	Ausrückstange kpl. *disengaging rod compl.*	1,2kN-180.051-1	
49	1	Filzscheibe *felt washer*	08-130.030	
50	2	Schaltblech *switch plate*	1,2kN-140.030	
51	1	Distanzscheibe *distance washer*	1,2kN-140.040	
52	1	Bezeichnungsschild *designation plate*	1,2kN-150.040	
57	1	Schubstange kpl. *driving rod compl.*	1,2kN-200.010-1A	
58	2	Paßfeder *fitting key*	A5x5x10	DIN 6885
63	1	Bremsplatte *brake plate*	3,5kN-160.050	
64	4	Druckfeder *compression spring*	3,5kN-160.055	
67	1	Buchse (f. Bremsscheibe) *bushing*	3,5kN-160.060	
68	1	Bremsscheibe *brake disk*	3,5kN-160.070	
69	1	Bezeichnungsschild f. WE *designation plate*	1,2kN-150.050-1	
75	1	Druckblech *pressure plate*	1,2kN-180.060-1	
80	1	Buchse *bushing*	28H-180.100-1	
81	1	Hebel *lever*	28H-180.110-1	
82	1	Feder *spring*	1,2kN-180.120-1	
83	1	Gewindebuchse *threaded bush*	1,2kN-180.130-1	
84	1	Sechskantmutter *hexagon nut*	M6 (flach)	DIN 439
100	1	Druckfeder *compression spring*	1,2kN-180.055	
103	1	Profilschnurring *profile string ring*	1,2kN rd. 142,6	
105	1	Abstreifer *wiper ring*	14x22x7	
107	1	Kondensator (f. Mot. 230 V, 1350 U/min) *capacitor (f. mot. 230V, 1350 U/min)*	2 µF/400 V~	
oder	1	Kondensator (f. Mot. 230 V, 2700 U/min) *capacitor (f. mot. 230V, 2700 U/min)*	3 µF/400 V~	
108	1	Lüsterklemme, 12-polig *terminal strip, 12 way*	Art.Nr. 1606-DS	
109	1	Motor 230 V-50 Hz, 1350 U/min *motor 230V-50 Hz, 1350 U/min*	EE 14/81 S	

Ersatzteilliste für Schubantrieb

4,5 kN/A

spare parts list for linear actuator

Pos. Nr. *item-no.*	Stück *req. qty*	Benennung *designation*	Zeichnungs-Nr. *order-no.*	Norm *norm*
oder	1	Motor 230 V-50 Hz, 2700 U/min *motor 230V-50 Hz, 2700 U/min*	EE 12/81 S	
oder	1	Motor 220 V-60 Hz, 1620 U/min *motor 220V-60 Hz, 1620 U/min*	EE 14/81 S	
oder	1	Motor 220 V-60 Hz, 3240 U/min *motor 220V-60 Hz, 3240 U/min*	EE 12/81 S	
110	2	Dichtscheibe *sealing washer*	08-170.030	
111	1	O-Ring *o-ring*	5,6 x 1,9	
112	2	Mikroschalter (DE) *torque switch*	VCSJ-ML	
oder	2	Schmersal-Schalter Schmersal-*switch*	M6800-11-2-8-V	
114	1	Schalt- u. Meldeeinrichtung kpl.: *switching and signalling unit compl.*	1,2kN-400.000	
114.1	+	Mikroschalter m. Rollenhebel (WE) *torque switch*	V5C010SB1DX115	
114.2	+	Potentiometer *potentiometer*	T 18	
122	2	Rillenkugellager *deep groove ball bearing*	6004.RS	DIN 625
127	1	Hutmutter *cap nut*	M6	DIN 917
132	4	Tellerfeder *cap spring*	40x20,4x2	
133	2	Zwischenscheibe *intermediate washer*	40-120.018	
138	4	ISK-Schraube *hexagon socket screw*	M6 x 25	DIN 912
200	1	Handrad kpl. *hand wheel compl.*	40-180.030/E	
207	1	Sechskantmutter, selbstsichernd *hexagon nut, self-locking*	M6	DIN 985
262	1	Betätigungsstange *operating rod*	28H-400.080	