



EC DECLARATION OF CONFORMITY

Original declaration as defined by EC machinery directive 2006/42/EC, Appendix II A

ARBURG GmbH + Co KG; Arthur-Hehl-Strasse 1, D-72290 Lossburg

Plastic injection moulding machine: **370 A 600 - 170**
Machine number: 248049
Year of construction: 02/2019

The machine of our manufacture complies, with regard to its concept and construction and in the execution marketed by ARBURG, to the following EC directives:

Machines 2006/42/EC
Electro-magnetic compatibility 2014/30/EU

The following harmonised norms were applied, inter alia, in the manufacture of the machine:

EN 201: 2009 Plastics and rubber machines – Injection moulding machines – Safety requirements
EN ISO 12100: 2010 Safety of machinery – General principles for design – Risk assessment and risk reduction
EN 60204-1: 2006/A1:2009 Safety of machinery – Electrical equipment of machines – Part 1: General requirements
EN 61000-6-2: 2005 Electrotechnical compatibility (EMC) – Part 6-2: Generic standards – Immunity standards for industrial environments
EN 61000-6-3: 2007/A1:2011 Electrotechnical compatibility (EMC) – Part 6-3: Generic standards – Emission standards for residential commercial and light-industrial environments

Furthermore the following national technical specifications were applied, inter alia:

DGUV Regulation 100-500

Documentation, provision of technical documents in accordance with Appendix VII A (for address, see address of manufacturer):

ARBURG GmbH + Co KG, Technical Documentation

European notified body (ID no. 0393) for EC type examination in accordance with Appendix IX:

DGUV Test, Prüf- und Zertifizierungsstelle Hebezeuge, Sicherheitskomponenten und Maschinen (HSM); Fachbereich Holz und Metall; Kreuzstraße 45; D-40210 Düsseldorf

EC type examination certification No.: HSM 17014

ARBURG confirms that all machines of this model produced for sale on the market are equipped with the same safety-relevant equipment as the approved machine.

Any changes made to the machine will invalidate the CE certification and the EC declaration of conformity.

Losburg, 14.02.2019

Managing Director
Technology & Engineering
Heinz Gaub

Signature

Managing Director
Sales
Gerhard Böhm

Signature



EG-KONFORMITÄTSERKLÄRUNG

Originalerklärung im Sinne der EG-Richtlinie Maschinen 2006/42/EG, Anhang II A

ARBURG GmbH + Co KG; Arthur-Hehl-Straße 1, D-72290 Loßburg

Kunststoff-Spritzgießmaschine: **370 A 600 - 170**
Maschinennummer: 248049
Baujahr: 02/2019

Die von uns hergestellte Maschine entspricht aufgrund ihrer Konzeption und Bauart sowie in der von ARBURG in Verkehr gebrachten Ausführung folgenden EG-Richtlinien:

Maschinen 2006/42/EG
Elektromagnetische Verträglichkeit 2014/30/EU

Bei der Herstellung der Maschine wurden insbesondere folgende harmonisierte Normen angewendet:

EN 201: 2009 Plastics and rubber machines – Injection moulding machines – Safety requirements
EN ISO 12100: 2010 Safety of machinery – General principles for design – Risk assessment and risk reduction
EN 60204-1: 2006/A1:2009 Safety of machinery – Electrical equipment of machines – Part 1: General requirements
EN 61000-6-2: 2005 Electrotechnical compatibility (EMC) – Part 6-2: Generic standards – Immunity standards for industrial environments
EN 61000-6-3: 2007/A1:2011 Electrotechnical compatibility (EMC) – Part 6-3: Generic standards – Emission standards for residential commercial and light-industrial environments

Des Weiteren wurden insbesondere folgende nationale technische Spezifikationen angewendet:

DGUV Regel 100-500

Dokumentation, Bereitstellung der technischen Unterlagen lt. Anhang VII A, (Adresse, siehe Herstelleranschrift):

ARBURG GmbH + Co KG, Technische Dokumentation

Europäisch notifizierte Stelle (Kenn-Nummer 0393) zur EG-Baumusterprüfung nach Anhang IX:

DGUV Test, Prüf- und Zertifizierungsstelle Hebezeuge, Sicherheitskomponenten und Maschinen (HSM); Fachbereich Holz und Metall; Kreuzstraße 45; D-40210 Düsseldorf

EG-Baumusterprüfbescheinigung Nr.: **HSM 17014**

ARBURG bestätigt, die sicherheitstechnische Gleichwertigkeit der in Verkehr gebrachten Maschine mit der geprüften Maschine.

Die CE-Kennzeichnung und die EG-Konformitätserklärung verliert bei einer Änderung der Maschine ihre Gültigkeit.

Loßburg, den 14.02.2019

Geschäftsführer Technik
Heinz Gaub

Unterschrift

Geschäftsführer Vertrieb
Gerhard Böhm

Unterschrift

Date : 14.02.2019
Printer

MACHINE CONFIGURATION

Mach.No

248049

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Montageauftrag NaN

Änderungsnr: 0000

Technical state 01.02.2019

Tension (SP00) 400 V / 50 Hz mit N
Wiring diagram

Typ:

Baureihe: A-Baureihe

Material	Qty	Description
MAV_MASCHINE	1 ST	Machine (Technic)
36	1 ST	=====
163166	1 ST	== Machine base =====
389847	1 ST	
364402	1 ST	Machine base, preassembled
311769	1 ST	Kit, add. parts machine base
291089	1 ST	Kit, machine footpad
364377	1 ST	Kit, guide rail L=1320
368351	1 ST	Kit, stroke measurement 625+325
362006	1 ST	Oil tank, preassembled 40L
315468	1 ST	Kit, control cabinet fixture
319174	1 ST	Cable duct preassem.
385907	1 ST	Profile 7 L=45
382487	1 ST	Mounting bracket 652x163
37	1 ST	=====
163176	1 ST	== Labels =====
323920	1 ST	Label
263071	1 ST	Label
247738	1 ST	Label
230620	2 ST	Label
231269	1 ST	Set of labels
314424	1 ST	Label
143577	1 ST	Label
377031	1 ST	
169764	1 ST	Label
262817	1 ST	Label
369660	1 ST	Kit, labels safety EN
378797	1 ST	
379434	1 ST	
176379	1 ST	Pad, foam - control cabinet 750x250
38	1 ST	=====
163177	1 ST	== Cooling water distributor =====
105663	1 ST	Label FLOWMATIC
297832	1 ST	Cooling water manifold
293920	1 ST	Cooling water manifold - circuit
293921	1 ST	Cooling water manifold - circuit
293996	4 ST	Cooling water circuit
282418	1 ST	Kit, holder for cooling water manifold
347440	1 ST	Cooling water manifold - circuit
294473	1 ST	Cooling water manifold raster
130256	4 ST	Connector, blue 13 D=14,7-F L=70
130257	4 ST	Connector, red 13 D=14,7-F L=70
125325	1 ST	Temperature sensor L=6000
369450	1 ST	Temperature control device
359779	1 ST	
365515	1 ST	Circulation pump for cooling water



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Tension (SP00) 400 V / 50 Hz mit N
Wiring diagram

Typ:

Baureihe: A-Baureihe

Material	Qty	Description
347587	1 ST	Temperature sensor L=3800
328709	2 ST	Pipe manifold, 5 temperat. control circ.
39	1 ST	=====
163174	1 ST	== Drive pump/motor =====
339831	1 ST	Servo motor
319249	1 ST	Hydraulic pump
40	1 ST	=====
163172	1 ST	== Hydraulics =====
334760	1 ST	Control manifold, ejector
311797	1 ST	Control manifold, axis module core pull
304044	1 ST	Label, axis module for core pull 1
12272	4 ST	Socket head screw M10x70
41	1 ST	=====
163178	1 ST	== Hydr. hoses/pipes =====
252153	1 ST	Kit, hydr.hoses
369335	1 ST	Kit, temperature control hoses
358941	1 ST	Kit, cooling water hoses
313962	1 ST	Kit, hydraulic hoses
309530	1 ST	Connection, core pull 1
383282	1 ST	Oil collection pan 116x100
329	2 ST	Hex nut M6
43650	2 ST	coupling M16x1,5
320163	1 ST	Connection, hydr. ejector
42	1 ST	=====
163168	1 ST	== Clamping unit =====
364387	1 ST	Clamping unit
293873	4 ST	Toggle AA 120,2 D=30
326953	8 ST	Toggle AA202
326950	4 ST	Toggle AA295
341217	4 ST	Tie bar D=50 L=1651
364379	1 ST	Drive plate set
285155	1 ST	Mould platen set
367727	1 ST	Electr. drive unit
277383	1 ST	Servo motor
364385	1 ST	Mould height adjustment system
368310	1 ST	Additional part, mould height adjustment
285255	1 ST	Kit, oil collection pan
341064	1 ST	Kit, cover panel
310858	1 ST	Hydr. ejector
341079	1 ST	Ejector coupling
368336	1 ST	Kit, stroke measurement 125
110836	1 ST	Coupling element 24 L=55
364444	1 ST	Central lubricat.system 25x dosing unit
341737	1 ST	Lubrication, mould height adjustment
268496	1 ST	Label
364311	1 ST	Lubrication, guide clamping unit

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 Baureihe: A-Baureihe

Tension (SP00) 400 V / 50 Hz mit N
 Wiring diagram

Material	Qty	Description
270761	1 ST	Kit, lubricating unit 1,8L
236568	1 ST	Mount, compl. D=38,1
320162	1 ST	Kit, energy conveyor chain
43	1 ST	=====
163175	1 ST	== Protection f.clamping unit =====
296353	1 ST	Safety guard, compl.
296367	1 ST	Additional parts, protection
301057	1 ST	Additional parts, protection
285261	1 ST	Additional parts, protection
285258	1 ST	Guard 910x737
296339	1 ST	Panel, transparent 705x655
296339	1 ST	Panel, transparent 705x655
44	1 ST	=====
163169	1 ST	== Injection unit == =====
282973	1 ST	Injection unit 170
285855	1 ST	Additional parts, nozzle movements
345863	1 ST	Kit, injection sensor
369492	1 ST	Kit, servo motor
367090	1 ST	Kit, stroke measurement 400
283042	1 ST	Kit, cooling + lubrication
324342	1 ST	Coupling f.plasticizing screw 17 D=24,85
279605	1 ST	Mounting injection unit
343830	1 ST	Add. parts, support base injection unit
279604	1 ST	Kit, swivel table
340882	1 ST	Kit, add. parts for injection unit
280292	1 ST	Tie-bar cover
257447	1 ST	Actuation element
291191	1 ST	Cover for injection unit
354857	1 ST	Additional parts, protection IU
296221	1 ST	Bracket 304x173 L=1056
246718	1 ST	Kit, cable/hose fixture
103307	1 ST	Feed hopper 50 L
45	1 ST	=====
163170	1 ST	== Plasticizing =====
230246	1 ST	Thermoplastic cylinder module D=30
231057	1 ST	Plug connector, 4 P+E L=500
9412	2 ST	Sheet metal screw M2.9x6.5
136086	1 ST	Label
192706	1 ST	Open nozzle 30 L=113
37645	1 ST	Nozzle tip 20 D=17 M24x1,5
259138	1 ST	Nozzle heater band 600W D=50
46	1 ST	=====
163183	1 ST	== Mould =====
183067	1 ST	Set of tools
366770	1 ST	Tool set
524638	1 ST	Socket wrench 24

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Tension (SP00) 400 V / 50 Hz mit N

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Wiring diagram

Baureihe: A-Baureihe

Material	Qty	Description
190535	1 ST	Tool set for injection unit 250/290
4161	1 ST	Cleaning brush for cylinder D=30
58131	1 ST	Handle for cleaning brush L=1100
55302	1 ST	Key for guide bolt 30
333377	1 ST	Paste Molykote cartridge 400gr.
347099	1 ST	Fat lever press
48	1 ST	=====
163173	1 ST	== Accessories-options =====
303551	1 ST	Pneum. pressure regulator
306877	1 ST	Kit, add. parts maintenance unit
306854	1 ST	Additional part, pneumatic valve
303555	1 ST	Pneum. 3/2 way directional valve
306820	1 ST	Add. part, pneumatic valve
302991	4 ST	Socket head screw M8x20
304656	1 ST	Securing plate 36x24 L=377
305964	1 ST	Machine transport devices 4600kg
20	1 ST	=====
156162	1 ST	== Contr.cabinet,str.current =====
382431	1 ST	Housing 800x400
223637	1 ST	Kit, housing, preassemb. 800x400x330
241082	2 ST	Rubber ring D=50
241082	1 ST	Rubber ring D=50
203672	2 ST	Cable guide 90° M40
196527	1 ST	Screwed plug M40x1,5
964	8 ST	Socket head screw M6x16
50429	1 ST	Closure for bore D=6,4
2156	2 ST	Socket head screw M4x12
1316	2 ST	Hex nut M4
4672	2 ST	Locking washer D=4,3/8
322186	1 ST	Mounting panel, high voltage
145654	1 ST	Label
195241	1 ST	Main switch 8P 80A
45403	4 ST	Sheet metal screw M4,8x11
71739	3 ST	Sheet metal screw M3.9x9.5
71739	2 ST	Sheet metal screw M3.9x9.5
71739	4 ST	Sheet metal screw M3.9x9.5
71739	4 ST	Sheet metal screw M3.9x9.5
71739	6 ST	Sheet metal screw M3.9x9.5
4072	1 M	Cable 1x0,5
4095	1 M	Cable 1x1,5
4072	1 M	Cable 1x0,5
4077	3 M	Cable 1x1
210598	1 M	Cable 1x1,5
4091	1 M	Cable 1x1,5
4096	1 M	Cable 1x1,5
4077	1 M	Cable 1x1

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Tension (SP00) 400 V / 50 Hz mit N
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Material	Qty	Description
36604	1 M	Cable 1x5,26
210598	3 M	Cable 1x1,5
4095	1 M	Cable 1x1,5
372047	1 ST	Contactor AC/DC 100-250V
372047	1 ST	Contactor AC/DC 100-250V
196435	1 ST	Connection M40x1,5
196435	1 ST	Connection M40x1,5
366591	1 ST	Motor starter 1,6-7A
184949	1 ST	Circuit breaker 6A
202762	1 ST	Connection M16x1,5
356218	1 ST	Transformer, 3 phase 2600VA
174828	1 ST	Transformer circuit breaker 4-6,3
322161	1 ST	Contactor 24V
150369	1 ST	P/C board, relay board ARB665
120689	1 ST	Plug-in board block 48P
64789	2 ST	Sheet metal screw M3, 9x19
214357	1 ST	Fan compl. 230V
303705	1 ST	Power supply unit 100-240VAC/24VDC
169103	1 ST	Kit, sockets
331714	1 ST	Contactor 230V 50/60Hz
331714	1 ST	Contactor 230V 50/60Hz
258996	1 ST	Plug socket housing 400V
219758	1 ST	Reduction M25-M20x1,5
299546	1 ST	Label
258996	1 ST	Plug socket housing 400V
219758	1 ST	Reduction M25-M20x1,5
299546	1 ST	Label
297332	1 ST	Plug connector 6P+E L=3800
167361	1 ST	Circuit breaker 16A
167361	1 ST	Circuit breaker 16A
255841	1 ST	Cable 5G2,5 L=5400
255841	1 ST	Cable 5G2,5 L=5400
233	2 ST	Socket head screw M5x10
380157	1 ST	
117272	1 ST	Busbar, 3-phase L=285
99088	1 ST	Busbar, 3-phase L=89
101345	1 ST	Busbar, 3-phase L=107
371032	1 ST	
158977	1 ST	Kit,nozzle heater band and
253307	1 ST	Label
167359	5 ST	Circuit breaker 10A
266724	1 ST	Cable support
37954	3 ST	Sleeve 6,3-2,5
99441	6 ST	Wire end clip 1,34-2,5
306379	1 ST	Kit, housing, preassemb. 800x800x330
- 306158	1 ST	Fan compl. 230V

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Tension (SP00) 400 V / 50 Hz mit N
Wiring diagram

Typ:

Baureihe: A-Baureihe

Material	Qty	Description
+ 229585	1 ST	Fan compl. 230V
277084	1 ST	Cable 4G0,5 L=2000
276738	1 ST	Cooling element 735x320x25
386389	1 ST	Cover panel 180x70
207	1 ST	Socket head screw M8x16
385732	1 ST	Housing 800x800
181851	1 ST	Circuit breaker 25A
177097	1 ST	Circuit breaker 10A
117427	3 ST	Lug D=6,5 10-20
117427	2 ST	Lug D=6,5 10-20
117427	2 ST	Lug D=6,5 10-20
117427	1 ST	Lug D=6,5 10-20
385144	1 ST	Cover panel 182x88
117427	2 ST	Lug D=6,5 10-20
207633	1 ST	Female multipole connector 2P
117427	1 ST	Lug D=6,5 10-20
95869	4 ST	Cage nut M6
313133	1 ST	Brake resistance 30 OHM/150W
284640	1 ST	Plug connector 5P L=3000/500
12208	1 ST	Socket head screw M6x8
12208	1 ST	Socket head screw M6x8
584	2 ST	Socket head screw M6x12
241079	1 ST	Rubber ring D=32
385607	1 ST	Profile 272 L=257
115469	2 ST	Flat head screw M6x12
241079	3 ST	Rubber ring D=32
130532	5 M	Cable 1x8,35
101359	2 M	Cable 1x16
33717	2 ST	Lug, ring D=8,5 10-20
98822	1 ST	Fan 230V 50/60Hz
72187	3 ST	Screw, torx head 5x18
297119	2 ST	Terminal 2,5mm
120886	1 ST	Cover plate 2,5
276399	1 ST	Frequency convertor
166	2 ST	Socket head screw M6x20
99213	1 ST	Socket head screw M6x12
1416	1 ST	Disc D=6,4/12
62566	1 ST	Locking washer DI=6,4 DA=11 S=0,7
207651	2 ST	Female connector 2P G 1R
30582	1 ST	Label
276399	1 ST	Frequency convertor
166	2 ST	Socket head screw M6x20
99213	1 ST	Socket head screw M6x12
1416	1 ST	Disc D=6,4/12
62566	1 ST	Locking washer DI=6,4 DA=11 S=0,7
207651	2 ST	Female connector 2P G 1R

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 Baureihe: A-Baureihe

Tension (SP00) 400 V / 50 Hz mit N
 Wiring diagram

Material	Qty	Description
30582	1 ST	Label
276400	1 ST	Frequency convertor
166	4 ST	Socket head screw M6x20
33717	1 ST	Lug, ring D=8,5 10-20
99213	1 ST	Socket head screw M6x12
1416	1 ST	Disc D=6,4/12
62566	1 ST	Locking washer DI=6,4 DA=11 S=0,7
207651	2 ST	Female connector 2P G 1R
30582	1 ST	Label
276398	1 ST	Frequency convertor
166	2 ST	Socket head screw M6x20
99213	1 ST	Socket head screw M6x12
1416	1 ST	Disc D=6,4/12
62566	1 ST	Locking washer DI=6,4 DA=11 S=0,7
207651	2 ST	Female connector 2P G 1R
30582	1 ST	Label
307987	1 ST	Frequency convertor
166	2 ST	Socket head screw M6x20
1416	1 ST	Disc D=6,4/12
62566	1 ST	Locking washer DI=6,4 DA=11 S=0,7
99213	1 ST	Socket head screw M6x12
107044	1 M	Cable 1x25
4080	2 M	Cable 1x1
248918	1 ST	Choke coil 36
99213	4 ST	Socket head screw M6x12
1416	4 ST	Disc D=6,4/12
30582	1 ST	Label
4080	1 M	Cable 1x1
4080	1 M	Cable 1x1
36603	1 M	Cable 1x13,29
584	4 ST	Socket head screw M6x12
196184	3 ST	Connection M32x1,5
193053	3 ST	Hex nut M32
193054	1 ST	Hex nut M40
263268	1 ST	Cable 4G6+2x0,5 L=5800
247939	1 ST	Plug connector 15/12P L=5400
186932	1 ST	Cable screen clip D=21
186932	1 ST	Cable screen clip D=21
196184	1 ST	Connection M32x1,5
203503	1 ST	Reduction M40-M32x1,5
299701	1 ST	Cable 4G 6+2 L=4600
256784	1 ST	Cable screen clip D=21
180173	1 ST	Clamp D=29 39X20 M25
196184	1 ST	Connection M32x1,5
203503	1 ST	Reduction M40-M32x1,5
276586	1 ST	Cable 4G16+2 L=3400

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Tension (SP00) 400 V / 50 Hz mit N
 Wiring diagram

Material	Qty	Description
221026	1 ST	Cable screen clip D=36
70651	1 ST	Cable clip D=34,5 46x20 M32
193053	1 ST	Hex nut M32
297790	1 ST	Plug connector, frequency encoder
180173	1 ST	Clamp D=29 39X20 M25
322287	1 ST	
272529	1 ST	Plug connector 15/12P L=3000
186932	1 ST	Cable screen clip D=21
306891	1 ST	Cable 2x0,5 L=2200
277110	1 ST	Cable 4G0,5 L=1400
277110	1 ST	Cable 4G0,5 L=1400
242416	1 ST	Plug connector 2P L=2200
269229	1 ST	Plug connector 2P L=2600
201528	2 ST	Plug connector 4P L=2400
207694	2 ST	Plug connector 4P L=2800
242427	2 ST	Plug connector 4P L=2200
248222	1 ST	Plug connector 4P L=3000
291829	1 ST	Plug connector 4P L=2600
291860	2 ST	Plug connector 4/4P L=190
291859	1 ST	Plug connector 4/4P L=400
300515	2 ST	Plug connector 4/4P L=3000
292976	2 ST	Plug connector 4/4P L=1800
295952	1 ST	Plug connector 6P L=2200
295951	1 ST	Plug connector 6P L=2600
326437	1 ST	Plug connector 6/3P L=300
293540	1 ST	Plug connector 6/3P L=300
291860	1 ST	Plug connector 4/4P L=190
292717	1 ST	Cooling water hose D=10 L=1200
371120	1 ST	Label
263067	1 ST	Serial label
1	1 ST	-----
381730	1 ST	Mounting bracket 167x138
196184	1 ST	Connection M32x1,5
203503	1 ST	Reduction M40-M32x1,5
21	1 ST	=====
156163	1 ST	= Control cabinet, low current =====
357863	1 ST	Kit, housing, preassemb. 800x400x330
383574	1 ST	Housing 800x400
381739	1 ST	Door, left, cpl. 792x392
280658	1 ST	Sealing plate, polyester 520x190x50
280659	2 ST	Sealing plate, polyester 340x190x50
194800	1 ST	Fan compl. 24V
258076	1 ST	Limit switch L=2800
234418	1 ST	Compact flash card, type I
240844	1 ST	Label
234418	1 ST	Compact flash card, type I

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 Baureihe: A-Baureihe

Tension (SP00) 400 V / 50 Hz mit N
Wiring diagram

Material	Qty	Description
260220	1 ST	Plug connector, emergency-stop circuit
237676	5 ST	Transponder card
241354	1 ST	Transponder card
319237	1 ST	USB-HUB 5 ports
254321	1 ST	Plug connector 8/8P L=600
147440	1 ST	Plug connector 50/50P L=1100
226753	1 ST	Limit switch L=3800
291828	1 ST	Limit switch L=3800
244089	1 ST	Actuation element
211909	2 ST	Flat head screw M5x10
244121	1 ST	Spacer 40x30x15
226066	1 ST	Limit switch L=3400
267006	1 ST	Limit switch L=2800
244089	1 ST	Actuation element
211909	2 ST	Flat head screw M5x10
244121	1 ST	Spacer 40x30x15
165203	1 ST	Plug connector 3P+E L=2400
205303	1 ST	Cable 2x0,5 L=2600
205303	1 ST	Cable 2x0,5 L=2600
218094	1 ST	Expansion measuring system M10x1
345971	1 ST	Amplifier
60302	4 ST	Flat head screw M6x6
22	1 ST	=====
156167	1 ST	==== Monitor =====
310256	1 ST	Monitor housing front LCD
236590	1 ST	Monitor housing
257602	1 ST	Error indicator, solid light
255054	1 ST	Solid light, green
259168	1 ST	Plug connector, monitor L=250
377686	1 ST	Closure for bore
378221	1 ST	
197090	1 ST	Plug connector 50/50P L=200
198956	4 ST	Insert strip 86x16
378221	1 ST	
197107	1 ST	Plug connector 50/50P L=155
198956	4 ST	Insert strip 86x16
255046	1 ST	Buzzer
254627	1 ST	Flash light, red
23	1 ST	=====
156164	1 ST	==== High performance unit 1 =====
293095	1 ST	Housing, compl. IP-V
126211	1 ST	Plug connector 64/14+14P L=1300
226930	1 ST	Printed circuit board
116761	1 ST	Printed circuit board
292607	1 ST	P/C board, relay board ARB 859
257018	1 ST	P/C board, relay board ARB818

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Material	Qty	Description
216339	1 ST	Printed circuit board ARB 809
305278	1 ST	P/C board, relay board ARB833
216339	1 ST	Printed circuit board ARB 809
132539	1 ST	Printed circuit board ARB 661
129193	1 ST	Printed circuit board
302699	1 ST	Printed circuit board ARB 854
119819	3 ST	Contact spring 0.6-1.5
154760	1 ST	Plug connector L=1200
143077	1 ST	Plug connector, power module
1206	18 ST	Flat head screw M2,5x10
147918	1 ST	Plug connector 64/30P L=1250
1206	2 ST	Flat head screw M2,5x10
290427	1 ST	Female connector 15P
24	1 ST	=====
156168	1 ST	== Controller rack =====
167128	1 ST	Housing, compl.
258878	1 ST	Power supply unit 160-280V
370835	1 ST	PCB diagnosis board ARB 816
188463	2 ST	Printed circuit board ARB 790
188463	1 ST	Printed circuit board ARB 790
188463	1 ST	Printed circuit board ARB 790
182790	1 ST	PCB, temperat.control board
119866	2 ST	Plug connector housing
119866	2 ST	Plug connector housing
119866	2 ST	Plug connector housing
310196	1 ST	P/C board, interface board
202406	1 ST	PCB, analog control board
351511	2 ST	PC board, CPU ARB 830
363809	1 ST	
361640	1 ST	
1	1 ST	-----
376805	1 ST	Software, SELOGICA 'direct' 05.40
376417	1 ST	
25	1 ST	=====
156166	1 ST	== Additional options =====
323711	1 ST	Plug connector 4/4P L=2600
273661	1 ST	Label
353907	1 ST	Plug connector L=2400
227493	1 ST	Label
156923	1 ST	Kit, colouring device
230301	1 ST	Plug connector, set, colouring device
190803	1 ST	Connection M20x1,5
190803	1 ST	Connection M20x1,5
161564	1 ST	Plug connector 7P L=3000
161565	1 ST	Plug connector 6P L=3000

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Material	Qty	Description
157047	1 ST	socket 7+6+4P
59163	1 ST	Bypass plug 4P
95993	1 ST	Label
12205	4 ST	Socket head screw M5x25
191296	1 ST	Plug connector 10P L=4600
313778	1 ST	Plug connector RJ45 8/4+2P L=5400
313772	1 ST	Plug connector RJ45 8/4+2P L=4600
181570	1 ST	Push button housing, emerg.stop L=3000
206305	1 ST	Cooling panel 324x236x4
326207	1 ST	Diode module 12~48V
28705	2 ST	Terminal clamp
211042	2 ST	Cable tie 200x4,6
294076	1 ST	Plug connector 15/9P L=5400
108700	4 ST	Bolt L=13
330048	1 ST	Protective socket cover 15P
119378	1 ST	Ring terminal 8,4 21,14 -26,65
274930	1 ST	Plug connector 2x4P L=2000
172097	1 ST	Circuit breaker 4A
156073	1 ST	Kit, additional signals
321	1 ST	Socket head screw M6x10
381717	1 ST	Console 152 L=200
321	2 ST	Socket head screw M6x10
277307	1 ST	Console, arched 184x50 L=200
69012	1 ST	Support rail L=60
235	10 ST	Sheet metal screw M2.9x9.5
235	8 ST	Sheet metal screw M2.9x9.5
123743	4 ST	Flat head screw M3x12
235	4 ST	Sheet metal screw M2.9x9.5
123743	4 ST	Flat head screw M3x12
235	8 ST	Sheet metal screw M2.9x9.5
123743	4 ST	Flat head screw M3x12
26	1 ST	===== ST-BG =====
156165	1 ST	== Standard assembly group ==
52671	1 ST	Female multipole connector 96P
92781	1 ST	Flat packing for plug
92781	2 ST	Flat packing for plug
92781	2 ST	Flat packing for plug
92781	3 ST	Flat packing for plug
92781	3 ST	Flat packing for plug
48453	1 ST	Female multipole connector 48P
257239	1 ST	Plug connector housing
257240	1 ST	Cover for plug connector housing
34177	2 ST	Sheet metal screw M2,2x9,5
257239	1 ST	Plug connector housing
257240	1 ST	Cover for plug connector housing
34177	2 ST	Sheet metal screw M2,2x9,5

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Material	Qty	Description
48453	1 ST	Female multipole connector 48P
119816	9 ST	Female multipole connector 48P
12843	25 ST	Cable tie 210x4,7
2142	1 ST	Cable tie 100x2,5
92781	1 ST	Flat packing for plug
92781	1 ST	Flat packing for plug
12843	1 ST	Cable tie 210x4,7
119816	2 ST	Female multipole connector 48P
119816	2 ST	Female multipole connector 48P
119816	2 ST	Female multipole connector 48P
127452	1 ST	Plug connector 2P+E L=5000
226142	1 ST	Plug connector 2P+E L=4200
218218	2 ST	Plug connector 2P+E L=2000
218218	2 ST	Plug connector 2P+E L=2000
218218	3 ST	Plug connector 2P+E L=2000
187497	1 ST	Plug connector 4P L=3000
218218	3 ST	Plug connector 2P+E L=2000
218219	3 ST	Plug connector 2P+E L=3800
303691	1 ST	Plug connector RJ45 8/4+2P L=3400
315910	1 ST	Plug connector 4/4P L=1600
218218	1 ST	Plug connector 2P+E L=2000
370025	1 ST	
371731	1 ST	
305288	1 ST	Plug connector RJ45 8/4+2P L=1800
313428	1 ST	Plug connector 2P+E L=5400
250806	1 ST	Plug connector 4P L=4600
168261	3 ST	Cable 2x0,5 L=3800
186017	1 ST	Thumbscrew M3x40 L=50
70433	1 ST	Thumbscrew M3x35 L=46,5
255397	1 ST	Plug connector L=400
237006	1 ST	Label
27	1 ST	===== ST-BG =====
156174	1 ST	==== Fixed function =====
162935	1 ST	Fixed function Q9150=0
174868	1 ST	Fixed function F9735=1
231207	1 ST	Fixed function F8367=1
303500	1 ST	Fixed function F-S VARANAUSF=1
313925	1 ST	Fixed function F90118=1
248737	1 ST	Control parameter index unit
182551	1 ST	Regulation parameter, screw rotation
328731	1 ST	
328738	1 ST	
260091	1 ST	Fixed function F8470=3
251250	1 ST	Fixed function F8109=1
336321	1 ST	Fixed function NVDAUSF=1
265666	1 ST	MJ control cabinet cooler tightness

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Material	Qty	Description
278161	1 ST	MJ visual inspection of cylinder module
265681	1 ST	MJ readjust machine alignment
265678	1 ST	MJ fill oil tank of central lubr. system
265723	1 ST	MJ central lubr. syst. visual check
265690	1 ST	MJ safety device
265691	1 ST	MJ clean, lubricate guide bars
265694	1 ST	MJ running survaces IU
265696	1 ST	MJ clean and lubricate tie-bars
192951	1 ST	Fixed function
260053	1 ST	Configurable safety circuit mould
305046	1 ST	Fixed function F8338=4
171495	1 ST	Fixed function 600
232723	1 ST	Fixed function F9267=23
260054	1 ST	Configurable safety circuit mould
170323	1 ST	Fixed function F9034=2
235671	1 ST	Fixed function
273154	1 ST	Fixed function F8406_2=1
273156	1 ST	Fixed function F8406_3=1
186512	1 ST	Fixed function F9830=2
221618	1 ST	Fixed function F8406=1
170677	1 ST	Fixed function F9617=1
221980	1 ST	Electric drive, dosage 2
296566	1 ST	Fixed function F90212=1
155115	1 ST	Fixed function F9016=1
161648	1 ST	Fixed function F9076=7
299096	1 ST	Fixed function F-S F96001=3
221560	1 ST	Fixed function F9600=1
299211	1 ST	Fixed function ROBAUSF=19
302760	1 ST	Assignment, distrib. board +H55
196980	1 ST	Data sheet / PC board 796
173652	1 ST	Fixed function T9210=450
237404	1 ST	Fixed function F9041=3
160330	1 ST	Fixed function F9869=1
157830	1 ST	Fixed function F9897=1
161658	1 ST	Fixed function F9033=4
156002	1 ST	Fixed function F9864=1
184791	1 ST	Fixed function F9954=4
156001	1 ST	Fixed function F9865=1
156000	1 ST	Fixed function F9867=1
156100	1 ST	Fixed function F9243=1
151803	1 ST	Fixed function F9233=1
180406	1 ST	Fixed function F9900=1
156004	1 ST	Fixed function F9868=1
158689	1 ST	Fixed function F9894=1
151800	1 ST	Fixed function F9213=1
156005	1 ST	Fixed function F9088=1

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 Wiring diagram

Material	Qty	Description
218988	1 ST	Fixed function F8495=1
151802	1 ST	Fixed function F9045=1
156009	1 ST	Fixed function F9028=1
151801	1 ST	Fixed function F9239=1
361862	1 ST	
211992	1 ST	Fixed function F9823=4
234058	1 ST	Fixed function F8330=1
211985	1 ST	Fixed function F8885=3
347485	1 ST	
347487	1 ST	
347488	1 ST	
347500	1 ST	
347501	1 ST	
208709	1 ST	Fixed function F8888=2
319334	1 ST	Control parameters + charact. curves
375153	1 ST	
224945	1 ST	Fixed function F8476=1
208105	1 ST	Fixed function F8594=1
332068	1 ST	MJ move mould height adjustm. system
323496	1 ST	MJ lubricate mould height adj.syst.
350582	1 ST	
217254	1 ST	Fixed function F8475=1
276915	1 ST	Fixed function Q9101=20
252506	1 ST	Fixed function P9100=0
305719	1 ST	Fixed function F-S F9006=6
326179	1 ST	Electr. drive ASH
346795	1 ST	
179914	1 ST	Fixed function F8609=1
211975	1 ST	Fixed function F9020=3
263435	1 ST	Fixed function F6993=1
305050	1 ST	Fixed function F7988=2
335029	1 ST	Fixed function F90216=1
269613	1 ST	MJ lubricate gear housing
265726	1 ST	MJ replace filter inj. unit
265727	1 ST	MJ change gear oil
375150	1 ST	
297584	1 ST	Electr. drive
375660	1 ST	
290424	1 ST	Control parameters + charact. curves
261971	1 ST	MJ drain off condense water
161665	1 ST	Fixed function F9035=2
184721	1 ST	Fixed function F9251=5
177801	1 ST	Fixed function F8751=1
184706	1 ST	Fixed function F8757=1
282219	1 ST	Fixed function F9252=11
177802	1 ST	Fixed function F8752=1

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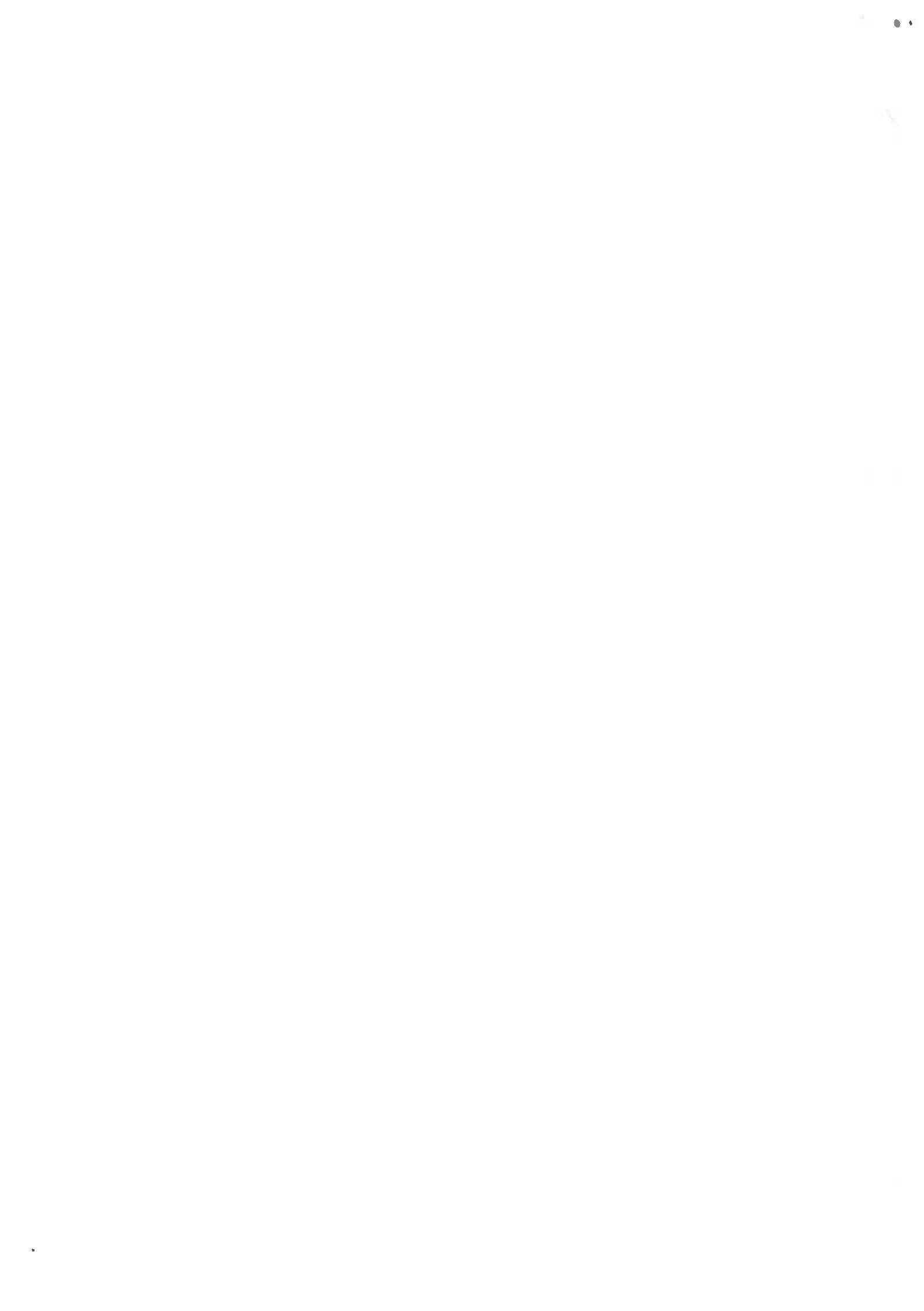
Material	Qty	Description
155112	1 ST	Fixed function F9019=1
235405	1 ST	D-ARB 816 DIAGNOSE-K.
242484	1 ST	Fixed function F9794=2
319239	1 ST	
190795	1 ST	Data sheet / PC board 790
202407	1 ST	Drawing "D-ARB798 adjustm.data"
310198	1 ST	Data sheet / PC board 875
234990	1 ST	Data sheet / PC board 775
170481	1 ST	Fixed function F9700=1
170483	1 ST	Fixed function F9701=1
156890	1 ST	Fixed function F9930=1
269743	1 ST	Fixed function F9750=6
269744	1 ST	Fixed function F9751=6
220827	1 ST	Fixed function F9980=4
335515	1 ST	
335520	1 ST	
335523	1 ST	
221951	1 ST	Fixed function
154233	1 ST	Fixed function F9730=1
170379	1 ST	Fixed function F8587=1
116752	1 ST	Partial plan 664 power bus
116741	1 ST	Partial plan 654 distributor
292613	1 ST	
257016	1 ST	
204178	1 ST	
257588	1 ST	
275252	1 ST	MJ hydr. oil particle meas.
286470	1 ST	Fixed function F9030=5
304186	1 ST	Fixed function F8600=4
260015	1 ST	Fixed function TEMP941=45
344281	1 ST	
343186	1 ST	Fixed function F86001=2
348576	1 ST	
265704	1 ST	MJ replace air filter in oil tank
265703	1 ST	MJ change hydraulic oil
265699	1 ST	MJ replace oil filter
265669	1 ST	MJ have hydr. oil checked in lab.
275252	1 ST	MJ hydr. oil particle meas.
265679	1 ST	MJ replace hose
265673	1 ST	MJ hydraulics: visual check f. leaks
265702	1 ST	MJ replace toothed ring in drive coupl.
199178	1 ST	
170516	1 ST	Fixed function F9272=1 H
170381	1 ST	Fixed function F8272=128
203274	1 ST	Fixed function F8991=2
360894	1 ST	

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Material	Qty	Description
226886	1 ST	Fixed function F9060=2
345954	1 ST	
314682	1 ST	Fixed function E8338=0.94
158974	1 ST	Fixed function F9042=6
170166	1 ST	Fixed function F9801=1
170195	1 ST	Fixed function F9801_F=1
170167	1 ST	Fixed function F9802=2
170197	1 ST	Fixed function F9802_F=1
170171	1 ST	Fixed function F9803=3
170199	1 ST	Fixed function F9803_F=1
170178	1 ST	Fixed function F9804=4
170201	1 ST	Fixed function F9804_F=1
154022	1 ST	Fixed function F9805=5
154023	1 ST	Fixed function F9805_F=1
158975	1 ST	Fixed function F9806=6
158976	1 ST	Fixed function F9806_F=1
206961	1 ST	Fixed function F9032=20
283854	1 ST	Fixed function F9058=7
274388	1 ST	Label
317112	1 ST	
374459	1 ST	
216340	1 ST	Data sheet / PC board 809
116748	1 ST	Part. plan 661 distrib. board
116742	1 ST	Partial plan 655 distributor
153940	1 ST	Fixed function F9702=1
269745	1 ST	Fixed function F9752=6
156699	1 ST	Fixed function F9703=1
269746	1 ST	Fixed function F9753=6
154796	1 ST	Fixed function F9705=1
269748	1 ST	Fixed function F9755=6
251000	1 ST	D-ARB 830 CPU-CELERON
234671	1 ST	Fixed function
170471	1 ST	Fixed function F9710=1
299039	1 ST	Fixed function F9760=16
170379	1 ST	Fixed function F8587=1
170335	1 ST	Fixed function F8586=1
182791	1 ST	Data sheet / PC board 777
170491	1 ST	Fixed function F9720=1
231958	1 ST	Fixed function F9770=8
229135	1 ST	Data sheet
395392	1 ST	
1	1 ST	- - - - - - - - - - - - - - - -
282218	1 ST	Fixed function F-S F8598=4
282539	1 ST	MJ decalcify temp. control medium
282540	1 ST	MJ Change temperature control medium
305403	1 ST	Floor plan 370 A/E/H/S



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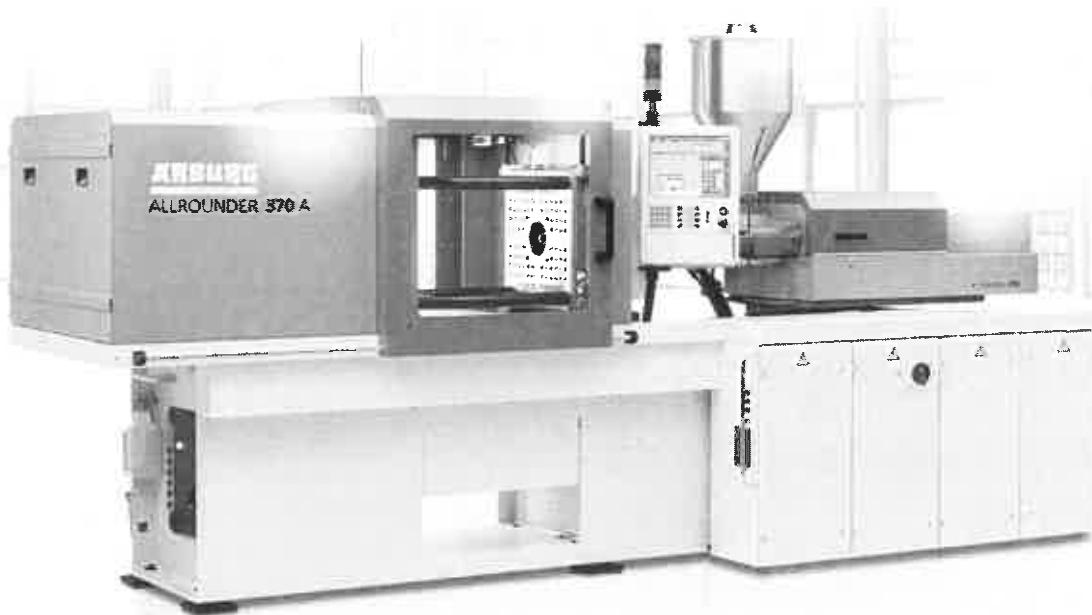
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Short operating manual for machine no. 248049

>>> Full version of operating manual on enclosed CD-ROM



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ARBURG

Preface

Short operating manual

The purpose of this short operating manual is to explain the most important procedures and operating steps which you need to know and observe when working with your machine.

Immediately after this preface you will find important information on safety and what you require in the way of personal protective clothing and equipment for your work on and with the machine.

Also included is information on machine transport, installation and power connections. The operating elements are explained as well as how to start up and shut down the machine. Following this you will find important information on maintenance. At the end of the manual you will find ARBURG locations of service centres and subsidiaries.

All further information, such as how to program the controller and operate the additional equipment, can be found on the enclosed documentation CD. The full version of the operating manual on the CD contains important information on the safe, efficient and economic operation of the machine. Observing this information helps to reduce repair costs and machine standstill times and to increase the reliability and service life of the machine.

The contents of the documentation CD must be made accessible to the operating personnel at all times. A suitable viewing device must also be available.

The full version of the operating manual complete with spare parts list is also available in printed form, as an option.

This short operating manual, as well as the full version of the operating manual on the documentation CD, is to be read and the contents applied by all persons assigned with the following work with or on the machine:

- ◆ transport,
- ◆ operation
 - including set-up, trouble-shooting in the course of operation, removal of production waste, cleaning, disposal of used operating and auxiliary materials,
- ◆ maintenance (service, inspections, repairs).

In addition to the operating instructions and mandatory rules and regulations for the prevention of accidents valid at the site and country where the machine is used, the generally recognised regulations for safe and correct operation particular to this field of technology are also to be observed.

Preface / Safety Instructions

Original operating manual



WARNING

Improper operation of the machine can lead to considerable personal injury and material damage!

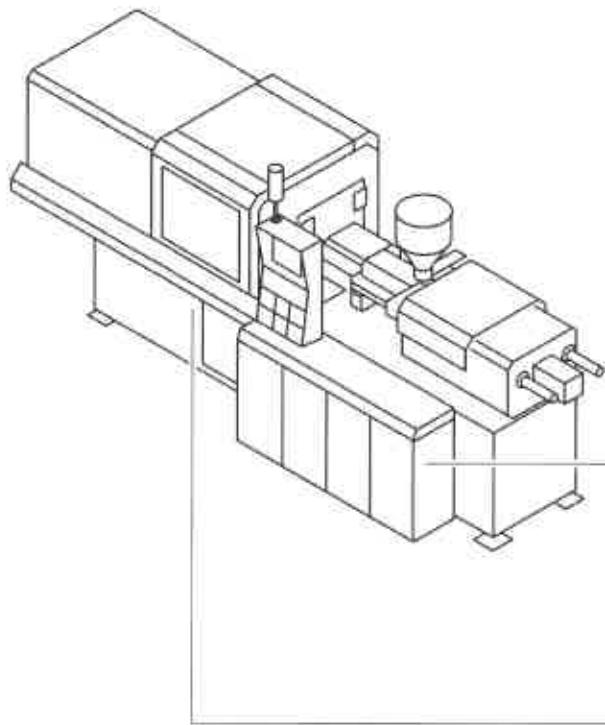
Before setting the machine into operation, read the operating manual thoroughly and familiarise yourself with the safety devices.

General information

Information labels/markings on the machine

Serial label and centre of gravity

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ALLROUNDER	
Maschinen Nr.	Serial No.
Baujahr	Manufactured
Betriebsspannung	Operating voltage
Steuerspannung	Control voltage
Steuerstrom	Control voltage
Nennstrom Motor-Heizung	Motor/heating rated current
Gesamtnennstrom	Total rated current
Gesamtanschluss	Total connected load
ARBURG	
420 A 1000 - 400	
207724	
02 / 2008	
400 V 3~ 50 Hz	
230 V ~ 50 Hz	
24 V=	
100 / 40 A	
140 A	
73 kW	
Made in Germany	ARBURG GmbH + Co KG Arthur - Hehl - Strasse 72290 Lossburg



Schwerpunkt ohne Ölfüllung	
Centre of gravity without hydraulic oil	
Maschinen Nr. Serial No. xxxxxx	Gewicht Weight xxxx kg / xxxx lbs

- 1 Machine serial label
- 2 Model
- 3 Machine no.
- 4 Certification symbol, e.g. CE
- 5 Centre of gravity without hydraulic oil (this position is variable)
- 6 Machine weight

Safety information

Warnings and symbols

In the operating manual the following symbols and warning signs are used to draw your attention to particularly important information:



DANGER

- Personal injury
- Imminent danger
- Fatal injury



WARNING

- Personal injury
- Potentially dangerous situation
- Can lead to major or fatal injuries



CAUTION

- Personal injury
- Less dangerous situation
- Minor injuries



NOTICE

- Material/property damage
- Situation in which damage can be caused
- Risk of damage to the machine and its environment

INFORMATION

- User tips and other important or useful information
- No risk of material damage or personal injury

Other symbols

In this operating manual the following three symbols are frequently used.

Symbol	Explanation
---------------	--------------------

- ◆ Enumeration: marks a list of items or information
- Action: prompts the operator to act
- Reaction: explains the reaction of the machine / controller to an action

Safety

During operation, injection moulding machines generate high pressures, forces and temperatures. This can present a danger to persons. In order to protect persons from accidents, ARBURG ALLROUNDERs are equipped with relevant safety devices.

**DANGER**

High voltage!

Contact with high voltage is dangerous and can lead to serious or fatal injury.

Before commencing any work in the high voltage area, the power must be shut off.

All work on the electric system must be carried out by specifically trained personnel only.

**WARNING**

Hot surface!

Contact with hot surfaces can cause serious burns.

Protective clothing and a face mask must always be worn when carrying out work in the vicinity of the plasticising unit.



WARNING

Hot plastic.

Hot molten plastic and pressurised gas in the injection unit can cause serious burns.

Danger areas:

- ◆ nozzle outlet,
- ◆ degassing outlet (on vented cylinders),
- ◆ feed opening.

Protective clothing and a face mask must be worn during all work carried out on the nozzle and plasticising cylinder.



DANGER

Danger of fatal injury.

No persons are permitted inside closed safety enclosures!

The robot system must not be set into operation as long as persons are still within the hazardous area of the robot or inside a safety enclosure.



DANGER

Danger of fatal injury from moving machine components and high pressure!

Do not reach into or enter the range of movement of the machine components during operation, under any circumstances.

Do not change, remove or deactivate any safety devices. Check the function of the safety devices before setting the system into operation.

If any of the safety devices are found to be defective:

- ◆ Stop machine operation and switch off the motor.
- ◆ Discontinue any work on the injection moulding machine.
- ◆ Report your findings immediately to the person responsible for the safety of the machine/system.
- ◆ The machine must not be set into operation again until the correct functioning of all safety equipment is guaranteed.

See "Inspecting the safety devices" in chapter 1.2.



WARNING

Danger of crushing injuries from moving machine parts.

Do not work or stand under moving machine components. This applies to all operating modes, even when the system is switched off. Make sure the moving machine components (e.g. axes of the robot system) have been brought to a safe position before commencing any work on the system.

NOTICE

Incorrect machine settings can cause damage.

When operating the machine, adapt the settings precisely to the interaction of machine, mould, material and peripheral equipment.

ARBURG accepts no responsibility for operating errors.

Additional safety information in the individual chapters of the operating manual is also to be observed.

**DANGER**

Improper maintenance can lead to fatal injuries!

Maintenance and repair work on the machine must be carried out by suitably trained and qualified service personnel only.

Service personnel must have comprehensive knowledge of the necessary safety precautions and the available operating elements.

The work described in the chapters on maintenance and the maintenance schedules must be adhered to.

In addition to this, the schedule for checking all safety equipment must be adhered to and punctually carried out in accordance with the safety regulations in the country of usage, as a safeguard against personal injury and material damage.

All further work on the machine, beyond that which is described in this manual, must be carried out by ARBURG Service technicians only.

Accident prevention

- ◆ Always wear suitable protective clothing when working on the system (safety shoes, safety gloves, face mask ...). Observe all regulations pertaining to the operational safety of injection moulding machines, which are applicable in your country.
- ◆ Always keep the entire system clean. This contributes to its correct functioning and increases the safety of the operating personnel.
- ◆ Do not remove any warning or information signs and labels from the machine or additional devices.
- ◆ If a climbing aid is required to fill the feed hopper of the material to be processed, use only climbing aids which comply with the safety regulations applicable in the country of use.
- ◆ Do not access or reach into the machine base and/or the opening for part removal during operation of the machine.
- ◆ Do not reach into the material feed inlet.
- ◆ Adhere to the processing directives and safety instructions of the material manufacturer.
- ◆ Suitable fume extraction equipment must be used when processing material types which are detrimental to health.
- ◆ Switch off the motors before commencing any work on the machine. Ensure that the entire hydraulic system is depressurised. Particular care must be taken with hydraulic accumulators!
- ◆ When working in the vicinity of heated machine parts such as the plasticising cylinder, injection mould etc., the following points must be observed:
 - The nozzle must be retracted from the mould. There must be no connection between the nozzle tip and the injection mould.
 - When removing cold plug-ups, hot melt can emerge from the mould under pressure. This can present a risk of burns.
- ◆ Do not use the surface area of the injection moulding machine as a worktop.
- ◆ Do not carry out any maintenance work during operation of the machine.
- ◆ Protect all hoses and cables from the harmful effects of acids and mechanical strain.
- ◆ Check all hoses and cables for their safe operational condition. If any leakages, damage or ruptures are detected, the machine/system must be switched off immediately.
- ◆ Before commencing any repair or conversion work, always disconnect the machine from the electrical supply. Switch off the main switch and secure it against re-switching on.
- ◆ Unauthorised persons are not permitted near the injection moulding machine.

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**General principles;
designated use of the freeformer**

- ◆ The machine is designed exclusively for the processing of injection-mouldable materials in accordance with the data provided by the material supplier.

Incorrect material processing can lead to personal injury or material damage. Using the machine for purposes other than those specified (so-called foreseeable misuse), e.g. using the machine as a press or for processing non-injection-mouldable materials or disassembling the machine and using the component parts for other purposes, is considered contrary to its designated use. ARBURG accepts no liability for any damage resulting thereof.

Operating the system within the limits of its designated use also involves observing the instructions specified in the operating manual and fulfilling the inspection and maintenance requirements.

- ◆ The machine has been built in accordance with state of the art standards and recognised safety regulations. Nevertheless, its use may constitute a risk to life and limb of the operator or third parties, or cause damage to the machine or to any other material property.
- ◆ The machine must only be used in technically perfect condition and in accordance with its designated use and the instructions set out in the operating manual, by persons who are aware of its potential dangers and familiar with the safety regulations. Any functional disorders, especially those affecting the safety of the machine, must be rectified immediately.

Organisational measures

- ◆ The operating manual and the brief guide(s) must always be at hand near the machine.
- ◆ In addition to the operating manual, the operator must observe all other generally applicable legal regulations relevant to accident prevention and environmental protection and instruct other persons involved accordingly. Such obligations also apply e.g. to the handling of hazardous substances and to the issuing and/or wearing of personal protective clothing and equipment.
- ◆ The operating manual must be supplemented by additional instructions from the employer, including supervisory and reporting duties, covering the company's particular facilities, e.g. in regard to work organisation, work procedures or the personnel entrusted with the work.
- ◆ Personnel entrusted with work on the machine must have read the operating manual and in particular the safety information before commencing work. Reading the information after work has begun is too late. This applies in particular to persons working only occasionally on the machine e.g. for set-up or maintenance work.
- ◆ Regular checks must be carried out to ensure that the personnel is carrying out the work in compliance with the operating manual and paying attention to the risks and safety factors involved.
- ◆ Protective clothing and equipment must be worn wherever required by the circumstances or by law. This applies in particular to the handling of hot injection moulding materials.
- ◆ Observe all safety instructions and warnings attached to the machine.
- ◆ Ensure that safety instructions and warnings attached to the machine are complete and perfectly legible.
- ◆ If safety-relevant changes are noticed on the machine or in its behaviour during operation, the machine must be stopped immediately and the malfunction reported to the competent authority/person.
- ◆ Never make modifications, additions or conversions to the machine which might affect its safety without ARBURG's written approval. This also applies to the installation and adjustment of safety devices and safety valves as well as to welding work on load-bearing elements.
- ◆ If modifications are undertaken on the machine, the EC declaration of conformity will cease to apply. The machine must not be set into operation in this state.
- ◆ If additional equipment approved by ARBURG is subsequently removed from the machine, the original safety devices must be reinstalled.
- ◆ Spare parts must comply with the technical requirements specified by ARBURG. This is always guaranteed with genuine spare parts.

- ◆ Do not carry out program changes (software) to the programmable control systems, unless this is specifically permitted!
- ◆ Replace hydraulic hose assemblies within stipulated and appropriate intervals even if no safety-relevant defects are apparent.
- ◆ The deadlines for routine checks and inspections specified in the operating manual must be met.
- ◆ For the execution of maintenance work, it is essential to use only workshop equipment especially adapted to the task on hand.
- ◆ Screws and nuts which have been sealed with red sealing lacquer must not be readjusted or removed. The adjustment or safety-relevant function would no longer be guaranteed.
- ◆ For the refilling of raw materials and all other overhead work on the machine, a suitable climbing aid is necessary, e.g. platform lift, safe ladder.

Selection and qualification of personnel; fundamental responsibilities

- ◆ All work on the machine must be carried out by reliable personnel only.
- ◆ Engage only trained or instructed staff and clearly define their individual responsibilities for operation, set-up, maintenance and repair work.
- ◆ Do not allow persons under training/instruction or persons taking part in a general training course to work on or with the machine/system without permanent supervision by an experienced person.
- ◆ Work on electrical equipment of the machine must only be carried out by a qualified electrician, or by instructed persons under the supervision and guidance of a qualified electrician, and in accordance with electrical engineering rules and regulations.
- ◆ Work on gas-engineered equipment (pressure accumulators) is to be carried out by specifically trained personnel only.
- ◆ Work on hydraulic and pneumatic equipment must only be carried out by personnel with specialised knowledge in and experience with hydraulic and pneumatic systems.

**Safety information for specific operating phases
standard operation**

- ◆ Refrain from carrying out any operations that might be prejudicial to safety.
- ◆ Take all necessary precautions to ensure that the machine is operated only in a safe and correctly functioning state! Only operate the machine if all safety equipment and safety-related devices, such as removable safety guards, emergency-stop equipment, evacuation units, are in place, fully functional and activated.
- ◆ Inspect the machine regularly for visible damage and defects. Report any changes to the competent authority/person immediately. If necessary, stop the machine and inhibit all functions.
- ◆ In the event of a malfunction, stop the machine/system immediately and inhibit all functions. Have any defects rectified immediately.
- ◆ Observe the procedures for machine start-up and shut-down, inspection and on-screen monitoring displays in accordance with the operating manual.
- ◆ Before switching on / starting up the machine, ensure that no person will be at risk by its functions or movements when it starts operation.
- ◆ For the overhead task of filling the feed hopper, suitable climbing aids must be used that comply with all safety regulations. The same applies when connecting and disconnecting supply lines or pipes of conveyor appliances. Switch off the machine before filling the hopper.
- ◆ For all work to be carried out on the machine, in particular work inside the protective guards or work on the injection unit, always switch off the main switch first and secure it against reactivation.

Non-routine work in conjunction with the utilisation of the machine, maintenance and repair work and trouble-shooting in the course of operation; disposal

- ◆ Observe the adjustment, maintenance and inspection duties / schedule stipulated in the operating manual, including the information on the replacement of parts and assemblies. This work must be executed by specifically trained personnel only.
- ◆ Use suitable lifting gear (crane) for the removal and installation of the mould.
- ◆ Use suitable lifting devices when changing the working position of the injection unit.
- ◆ Use a suitable climbing aid which complies with the safety regulations when attaching the injection unit to a crane hook.
- ◆ Always inform operating personnel before beginning non-routine operations and maintenance work.
- ◆ Ensure that a sufficiently wide area is cordoned off around the maintenance work being carried out.
- ◆ When the machine is completely switched off for maintenance and repair work, it must be secured against inadvertent restart-up: secure the main switch with a lock and remove the key and/or attach a warning sign to the main switch.
- ◆ When carrying out overhead assembly, maintenance or other work always use specially designed or otherwise safety-orientated climbing aids and hoisting platforms. Never use machine parts as a climbing aid or hoisting platform. Keep the machine operating-area free of any dirt, granulate and cleaning materials.
- ◆ Before carrying out any maintenance or repair work, clean the machine, in particular connection terminals and threaded connections, so that they are free of oil, fuel or cleaning agents. Do not use aggressive detergents. Use lint-free cleaning cloths only.
- ◆ After cleaning, inspect all hydraulic hoses and pipes for leaks, loose connections, chafing marks and damage. Rectify any defects immediately.
- ◆ Always tighten any screwed connections that have been loosened during maintenance and repair to the required torque.
- ◆ If safety devices need to be removed for set-up, maintenance or repair purposes, they must be refitted and checked immediately upon completion of the maintenance and repair work.
- ◆ Ensure that all replaced parts and materials are disposed of safely and with the minimum of environmental impact.
Observe the instructions of the material manufacturer.
- ◆ On the electric ALLDRIVE machine the switch for locking the safety door can be mechanically deactivated (see chapter 8.6 in the operating manual of the ALLDRIVE).

Warnings of particular sources of danger electrical energy

- ◆ Use only original fuses with the specified current rating. Switch off the machine immediately if malfunctions occur in the electrical supply system.
 - ◆ When inspection, maintenance, and repair work is being carried out on the control cabinet or other live parts, the machine parts must be de-energised. Before starting any work, secure these parts against reactivation, ensure there is zero potential, then ground and short-circuit them in addition to covering and isolating any adjacent live parts.
 - ◆ The electrical equipment of the machine is to be inspected/checked regularly. Defects such as loose connections or scorched wires must be replaced immediately.
 - ◆ In the vicinity of the control cabinets for frequency converters (on machines with electric drives), electro-magnetic fields can be generated in a range of up to approx. 30 cm from the control cabinet surface. These electro-magnetic fields may slightly exceed the limit values specified in the DIN VDE 0848 (1995-07) and BGV_B11 regulations for exposure range 2 and may be hazardous for persons carrying implanted electronic health-supportive equipment.

Gas, dust, steam and smoke

- ◆ Before carrying out welding, flame cutting and grinding work, clean the machine and its surroundings so that it is free of dust, granulate, oil and other flammable materials. Cover the hoses and provide adequate ventilation (risk of fire or explosion).
 - ◆ When processing different types of plastic materials, gases can be emitted that may be aggressive and/or detrimental to health. Ensure that adequate ventilation and fume extraction is provided. Do not simply let gases escape into the atmosphere. They must be collected and neutralised.
 - ◆ Suitable fire-extinguishing facilities, in particular for the types of materials being processed on the machine, as well as personal protective clothing and equipment to protect against possible gas formation, must be provided.

Hydraulic and pneumatic equipment

- ◆ Work on hydraulic and pneumatic equipment must only be carried out by persons with specialised knowledge in and experience with hydraulic/pneumatic systems.
- ◆ Check all lines, hoses and screw connections regularly for leaks and visible damage. Repair any damage immediately.
- ◆ Depressurise all system sections and pressure lines (pressure accumulator, hydraulic system, compressed air) in accordance with the specific instructions for these component assemblies, before carrying out any repair work involving them.
- ◆ Adhere to the inspection and maintenance schedules of the hydraulic bladder-type accumulators and pneumatic compressed air accumulators. Observe the instructions of the accumulator manufacturer.
- ◆ Hydraulic hoses and compressed air pipes must be laid and fitted correctly. Do not interchange the connections. The fittings, length and quality of the hose assemblies must comply with the technical specifications.

Oil, grease, plastics and other chemical substances

- ◆ Observe the product-related safety regulations when handling oil, grease, plastic and other chemical substances.
- ◆ Extreme care must be taken when handling hot operating materials and processing aids, in particular hot plastic melt (risk of burning or scalding).

Machine transport

- ◆ Use only appropriate lifting gear and load-suspension equipment of adequate load capacity during transport and loading operations.
- ◆ Appoint a person with the relevant specialised knowledge to assist in lifting operations.
- ◆ Lift machines properly with lifting gear in accordance with the instructions in the operating manual (observe suspension points for load suspension equipment etc.).
- ◆ Use only suitable means of transportation with an adequate load capacity.
- ◆ Fasten the load safely using suitable suspension points!
- ◆ Before loading, secure the machine and injection unit against unintentional position change with the devices provided. Attach appropriate warning labels.
- ◆ Carefully refit and fasten all parts which have been removed for transport purposes before setting the system into operation.
- ◆ Disconnect the external power supply even if only minor changes in location are carried out. Reconnect the machine to the mains supply properly before setting into operation again.
- ◆ When setting the system into operation again, proceed only in accordance with the operating manual.

Personal protective equipment

As a protection against possible dangers during conversion, maintenance or repair work the machine operator must wear personal protective equipment. If required by the production procedure this protective equipment must also be worn during machine operation.

The following personal protective equipment is stipulated:



Heat-resistant protective gloves, acc. to DIN EN 420/EN407

For all work with hot objects such as the plasticising cylinder, screw and nozzle.



Eye protection / face mask, according to DIN EN 166

For all work on the heated injection unit and for work presenting a danger for the eyes and face.



Safety shoes, category S2, acc. to DIN EN 345

For work where there is a risk of injury to the feet due to falling objects.



Particle-filtering face mask, category FFP3, acc. to DIN EN 149

For all work where there is a possibility of air impurities.

NOTICE

Before deciding on the choice and application of personal protective equipment, the operating authority of the injection moulding machines has to carry out an individual assessment of the degree of risk involved, in accordance with the law of safety precautions at the place of work, which takes into consideration in particular the type and extent as well as duration and probability of the risk involved for the operating personnel.

This assessment is to be directive in the choice of suitable personal protective equipment.

The personal protective equipment must be inspected regularly and kept in correct working order.

Conditions for transport, operation and storage

Transport conditions

During transport of the machine the following environment-specific values for temperature and humidity must be fulfilled (DIN EN 60204-1: 2007 pt. 4):

- ◆ Permissible temperature range:
-25 °C to 55 °C
-13 °F to 131 °F,
- ◆ Permissible relative air humidity:
min. 20 % to max. 80 %

Operating conditions

During operation of the machine the following environment-specific values must be fulfilled (DIN EN 60204-1: 2007 pt. 4):

- ◆ Voltage supply:
0.9 ... 1.1 of the nominal voltage,
- ◆ Frequency:
0.99 ... 1.01 of the nominal frequency, when permanently on
0.98 ... 1.02 when briefly on
- ◆ Electro-magnetic compatibility (EMC):
in accordance with guideline 2014/30/EU,
- ◆ Permissible temperature range:
15 °C to 40 °C
59 °F to 104 °F
- ◆ Minimum temperature of hydraulic oil:
15°C, 59 °F,
- ◆ Permissible relative air humidity:
max. 50 % at a max. temperature of 40 °C (104 °F)
The air humidity is permitted to be higher if it does not cause condensation on machine components.
- ◆ The temperature of the cooling water supply must be above the temperature at which condensation takes place, (condensation could otherwise damage machine components).
- ◆ The cooling system of the machine must not be connected directly to the drinking water network.
Always use process water in a closed system for the cooling system.
- ◆ Maximum installation height:
max. 2000 m above sea level
max. 6600 ft above sea level

- ◆ Ambient light intensity, in particular around the clamping unit:
min. 500 Lux
following DIN EN1837/2009; in accordance with German operational
safety standard (BetrSichV), App. II, section 2.4.
- ◆ Quality of the compressed air supply in accordance with
ISO 8573-1: 2004
Solids : class 5,
Water: class 4,
Oil: class 2.

Storage conditions

If you want to leave your machine in standstill or in storage for a longer period of time, we recommend you switch off the cooling water supply and disconnect it from the machine.

- Open the hoses in the return line and let the cooling water drain out of the machine.
- Blow compressed air through the individual cooling circuits.

When storing the machine in rooms where temperatures can drop below zero, the cooling circuits should be rinsed with an anti-freeze agent. Any remaining water will then be displaced and/or protected against freezing.

NOTICE

If this is not observed the cooling water can freeze and destroy components on the machine.

Requirements for commissioning and service work on ARBURG machines

- ◆ The machine is filled with the stipulated utilities.
- ◆ The connections for electricity and water are established.
- ◆ Any required lifting gear, climbing aids, scaffolding, hoisting platforms are provided by the operating authority free of charge.
- ◆ Accessibility and free space on all sides of the machine as well as above the machine is guaranteed.

Facilities required at the installation site of the machine

Tasks	Local facilities	Information / remarks
Transport to the installation site	Suitable crane Transport aids	There must be no steps or edges when using heavy-duty rollers. Plane surfaces are required.
Installation / assembly De-installation / disassembly	Suitable crane ARBURG transportation fixtures Lifting gear	The crane must cover the whole area of the machine.
Production	Ladder / climbing aid / platform Conveyor	Refilling of material: using a suitable climbing aid (e.g. platform), or a conveyor.
Service / maintenance / cleaning	Ladder / climbing aid / platform Crane / lifting gear Safety harness	When using climbing aids, these must be secured against slipping. Work above body height must only be carried out wearing a safety harness.
Conversion work	Crane / lifting gear ARBURG transportation fixtures	Replacement and repair of machine components, e.g. injection units / cylinder modules (see following table)

Weight of injection unit (hydraulic) and cylinder module¹

Injection unit / cylinder module size	Injection unit weight / kg (lbs), approx.	Cylinder module weight / kg (lbs), approx.
30-100	200 (441)	35 (77)
170-290	330 (728)	65 (143)
400	750 (1653)	130 (287)
800	950 (2094)	230 (507)
1300	1560 (3439)	380 (838)
2100	2200 (4850)	575 (1268)
3200	3100 (6834)	750 (1653)
4600	4300 (9480)	1000 (2205)

Weight of injection unit (electric) and cylinder module¹

Injection unit / cylinder module size	Injection unit weight / kg (lbs), approx.	Cylinder module weight / kg (lbs), approx.
5-70	360 (794)	35 (77)
100-290	575 (1268)	65 (143)
400	850 (1874)	130 (287)
800	1300 (2866)	230 (507)
1300	2500 (5516)	380 (838)
2100	3500 (7716)	575 (1268)

¹ The weights may differ due to additional options or equipment.

Safety devices

Function of the safety devices

When the emergency-stop key is pressed the injection moulding machine complete with peripheral devices must stop. When a safety cover or safety gate is opened all dangerous machine movements must stop. An alarm message for each situation is displayed on-screen.

Emergency-stop buttons for stopping the system

The emergency-stop buttons are located on the operating keypad of the injection moulding machine and also in the following places, depending on the equipment installed on the machine:

- ◆ at the rear of the injection moulding machine,
- ◆ on the manual control of the MULTILIFT,
- ◆ inside a safety fence,
- ◆ on the door of a safety fence.

When an emergency stop function is activated, the driving motors of the injection moulding machine are immediately stopped.

Message:



EMERGENCY STOP

- ◆ Cause:
An emergency-stop function is active, e.g. the emergency stop button was pressed, safety gate on operator side is open.
- ◆ Effect:
The alarm indicator lights up, the machine cycle and motor stop immediately. All dangerous movements are immediately inhibited.

Re-start after emergency stop

- Make sure that the dangerous situation is no longer prevalent.
- Reset the emergency stop key by turning it in a clockwise direction, or pulling it.
- Press the controller start key to acknowledge the alarm.
- Switch on the motors.



INFORMATION

The emergency stop systems are active in all operating modes.

Safety gate of injection moulding machine

When a safety gate is opened all dangerous movements are inhibited and the respective alarm message is displayed.

FOR EXAMPLE: SAFETY GATE NOT CLOSED

- ◆ Cause:
Safety gate open
- ◆ Effect:
All machine movements are inhibited.
- ◆ Correction:
Close the safety gate.

Additional safety devices

If, due to additional equipment, further safety devices are installed on the injection moulding machine, you will find more information on these in a separate chapter, see "Supplementary documentation".

Working above body height

For all maintenance or other work above body height the operating authority of the machine must provide a suitable, approved and stable climbing aid which conforms with the country-specific safety requirements.



WARNING

Risk of injury.

Danger from moving machine parts.

For all maintenance and other work in which a climbing aid is used, the machine must be switched off and the main switch secured against inadvertent re-switching on.



WARNING

Risk of injury.

Danger of falling. Danger can arise from an unsecured climbing aid.

No part of the machine must be used to stand on or as a climbing aid.

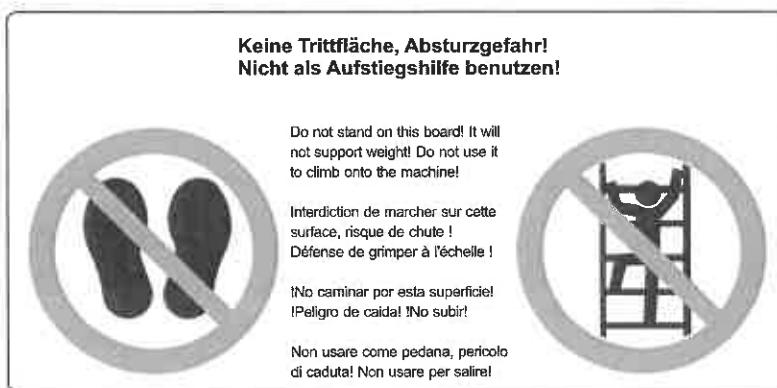
The climbing aid must comply with the requirements of EN ISO 14122. Further country-specific regulations for climbing aids, e.g. certification, safety tests etc. must be observed by the operating authority and compliance to these regulations ensured.

The following standards and directives must be observed when selecting and using a climbing aid:

- ◆ EU directive 2001/45/EG,
- ◆ General requirements EN ISO 14122.

When determining which type of climbing aid is suitable for work on the machine, the surrounding conditions of the machine, the qualification of the operating and maintenance personnel, as well as the type and extent of the work to be carried out must be taken into consideration.

The operating and maintenance personnel must undergo training in the safe and correct handling of the climbing aid. This training must be repeated at regular intervals. The operating authority of the machine must ensure that the climbing aid is applied correctly.



Behaviour in case of fire

Fire extinguishing measures

Fire extinguishers of the appropriate fire classes for the workpieces, operating materials and cleaning materials to be processed must always be at hand at the production site.

- ◆ Only use appropriate fire extinguishers of fire classes A B C to extinguish fires.
- ◆ Do not use extinguishers of fire class D.



DANGER

High voltage!

Contact with electric voltage is dangerous and can lead to serious or fatal injury.

Switch off the main switch of the machine if it is safe to do so.

Do not use water to extinguish fires.

Behaviour

- ◆ Leave the affected area and go outside using marked escape routes and emergency exits.
- ◆ Do not use elevators, as there is danger of suffocation from smoke.
- ◆ Close doors and windows - but do not lock them.
- ◆ Keep calm.
- ◆ Report the fire.
- ◆ Give clear information on the fire scene.
- ◆ Follow the instructions of the fire brigade.



INFORMATION

A fire on or in the vicinity of an ARBURG machine can damage or impair the function and safety of the machine. The machine must not be set into operation again until its safe operation can be ensured.

We recommend having the machine inspected for safe functioning by an ARBURG service technician.

Accident prevention and measures in case of an emergency

ARBURG machines are built in accordance with state of the art standards and recognised safety regulations. However, accidents or damage cannot be ruled out under the following circumstances:

Causes

- ◆ The operating manual is not read or not observed.
- ◆ The warnings / safety information on the machine are not observed.
- ◆ The stipulated purpose of usage is not complied with.
- ◆ Safety devices are disabled or bypassed (manipulated).
- ◆ Work on the machine carried out by insufficiently qualified personnel or non-authorised personnel.

Consequences

Possible consequences:

- ◆ Trapping of body parts in the area of the mould or injection unit.
- ◆ Crushing of body parts caused by moving components on the machine (e.g. core pull, ejector, robot system).
- ◆ Burns of body parts (e.g. on the cylinder module, from the heated injection moulding compound).

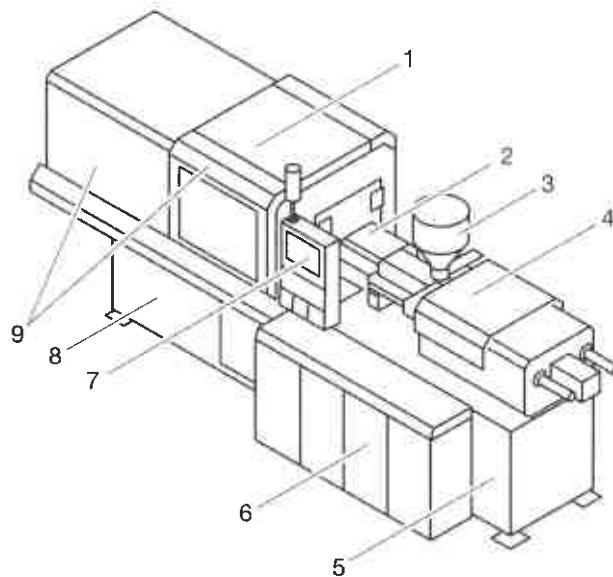
Measures

Adhere to the operational regulations and instructions regarding the rescue of persons in case of accidents.

In case of accidents, the respective measures must be taken:

- ◆ Moving components (e.g. core pull, ejector, mould mounting platen) must be safeguarded against further movement in the effective direction by a mechanical lock.
- ◆ Descending components (e.g. vertical axis of robot system) must be protected with a support against slipping further down.
- ◆ First-aiders on duty must be familiar with the function and operation of the machine.

General description of the machine



- 1 Clamping unit
- 2 Plasticising cylinder
- 3 Feed hopper
- 4 Injection unit
- 5 Machine base under injection unit
- 6 Control cabinet
- 7 Operating unit with flat-screen display and input keyboard
- 8 Machine base under clamping unit
- 9 Guard

The ALLROUNDER is an injection moulding machine with horizontally arranged clamping unit.

Inside the clamping unit (1) a mould consisting of two mould halves is installed. The stationary mould half is mounted to the stationary mounting platen. The moving mould half is mounted to the moving mounting platen. The mould is opened and closed by the opening and closing movements of the clamping unit.

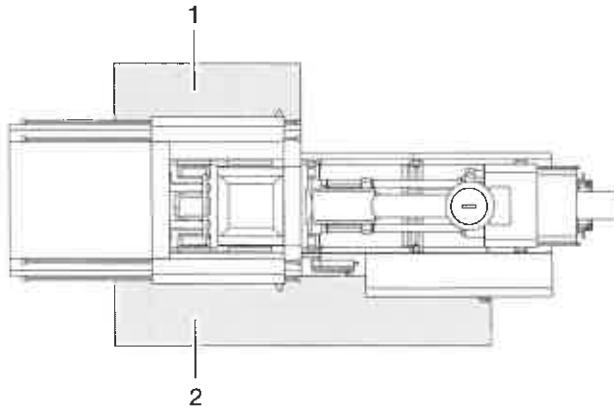
The injection unit (4) is arranged horizontally as a rule and injects through the stationary mould mounting platen into the mould. With an adapter, the injection unit can also inject vertically through the mould parting line.

The mould in the clamping unit is completely covered by safety guards (9) during the entire moulding process. The guards are monitored by electric switches.

After the mould has opened, the completed parts are demoulded by the ejector and fall into a container or onto a conveyor belt, or they are removed from the clamping unit by a robot system.

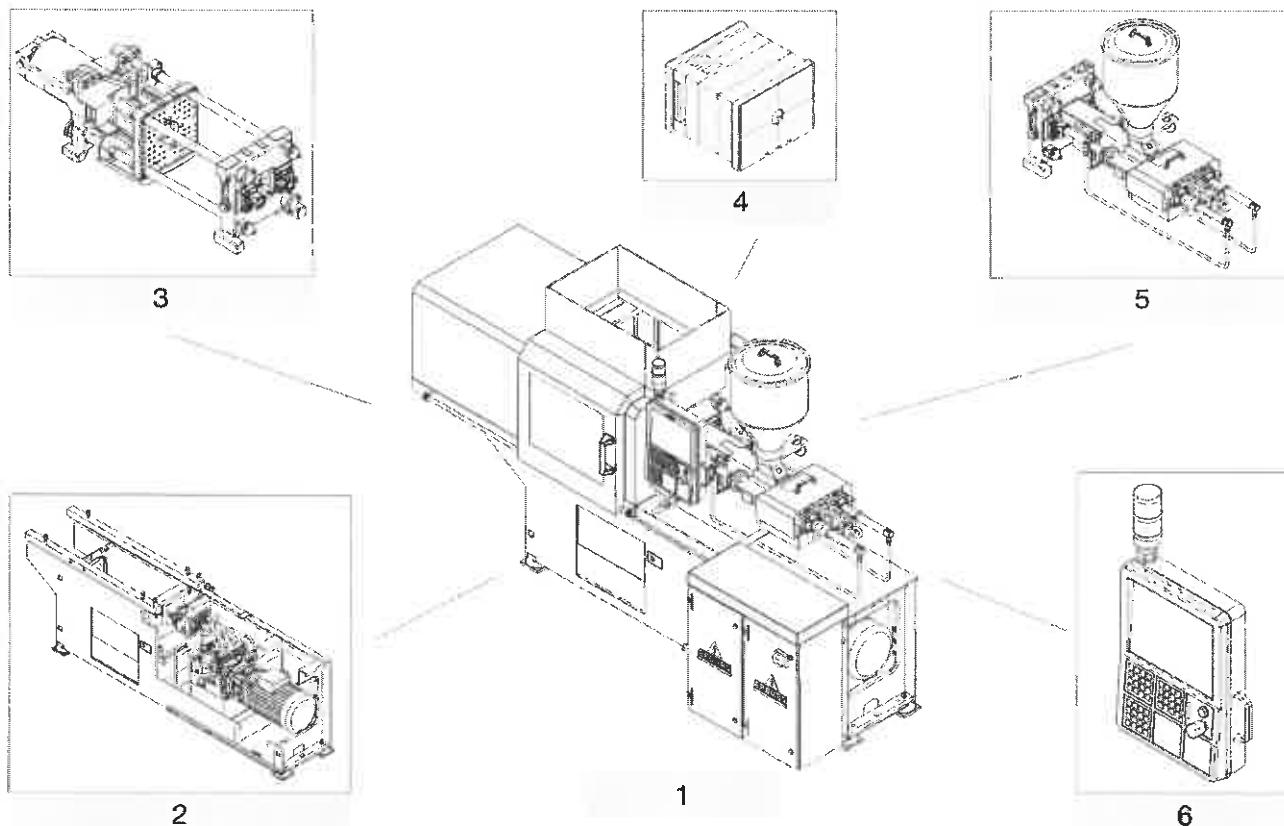
The mould then closes again and the next cycle is started.

Permitted working areas at the machine



- 1 Working area at rear of machine
- 2 Working area, operator side

Components of an injection moulding machine



- 1 Injection moulding machine
- 2 Machine base / hydraulic system
- 3 Clamping unit
- 4 Mould
- 5 Injection unit
- 6 Controller

Clamping unit

The clamping unit with mould mounting platens accommodates the mould.

Injection unit

The injection unit consists of a feed hopper, cylinder, screw, nozzle, heater bands and servo-electric or hydraulic drives and serves the purpose of melting the moulding compound and injecting it into the mould.

Machine base with hydraulic system

The machine base supports the clamping and injection units.

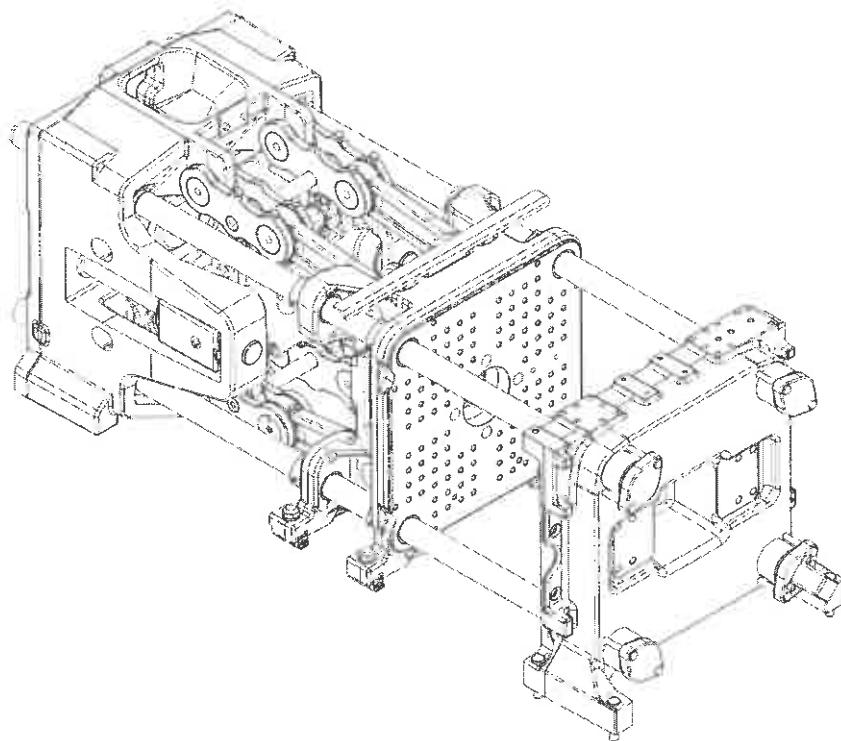
Clamping unit

The clamping unit contains the mould and carries out the following operations:

- ◆ mould closing
- ◆ clamping force build-up and locking of the clamping unit
- ◆ absorption of the locking force
- ◆ mould opening
- ◆ part ejection.

The clamping force is built up mechanically or hydraulically, depending on the type of construction.

Mechanical systems work with a servo-electrically operated toggle joint:

**Toggle-type clamping unit
ALLROUNDER A and H**
**Clamping force**

The clamping force is the total of all forces acting on the tie-bars of the clamping unit under strain when the mould is closed (before injection).

The clamping force also presses the two mould halves together.

Locking force

The locking force is the total of all forces acting on the tie-bars of the clamping unit when the part is being moulded.

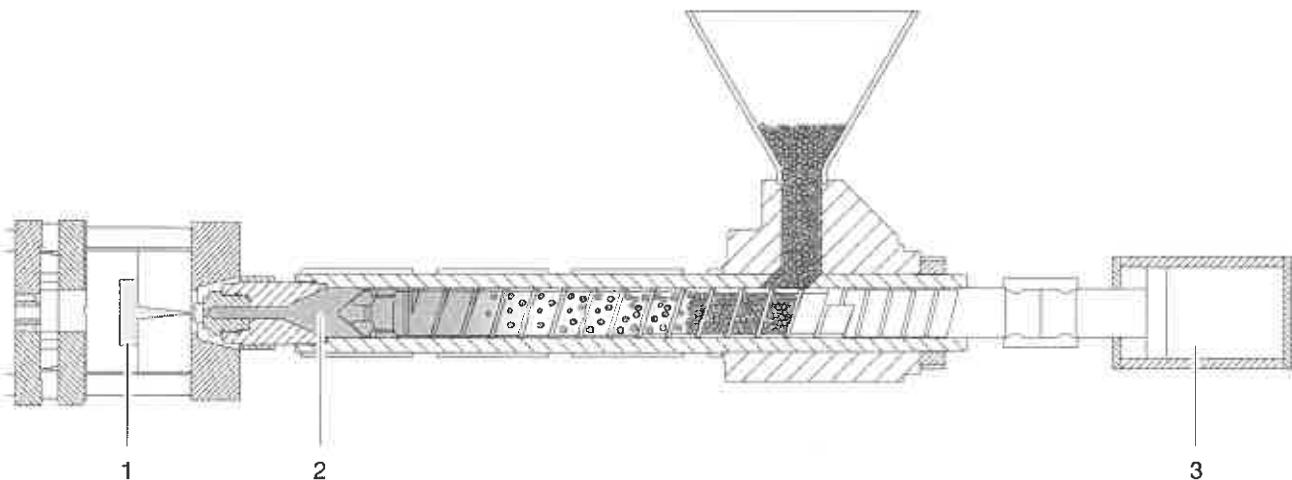
The locking force required during injection depends on:

- ◆ the max. lifting force inside the mould (counter force inside the cavity as the melt flows inside) ,
- ◆ the type of clamping system,
- ◆ the rigidity of the clamping unit and mould.

Injection unit

The injection unit plasticises the moulding compound and injects it into the mould.

Generally speaking, injection units can be equipped with different sized plasticising cylinders, i.e. with different screw diameters. The larger the cylinder the greater the attainable weight of the moulded part, but the smaller the maximum injection pressure.

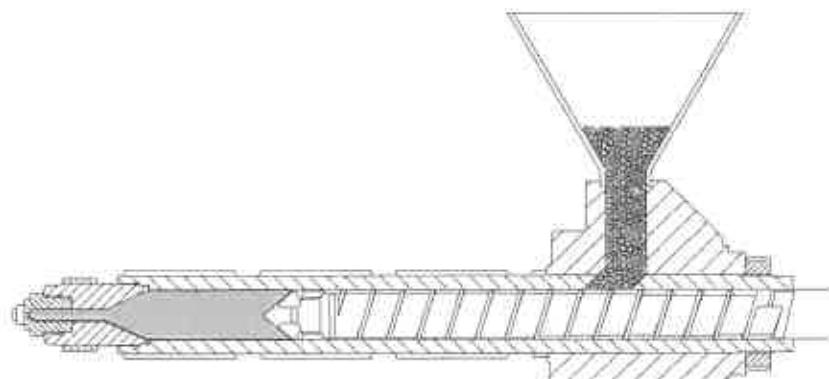
Screw (piston)-type injection unit

- 1 Mould cavity pressure
- 2 Pressure in front of the screw: injection pressure, back pressure
- 3 Hydraulic pressure in the stroke drive of the screw

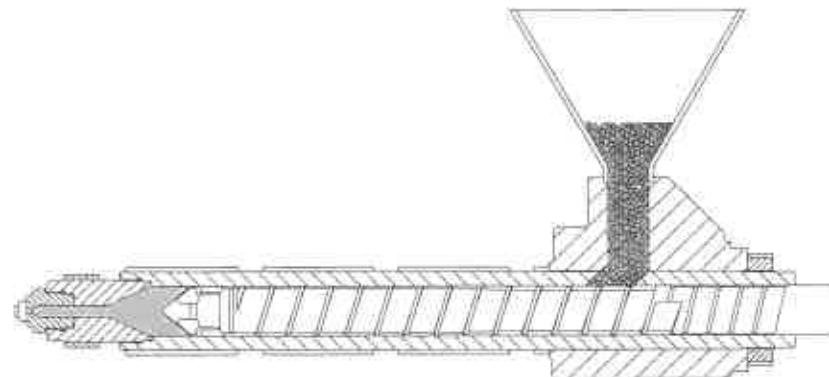
Injection and holding pressure

During the injection process the screw acts as a piston, i.e. it is pushed forwards by the hydraulic pressure in the stroke cylinder and presses the material currently in front of it through the nozzle tip into the mould until it is volumetrically filled (injection phase) and the melt has compressed (compression phase).

As the melt solidifies, a little more melt must be pressed out of the cylinder into the mould, just enough to compensate for the shrinkage in volume which takes place during the holding pressure phase.

Plasticising cylinder

Screw position at the end of the dosing; the plasticised material is in front of the screw tip.



Screw position at the end of the injection process; the plasticised material has been injected into the mould.

A material cushion is left in front of the screw for injection into the mould during the holding pressure phase.

Injection moulding process

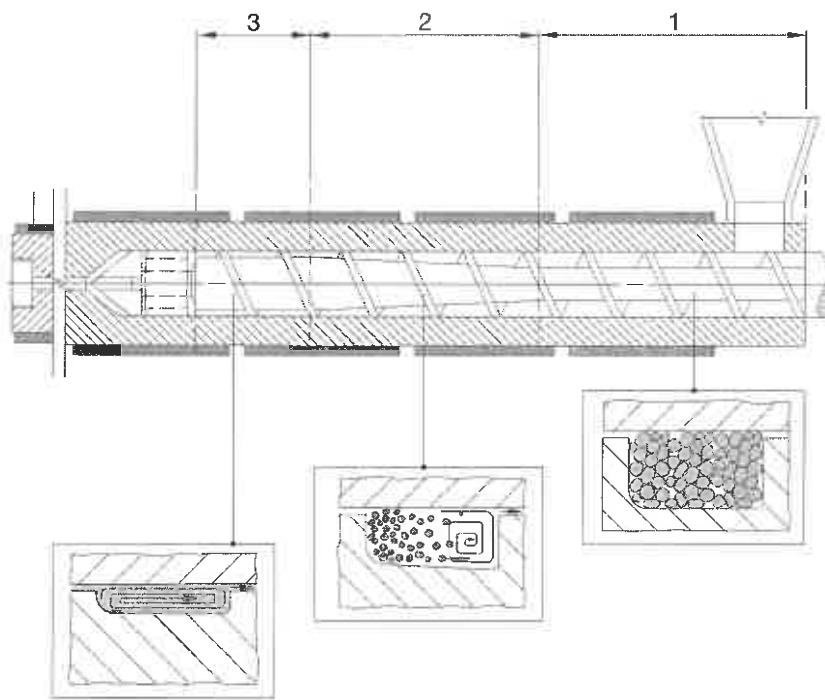
General description

The injection moulding process is an arch-type technology for the manufacture of moulded parts made of plastic materials.

Plastification

The raw material which is mainly supplied in granulated form, is filled into the feed hopper of the injection unit. From here it goes into the cylinder inside which a screw rotates. The rotating screw plasticises the material with the aid of the active cylinder heater bands and in doing so, conveys it forwards to the space at the front of the screw.

During plasticising approx. 60 % of the required energy is generated by frictional heat and only 40% by the heater bands.



- 1 Feed zone
- 2 Compression zone
- 3 Metering zone

Back pressure

The back pressure ensures that the screw does not move backwards in the cylinder uncontrolled. It counteracts the pressure which builds up at the screw tip as a result of the melt being conveyed forwards.

Dosage

When the specified amount of material required to fill the mould has collected in front of the screw tip the rotary movement of the screw is stopped.

Decompression

After dosage the compressed material is relieved by retracting the screw a little.

Injection

The screw then advances and injects the plastic melt under high pressure (ca. 500-1500 bar) into the closed mould. The screw hereby acts as a piston.

Holding pressure

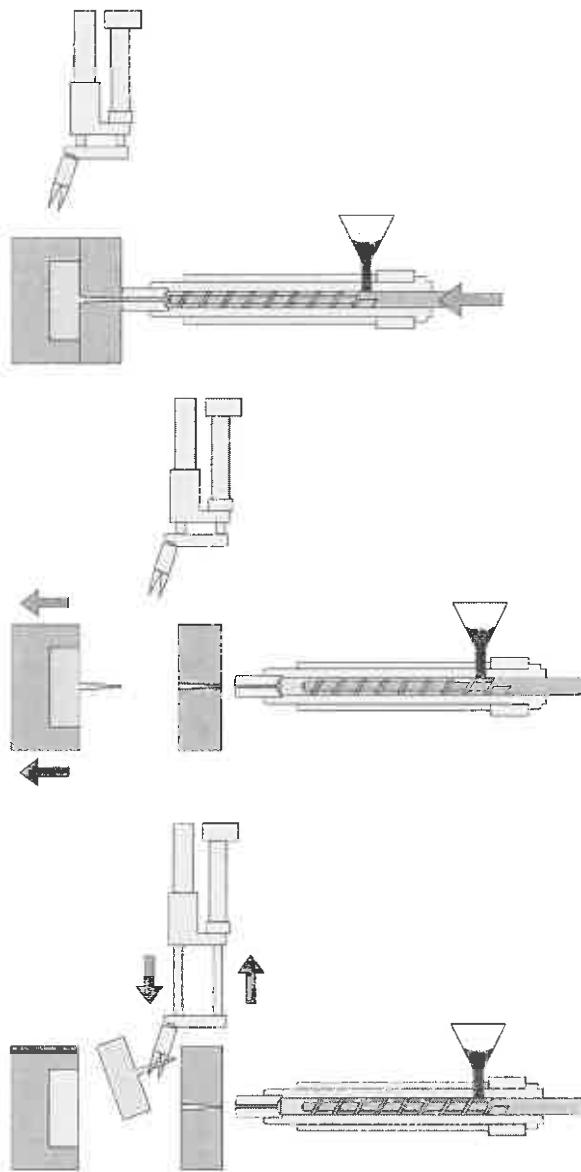
When the mould cavity has been filled, the controller switches over to holding pressure so that no sinks or hollows can form. During this phase the screw continues to push just enough material into the mould to compensate for the shrinkage which occurs due to cooling, until the sprue hardens (sealing point).

The holding pressure phase can be programmed with various times and pressure profiles, depending on the requirements of the application.

Then the remaining cooling time begins.

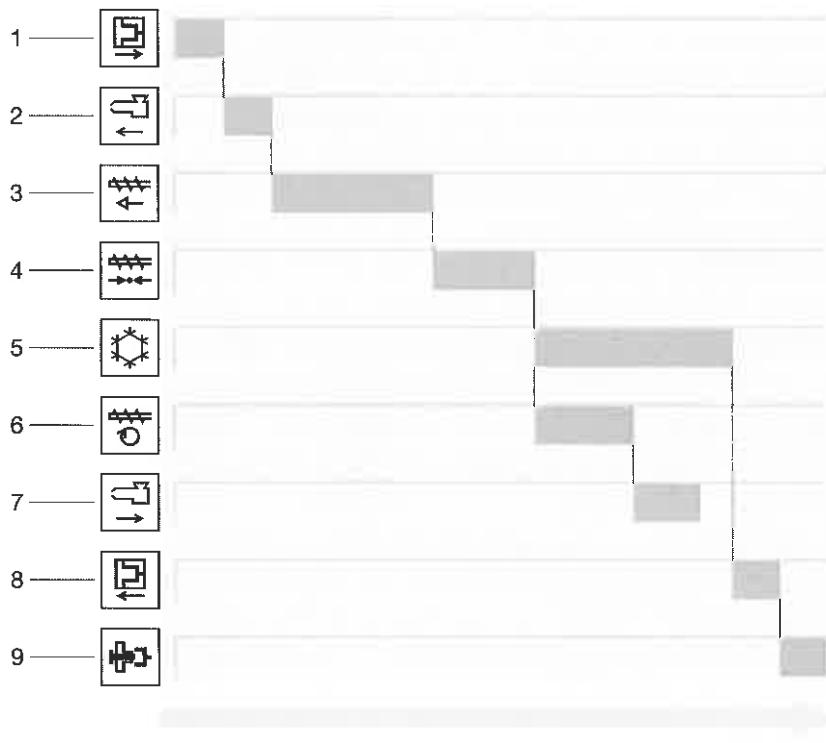
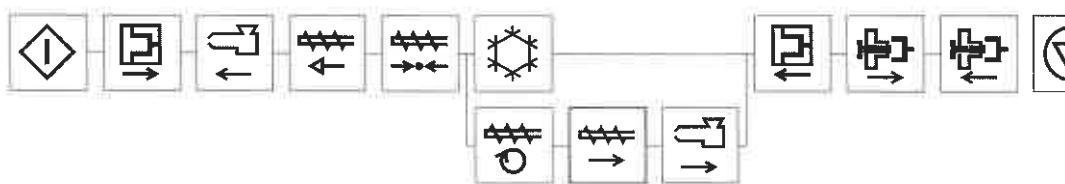
Ejection

When the moulded part has cooled adequately (solidified) the mould opens and the part is ejected or removed - and the next cycle can begin.

**Advantages of injection moulding**

The great advantage of injection moulding technology lies in its high economic viability. In only one operating process, high-quality parts can be produced - mostly fully automatically - which require practically no subsequent processing steps.

An example of a sequence of processes in the injection moulding cycle



- 1 Mould closing
- 2 Nozzle advancement
- 3 Injection
- 4 Holding pressure
- 5 Remaining cooling time
- 6 Dosage for next cycle
- 7 Nozzle retraction
- 8 Mould opening
- 9 Ejection

1 Introduction

1.1.6 Cooling water connection



WARNING

Risk of contamination of the drinking water network.

The cooling system of the machine must not be connected directly to the drinking water network.

Always use process water in a closed system for the cooling system.

The cooling water connections for the supply and return line of the cooling system are located on the cooling water manifold. The position of the cooling water manifold is indicated in the "Technical Data" chapter.

Do not use pipes for connection of the cooling water manifold to the water supply, use hoses only.

The cooling water must fulfil the hydrological requirements specified in the "Quality requirements of the cooling water" chapter.

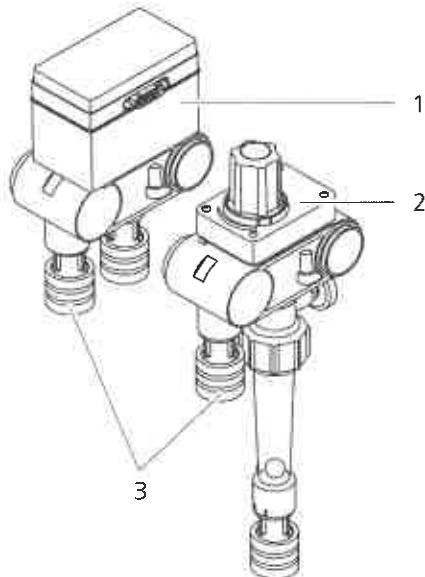
The connection values specified in the "Connection values for the cooling system" chapter must be adhered to.

Cooling water channels on the cooling water manifold

The number and assignment of the cooling water channels can vary subject to the equipment installed on the machine.

The cooling water channels can either be programmable or manually adjustable.

The cooling water hoses to the consumers are connected with connection nipples on the cooling water channels.



- 1 Programmable cooling water channel
- 2 Manually adjustable cooling water channel
- 3 Connections for connection nipples

NOTICE

Risk of damage caused by water!

When the connection nipple is inserted, the connection of the cooling water channel is open.

If a value is programmed for this cooling water channel in the data set of the machine, water flows out of this connection.

Remove the connection nipples from connections on the cooling water manifold which are not needed. Connections without connection nipples are blocked, so that no water can flow out.

Symbols on the cooling water manifold

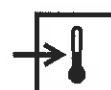


The cooling water manifold is marked with this symbol. If several cooling water manifolds are installed on the machine, the symbols are numbered consecutively.

The assignment of the channels on the cooling water manifold is represented by the following symbols. If further consumers are installed, symbols which are used multiple times are numbered consecutively.



Control cabinet



Temperature control device, refilling



oil cooler



Injection unit



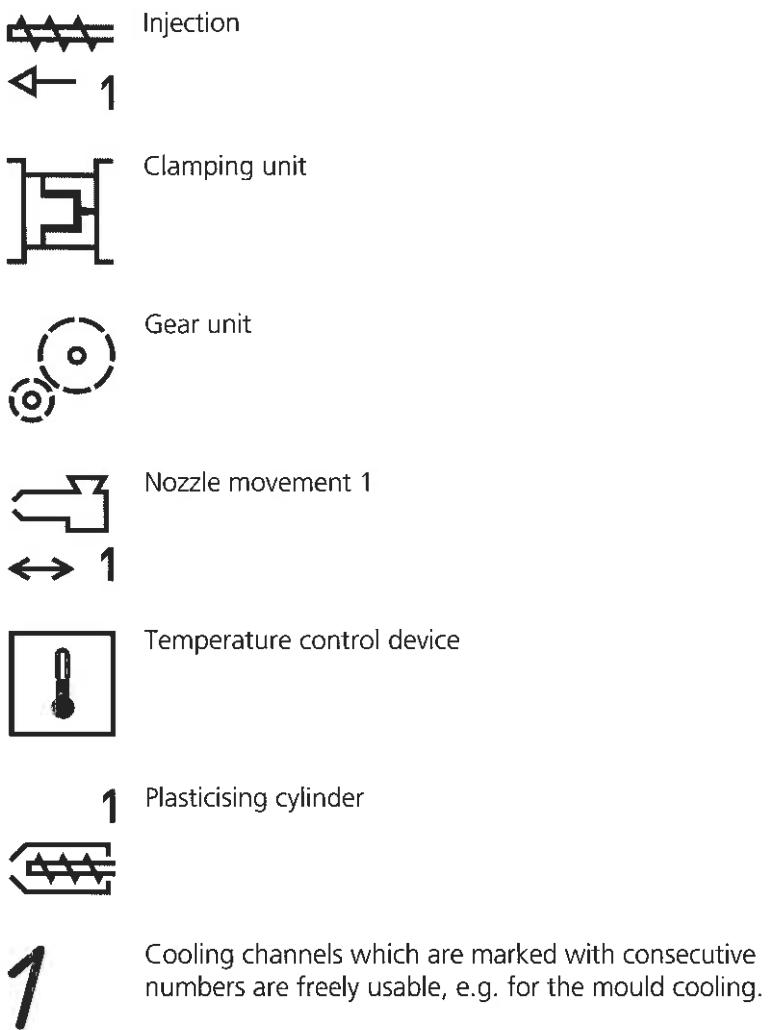
Converter



Dosage



Motor



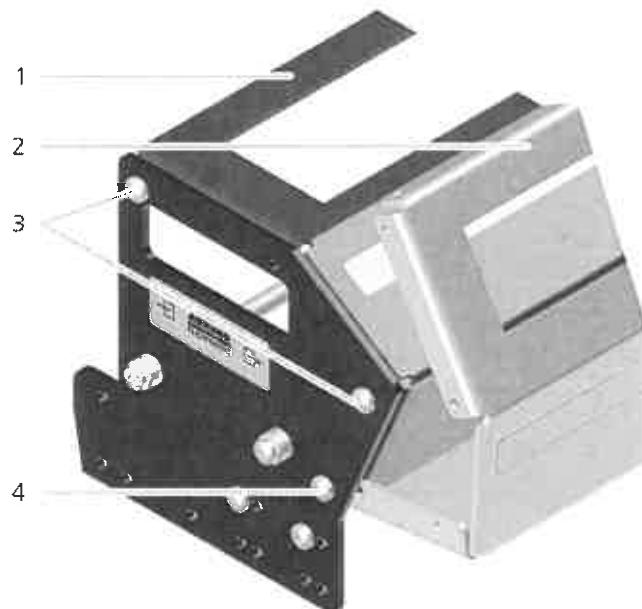
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Connecting the thermocouples

To connect the thermocouples to the programmable cooling water channels, the cover on the cooling water manifold must be opened.

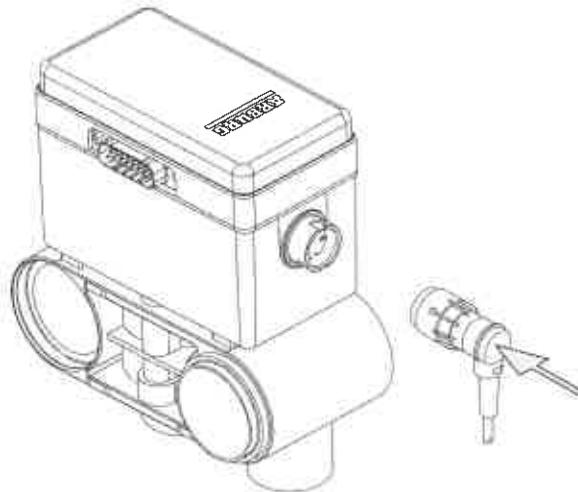
- Remove the screws on both sides on the upper part of the cover of the cooling water manifold.



- 1 Cover closed
- 2 Cover opened
- 3 Screws on the upper part of the cover
- 4 Screw at the centre of rotation of the cover

- Loosen the screws on both sides at the **centre** of rotation of the cover so far that they do no longer exercise a clamping function.
- Open the cover by swivelling it to the front.

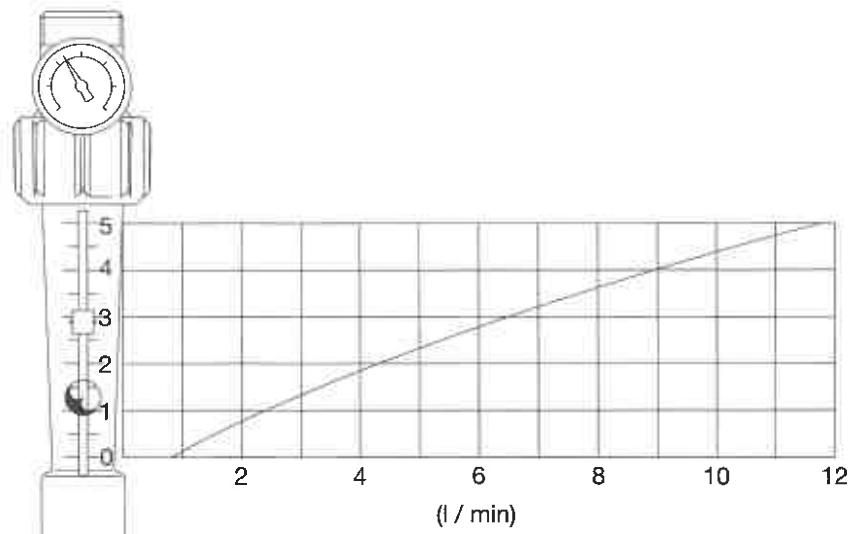
- Connect the connection plugs of the thermocouples to the respective cooling water channels.



- Screw on the cover of the cooling water manifold in the closed position again.

Optical flow meter

On cooling water channels with optical flow meters, the flow volume can be determined in dependency of the position of the float with the aid of the following chart.

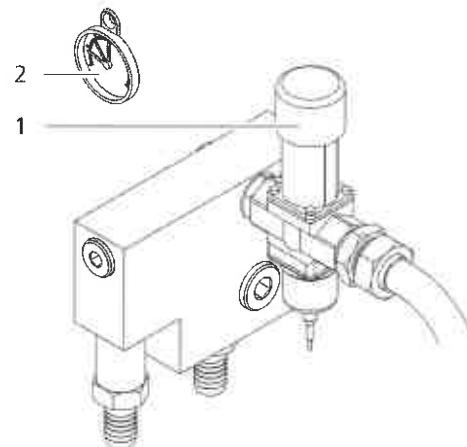


Manually adjustable oil temperature

Subject to the equipment of the machine, the oil temperature is adjusted manually on the thermostatic valve for the oil cooling on the cooling water manifold.

The thermostatic valve regulates the flow volume independently to keep the adjusted temperature constant. The adjusted temperature is displayed on the thermometer next to the cooling water manifold.

The machine has been calibrated at an oil temperature of 45 °C (113 °F). For this reason, the thermostatic valve must be adjusted so that a temperature of 45 °C (113 °F) is displayed on the thermometer.



1 Thermostatic valve
2 Thermometer

1.1.6.2 Quality requirements of the cooling water

Hydrological requirements

In order to ensure trouble-free operation of the cooling system, the cooling water must comply with the following hydrological requirements. Have your water analysed, if required.

NOTICE

Risk of damage to the cooling system.

Cooling water which does not meet the quality requirements can cause malfunctions and damage, e.g. pitting and lime formation.

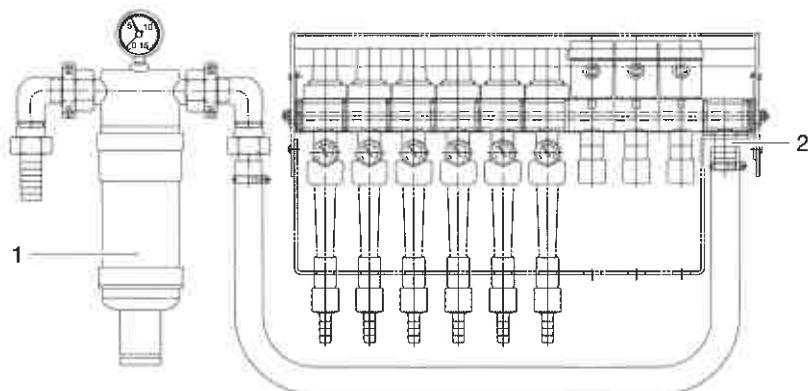
Ensure that the cooling water and all other media which come into contact with the cooling system do not contain any substances which can damage the cooling system.

Hydrological data	Max. value
Overall hardness	< 15 °dH
Carbonate hardness when using hardness stabilisers	< 5.6 °dH
pH-value (lime-carbon equilibrium)	6.5-8.5
Conductivity	< 50 mS/m
Chloride (Cl)	< 100 mg/l
Grain size	< 100 µm

Filtration

The cooling water must be free of impurities such as suspended particles and algae. Substances which are not water-soluble and exceed the permissible grain size must be restrained by a filter in the supply line of the cooling water manifold.

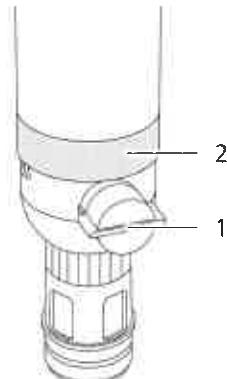
Particularly when components with sensitive seals are used, e.g. rotary unions, the cooling water manifold must be equipped with a suitable upstream backwashing filter. If this is not observed, such parts are subject to increased wear.



1 Backwashing filter
2 Supply on cooling water manifold

An input pressure of at least 1.5 bar (21.8 PSI) is required for backwashing. The interval between backwashing operations depends upon the degree of contamination of the water. The date for the next backwashing can be adjusted on the memory ring of the backwashing filter.

If the filter is not connected to a depressurised sewer pipe, a suitable catch pan must be positioned under the outlet for the backwashing.



1 Outlet valve
2 Memory ring

- Open the outlet valve.
 - Water flows out of the outlet.
- Close the outlet valve again after approx. 15 s. Subject to the degree of contamination, a longer backwashing time may be required.

Decalcifying

Check the flow volume and the return temperatures at regular intervals. Significant changes usually point to a narrowing of the cross-section in the cooling circuit. Decalcify the cooling system at regular intervals using a commercially available decalcifying system.

Cooling water additives

Cooling water additives, such as anti-freeze, anti-algae additives or decalcifiers, must not contain substances which react with the materials in the cooling system. Observe the data sheets of the manufacturers.

Pay particular attention to reactions of the cooling water additives with the materials EPDM, FKM, NBR, PA, PC, POM, PTFE, TPE, TPU, copper and aluminium.

1.1.6.3 Connection values for the cooling system

The cooling system of the machine is designed for the specified connection values.

If these values are not adhered to, the cooling system and the components of the machine will suffer damage.

Connection values

	Hose	Operating pressure min.	Operating pressure max.	Water temp. max.
Supply line	DN 25	Pressure of return line +1.5 bar (21.8 PSI) ¹	8 bar (116 PSI)	30 °C (86 °F)
Return line	DN 25	0 bar (0 PSI)	8 bar (116 PSI)	80 °C (176 °F)

- 1 Pressure difference between supply and return line
min. 1.5 bar (21.8 PSI)

1.1.6.4 Emptying and rinsing the cooling circuits

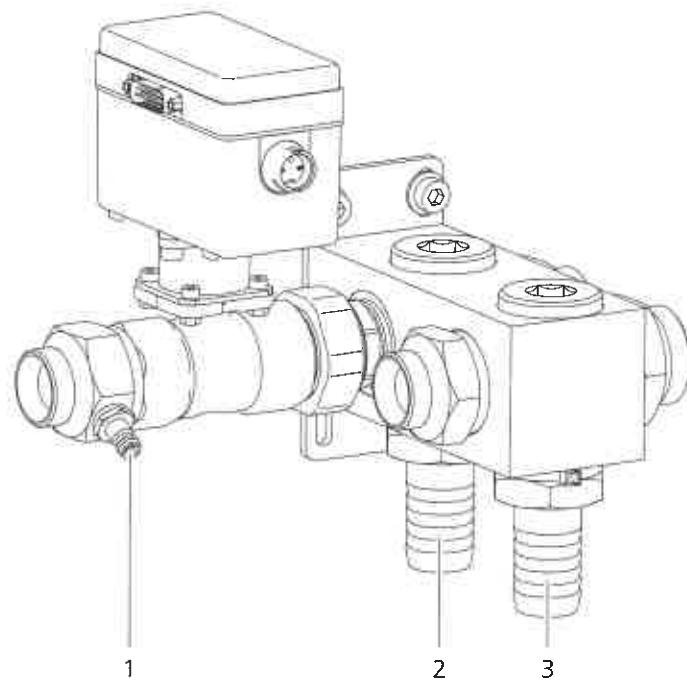
The cooling circuits of the machine are emptied before the machine leaves the factory and cleaned out with compressed air.

If the machine is dispatched by ARBURG Lossburg during the winter months (October to April), the cooling circuits are rinsed with an anti-freeze agent.

Despite of blowing them through with compressed air, there may still be residues of cooling water or anti-freeze agent in the hose and pipe bends.

Any remaining anti-freeze agent can impair the microbiology in a closed cooling system and cause congestion or corrosion. For this reason, the cooling circuits must be rinsed with process water before setting into operation.

Subject to the equipment of the machine, a check valve for air blow is provided behind the inlet on the cooling water manifold.



- 1 Check valve for air blow
- 2 Connection of supply line
- 3 Connection of return line

Switch-off valves

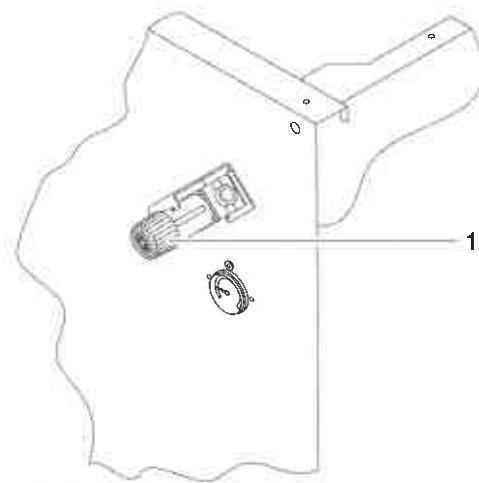
The cooling circuits of the machine may be equipped with switch-off valves.

The switch-off valves must be actuated (opened) to rinse the cooling circuits.

Manually adjustable cooling water regulator

If the machine is equipped with a manually adjustable thermostatic cooling water regulator, this must be set to "0" before rinsing.

Write down the set value on the cooling water regulator in order to be able to adjust it again after rinsing.



1 Manually adjustable cooling water regulator

Rinsing the cooling circuit**NOTICE**

Environmental pollution!

The operating fluids of the machine can pollute the ground or water.

The mixture of anti-freeze agent and water from the rinsing process must not get into the sewer system.

The applicable national rules and regulations concerning the disposal of hazardous substances must be adhered to.

- Connect the supply line of the cooling water manifold to the process water supply.
- Connect a suitable hose to the return line of the cooling water manifold and place the open end in an appropriate container.
- Open the supply only slightly.
- Rinse the cooling system with plenty of water.
- Close the supply.
- Connect the return line to the process water supply.
- Open the supply.

INFORMATION

Cooling circuits which work independently of each other must all be rinsed separately in the same way.

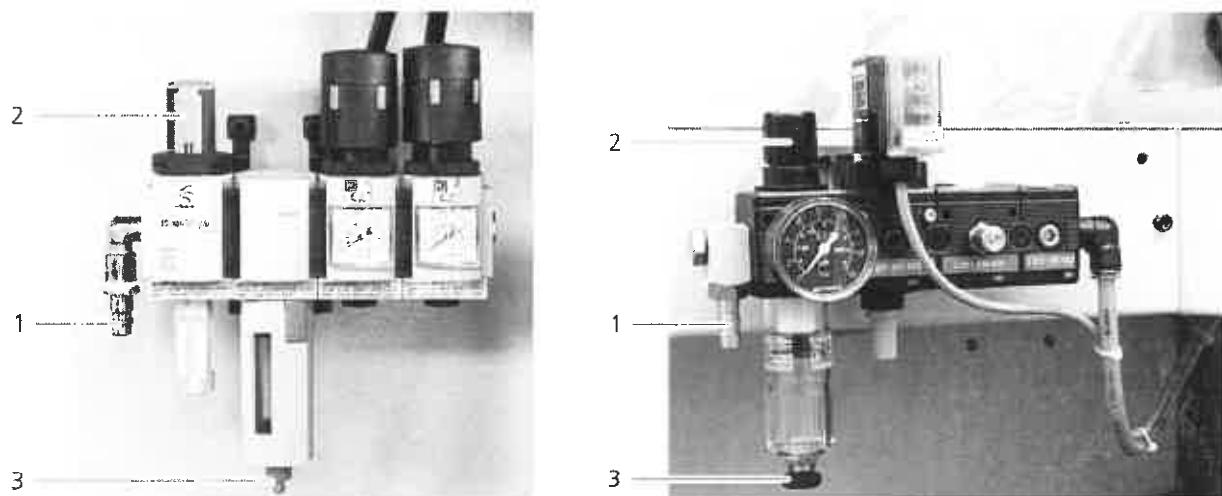
1.1.6.5 Connection for compressed air

Connection for compressed air

If your machine is equipped with a pneumatic system, the machine must be connected to the compressed air system. This is realised with one of the pneumatic maintenance units, as shown in the illustration below. The maintenance unit is located at the rear of the machine base.

The compressed air which is fed to the maintenance unit must be free of oil and contaminations. Any condensation is collected in the water separator on the maintenance unit. The condensation must be discharged via the outlet valve before the maximum level is reached.

The highest pressure level from the compressed air system must not exceed 10 bar (145 psi, 1.0 MPa).



- 1 Connection for compressed air
- 2 Adjustment valve
- 3 Drain for condensation water

- Lay a compressed air supply line DN 9 up to the pneumatic maintenance unit.
- Connect the supply line to the connection piece (1) and fasten it with a hose clip.
- Check that the output pressure complies with the value stipulated on the designation label near the maintenance unit and correct it if necessary, proceeding as described in chapter 9.8.9.

NOTICE

The pneumatic system must only be operated using the pneumatic maintenance unit.

Compressed air which has not been processed by the maintenance unit can cause malfunctions or a total failure of the pneumatic components.

1.1.7 Electrical connections



DANGER

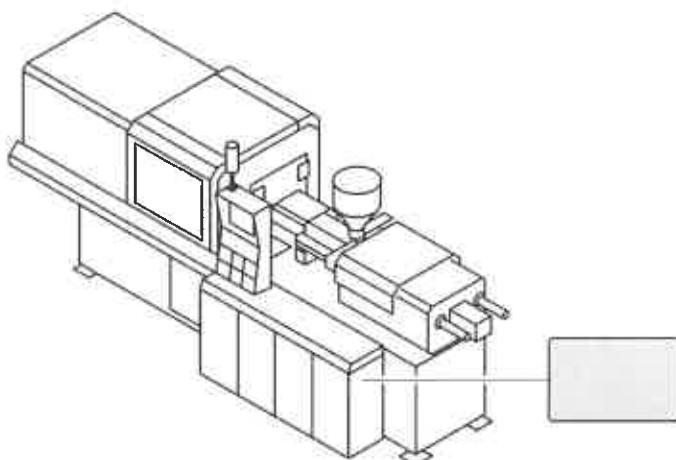
High voltage!

Contact with high voltage is dangerous and can lead to serious or fatal injury.

The connection of the machine to the mains must be carried out by a fully qualified electrician, whereby all safety regulations valid for your country must be observed, and all precautionary safety measures complied with.

Connection values

A serial label with the technical data is located on the control cabinet of the machine.



WARNING

The supply voltage must concur with the operating voltage specified on the serial label and with the mains connection.

Mains connection for the USA and Canada is described later in this chapter.

Residual-current device

When your machine is equipped with a frequency converter and connected via a residual-current device, an all-current sensitive residual-current device with the following characteristics must be used:

- ◆ Type B in accordance with IEC 60755 A2,
- ◆ All-current sensitive (in acc. with EN 50178 chapter 5.2.11.2),
- ◆ Trip current --> 300 mA (no operator safety),
- ◆ Tripping time --> 300 ms.

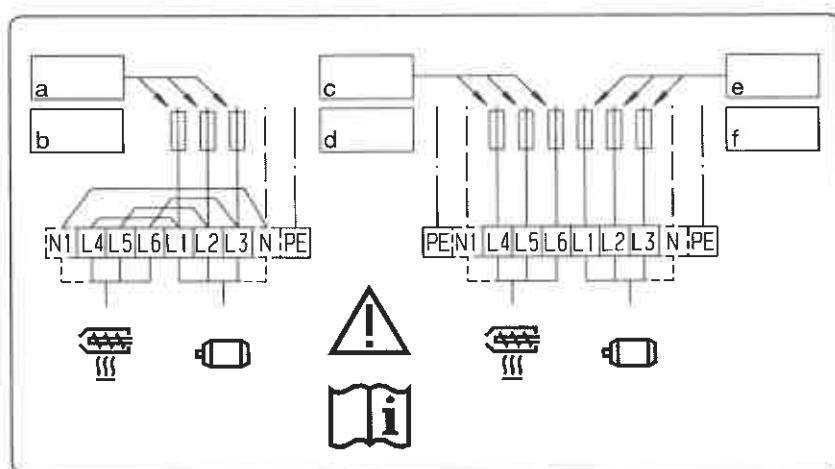
Motor

The machine is driven by a three-phase motor which has already been connected to the control cabinet before leaving the factory.

Supply cable(s) for mains connection

Subject to the size and configuration of the machine, connection to the mains is realised with 1 or 2 supply cables. Two cables are required when the machine is to be operated with the "separate power for motor and heating" connection method. Two supply cables are also required when the total current required is so high that the supply cable cannot be connected together with the bridges.

Which type of connection is stipulated for your machine is to be taken from the information label on the inside of the control cabinet door (see illustration).



- ◆ The values for the back-up fuse are entered in the fields "a", "c" and "e".
- ◆ The prescribed voltage is entered in the fields "b", "d", and "f", as on the serial label.

The connections must only be carried out in accordance with this identification.

Example:

Field a = 63 A	back-up fuse of total nominal current
Field c = 16 A	back-up fuse of heating
Field e = 50 A	back-up fuse of motor

With this specification, the current for the heating and motor can either be connected together or separately.

If however only fields "c" and "e" are marked, the power for the heating and the motor must be connected separately.

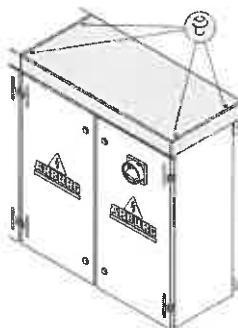
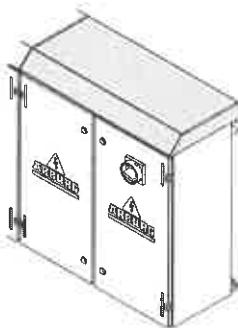
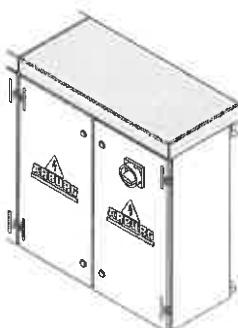
The conductor cross-section must be determined in accordance with the supply cable and the fuse.

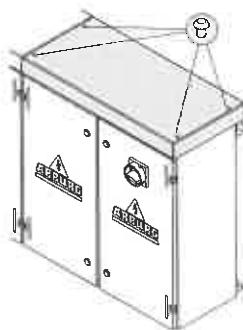
Demounting the cover panel

To connect the power cable, the cover panel on the control cabinet must be demounted.

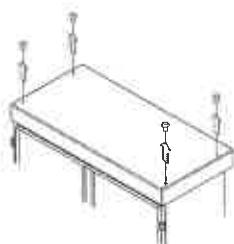
To do this, proceed as follows:

- First you must ascertain which variant of fixation is applicable to your machine:

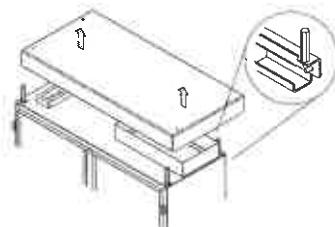
Cover panel with 4 outer screws on top**Cover panel with bevelled front, without outer screws****Cover panel with straight front, without outer screws**

Cover panel with 4 outer screws on top**Removing the screws**

- Unscrew the 4 screws located on the top of the cover and remove them.

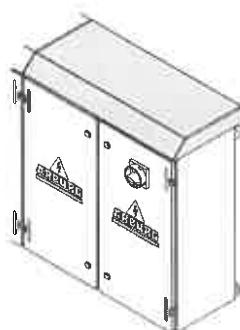
**Removing the cover panel**

- Remove the cover panel.



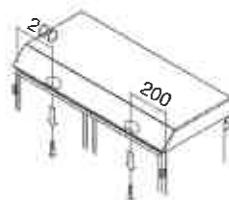
- Guide the power cable through the provided opening in the control cabinet.

**Cover panel with bevelled front,
without outer screws**



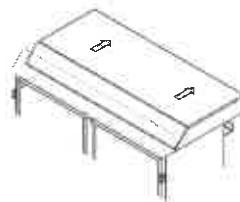
Removing the screws

- Open the doors of the control cabinet.
- Look for the two screws. The distance of each screw to the outer wall of the control cabinet must be 20 cm (7.9").
- Unscrew the two screws and remove them.



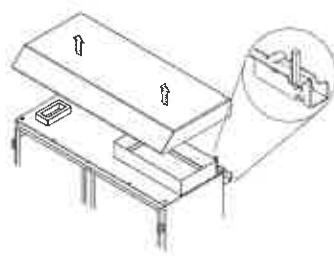
Pushing the cover to the back

- Push the cover panel approx. 5 mm (0.2") towards the back.



Removing the cover panel

- Remove the cover panel.



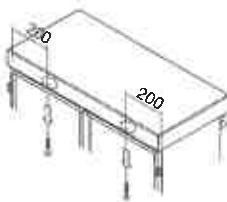
- Guide the power cable through the provided opening in the control cabinet.

**Cover panel with straight front,
without outer screws**



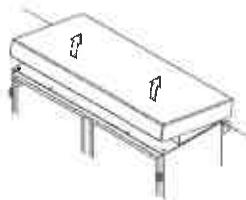
Removing the screws

- Open the doors of the control cabinet.
- Look for the two screws. The distance of each screw to the outer wall of the control cabinet must be 20 cm (7.9").
- Unscrew the two screws and remove them.



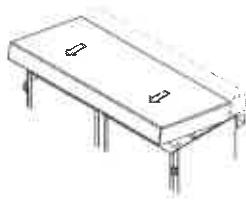
Lifting off the cover

- Lift the front edge of the cover panel slightly.



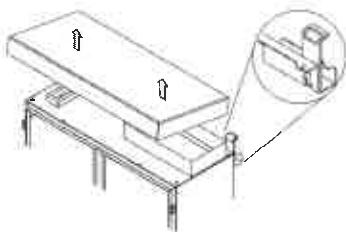
**Pulling the cover panel to
the front**

- Pull the cover panel approx. 1 cm (0.4") to the front.



Removing the cover panel

- Remove the cover panel.



- Guide the power cable through the provided opening in the control cabinet.

Mains connection

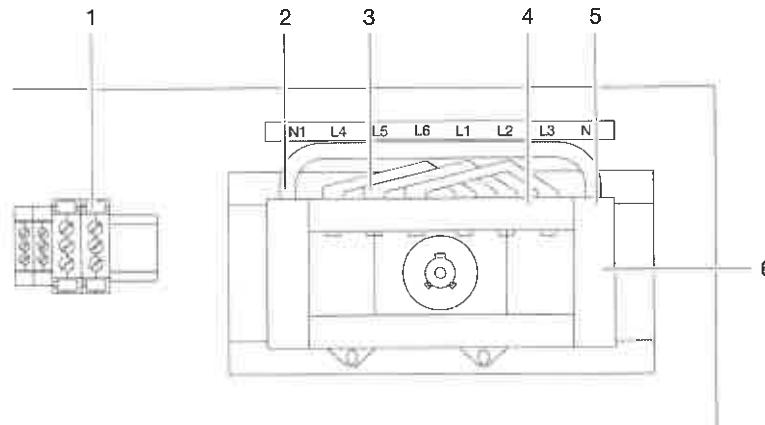
- Guide the power cable through the provided opening in the high-voltage control cabinet.
- Connect the green/yellow earth conductor to the green/yellow earth terminal and the N-conductor to the N-terminal of the main switch.
- Connect the L1, L2 and L3 conductors to the L1, L2 and L3 terminals of the main switch, see illustration.
- Tighten the terminals.
- Make sure that all screwed terminals are firmly tightened. They may have become loose during transport.

Mains connection with separate supply for heating

- Connect the green/yellow earth conductor to the green/yellow PE terminal and the N1 conductor to the N1 terminal.
- Remove the bridges between terminals L1 and L4, L2 and L5, L3 and L6, N and N1.
- Connect the cable for the heating current to L4, L5 and L6.
- Tighten the terminals.

Mounting the cover panel

- Mount the cover panel onto the control cabinet.
- Proceed in reverse order, as described for demounting.

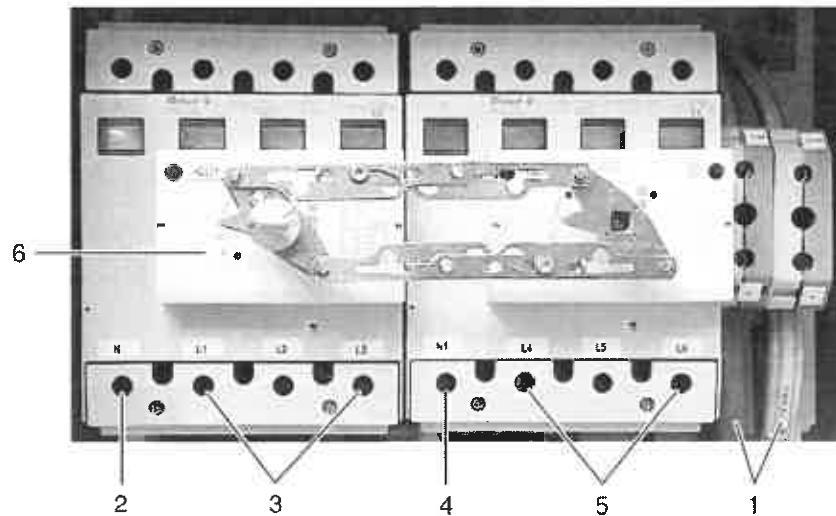
Terminal strip for mains connection

- 1 PE terminal strip
- 2 N1 terminal strip
- 3 L4, L5, L6 terminal strip
- 4 L1, L2, L3 terminal strip
- 5 N terminal strip
- 6 Main switch

If the machine requires very high connection values, it is equipped with an additional high-voltage control cabinet. Mains connection for this execution is shown in the following illustration:

**Mains connection with
additional control cabinet**

(Subject to machine equipment)



- 1 PE terminal strip
- 2 N terminal strip
- 3 L1, L2, L3 terminal strip
- 4 N1 terminal strip
- 5 L4, L5, L6 terminal strip
- 6 Main switch

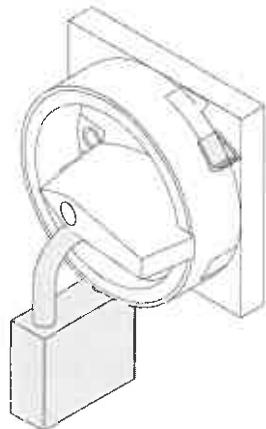

DANGER

High voltage!

Contact with high voltage is dangerous and can lead to serious or fatal injury.

The machine must only be connected to the mains by a suitably qualified electrician.

Tighten all screwed terminals in the control cabinet. If the terminals are not tightened, the main switch and other components may suffer irreparable damage.

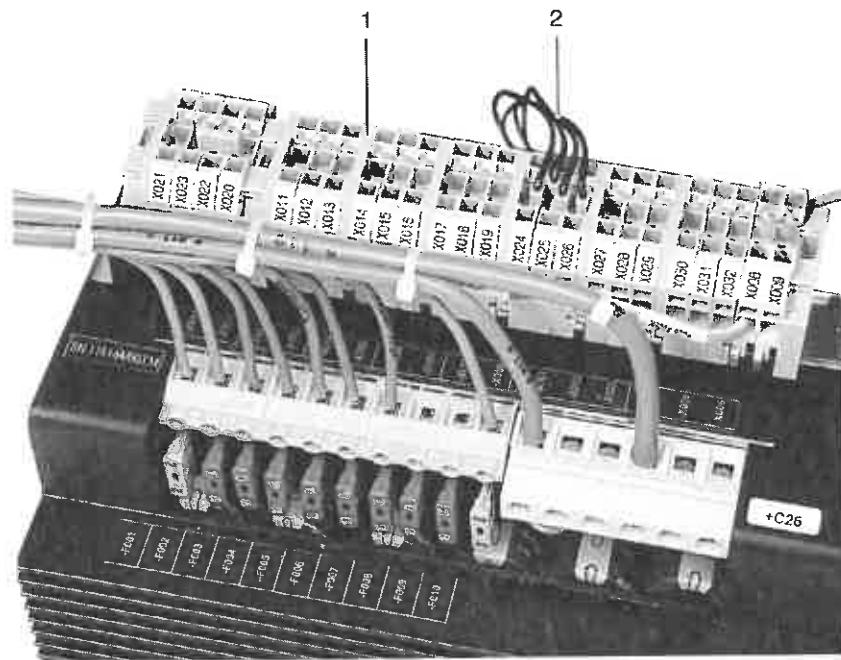


When working on the electric or hydraulic system, always switch off the main switch and secure it with a lock so that it cannot be inadvertently switched on again.

Inspecting/adapting the low voltage

In order to guarantee trouble-free function of the controller and the control elements, the low voltage of the machine must be 24 V (26-28 V in unloaded condition). The low voltage is dependent on the system voltage the machine is connected to.

The low voltage can be changed by varying the connection to the taps on the terminal strip (1) of the transformer (see illustration).



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- Please ensure that the cables L1, L2, L3 and the bridges (2) are connected in accordance with the available system voltage by referring to the table on the transformer or in the circuit diagrams.

A reassignment must only be carried out by a suitably qualified electrician under observance of the safety regulations.



WARNING

See also group 2 circuit diagram (low voltage supply).

The set of circuit diagrams is to be found in the control cabinet of the machine.

Mains connection for USA, Canada

The following information on the mains connection applies only to machines in the USA and Canada.

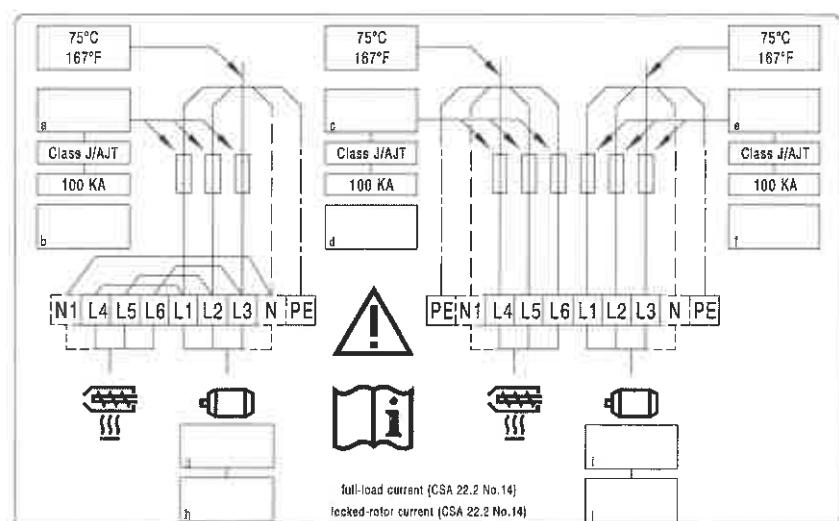
Motor

The machine is driven by a three-phase motor which has already been connected to the control cabinet before leaving the factory.

Supply cable(s) for mains connection

Subject to the size and configuration of the machine, connection to the mains is realised with 1 or 2 supply cables. Two cables are required when the machine is to be operated with the "separate power for motor and heating" connection method. Two supply cables are also required when the total current required is so high that the supply cable cannot be connected together with the bridges.

Which type of connection is stipulated for your machine is to be taken from the information label on the inside of the control cabinet door (see illustration).



- ◆ The values for the back-up fuse are entered in the fields "a", "c" and "e".
- ◆ The prescribed voltage is entered in the fields "b", "d", and "f", as on the serial label.
- ◆ The motor capacity is stated in the fields "g" and "i" in kW and hp. The indicated motor capacity applies to the drive of the hydraulic pump, any connected electrically driven auxiliary axes are not included.
- ◆ The fields "h" and "j" contain the values for
 - "full-load current"
 - in accordance with CSA 22.2 no. 14 table 18 and
 - "locked rotor current"
 - in accordance with CSA 22.2 no. 14 (the locked rotor current is six times the current indicated in table 18).

- ◆ The temperature values given in °C and °F are the maximum permissible temperatures for the connection line.
- ◆ The specifications Class J / AJT and 100 kA are provided to help select the correct mains fuse (fuse type by Ferraz Shawmut Inc. Newburyport, MA 01950 USA. Other fuse types may also be used if they have the same characteristic values).

The connections must only be carried out in accordance with this identification.

Example:

Field a = 63 A	back-up fuse of total nominal current
Field c = 16 A	back-up fuse of heating
Field e = 50 A	back-up fuse of motor

With this specification, the current for the heating and motor can either be connected together or separately.

If however only the fields "c" and "e" are marked, the current for the heating and motor must be connected separately.

The conductor cross-section must be determined in accordance with the supply cable and the fuse.

- Now proceed with the mains connection as described in the previous pages.

1.1.8 Filling the system with hydraulic oil

Oil quantities

See chapter 9.9 for selection of permissible oil types.

Alternative hydraulic fluids must not be used without our explicit written consent - otherwise no guarantee!

Please take the required oil quantities from the following table:

Machine model	Oil quantity (subject to the equipment installed on the machine)	
370 A	0 litres / 0 US gall.	
	40 litres / 10.6 US gall.	
470 A	0 litres / 0 US gall.	
520 A		
570 A		
630 A	40 litres / 10.6 US gall.	≤ 5,5 kW
720 A		
820 A	80 litres / 21.1 US gall.	≥ 7,5 kW
920 A		

NOTICE

The hydraulic oil must only be filled through an ultra fine, 3 µm filter system.

This also applies to new hydraulic oil, which does not always correspond to the specified purity grade of 18/15/12.

If this is not observed the hydraulic components such as pump and control valves can suffer damage.

Ultra fine filter system

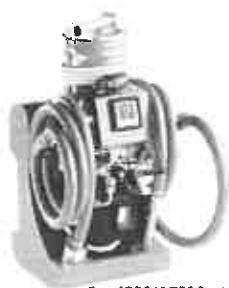
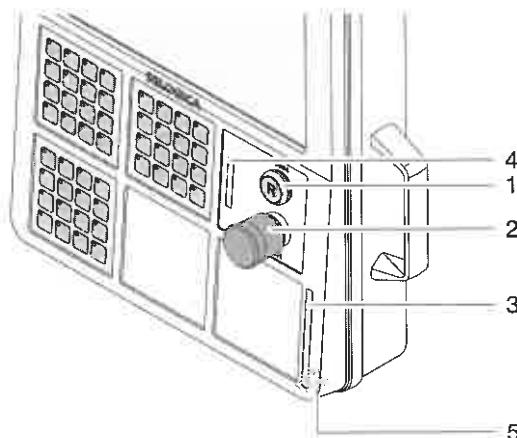


Foto: ARGO-HYTOS GmbH

Calling up the oil level display

The machine must have been previously connected as described in chapter 1.1.7.

- Set main switch to "I" (red/yellow switch on control cabinet).
- When the request to "press controller start key" is displayed, press the controller start button under the screen of the monitor.
- The alarm message "Alarm S925 oil level" "Oil level below min." is displayed on the monitor.
The pump motor cannot be switched on.



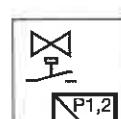
- 1 Controller start key
- 2 Emergency stop switch
- 3 Reading device for transponder cards (user access rights)
- 4 Reading device for CompactFlash (memory medium)
- 5 USB interface for PC keyboard

Calling up the parameter screen page

Call up the "Production control" main group with this key.



Call up the "Valves/switches" superior group with this key.



Call up the "Valves/switches control circuit" parameter screen page with this key.

Filling the system with oil

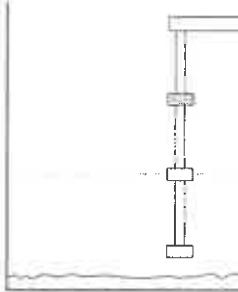
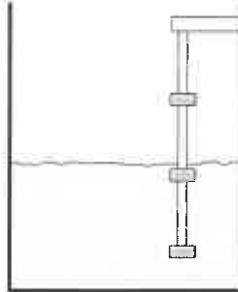
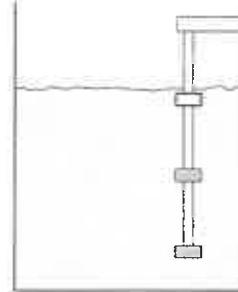
- Unscrew the oil tank lid with air filter at the front of the machine base (to the left).
- Pour in the oil. Observe the handling and storing recommendations of the fluid manufacturer and fill the system with pre-filtered hydraulic fluid only. Contaminations in the oil can lead to malfunctions!
- While filling in the oil, watch the positions S923, S924 and S925 in the parameter screen page "Valves/switches control circuits". You will find an explanation of the valve and switch displays in chapter 8.1.

Switch display on machine without oil filling:

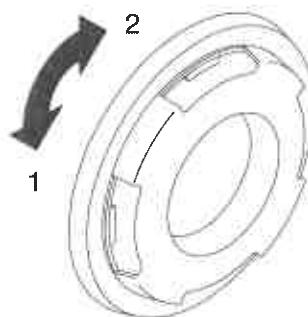
- ◆ S923 = marked,
- ◆ S924 = not marked,
- ◆ S925 = not marked.
- Keep filling with oil until S925 is marked.
- Now fill more slowly until S924 is also marked.
- Pour in another 10 litres approx.
- S923 must remain marked!
 - If you pour in too much oil, the marking at S923 will be erased and the motor can not be switched on.

Switch display with oil filled to correct level:

- ◆ S923 = marked,
- ◆ S924 = marked,
- ◆ S925 = marked.

	no or too little oil	correct oil level	overfilled
S923			
S924			
S925			
	Motor cannot be switched on		Motor cannot be switched on

- Replace oil tank cover with air filter and turn to the right to close.



- 1 Open
2 Close

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NOTICE

After filling or refilling the system with hydraulic oil:

- ◆ Let the oil degas for at least one hour before switching on the pump motor, because air bubbles penetrate the system during the filling operation.

NOTICE

Before setting into operation, the direction of rotation of the motor must be checked (see chapter 1.1.9).

Set low speeds and pressure values for the first axis movements. This allows any air that is still trapped in the hydraulic system to escape gently.

Then load the start program from the Compact-Flash system and vent the whole hydraulic system as described in chapter 9.8.4.

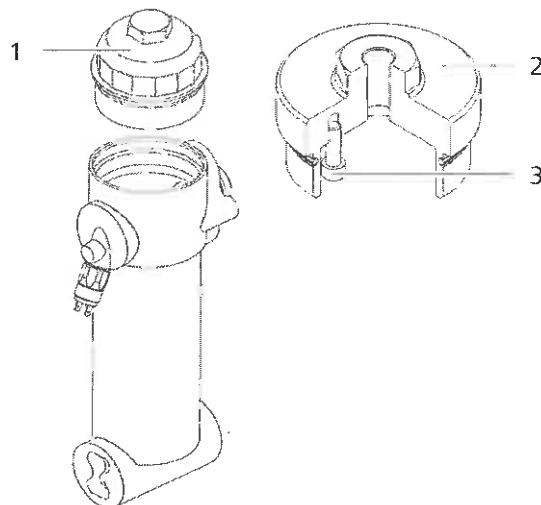
It may be necessary to top up the oil level after a few axis movements have been carried out.

1.1.8.1 Filling in the hydraulic oil through the filler lid on the oil filter

The hydraulic oil can be filtered when it is filled in through the oil filter in the hydraulic circuit of the machine. For this purpose, a special filler lid must be mounted on the filter housing.

To connect the pump, a M18 x 1.5 thread is provided in the filler lid. The maximum conveying capacity of the pump must not exceed 20 l/min to assure good filtration.

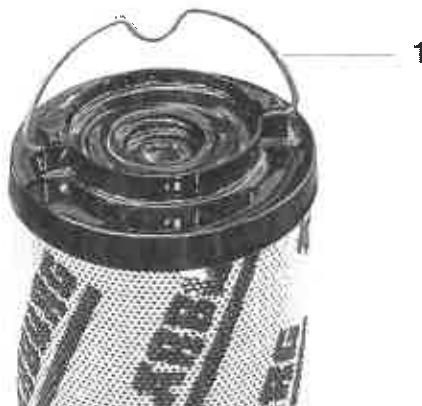
After filling in the hydraulic oil, the filter element need not be changed.



- 1 Lid of filter housing
- 2 Filler lid (material number 368937)
- 3 Socket head screw

Mounting the filler lid

- Remove the lid on the filter housing with a ring spanner (WS 36).
- Pull out the filter element and remove the removal handle.



1 Removal handle

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INFORMATION

The filter element is fixated in the filter housing with the socket head screws on the filler lid.

The removal handle on the filter element impairs the function of the socket head screws and must therefore be removed.

Filling the system with hydraulic oil

- Mount the filler lid on the filter housing with a ring spanner (WS 41).
- Connect the pump to the filler lid.
- To fill in the oil, proceed as described in the "Filling the system with hydraulic oil" chapter.

Demounting the filler lid

- Disconnect the pump from the filler lid.
- Demount the filler lid from the filter housing.
- Check the seat of the compression spring in the lid of the filter housing.

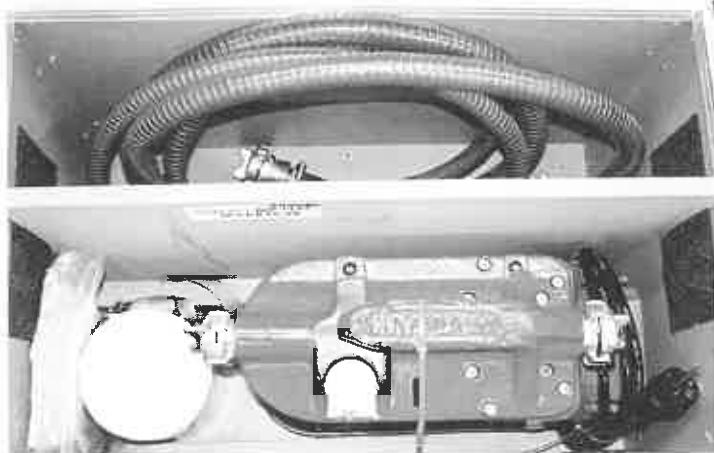


- Mount the lid on the filter housing.
- After setting into operation, check the filter housing for leakage.

**Assembly tool kit
micro filter unit**

The hydraulic oil can also be filled into the oil container through a separate micro filter unit.

For this purpose, you can rent an assembly tool kit with accessories from ARBURG.



The assembly tool kit (material number 530097) comprises the following items:

- ◆ Micro filter unit, material number 529475
- ◆ Spare filter element, material number 529476
- ◆ Various coupling and connection elements.

1.1.8.2 Venting the hydraulic pump

Before setting the hydraulic pump into operation, ensure that the pump is completely filled with oil.

NOTICE

Risk of damage if incorrectly operated!

The hydraulic pump must only be set into operation when it is filled with oil.

Before setting the hydraulic pump into operation, it must be vented.

The pump must also be vented after the following situations:

- ◆ transport of the machine without oil,
- ◆ oil change,
- ◆ installation of a new hydraulic pump,
- ◆ maintenance work on the hydraulic system,
- ◆ all work during which air could have penetrated the hydraulic system.



WARNING

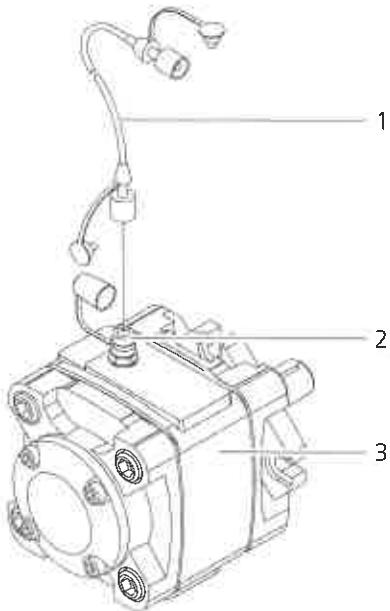
Danger of crushing injuries if the safety devices are not mounted!

Risk of injury from escaping fluids!

This work must only be carried out by suitably trained persons.

During this work switch off the main switch and safeguard it with a lock against inadvertent re-switching on.

- Remove the cover panels under the injection unit.



- 1 Measuring hose
- 2 Measuring terminal
- 3 Hydraulic pump

- Unscrew and remove the protective cap on the measuring terminal of the hydraulic pump.
- Connect the measuring hose (1) to the measuring terminal (2).
- Attach the open end of the measuring hose so that outflowing hydraulic oil is conducted into the oil tank.



WARNING

Risk of injury from escaping fluids!

Ensure that the measuring hose is attached in such a way that no person can be injured by the outflowing hydraulic oil.



WARNING

Risk of injury from moving machine components!

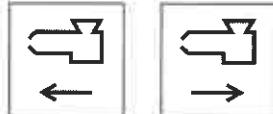
Ensure that no other persons are in the danger area.

- Switch the machine on.
 - The machine should now start to pre-heat the oil. The hydraulic pump circulates the oil.
 - After a few seconds oil will emerge from the open end of the measuring hose.

If the machine does not start circulating oil, you must carry out the venting procedure manually.

- To do this, advance and retract the injection unit a few times manually.

Press these two keys alternately.



- As soon as oil emerges from the measuring hose, the pump is vented.
- Switch the machine off.
- Secure the main switch against re-switching on.
- Remove the measuring hose.
- Close the measuring terminal.
- Reattach the protective panels.
- Remove the safeguard on the main switch.

1.1.9 Checking the direction of rotation of the pump motor

Switching on the motor

The motor must not be switched on if there is no hydraulic oil in the tank!

After filling the tank with hydraulic oil (see chapter 1.1.8), it is very important to check the direction of rotation of the motor.



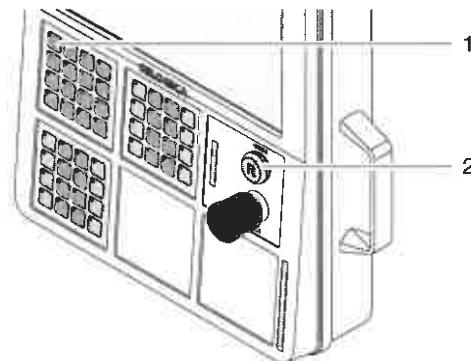
DANGER

Work on the low-voltage system must only be undertaken by an adequately qualified electrician.

When carrying out work on the low-voltage system, the power supply to the machine must be disconnected and secured so that it cannot be inadvertently switched on again.

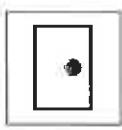
To do this, switch on the machine (after first reading section 1.4.1 "Switches")

- Turn the main switch to "I" (red/yellow switch on front door of control cabinet.)



- 1 Motor on/off
- 2 Controller start key

- When the request to "press controller start key" is displayed, press the controller start button under the screen, see illustration.



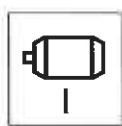
Call up the "Production control" main group with this key.



Call up the "Valves/switches" superior group with this key.



Call up the "Valves/switches of hydraulic circuits" parameter screen page with this key.



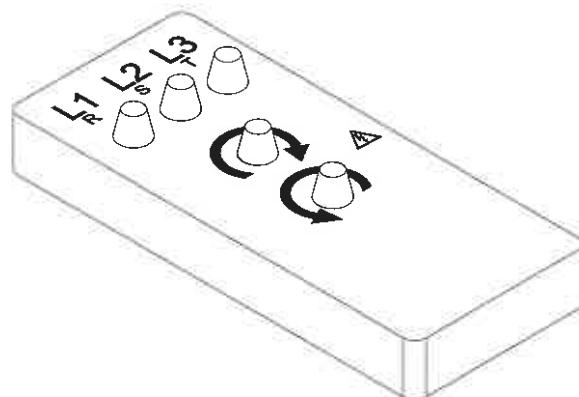
Switch the motor briefly on and off again with the "Motor on/off" key on the operating panel (min. 5 s, max. 10 s).

- Hereby observe parameter B908A which is displayed in the "Actual values 1" parameter screen page.
This value must reach over 30 bar within a short time.
 - ◆ YES
All OK. You can ignore the next points.
 - ◆ NO
The machine must not be operated in this state. Proceed to the next point.
- Switch the machine off again immediately.
- Cut off the power supply (disconnect the power plug).
- Exchange two of three connection wires L1, L2, L3 of the power cable on the terminal strip inside the control cabinet (see chapter 1.1.7 "Electrical connections").
- Check the direction of rotation of the motor again (as outlined above).

Phase rotation indicator

With some machines it is not possible to test the direction of rotation of the electric motors by observing the fan blade or the pressure displayed on the screen.

For these machines a special measuring device is required to check the direction of rotation.



- Connect the phase rotation indicator to L1, L2, L3.
 - The "clockwise rotary field" indicator must light up.
- If the "anti-clockwise rotary field" indicator lights up, switch off power supply immediately.
- Exchange two of the three connection wires L1, L2, L3 on the terminal rail in the control cabinet.

Checking/changing the phase rotation of the temperature control unit

On all-electric machines the direction of rotation of the electric motors must always be checked on the temperature control device.

Checking the direction of rotation of the pump motor

ARBURG

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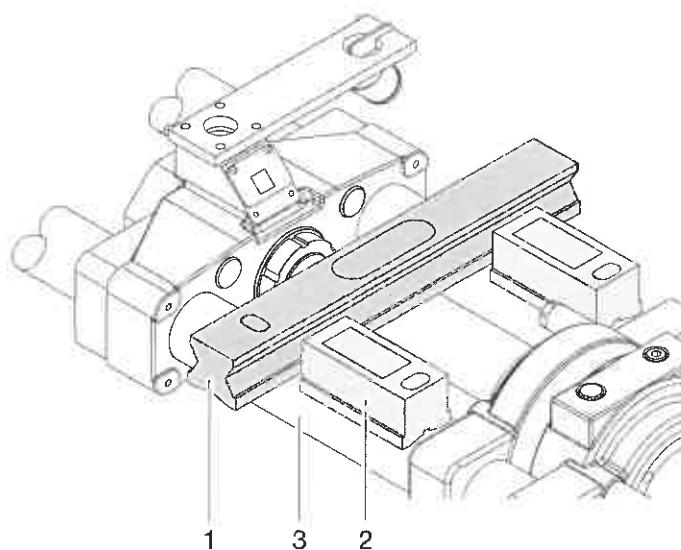
1.1.10 Adjusting the nozzle centre

When the machine has been correctly aligned, the nozzle centre will also be correct. An inspection and/or adjustment of the nozzle centre only becomes necessary when:

- ◆ repair or maintenance work has been carried out on the injection unit.

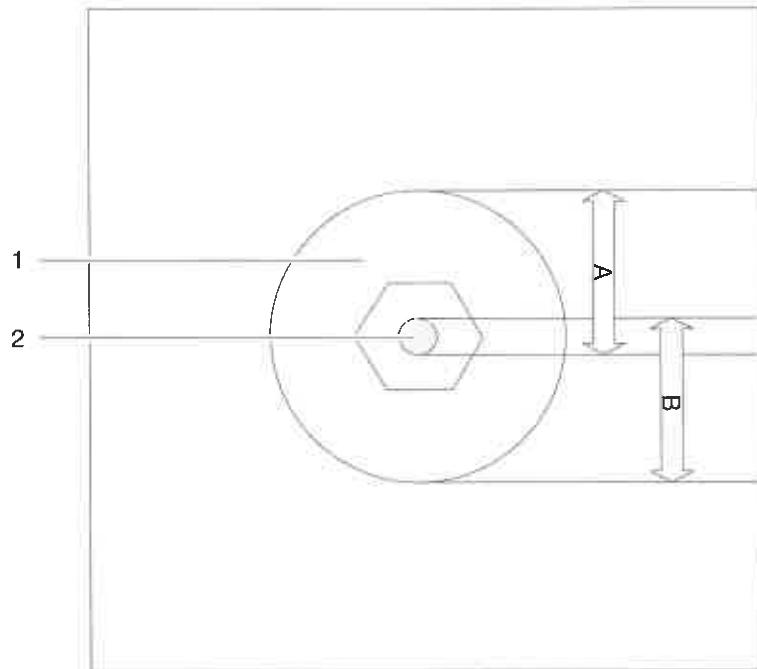
Vertical adjustment of the nozzle centre (applies only to injection units mounted on guide rails)

- Remove the injection mould.
- Advance the nozzle into the locating hole of the fixed mould platen until it is flush with the mounting surface of the mould.
- Retract the screw fully.
- Place an industrial spirit level (1) (with a resolution of 0.1 m/mm) transversely across the two guide cylinders (3) of the injection unit and a second industrial spirit level (2) on the guide cylinder in the longitudinal plane.
- Loosen the socket head screws (3) in the injection unit supports (see illustration page 3).
- Adjust the supports with the adjustment screws (5) so that the injection unit is truly horizontal, tolerance 0.1 mm/m. Ensure that the bearing blocks are not tilted.



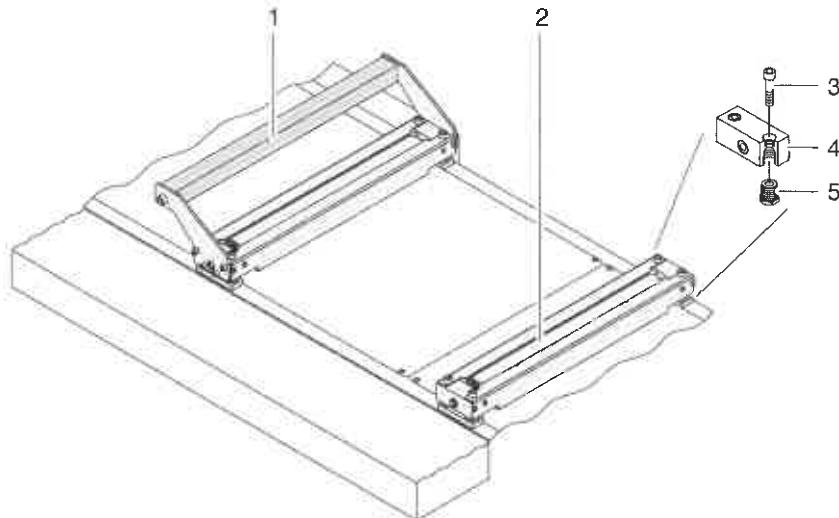
- | | |
|---|-------------------------|
| 1 | Industrial spirit level |
| 2 | Industrial spirit level |
| 3 | Guide cylinder |

- Using callipers, measure the vertical clearance of "A" and "B" between the bore of the nozzle tip and the locating hole (see diagram).



- 1 Locating hole in fixed mould platen
- 2 Nozzle bore
- A Dimension A
- B Dimension B

Adjusting the nozzle centre
Injection unit 170 E (applies only to injection unit on guide rails)



- 1 Injection unit support with safety bar (applies only to ALLROUNDER 320 A / 370 A, subject to the machine equipment installed)
- 2 Injection unit support
- 3 Socket head screw
- 4 Bearing block
- 5 Adjustment screw

- If there is a difference between dimension "A" and dimension "B", adjust all 8 socket head screws evenly until "A" = "B".
- Ensure that all 8 screws are adjusted evenly. The horizontal alignment must remain true (test with spirit level).
- Insert the socket head screws (3) again and tighten them.
- Check the nozzle centre and horizontal alignment again. (When the nozzle centre and horizontal level are correct, it must be possible to pull the injection unit easily out of the tie-bar supports.)



INFORMATION

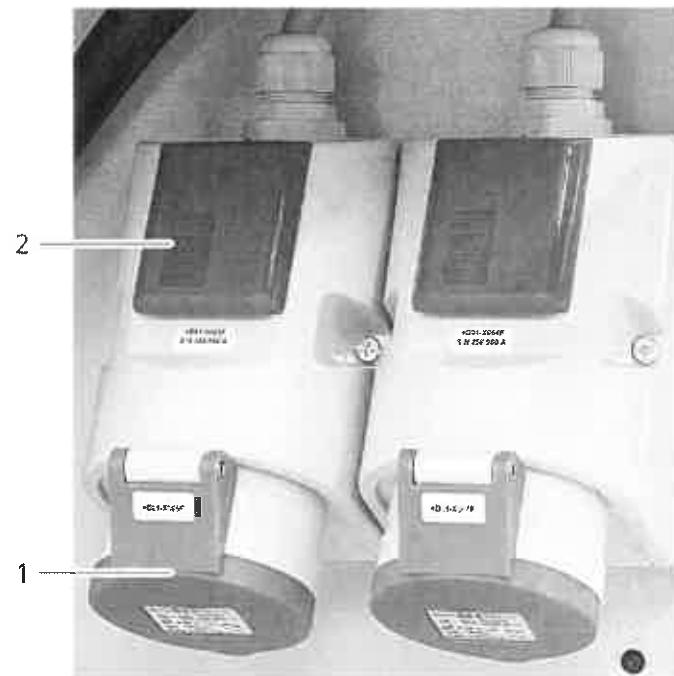
If the injection unit of your machine is mounted on a rotary bearing, the nozzle centre can only be determined when the machine (in particular the injection unit) has been correctly aligned. This means, when the alignment is correct, the nozzle centre will be automatically correct too.

See also chapter 1.1.5.

1.1.19 Sockets for additional devices

Depending on the version of your machine, it can be equipped with one or more three-phase sockets (1) and single-phase sockets (2).

These sockets are safeguarded by a standard 16 A automatic circuit breaker and are only suitable for additional and peripheral devices of the machine. The sockets and thus the additional devices are switched off together with the automatic shut-down function of the machine.



- 1 Three-phase socket
- 2 Single-phase socket

If the sockets are marked with the following label, there is no residual-current safeguard:



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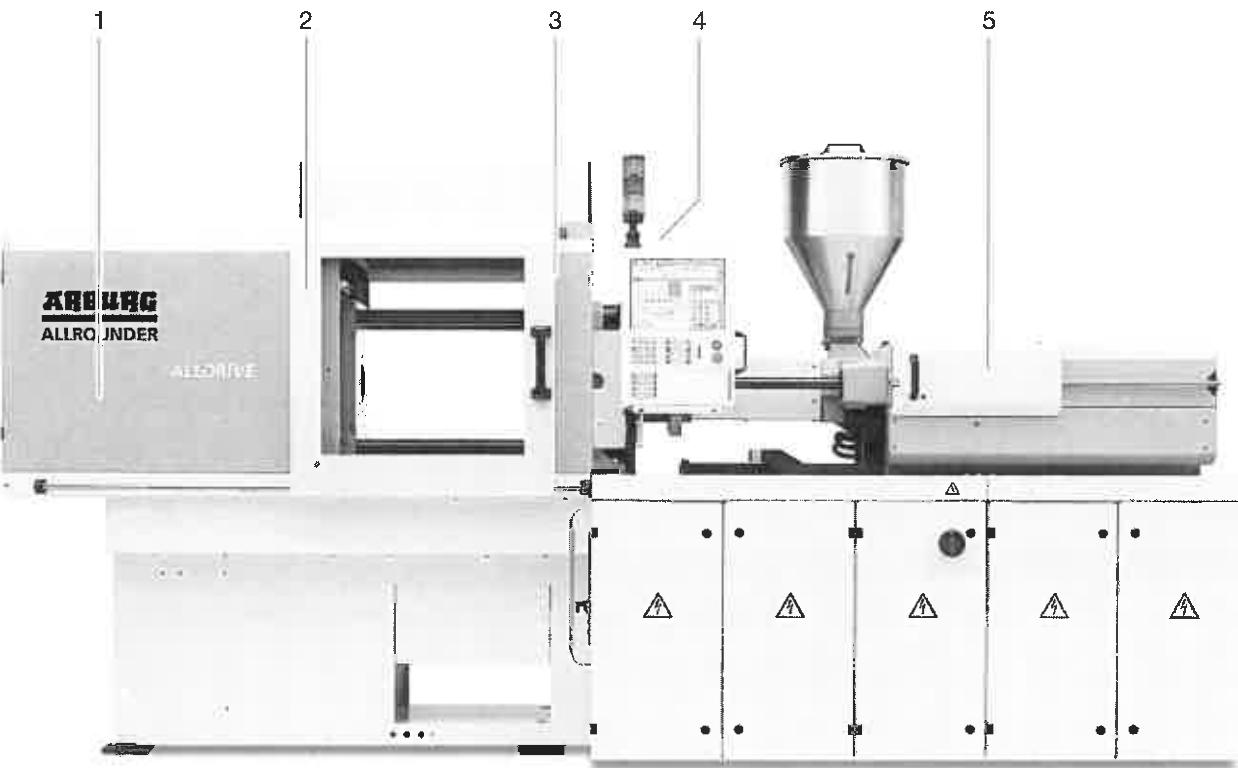
INFORMATION

If your machine is equipped with a residual-current device, you will find more information in 1.1.20, and whether type A or type B is installed.



1.2 Inspecting the safety devices

1.2.1 Overview of the safety devices



- 1 Clamping unit safety panel, see 1.2.2
- 2 Clamping unit safety switch, see 1.2.2
- 3 Contact rail safety switch, see 1.2.2
(on power-driven safety gate, not standard)
- 4 Injection unit safety switch, see 1.2.3
- 5 Injection unit safety panel, see 1.2.3



WARNING

Inspect the safety equipment:

- ◆ after each mould change,
- ◆ at the start of each shift (non continuous operation)
- ◆ once a week (continuous operation).

Hereby ensure that the safety equipment:

- ◆ is in the specified condition,
- ◆ is in the specified position,
- ◆ is securely and correctly attached,
- ◆ and functions as prescribed.

Use the check lists on the following pages for each inspection.

Any malfunctions must be corrected before the machine is set into operation.

The machine must be switched off immediately if any malfunctions occur during operation.

Such malfunctions are to be rectified by qualified personnel only!

Do not change or remove any safety equipment! Do not eliminate the effect of a safety device by modification to the machine!

If you are not using the clamping or injection unit in a horizontal operating position, or if peripheral devices or additional equipment are connected to the machine, the respective safety equipment must also be inspected (refer to the respective chapter on additional equipment or in the case of peripheral devices see manufacturer's handbook).

1.2.2 Inspecting the safety devices on the clamping unit

Check list

Use the following pages as a check list when inspecting the safety devices. Photocopy them for use with the regular inspections. Tick off each point when it is in order.

Calling up the screen page



Call up the "production control" main group with this key.



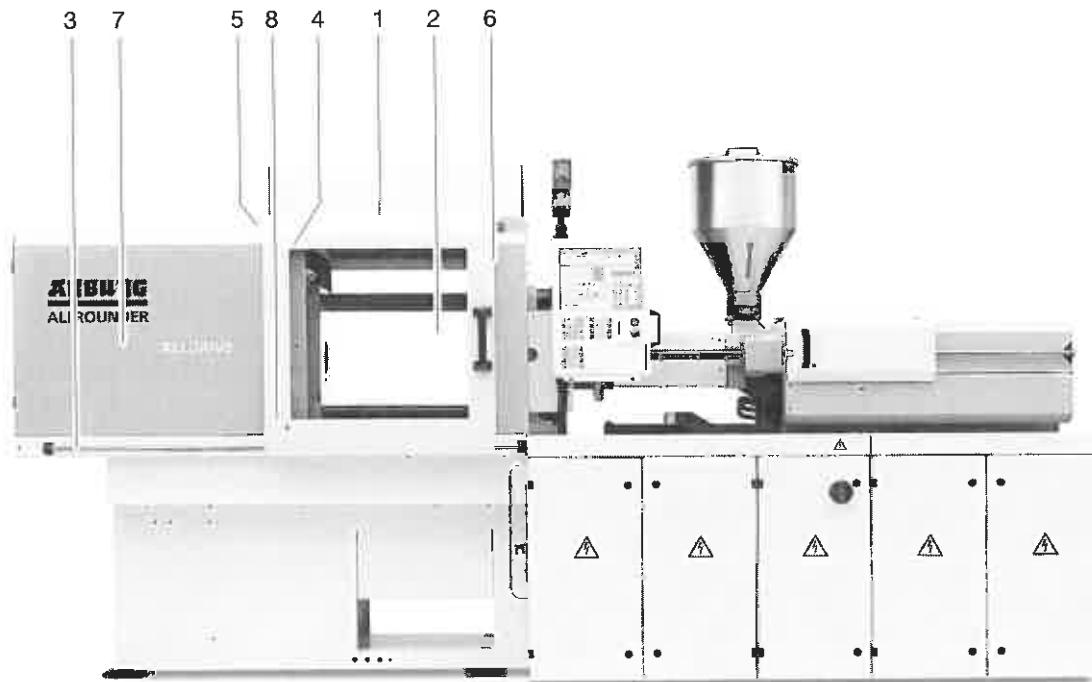
Call up the "Valves/switches" superior group with this key.



Call up the "Valves/switches of Safety Gate" parameter screen page with this key.

- Here the status of each switch is displayed.

You will find a detailed explanation of the valve and switch displays in chapter 8.1.



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1. Safety gate (clamping unit); must be securely installed and slide easily on the guide rail. The guide elements for the safety gate must be fully installed.

2. The viewing panels on the safety gate must be securely installed.

3. The guide rails for the safety gate must be securely attached.

4. Safety switch on front safety gate:

Monitor display when safety gate open:

- ◆ S151A = "marked"
- ◆ S151B = "marked".

Monitor display when safety gate closed:

- ◆ S151A = "not marked"
- ◆ S151B = "not marked".

Safety switch S152:

Monitor display when safety gate closed:

- ◆ S152 = "not marked"

5. Safety switch on rear safety gate

Monitor display when safety gate open:

- ◆ S153A = "marked"
- ◆ S153B = "marked".

Monitor display when safety gate closed:

- ◆ S153A = "not marked"
- ◆ S153B = "not marked".

Safety switch S154:

Monitor display when safety gate closed:

- ◆ S154 = "not marked"

6. Safety rails (only with hydraulic safety gate, not standard); The safety gate must open when the safety rail is actuated during the closing movement.

Monitor display during closing movement of safety gate:

- ◆ S161 / S162 = "marked".

7. The protective panel of the clamping unit must be completely installed.

The safety panels (protection against reaching into the mould) on the machine base must be correctly installed (see section 7.1.1).

8. Safety switch with lock:

Front safety gate:

Monitor display when safety gate open:

- ◆ S152 = "marked".

Monitor display when safety gate closed:

- ◆ S152 = "not marked".

Rear safety gate:

Monitor display when safety gate open:

- ◆ S154 = "marked".

Monitor display when safety gate closed:

- ◆ S154 = "not marked".

9. The safety gates are locked during all machine movements. It must not be possible to open either safety gate during a machine movement (see chapter 8.6.1).

Machine
model:

Machine no.: _____

Date of
inspection:

Inspector
(signature):

1.2.3 Inspecting the safety devices on the injection unit

Check list

Use the following pages as a check list when inspecting the safety devices. Photocopy them for use with the regular inspections. Tick off each point when it is in order.

Calling up the parameter panel



Call up the "Production control" main group with this key.



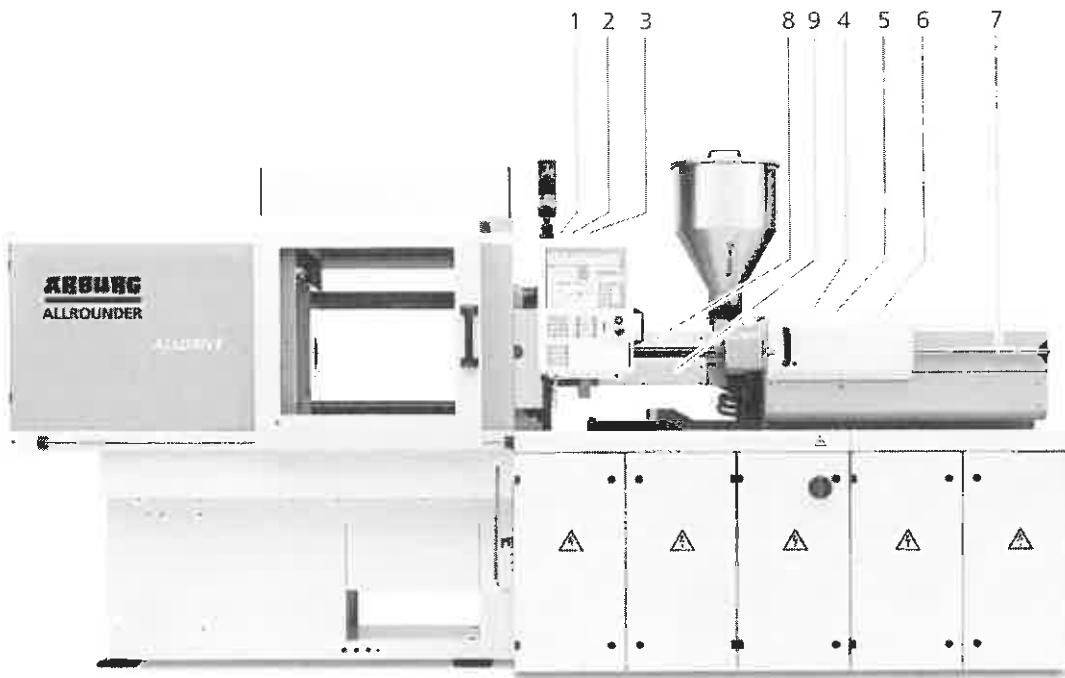
Call up the "Valves/Switches" superior group with this key.



Call up the "Valves/switches Safety Gate" parameter panel with this key.

- Here the status of each switch is displayed.

You will find further explanations on the valve and switch displays in chapter 8.1.



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1. Upper nozzle cover;
Must be completely closed during operation.

On-screen display when nozzle cover open:
◆ S202 = "marked".

On-screen display when nozzle cover closed:
◆ S202 = "not marked".
2. Actuation element (2) on the nozzle cover
it must lock into the switch (3) on the support of the injection unit.
3. Switch located on the support (nozzle side on the fixed clamping platen)
must be securely mounted.
4. Screw cover;
must be fully installed and closed during operation.

On-screen display when screw cover open:
◆ S204 = "marked"

On-screen display when screw cover closed:
◆ S204 = "not marked".
5. Plug connector on moving panel (5);
it must engage in the counter piece (4) when the screw cover is completely closed.

6. Groove nut (6) which secures cylinder; must be tightened and secured.
7. Panels of screw cover are complete and securely installed.
8. Upper cover of plasticising cylinder (8) must be installed.
9. Lower cover of plasticising cylinder (9) must be installed.

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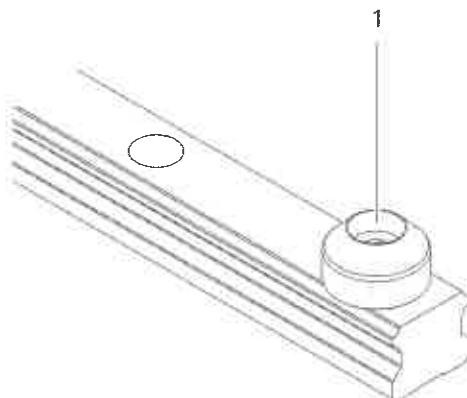
Prescribed function:

Machine movements are only possible when

- ◆ the injection unit is inserted,
- ◆ the screw cover is completely closed,
- ◆ the nozzle cover is completely closed

Date of inspection: _____ Inspector (signature): _____

1.2.3.1 Inspecting the end limit bolt on the linear guide



1 End limit bolt on linear guide

An end limit bolt is mounted onto the end of the linear guide of the injection unit.



WARNING

Risk of injury from falling injection unit.

This serves as a stop and prevents the injection unit from falling off the guide rails when it is pulled back.

The end limit bolt must always be installed and securely attached.

The screws attaching the injection unit to the fixed mould mounting platen must only be loosened when the end limit bolt at the end of the linear guide is installed and securely fastened.

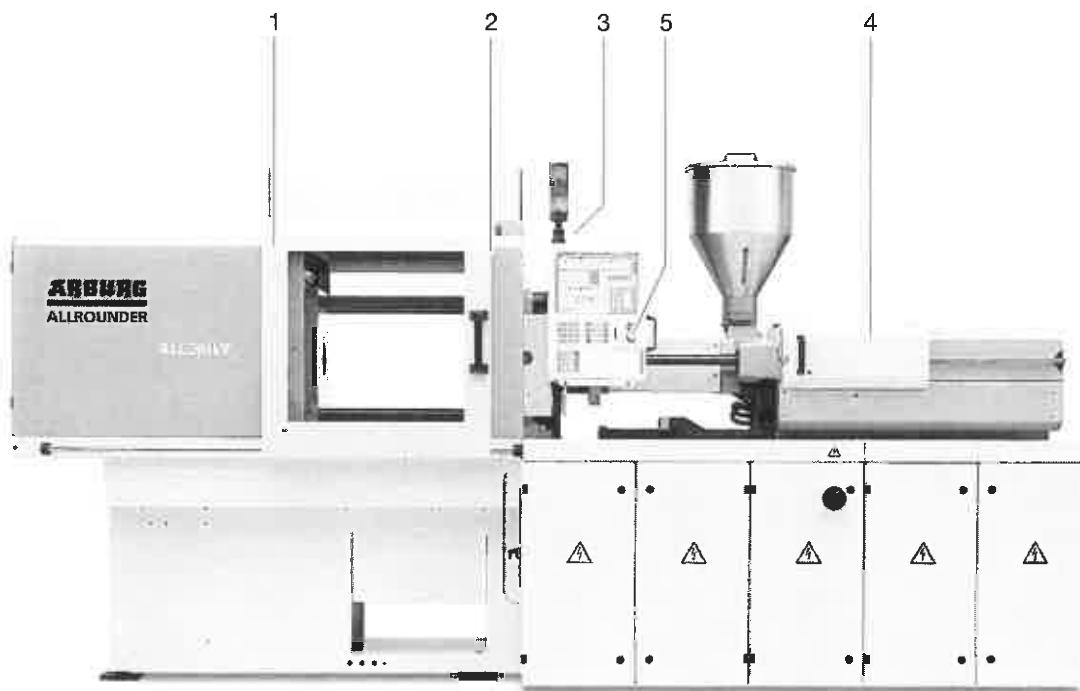
Inspecting the end limit bolt on the linear guide

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1.2.4 Overview of the switch designations, safety devices of the ALLDRIVE



- 1 Front safety gate: clamping unit S151A + S151B + S152
Rear safety gate: clamping unit S153A + S153B + S154
- 2 Safety rail S161/ S162 (optional)
- 3 Nozzle cover S202
- 4 Screw cover S204
- 5 Emergency stop S191

1.2.5 Inspection of the hose assemblies



DANGER

Danger of fatal injury!

If the hydraulic hose assemblies become damaged, the pressurised hydraulic fluid can squirt out of the hoses in a fine spray.

This spray can cut like a knife and penetrate the skin causing toxic poisoning. If injuries caused by the penetration of hydraulic fluid or grease occur, a doctor must be consulted immediately.

Never touch a spray of escaping hydraulic fluid! Switch off the machine immediately and repair the damage.

Hydraulic hose assemblies

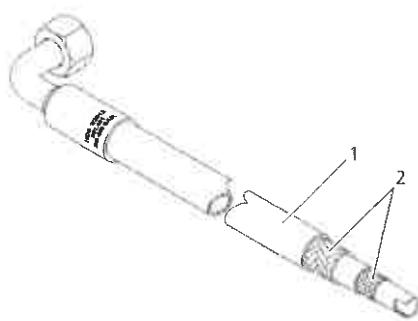
All hydraulic hose assemblies on your injection moulding machine are to be inspected at least once every 5,000 operating hours with regard to their operating condition. This inspection must be carried out by a specialist.

A specialist is a fully qualified person who has undergone specific training and has experience in the field of hydraulic hose assemblies. He should be completely familiar with all state-prescribed regulations of safety and accident prevention as well as with all guidelines and generally recognised rules applying to this technology, so that he is in a position to judge the safe working condition of the hydraulic hose assemblies.

Possible defects

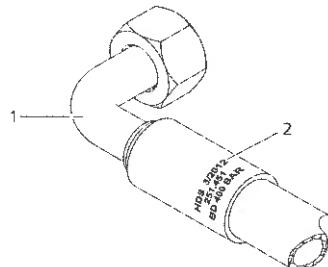
The following examples illustrate possible defects which require an immediate replacement of the hydraulic hose assemblies.

- ◆ The outer layer of the hydraulic hose assembly is damaged up to the lining (chafed sections, cuts or cracks).
- ◆ The outer layer is brittle (cracks in the hose material).
- ◆ The hydraulic hose assembly is deformed or deforms in a pressurised or depressurised state, for example when bent, resulting in layer separation, the formation of blisters, buckling or kinking.
- ◆ The hydraulic hose assembly leaks.



1 Outer layer
2 Lining

- ◆ The hydraulic hose assembly drifts out of its fitting.
 - ◆ The fitting is damaged or deformed (stability of the fitting or the connection of the hose/fitting is impaired).
 - ◆ The fitting is corroded and the function and stability impaired.
 - ◆ The stipulated period of use is exceeded (see date of manufacture on the hose fitting).



- 1 Fitting
- 2 Date of manufacture

Cooling water hoses

In the same way as the hydraulic hose assemblies, the cooling water hoses on the injection moulding machine must also be inspected regularly (at least once every 5,000 operating hours).

Hot water hoses

Observe the regulations of the hose manufacturers and the operational safety standards (BetrSichV) when using steam or hot water hoses. The inspection periods and the period of use for steam and hot water hoses are considerably shorter.

By regularly inspecting your water hoses you can help to prevent potential dangers and leakages and their consequences.

Possible defects

The following examples show the most critical defects which can make it urgently necessary to replace the water hoses or the connection fittings.

- ◆ The outer layer is damaged (chafe marks, cuts or cracks).
 - ◆ The hose assembly is deformed or has kinks.
 - ◆ The hose assembly leaks.
 - ◆ The seat on the connection fitting is defective.
 - ◆ The connection fitting is damaged.



CAUTION

Defective hoses and fittings present a risk of scalding and also of flooding.

Danger of burns from steam or hot water hoses.

Water hoses must be inspected at least every 5,000 operating hours.

1.2.6 Replacement of parts after natural ageing

Hydraulic hose assemblies

Hydraulic hose assemblies are subject to a natural ageing process. This limits the period of use. The operating authority of the injection moulding machine is responsible for ensuring that the hydraulic hose assemblies are replaced within the prescribed time period, even if there is no indication of a technical defect or malfunction on the hydraulic hose assembly.

Under normal conditions, the period of use should not exceed 6 years from the date of manufacture of the hose assembly.

Under more difficult conditions, e.g. multi-shift operation and short cycle times, the maximum period of use for the hydraulic hose assemblies is 2 years.

Replacing the hydraulic hose assemblies

The following is to be observed when replacing the hydraulic hose assemblies:

- ◆ Use only original spare parts. This ensures that the hydraulic hose assemblies are adequately rated for the required loads, and the lengths and the fittings are correct.
- ◆ Install in the original position of installation and do not change the access positions or bend angles.



CAUTION

Hydraulic hose assemblies must not come in contact with substances which could lead to damage, e.g. acids, alkaline solutions, solvents.

Do not use any illumination elements which form ozone or devices which create sparks, in close vicinity of the hoses.

Avoid re-using the hydraulic hose assemblies. The initial use of the hose may have changed the characteristics in such a way as to present an increased risk if re-used.

Cooling water hoses

Water hoses are wear parts. Due to their natural ageing and thermal stress, water hoses are subject to a certain level of material fatigue. In order to guarantee safe and problem-free operation of your injection moulding machine, we recommend replacing all water hoses at the latest every three years or at the first signs of damage in any individual hose.

Use only water hoses and fittings which are rated to withstand the required loads (thermal and pressure). This is guaranteed with original spare parts.

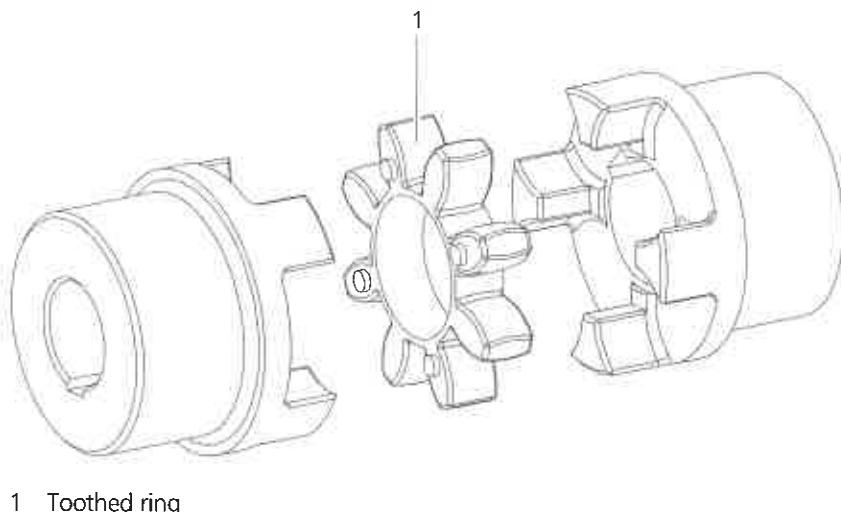
Hot water hoses

Water hoses are wear parts. The service life of a hose assembly is primarily subject to the operating conditions (pressure, temperature, flow medium and load cycles).

- ◆ Elastomers and thermoplastics can become brittle under these conditions.
- ◆ Frequent movement can lead to material fatigue.

Drive coupling

Also due to natural ageing, the toothed ring in the drive coupling must be replaced after approx. 6 years. The drive coupling is installed between the motor and the hydraulic pump.



1 Toothed ring

Viewing panels

Viewing panels of polycarbonate must be replaced every 6 years. See also chapter 1.2.9.

1.2.9 Inspecting the viewing panels

Viewing panels

The safety guards on your machine are sometimes equipped with viewing panels which enable the machine movements to be observed.

Due to external influences such as heat, vapours or unsuitable cleaning detergents, these viewing panels can in time lose some of their shock resistance and become brittle (ageing process).

The ageing process of the viewing panels can occur sooner or later, depending on the intensity and concentration of the detrimental influences.

If it is already known before the machine leaves the factory that increased heat or vapours are likely to occur (e.g. if duromer, elastomer, or liquid silicone are to be processed on this machine) viewing panels of polycarbonate (PC) are installed. These viewing panels are extremely resistant to shock and breakage.

Furthermore, all ALLROUNDERS on which it is possible to work with the injection unit in a position which faces the viewing panel are also equipped with viewing panels of polycarbonate.

If a machine is later retrofitted to a production method which affects the viewing panels, the standard viewing panels of Plexiglas (Perspex) are to be replaced with ones of polycarbonate.

In order to guarantee the protective characteristics of the viewing panels, they must undergo regular inspections.

Possible faults

The following examples show the most common faults which can make an immediate replacement necessary:

- ◆ plastic deformation (buckling or dents),
- ◆ cracks,
- ◆ cloudiness

NOTICE

Never clean the viewing panels with alcohol or detergents containing solvents.

Use commercially available window cleaning products.

Replacing the viewing panels

In order to ensure their protective function, we recommend renewing the polycarbonate viewing panels every 6 years. This applies even if no apparent faults are visible on the viewing panels.

No changes are visible e.g. when the viewing panels become brittle.

**WARNING**

When working with hot plastic melt, combustion can occur which can cause serious burns!

Viewing panels of polycarbonate are to be renewed at the latest every 6 years. When converting production to duromer, elastomer or liquid silicone processing, viewing panels of polycarbonate are to be installed.

Viewing panels of polycarbonate must also be used when the injection unit is operated in a position facing the viewing panels.

Removing the viewing panel

The viewing panels are attached on the inside of the safety gate and secured by profiled rails. A strip of neoprene between the rail and viewing panel serves as a cushioning element.

- Remove the attachment screws from the profiled rail.
- Remove the profiled rail complete with strip of neoprene.
- Now you can remove the viewing panel.

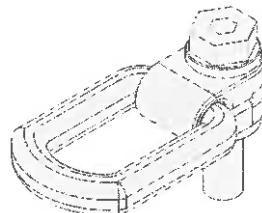
Installing the viewing panel

- Remove the protective foil from the new viewing panel.
- Insert the new viewing panel in the safety gate.
- Ensure that the viewing panel contacts the machine guard evenly all round.
- Attach the profiled rail with neoprene strip and tighten the screws.
- Use only viewing panels of the specified quality and thickness. This is always guaranteed with original spare parts.

1.2.11 Inspecting the screw-in suspension points

If screw-in suspension points are attached to your machine or included in the accessories, these must be inspected annually by a suitably qualified person appointed by the company. If the suspension points are used frequently, this inspection must be carried out more often.

Swivel lifting ring, type VLBG



Check for:

- ◆ firm attachment of the screws (if the suspension point is used regularly, check the torque values, as specified in the table below),
- ◆ severe corrosion (pitting),
- ◆ wear, e.g. necking (>10 %) or deep indentations,
- ◆ deformation,
- ◆ cracks,
- ◆ easy manoeuvrability of the hoist ring.

Swivel lifting ring type	Thread/nominal load capacity	Material number	Torque
VLBG 1 t M12	M12 / 1.0 t (2200 lbs)	284453	100 Nm (73.76 lbf ft)
VLBG 1.5t M16	M16 / 1.5 t (3300 lbs)	140753	150 Nm (110.6 lbf ft)
VLBG 2.5t M20	M20 / 2.5 t (5500 lbs)	148190	250 Nm (184 lbf ft)



WARNING

If the following information is not observed, there is a danger of serious or fatal injury.

Defective swivel lifting rings must not be used, but replaced immediately.

Before applying the load attachment gear, position the hoist ring in direction of force. The hoist ring must be freely manoeuvrable and not rest on any edges.

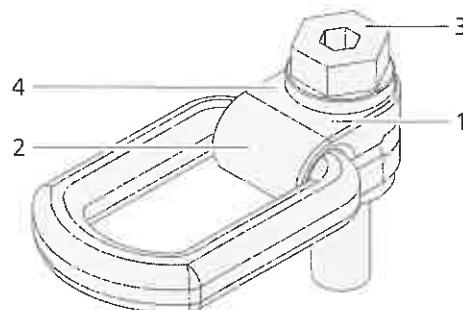
Do not turn the swivel lifting ring when under load.

Use only 100% crack-tested original attachment screws of DIN EN 1677. No parts of the swivel lifting ring must be mechanically processed or welded.

Swivel lifting rings which are used regularly (e.g. for changeover of the machine) must be secured with medium-tight thread locking adhesive, Loctite243 (material no. 37548). Glued screws must be tightened to the torque value in the above table.

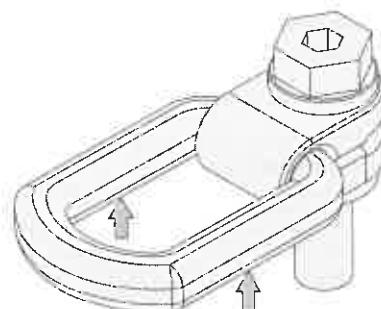
**Swivel lifting ring type VLBG
embossed load rating**

On each swivel lifting ring you will find important information such as the nominal load capacity in tonnes (t, metric tonnes) and specific values of the attachment screw.

Top

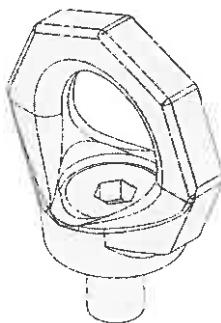
- 1 Manufacturer "RUD"
- 2 Nominal load capacity xx.x in metric tonnes (t)
- 3 Internal/external hexagonal screw e.g. "RUD M12 10.9" manufacturer, thread size, property class
- 4 Type of swivel lifting ring "VLBG"

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Base

Manufacturer "RUD", certification (e.g. CE)

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Ring bolt type VRS

Ring bolt type	Thread / nominal load capacity	Material number	Torque (Nm / lbf ft)
VRS-F-M10	M10 / 0.4 t (880 lbs)	215210	10 (7.4)
VRS-F-M12	M12 / 0.75 t (1650 lbs)	245836	25 (18.4)
VRS-F-M16	M16 / 1.5 t (3300 lbs)	188653	60 (44.3)
VRS-F-M20	M20 / 2.3 t (5070 lbs)	193730	115 (84.8)
VRS-F-M24	M20 / 2.3 t (5070 lbs)	300931	190 (140)

Check for:

- ◆ firm attachment of the screws (if the suspension point is used regularly, check the torque values, as specified in the table below),
- ◆ wear, e.g. necking (>10 %) or deep indentations,
- ◆ deformation,
- ◆ cracks,
- ◆ smooth manoeuvrability of the eye.

**WARNING**

If the following information is not observed, there is a danger of serious or fatal injury.

Defective ring bolts must not be used but replaced immediately.

Before applying the load attachment gear, position the ring bolt in direction of force. The ring bolt must be freely rotatable by 360° and not rest on any edges.

Do not turn the ring bolt when under load.

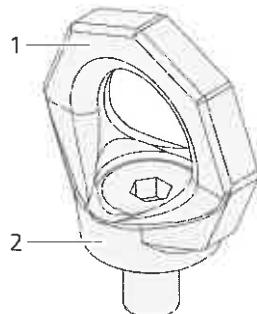
Use only 100% crack-tested original attachment screws of DIN EN 1677. No parts of the ring bolt must be mechanically worked or welded.

Ring bolts which are used regularly (e.g. for changeover of the machine) must be secured with medium-tight thread locking adhesive Loctite 243 (material no. 37548). Glued screws must be tightened to the torque value in the above table.

Ring bolt type VRS
Embossed load values

On the front and back of each eye bolt you will find important information such as the nominal load capacity in tonnes (t = metric tonnes) and pounds (lbs, 1 lb = 0.45 kg)

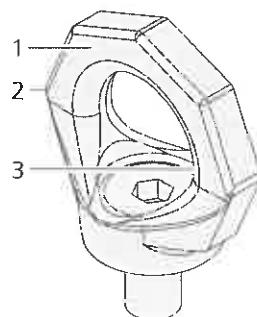
Front side



- 1 Manufacturer "RUD", certification (e.g. CE)
- 2 Nominal load capacity xx.x in metric tonnes (t)

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Rear side



- 1 Nominal load capacity "WLL" xxxx (Working Load Limit with the unit specified under (3) (lbs))
- 2 Type of eye bolt "VRS"
- 3 Unit (lbs) for the value specified under (1)

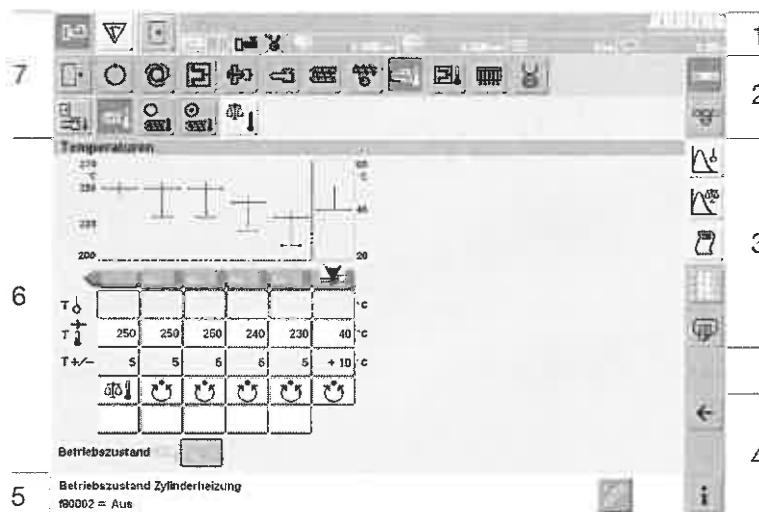
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 EN01BK_00_306_002.FM 2018.02.08

1.3.3 Introduction to the screen layout

The following illustration gives you an overview of the various sections on the SELOGICA 'direct' screen.

Temperatures

Operating status

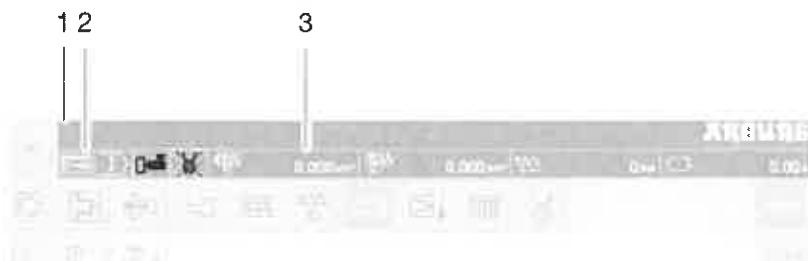


- 1 Status lines
- 2 Type of navigation
- 3 Direct access keys
- 4 Special-function keys
- 5 Editing field
- 6 Input chart and table
- 7 Navigation levels

The individual areas are described in more detail in the following chapters.

1.3.4 Machine status display

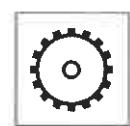
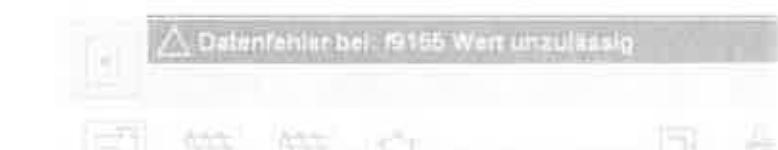
The status of the machine is displayed on-screen together with current messages and actual values.



- 1 Message line
- 2 Status display area
- 3 Actual value display area

Message line

In the message line information warnings, alarms and system errors are displayed in plain text.



Press this key to go directly to the parameter screen page containing the faulty parameter.

You will find a more detailed explanation of parameter designations in the chapter "Entering production data".



INFORMATION

Only the "most important" message is displayed in the message line.

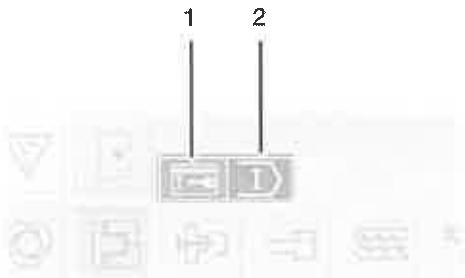
A list of all active messages is to be found in the "Alarm messages", "Warnings" and "Information" parameter screen pages, which can be called up via the green main group.

Alarms in "manual" operating mode are not output visually with the alarm indication lamp or acoustically with the horn.

In "dry cycle" operating mode or when the quality control function is switched off the yellow lamp lights up and any warnings are displayed on the screen.

Status display area

The user authorisation and the editing level are displayed in the status display area.



- 1 User authorisation
- 2 Editing level



User authorisation:

The user authorisation function protects the controller from inputs by unauthorised persons. If the symbol has a green background, changes can be made in parameter screen pages or in the cycle sequence (subject to the level of authorisation).



Production level:

If this symbol has a green background you are currently in the production level.



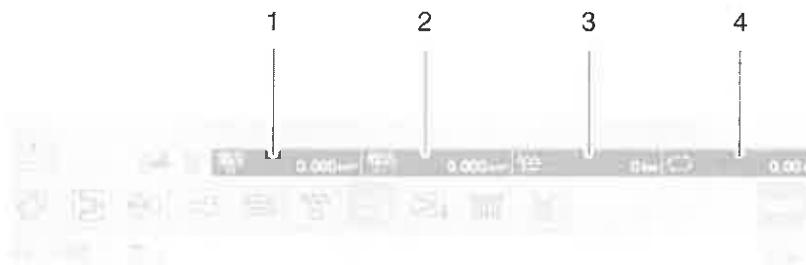
Preparatory level:

If this symbol has a yellow background you are currently in the preparatory level.

In this level you can look at data and edit it while the machine continues working with data from the production level.

Actual value display area

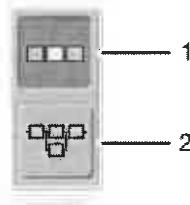
In the actual value display area the current actual values are displayed irrespective of which parameter screen page is currently displayed.



- 1 Volume of injection moulding material
- 2 Material cushion
- 3 Maximum injection pressure
- 4 Cycle time

1.3.5 Navigation mode and navigation level

On the SELOGICA 'direct' you can switch over between theme navigation and sequence navigation at the press of a button.

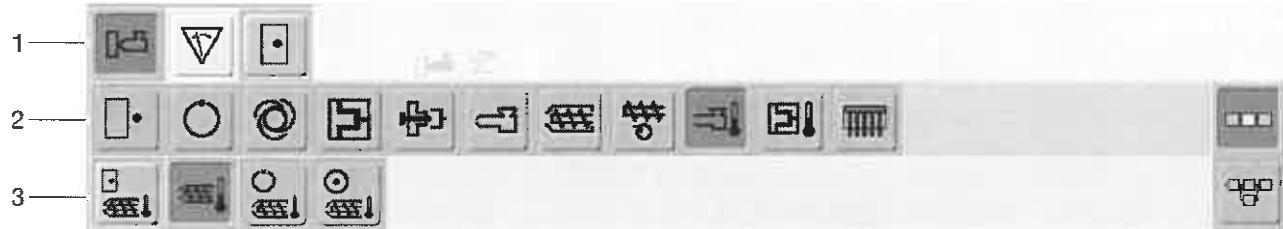


- 1 Theme navigation
- 2 Sequence navigation

Theme navigation



When you press this key, symbols representing the individual themes are displayed in the navigation level.



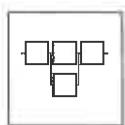
- 1 Main groups
- 2 Superior groups
- 3 Parameter screen pages

In this display mode the navigation levels are divided into:

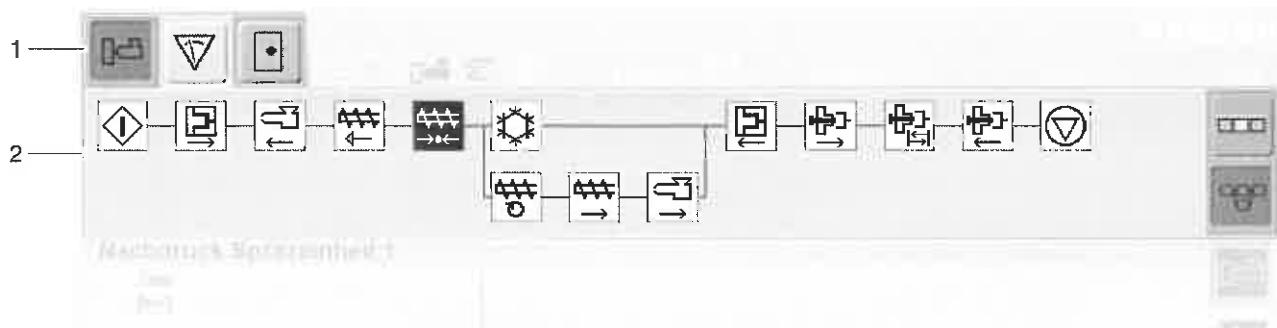
- ◆ main groups (colour-coded),
- ◆ superior groups (colours matching main group),
- ◆ parameter panels:
 - in green parameter panels you make a selection,
 - in grey parameter panels you find process parameters and,
 - in yellow parameter panels the monitoring parameters.

Due to the optical effects and the colour coding in all three levels you can easily recognise which parameter panel is currently displayed.

Sequence navigation



By pressing this key the superior group and parameter panel display changes into a symbolic representation of the sequence.



- 1 Main groups
- 2 Sequence

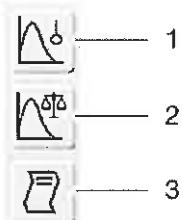
In this type of representation the navigation levels are divided into

- ◆ main groups
- ◆ sequence.

The individual parameter panels can be called up simply by pressing the respective sequence symbol.

1.3.6 The direct access keys

The direct access keys facilitate machine operation. Each of the direct access keys automatically remembers the last parameter panel you selected in this sector.



- 1 Graphical measuring charts
- 2 Graphical monitoring charts
- 3 Protocolling (logging function)

Graphical measuring charts



When you touch this key you go directly to the last parameter screen page you selected in the "measuring charts" sector.

Graphical monitoring charts



When you touch this key you go directly to the last parameter screen page you selected in the monitoring charts sector.

Protocolling



When you touch this key you go directly to the last parameter screen page you selected in the protocolling sector.

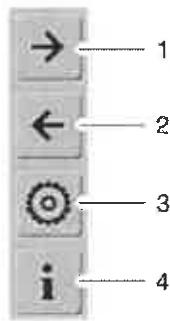
The direct access keys

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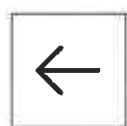
W:\DOD-WORK\BAUSTEINE\ENSTRG-SWASDSW409X\
EN01CF_00_5209_002.FM 08.05.2015

1.3.7 The special-function keys



- 1 Page forwards
- 2 Page backwards
- 3 Error search / parameter search
- 4 Information / Help

Page backwards



Press this key if you want to go back to the previously called up parameter screen page.

Page forwards



Press this key if you want to return again to the first parameter screen page.

Error search

If the controller issues an alarm message which contains one or more faulty parameters, you must call up this parameter screen page in order to rectify the cause of error.



By pressing this key, the controller immediately calls up the parameter screen page containing the first faulty parameter and displays it in the respective colour.

Parameter search

If there are no messages in the alarm line, you call up the parameter search with this key.

- A keyboard is displayed on the screen with which you first input the required parameter and then press the "Y" key to start the search.



- 1 Start search
- 2 Cancel inputs

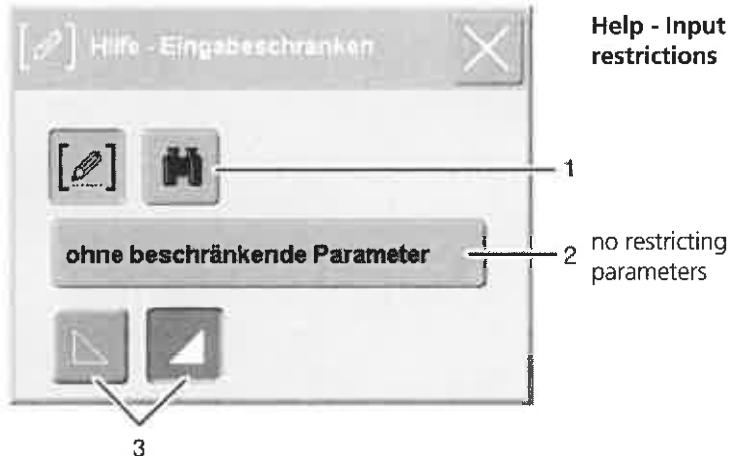
By pressing the "N" key you can cancel your input.

All functions of this displayed keyboard are carried out in the same way as on a conventional PC keyboard. You will find more details in the following chapter.

Information / Help

By pressing this key you call up information on the currently marked parameter.

If the parameter is not dependent on another one, the following window is displayed:



- 1 Go to parameter search
- 2 The parameter is not dependent on another one
- 3 With these symbols you can move the window to the left or right side of the touch screen (in case this window is covering the part of the screen you currently want to work in).

If the selected parameter is dependent on or limited by another parameter, the following window appears:

Help - Input restrictions



- 1 By pressing this field you access the parameter screen page of the dependent parameter.

Explanations:

[...] ← s101 = The upper limit of the selected parameter is determined in this example by s101.

→ [...] s101 = The lower limit of the selected parameter is determined in this example by s101.

[...] = The selected parameter is dependent on another one.

Press this symbol to return to the previous display.



1.3.8 The editing box

Parameter selected

When a parameter has been selected, the following is displayed in the editing box

- ◆ designation (1), (2),
- ◆ input possibilities or limit values (3)
- ◆ the current value (4) of the respective parameter



- 1 Designation in full (here: cylinder heating zone 1)
- 2 Parameter
- 3 Input range / limit values
- 4 Current value
- 5 Function-input / function keys
- 6 Edit / text input

Process selected

When a process has been selected, the following related information is displayed:

- ◆ designation and
- ◆ drive::

Vorgang: Werkzeug schließen Grundprogramm

Antrieb: Steuerkreis 1

Process: basic mould closing program

Drive: control circuit 1

INFORMATION

In sequence navigation mode you have two markings (one for the selected process in the sequence and one in the parameter panel).

The contents of the editing box refer to the currently active parameter or process (i.e. the one you last touched on the screen).



Function keys (5)

The function keys displayed here vary. They always relate to the parameter panel currently in the display.

Function input (5)

With this key you can select certain functions. When you touch it a window opens in which possible functions (related to the currently active parameter) are displayed for selection:



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Subject to the currently selected parameter, the parameter can be

- ◆ taken over in the protocol,
- ◆ used as a start-up parameter,
- ◆ taken over in the freely configurable parameter panels.

Magnifier

With this key you can "zoom in" or "zoom out" (enlarge or reduce certain sections of) a graphical display.

Flag

With this key you can select certain markings.

**Visible marking**

No markings

Omit in dry cycle

Omit in alarm

Omit in auto

Mould position monitoring

End position monitoring

Confirm

This key is used generally to activate actions and confirm inputs.

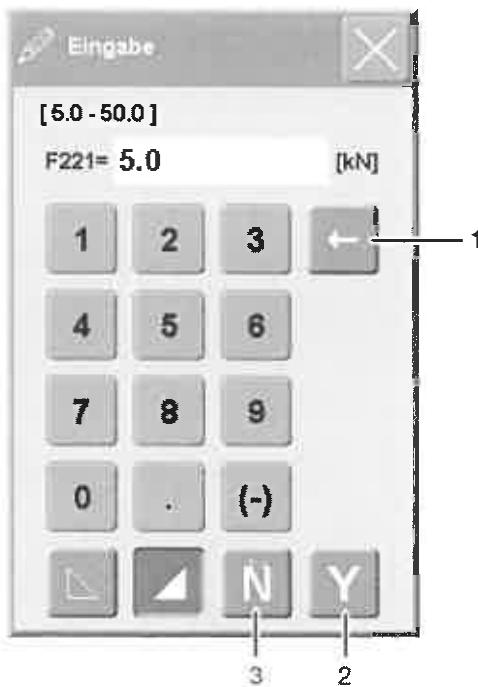
Delete

This key is used generally to deactivate actions and delete inputs.

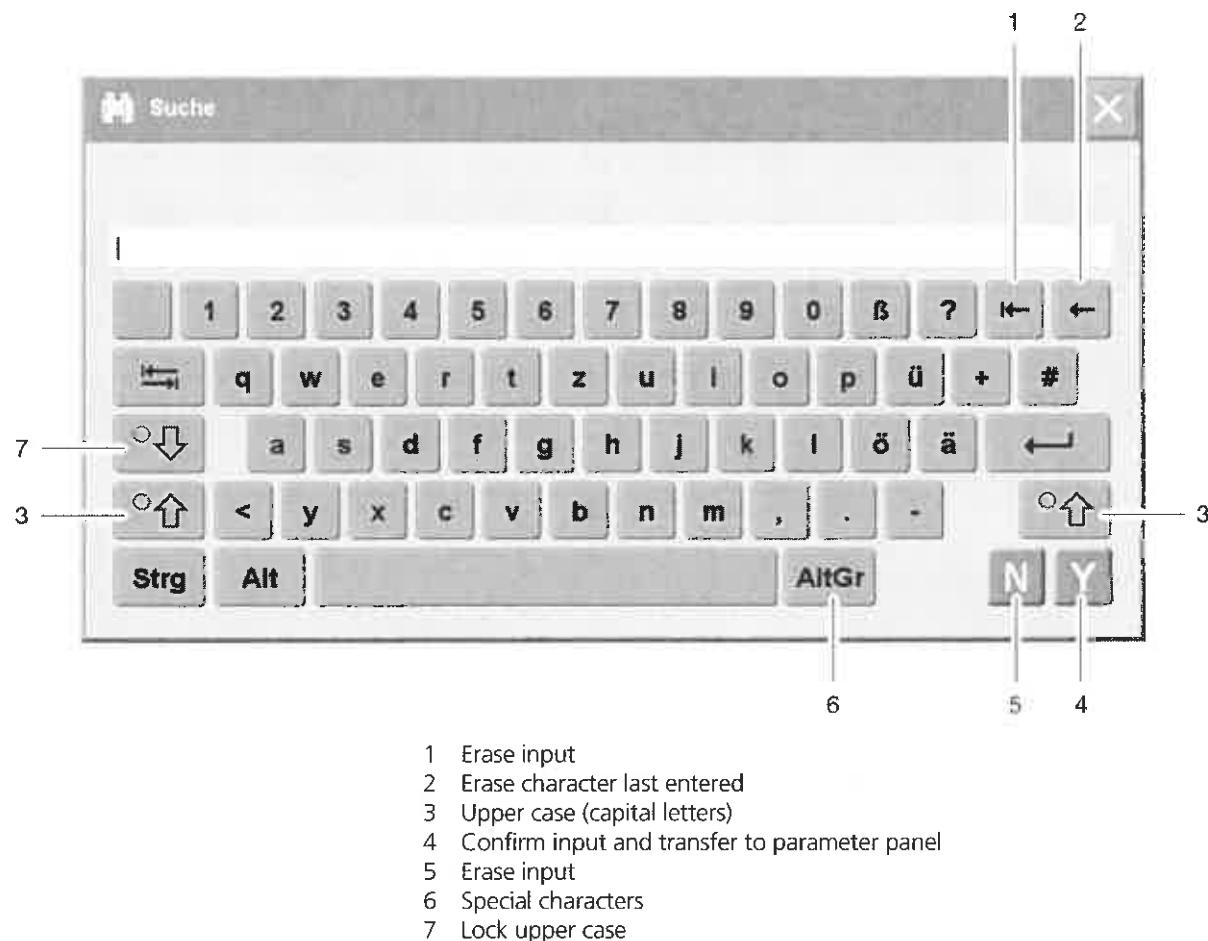
Edit/text input (6)

With this key you activate the currently possible input mode:

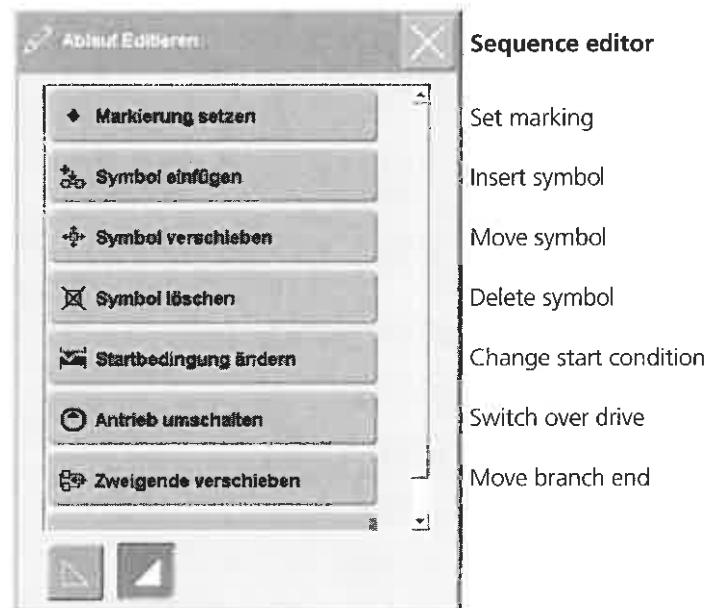
- ◆ Numeric keypad,
- ◆ On-screen keyboard,
- ◆ Selection options.

Numeric keypad

- 1 Erase the character last entered
- 2 Confirm input and transfer to parameter panel
- 3 Cancel input

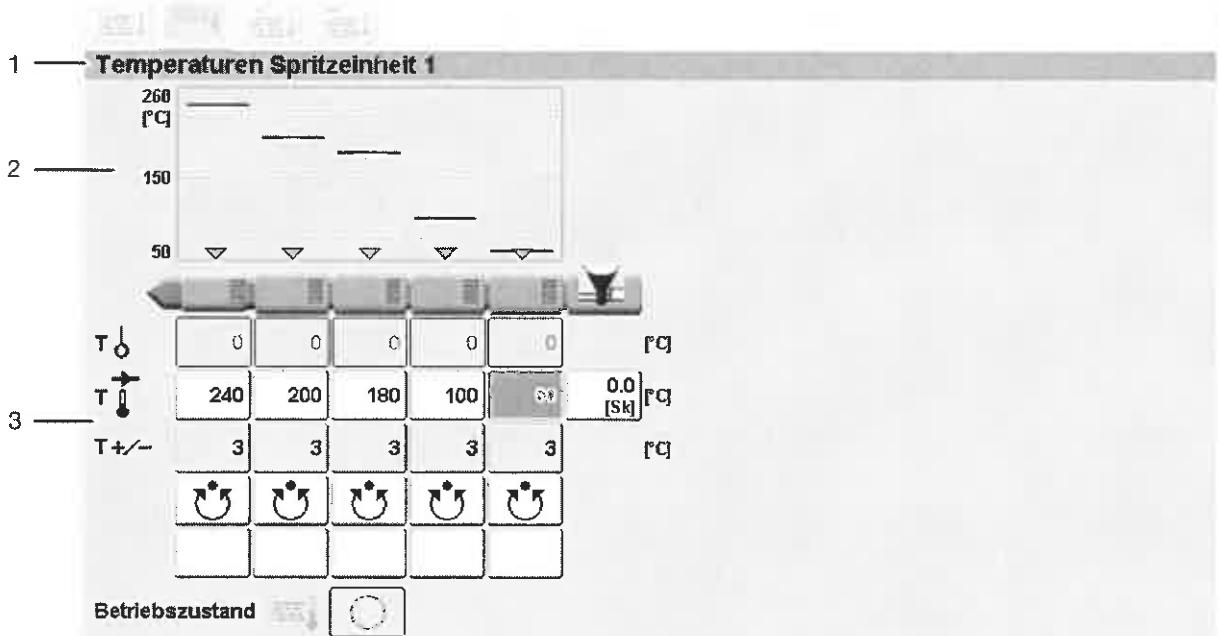
On-screen keyboard:

All functions of this on-screen keyboard are carried out in the same way as on a conventional PC keyboard.

Selection options

1.3.9 The parameter screen page

The parameter screen page is divided into the input chart and the input table. For easier understanding, all processes are displayed in symbols so that very little text is necessary.



- 1 Designation of the parameter screen page
(here: Injection Unit 1 Temperatures)
- 2 Input chart
- 3 Input table



INFORMATION

All movements are displayed in the direction (as seen from the view of the operator) in which they actually take place, i.e. for example:

- ◆ mould closing from left to right
- ◆ mould opening from right to left
- ◆ injection from right to left
- ◆ chronological order always from left to right

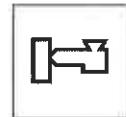
If this display seems unfamiliar to you at first, you can refer to the arrows which always point in the direction of movement.

1.3.10 The navigation levels

Main group: machine settings



- 1 Main groups
 - 2 Superior groups
 - 3 Parameter panels



Assigned to this grey main group key you will find all parameter panels for the machine set-up parameters.

These are (depending on the configuration of your machine):

- ◆ machine characteristic parameters
 - ◆ operating modes
 - ◆ order data
 - ◆ switch-on/off
 - ◆ start-up / switch-off
 - ◆ production sequences,
 - ◆ mould,
 - ◆ ejector,
 - ◆ nozzle,
 - ◆ injection/holding pressure,
 - ◆ dosage,
 - ◆ cylinder temperature,
 - ◆ core pulls,
 - ◆ mould temperature,
 - ◆ conveyor belt / sorter unit,
 - ◆ programmable outputs,
 - ◆ robot system,
 - ◆ rotary table.

The keys for the parameter panels have different colours so that you can see at a glance which type of parameter panel is concerned.

- ◆ in green parameter panels you make a selection,
- ◆ in grey parameter panels you will find the process parameters and,
- ◆ in yellow parameter panels the monitoring parameters.

The symbols used are standardised and self-explanatory and in most cases already familiar from use with the conventional SELOGICA controller.

Due to the optical effects and the colour coding you can easily recognise which type of parameter panel is currently displayed.

Main group: QS and documentation



- 1 Main groups
- 2 Superior groups
- 3 Parameter panels



Assigned to this yellow main group key you will find all parameter panels for quality assurance and documentation.

These are (depending on the configuration of your machine):

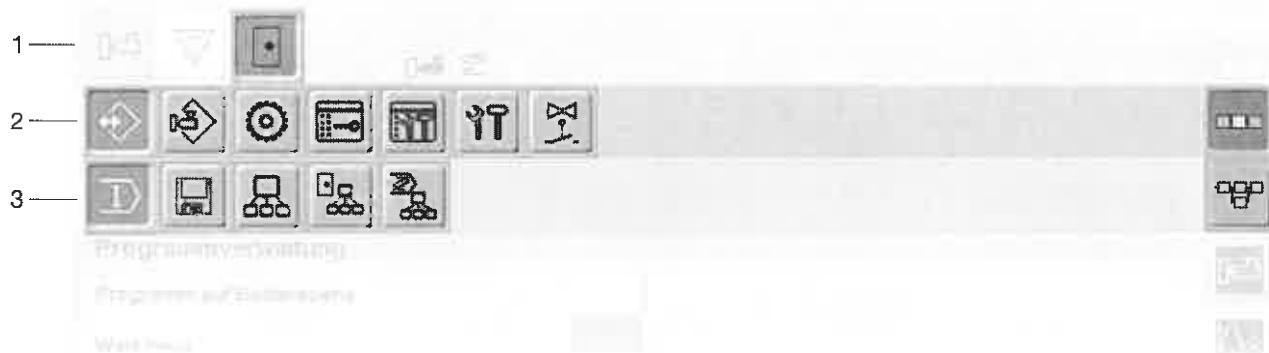
- ◆ measuring systems,
- ◆ measuring charts,
- ◆ monitoring charts,
- ◆ printer / archive
- ◆ protocol (logging),
- ◆ SPC charts,
- ◆ archiving,
- ◆ quality control / quality monitoring,
- ◆ monitoring,
- ◆ cycle time diagram,
- ◆ AQC.

The keys for the parameter panels have different colours so that you can see at a glance which type of parameter panel is concerned.

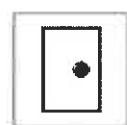
- ◆ in green parameter panels you make a selection,
- ◆ in yellow parameter panels you find the monitoring parameters.

The symbols used are standardised and self-explanatory and in most cases already familiar from use with the conventional SELOGICA controller.

Due to the optical effects and the colour coding you can easily recognise which type of parameter panel is currently displayed.

Main group: production control

- 1 Main groups
- 2 Superior groups
- 3 Parameter panels



Assigned to this green main group key you will find all parameter panels for the production control.

These are (depending on the configuration of your machine):

- ◆ program administration,
- ◆ host computer,
- ◆ machine characteristic parameters,
- ◆ units
- ◆ order data,
- ◆ order control,
- ◆ machine data,
- ◆ user authorisation,
- ◆ service functions
- ◆ alarms / warnings / messages,
- ◆ valves / switches.

The symbols used are standardised and self-explanatory and in most cases already familiar from use with the conventional SELOGICA controller.

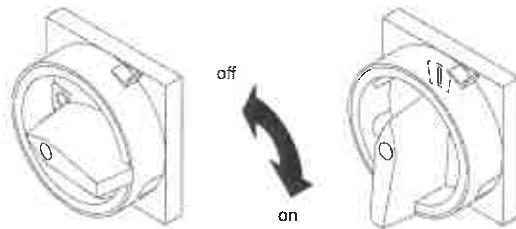
Due to the optical effects and the colour coding you can easily recognise which type of parameter panel is currently displayed.

1.4 Overview of the operating elements

1.4.1 The most important operating elements and their functions

Main switch

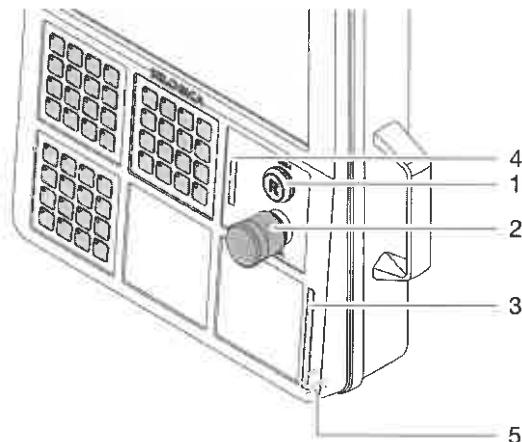
The main switch is located on the control cabinet. With this you turn the power supply for the whole machine on and off.



- ◆ Position "0" = OFF
- ◆ Position "1" = ON

NOTICE

Turn off the heating and the motor before you switch the machine off with the main switch.



- 1 Controller start key
- 2 Emergency-stop switch
- 3 Reader for transponder cards (user authorisation)
- 4 Reader for CompactFlash cards (storage medium)
- 5 USB interface for PC keyboard

Controller start key (1)

When you set the machine into operation, you must first start the SELOGICA controller.

The controller start key (1) is located on the right under the touch screen.

After switching on the main switch, the controller and various machine systems are tested.

- When these tests are completed, the message "Unlock emergency-stop key - press controller start key" appears at the top of the screen in the message line.
- Press the controller start key.

Emergency-stop switch (2)

With the emergency-stop switch (2) you can cut off the power supply to the machine in an emergency.

All machine movements are stopped immediately and the heating is deactivated.

- Press the red button to activate the emergency-stop switch.
 - The machine stops all movements.
 - All machine functions are inhibited.
 - The switch locks when actuated.
- Rectify the malfunction or cause of danger immediately! Before you can resume operation, the emergency-stop switch must be released (unlocked).
- In order to do this, pull the red button out a little way.
 - The switch snaps back into its released position and the emergency-stop switch is then unlocked.



INFORMATION

If your ALLROUNDER is equipped with external safety devices (option), these must be acknowledged.

-
- Press the controller start key (1).
 - The machine is ready to start again.

User authorisation via transponder card (3)

The personal transponder card authorises access to the controller in order to protect it from unauthorised inputs. Without the transponder card it is only possible to switch on the machine and work with it but not to make any changes to the data.

Compact flash reading device (4)

With the SELOGICA 'direct' you can save your data on a CompactFlash card.

USB interface (5)

You can connect your PC keyboard to the controller via a USB interface.

The USB interface for printers is located on the control cabinet.

External devices

When you connect external devices to the single-phase (Schuko) socket or CEE three-phase socket on the machine, the following must be observed:

- ◆ The sockets are switched off when the emergency-stop devices are actuated.
- ◆ When the emergency-stop device is reset and acknowledged all sockets are reactivated. This deactivation complies with performance level (PL) "b" (in accordance with DIN EN ISO 13849-1:2008).

**WARNING**

When external devices are connected, dangers can arise which are not safeguarded by the safety equipment of the machine.

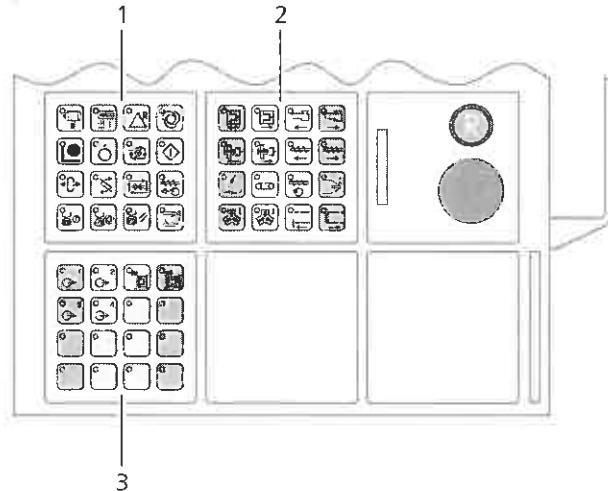
The operating authority must draw up a risk analysis and decide which additional safety devices are required for the external equipment connected.

The operating authority is responsible for providing a safeguard against re-start.

The machine must only be set into operation when the necessary safety equipment for the external device is installed.

1.4.5 The control panels

Control panel 1



- 1 Control panel 1
- 2 Control panel 2
- 3 Control panel 3

The keys in the first control panel are used to switch various functions on and off.

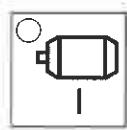
An LED is incorporated in each key.

Some keys have a switch function, others a push-button function. When the keys with a switch function are pressed, a function is either activated or deactivated. When it is activated, the LED in the key lights up continuously. When the key is pressed again to deactivate the function, the LED goes out.

When the keys with a push-button function are pressed, the function is activated and the LED lit for as long as the key is pressed. When you release it, the function is deactivated and the LED goes out.

The keys have the following functions:

Motor



With this key you switch the pump motor on and off.

- Press this key briefly to switch on the motor.
 - The LED in the key lights up, the motor is switched on.
- Press the key again to switch off the motor.
 - The LED in the key goes out, the motor is switched off.

Heating



With this key you switch the heating of the machine on and off.

Alarm reset



With the alarm reset button you erase alarm messages on the screen. If an alarm occurs on the machine, all machine functions are stopped.

The alarm messages must be erased before the cycle can be continued.

- The LED in the key flashes as long as the alarm is displayed.
- Rectify the cause of the alarm message.
- Press the alarm reset key. The LED lights up as long as you keep the key suppressed.
- The alarm message on the screen is erased. The cycle can now be restarted.

Manual / automatic



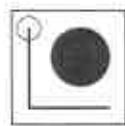
With this key on the control panel you switch between manual and automatic control.

Various operating modes are effective in manual or automatic control.

The selected operating mode is displayed in the status display as a symbol.

- Press the key briefly to switch over to "automatic" mode.
 - The LED in the key lights up, the "automatic" operating mode is active.
- Press the key again to switch over to "manual" operating mode.
 - The LED in the key goes out, "manual" mode is active.

With this key you can determine which operating mode is to be effective in manual or automatic operation (see section 2.6.2).

Set-up

With this key you have the possibility of switching the machine to the "set-up" operating mode directly from the control panel.

In this operating mode you can purposely switch off certain monitoring functions. Machine movements can be carried out using the keys on the second control panel.

The machine moves with fixed, pre-defined values for pressure, speed, mould, screw, nozzle and ejector (not for core pull and programmable outputs).

- Press this key briefly to switch over to "set-up" operating mode.
 - The LED in the key lights up, the "set-up" operating mode is active.
- Press the key again to switch off the "set-up" operating mode.
 - The LED in the key goes out, the "set-up" operating mode is switched off.

NOTICE

In the "set-up" operating mode, monitoring functions and stroke limitations can be switched off, depending on the programming in the "Monitoring off in set-up mode" parameter panel.

This means that damage can be caused to the mould or machine if care is not taken when operating the machine in set-up mode!

When returning to another operating mode, all values input in the parameter panel "Monitoring off in set-up mode" are reset.

All monitoring functions are thus reactivated.

Switch-off

With this key the machine can be set into a "switched-off" state.

- Press this key briefly to set the machine into the "switched-off" state.
 - The LED in the key is lit, the switched-off state is active.
- Press the key again to end the switched-off state.
 - The LED in the key is dark, the switched-off state is ended.

Switch-off in "automatic" operating mode:

- Press the "switch-off" key.
 - The shut-down cycle is started at the end of the current cycle and the motor switched off. If automatic switch-on is activated, the machine will start again with the start-up cycle at the end of the programmed time.

Switch-off in "manual" operating mode:

- Press the "switch-off" key.
 - The cylinder and mould heating are set to the state which was programmed for each unit in the nominal value control. The motor remains on.

Automatic switch-on:

- Press the "automatic" key.
 - The "start" key flashes, but do not press it.
- Press the "switch-off" key.
 - The motor is switched off (without shut-down cycle) and the heating is set to the state programmed for each zone in the nominal value control.
 - If automatic switch-on is activated, the controller automatically starts with the start-up cycle after the programmed time.

Stop at cycle end

With this key you can stop the machine at the end of the current cycle.

With "stop at cycle end" a new cycle is not automatically started at the end of the cycle; the next cycle is not started until the start key is pressed.

- Press the key briefly to activate "stop at cycle end".
 - The LED in the key lights up, the machine stops at the end of the current cycle.
- Press the key again to deactivate "stop at cycle end".
 - The LED in the key goes out, and the next cycle begins automatically at the end of the current cycle.

NOTICE

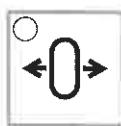
This function must not be confused with "semi-automatic" and is not suitable for production.

Start

With the start key you start a new production sequence in automatic operation. Each automatic programme is started with this key.

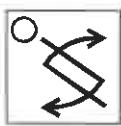
- Press the start key and release it again.
 - The LED lights up as long as you press and hold the start key.
 - The LED flashes when the controller prompts you to press the start key.

The LED also lights up as long as the machine is operating in automatic mode.

Zeroing key

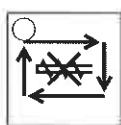
The zeroing key is used in the "set-up" or "manual" mode to determine the machine zero points for stroke measurement.

- When you have moved to the end point, press this key simultaneously with the movement key and keep it suppressed.
- The zero point for the respective machine movement is determined.
- The LED in the key lights up as long as the zeroing key is suppressed.

Conversion

With this key you switch the machine over to the "conversion" operating mode.¹

- Press the key and release it again.
- In this operating mode special conversion sequences of the machine can be carried out.

Dry cycle

With this key you switch the machine to the "dry cycle" mode.

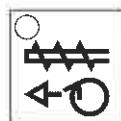
- Press this key and release it again.
- The programmed dry cycle is carried out in the "dry cycle" operating mode, whereby the marked processes are omitted.
- Press the "automatic" key.
- Press the start key.
- The machine carries out the programmed dry cycle sequence (see chapter 2.4).

NOTICE

In "dry cycle" make sure that the correct processes are marked in the sequence.

Otherwise damage to the mould and machine can be caused!

¹ not standard

Purging

With this key you start the purging process.

Depending on the current nozzle and mould position, two different functions are carried out:

- ◆ purging the hot runner, or
- ◆ purging the plasticising cylinder.

- Use the first function to clear the hot runner in the mould of moulding material.

Requirement:

- ◆ the nozzle must contact the mould,
- ◆ the mould is opened and
- ◆ f425 = "yes" (purge hot runner).

- Press the "Purging" key on the control panel.

- The hot runner is now purged. The parameters and values input in the "Purging" parameter panel are now active.

- Use the second "Purging" function to remove thermally damaged plastic material from the plasticising cylinder.

Requirement:

- ◆ The nozzle must be lifted off the mould.

- Press the "Purging" key on the control panel.

- The injection unit now moves back to the nozzle end position.

- The purging program is carried out, whereby the parameters and values input in the "Purging" parameter panel become active.

Robot system on/off

Press this key to switch on the robot system.

- The LED in the key lights up, the robot system is switched on.
- Press the key again to switch the robot system off again.¹
- The LED in the key does not light up.

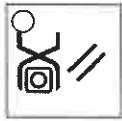
Robot system active/inactive

Press this key to deactivate the robot system.¹

- The LED in the key does not light up.

The drive of the robot system is switched on but remains inactive in the cycle.

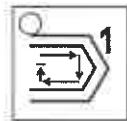
- Press the key again to reactivate the robot system.
- The LED in the key lights up, the robot system is active.

Home position sequence

The home position sequence¹ serves the purpose of moving the robot system to the correct position for the start of the production sequence.

- Switch the machine to the "conversion" operating mode.¹
- Press the "home position sequence" key.
- The LED lights up and the LED in the "start" key flashes.
- Press the "start" key.
- The home position sequence is carried out once, as programmed.

¹ not standard

Partial sequence 1

With the partial sequence (not standard) you can carry out selected sections of the production sequence via this key. In this way whole sequences, for example interdependent core pulls can be moved with only one key.

- Switch the machine to the "conversion" or "manual" operating mode (not standard).

"Manual" mode:

- Press the "Partial sequence 1" key.
 - In the "manual" operating mode the "Partial sequence 1" is carried out as programmed for as long as the key remains pressed (LED is lit). As soon as the key is released the sequence stops. When it is pressed again the sequence is continued.

"Conversion" mode:

- If the machine is in the "conversion" operating mode, the LED lights up and the LED in the start key flashes.
- Press the start key.
 - The partial sequence is carried out once, as programmed.

Start-up

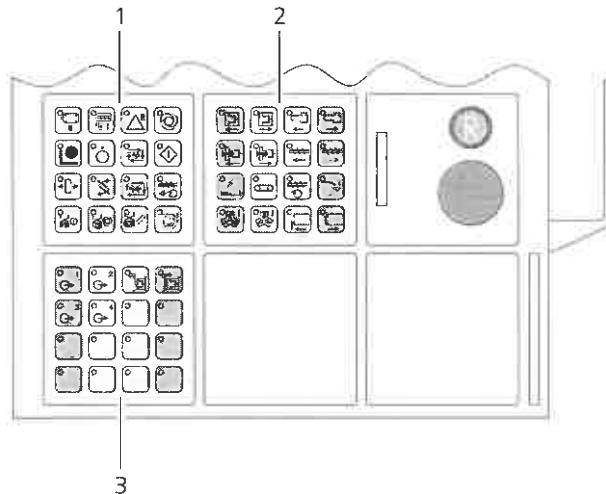
The start-up key (not standard) is used to switch over between bad part production and for quality evaluation.

Activating the start-up key

- To activate the start-up key, input one of the following at parameter f053
 - ◆ 0 = "automatically active", if you want the start-up key to be automatically activated every time the operating mode is changed to "automatic".
 - ◆ 1 = "active only when pressed" if the start-up key is to be manually switched on when pressed.

Start-up key for switching over bad part / quality monitoring

- Change to "automatic" operating mode.
- As soon as the start key is now activated the machine starts production.
 - The LED in the start-up key lights up to indicate that the machine is in bad-part production, i.e. all parts are graded as bad parts.
- Press the start-up again to inform the controller that the parts now produced are to be rated as good parts.
 - The LED in the key goes out.
- During the production now running you can switch over between good part production (LED off) and bad part production (LED on) as often as required.

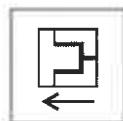
Control panel 2

- 1 Control panel 1
- 2 Control panel 2
- 3 Control panel 3

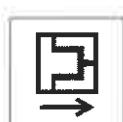
With the keys of the second control panel you operate the machine in manual mode (manual/automatic key not activated = LED is off). The respective function is carried out for as long as you keep the key pressed.

The movement stops when you release the key or reach the end marking or mechanical end limit.

The key for "conveyor belt" and "sorter unit" can also be used in automatic operation.

Mould opening

The mould opens with the values input in the "Mould opening" parameter panel.

Mould closing

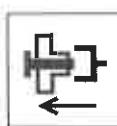
The mould closes with the values input in the "Mould closing" parameter panel.

Injection unit advancement

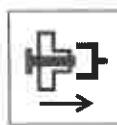
The injection unit moves forward with the values input for "Nozzle movements" (fixed pre-defined values with contacting nozzle).

Injection unit retraction

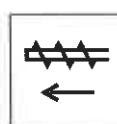
The injection unit moves back with the values input for "Nozzle movements" (fixed pre-defined values with contacting nozzle).

Ejector retraction

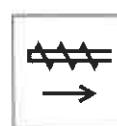
The ejector retracts with the values input for "Ejector movements".

Ejector advancement

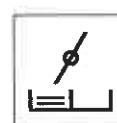
The ejector advances with the values input for "Ejector movements".

Screw advancement

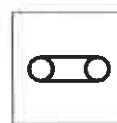
The screw advances with the programmed values for purging speed and purging pressure. In the "set-up" operating mode it moves with fixed, pre-defined values.

Screw retraction

The screw retracts with the programmed values for speed and pressure.

Sorter unit

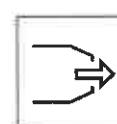
The flap position of the sorter unit¹ is switched over (single sample). It is also possible to take random samples in the "automatic" operating mode.

Conveyor belt

The conveyor belt¹ starts to run. The movement ends when you release the key.

Dosage

The screw rotates and doses material. In the "Set-up" operating mode you can turn the screw to a certain position when the screw cover is open.

Air blow

The air blow device¹ demoulds the moulded part for as long as the key remains pressed.

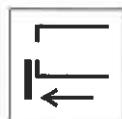
¹ not standard

Core insertion

A hydraulically (or non-hydraulically) operated core ¹ is inserted into the mould with the programmed values, for as long as the key is pressed.

Core retraction

A hydraulically (or non-hydraulically) operated core ¹ is retracted out of the mould with the programmed values for as long as the key is pressed.

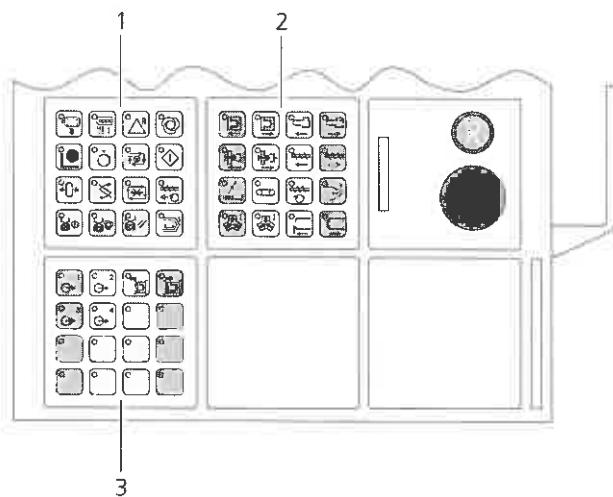
Safety gate opening

The power-actuated safety gate ¹ is opened.

Safety gate closing

The power-actuated safety gate ¹ is closed.

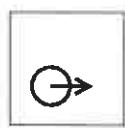
1 not standard

Control panel 3

- 1 Control panel 1
- 2 Control panel 2
- 3 Control panel 3

BAK_248049_000_EN_80

In the third control panel you will find manual control keys for additional functions, for example:

Programmable outputs I - VIII

With the keys of the programmable outputs ¹ the functions of the outputs can be activated at the programmed position in the cycle in manual mode.

Mould height adjustment

Mould height adjustment advancement
(subject to machine model)



Mould height adjustment retraction
(subject to machine model)

You will find a detailed description of the mould height adjusting function in chapter 7.1.

¹ not standard

1.4.6 Signalling elements

Alarm indication lamp

The SELOGICA controller is equipped with a signal tower. It is located at the top of the operating unit housing. The status of the machine is indicated with lighting elements or further signalling elements.

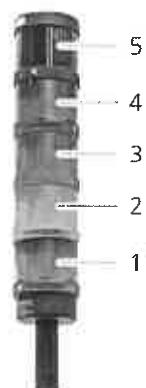
The cause for the warning or alarm is displayed on the screen of the SELOGICA controller.



- 1 Lighting element, red
- 2 Lighting element, yellow

The signal tower can be optionally expanded by further lighting elements in different colours.

This way, further events of the machine can be indicated.



- 1 Lighting element, green
- 2 Lighting element, yellow
- 3 Lighting element, red
- 4 Lighting element, blue
- 5 Horn

Meaning of the colours

The meaning of certain colours is predefined. Others can vary according to the customer requirements.

Signalling element	Status	Meaning	Control
red	Alarm	The machine has stopped production due to an alarm or because the emergency-stop switch has been actuated. The lighting element remains active until the alarm is acknowledged.	K062
yellow	Warning	The machine runs in "dry-cycle" or "automatic" operating mode and produces bad parts or the quality monitoring is deactivated.	K061
green	Production of good parts	The machine runs in "automatic" operating mode. (On hydraulic machines, this signalling element is optional.)	K063
blue	Peripheral signal	The lighting element starts flashing when the entered "number of parts before nominal part count reached" is reached. When the nominal parts count is reached, the lighting element lights up permanently until the respective message is acknowledged. (The signalling element is optional.)	K064

Horn

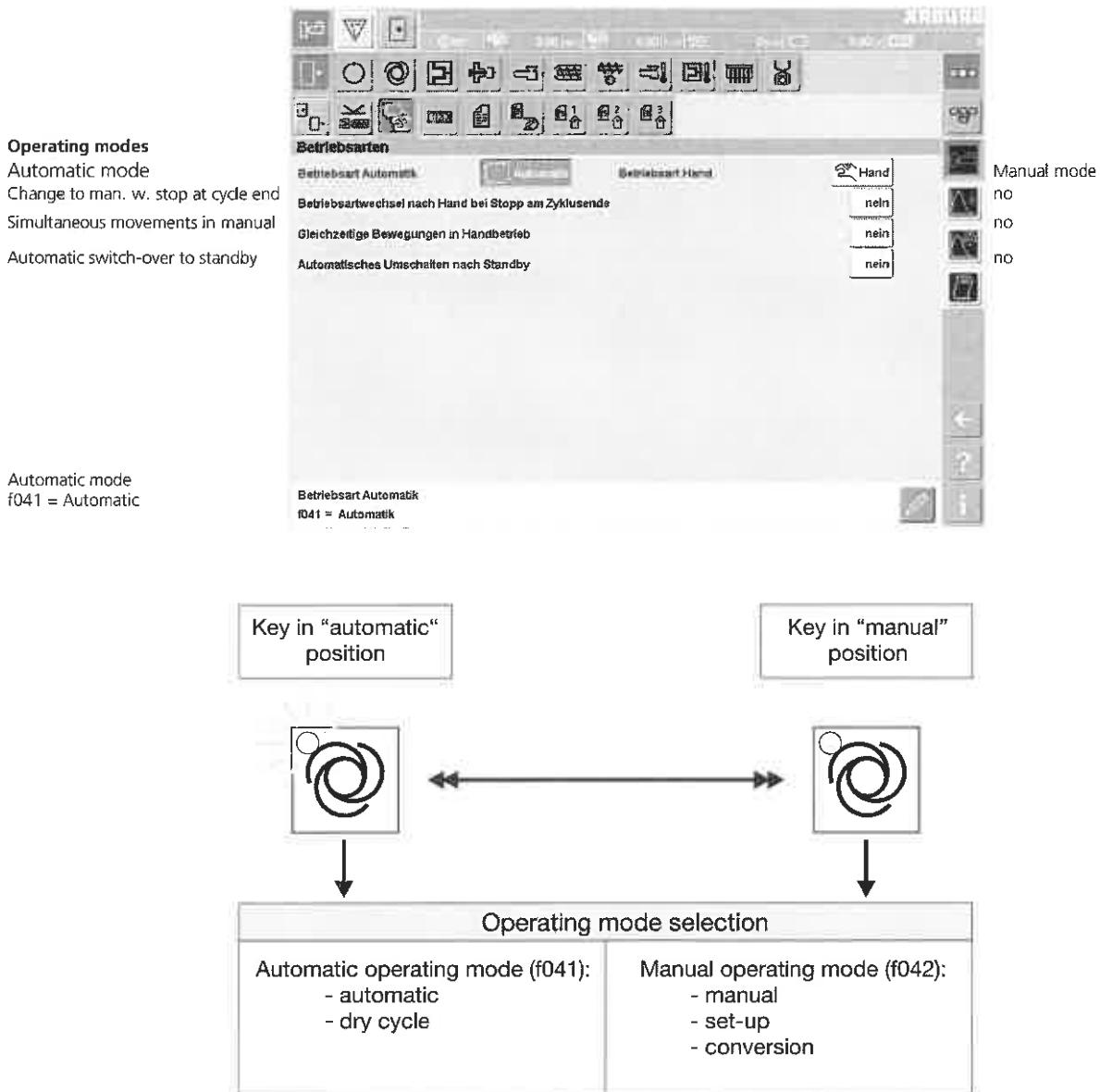
The horn is another element which is added on top of the lighting elements. The horn reacts in the same way as the red lighting element, which means it is activated in addition when an alarm occurs.

Signalling element	Status	Meaning	Control
Horn	Alarm	The machine has stopped production due to an alarm or because the emergency-stop switch has been actuated. The horn remains active until the alarm is acknowledged. (The horn is optional.)	K062

2 Production sequence, production / order control

2.6.2 Operating mode selection

In the "Operating mode" parameter screen page you enter which operating modes are to be effective in manual and automatic operation.



"Automatic" mode

- Touch the "Automatic" key (next to "Automatic operating mode) and then press the "Edit" key (pencil).
- The following window appears in which you can select the required operating mode in the usual way.

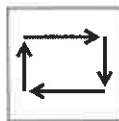
**Selection**

Automatic

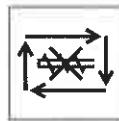
Automatic

Dry cycle

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Automatic

A new cycle is started automatically at the end of each cycle.

Dry Cycle

The next cycle starts automatically at the end of each cycle, in the same way as with automatic.

As the dry cycle mode is usually required for test purposes, one or more processes in the production sequence e.g. injection unit movements, can be deactivated.

**INFORMATION**

The "dry cycle" mode does not have production status (yellow warning light is on). Check whether the markings are correctly set in dry cycle.

"Manual" operating modes

- Touch the field next to "Manual operating mode" and then the "Edit" key (pencil).
- The following window appears in which you can make your selections in the usual way.

**Manual mode**

Here you operate the machine movements using the keys on the control panel. The speeds and pressures which are programmed for each process become effective.

Set-up mode

Here you operate the machine movements using the keys on the control panel. The machine moves with fixed, pre-defined values for speed and pressure.

NOTICE

In "Set-up" operating mode, monitoring functions can be partially switched off, depending on the programming in the "Monitoring off in Set-up mode" parameter panel.

Work in this operating mode must therefore be carried out with the utmost care to prevent damage to the mould and machine.

Conversion mode

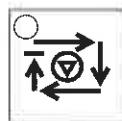
All conversion and changing sequences are carried out in this operating mode.

Other settings
Operating mode change to manual after stop at cycle end f046

When this function is activated the controller changes to "manual" mode after stop at cycle end.

Pre-requisite: the machine must be in "automatic" mode.

- Input "yes" at f046 by touching the "Y" key.



Press this key (stop at cycle end) on the operating keypad.

- The LED lights up.
- The current cycle is completed, the machine stops at the end of the cycle and changes to "Manual" mode.
- To start the next cycle the start key must be pressed.

Simultaneous movements in manual mode f9430

If this function is active (f9430 = yes) other movements can be carried out simultaneously with "mould closing" and "mould opening".

Pre-requisite: You have programmed simultaneous movements to run parallel with the mould movements in the production sequence.

- Set f9430 to "yes".
- Press the "mould closing" or "mould opening" key.
- The movements are carried out simultaneously.

NOTICE

If parameter f9430 is set to "no", simultaneously programmed movements are omitted. This can mean for example that the mould closes and the ejectors are still advanced.

Automatic switch-over to standby f9163

If this function is active (f9163 = yes), the parameter "Standstill until switch-over to standby" (t961) is displayed.

- Enter the standstill duration here after which the machine is to switch over to standby.

4 Temperatures, plasticizing process and part formation

4.1.2.1 Enable time for screw

During start-up or after interruptions, the plasticising screw must not be moved until the plastic compound has melted completely.

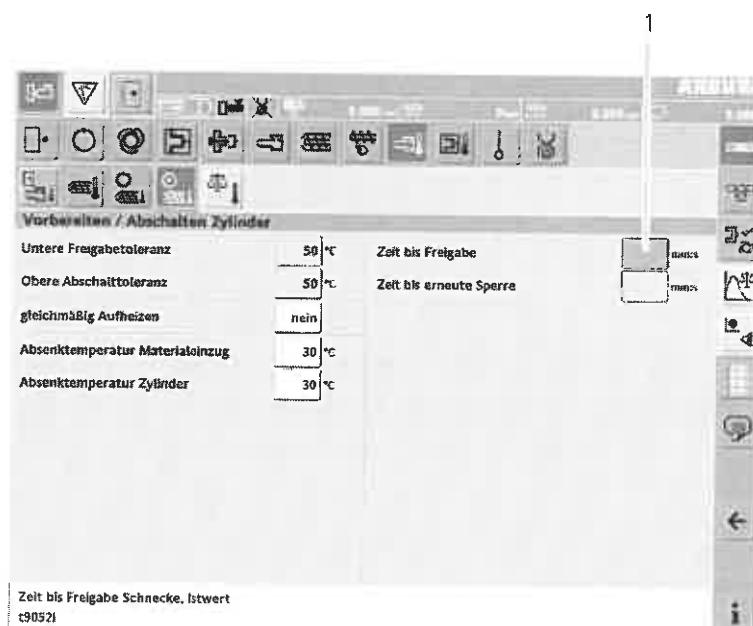
If the screw is moved beforehand, e.g. for dosing or purging, the screw or non-return valve can suffer damage due not completely plasticised plastic compound.

The SELOGICA controller provides a monitoring function to avoid this. The length of the enable time depends on the screw diameter and is predefined by the system data.

Time to screw enable t9052I

The time t9052I starts running when the heating is switched on for the first time and the enable tolerance of all heating zones is reached.

Screw movements are only permitted after this time has expired.



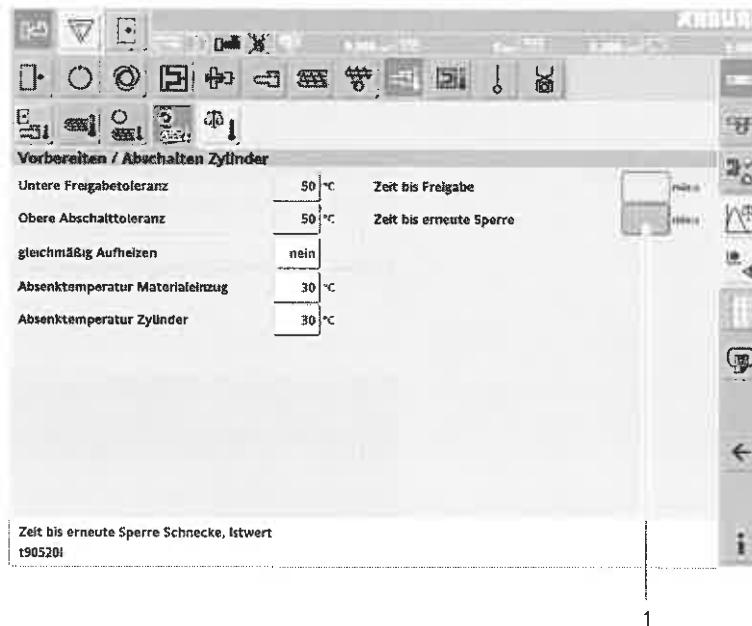
1 Time till enable

**Time until next inhibition of screw
t90520I**

When the heating switches to standby, a second time t90520I is started as soon as one of the heating zones falls below the enable tolerance.

The time t90520I is exactly twice the time of t9052I. When the heating is switched on again during this time, the screw can be moved without the enable time.

The second enable time t90520I is reset when all heating zones have reached the enable tolerance t8002 after the heating has been switched on again.



1 Time till next inhibit

Time to screw enable, special function t9052

The machine can optionally be equipped with the function t9052.

With this function, the predefined system data for "Time to screw enable" can be overwritten by the operator.

NOTICE

Important monitoring functions of the screw are deactivated with the special function t9052.

The usability and service life of the machine are thereby reduced. Even damages leading to a machine standstill can be caused in this way.

Ensure that the time till screw enable is always sufficient.



1 Time to screw enable (t9052)

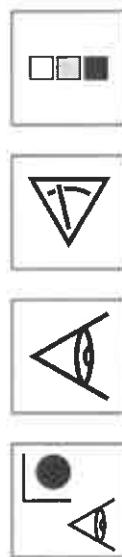
5 Production control

5.4 Monitoring functions

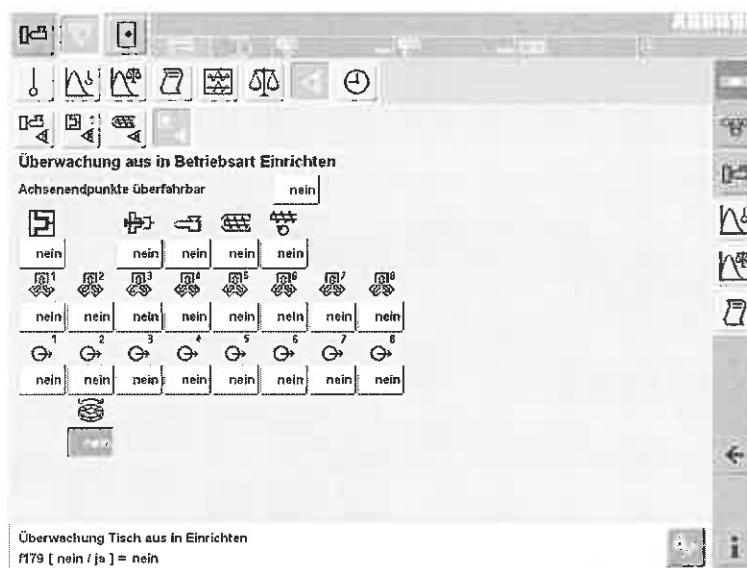
5.4.1 Monitoring OFF in set-up operating mode

With the SELOGICA controller, it is possible to switch off various monitoring functions and stroke limitations in "Set Up" operating mode.

Calling up the parameter screen page



Monitoring OFF in "Set-up" operating mode.
Axis end points exceedable



Monitoring of table OFF in set-up
f179 [no / yes] = no

Überwachung Tisch aus in Einrichten
f179 [nein / ja] = nein

- Here you activate or deactivate various monitoring functions.
- Change to "Set-up" operating mode.

Axis end points exceedable f180

- Enter "yes" here if you want to move beyond the axis end points during machine movements.
- When you now undertake machine movements via the manual keypad, the machine will not stop at the axis end points.
- The movements end only when the key is released or when the machine has reached the mechanical end limit.

The monitoring functions are reactivated when you change over from "Set-up" to another mode.

Switching off individual monitoring functions

The following monitoring functions can be individually switched on and off in "Set-up" mode.

The mutual interlocking of various machine axes, as programmed in the machine sequence, can be switched off.

- ◆ Switch off monitoring → Select: "yes",
 - ◆ Switch on monitoring → Select: "no"
- | | |
|------|-----------------------|
| f181 | Clamping unit |
| f182 | Ejector |
| f183 | Core pull 1 |
| f184 | Core pull 2 |
| f151 | Core pull 3 |
| f185 | Nozzle |
| f186 | Screw |
| f187 | Screw rotation |
| f153 | Programmable output 1 |
| f154 | Programmable output 2 |
| f155 | Programmable output 3 |
| f156 | Programmable output 4 |
| f157 | Programmable output 5 |
| f158 | Programmable output 6 |
| f188 | Mould fixture |
| f189 | Horizontal offset |
| f179 | Table rotation |
| f178 | Safety gate 1 |



CAUTION

In "Set-up" mode, monitoring and stroke limitations can be partially switched off, depending on the programming in the "Monitoring OFF in Set Up Operating Mode" parameter screenpage.

Incorrect operation can lead to damage to the mould or other machine parts.

Great care must therefore be taken when carrying out machine movements in set-up mode.

7 Working with the machine

7.1 Setting into operation

7.1.1 Inspections on installing the machine and setting into initial operation

Daily inspections, mould change

The following must be checked daily before setting the machine into operation or after changing the mould:

- Are all safety devices functioning as stipulated?
- Is sufficient hydraulic oil filled? Never switch on the pump motor without sufficient oil! Not even briefly!
- Are the doors of the control cabinet completely closed? Dust penetration can cause damage.
- Are the panels (access prevention) on the machine base correctly mounted? (See page 4 in this chapter.)
- Is an oversized mould installed, which requires additional safeguarding? (See page 3 in this chapter.)
- Is the cooling water supply open?
- Is the pre-charged pressure of the pilot oil accumulator correct? See chapter 1.1.14 (subject to equipment installed on machine).
- Is the pre-charged pressure of the hydraulic accumulator for machine movements correct? Test according to the enclosed instructions of the hydraulic accumulator manufacturer (not standard).
- Observe the prescribed maintenance intervals.



DANGER

- ◆ Never climb into or on top of a machine in operation!
- ◆ Always cordon off adequate space around the machine when carrying out maintenance or conversion work. Ensure that no persons other than the operator are in the vicinity of the machine.
- ◆ Always wear protective gloves and a face mask when carrying out maintenance work on a heated cylinder.
- ◆ Ensure cylinder and nozzle temperatures are correct. Incorrect temperatures can lead to combustion and explosions.
- ◆ Never mix two materials that may chemically react with one another or if their processing temperatures do not correspond.
- ◆ The operator must have suitable equipment (e.g. compressed air, vacuum cleaner) at his disposal to remove any spilled granular material.



DANGER

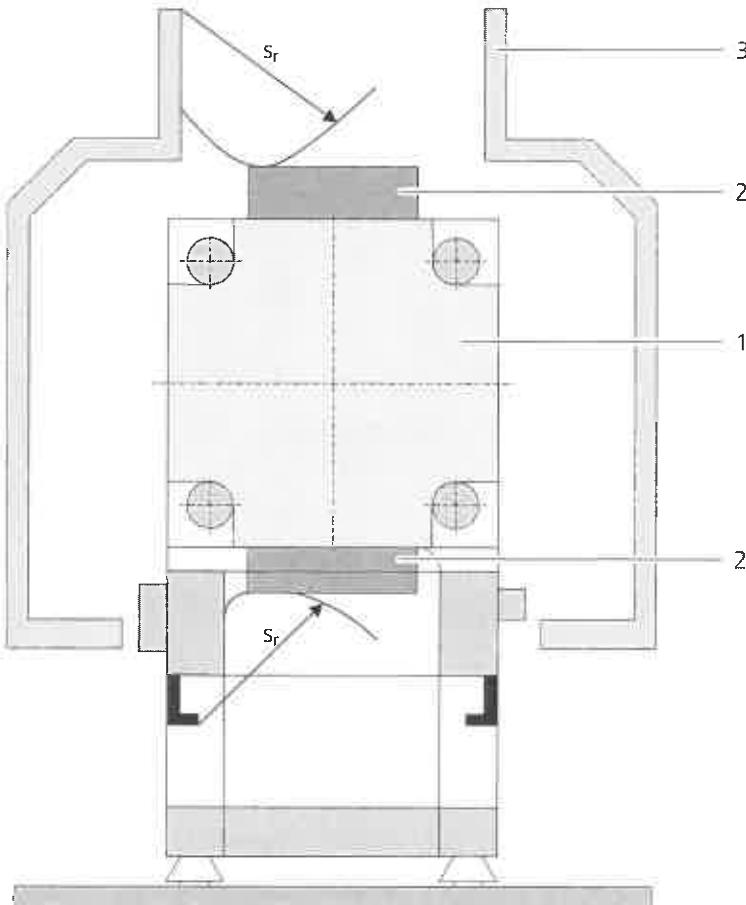
If the mould or any attached components protrude over the top or bottom edge of the moving mould mounting platen creating a crushing or shearing hazard during operation, the safety clearance S_r is to be checked.

If necessary, the safety clearance is to be re-established by installing a permanent additional guard. Refer here also to the European standard EN ISO 13857.

On machines where the guard is open to the top, the protective panels must be increased accordingly.

Any openings in the lower part of the machine base must also be completely closed off.

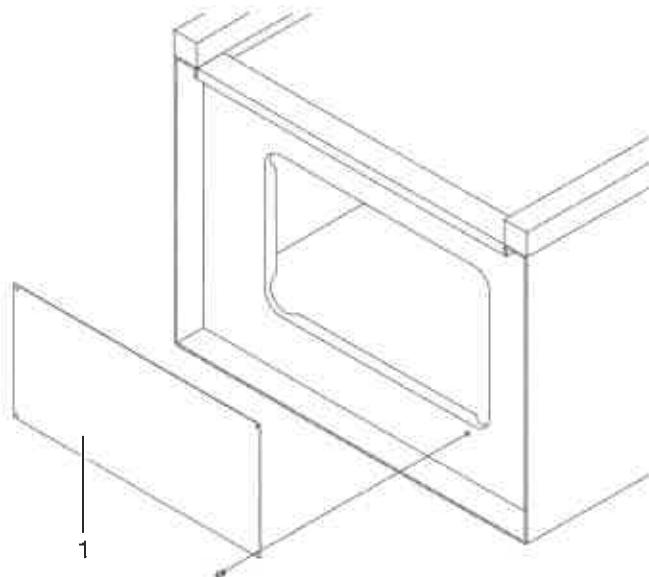
The obligation to carry out these safety measures lies with the operating authority of the machine.



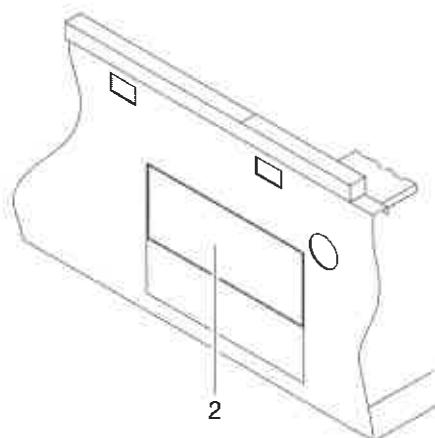
- 1 Moving mould mounting platen
- 2 Mould (protruding)
- 3 Increased guard
- S_r Radial safety clearance

**Access prevention
on machine base**

If the openings on the machine base are not being used for additional devices such as conveyer belt etc., the openings must be sealed off with the respective access prevention panels (1) or (2).



1 Access prevention panel at front end of machine base



2 Access prevention panel on operating side and rear side of machine base

Cooling water supply

NOTICE

Risk of damage caused by water!

Due to mechanical and thermal effects, leaks can occur on the cooling water supply after some time.

Check the cooling water supply for leakage.

Tighten the hose clamps on the cooling water hoses again, two weeks after initial setting into operation of the machine.

Inspections after modifications to machine components

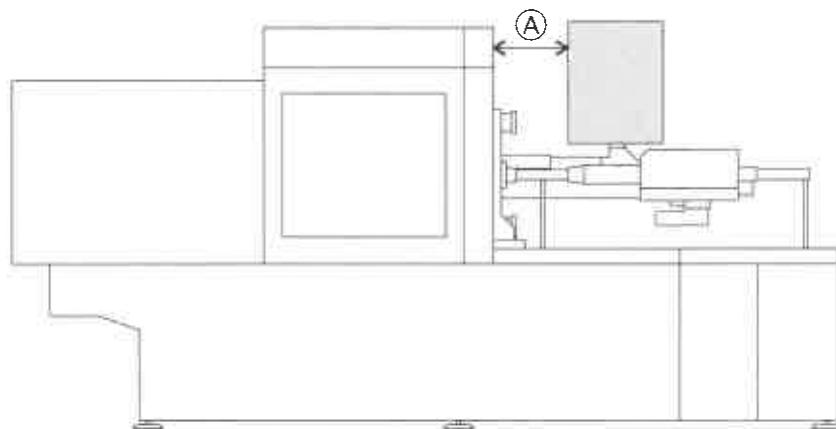


WARNING

Danger of crushing injuries from moving machine components.

With all modifications to the machine, a defined minimum clearance between the moving and the fixed components of the machine must be maintained permanently.

Modifications by which the minimum clearance "A" can be exceeded are e.g. a larger feed hopper on the injection unit or attachments on the clamping unit.



A Minimum clearance 300 mm

7.1.2 Switching on the machine

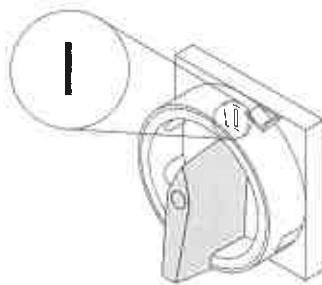
Inspections

- Carry out the inspections as described in section 7.1.1.

Switch-on

The main switch is located on the control cabinet. With this you turn the power supply for the whole machine on and off.

- Turn the main switch to the "I" position or "ON".

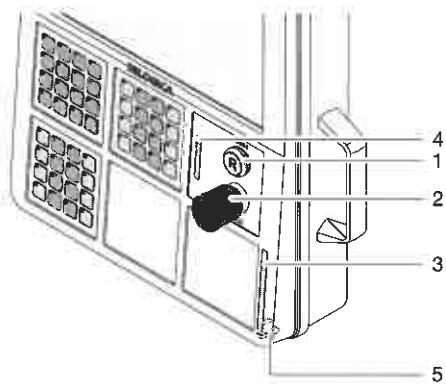


- ◆ Position "0" = OFF
- ◆ Position "I" = ON.

- After switching on the main switch, the controller and various machine systems are tested.

When these tests are completed after approx. 2 mins. the message "Press controller start key (unlock emergency stop)" appears in the message line of the screen.

- Press the control start key.



- 1 Controller start key
- 2 Emergency-stop switch
- 3 Reading device for transponder cards (user authorisation)
- 4 Reading device for compact flash (storage medium)
- 5 USB interface for PC keyboard

INFORMATION

When the "Automatic switch-on" function (not standard) is set to "yes" the heating becomes active when the main switch is switched on.



Switching on the machine cooling

- Open the cooling water supply (if it has been manually shut).

Preheating the hydraulic oil

A uniform part quality can be achieved more quickly by preheating the hydraulic oil up to 40-45 °C (104-113 °F). Subject to machine equipment (not applicable to EDRIVE with ASH).

Minimum temperature of the hydraulic oil

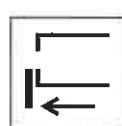
NOTICE

Start the pump motor only at a minimum oil temperature of 15 °C (59 °C).

Temperatures below this can cause considerable damage to the hydraulic components, in particular to the pump(s).

- Close the sliding guard(s) and all safety doors, if available. External safety doors usually require acknowledgement by pressing a key, even if they are already closed.
- If your machine is equipped with a power-operated sliding guard, you will find information on the manual operation as well as important safety information in chapter 12.7.

If the control panel of your machine contains the following keys, your machine is equipped with the optional "Power-operated sliding guard".

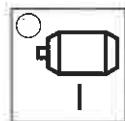


Sliding guard opening



Sliding guard closing

Switching on the pump motor



Press this key in the first control panel to switch on the pump motor.

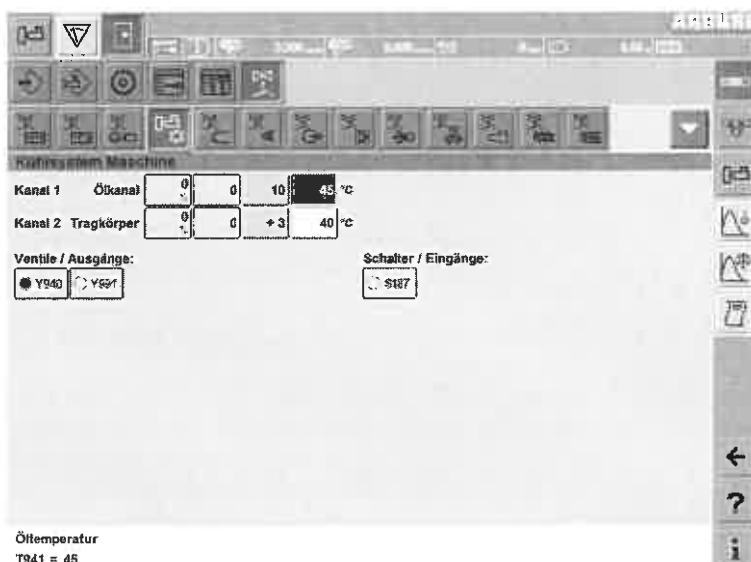
- The machine starts to pre-heat the oil.

All movements in "Automatic" mode are inhibited on nearly all machines,

- ◆ before the oil temperature has reached a minimum temperature of 30 °C,
- ◆ before the oil temperature reaches the tolerance T941 ±T941T.
- The pre-heating is automatically stopped when the oil temperature reaches the tolerance temperature.

You will find the temperature setting and the tolerance for the oil temperature in the "Machine Cooling System" parameter screen page ("Valves/switches superior group").

Machine cooling system



INFORMATION

In order to protect the machine, the oil temperature value T941 can only be changed by ARBURG Service personnel.

If your machine is equipped with the option "Programmable oil temperature" instead of a non-editable oil temperature, you can define the oil temperature yourself within the range of 40-55 °C (104-131 °F).

As the machine was calibrated at a hydraulic oil temperature of 45 °C (113 °F) before leaving the factory, it only reaches the optimum parameter values when the temperature of the hydraulic oil remains as close as possible to this temperature.

You should therefore operate the machine as close as possible to the recommended oil temperature of 45 °C (113 °F).

Switching on mould temperature control

- Switch on the mould temperature control device(s) (if available) and check the following settings:
 - ◆ temperatures,
 - ◆ operating mode of each zone,
 - ◆ programmed procedures in the set value temperature control.

Switching on the heating



Press this key in the first control panel to switch on the heating.

- All movements of the screw are inhibited as long as the heating zones have not reached at least the enable temperatures.
- In order to ensure that the cylinder is completely heated through to the correct temperature, a further pre-defined screw enable time is waited for, (subject to the size of the injection unit) after the cylinder enable time has been reached. All screw movements remain inhibited during this time.



INFORMATION

While the machine is heating up to the nominal temperature the controller calculates the regulation parameters (adaptation). To ensure that these parameters are calculated correctly, the machine should be left to heat up undisturbed.

When saving a data set the determined control parameters are also saved on the CompactFlash card.

When the heating has adapted and a new data set has been imported, the newly imported control parameters and not the previously determined ones become valid after switching the heating briefly off and on again.

Exception: if the temperature difference between switching the heating off and on is too great, a new adaptation will be carried out.

7.1.3 Mould installation

Requirements

The mould and the ejector system must correspond with the mould dimensions and the ejector connection dimensions stipulated in chapters 1.1.1 and 1.1.2.

- Check measurements before installation!



Set the operating mode to "Set-up"

NOTICE

On machines with an electric ejector, it must be ensured before installing a mould that low speeds have been set for the mould and ejector movements.

If the programmed travel distances are not correct for the new mould the ejector could collide with a mechanical stop. If the speed is set too high, the spindle system can suffer damage.

Always import a suitable data set before installing a new mould. In this way functions will be installed to protect the drive spindle. These are however only effective until the programmed stroke end points have been reached once.

If no data set is available for the new mould, import the previous data set again.

Due to the toggle kinematics, the closing speed of long opening strokes may be set too high in "set-up" operating mode for some moulds.

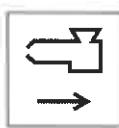
In this case enter a speed < 5 % and undertake this movement in "manual" mode.

Inspecting the mould

- The mould halves must be firmly joined together before installation, e.g. by lashing straps.

Installing the mould

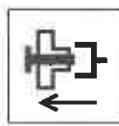
- Clean the mounting surfaces of mould and machine carefully and apply a little oil or anti-corrosion agent. Attach insulating plates between the mould and the mounting platens.
- Carry out inspections in accordance with chapter 7.1.1 and switch on the machine in acc. with chapter 7.1.2.



Retract the injection unit fully.

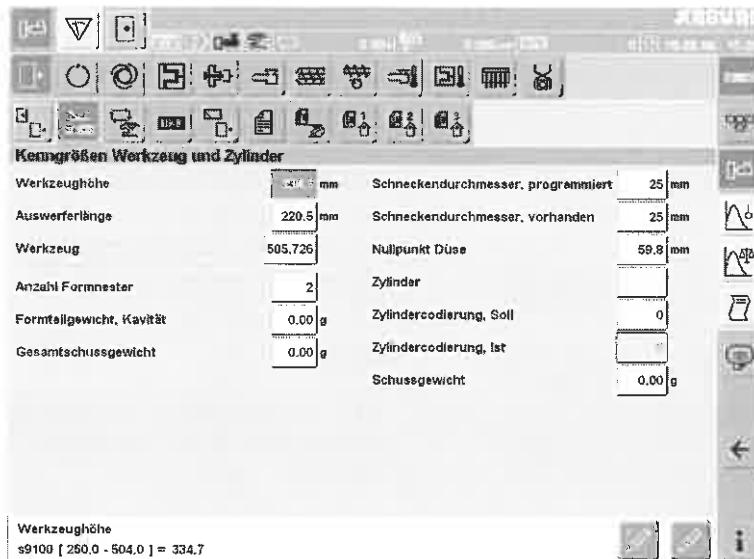


Enter "yes" at f180 "axis points exceedable" in the "Monitoring off in set-up mode" parameter screen page.



Retract the ejector fully.

- Call up the "Mould and Cylinder Parameter Selection" parameter screen page.



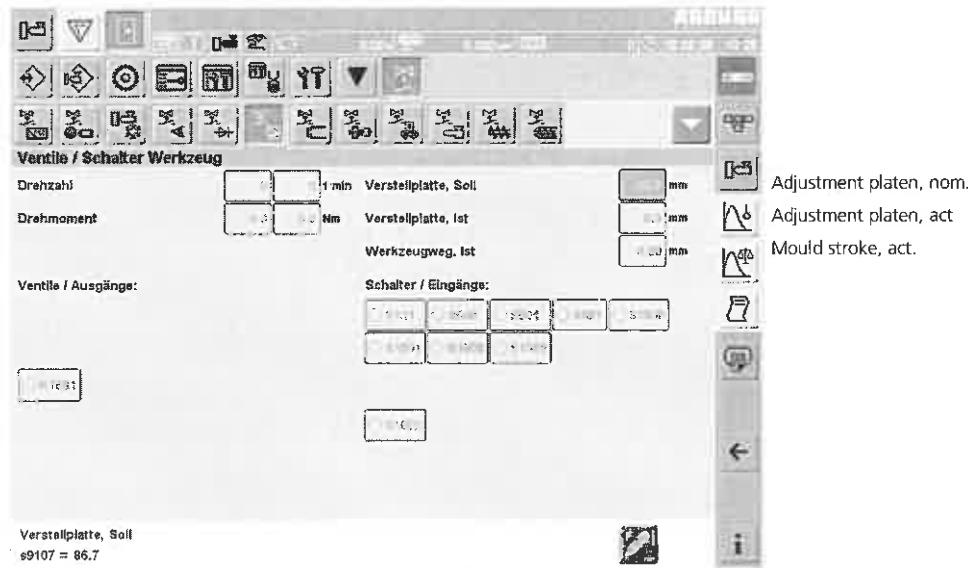
Mould and cylinder parameter selection

Mould height

Mould height
s9100 [250.0 - 504.0] = 334.7

- Enter the mould height of the mould to be installed at s9100.
- The controller now automatically calculates the nominal position for the mould height adjustment.

- Call up the "Valves/switches, mould" parameter screen page.



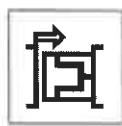
s9107 Adjustment platen, nominal

The value calculated by the controller for the mould height adjustment is automatically entered here.

9109 Adjustment platen, actual

Here the actual value of the mould height adjustment platen is displayed.

- Switch over to "Set-up" operating mode.
 - The mould height is adjusted at a low speed when the "Mould height adjustment" keys are pressed.
- Switch over to "Manual" operating mode.
 - The mould height is adjusted at a fixed speed (fast).



Press this key to reduce the mould height.



Press this key to increase the mould height.

- The mould height adjustment system moves to position s9107 in accordance with the operating mode selected.



- The mould height adjustment system moves to position s9107 in accordance with the operating mode selected.

- Lift the mould into the clamping unit. Centre it with the aid of the positioning bore on the fixed mounting platen and secure it.
- Close the safety gates.
- Change the operating mode to "Set-up", if not already active.
- Using the manual "Mould closing" key, move the moving mould platen carefully towards the mould. The last part of the stroke, until the platen contacts the mould, is operated with the "Reduce mould height" manual key.
- The clamping force F101I should show over 10 kN.
- Zero the mould.
- Tighten all mould attachment screws.
- Remove the connections between the mould halves, e.g. lashing straps.
- Ensure that the core pulls, if applicable, are in their end positions.
- Open the ejector coupling.
- Open the mould with the manual "Mould opening" key (s504).

NOTICE

Only centre your mould on one of the two mould mounting platens (preferably the fixed platen)!

Centring the mould on both sides can lead to increased wear of the mould.

Ensure that all screws with which the mould is attached are well tightened. Otherwise the mould could fall out when opened.

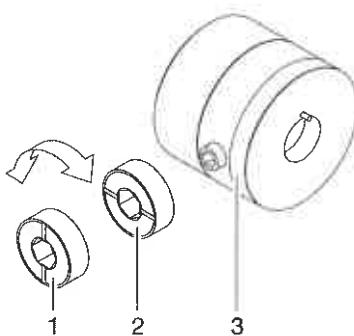
Remove the connection between the two mould halves.

Do not open the mould before you have checked the data for "mould opening and closing" and corrected it if necessary.

Unsuitable data could lead to mould damage!

Connecting the ejector with quick-lock coupling

The hydraulic ejector is connected with a quick-lock coupling.



- 1 locked position
- 2 unlocked position
- 3 locking mechanism

NOTICE

When using an unscrewing unit on the moving mould platen, the fixing pin on the ejector coupling must be removed.

Otherwise there is a danger of collision during ejector advancement!

Fixed coupling element

Proceed as follows when you are operating with a coupling which is fixed to the mould ejector bolt:

Before mould installation:

- Set operating mode to "Set-up" or adjust slow speeds (lower than 20 mm/s).
- Open the ejector coupling.
- Retract the ejector fully.
- Screw the coupling element with the connection joint into the mould ejector bolt. Observe the maximum length as specified in chapter 1.1.2.
- Tighten the lock nuts on both sides.

Mould installation:

- Install and tighten the mould as described.
- Close the safety gate.

Connecting the ejector:

- Insert the ejector bolt into the coupling and close the lock.
- Set operating mode to "Set-up" or adjust slow speeds (lower than 20 mm/s).
- Retract the ejector with the coupled mould ejector bolt fully.
- Zero the ejector.

Coupling element without fixed connection

If you are operating with a coupling element without a fixed connection, proceed as follows:

- Insert the coupling element with adjustment screw into the coupling and close the lock.
- A play of 0.6 mm must remain between the mould ejector bolt and the adjustment screw in the coupling piece (the bolt heats up and expands during operation).
- Tighten the lock nut on the adjustment screw and inspect the play again.

Electric ejector

If your machine is equipped with an electric ejector without fixed connection ensure that it does not collide with the ejector rod during advancement. The spindle system could otherwise suffer damage.

In order to prevent this, proceed as follows:

- Install the mould.
- Open the mould.
- Position the ejector in the rearmost position.
- Move the electric ejector in the following steps.
 - Enter the maximum value at s9103 (ejector length).
 - Set the operating mode to "Set-up".
 - Move the ejector with the manual key to a few 1/10ths of a mm in front of the ejector rod.
 - Read off the current actual value at S6011 and subtract this from the maximum value.
 - Enter the result at s9103.
 - 0.0 mm is now displayed at s6011.

This means that the electric ejector is in the retracted position and the start position is thus only a few 1/10ths of a mm from the ejector rod.

NOTICE

Ensure that the electric ejector cannot collide with a mechanical end stop, otherwise the spindle system could suffer damage.

- Call up the "Ejector Selections" parameter panel.

Ejector selections
ejector not held

Ejector held
f614 = ejector not held



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f614 No ejector hold

- Select "No ejector hold" at f614.
- Enter a slow speed in parameter panel "Ejector advancement" for stage 1 (until the electric ejector contacts the ejector rod of the mould), then increase the speed.
- Connect the temperature control for the mould (if applicable).

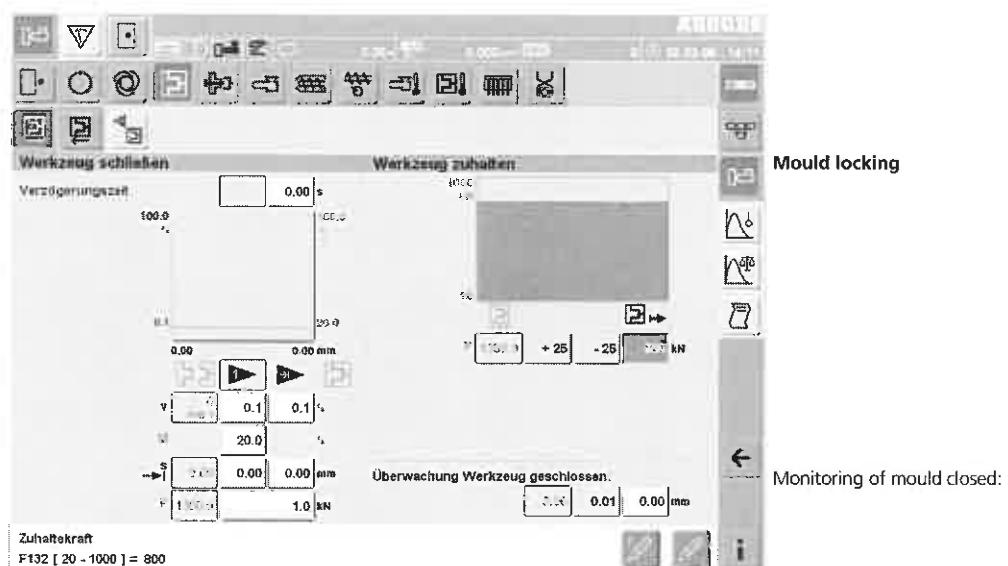
Automatic locking force adjustment

Subject to the machine equipment. After installing the mould, the locking force must be adjusted. This is carried out with the aid of the automatic locking force adjustment function. When the mould is heated, it must first be heated to operating temperature.

- Call up the "Mould locking" parameter screen page..

Mould closing
Delay time

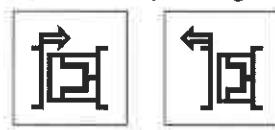
Locking force
F132



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- Enter the required locking force at F132.

- Set the operating mode to "Conversion".



Press and hold one of these keys for the mould height adjustment.

- The LED in the start key now flashes.
- Press the start key.
 - The message "Clamping pressure adjustment: continue with start key" appears.
 - Press the start key again.
 - The programmed clamping force is automatically adjusted.
 - When this operation is completed, the message "Clamping force adjustment completed" appears on the screen.

7.1.4 Zeroing the position measuring systems

Zeroing the position measuring systems

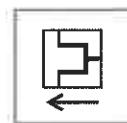
The position measuring systems of the machine always take measurement from fixed points which cannot be changed (machine-related zero points). You can however, enter all data for machine movements as absolute values.

To make this possible, zero points must be determined for each mould for the position measuring systems (mould-related zero points). This occurs in a simple manner by "zeroing" the position measuring system. The machine must be in "Set-up" operating mode.

The following position measuring systems must be zeroed:

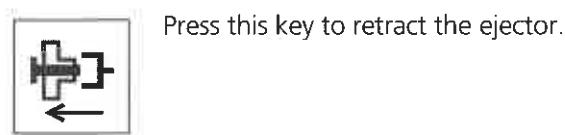
- ◆ Ejector movements zero position = ejector retracted
- ◆ Nozzle movements zero position = nozzle on mould

Zeroing the ejector



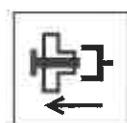
Press this key to open the mould.

Call up the "Ejector retraction" parameter screen page with this key.



Press this key to retract the ejector.

- Check whether the ejector has reached the mechanical end limit.



Keep the left key pressed and press the "<0>" key simultaneously. Press and hold both keys for approx. 2 seconds.



Zeroing the nozzle

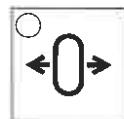


Press this key to close the mould.

- Call up the "Nozzle advancement" parameter screen page with this key.



Press the left key to advance the nozzle. Hold the key down and press the "<0>" key simultaneously. Hold both keys down for approx. 2 seconds.



- The value "0.0 mm" now appears on the screen at "nozzle stroke actual value". This value can increase up to 0.2 mm as soon as the keys are released. This does not matter, the nozzle springs back a little as soon as the nozzle contact force is removed.

NOTICE

Zero the nozzle at cylinder nominal temperature as far as possible!

7.1.5 Starting up the machine

Checking the data

You have inspected the machine according to section 7.1.1 and have switched it on according to section 7.1.2.

- Check all the settings for the stroke control again! This is especially important when you are working with a program which has been loaded from a diskette! Set the machine to the "Set-up" operating mode.

Checking the temperatures

- Ensure that the nominal temperatures for cylinder and nozzle heating have been reached. All movements of the screw are inhibited in automatic mode as long as the temperatures are not within tolerance.
- Ensure that the mould temperature corresponds with the nominal value (inspect temperature control devices if available).

NOTICE

When the machine is put into operation for the first time or when the nozzle has been changed, the nozzle and nozzle tip must be tightened after the nominal temperature is reached.

The sealed parts may leak if this is not observed!

Furthermore, the clamping screws on the nozzle heating system must be tightened after the first heating up. Badly fitting heating elements lead to higher energy consumption and the heating-up period is prolonged.

Material supply

- Fill the material hopper and slide it over the feed opening.



WARNING

Risk of injury.

Use a suitable climbing aid or a conveyer for the overhead refilling of the material hopper.

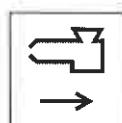
When connecting and disconnecting the conveyor supply lines, always use suitable climbing aids.

Always switch off the machine before refilling the material hopper and before carrying out assembly work on the machine!

Measuring the melt temperature

After the cylinder has heated up you can measure the temperature of the melt with a dip thermometer.

- Switch over to manual control.



Press this key to retract the injection unit completely.

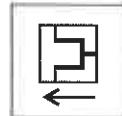


Press this key. The machine doses material. Press and hold the key until melt emerges from the nozzle. Caution, hot plastic!

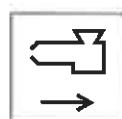
**WARNING**

Danger of serious burns from hot plastic!

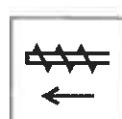
For all work on the heated plasticising cylinder a face mask and safety gloves must be worn.

Dosage

Open the mould fully (paying attention to the supply lines attached to the mould).

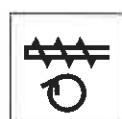


Retract the plasticising unit. Press this key again until the plasticising unit is retracted to the mechanical limit.



Advance screw fully.

- Remove the material which has emerged from the nozzle.



Dose manually.

You can enter a special value for back pressure when dosing in manual mode with a retracted nozzle. This will prevent material emerging from the nozzle:

- Select "yes" at f404.

Determining the number of start-up cycles

During the start-up cycles, quality-related errors do not lead to a machine alarm.

Furthermore, the parts produced are sorted out and counted as "bad parts" if you are using a sorter unit (not standard).

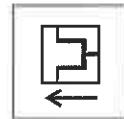
- Enter the number of required start-up cycles after "heating off" at f090.
- Enter the number of required start-up cycles to be carried out after "auto interruption" at f090A.

Start-up order of injection units¹

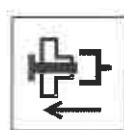
On two-component machines you can define at which production stage the respective injection unit is to become active at parameters f9426 and f9427. (On three- and four-component machines parameters f9428 and f9429 are additionally available, see chapter 20.2.1).

- If you do not want an order of sequence, input the following values:
f9426 = 1 injection unit 1,
f9427 = 1 injection unit 2.
 - Both injection units become active in the first production stage.
- If you are producing a part which consists of a pre-form and a finished part (i.e. produced in two production stages), define the order of sequence as follows:
f9426 = 1 injection unit 1,
f9427 = 2 injection unit 2.
 - Injection unit 1 is active in the first stage and produces the pre-form. Injection unit 2 becomes active in the second stage and completes the moulded part. (For more information see chapters 20.1.15 and 20.1.16).

Opening the mould



Open the mould completely (to s504).



Retract the ejector completely (to s613).

Starting automatic operation

- Select the required operating mode.
- Press manual/auto in order to switch on automatic (LED lights up).
- The LED on the start key flashes.
- Press the start key. The first cycle starts.

¹ only on multi-component machines

7.1.6 Working with spring moulds

Spring moulds have spring-mounted platens. This means that when the mould closes, the spring force must first be overcome by the closing force before the platens make contact and the mould halves can be clamped together.

If the spring force is higher than 10 kN (1.1 US tons), the automatic locking force setting cannot be used when setting up the mould because the mould height adjustment system cannot overcome the spring force. In this case you must adjust the locking force manually, as follows:

- Bring the toggle to the extended position while the mould is removed (by closing the clamping unit).
- Call up the "Mould and Cylinder Parameter Selection" parameter screen page.
- Enter a mould height at s9100 which corresponds to the state of the mould when the spring assembly is relieved.
- Move the mould height adjustment system in "manual" mode until s9109 (actual mould height stroke) corresponds to s9107 (nominal mould height stroke, calculated from the mould height s9100).
- Install the mould as described in chapter 7.1.3.

Setting the locking force manually

When setting the locking force manually, the mould height must be slightly reduced with the manual key so that a greater, sufficient locking force is built up after mould closing.

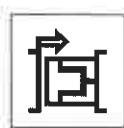
- Call up the "Mould closing/locking" parameter screen page.

F132
Locking force

- Enter the required locking force here. (If this locking force plus tolerance F147 is exceeded when manually setting the locking force the controller issues an alarm).

**F147T locking force
+tolerance**

- Enter a plus tolerance for F132 here.
- If F132 is exceeded by this tolerance, the controller issues an alarm.
- Bring the toggle to the extended position (by closing the mould).
- Advance the mould height adjustment system in "manual" mode until the resistance of the spring mould stops the movement.
- Zero the mould.
- Open the mould.



Press this key briefly.

- The mould height is reduced at a low speed.
- Switch over to "manual" mode.
- Close the mould and zero it (by holding the "mould closing" key pressed and pressing the zero key at the same time).
- Check the locking force actual value at F101I. Is the required locking force actually reached?
 - ◆ Yes:
All is in order, you can continue with set-up.
 - ◆ No:
● Open the mould.
 - Switch over to "set-up" mode.
 - By reducing or increasing the mould height adjustment system you can change the locking force in a + (plus) or - (minus) direction.
 - Close the mould in "manual" mode.
 - Check F101I again.
 - Keep repeating these steps until the required locking force is reached.

7.1.8 Reference movement of the mould clamping unit

If, after switching off the main switch or after a power cut, the toggle system remains in the extended position (mould completely closed) it is not possible to continue operating the machine in automatic immediately after re-switching on (subject to on the equipment installed on the machine).

- The following warning is displayed on-screen: "Mould: end position opening/closing in manual"

Proceed as follows:

- Set the operating mode to manual.
- Open the mould clamping unit to s594 (mould open position). Ensure supply hoses and cables do not get caught.
- Close the mould clamping unit to the end limit.
 - The position measuring system is now calibrated.

The machine can be switched to "automatic" operating mode ready for production.

7.2 Change of material, end of production

7.2.1 Important information on various plastics

Compatibility

When changing the material, never mix two materials that may react with one another or of which the processing temperatures are not compatible! This could lead to residue formation, combustion and explosions.

Always observe the correct cylinder and nozzle temperatures! The information supplied by the material supplier must be complied with! Incorrect temperatures can lead to combustion or explosion!

If the processing temperatures of the old and new materials are not the same, the plasticising cylinder must first be cleaned. Inject a relatively insensitive material for this purpose (PE, PP or PMMA - see table in 7.2.2, page 1). Only then should you inject the new material.

Specific information for POM or PC

Before or after processing with POM or PC the plasticising cylinder must be cleaned with an insensitive material. Inject with PE, PP or PMMA (see table). Better still: purge with a cleaning material (see chapter 9.1.3)

The nozzle must be cleaned before or after the processing of PC! It is advisable to have an additional nozzle for the processing of PC.

PC must not be allowed to cool in the plasticising cylinder as it will create a strong bond with the surface of the screw and cylinder wall. The material must be completely removed from the cylinder at the end of production (see above). The cylinder temperature should not sink below 150 - 170 °C (302 - 338°F) during interruptions in production or machine down time.

Specific information for PVC

After processing PVC, the entire plasticising unit must be cleaned. Remove the plasticising screw for this purpose (see 9.1.3 for instructions).



WARNING

Danger of serious injury or burns from hot surfaces and hot plastic melt!

When carrying out cleaning or maintenance work on a heated cylinder or when changing the colour or material, always wear a protective face mask and heat-resistant gloves!

Specific information for PVDF

The melt of PVDF must not come in contact with products containing Boron (screw, cylinder, nozzle, certain types of fibre glass) or MoS₂, because spontaneous degradation of the melt occurs which can lead to fire or the formation of gas. It is also important to use only colouring agents, fillers and reinforced materials which are recommended by the manufacturer.

ARBID plasticising components (cylinder, screw, check valve) have a layer containing Boron and must not be used for the processing of PVDF.

ARBURG plasticising cylinders and screws are stamped with a number on the rear of the shaft. If you are in doubt, please contact ARBURG and state these numbers to ensure that your components are suitable for the processing of PVDF.

**WARNING****Danger of explosion!**

Chemical reactions can lead to a high pressure build-up in the plasticising cylinder.

PVDF must not be processed in plasticising units that have been hardened with Boron (ARBID version).

It is absolutely essential to observe the processing instructions stipulated by the material manufacturer.

7.2.2 Adjustment values and processing information for injection moulding materials

Europe

Moulding material	Nozzle-end cylinder temp. °C ¹	Mould temperature °C	Injection pressure bar	Holding pressure bar	Back pressure bar	Remarks (see footnotes)
PS	160-230	20-80	650-1550	350-900	40-80	
SB	160-250	50-80	650-1550	350-900	40-80	²
SAN	200-260	40-80	650-1550	350-900	40-80	²
ABS	180-260	50-85	650-1550	350-900	40-80	²⁻³
PPO mod.	245-290	75-95	1000-1600	600-1250	60-90	²⁻³⁻⁴
PVC - rigid	160-180	20-60	1000-1550	400-900	40-80	³⁻⁵⁻⁶⁻⁷
PVC - soft	150-170	20-60	400-1550	300-600	40-80	³⁻⁵⁻⁷
CA	185-225	60-80	650-1350	400-1000	40-80	²⁻³
CAB	160-190	60-80	650-1350	400-1000	40-80	²⁻³
CP	160-190	60-80	650-1350	400-1000	40-80	²
PMMA	220-250	20-90	1000-1400	500-1150	80-120	²
PC	290-320	85-120	1000-1600	600-1300	80-120	²⁻⁷
PSU, PES	320-390	100-160	900-1400	500-1100	80-120	²⁻⁷
PE-LD	210-250	20-40	600-1350	300-800	40-80	⁸
PE-HD	250-300	20-60	600-1350	300-800	60-90	⁸
PP	220-290	20-60	800-1400	500-1000	60-90	⁴⁻⁸
PA 6.6	270-295	20-120	450-1550	350-1050	40-80	²⁻⁴
PA 6	230-260	40-120	450-1550	350-1050	40-80	²⁻⁴
PA 6.10	220-260	20-100	450-1550	350-1050	40-80	²⁻⁴
PA 11	200-250	20-100	450-1550	350-1050	40-80	⁴
PA 12	200-250	20-100	450-1550	350-1050	60-90	²⁻⁴
PA amorph	260-300	70-100	900-1300	300-600	60-90	²⁻⁷
POM	185-215	80-120	700-2000	500-1200	40-80	³⁻⁴
PETP	260-280	20-140	800-1500	500-1200	80-120	²⁻³⁻⁴
PBTP	230-270	20-60	800-1500	500-1200	80-120	²⁻³⁻⁴
PPS	300-360	20-200	750-1500	350-750	40-80	²⁻⁷
FEP	340-370	150-180				⁵⁻⁹
ETFE	315-365	80-120				⁵⁻⁹

1 If no other empirical values are available:

Nozzle temperature = adjust to nozzle-end cylinder temperature. Reduce the cylinder temperature by 5-10°C for each heater zone approaching the feed zone: max. temperature difference between the nozzle-end and feed zone 20°C. Set the nozzle heater band and the following heater band to the same temperature if more than 2 heater zones are available.

2 Process granulate only when dry!

3 Thermally sensitive! Set upper temperature value only with a high shot count (short dwell time in cylinder).

4 Highly wear resistant cylinder assembly recommended for processing reinforced materials.

5 Do not use shut-off nozzle, work with open nozzle only.

6 Injection recommended without check valve.

7 Highly wear resistant cylinder assembly recommended (bi-metal cylinder and PK screw).

8 If the material has an MFI (190/2.16) < 4 g/10 min, it is suitable for processing with a bolt-type shut-off needle.

9 Anti-corrosion cylinder assembly required (BMK cylinder and screw of Ni alloy).

USA

Molding material	Nozzle-end cylinder temp. °F ¹	Mould temperature °F	Injection pressure psi	Holding pressure psi	Back pressure psi	Remarks (see footnotes)
PS	320 - 446	68 - 176	9427 - 22480	5076 - 13053	580 - 1160	
SB	320 - 482	122 - 176	9427 - 22480	5076 - 13053	580 - 1160	²
SAN	392 - 500	104 - 176	9427 - 22480	5076 - 13053	580 - 1160	²
ABS	356 - 500	122 - 185	9427 - 22480	5076 - 13053	580 - 1160	² ³
PPO mod.	473 - 554	167 - 203	14503 - 23206	8702 - 18129	870 - 1305	² ³ ⁴
PVC - rigid	320 - 356	68 - 140	14503 - 22480	5801 - 13053	580 - 1160	³ ⁵ ⁶ ⁷
PVC - soft	302 - 338	68 - 140	5801 - 22480	4351 - 8702	580 - 1160	³ ⁵ ⁷
CA	365 - 437	140 - 176	9427 - 19580	5801 - 14503	580 - 1160	² ³
CAB	320 - 374	140 - 176	9427 - 19580	5801 - 14503	580 - 1160	² ³
CP	320 - 374	140 - 176	9427 - 19580	5801 - 14503	580 - 1160	²
PMMA	428 - 482	68 - 194	14503 - 20305	7251 - 16679	1160 - 1740	²
PC	554 - 608	185 - 248	14503 - 23206	8702 - 18854	1160 - 1740	² ⁷
PSU, PES	608 - 734	212 - 320	13053 - 20305	7251 - 15954	1160 - 1740	² ⁷
PE-LD	410 - 482	68 - 104	8702 - 19580	4351 - 11603	580 - 1160	⁶
PE-HD	482 - 572	68 - 140	8702 - 19580	4351 - 11603	870 - 1305	⁸
PP	428 - 554	68 - 140	11603 - 20305	7251 - 14503	870 - 1305	⁴ ⁸
PA 6.6	518 - 563	68 - 248	6526 - 22480	5076 - 15228	580 - 1160	² ⁴
PA 6	446 - 500	104 - 248	6526 - 22480	5076 - 15228	580 - 1160	² ⁴
PA 6.10	428 - 500	68 - 212	6526 - 22480	5076 - 15228	580 - 1160	² ⁴
PA 11	392 - 482	68 - 212	6526 - 22480	5076 - 15228	580 - 1160	⁴
PA 12	392 - 482	68 - 212	6526 - 22480	5076 - 15228	870 - 1305	² ⁴
PA amorph	428 - 572	158 - 212	13053 - 18854	4351 - 8702	870 - 1305	² ⁷
POM	365 - 419	176 - 248	10152 - 29007	7251 - 17404	580 - 1160	³ ⁴
PETP	500 - 536	68 - 284	11603 - 21755	7251 - 17404	1160 - 1740	² ³ ⁴
PBTP	446 - 518	68 - 140	11603 - 21755	7251 - 17404	1160 - 1740	² ³ ⁴
PPS	572 - 680	68 - 392	10877 - 21755	5076 - 10877	580 - 1160	² ⁷
FEP	644 - 698	302 - 356				⁵ ⁹
ETFE	599 - 689	176 - 248				⁵ ⁹

1 If no other empirical values are available:

Nozzle temperature = adjust to nozzle-end cylinder temperature. Reduce the cylinder temperature by 5-10°C for each heater zone approaching the feed zone: max. temperature difference between the nozzle-end and feed zone 20°C. Set the nozzle heater band and the following heater band to the same temperature if more than 2 heater zones are available.

2 Process granulate only when dry!

3 Thermally sensitive! Set upper temperature value only with a high shot count (short dwell time in cylinder).

4 Highly wear resistant cylinder assembly recommended for processing reinforced materials.

5 Do not use shut-off nozzle, work with open nozzle only.

6 Injection recommended without check valve.

7 Highly wear resistant cylinder assembly recommended (bi-metal cylinder and PK screw).

8 If the material has an MFI (190/2.16) < 4 g/10 min, it is suitable for processing with a bolt-type shut-off needle.

9 Anti-corrosion cylinder assembly required (BMK cylinder and screw of Ni alloy).

7.2.3 Colour or material change

Important information

Before carrying out a colour or material change it is essential to observe the important information in chapter 7.2.1.

Stopping the supply of material

- Slide the feed hopper to the closed position.
- Let the machine continue processing until the dosage volume cannot be achieved due to lack of material.
 - The controller then goes on alarm.

SAFETY INSTRUCTIONS

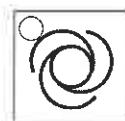


If the material feed is located overhead, suitable climbing aids must be used to reach the material hopper.

Always switch off the respective machine before carrying out work on a climbing aid!.

Ejecting the last part

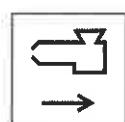
- Select "manual" mode (f042).



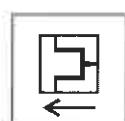
Set "Manual/automatic" key to "manual".



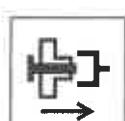
Press reset key (erase alarm).



Press this key.
The nozzle retracts and stops.
Press the key again until the nozzle is retracted to the mechanical end limit.



Press this key.
The mould opens.



Press these keys alternately to eject the part.

- Select "Set-Up" operating mode (f042).

Emptying the cylinder

Press these keys alternately until material stops emerging from the nozzle.

Changing the material

- Place a container under the emptying slot (underneath the feed hopper on the operating side).
- Slide the material hopper to the emptying position and empty it.
- Enter the temperatures for the new material.
- Clean the feed hopper, e.g. vacuum it and slide it back to the blocked position.
- Fill with new material.

Cleaning the cylinder

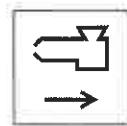
- Clean the opening on the feed yoke, e.g. with vacuum.
- Depending on type of material, empty the cylinder completely. For instructions see section 7.2.1 (Refer to 9.2.1 for cleaning of cylinder, screw and nozzle).

Starting material supply

- Slide the material hopper over the feed opening.

Starting production

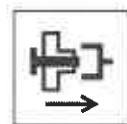
- When you have cleaned the dismounted nozzle, screw and cylinder, and reinstalled them, you can start up the machine according to section 7.1.5.
- Any old material or cleaning material which may still be in the cylinder must first be ejected.

Ejection of old material

Press this key.

The nozzle retracts and stops.

Press the key again until the nozzle has retracted to the mechanical end limit.

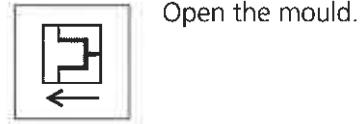


Press screw advancement and dosage alternately, until the new material emerges from the nozzle without impurities.



Remove the material which has emerged.

- Then dose material for the next shot.



Open the mould.

- The clamping unit is now in the starting position.
- Select "automatic" operating mode.
- Press the start key.
- The first automatic cycle begins.

IMPORTANT

Set the machine to "Set-Up" before ejecting material out of the cylinder.

7.2.4 End of production, stopping the machine

Important information

Observe the important information contained in section 7.2.1 at the end of production!

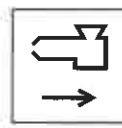
Stopping the material supply

- Slide the feed hopper to the closed position.
- Let the machine continue processing until the dosage volume cannot be achieved due to lack of material.
 - The controller goes on alarm.

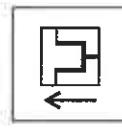
Ejection of last part



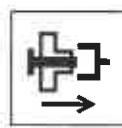
Press the alarm reset key (erase alarm).



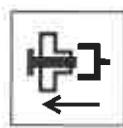
Press this key. The nozzle retracts and stops. Press the key again until the nozzle is retracted to the mechanical end limit.



Open the mould.

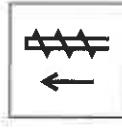


Press these keys alternately to eject the part.



Emptying the cylinder

- Set the operating mode to "Set Up".



Press these keys alternately until material stops emerging from the nozzle.



WARNING

If the material feed is located overhead, always use a suitable climbing aid to reach the material hopper.

Always switch off the machine before carrying out any work on a climbing aid.

Cleaning the mould

- Clean the mould. Apply an anti-corrosion agent if necessary.

Machines with vertical clamping unit:**NOTICE**

On machines with vertically arranged clamping unit there is a tendency for the moving mould platen to sink slowly downwards when the production is interrupted or the machine is switched off. This sinking tendency is caused by very slight oil leaks that can occur in spite of flawless seals.

The moving mould platen must only sink by a maximum of 1 mm/min.

If it sinks more than 1mm/min., the clamping unit must be checked and if necessary the seals renewed.

Always move the peripheral devices out of the mould clamping area before interrupting the production or switching off the machine. Collisions or movement problems due to stroke monitoring could otherwise occur.

Machines with toggle-type clamping unit:**NOTICE**

Machines with toggle-type clamping unit must not be left standing for a longer period (several hours) with extended toggles under full locking force.

This can cause increased wear on the sliding surfaces of the toggle joints.

Switching off the machine

- Switch off the pump motor.
- Switch off the heating.
- Shut off the supply of cooling water. The individual cooling circuits can remain open. You do not need to adjust them again when you restart operation.
- Switch off the main switch. The main switch must remain at position "1" if you are operating with automatic switch on.

7.5.6 Safety instructions for horizontal parting line injection

If your machine is being operated in L-position or in working position 4 or 5 (vertical clamping unit and horizontal injection unit - this depends on the equipment of the machine), the nozzle points directly towards the operating area of the user.

Explosive combustion

Some plastics can ignite or are subject to an explosive combustion when exposed to high temperatures too long.



CAUTION

Combustion can also occur when the safety gate is open. Operating the machine in the above mentioned working positions can thus lead to a higher risk of burns.



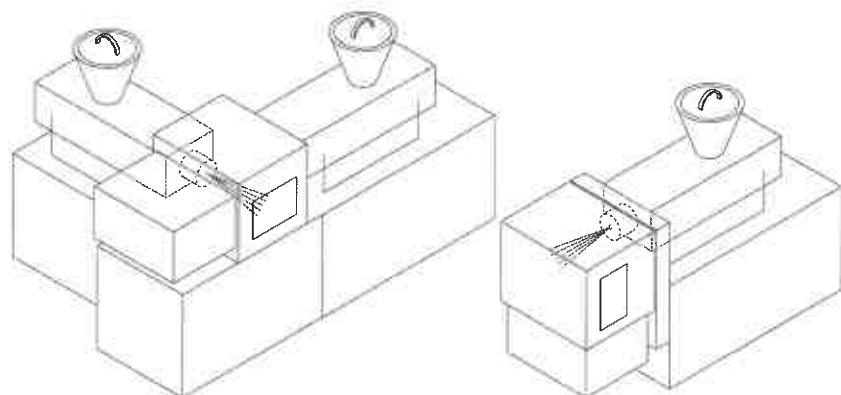
DANGER

All work in the nozzle and mould area may only be carried out when a face mask and protective safety gloves are worn.

Set lower values of speed and pressure before purging or dosing the cylinder until empty. During this process of purging and dosing until empty, do not stay in the area where the material is being ejected. Ensure the correct temperature settings and drying regulations are observed, as prescribed by the material manufacturer (danger of combustion).

The operating personnel (e.g. for insertion or removal work) must also wear protective clothes and a face mask.

Attach a deflection plate to the mould when possible which covers the material ejection zone during opening of the mould (see construction suggestion on the following page).



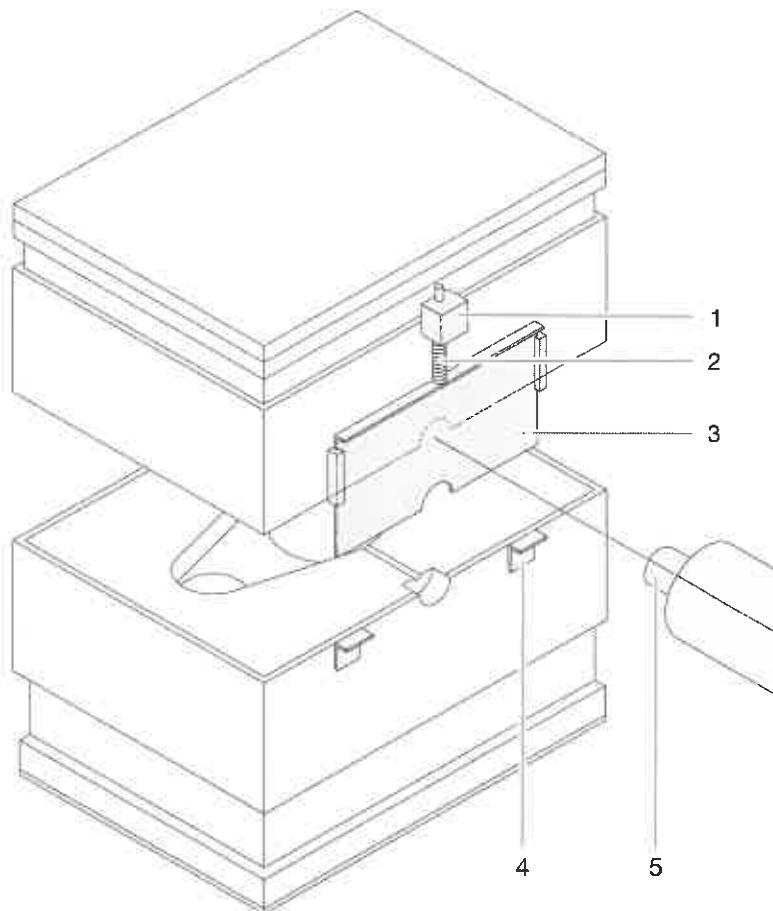
Deflection plate for horizontal parting line

In order to increase the safety conditions in the parting line during horizontal injection, we recommend attaching a deflection plate to the mould, which covers the material ejection zone during opening of the mould.

In this way, you prevent hot plastic entering the mould or jetting out into the open when emptying the screw or purging the cylinder or in the case of combustion.

The deflection plate must be manufactured individually for each mould and is not available for this reason from ARBURG.

The following illustration indicates a possible variation as to the arrangement of the deflection plate..



- 1 Bearing block
- 2 Pressure spring
- 3 Deflection plate
- 4 Stop
- 5 Nozzle

7.6 Shutting down the machine

7.6.1 Decommissioning, disposal

General information

Injection moulding machines from ARBURG are developed, designed and constructed for a long service life. When this service life cannot be prolonged anymore, preparations for decommissioning the injection moulding machine must be made.

The following chapter provides information for proper and environmentally compatible decommissioning and disposal of the machine.

The following conditions must be observed or established in advance:

- ◆ No more processed materials must be in the machine. See chapter 9.1 of the operating manual.
- ◆ All moulds or peripheral devices, such as hot runner systems, robot systems, material feeds, conveyor belts as well as other additional installations, must be removed from the machine.



INFORMATION

If necessary, peripheral devices must be disposed of separately if they cannot be used anymore.

The respective specifications of the manufacturer must be adhered to.

Discharging the hydraulic system



INFORMATION

Before switching off the drive motor of the injection moulding machine and discharging the hydraulic system, the injection and clamping unit must be moved to their transport positions.

You will find further information on transport of the injection moulding machine in chapter 1.1.4 of the operating manual.



WARNING

Hydraulic pressure!

The hydraulic components can be subjected to considerable pressure, even after switch-off. In case of suddenly emerging hydraulic oil or when dismantling hydraulic hoses under pressure, this can lead to serious injury.

Before commencing any work on the hydraulic system, it must be depressurised.

Always ensure that the pressure accumulator is discharged before switching off the machine.

Wear personal protective clothing.

- Discharge the hydraulic accumulator, if available. See the "Discharging the pressure accumulator" section in chapter 1.1.14 of the operating manual.
- Or, actuate the emergency-stop switch several times after the drive of the machine has been switched off and set the main switch of the machine to the "0" position.
- Depressurise the complete hydraulic system in accordance with the hydraulic circuit diagram and the descriptions of the component assembly.

Disconnecting the machine from the power supply**DANGER**

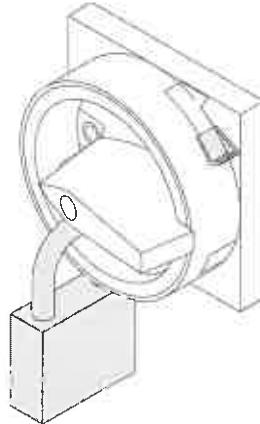
High voltage!

Contact with high voltage is dangerous and can lead to serious or fatal injury.

Before commencing any work on the electrical equipment, the main switch of the injection moulding machine must be switched off and secured against being switched on again.

All work on the electric system must be carried out by qualified electricians only.

- Switch off the main switch of the injection moulding machine and secure it with a lock so that it cannot be inadvertently switched on again.



- Let the injection moulding machine cool down before carrying out any further work.
- Disconnect the electric power supply cable from the injection moulding machine.
- Disconnect the compressed air supply from the injection moulding machine.
- Disconnect all other supply connections from the injection moulding machine, such as cooling water and data connections.

Draining off the operating fluids**CAUTION**

Danger from leaking operating fluids!

Leaking operating fluids present a potential source of danger. There is risk of slipping and injury.

Watch out for leaking operating fluids, such as hydraulic oil and lubricants, when disassembling the machine.

Any leaked operating fluids must be absorbed immediately with suitable means.

Wear personal protective clothing.

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NOTICE

Environmental pollution!

The operating fluids of the machine can pollute the ground or water.

The applicable national rules and regulations concerning the disposal of hazardous substances must be adhered to.

The safety data sheets of the manufacturers or suppliers must be observed.

Use suitable and sufficiently large catch pans for draining off the various operating fluids.

All drained off operating fluids must be disposed of in accordance with the national rules and regulations.

You will find further information on the disposal of operating fluids in chapter 9.10.3 of the operating manual.

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**INFORMATION**

It depends on the equipment of the injection moulding machine, which of the following work needs to be carried out.

Not all injection moulding machines are equipped with a central lubrication system, for example.

- Remove the hydraulic oil from the injection moulding machine. See the "Changing the oil" section in chapter 9.8.2 of the operating manual.

**INFORMATION**

Please note that hydraulic oil flows back into the empty oil container after several hours.

- Remove the gear oil from the injection moulding machine. See the "Changing the gear oil" section in chapter 9.8.7 of the operating manual.
- Remove the temperature-control medium from the temperature control unit. See the "Emptying the temperature control circuit" section in chapter 9.8.8 of the operating manual.
- Empty the lubricant and leakage oil container of the central lubrication system.
- Open the hoses in the return line and let the cooling water drain out of the injection moulding machine.
- Blow compressed air through the individual cooling circuits.

Disposal, recycling

NOTICE

Environmental pollution!

The operating fluids of the machine can pollute the ground or water.

The applicable national rules and regulations concerning the disposal of hazardous substances must be adhered to.

Observe the safety data sheets from the manufacturers or suppliers.

NOTICE

Environmental pollution!

The accumulators in the controller and electric equipment contain environmentally hazardous substances.

The national and regional rules and regulations concerning the disposal of batteries and accumulators must be adhered to.

All parts and components of the machine must be disposed of by an approved disposal company in accordance with the national and regional rules and regulations.

The disposal company is responsible for the separation of the different materials, as well as for their recycling and disposal.

All operating fluids must be removed from the machine before the machine is handed over to the disposal company. Adhering residual liquids lie in the responsibility of the disposal company.

8 What to do in the case of malfunctions

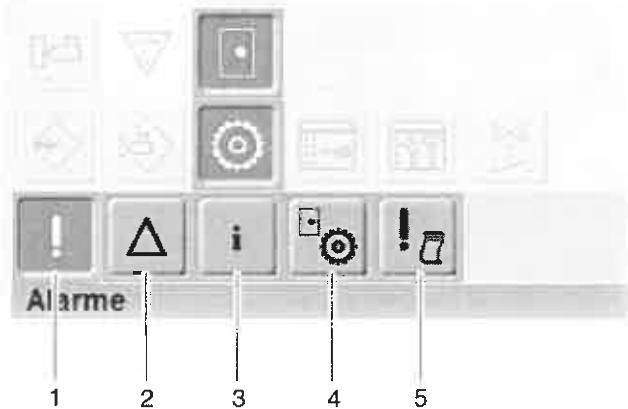
What to do in the case of malfunctions

ARBURG

8.2 Alarm functions

8.2.1 "Alarms" parameter screen pages and alarm functions

Alarms, warnings, information



- 1 Alarms
- 2 Warnings
- 3 Information
- 4 Alarm functions
- 5 Alarm protocol

You will find all active error messages in the parameter screen pages of "alarms", "warnings" and "information".

Should more than one error occur at a time, the most important alarm message is displayed in the alarm line. All others are saved in the parameter screen pages in the order of their occurrence and displayed.

When the error has been rectified, the respective error message is deleted from the parameter screen page.

Alarm functions.



Alarm time

Alarm time t951

- Input the required alarm time here.

We recommend:

- ◆ 5 - 10 minutes for thermally non-sensitive plastics
- ◆ 1 - 3 minutes for thermally sensitive plastics
- If an alarm occurs on the machine, the programmed switch-off function is carried out after the time entered here has expired, and the machine switches off.

Alarm message f956

- Enter the required type of alarm message here.

- ◆ When "via time" is selected, the alarm functions are switched off again after a specified length of time.
- ◆ When "continually on" is selected the alarm functions are not switched off until the "Alarm reset" button on the operating pad is pressed.

Alarm message duration t952

This parameter is displayed when "via time" has been selected at f956 "alarm message".

- Enter the required duration of the alarm message here.

- Should an alarm occur on the machine, the alarm functions are started and the respective alarm message appears on the screen. The alarm functions are switched off again after the length of time entered here has elapsed.

8.2.2 Alarm sequence

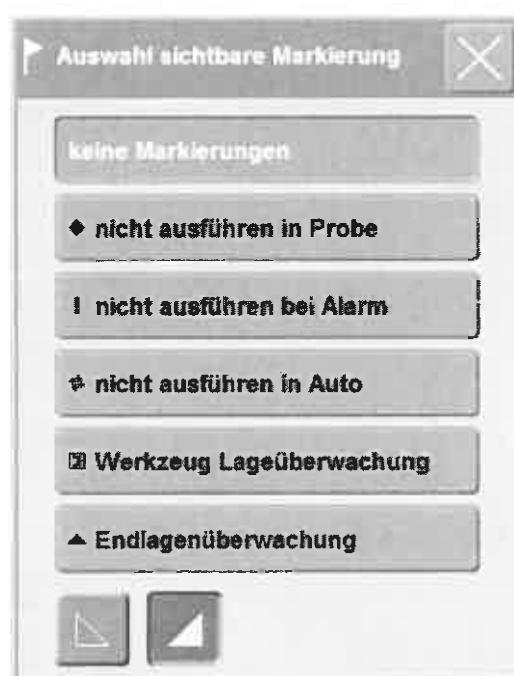
With the SELOGICA 'direct' controller it is possible to create a separate sequence for the case of an alarm. In this sequence you determine which processes in the production cycle are to be omitted when an alarm has occurred.

- Touch any symbol in the sequence.



Then touch this key.

- The following window appears:



Visible markings options

No markings

Omit in dry-cycle

Omit in alarm

Omit in automatic

Mould position monitoring

End position monitoring

Defining an alarm sequence

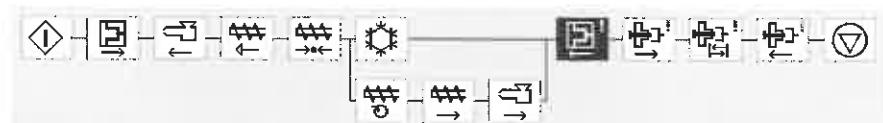
- Touch the "omit in alarm" field.
- The window is closed and the controller marks the symbols which are not to be carried out in the alarm sequence with a red exclamation mark.

If an alarm with stop at cycle end occurs before the end of the cooling time, the marked symbols are not carried out.

The alarm sequence is also carried out when a "mould protection" alarm occurs and the follow-on function f102 = "Open as with alarm cycle" is programmed.

In case of error, this prevents the mould from opening or the part from being ejected.

Thus damage to the mould or ejector system can be avoided.



This defined alarm sequence has no effect in the following cases:

- ◆ if "immediate machine stop" is programmed in the case of alarms, or
- ◆ if the alarm occurs after the end of the cooling time.

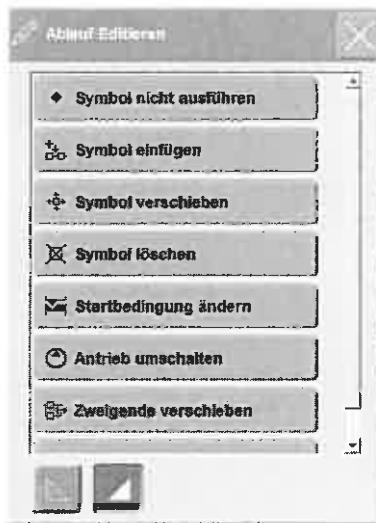
In order to adapt the sequence to your individual application, the markings can be removed from symbols or added to other ones.

Adding markings



If you want to add further markings, first touch the symbol to be marked in the sequence and then this key.

- The following window appears:



Edit sequence
Omit this symbol
Insert this symbol
Move this symbol
Delete this symbol
Change start condition
Switch over drive
Move branch end

- Touch the "Omit this symbol" key. The small symbol in the key represents the sequence previously selected.
- The window is closed and the marking appears in the selected symbol.



INFORMATION

Depending on the selected process, the controller can mark other processes in addition, for safety reasons (see example).

Example of an alarm sequence

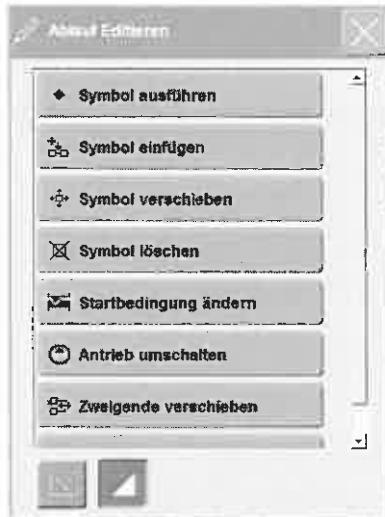
When the process "Mould opening" is marked, the subsequent ejector movements up to the cycle end are also marked.

The controller thus prevents the ejector from crashing into the closed mould and becoming damaged.

Removing the markings

If you want to remove individual markings, touch first the respective symbol and then this key.

- The following window appears:

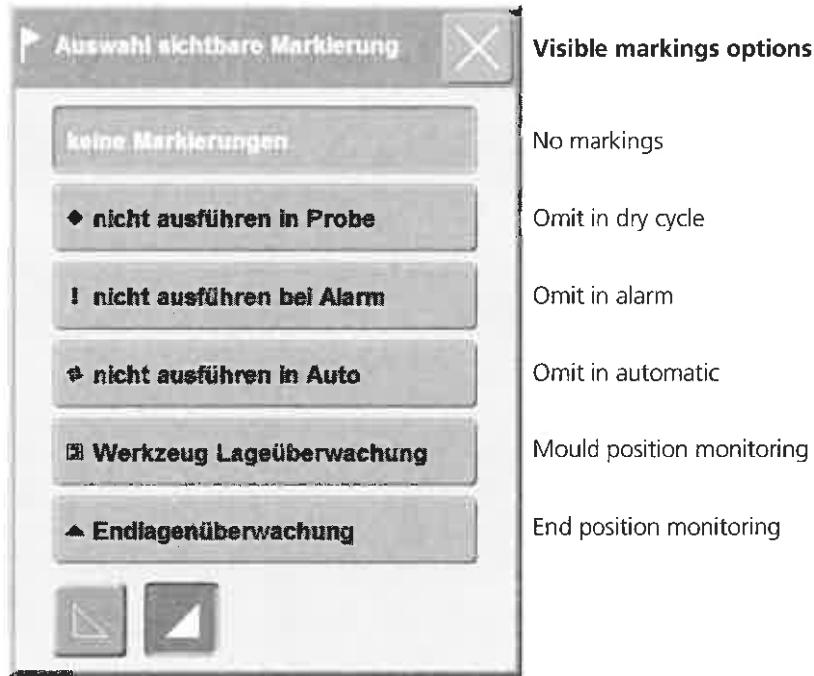


- Touch the "Carry out this symbol" key. The small symbol in the key represents the sequence previously selected.
 - The window is closed and the marking removed from the selected symbol.

Hiding all markings

If you want to hide all markings for the alarm sequence, touch any symbol in the sequence first and then this key.

- The following window appears:



- Touch the "No markings" key.
- The window is closed and all markings hidden.

8.6 Troubleshooting

8.6.1 Safety switch on the safety gate

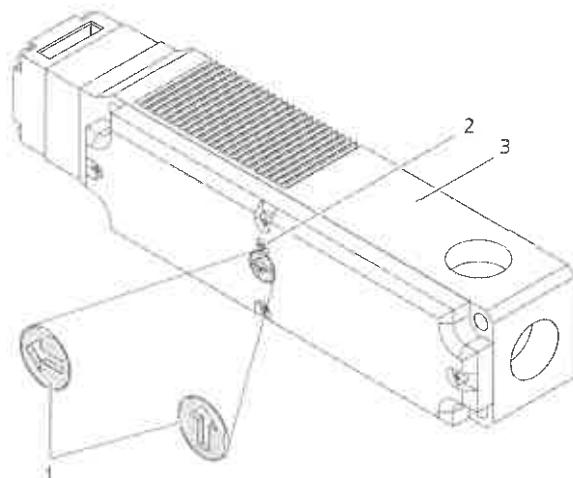
Manually unlocking the safety switch

The safety switch is equipped with a locking function which only permits the safety gate to be opened after a certain delay. This ensures that the safety gate cannot be opened until all movements have stopped.

If, however, the machine is stopped due to a particular situation, e.g. due to a power cut, it can be necessary to open the safety gate even though it is not possible to switch the machine on.

Proceed as follows to unlock the safety switch (3):

- Unscrew the fixing screw (2) by a few rotations.
- Turn the set screw (1) by 90° in a clockwise direction.
- The safety switch is now unlocked, the safety gate can be opened.



- | | |
|---|---------------|
| 1 | Set screw |
| 2 | Fixing screw |
| 3 | Safety switch |

Locking the safety switch

The locking function of the safety switch is monitored by the controller.

After opening the safety gate, the safety switch must be locked again. Otherwise an alarm will occur when resuming operation.

- Turn the set screw by 90° in an anti-clockwise direction.
- Tighten the fixing screw again.

Safety switch on the safety gate

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8.7 Processing problems

8.7.1 Removing blockages and shot plugs

Processing problems

Subject to the type of material and the flow properties of the granulate in connection with insufficient drying and incorrect temperature control, considerable problems can arise during processing.



DANGER

Serious risk of injury and burns from the uncontrolled emergence of hot plastic melt!

Observe the processing specifications of the material manufacturer!

All errors which indicate a blockage in the material feed or a blocked nozzle must be rectified by specifically trained personnel only.

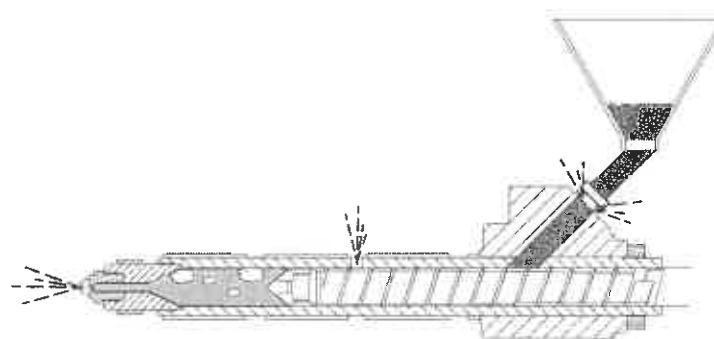
Protective clothing and a face mask must be worn during all work carried out on the nozzle and cylinder module.

Prevent access of unrequired persons with barrier tape.

Examples

1. The material feed zone can become blocked if the material does not flow through smoothly.
2. Shot plugs can form in the nozzle bore when the nozzle cools down.
3. During operational interruptions the material in the cylinder can overheat if the temperature is not reduced.

This can lead to gas formation and explosions causing the melt to escape uncontrollably.



INFORMATION

Temperature reduction in the various operating modes is described in chapter 4.3 "Nominal value control". How to automatically switch the machine to standby after an alarm is described in chapter 8.2.1.



Blockages in the feeding zone

Blockages in the feeding zone can usually be removed by vibrating the feed connection pieces.

If this does not help:

- Lower the temperature of the melt to under glass-transition temperature, observing the values in the data sheet of the material manufacturer.
- Move the feed hopper along the rail.
- Inspect the feed opening and clear if necessary (with a vacuum cleaner).
- Do not use any hard or brittle objects to clear blockages.
- Do not clean the feed zone while the screw is rotating!

If the problem occurs frequently, a mixer in the feed hopper can help. These are commercially available as an accessory.

Removing shot plugs

- Check the temperature of the nozzle heating, if necessary increase the temperature briefly.
- Purge the cylinder by ejecting all material with the "Cleaning" key.

If this does not help:

- Lower the temperature of the cylinder module, remove the nozzle tip and clean it.

Cleaning the degassing outlet

Only applicable to vented cylinders.

- Do not clean while the screw is rotating.
- Remove material residue with a spatula.
- If necessary, remove the flue on the degassing outlet and clean it.

Shut-off nozzles

Particular care must be taken with shut-off nozzles because gases can be trapped behind the nozzle.

- Before disassembling a shut-off nozzle or nozzle tip, always eject all material and retract the screw a little way first.
- Ensure that the shut-off nozzles are in a statically open state (only possible with power-operated nozzles).
- Reduce the temperature of the cylinder module.

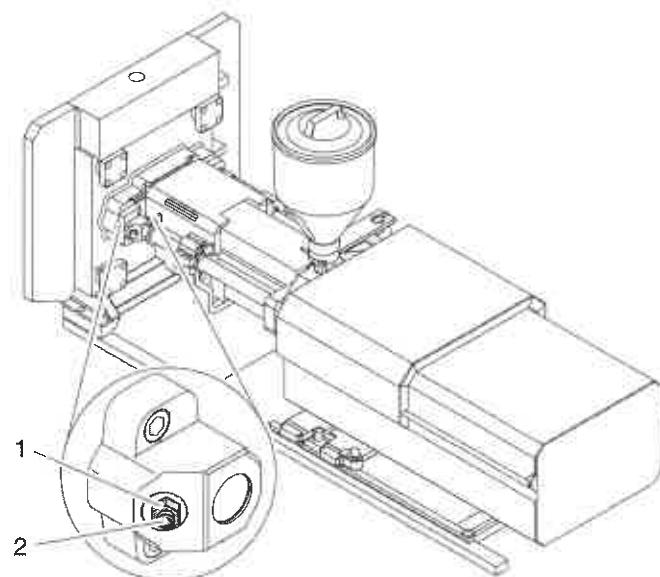
9 Cleaning and maintenance work

9.1 Cleaning the plasticising cylinder, screw and nozzle

9.1.1 Removing the injection unit

Before carrying out maintenance work on the screw or check valve, the injection unit must be removed.

- Unlock the lock nuts (1) on the injection unit support.
- Unscrew the threaded pins (2) fully, see illustration.
- Pull the injection unit back on its guide rails.



1 Lock nut
2 Threaded pin



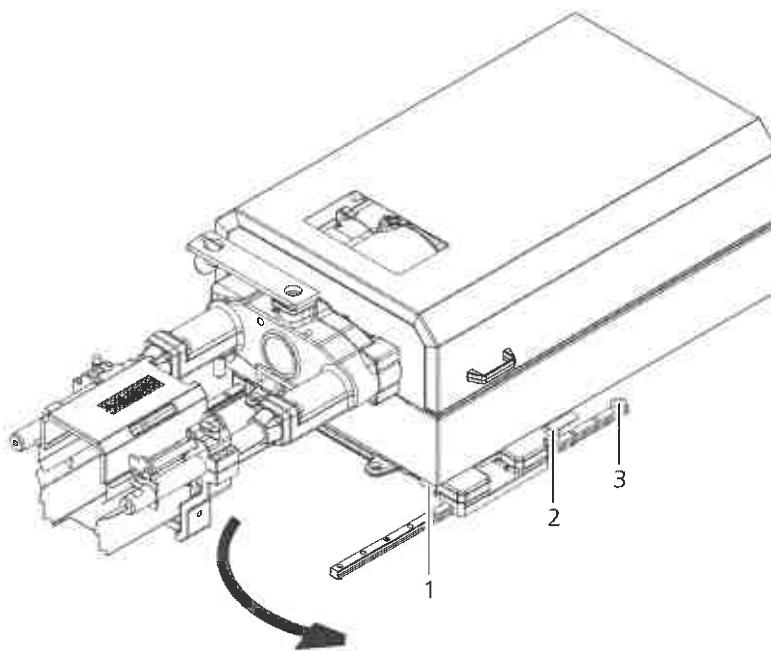
WARNING

Maintenance work on a heated cylinder must only be carried out when goggles and protective gloves are worn.

9.1.2 Swivelling the injection unit

To facilitate maintenance and cleaning work in the vicinity of the nozzle or non-return valve, the injection unit can be swivelled diagonally to the front (see illustration).

- Remove the injection unit as described in chapter 9.1.
- Pull the injection unit back onto the guide rails until the fixing bolt (2) snaps into the end limit (3).
- Release the lock (1) and swivel the injection unit forwards to the operator side until it snaps into position.



NOTICE

Risk of damage to the cable harnesses.

When swivelling the injection unit, ensure that the cable harnesses do not tangle or catch anywhere.

9.1.3 Cleaning the plasticising cylinder and screw with a cleaning compound



WARNING

Danger of serious injury or burns from hot plastic melt or hot machine parts!

Maintenance work on a heated cylinder must only be carried out when full face protection and protective gloves are worn!

Danger of blockage

Shut-off nozzles must be removed before cleaning the plasticising cylinder. Open nozzles can remain installed.

Cleaning

- Slide the feed hopper to the closed position.
- If the feed hopper is located overhead, always use a suitable climbing aid to reach the feed hopper. Always switch off the machine before carrying out any work on a climbing aid.
- Retract the injection unit as far as possible and purge and dose the cylinder until empty.
- Adjust the cylinder temperatures to the upper values for the respective type of material (see chapter 4.4.3). The higher the temperature the better the cleaning results.
- Set a high back pressure and medium screw rotational speed.
- Pour the cleaning agent into the feed opening using a beaker. Do not insert hard tools into the feed opening. Do not let dirt fall in.
- Rotate the screw until the cleaning compound has fully displaced the old material in the plasticising cylinder and the cleaning compound emerges clean.
 - If this is not the case, see "Problems during cleaning" on the next page.
- Set the cylinder temperatures to the required value.
- Push the feed hopper (with new material, if applicable) over the feed opening again.
- Rotate the screw again until the new material has fully displaced the cleaning compound from the plasticising cylinder.
- Reinstall the nozzle, if it was removed, as follows:
 - ◆ Thoroughly clean the thread and fit of the nozzle and apply a little heat-proof grease.
 - ◆ Tighten the nozzle according to chapter 9.1.4.
- Reset the required screw rotational speed and back pressure.

Problems during cleaning

1. The plasticising screw does not rotate or it does not convey material. Increase the rotational screw speed. If this does not help, increase the cylinder temperature too.
2. No material emerges from the nozzle. Nozzle is blocked.

Unscrew the nozzle tip (right hand thread). If this does not help, remove the nozzle (see chapter 9.1.4). If necessary, remove the screw and clean the non-return valve (see chapter 9.1.5).

Recommended cleaning compounds (German manufacturers)

- ◆ "Rozylit", Alfred Engelmann, D-30900 Wedemark-Wennebostel, or in particular when working with high processing temperatures, e.g. with PC,
- ◆ "NCR cleaning granules" Normann Rassmann GmbH & Co., D-20459 Hamburg.

9.1.4 Nozzle removal, cleaning and installation injection unit 170 E (3.7 oz)

The following information applies to the cylinder module for thermoplastic processing.

Removing the nozzle

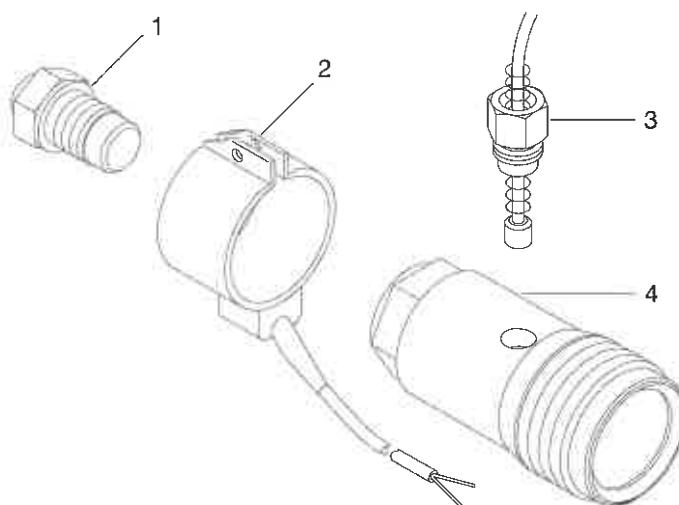
- Heat the cylinder to the temperature of the respective material. Set lower temperatures for thermally sensitive materials (PVC, POM, CA, CAB) or wet PA.
- Set low injection flows and low injection pressures.
- Purge and inject the cylinder empty.
- Switch off the nozzle heating.
- Remove the nozzle heater band.
- Unscrew the thermocouple.
- Unscrew the nozzle body (left hand thread).

Cleaning and installation

- Clean the nozzle thoroughly and apply a light coating of heat-proof grease to the thread and fit of the nozzle.
See chapter 9.9.5 for suitable lubricant.
- Screw the nozzle back on (left hand thread). Do not tighten yet. Allow the nozzle to heat up for 10 minutes and then tighten it according to the following table.

Injection unit	Screw diameter	Torque
170 E (3.7 oz)	25 + 30 + 35 mm (0.1 + 1.2 + 1.4 in)	450 Nm (331.9 lbf ft)

- Reattach the nozzle heater band (tightening the clamping screws evenly).
- Screw in the thermocouple tightly (checking that the bore is clean), see also chapter 9.5.

Injection unit 170 (3.7 oz)

- 1 Nozzle tip
 2 Nozzle heater band
 3 Thermocouple
 4 Nozzle body

- Screw in nozzle tip, heat up to same temperature and then tighten it.
 - ◆ Injection unit 170 E = 300 Nm (221.3 ft lbs).

**WARNING**

With thermally sensitive materials or wet PA, pressure build up in the cylinder is possible.

Do not stand in front of the nozzle when unscrewing the nozzle body!

All maintenance work on a heated cylinder must only be undertaken when a protective face mask and gloves are worn.

Only use solvents in exceptional circumstances (inflammable, fumes are often harmful).

NOTICE

Avoid knocks and impacts on cylinder units treated with ARBID. Do not drop.

Do not use hard objects during cleaning. A special cleaning brush is included in the spare parts kit.

Avoid flame cleaning of plastic remnants (loss of hardness and distortion are possible).

9.1.5 Removing, cleaning and installing the plasticising screw, injection unit 170 E (3.7 oz)

The following information applies to the cylinder module for thermoplastic processing.



WARNING

Risk of injury from hot plastic melt or hot machine parts!

When carrying out cleaning and maintenance work on the heated cylinder and mould, or when changing the colour or material, a protective face mask and heat-resistant gloves must be worn.

Risk of injury from harmful fumes or solvents!

Do not use highly inflammable solvents on the heated cylinder or on hot machine parts.

Do not use solvents which emit harmful vapours.

NOTICE

Using improper tools can lead to damage!

- ◆ Do not use hard tools when cleaning. A special cleaning brush is included in your tool kit.
- ◆ Avoid burning off plastic remnants with a blow torch (this could lead to loss of hardness or distortion).

Removing the screw

- Heat up the cylinder, purge and dose without material until empty.
- Remove the nozzle (left hand thread) (see chapter 9.1.4).
- Retract the cover panel on the drive unit.

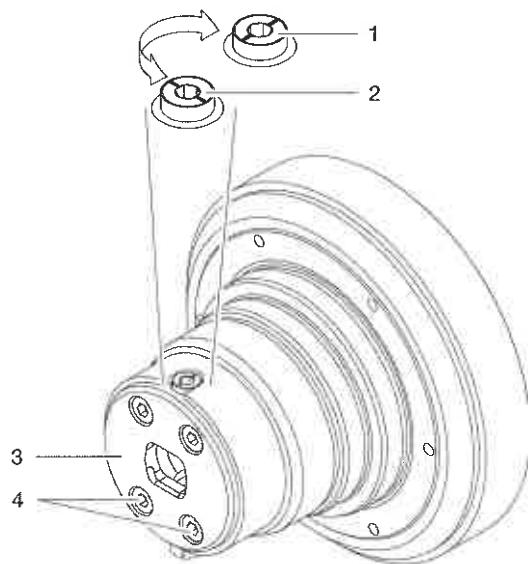
Opening the screw coupling

The screw coupling can only be opened when the cover of the coupling is released.

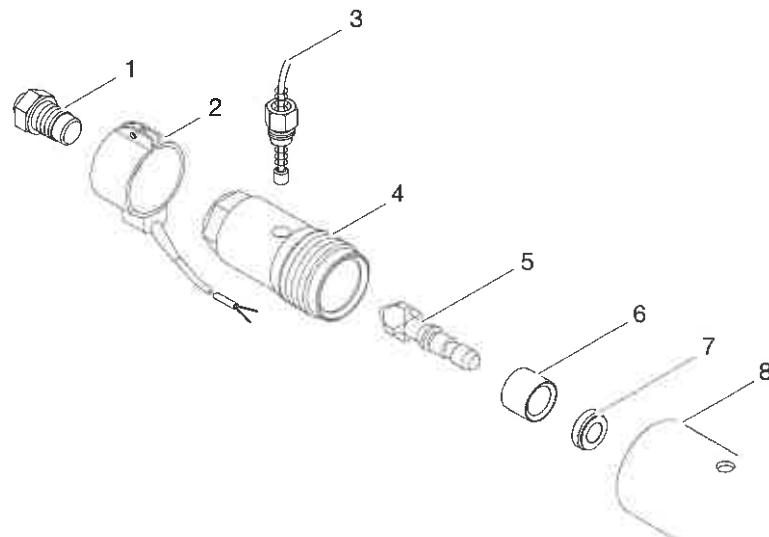
- Switch on the pump motor. This secures the motor shaft of the screw drive so that it does not turn when the screws are unscrewed.
- Unscrew the four clamping screws at the front end of the screw coupling by approx. 2 rotations.
- Open the lock.
- Retract the injection yoke (by pressing the "screw retraction" key) until the screw goes out of the coupling.
- Remove the slotted nut (with sickle spanner).
- Remove the injection unit according to chapter 9.1.1 and turn it diagonally to the rear.
- Pull the screw manually out of the cylinder to the front (see chapter 9.2.3 for removal of the screw tip or non-return valve).

Cleaning

- Clean all parts of the cylinder unit thoroughly. All surfaces that come in contact with plastic must be free of plastic residue. Apply a light coating of heat-proof grease (e.g. Molykote paste U) to the fit and threads of the nozzle body and nozzle tip.
- Inspect the feed opening to ensure that it is clean. Do not use hard objects to remove plastic residue. Melt the residue with a hot air gun and remove it.



- 1 Locking element, unlocked
- 2 Locking element, locked
- 3 Coupling cover
- 4 Clamping screws in coupling cover



- 1 Nozzle tip
- 2 Nozzle heater band
- 3 Thermocouple
- 4 Nozzle body
- 5 Ribbed screw tip
- 6 Bushing
- 7 Seat ring
- 8 Cylinder

Installing the screw

- Switch all zones with dismantled heater bands (e.g. nozzle heater band) to "off".
- Before re-installing the screw, the cylinder must be heated.
- Push the cold screw into the preferably pre-heated cylinder. The non-return valve must slide easily into place.
- Re-install the injection unit.
- Insert the screw into the coupling and close the coupling.

Closing the screw coupling

- Unscrew the four clamping screws at the front end of the screw coupling by approx. 2 rotations.
- Push the screw into the coupling and close the lock so that the notch in the locking element points in the transversal direction.

NOTICE

The claws of the screw coupling must fully engage.

To test this, turn the locking element slightly and ensure that it is pressed back completely into the locked position by the claws.

- Tighten the screws in the screw coupling to the following torque value:

Coupling cover	Injection unit 170 E
Part no.	230.318
Torque	43 Nm (31.7 lbf ft)

- Apply a light coating of heat-proof grease, e.g. Molykote paste U to the thread and fits of the nozzle body and the nozzle tip.
- Screw the nozzle in again (left-hand thread). Do not tighten yet. Allow the nozzle to heat up for approx. 10 minutes. Then tighten it.
- Re-attach the nozzle heating band (tighten clamping screws evenly).
- Screw in the thermocouple tightly (making sure the bores are clean).

9.2 Changing the screw tips

9.2.1 Screw tips



WARNING

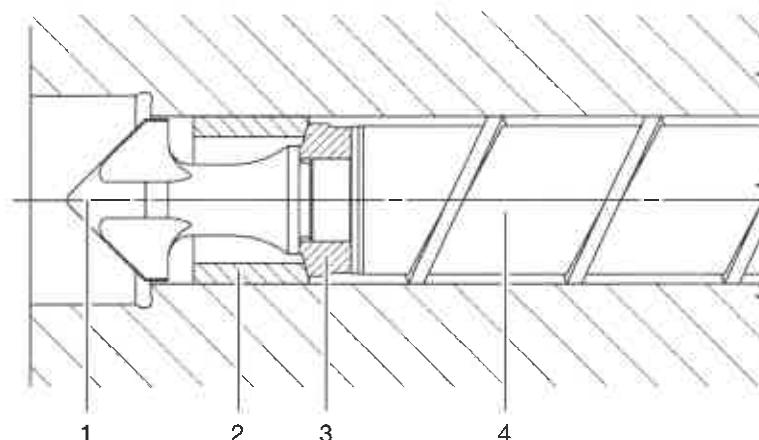
When carrying out maintenance work on a heated cylinder (heating switched on), always wear a face mask and protective gloves.

NOTICE

Avoid impact stress and knocks on ARBID screws and non-return valves made of sintered metal!

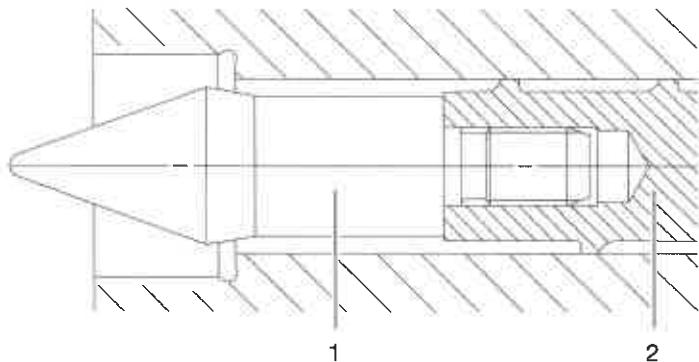
The screw is normally equipped with one of the following two screw tips:

Ribbed screw tip with non-return valve and seat ring



- 1 Ribbed screw tip
- 2 Non-return valve
- 3 Seat ring
- 4 Screw

Screw tip without non-return valve

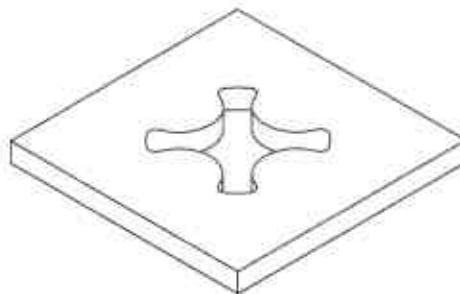


1 Smooth screw tip without non-return valve
2 Screw

9.2.2 Tools required for changing the screw tips

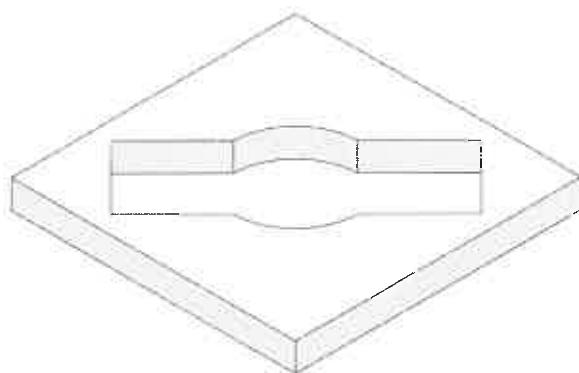
- ◆ Key for ribbed screw tip, to be found in your accessories.
- ◆ Clamping jaws for smooth screw tip.
- ◆ Key for rotating the screw at the drive end.

**Key for ribbed screw tip with
non-return valve**



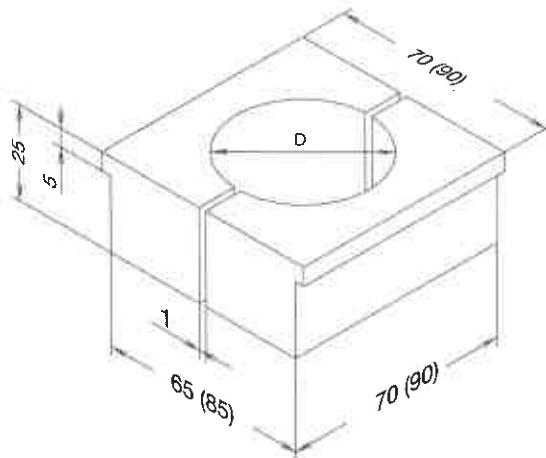
**Key for ribbed screw tip with
non-return valve (highly wear-
resistant version)**

(Subject to machine equipment)



Clamping jaws

Constructional suggestion for clamping jaws for dismantling screw tips without non-return valve.

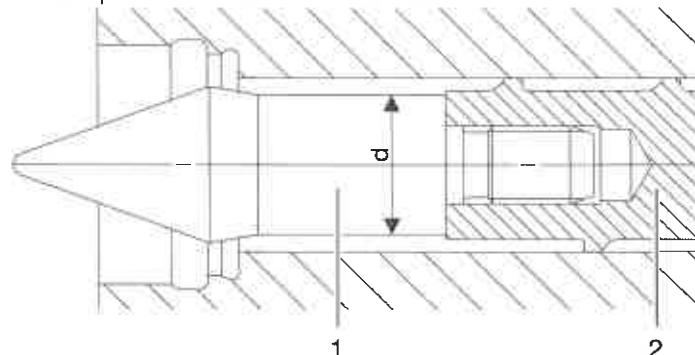


- ◆ Clamping jaws dimension $D = d + 0.1 \text{ mm}$,
- ◆ $d =$ screw diameter d (see illustration below),
- ◆ Dimensions in brackets apply to screw diameter 65 to 80.

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Screw tip without non-return valve

Screw tip without non-return valve $d + 0.1 \text{ mm}$



- 1 Smooth screw tip without non-return valve
- 2 Screw

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9.2.3 Installing/removing the screw tip

Injection units 30-1300 (0.5-29.1 oz)

- Remove the nozzle and the screw as described in chapter 9.1.5.
- Clamp the ribbed screw tip with the correct sized key, the smooth screw tip with the correct sized clamping jaws in a vice.
- Unscrew the screw tip (right-hand thread).
- Clean the smooth screw tip or ribbed screw tip complete with bushing and seat ring thoroughly.

Injection units 2100-4600 (45.5-91.1 oz)

- Remove the nozzle and the screw as described in chapter 9.4.1.
- Remove the injection unit and swivel it to the front.
- Push the screw manually out of the front of the cylinder until the ribbed screw tip with non-return valve is accessible.
- Remove the material residue on the ribbed screw tip.
- Insert the special key onto the ribbed screw tip and unscrew the ribbed screw tip.
- Remove the ribbed screw tip with bushing and seat ring.
- Clean the smooth screw tip or ribbed screw tip complete with bushing and seat ring thoroughly.



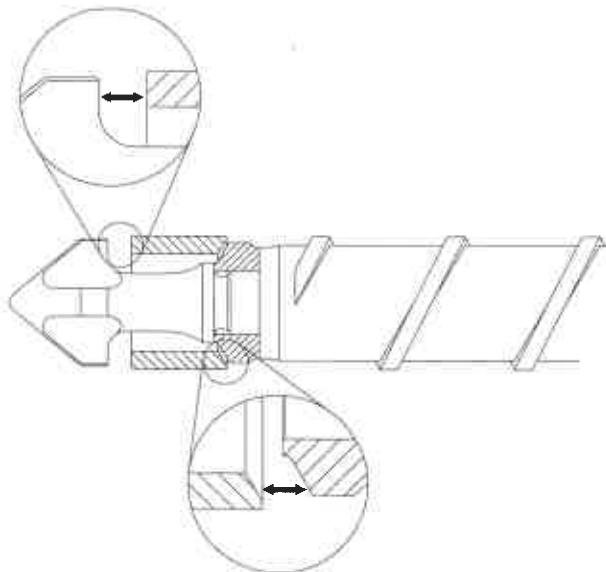
WARNING

Risk of injury from hot plastic melt or hot surfaces.

Protective clothing and a face mask must always be worn when carrying out work in the plasticising area.

Installing the ribbed screw tip

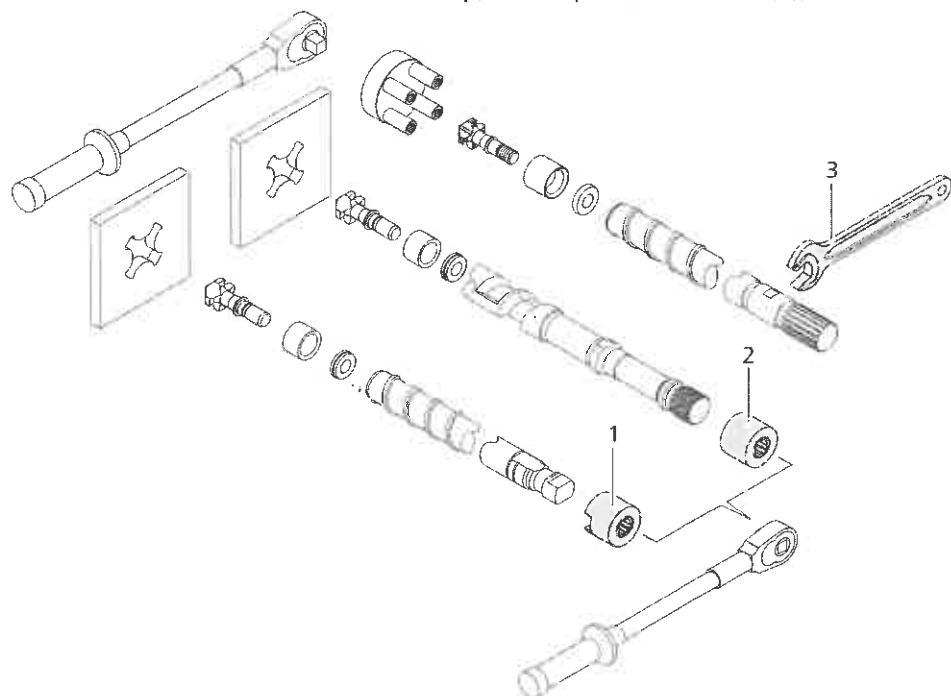
- Clean the front end of the screw, the fits of the screw tip and the seat ring thoroughly.
- Apply a light coating of heat-resistant grease evenly to the thread of the ribbed screw tip or smooth screw tip (for suitable lubricant see chapter 9.9).
- Push the non-return valve (bushing) and the seat ring onto the ribbed screw tip (observing the direction of mounting of seat ring and non-return valve, see illustration).



- Manually screw the ribbed screw tip or smooth screw tip into the screw.
- Clamp the ribbed screw tip with the correct sized key, the smooth screw tip with the correct sized clamping jaws in a vice.

Socket wrench for screw end

- Use the correct sized socket wrench (1 or 2) to unscrew and tighten the screw tip, or an open-end wrench (3), see illustration.



Injection unit size		Socket wrench (1)	Socket wrench (2)	Open-end wrench (3)
Europe	USA	Part no.	Part no.	Size
30 + 70	0.5 + 1.4 oz	223.546	-	
60	1.3 oz	154.681	-	
100	2.3 oz	109.618	-	
150/170	3.4/3.7 oz	120.676	-	
250/290	6.1 oz	109.619	-	
350/400	7.4 / 8.2 oz	118.507	286.371	
675/800	13.8 / 15.3 oz	107.931	288.090	
1300	29.1 oz	189.503	-	50, 55, 65
2100	45.4 oz	-	-	55, 60, 70
3200	65.6 oz	-	-	60, 70, 80
4600	91.1 oz	-	-	70, 80, 90

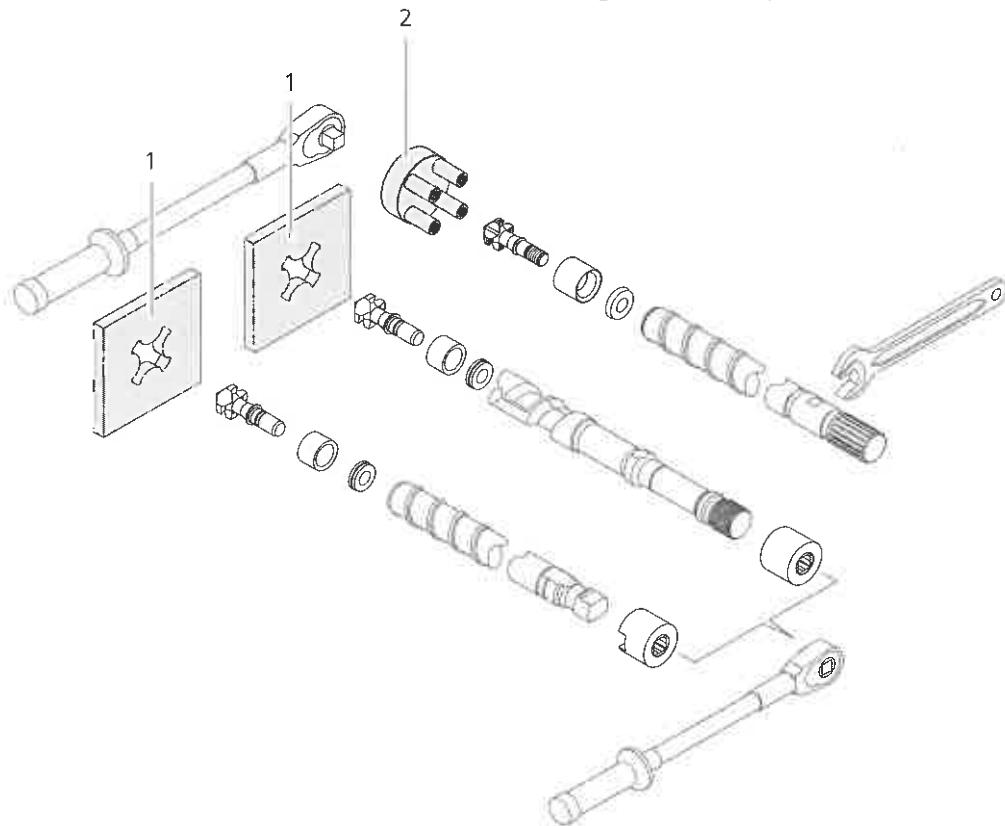
- Apply the open-end wrench (3) to the shaft of the screw and turn the screw until the wrench contacts the moving cylinder of the injection unit.

**INFORMATION**

To unscrew the ribbed screw tip the open-end wrench must be positioned so that it contacts the rear moving cylinder. To tighten the ribbed screw tip, the open-end wrench must be positioned so that it contacts the front moving cylinder.

Mounting the smooth screw tip

- Tighten the smooth screw tip using the correct key (1-2) and a torque wrench. See following table for torque values.



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Torque values**Injection units 30-1300
(0.5-29.1 oz)**

Ø mm/in	Torque Nm/ft lbs	Key for ribbed screw tip (1) Part no.
15/0.6	20/14.75	111.959
18/0.7	25/18.4	7.388
20/0.8	25/18.4	99.481
22/0.9	30/22.1	7.389
25/1.0	30/22.1	7.390
30/1.2	35/25.81	55.302
35/1.4	40/29.5	7.392
40/1.6	50/36.9	7.393
45/1.8	65/47.9	7.394
50/2.0	65/47.9	42.480
55/2.2	80/59	103.607
60/3.4	80/59	107.909
70/2.75	90/3.5	141.804

**Injection units 2100-4600
(45.5-91.1 oz)**

Ø mm/in	Torque Nm/ft lbs	Key for ribbed screw tip (2) Part no.
55/2.2	80/59	216.579
60/2.4	80/59	216.584
70/2.8	90/3.5	216.583
80/59	100/73.75	216.585
90/3.5	110/81.1	216.587
100/73.75	120/88.5	262.591

9.4 Changing the thermoplastic cylinder module

9.4.1 Changing the cylinder, injection unit 170 E (3.7 oz)

Removing the plasticising cylinder

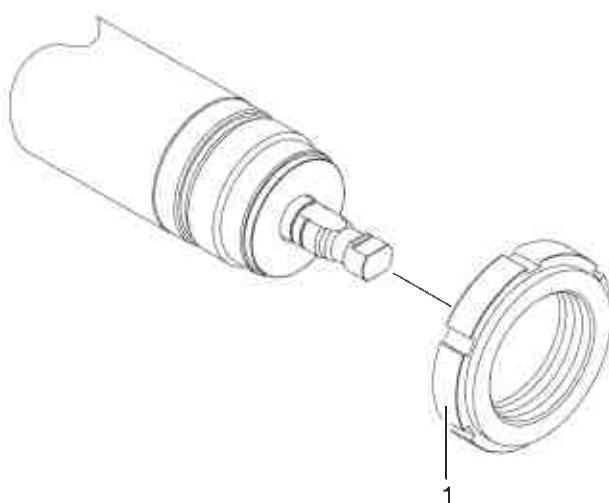
- Set low values for the injection pressure and speed.
- Eject and dose without material until the cylinder is empty.
- Switch over to "Set-up" operating mode.
- Press the "Dosing" key.
 - The screw rotates at a slow speed.
- Watch the screw coupling.
- Release the "Dosage" key as soon as the closure of the screw coupling is at the top.
- Advance the screw to the end limit and then retract it by approx. 10-20 mm.
- Advance the injection unit to the foremost end position.
- Pull back the screw cover onto the support housing.
- Open the screw coupling.

Opening the screw coupling

The screw coupling can only be opened when the cover of the coupling is released.

- Switch on the pump motor. This secures the motor shaft of the screw drive so that it does not turn when the screws are unscrewed.
- Unscrew the four clamping screws at the front end of the screw coupling by approx. 2 rotations.
- Open the lock.
- Retract the injection yoke (by pressing the "screw retraction" key) until the screw goes out of the coupling.
- Remove the slotted nut (with sickle spanner).

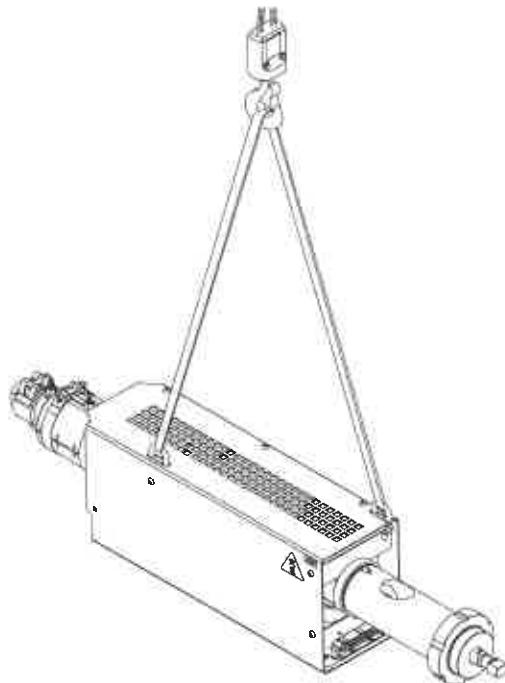
Slotted nut



1 Slotted nut

- Remove the injection unit as described in chapter 9.1, pull it back and swivel it to the operating side.
- Attach the cylinder module by the two shackles to a crane.
- Pull the cylinder module out of the support housing and remove it.

**Suspension of
plasticising cylinder,
injection unit 170 E**



Installing the cylinder

Precondition:

The injection unit must be completely retracted and pulled back onto the support rails.

- Lift the cylinder module into the injection unit with the crane and push it into the support housing.
- Push the injection unit into the support elements and secure it with the threaded pins and lock nuts.
- Open the screw cover.
- Attach the slotted nut and tighten it.
- Push the screw manually into the screw coupling.
- Close the screw coupling.

Closing the screw coupling

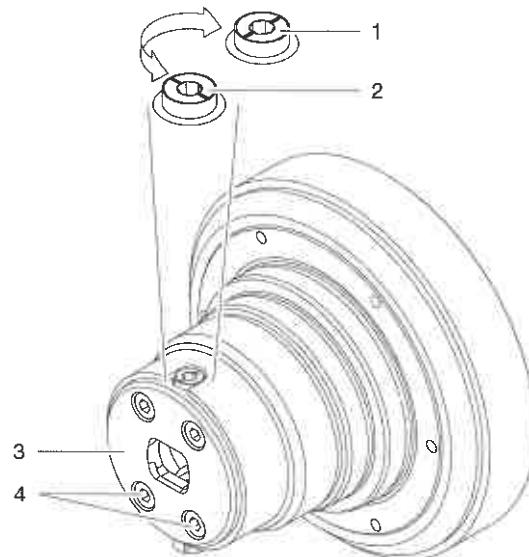
- Unscrew the four clamping screws at the front end of the screw coupling by approx. 2 rotations.
- Push the screw into the coupling and close the lock so that the notch in the locking element points in the transversal direction.

NOTICE

The claws of the screw coupling must fully engage.

To test this, turn the locking element slightly and ensure that it is pressed back completely into the locked position by the claws.

- Tighten the screws in the screw coupling to the following torque value:



- Locking element, unlocked
- Locking element, locked
- Coupling cover
- Clamping screws in coupling cover

Coupling cover	Injection unit 170 E
Part no.	230.318
Torque	43 Nm (31.7 lbf ft)

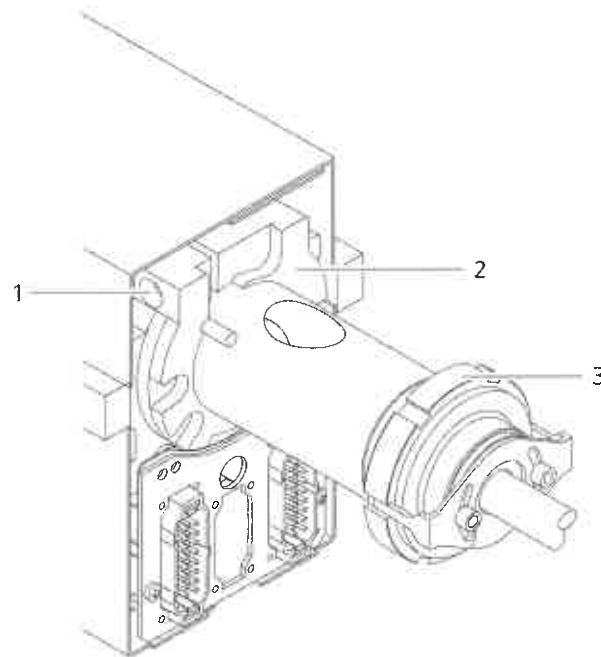
Adjusting the control parameters

- Import the data set for the next production with the new cylinder module.
- Heat up the cylinder until the actual temperatures concur with the nominal values.
- Save the data set again.

9.4.3 Reinstalling the cylinder after dismantling

If you have completely dismantled the cylinder module, e.g. in order to clean the plasticising cylinder, proceed as follows to reinstall it:

- Install the cylinder model as described in chapter 9.4.1.
- Screw on the slotted nut (3) manually until it makes contact with the support housing.
- Unscrew the clamping screw (1) on the clamping element (2).
- Switch on the cylinder heating and heat up the cylinder to the nominal temperature.
- Move the nozzle up to the installed mould until the nozzle contact pressure builds up.
- Tighten the clamping screw (1) while the nozzle contact pressure is still built up.
- Retract the nozzle.
- Tighten the slotted nut (3).



INFORMATION

Proceed in the same way if you want to install a new cylinder module or one which has been repaired. This assembly step does not apply in the case of cylinder modules which were installed in the machine before leaving the factory.

If the clamping screw (1) is not tightened under nozzle contact pressure, the clamping element (2) can move during operation. As a result the cylinder module will become loose even if the slotted nut is tightened and secured with a circlip.

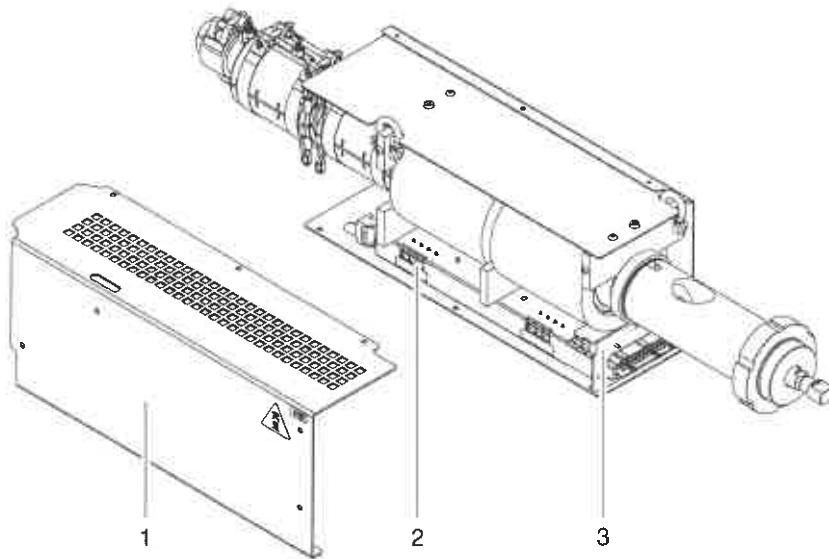
9.5 Installing the thermocouples

9.5.1 Replacing the thermocouples on the plasticising cylinder, injection unit 170 E (3.7 oz)

Removal

- Switch off the machine at the main switch, for safety reasons.
- Remove the cover panel on the cylinder module.
- Pull off the insulator pads (push-button fastening) of the respective heating zone.
- Unscrew the screw-in tab on the thermocouple and pull it out of the bore.
- Unclamp the thermocouple to be replaced from the plug connection. Observe the designations (B11-B16).

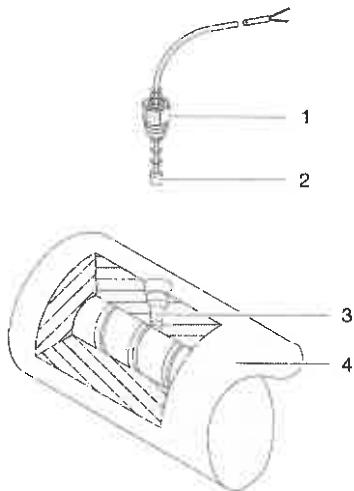
Connections injection unit 170 E



- 1 Cover panel
- 2 Heater band connector
- 3 Thermocouple connector

Installation

- Clamp the wires into the plug connectors. Observe the designations (B11-B16).
- Clean the bore of the thermocouple, if necessary (otherwise you may get an inaccurate measurement!)
- Unscrew the screw-in connection tab of the thermocouple far enough back onto the spiral spring to ensure an unhindered insertion of the thermocouple into the bore.
- Push the thermocouple into the bore until the tip touches the bottom.
- Screw the connection tab in until the clearance from the screw-in thread is 5 mm.
- Squeeze the spiral spring together and screw in the tab as far as the end limit.
 - The spiral spring now presses the thermocouple against the bottom of the bore.
- Reattach the cover for the cylinder module.



- 1 Screw in connector
- 2 Thermocouple
- 3 Bore for thermocouple
- 4 Plasticising unit

- When the heating is switched on, any false polarity of the thermocouples or a cable rupture is recognised and indicated on the screen in an error message.

9.5.2 Replacing the thermocouples on the nozzle, injection unit 170 E (3.7 oz)

The following information applies to cylinder modules for thermoplastic processing.

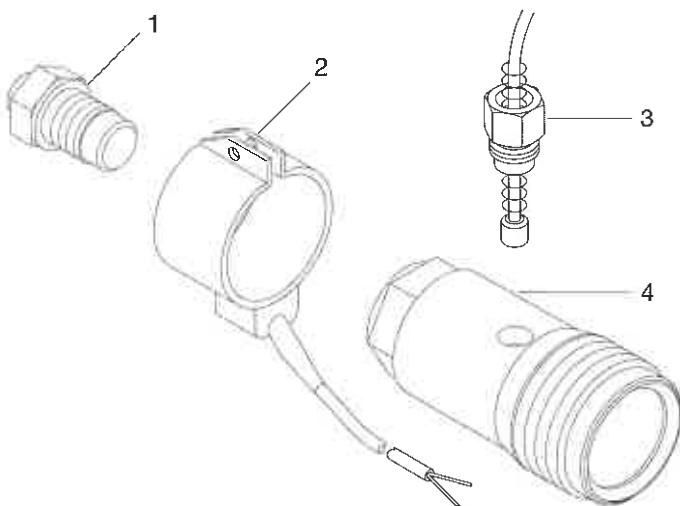
Removal

- Switch the machine off at the main switch for safety reasons.
- Remove the plug connector from the thermocouple on the front side of the cylinder module.
- Remove the screw-on muff from the thermocouple.
- Remove the thermocouple from the bore.

Installation

- Clean the bore of the thermocouple thoroughly (otherwise you may get an inexact measurement).
- Unscrew the muff on the thermocouple far enough back onto the spiral spring so that an unhindered insertion of the thermocouple into the bore is possible (see table for dimensions).
- Insert the thermocouple into the bore until the tip makes contact with the base of the bore.
- Screw the screw-in muff onto the spiral spring until the clearance to the end of the bore is approx. 5mm.
- Squeeze the spiral spring together and screw the muff on as far as it will go.
 - The spiral spring now pushes the thermocouple against the base of the bore.
- Insert the plug connector of the thermocouple into the plug coupling **on the front side** of the cylinder module.

Injection unit 170 E (3.7 oz)



- 1 Nozzle tip
- 2 Nozzle heater band
- 3 Thermocouple
- 4 Nozzle body

NOTICE

Ensure that the sensor makes contact with the nozzle.

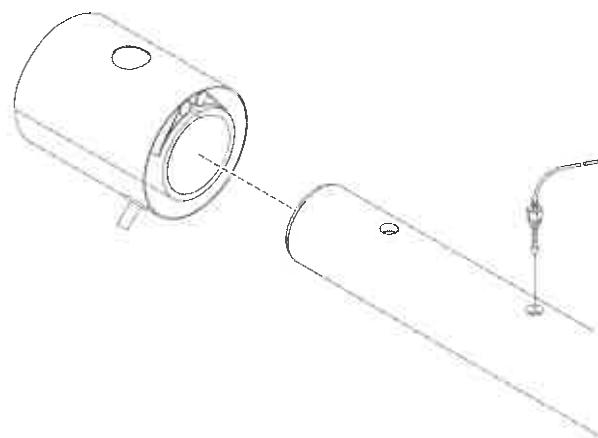
9.6 Changing the heating elements

9.6.1 Changing the cylinder heating elements, injection unit 170 E (3.7 oz)

The following information applies to the cylinder module for thermoplastic processing.

Removal

- Remove the cylinder module as described.
- Remove the screws on the upper safety cover of the cylinder module (top and front).
- Open the push-on cover on the insulator pads of the respective heating zone.
- Unscrew the screw-in muff from the thermocouples. Remove the thermocouple from the bore.
- Open the protective sleeve on the heating element.
- Open the two clamps on the heating element.
- Disconnect the connection cables of the heating element from the terminal.
- Mark the thermocouple connections and their respective heating zones.
- Pull out the connection cable of the heating element to be changed.
- Pull heating element out from the front, over the cylinder.



NOTICE

After heating up the heating elements for the first time, the clamping screws must be tightened again.

Incorrectly fitting heating elements can cause a higher energy requirement and prolong the heating-up period.

Changing the cylinder heating elements, injection unit 170 E (3.7 oz)

ARBURG

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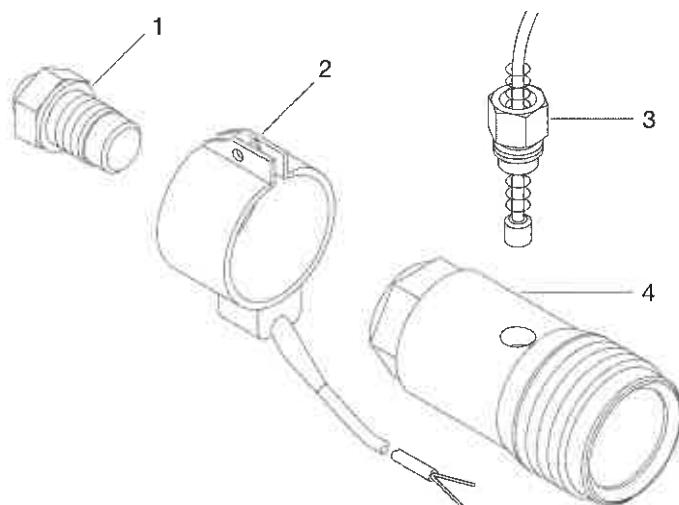
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9.6.2 Changing the nozzle heating band, injection unit 170 E (3.7 oz)

The following information applies to the cylinder module for thermoplastic processing.

- Switch off the main switch on the machine for safety reasons.
- Disconnect the plug for the nozzle heating band (plug-coupling at the front end of the cylinder module).
- Open the clamping screws on the nozzle heating band.
- Remove the nozzle heating band.
- Attach the new heating band to the nozzle. The screws on the nozzle heating band must be located at the top.
- Tighten the screws on the nozzle heating band.

Injection unit 170



- 1 Nozzle tip
2 Nozzle heating band
3 Thermocouple
4 Nozzle body

NOTICE

After heating up the nozzle for the first time, the clamping screws on the nozzle heating band must be retightened.

Heating bands which do not contact the nozzle properly can cause increased energy requirement and prolong the heating duration.

9.7 Heating-up the cylinder module outside the machine

Explanation

In order to heat up a cylinder module outside the machine (e.g. for cleaning purposes), a plug connector is available as optional equipment. The plug connector serves as an extension cable between the cylinder module and the machine.



WARNING

For all work on the heated cylinder a face mask and safety gloves are to be worn.

Never stand in front of the nozzle when the cylinder has not completely cooled down or is not completely empty. Discharging material or explosions of escaping gas could cause serious burns!

The plug connector must only be connected or disconnected when the cylinder heating is switched off!

The temperature regulation of the individual heating zones is carried out with the machine controller.

Plug connectors for the external cylinder heating:

Thermoplastic cylinder		Part no.
Euromap size	US size	
30, 60, 70, 100, 170, 250, 290	0.5, 1.3, 1.4, 2.3, 3.7, 6.1 oz	157.109
150, 350, 400	3.4, 7.4, 8.2 oz	130.331
675, 800	13.8, 15.3 oz	110.806
1300, 2100, 3200	29.1, 45.4, 65.6 oz	184.324
4600	91.1 oz	255.204

Requirement

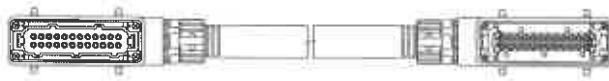
In order for the plug connector to be connected on the machine side, there must be no cylinder module installed in the machine.

Establishing the connection

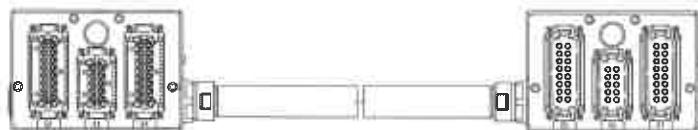
- Switch the cylinder heating off.
- Plug the plug connector for the external cylinder heating into the plug socket on the cylinder support housing of the injection unit.
- Plug the socket side of the plug connector into the cylinder module.
- Check the values for the temperature adjustment and adjust if necessary.
- Switch on the heating.
 - The cylinder module will be heated up to the pre-selected temperature.

Plug connectors for cylinder heating

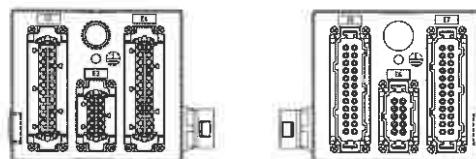
**Injection unit 30, 60, 70, 100, 170,
250, 290
(0.5, 1.3, 1.4, 2.3, 3.7, 6.1 oz)**



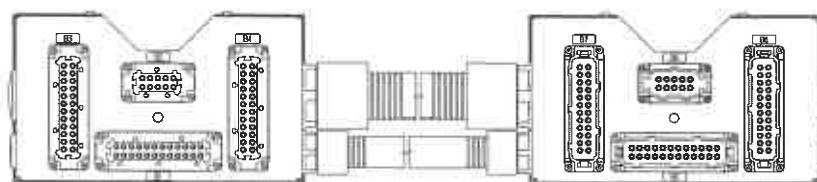
**Injection unit 150, 350, 400
(3.4, 7.4, 8.2 oz)**



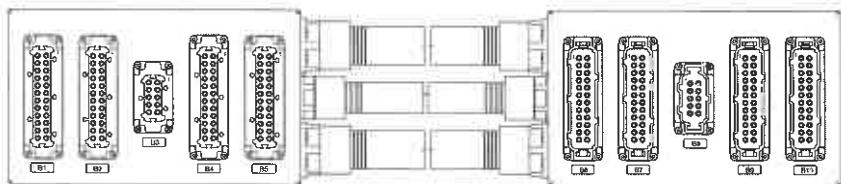
**Injection unit 675, 800
(13.8, 15.3 oz)**



**Injection unit 1300, 2100, 3200
(29.1, 45.4, 65.6 oz)**



**Injection unit 4600
(91.1 oz)**



9.8 Inspections and maintenance work

9.8.1 Maintenance schedule

Maintenance schedule

The maintenance schedule for the machine includes a list of the most important maintenance work.

The maintenance schedule is kept in the control cabinet of the machine.

Maintenance overview

The check lists in the maintenance schedule assist in the execution of the maintenance work and serve as proof that it has been regularly carried out.

- Carry out the respective maintenance work at the specified intervals and confirm with date and signature that this work has been completely and correctly carried out.
- Observe the dates specified in the maintenance schedule. This will help to prevent unnecessary malfunctions and repairs and prolong the service life of your machine. See chapter 9.9 for a list of suitable lubricants.

Maintenance locations

The specified maintenance locations correspond to the respective sections in the spare parts list.

Maintenance work on additional and non-standard equipment

Depending on the equipment level of your machine, additional and non-standard equipment may be installed on your machine. The required maintenance work is then described in the respective chapters of the operating manual or in the enclosed documentation of the manufacturer.



INFORMATION

The maintenance schedules for additional and non-standard equipment are not included in the maintenance forewarning system of the SELOGICA controller.

If you want to include these maintenance schedules in the management system of SELOGICA controller, they must be entered manually (see chapter 9.11).



WARNING

Danger of serious injury if safety equipment is defective or removed.

The safety devices must be inspected at regular intervals:

- ◆ after each mould change,
- ◆ before each work shift,
- ◆ once a week in continual operation.

NOTICE

The plastic coating of the machine must not be treated with cleaning agents which contain ketones, e.g. acetone, methanol, ethanol, glycol, PER, or trichlorethane.

No plastic components on the machine, including the viewing panels on the safety devices must be cleaned with cleaning agents containing alcohol or solvents.

9.8.2 Oil change, inspection of toothed ring

Schedule

Change the hydraulic oil after every 20,000 operating hours.

Carefully observe the oil changing schedule noting the date of each change (see 9.8.1).

Procedure

For the oil change, the oil should have a temperature of between 45 °C and 50 °C (104 °F - 122 °F) (thin bodied).

- Open the air filter on the oil tank and pump out the oil.
- Remove the tank cover (underneath the injection unit).
- Remove the oil residue.
- Clean the tank thoroughly. Do not use fibrous cloths or cleaning wool!
- Pour in new oil according to section 1.1.8.
- Vent the hydraulic system according to section 9.8.4.

Important information

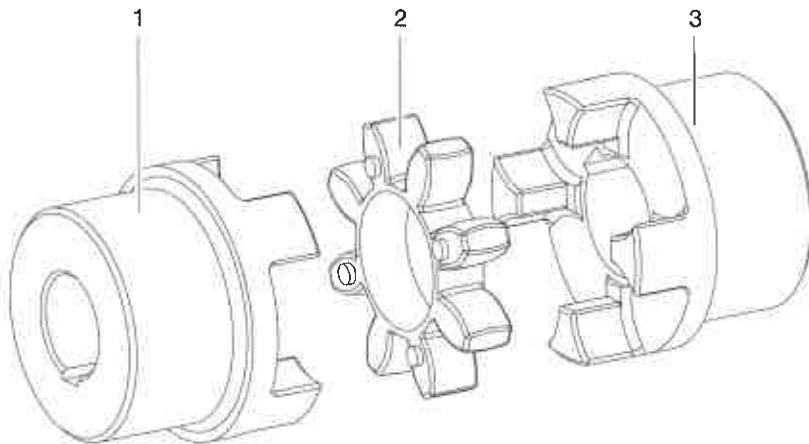
- ◆ With each oil change also replace the oil filters (see 9.8.3) and the air filter insert in the air filter.
- ◆ Cater for absolute cleanliness during the oil change. Contamination will shorten the machine's service life.
- ◆ Use only oil brands and types listed in section 9.9.
- ◆ Get your oil supplier to test the oil quality at least once a year, independently of the service intervals.
- ◆ Do not mix oil brands. Do not change the oil brand without good reason. This could otherwise cause foam and sludge.

NOTICE

The warranty for the hydraulic system will cease to apply, if the above maintenance instructions are not complied with!

Inspection of toothed ring

The drive motor and the hydraulic pump unit are connected by a claw coupling. Between the steel hubs (1 and 3) there is a plastic toothed ring (2) which serves as a cushioning element.



- Replace the toothed ring (2) with every oil change.

NOTICE

Friction causes not only wear but also produces ageing effects, which are not necessarily visible. The toothed ring can become hard and transfer oscillations from the motor and the pump which can have a mutual negative effect.

The noise level of the machine can also increase considerably.

If the steel hubs (1 and 3) also show signs of wear, the whole coupling must be replaced.

9.8.3 Maintenance of the oil filter / oil cooler



DANGER

When carrying out maintenance work on the cooler/filter system always switch off the machine first and let it cool down.

Danger of burns from hot surfaces! Depressurise the hoses before disconnecting them.

Risk of injury from squirting fluids!

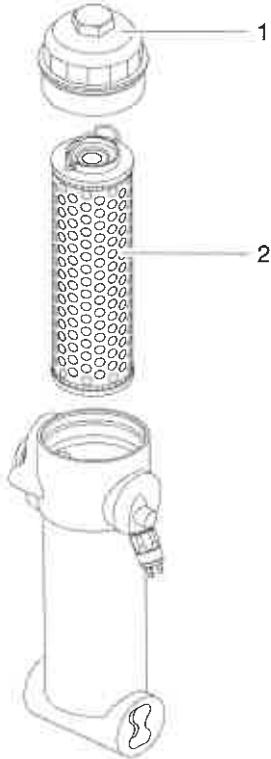
Relieve the pressure on the oil side of the pressure accumulators (see manometer display).

Subject to machine equipment, further oil filters may be installed.

The listed work steps must be carried out for all oil filters.

Changing the oil filter insert

- Switch off the main switch, for safety reasons.
- Remove the lid (1) of the filter housing.
- Pull out the filter insert (2) and check for coarse contamination (e.g. fragments).
- Replace the filter insert with a new one. A replacement filter insert is included in your machine tool kit for the first filter change.
- Apply a little oil to the O sealing ring on the filter element.
- Ensure the filter element is inserted the correct way round, see illustration.
- Screw the lid (1) on again tightly.



1 Lid
2 Filter element

Maintenance of the oil cooler

The oil cooler must be cleaned and decalcified at least once a year.

- Switch the machine to standby and let it cool down.
- Shut off the cooling water supply of the machine.
- Remove the supply and return hoses from the cooling water manifold of the oil cooler.

Decalcify the assembled cooler:

- Connect a commercially available decalcifying system. The operating pressure must not exceed 16 bar (232 PSI)!

NOTICE

Observe the schedule for changing the oil filter strictly and note the date of each filter change (see chapter 9.8.1):

The filter element must be replaced every **5000 operating hours or once a year at the latest**.

The condition of the filter element is monitored. When the following message is displayed on the screen "Notice 4: Oil filter contaminated (change it!) ", the filter must be replaced immediately.

Warranty claims on the hydraulic system will become void if the above maintenance instructions are not complied with!

Malfunctions (e.g. pump damage) could occur if this message is not observed.

9.8.4 Venting the hydraulic system

When is it necessary?

Venting of the hydraulic system is always necessary if it is possible that large amounts of air have penetrated the system.

The system should be vented after one of the following circumstances:

- ◆ after filling the oil tank for the first time
- ◆ after an oil change or other work on the hydraulic system
- ◆ after a long machine standstill.

Air in the hydraulic system?

Air in the hydraulic system can be recognised by:

- ◆ foaming of the oil
- ◆ sudden, jerky injection and clamping unit movements
- ◆ abnormal noises.

How to vent

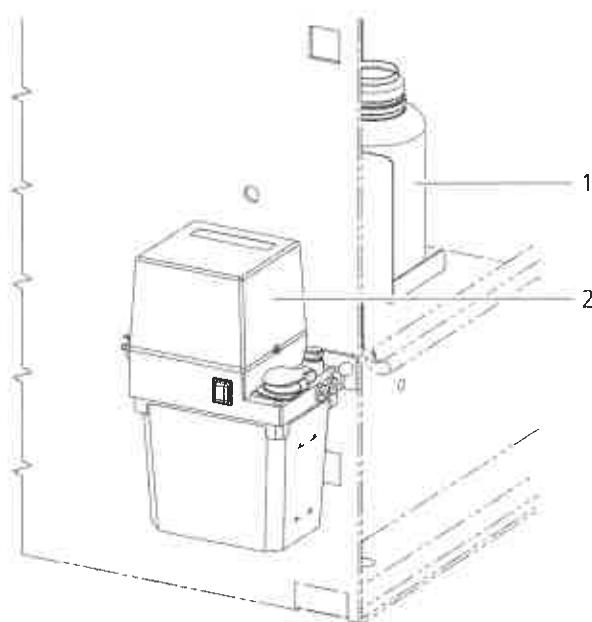
- Set low speeds and pressures for the initial axis movements.
- 1. Open and close the clamping unit 8 - 10 times in manual control (total stroke).
- 2. Check the oil level after venting and top up if necessary (see 1.1.8).
- Load the start program from the system diskette and repeat step 1 several times until the hydraulic system is completely vented.

9.8.5 Automatic central oil lubricating system

Function of the central lubrication

An electric pump unit supplies the individual lubrication points on the toggles and the spindles of the mould and ejector drive via dosage units. The lubrication intervals are cycle-dependent and determined by the SELOGICA controller.

The lubrication is monitored by the pressure switch and the oil level switch. If malfunctions occur a warning or alarm is issued.



- 1 Container for leakage oil
- 2 Pump unit

NOTICE

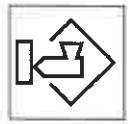
Check the level of leakage oil in container (1) regularly and empty as required.

Intervals between lubrication

In the following parameter screen page you will find information on the intervals (number of cycles) between lubrication.

Calling up the parameter screen page

Press this key to call up the "Production control" main group.



With this key you call up the "Machine parameters" superior group.



With this key you call up the "Machine lubrication selectable options" parameter screen page.

Machine lubrication - selectable options

Cycle counter for toggle lubrication

Pre-defined value

Actual value

Cycle counter for spindle lubrication

Pre-defined value

Actual value



Pre-selection
f8886

f8886/f8596**Pre-defined value**

Here the controller displays the number of cycles between lubrication processes.

These cycles between lubrication processes have been specified as standard and can not be changed.

f8887/8597**Actual value**

Here the actual value of cycles is displayed which have been completed before the next lubricating process is started.

Lubrication sequence

In the "Automatic" and "dry cycle" operating modes the toggle system of the clamping unit and the spindles for mould closing and ejection are automatically lubricated, in relation to the number of cycles and the status of the machine.

Besides the cycle-related lubrication, there are further events which can trigger a lubrication:

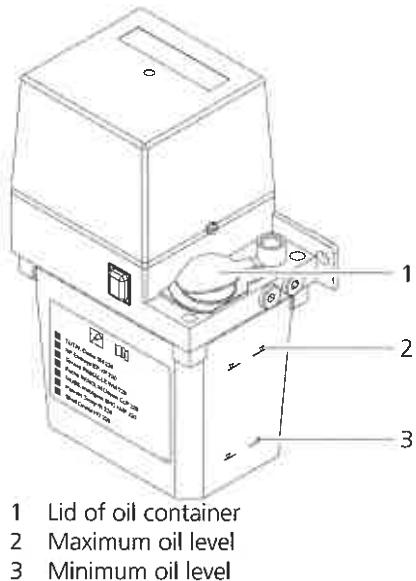
- ◆ Every time the controller is switched on, a lubrication process is carried out with the 1st automatic start (normal lubrication process).
- ◆ If the toggle system remains in the extended position for more than 15 minutes in one of the manual modes, a lubrication process is carried out with the next automatic start (normal lubrication process).
- ◆ If more than 1 week passes without a lubrication process being carried out, the whole system is completely lubricated for 5 minutes.

NOTICE

In the parameter panel "Valves/switches mould 1" you can check when the output M090/Y095 has been set, or switch S090 / S091/S095 is active.

Topping up the oil

- Remove the lid of the oil container.
- Fill in the prescribed oil. Observe the maximum filling level. The container holds 2 litres of oil. Approximately 1 l can be topped up from the minimum level to the maximum level.
- Only use a brand and type of oil stipulated in the lubricant table in chapter 9.9.

**Venting the central lubrication system**

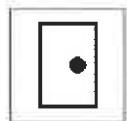
If you have opened the circuit of the central lubrication system or air has penetrated the system, it must be vented. This is the case, for example after one of the tubes has been replaced.

Proceed as follows to vent the system:

- Unscrew the respective lubrication tube on the dosing element of the lubrication point (e.g. on the toggle).

Machine parameters**Ventilation central lubrication**

Press this key.



Press this key.



- The "Service" parameter screen page appears.
- Enter the code no. "250xxxx" and press the "Y" key.

Press this key.



- The "Machine parameters" screen page appears.

Touch this symbol.



f8448

Ventilation of central lubrication system

- Enter "yes" here and confirm with the "Y" key.
 - The central lubrication valve now switches between spindle lubrication and toggle lubrication.
- Watch the open lubrication screw connection, until oil emerges.
- Screw the lubrication hose back on to the dosing element.
- Press the "N" key at f8448 "Central lubrication ventilation".
 - The central lubrication venting process is now switched off.

9.8.6 Maintenance and repair work on the hydraulic system



DANGER

Risk of fatal injury.

Residual pressure in the hydraulic system presents a potential source of danger.

Risk of serious or fatal injury from hydraulic oil escaping under high pressure.

All remaining pressure must be relieved before work commencement.

The hydraulic accumulator must be discharged completely before commencing any work on it.

Before starting any work, switch off the main switch of the machine and safeguard it against inadvertent re-switching on.

Wear personal protective clothing and equipment.



WARNING

Risk of injury from vertically positioned hydraulic components slipping downwards.

On vertically positioned hydraulic components, the moving cylinders and thus the complete unit can fall down when the hydraulic connections are opened.

Hydraulic components must be supported or moved to a secure position before commencing work, in order to prevent them from slipping down.

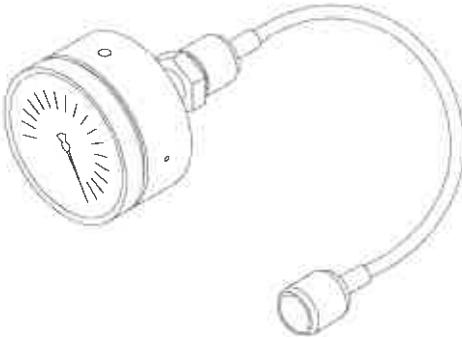
Support of vertical hydraulic components

Before commencing any work, check whether the hydraulic components are removed so that work in the horizontal position can be carried out.

- Measure the clearance between the vertical hydraulic components and the supporting element.
- Cut two suitable pieces of squared timber to the measured length.
- Insert the two squared timbers and secure them with suitable means, for example to the tie-bars.

Checking the residual pressure

Before undertaking any work on the hydraulic system, it must be checked whether there is residual pressure. This check is to be carried out on the respective measuring terminals using the measuring equipment from the machine tool kit.



- Connect the measuring equipment to the respective measuring terminal and check the pressure.

Measuring terminal	Designation
M1.2	Mould locking pressure
M1.14	Mould closing
M1.44	Mould opening
M2.3	Nozzle contact pressure
M3.1	Pressure on injection side
M6.5	Ejector pressure
M7.5	Core pull pressure

The position and execution of the measuring terminals are subject to the equipment of the machine.

Reducing the residual pressure

Any pressure remaining in the system can be discharged at the respective measuring terminal.

- Position a suitable catch pan underneath the place where the work is carried out.
- Connect the measuring cable without manometer to the respective measuring terminal.
 - As soon as the quick-release fastener opens, some hydraulic oil emerges and the residual pressure is relieved.
- Collect the emerging oil with suitable means.
- Check for remaining pressure once again.

Checking the safety valve

To ensure proper functioning of the safety valve, the discharging device must be actuated multiple times at least once a year.

For the location and actuation of the discharging device, see chapter "Position of the hydraulic accumulator".

Replacing the accumulator bladder

Due to the high mechanical stress, we recommend having the accumulator bladder in the pressure accumulator replaced after six years as a preventive measure.

The replacement of the accumulator bladder must be carried out by the customer service of the manufacturer or by ARBURG.

9.8.7 Lubrication of the injection unit 170 E

The injection unit 170 E is lubricated with a special gear oil. See chapter 9.9 for permitted lubricants.

See maintenance schedule for maintenance intervals.

Maintenance work

- Check the level of the gear oil.
- Top up the gear oil as required.
- Change the gear oil, replace the oil filter.
- Change the oil on the injection drive.
- Lubricate the guides on the gear housing.

Use the socket wrench Part No. 531.093 for detaching and mounting the filter.



WARNING

Danger of crushing injuries if the safety devices are not mounted.

This work must only be carried out by suitably trained persons.

During this work switch off the main switch and safeguard it with a lock against inadvertent re-switching on.

Checking the filling level of the gear oil

The machine must be heated to operating temperature so that the gear oil has the correct flow characteristics.

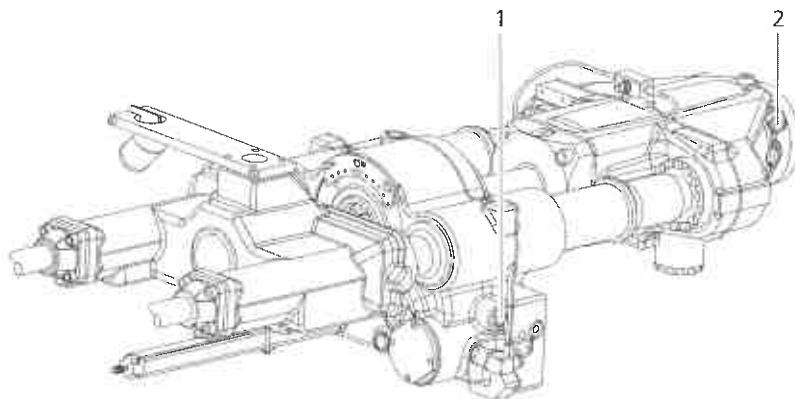
- Switch the machine off.
- Remove the upper guards on the injection unit.

NOTICE

Before measuring the oil level, switch off the machine and wait for approx. 30 minutes until the oil level in the gear housing has settled.

If oil loss is detected, check the oil level earlier. Top up as required using only the specified gear oil.

Checking the oil level



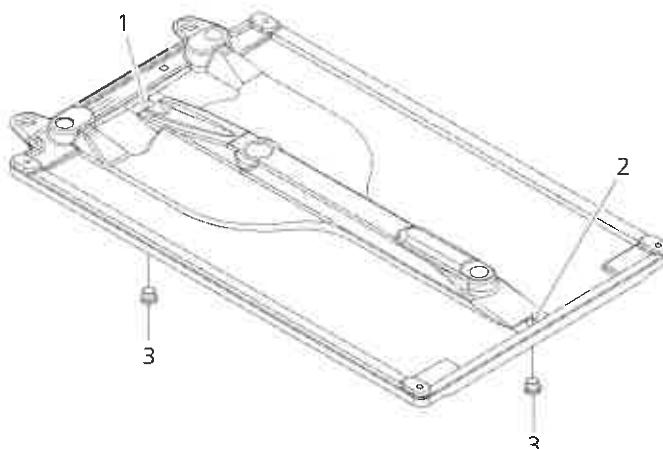
- 1 Oil level indicator in gear housing
- 2 Oil level indicator of injection drive

The oil level indicator must be covered to the centre.

- Top up the gear oil as required.

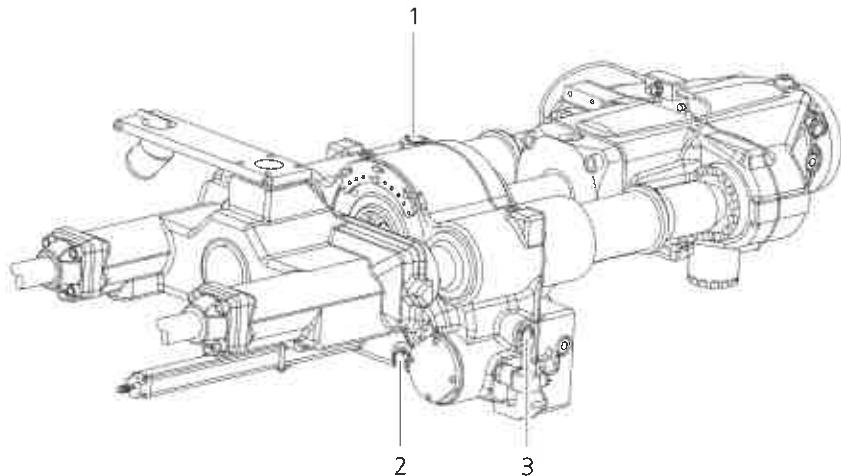
Changing the gear oil

Proceed as follows to change the gear oil:



- 1 Outlet, front
- 2 Outlet, rear
- 3 Screwed plug

- Place a collection pan of adequate capacity (ca. 4 l) underneath the front outlet opening.
- Remove the respective screwed plug.



1 Inlet
2 Screwed plug
3 Oil level indicator

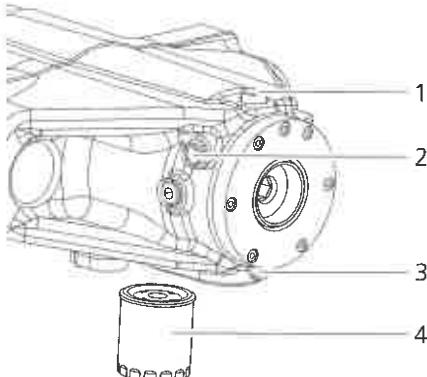
- Remove the screwed plug in the inlet (1).
- Remove the screwed plug in the outlet (2).
- Drain off the gear oil completely.

The screwed plug (2) is magnetic and will attract any metal particles.

- Clean the screwed plug (2).
- Remount the screwed plug (2).
- Fill the new gear oil into the inlet (1).
- Pour in gear oil until the oil level indicator (3) is covered up to the centre.
- Close the inlet (1).
- Close the front outlet.
- Check the oil level after approx. 30 minutes production again.
- Dispose of the used gear oil according to directives in chapter 9.10.3.

Changing the oil of the injection drive

- Place a collection pan of adequate capacity (ca. 2 litre) underneath the rear outlet opening.
- Remove the respective screwed plug.

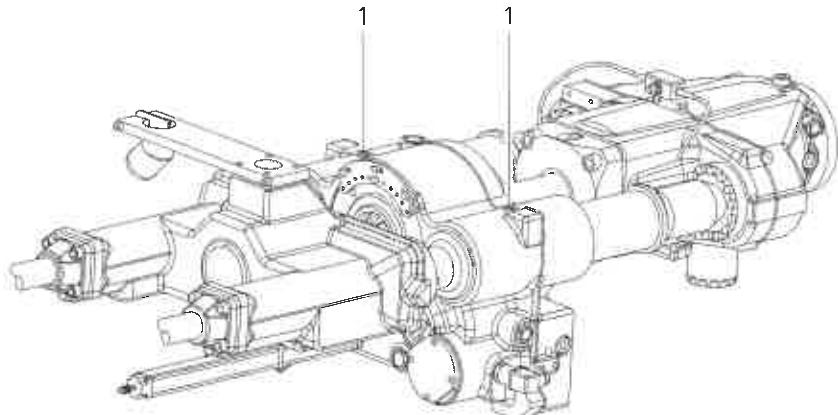


- 1 Inlet
- 2 Oil level indicator
- 3 Screwed plug
- 4 Oil filter

- Remove the screwed plug in the inlet (1).
- Remove the screwed plug in the outlet (3).
- Drain off the gear oil completely.
- Clean the screwed plug (3).
- Remount the screwed plug (3).
- Install a new oil filter Part No. 264.548.
- Fill the new gear oil into the inlet (1).
- Pour in gear oil until the oil level indicator (3) is covered up to the centre.
- Close the inlet (1).
- Check the oil level after approx. 30 minutes production again.
- Dispose of the used gear oil and the oil filter according to directives in chapter 9.10.3.

Lubricating the guides on the gear housing

- Lubricate the guides of the gear housing.



1 Lubricating nipple

- Press the grease into the lubricating nipple (1) using a grease gun until excess grease emerges from the guides at the side of the gear housing.
- Replace all guards.
- Remove the excess grease after approx. 30 minutes production.



WARNING

Danger of crushing injuries if the safety devices are not mounted.

Safety devices which have been removed in order to carry out maintenance work must be correctly reinstalled before starting up the machine again. The machine must only be operated when all safety devices are completely installed.

9.8.8 Maintenance of the temperature control unit

The temperature-control medium "HAKUFORM 50-60-7 AB" is used. This guarantees an anti-corrosion and anti-freeze protection up to - 25 °C (-13°F).

The temperature-control medium can be purchased from ARBURG in 10 l (2.6 US gal) disposable containers under material number 381527.



CAUTION

Risk of injury from hot fluids!

If the temperature-control medium has not completely cooled down, spillage can cause serious burns.

During all maintenance work on the temperature control unit, the main switch of the machine must be switched off and secured against inadvertent re-switching on.

The safety data sheets of the manufacturers or suppliers must be observed.

NOTICE

Risk of damage!

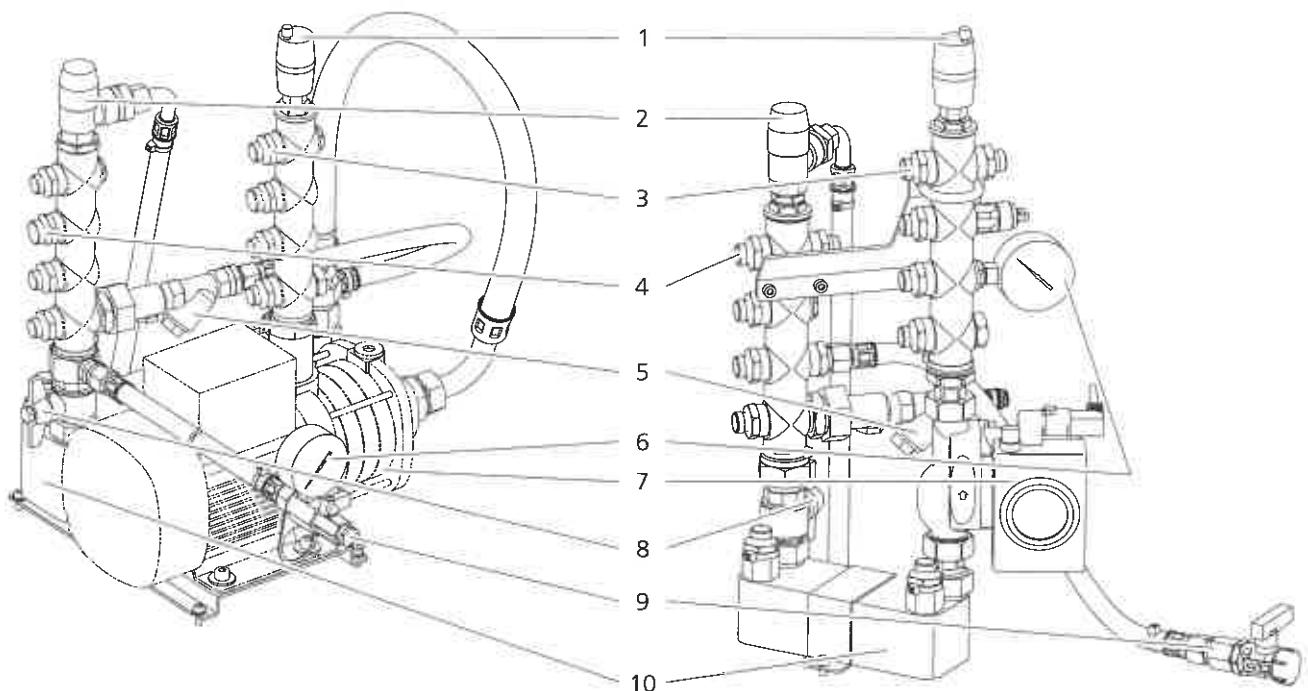
Leakage on the temperature control device can lead to frequent replenishment with cooling water. Consequently, the concentration of the anti-corrosion and anti-freeze agent in the temperature control unit is reduced.

Check the temperature-control circuits for leakage.

Emptying the temperature-control circuit

- Switch off the machine at the main switch.
- Disconnect the cooling water supply to the temperature control device on the cooling water manifold.
- Disconnect the connection for the replenishment of the temperature control device on the cooling water manifold.

The execution and layout of the temperature control device differ, subject to the equipment of the machine.



- 1 Venting valve
- 2 Safety valve
- 3 Connections for temperature-control circuits, feed
- 4 Connections for temperature-control circuits, return line
- 5 Strainer
- 6 Pressure indicator
- 7 Circulation pump
- 8 Stopcock on return line
- 9 Hose assembly with stopcock
- 10 Heat exchanger



- Lay the hose assembly into a suitable catch pan.

INFORMATION

Subject to the equipment of the machine, a quick-connect coupling must be additionally connected to the hose assembly in order to open the check valve in the stopcock.

- Open the stopcock of the hose assembly carefully.
- Drain off the temperature-control medium, until the pressure indicator shows 0 bar.
- Remove the hoses on the supply and return connections for the top temperature-control circuit.
- Lay the hoses into the catch pan.



WARNING

Danger from gaseous materials, vapours and dust.

The vapours and dusts arising when the circuit is blown with compressed air are harmful to health.

Do not inhale these substances.

Wear a suitable breathing mask.

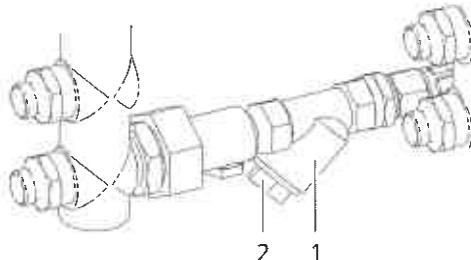
The safety data sheets of the manufacturers or suppliers must be observed.

- Blow the temperature-control circuit carefully with compressed air through one of the hoses to drain the circuit completely into the catch pan.
- Reattach the hoses of the temperature-control circuit to the supply and return connections. Pay attention to the markings of the connections.
- Repeat the procedure for all temperature-control circuits from top to bottom.

Cleaning the strainer

After the temperature-control medium has been drained off, the strainer in the supply line for replenishment must be cleaned.

- Remove the screwed plug with the seal on the strainer.



1 Strainer
2 Screwed plug

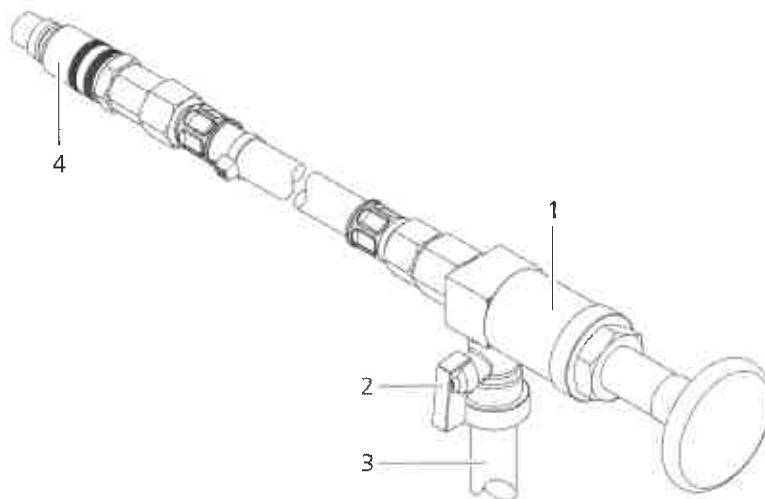
- Pull out the strainer insert.
- Clean the strainer insert carefully with compressed air.
- Insert the strainer insert again with the collar facing upwards.
- If required, replace the seal and tighten the screwed plug again.

Filling the temperature-control circuit

- Check whether all hoses are correctly attached to the temperature control device.
- Check whether the adjustment screw on the venting valve is opened by approx. half a turn.
- Disconnect the cooling water supply to the temperature control device on the cooling water manifold.
- Disconnect the connection for the replenishment of the temperature control device on the cooling water manifold.
- In order to fill the temperature-control circuit, close the stopcock on the return line of the temperature control device (horizontal position).

For filling the temperature control device and building up the pressure, the hand pump material number 333163 is required.

- Insert the suction hose of the hand pump into the container with the temperature-control medium.



- 1 Hand pump
- 2 Stopcock of the hand pump
- 3 Suction hose
- 4 Connector

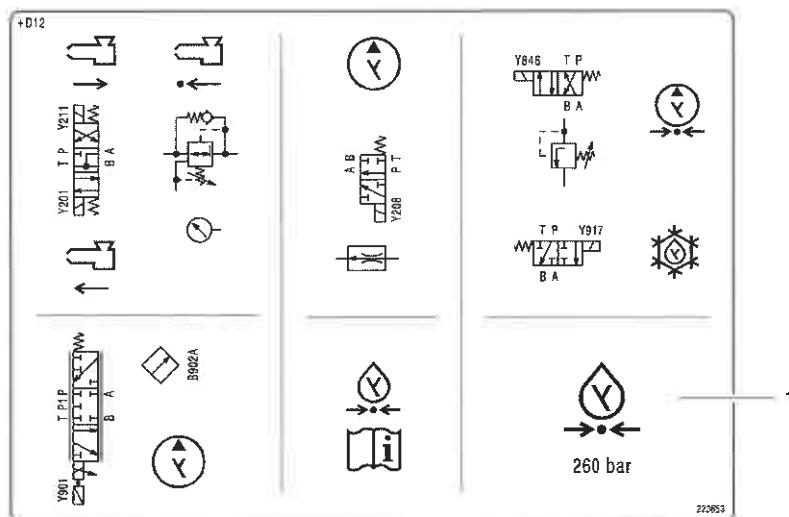
- Open the stopcock of the hand pump and actuate the hand pump until it is vented completely.
- Connect the hand pump with the hose assembly on the temperature control device.
- Open the stopcock of the hose assembly.
- Pump temperature-control medium into the temperature control device with the hand pump until the pressure indicator shows approx. 4 bar (58 PSI).

- Open the stopcock on the return line of the temperature control device (vertical position).
- Switch on the main switch of the machine again.
 - The temperature control device is vented autonomously.
- If necessary, top up temperature-control medium with the hand pump until the pressure indicator shows approx. 4 bar (58 PSI).
- Close the stopcock of the hose assembly and remove the hand pump.
- Establish the cooling water supply to the temperature control device on the cooling water manifold again.
- Re-establish the connection for replenishment of the temperature control device on the cooling water manifold.
- Check the temperature control device and the temperature-control circuits for leakage.

9.8.9 Pressure settings

System pressure

The system pressure of the machine is set before leaving the factory and must not be changed. The level of the system pressure is marked on a special designation label as shown in the following illustration. This designation label is located near the hydraulic control manifold or, for the pneumatic system, near the maintenance unit.



1 System pressure

Example

In the above shown case the hydraulic system pressure is set to 260 bar (3771 PSI).

No adhesive label is available for variable pressure settings, such as the manually adjustable core pull or nozzle contact pressure. These pressure values must be adapted to the individual application.



WARNING

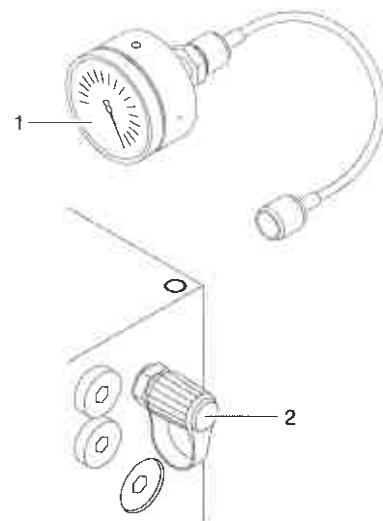
Adjusting elements which are sealed with a lead seal or sealing lacquer may only be set by an ARBURG service technician.

Accidents or damage can be caused if this is not observed!

Adjusting the hydraulic pressure

For checking or setting the adjustable hydraulic pressure values, either a manometer or measuring terminals are available on the relevant control manifold. These measuring terminals are marked on the control manifold with engraved numbers, e.g. M2.3. The meaning of these designations can be taken from the hydraulic circuit diagram of the machine.

- Connect the manometer with the measuring cable from the machine tool kit to the respective measuring terminal.
- Adjust the adjusting element, until the required pressure is reached.



1 Manometer with measuring cable
2 Measuring terminal

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INFORMATION

The manometer on the control manifolds and the manometer with measuring cable have a tolerance of 1.6%.

For very precise pressure settings, a precise measuring manometer must be used.



Adjusting the pneumatic pressure

The pneumatic pressure is set on the pressure reduction valve of the pneumatic maintenance unit.

- Pull the knob upwards, set the pressure, press the knob down again to lock it.

Example

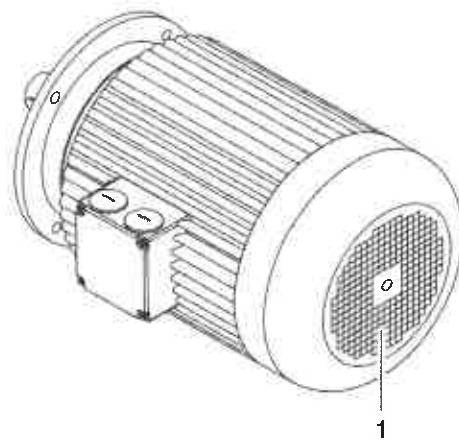


The designation label with the required pressure setting is located near the pneumatic system.

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9.8.11 Cleaning the motor cover

The cover for the fan blade of the pump motor must be checked for contamination every six months and cleaned if necessary.



- Stop production and switch off the pump motor.

If the ventilation slits (1) are clogged with dust/dirt, the cover must be cleaned.

9.8.12 Programmable drive unit for "nozzle movement" axis

Function of the drive unit

The drive unit serves to carry out the servo-electric nozzle movements with hydrostatic force transmission.

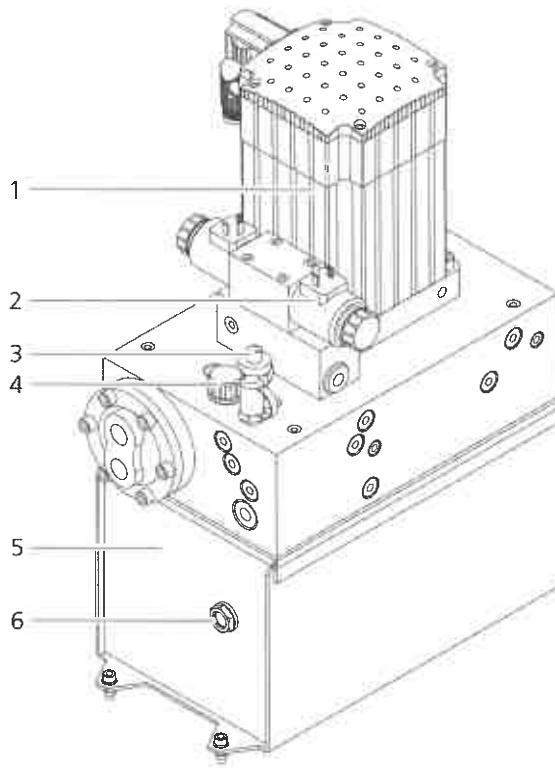
The drive unit is an enclosed system. A servo motor coupled with a gear pump is hereby used to generate the drive energy. The nozzle movement speed as well as the nozzle contact force are programmable and servo-controlled.

The drive unit is located underneath the injection unit in the machine base. A watch-dog monitors the filling level and the temperature of the fluid. In case of irregularities, a warning message is displayed on the screen and the machine is switched to standby issuing an alarm.

Topping up the fluid

If the minimum oil level is reached, the hydraulic oil stipulated in the table of lubricants (chapter 9.9.3) must be filled in through the screwed plug.

The purity grade must at least comply with ISO 4406 - 15/12/09.



- 1 Servo motor
- 2 Directional valve
- 3 Level and temperature monitor
- 4 Screwed plug
- 5 Container
- 6 Sight glass

Checking the oil level

The sight glass must be covered completely with oil.

NOTICE

Contaminations in the oil can lead to malfunctions.

Observe the handling and storing recommendations of the fluid manufacturer. Only fill the system with pre-filtered oil.

- Open the screwed plug on the inlet.
 - Fill in oil until the sight glass is completely covered with oil.
- 0.6 litre is required to top up the level by 1 cm.
- In the "Switches/inputs" parameter screen page you can check whether the nominal filling level has been reached.
 - If there is no sight glass, push a measuring bar (tape measure) through the oil inlet.

The level must be at 170 ± 40 (measured from above).

Position S984 must be marked.

- Close the inlet with the screwed plug.

Maintenance of the drive unit for servo-electric nozzle movements

The maintenance work on the drive unit is to be carried out in certain intervals. A respective message is displayed on the screen.

The work described in the following must be carried out by ARBURG service technicians only.

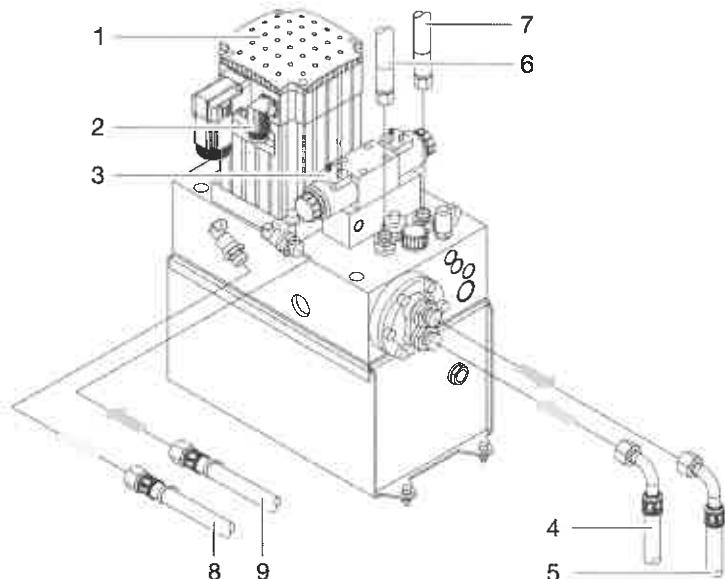
- ◆ Changing the hydraulic oil,
- ◆ Cleaning the oil container,
- ◆ Changing the oil filter.

Removing the drive unit

The drive unit must be removed from above.

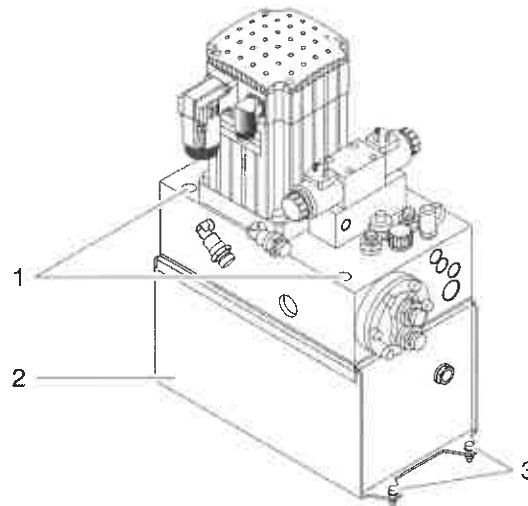
- To do this, retract the injection unit fully and push it to the maintenance position.
- Open the covers in accordance with chapter 1.1.5 and/or 1.1.5.11.

- Switch off the main switch of the machine and secure it with a padlock so that it cannot be inadvertently switched on again.



- 1 Servo motor
- 2 Supply lines
- 3 Directional valve
- 4 Supply line
- 5 Return line
- 6 Hose
- 7 Hose
- 8 Hose
- 9 Hose

- Remove the supply lines of the servo motor and directional valve.
- Always place a container aside to catch any escaping cooling agent or hydraulic oil when removing liquid-filled lines.
- Remove the supply and return lines on the heat exchanger.
- Remove the hoses for the hydrostatic supply of the injection unit.
- Mark the hoses and lines so that they cannot be confused when installing them again.
- Dispose of the collected fluid properly.

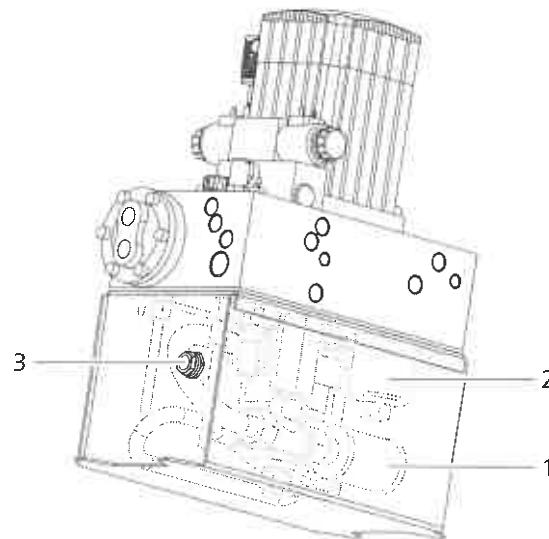


- 1 Screws
2 Oil tank
3 Attachment screws

- Remove the attachment screws of the drive unit (2 at the front and 2 at the rear).
- Lift the drive unit out of the machine base from above.

Disassembling the drive unit

- Place a tub aside to collect the demounted parts.
- Remove the screws.
- Remove the drive unit of the oil container and place it into the provided tub to drain.
- Clean all parts that have been covered with hydraulic oil using a lint-free cloth.



1 Suction filter

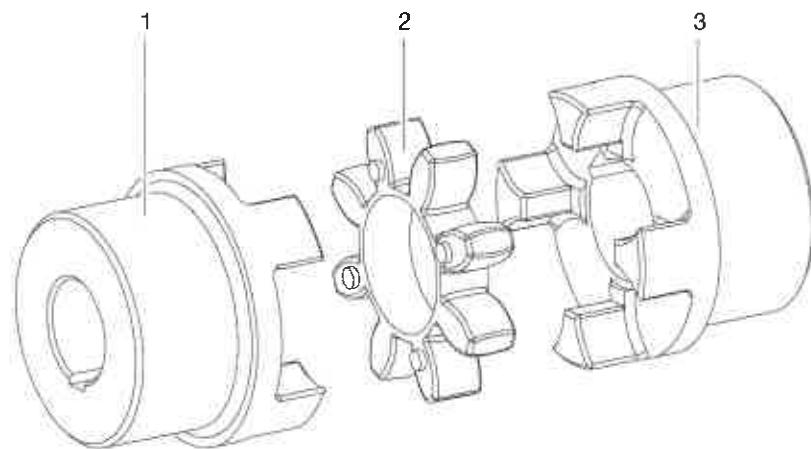
2 Oil filter

3 Sight glass

- Remove the suction filter and clean it thoroughly.
- Reinstall the suction filter.
- Remove the oil filter.
- Install the new oil filter, material number 250158.
- Remove the hydraulic oil from the oil container and dispose of it properly.
- Clean the oil container with a lint-free cloth.

Inspection of toothed ring

The drive motor and the hydraulic pump unit are connected by a claw coupling. Between the steel hubs (1 and 3) there is a plastic toothed ring (2) which serves as a cushioning element.



- Replace the toothed ring (2) with every oil change.

NOTICE

Friction causes not only wear but also produces ageing effects, which are not necessarily visible. The toothed ring can become hard and transfer oscillations from the motor and the pump which can have a mutual negative effect.

The noise level of the machine can also increase considerably.

If the steel hubs (1 and 3) also show signs of wear, the whole coupling must be replaced.

- Attach the complete drive unit to the machine base again and secure it.

Filling the system with hydraulic oil

- Fill the new hydraulic oil into the oil container, in accordance with the lubricant table in chapter 9.9.3, until the sight glass is covered to the upper rim.

The purity grade of the hydraulic oil must be at least 15/12/09, according to ISO 4406.

- Install all connections again, except for the connections of the directional valve.
- Switch the machine on.
- Change to "Set-up" operating mode.

Venting**NOTICE**

Risk of damage.

Be very careful as the pump is very sensitive regarding air.

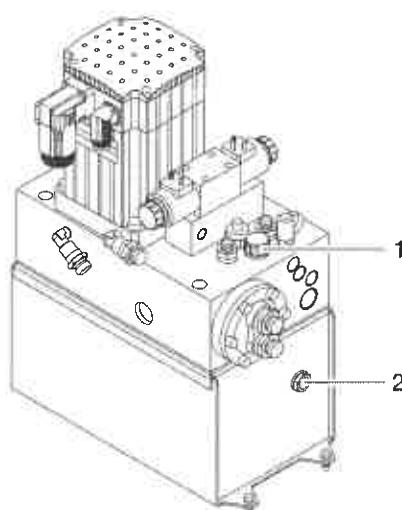
The maximum forces and speeds are 10 kN/20 mm/s.

- ◆ Venting the distribution manifold:
 - Disconnect the valve plugs of valves Y201 and Y211.
 - Vent the pump, the distribution manifold, etc. for approx. 2 minutes by pressing the "Nozzle advancement" key (oil circulation via pump-tank).
 - Insert valve plugs Y201 and Y211 again.
 - Let the system stand for approx. 10 minutes (air degasses from the oil).

- ◆ Venting the injection unit:
 - Attach the measuring hose connection, material number 314.656, between the "Nozzle advancement" and "Nozzle retraction" measuring connections (on the control manifold underneath the injection unit cover).
 - Fully advance and retract the nozzle for some time.
 - Let the system stand for approx. 10 minutes (air degases from the oil).
 - Remove the measuring hose connection again.

Adjusting the filling level

- The system must be completely vented.
- Check the filling level with the oil level indicator.
- The filling level must be in the centre of the oil level indicator.
- Only fill the system with hydraulic oil in conformity with the lubricant table in chapter 9.9.3.
- Remove the venting screw on the distribution manifold.
- Top up with oil until the filling level is in the centre of the oil level indicator (0.6 l oil is required to increase the filling level by 1 cm).
- Attach the venting screw again.



1 Venting screw
2 Sight glass

9.9 Hydraulic oils and lubricants

9.9.1 Requirements to be fulfilled by the lubricants

Regular and correct lubrication and using the most suitable lubricants are essential factors for ensuring maximum performance, a long service life and avoiding malfunctions in our machines.

Only those hydraulic oils and lubricants which conform to the standards listed in the following table may be used.

Designations of hydraulic fluids

The following overview explains the meaning of the hydraulic oil designations.

H = Hydraulic oil,

V = Active ingredients for improving the viscosity / thermal behaviour,

L = Active ingredients for increasing the anti-corrosion and/or ageing protection,

P = Active ingredients for lowering the wear and/or for increasing the resilience,

D = Active ingredients with detergent and dispersion characteristics (cleansing properties and properties which suspend ageing and foreign particles). The service life of the filter element can be reduced.

46 = Kinemat. viscosity at 40 °C (104 °F), this norm permits fluctuations of $\pm 10 \%$.

ZAF = Zinc and ash-free,

PAO = Poly-Alpha-Olephin, synthetic mineral oil,

HC = Hydro-cracking, new-technology basic oil with high viscosity index,

EP = Extreme pressure, active ingredient for the formulation of high-performance oils with high pressure stability,

AW = Anti-wear, active ingredients for improved adhesion and anti-friction properties,

LAV = Air release property.

Lubricants in general

- ◆ Miscibility/compatibility
Never mix different lubricants or lubricants of different manufacturers together. If this is unavoidable, e.g. when changing the oil on a machine, a compatibility test must be carried out by the lubricant manufacturer.
- ◆ System rinse required (fluid, seals and hoses).
- ◆ Viscosity category
Only viscosity category VG46 (ISO VG46 DIN51519) is permitted due to the type of hydraulic pump installed.
- ◆ Zinc/ash-free hydraulic fluids
These fluids are subject to approval by ARBURG, due to compatibility problems and counter reactions with the types of seals often installed in hydraulic systems.
- ◆ Component safety
The hydraulic fluid must be free of sodium and chlorine. The content of heavy metals in the hydraulic fluid must be limited to a minimum. The listed products are compatible with bearings and bearing media (radial, axial bearings and hydrostatic bearings).
- ◆ Fluids for increased requirements or special fluids
Hydraulic fluids of the category HVLP have multi-grade character and a naturally high viscosity index (energy-saving, long-life).
 - For the high-performance drives of the ALLROUNDER with AED and the ALLDRIVE, fluids must be used which are listed in the "high-performance gear oils" table.
 - For ALLROUNDERS which are used in the food industry or which require an FDA USDA-H1 or NSF approval, fluids from the table "Lubricants for the food industry" must be used.
 - Hydraulic fluids which come under the "low-flammable" category cannot be approved for ARBURG (machine requires special sealing systems and adapted hydraulic components). Here secondary fire prevention measures are more appropriate.

Hydraulic fluids which are not based on mineral oil are not permitted. Hydraulic fluids which come under the category of "synthetic esters" (HEE, HEES) must be tested and require ARBURG's explicit approval.
- ◆ Setting into operation/maintenance/repairs
Observe the guidelines for handling and storage stipulated by the fluid manufacturer and fill the system with pre-filtered hydraulic fluid only (ISO 4406: 1999 - ≤ grade 18/15/12). Adhere to the maintenance and oil-changing schedules and specifications stipulated in the operating manual.

Purity grades for hydraulic oils

Neutral institutes have ascertained that failures of hydraulic systems are caused in approx. 80 % of cases by contamination of the hydraulic fluid. For this reason, in addition to basic properties such as viscosity, temperature stability and protection against wear, the purity of the hydraulic fluid is particularly decisive in ensuring the trouble-free operation of your injection moulding machine.

Oil is usually contaminated by hard particles such as dust and wear products or soft particles which arise during the ageing process. The soft particles can stick to the hydraulic components or deposit in the filters and impair their function.

In order to measure and assess the degree of contamination, so-called "purity grades" have been introduced. Here the quantity and size of the particles per 100 ml oil are ascertained. The method for determining the purity of the oil and the classification of the purity grades are defined in ISO standard 4406:1999.

ISO 4406: 1999 (International Standard Organisation)

The classification is determined in accordance with the size of the particles > 4 µm, > 6 µm and > 14 µm. The particle count is ascertained cumulatively and specified in classification numbers, which are specified in turn in ISO standards.

Guiding rule: the higher the classification number, the greater the number of particles and thus the rate of contamination.

Example: purity grade 18/15/12 means:

- ◆ 18 indicates particles sized > 4 µm,
- ◆ 15 indicates particles sized > 6 µm,
- ◆ 12 indicates particles sized > 14 µm.

In respect of components such as pumps and valves installed in the hydraulic circuit of your injection moulding machine, the following purity grades apply as maximum permissible values.

Standard	max.
ISO 4406: 1999	18/15/12

If an additional filter system is used for increasing the service life of the machine components, the purity grade ISO 4406:1999 - 15/12/09 must be achieved permanently (see section on fluid management in this chapter).

NOTICE

Have the hydraulic fluid of your injection moulding machine checked (analysed) in a laboratory at least once a year.

All additional methods of filtration do not substitute the oil change prescribed in the maintenance schedule. Acidic components in very old oils can corrode the hoses and seals.

Fluid management and fluid condition monitoring

The specified purity grades already correspond to the demands made on a high-speed hydraulic system with control valves in an injection moulding machine.

Your machine availability can however be increased even further, by improving the purity grades and ensuring the required oil quality is maintained. For this purpose, an overall concept, i.e. a so-called fluid management is required, which is based on the following aspects:

- ◆ High-performance lubricants,
 - Only selected lubricants with increased performance reserves (LAV, AW, EP, wear indicators) must be used (see table of approved lubricants, index 1).
- ◆ Handling / avoidance,
 - Environment/production-friendly handling of lubricants, i.e. avoid changing the oil type once used and mixing different types of lubricants.
 - Storage in production environment in qualified storage tanks with integrated filter station.
 - Purity grade in the storage tank: ISO4406: 1999 - 15/12/09.
 - Filling / refilling of hydraulic system only with qualified transport containers through a filter system.
- ◆ Realisation
 - Machine filter concept with circulation or bypass filter using 3 µm abs. filters.
 - Connections for external filter system for cleaning and dewatering.
- ◆ Monitoring
 - Regular lubricant analyses at intervals of 3- 6 months (trend analysis).
 - Indicators: Viscosity,
Acid content,
Oxidation,
Water content,
Contamination,
Purity grades ISO 4406 : 1999 - 15/12/09
- ◆ Extended monitoring or fluid condition monitoring
 - Monitoring system with sensors integrated in the hydraulic system (purity grades and oil condition).

9.9.1.1 Oil analysis

In order to guarantee trouble-free operation of the hydraulic system, the hydraulic oil must comply with the requirements specified in the "Requirements to be fulfilled by the lubricants" chapter.

For this purpose, the intervals for an oil analysis by ARBURG or an external laboratory stipulated in the maintenance schedule must be adhered.

You can purchase an oil testing set from ARBURG for taking samples. When taking the sample, proceed exactly as described in the enclosed description to get a representative sample.

The first oil analysis serves as a reference for further analyses. In this way, a trend in the alteration of the oil state can be detected over time.

- ◆ Oil testing set, material number 163826

9.9.2 Approved lubricants

ARBURG

Initial filling of grease and oil

When a new machine leaves the factory, the lubrication points are already completely lubricated. Any available refill containers, e.g. for the central lubrication system are also filled. During later machine operation, only precisely these lubricants, or those lubricants which are approved and listed in this chapter, are permitted to be used for the lubrication of the individual maintenance locations.

Chapter	Lubricants
9.9.2	Approved lubricants
9.9.3	Central hydraulic system / machine base
9.9.4	Clamping unit
9.9.5	Injection unit
9.9.6	Accessories

The hydraulic oil is drained off before transport of the machine. Only a small amount of oil is left in the hydraulic circuit.

Table of lubricants

The types of hydraulic oil and lubricants listed in the following table are a selection of suitable types, based on the specifications of the oil manufacturer and/or suppliers of hydraulic components.

NOTICE

Use of alternative lubricants:

Before leaving the factory, ARBURG machines and systems are filled with high-quality lubricants which guarantee a long service life of the components. Only these lubricants guarantee the reduction of wear to an absolute minimum.

Only the approved lubricants listed in this chapter may be used as alternative lubricants for the relevant lubrication points.

Lubricant
Hydraulic oil HLP 46

In accordance with the standard ISO VG46 DIN51519, DIN 51524-2

Manufacturer	Type	Designation	Usage
Bremer & Leguil	HLP (PAO)	RIVOLTA F.L. 75 (1) - NSF-H1	alternative
BP - Castrol	HLP	Hyspin AWS 46	alternative
BP - Castrol	HLP-D-ZAF	Hyspin DF TOP 46	ARBURG test bay
Chevron Texaco	HLP	Rando Oil HD 46	alternative
Fuchs Petrolub	HLP	Renolin B15	alternative
Fuchs Petrolub	HVLP-D	Renolin Xtreme Temp 46 Plus (1)	alternative
Fuchs Petrolub	HVLP-D	Renolin MR46MC (1)	alternative
Mobil	HLP	Mobil DTE 25	alternative
Mobil	HVLP-ZAF	Mobil DTE 10 Excel 46 (1)	alternative
Shell Oil	HLP	Tellus S2 MX 46	alternative
Shell Oil	HLP-D-ZF	Tellus S2 MA 46 (1)	ARBURG test bay
Shell Oil	HVLP-ZF	Tellus S3 M 46	alternative
Shell Oil	HVLP-ZF	Tellus S4 ME 46 (1)	alternative
Total	HLP	Azolla ZS46	alternative

(1) Hydraulic fluid fulfills the requirements on improved wear indicators:
VKA value (four-ball test) > 1600 N, load stage acc. to FZG > 12,
Brugger value: b > 30 N/qmm

Lubricant
Grease KP2

In accordance with the standard DIN 51825, KP2 P/N

Manufacturer	Type	Designation	Usage
BP - Castrol	KP 2 N-30	TRIBOL GR 100-2 PD	alternative
Fuchs Petrolub	KP 2 N-30	Renolit CX-EP 2	ARBURG grease specification Material no. 313443
Mobil	KP 2 N-30	Mobilith SHC 220	alternative
Shell Oil	KP 2 N-30	Gadus S2 V220 AC2	alternative
Rhenus	KP 2 P-30	Rhenus LKR 2	ARBURG grease specification Material no. 303534
Klüber Lubrication	KP 2 N-30	Klüberplex BEM 34-132	ARBURG grease specification Material no. 299681

Lubricant
high-performance gear oil
CLP-HC

According to norm DIN 51517-3 CLP220-HC

Manufacturer	Type	Designation	Usage
Fuchs Petrolub	CLP (PAO)	Renolin Unisyn CLP 220	ARBURG pre-filling Material no. 284940
Fuchs Petrolub	CLP (M-PAO)	Renolin Unisyn XT 220	alternative Material no. 364004
Shell Oil	CLP (PAO)	Omala S4 GX 220	alternative
Shell Oil	CLP (M-PAO)	Omala S4 GXV 220	alternative
BP - Castrol	CLP (HC)	Alphasyn EP 220	alternative
Mobil	CLP (HC)	SHC Gear 220	alternative
Total	CLP (PAO)	Carter SH 220	alternative
Rowe	CLP (HEES)	Hightec NatSync GS68-NSF-H1	Subject to the injection unit version (see chapter 9.9.5) Material no. 308250 Not for central lubrication system

Lubricant
special-purpose grease

Manufacturer	Type	Designation	Usage
Bremer & Leguil	-	Rivolta G.W.F	Recommended by ARBURG Material no. 252677
Molykote	-	P-40	Recommended by ARBURG Material no. 115175
OKS	-	OKS 432	Recommended by ARBURG Material no. 276279
OKS	-	OKS 476	Recommended by ARBURG Material no. 276280
LUBE	-	YS2	Recommended by ARBURG Material no. 303533

**Lubricants
for the food industry**Norm: DIN51519 and DIN 51524-2
FDA-USDA-H1 or NSF approval

Manufacturer	Type	Designation	Usage
Bremer & Leguil	Hydraulic oil HLP (PAO)	RIVOLTA F.L. 75 NSF no. 119522	ARBURG oil specification Material no. 302417
Strub Schmiertechnik AG	Hydraulic oil HLP (PAO)	Foodlube ISO VG 46 (1) Hydraulic system poly-alpha-olephin (PAO) FDA: 21 CFR178.3620-3570	alternative
Bremer & Leguil	Gear oil CLP - EP	RIVOLTA F.L. 250 NSF no. 023933	ARBURG oil specification Material no. 319390
Rowe	CLP (HEES)	Hightec NatSync GS68-NSF-H1	Subject to the version of the injection unit (see chapter 9.9.5) material no. 308250 Not for central lubrication system
Interflon	Gear oil CLP - EP	FOOD LUBE G220 Gear unit, central lubrication system White medical oil NSF no. 119641	alternative
Bremer & Leguil	Grease KPHC 2 R-40	RIVOLTA F.L.G. GT-2 NSF no. 140657	ARBURG grease specification Material no. 313459
Interflon	Grease KPF 2 N-30	FIN FOOD GREASE EP Grease lubrication points NSF no: 123607	alternative
Klüber Lubrication	Grease	Klübersynth UH1 14-151 NSK - ball screw	ARBURG grease specification Material no. 296374
Bremer & Leguil	Paste	RIVOLTA F.L.A. NSF no. 128925	ARBURG assembly paste specification Material no. 302420
Interflon	Paste	HT 1200 paste High-temperature range NSF no: 122320	alternative

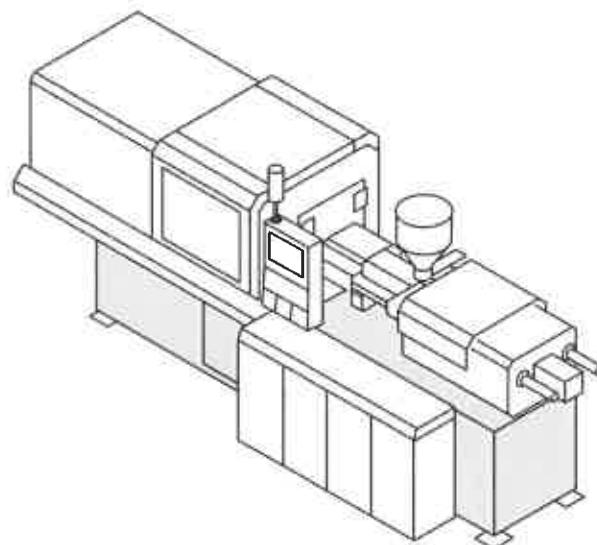
- (1) Hydraulic fluid fulfils the requirements on improved wear indicators:
VKA value (four-ball test) > 1600 N, load stage acc. to FZG > 12,
Brugger value: b > 30 N/qmm

9.9.3 Lubricants for the central hydraulic system / machine base

Ex-works status of lubricants for central hydraulic system / machine base

There is only a small amount of oil in the drive unit of the machine.

Precisely the same type of oil must be filled into the machine for maintenance purposes. Only then can wear be kept to an absolute minimum.



NOTICE

Only the approved lubricants listed in chapter 9.9.2 may be used as alternative lubricants for the relevant lubrication points.

Maintenance location	Lubricant	Manufacturer	Designation	Approved alternative lubricant
Hydrostatic nozzle movements	HLP (PAO)	Bremer & Leguil	RIVOLTA F.L. 75 NSF-H1	No
Machine footpads	Paste	Bremer & Leguil	Rivolta G.W.F.	No

Lubricants for the food industry

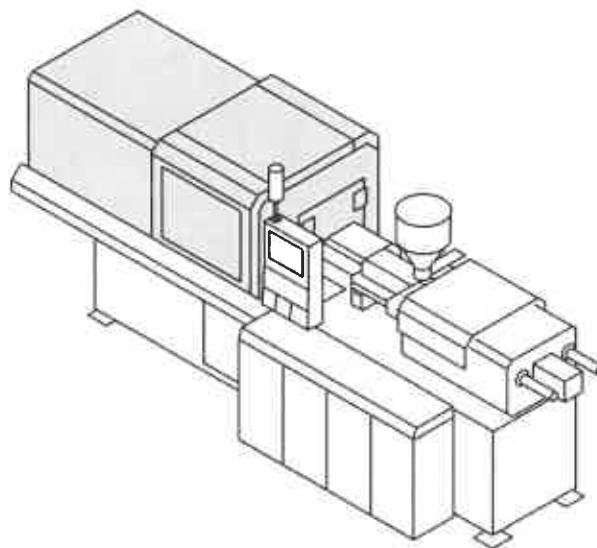
Maintenance location	Lubricant	Manufacturer	Designation	Approved alternative lubricant
Hydrostatic nozzle movements	HLP (PAO)	Bremer & Leguil	RIVOLTA F.L. 75 NSF-H1	Yes, see 9.9.2

9.9.4 Lubricants for the clamping unit

Ex-works status of lubricants for clamping unit

When a new machine leaves the factory, the lubrication points are completely lubricated and all refill containers, e.g. for the central lubrication system, are filled.

For the further operation of the machine, only these lubricants may be used.



NOTICE

As a substitute, only those lubricants listed in chapter 9.9.2 may be used alternatively to the recommended type for the relevant lubrication points.

Maintenance location	Lubricant	Manufacturer	Designation	Alternative lubricant permitted
Central lubrication system	Heavy-duty gear oil CLP-HC	-	-	Yes, see 9.9.2
Mould height adjustment system	Paste	Molykote	P-40	No
Moving mould mounting platen	Heavy-duty gear oil CLP-HC	-	-	Yes, see 9.9.2
Drive platen	Heavy-duty gear oil CLP-HC	-	-	Yes, see 9.9.2
Sliding blocks on moving mould mounting platen	Lubricating grease KP2	-	-	Yes, see 9.9.2
Ejector plate	Heavy-duty gear oil CLP-HC	-	-	Yes, see 9.9.2
Ejector guide bushing	Heavy-duty gear oil CLP-HC	-	-	Yes, see 9.9.2
Ejector guide rails	Heavy-duty gear oil CLP-HC	-	-	Yes, see 9.9.2
Clamping unit tie-bars	Heavy-duty gear oil CLP-HC	-	-	Yes, see 9.9.2

Safety gate guides	Heavy-duty gear oil CLP-HC	-	-	Yes, see 9.9.2
Plain bearings on rear platen of clamping unit (subject to the equipment of the machine)	Paste	Molykote	P-40	No

Lubricants for the food industry

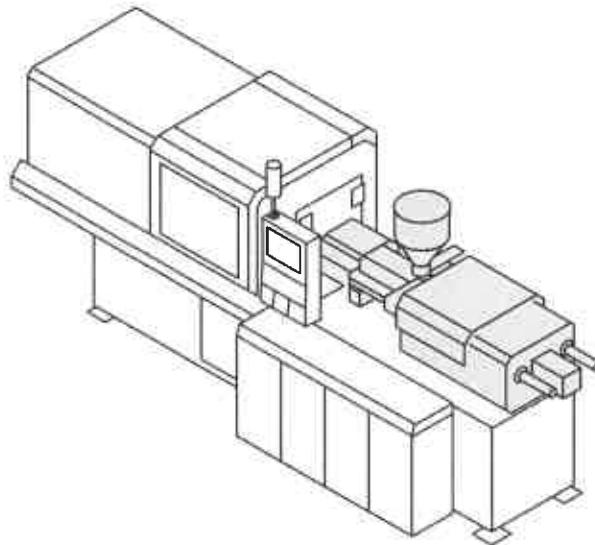
Maintenance location	Lubricant	Manufacturer	Designation	Alternative lubricant permitted
Central lubrication system	Gear unit oil CLP-EP	-	-	Yes, see 9.9.2
Mould height adjustment system	Paste	Molykote	P-40	No
Moving mould mounting platen	Gear unit oil CLP-EP	-	-	Yes, see 9.9.2
Drive platen	Gear unit oil CLP-EP	-	-	Yes, see 9.9.2
Sliding blocks on moving mould mounting platen	Grease	Bremer & Leguil	RIVOLTA F.L.G. GT-2	Yes, see 9.9.2
Ejector plate	Gear unit oil CLP-EP	-	-	Yes, see 9.9.2
Ejector guide bushing	Gear unit oil CLP-EP	-	-	Yes, see 9.9.2
Ejector guide rails	Gear unit oil CLP-EP	-	-	Yes, see 9.9.2
Clamping unit tie-bars	Gear unit oil CLP-EP	-	-	Yes, see 9.9.2
Safety gate guides	Gear unit oil CLP-EP	-	-	Yes, see 9.9.2
Plain bearings on rear platen of clamping unit (subject to the equipment of the machine)	Paste	Molykote	P-40	No

9.9.5 Lubricants for injection unit 170 E

Ex-works status of lubricants for injection unit

When a new machine leaves the factory the lubrication points are already completely lubricated.

For the further operation of the machine, only these lubricants may be used.



NOTICE

Only the approved lubricants listed in chapter 9.9.2 may be used as alternative lubricants for the relevant lubrication points.

Maintenance location	Lubricant	Manufacturer	Designation	Approved alternative lubricant
Gear unit for dosage axis and injection axis	Oil (CLP)	Rowe	NatSync GS 68	No
Injection axis spindle	Oil (CLP)	Rowe	NatSync GS 68	No
Plain bearings of gear housing	Lubricating grease KP2	-	-	Yes, see 9.9.2
Rollers in runner block	Lubricating grease KP2	-	-	Yes, see 9.9.2
Running surfaces, guides	High-performance gear oil - CLP	-	-	Yes, see 9.9.2
Injection unit tie-bars	High-performance gear oil - CLP	-	-	Yes, see 9.9.2
Guides of the safety gates	High-performance gear oil - CLP	-	-	Yes, see 9.9.2
Threads and contact faces on the plasticising cylinder	Paste	Bremer & Leguil	Rivolta G.W.F.	No

Lubricants for the food industry

Maintenance location	Lubricant	Manufacturer	Designation	Approved alternative lubricant
Gear unit for dosage axis and injection axis	Oil (CLP)	Rowe	NatSync GS 68	No
Injection axis spindle	Oil (CLP)	Rowe	NatSync GS 68	No
Plain bearings of gear housing	Grease	Bremer & Leguil	RIVOLTA F.L.G. GT-2	Yes, see 9.9.2
Rollers in runner block	Grease	Bremer & Leguil	RIVOLTA F.L.G. GT-2	Yes, see 9.9.2
Running surfaces, guides	Gear oil CLP-EP	-	-	Yes, see 9.9.2
Injection unit tie-bars	Gear oil CLP-EP	-	-	Yes, see 9.9.2
Guides of the safety gates	Gear oil CLP-EP	-	-	Yes, see 9.9.2
Threads and contact faces on the plasticising cylinder	Paste	Interflon	HT 1200 paste	No

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9.9.6 Lubricants for additional equipment

Ex-works status of lubricants for additional equipment

When a new machine leaves the factory, the lubrication points are already completely lubricated.

For the further operation of the machine, only these lubricants may be used.

NOTICE

Only the approved lubricants listed in chapter 9.9.2 may be used as alternative lubricants for the relevant lubrication points.

Maintenance location	Lubricant	Manufacturer	Designation	Approved alternative lubricant
Gear unit of unscrewing unit	High-performance gear oil CLP-HC	-	-	Yes, see 9.9.2
Parting line unit	High-performance gear oil CLP-HC	-	-	Yes, see 9.9.2
Displacement system for injection unit	High-performance gear oil CLP-HC	-	-	Yes, see 9.9.2
Guides of displacement system	Lubricating grease KP2	-	-	Yes, see 9.9.2
Rotary unit	Lubricating grease	OKS	OKS 422	No
Rotary unit 720	Lubricating grease	Bremer & Leguil	Rivolta F.L.G. GT-2	No
Roller guides	Lubricating grease	Rhenus	Norplex LKR-2	Yes, see 9.9.2
Ball screw drive	Grease	LUBE	YS2	No
Vacuum pump	Lubricating oil	Leybold	LEYBONOL LVO 210	Yes, according to manufacturer Leybold

Lubricants for the food industry

Maintenance location	Lubricant	Manufacturer	Designation	Approved alternative lubricant
Gear unit of unscrewing unit	Gear oil CLP-EP	-	-	Yes, see 9.9.2
Parting line unit	Gear oil CLP-EP	-	-	Yes, see 9.9.2
Displacement system for injection unit	Gear oil CLP-EP	-	-	Yes, see 9.9.2
Guides of displacement system	Grease	Bremer & Leguil	RIVOLTA F.L.G. GT-2	Yes, see 9.9.2
Rotary unit	Lubricating grease	OKS	OKS 4220	No
Rotary union	Lubricating grease	OKS	OKS 476	No
Roller guides	Grease	Bremer & Leguil	RIVOLTA F.L.G. GT-2	Yes, see 9.9.2
Ball screw drive	Grease	Klüber	UH1 14-151	No

9.10 Environmental protection measures

9.10.2 Gaseous materials / vapours

Gas extraction

During the plastification of plastic materials, gases and vapours are emitted. These gases often contain harmful and poisonous substances.

The gases can emerge in the following places:

- ◆ at the vent opening (only with vented cylinders),
- ◆ at the nozzle tip
- ◆ at the mould.
- For this reason, an effective device for the collection and extraction of the gas should be placed in the immediate vicinity.
- Do not simply extract the gas unfiltered into the open air!
- Ensure that the extracted gases are suitably processed (filtered, neutralised etc.).



WARNING

Dust and gases are harmful to personal health and the environment!

- ◆ Before commencing production, consult your plastics manufacturer about possible detrimental effects on the environment and the availability of suitable protection measures.
- ◆ Gases and dust can be harmful, subject to their composition.
- ◆ Do not inhale the gas or dust.

Attachment of a gas or dust filter is exclusively the responsibility of the machine operating company.

Gas extraction unit (example)

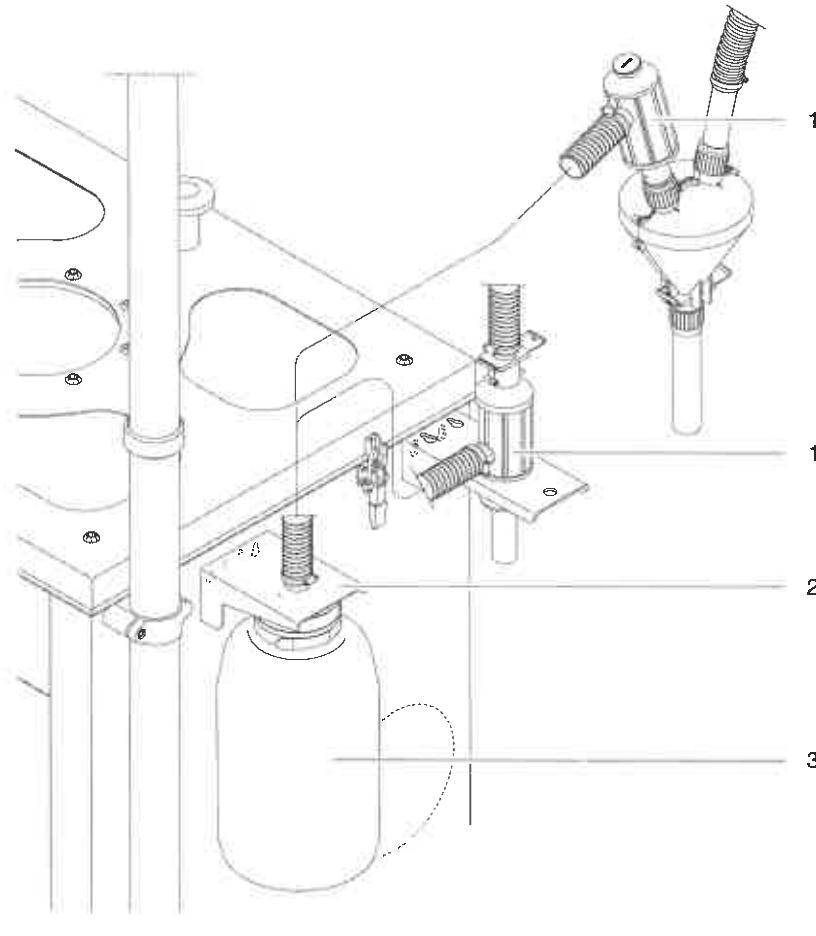


1 Mobile evacuation unit

A list of suppliers and installation suggestions is available from ARBURG on request.

Dust emission

Just as with gases, the dust from some plastics can also contain harmful substances. For this reason, sealed granulate feed systems should be used for materials containing dust.

Material feed with dust extraction

- 1 Dust filter
- 2 Bracket
- 3 Dust collection bag

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9.10.3 Disposal of used oils and lubricants

NOTICE

Environmental pollution!

The operating fluids of the machine can pollute the ground or water.

The applicable national rules and regulations concerning the disposal of hazardous substances must be adhered to.

The information on environmental protection to be found in the safety data sheets of the manufacturers and suppliers must be observed.

Definition

Used oils are all mineral lubricating or industrial oils that have become unsuitable for the use for which they were originally intended.

With injection moulding machines, this applies in particular to hydraulic and gear oils as well as to various lubricants.

Disposal

All materials to be disposed of are subject to the recycling and waste management law.

Used oils and lubricants must be disposed of as hazardous waste and in an environmentally compatible way by an authorised disposal company, in accordance with the statutory provisions.

Hydraulic oils must be stored, collected or transported separately from other used oils and lubricants and disposed of in a special facility.

Mixing ban

In accordance with the recycling and waste management law, it is strictly forbidden to mix used oils with other used oils or foreign substances, such as solvents, brake and cooling fluids, or other waste.

Verification

The verification of the disposal of used oils and lubricants is compulsory.

Every company that produces, collects and disposes of used oils is obliged to keep a waste record in accordance with the statutory stipulations.

The waste record is considered as proof and is to be presented to the respective authority, on demand.

9.11 Maintenance forewarning system on the SELOGICA 'direct'

9.11.1 Machine maintenance

Functions of the maintenance forewarning system

From software version 4.080 onwards, the SELOGICA 'direct' controller offers an extensive maintenance forewarning program for the machine and any peripheral equipment attached.

For the injection moulding machine, all maintenance work and the maintenance schedule are pre-defined according to the equipment installed. For the peripheral equipment the maintenance work and schedule can be manually defined in the SELOGICA controller as required.

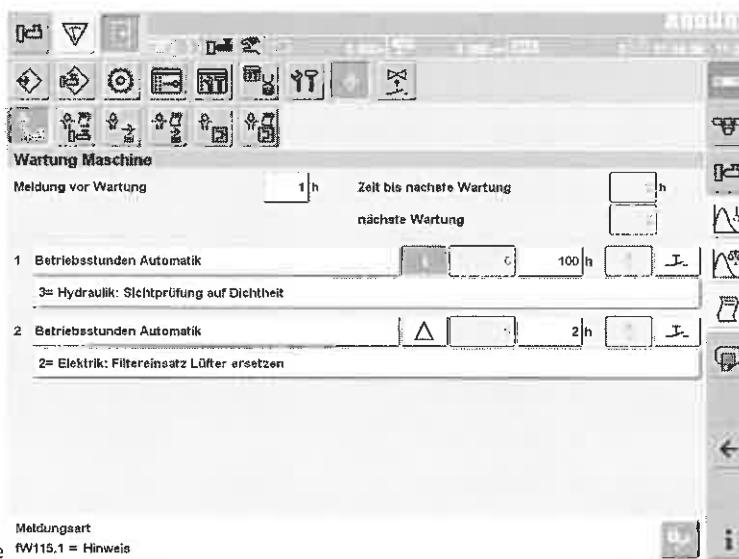
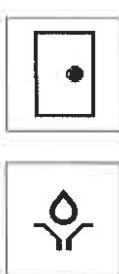
When maintenance work is due, the controller issues the following indication in the order of priority

- ◆ a forewarning message,
- ◆ a warning,
- ◆ an alarm, or
- ◆ no message.

As soon as the maintenance work has been carried out, this must be acknowledged in the controller. The confirmation is protocolled and archived in the controller.

When a maintenance alarm is issued, the machine is not switched off immediately but continues operating until the end of an order or until the machine is stopped manually. It can then only be restarted when the due maintenance work has been carried out.

Calling up the parameter screen page



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Machine maintenance Forewarning message

Operating hours in automatic
3 =Hydraulics: visual inspection for leakages
Operating hours in automatic
2 =Electrics: replace filter in ventilator

Type of indication
fW116.1 = forewarning message

Meldungsart
fW115.1 = Hinweis

Forewarning message

Here you define how many hours in advance of the due maintenance work the status symbol displays the forewarning message. The status symbol then changes from green to yellow.

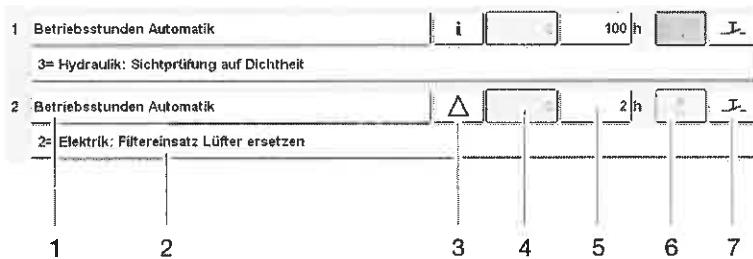
In this way you can plan the next maintenance work in good time. The maintenance forewarning message is displayed in the alarm line when the status symbol changes to red.

Time to next maintenance

Here the time remaining before the next maintenance is displayed in hours.

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Display of due maintenance work



1. The maintenance schedule is sub-divided into the following groups:
 - ◆ Operating hours of pump,
 - ◆ Operating hours in automatic,
 - ◆ Machine cycles,
 - ◆ Months,
 - ◆ Operating hours in automatic with S921 (hydraulic oil filter),
 - ◆ Operating hours in automatic with S971 (gear oil filter, injection unit 1),
 - ◆ Operating hours in automatic with S973 (gear oil filter, injection unit 2),
 - ◆ Operating hours of robot system.
2. Maintenance work
The maintenance work to be carried out is displayed underneath the maintenance group (e.g. replace filter insert in ventilator).
3. Urgency level:
 - ◆ forewarning message
 - ◆ warning,
 - ◆ alarm,
 - ◆ no message.
4. Actual value
Here the number of expired units of the interval period between maintenance jobs is displayed.
5. Maximum timeout permitted (until the machine is stopped).
6. Status of maintenance
The status of the machine maintenance is displayed in the following colours:
 - ◆ green = maintenance has been carried out,
 - ◆ yellow = forewarning threshold has been reached,
 - ◆ red = maintenance is due (the maximum time has expired and the alarm status reached. The machine cannot be restarted until the due maintenance work has been carried out).
7. Confirmation of maintenance
The maintenance work can only be confirmed by the Superuser.

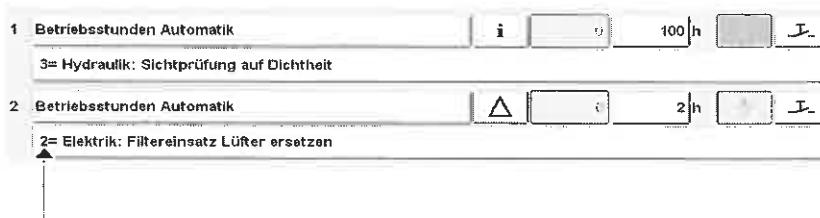
Maintenance forewarning

Operating hours in automatic

3 = Hydraulics: visual inspection for leakages

Operating hours in automatic

2 = Electrics: replace filter in ventilator



A maintenance manual is delivered together with the operating manual of the machine. In this maintenance manual the procedure for each maintenance job is explained.

The maintenance jobs are numbered in the same order as the numbers displayed in the controller (see arrow).

- If you require further information e.g. on replacing the filter in the ventilator, refer to the maintenance manual under no. 2.

Confirming the maintenance

The maintenance work can only be confirmed by the Superuser.



Press this key.



Press this key.

- The following safety check is displayed.



- Confirm the safety check with the "Y" key.
- The completed maintenance job is protocolled in the maintenance log book.

Machine maintenance log book

All maintenance work is entered in the log book as soon as you have completed and confirmed it.

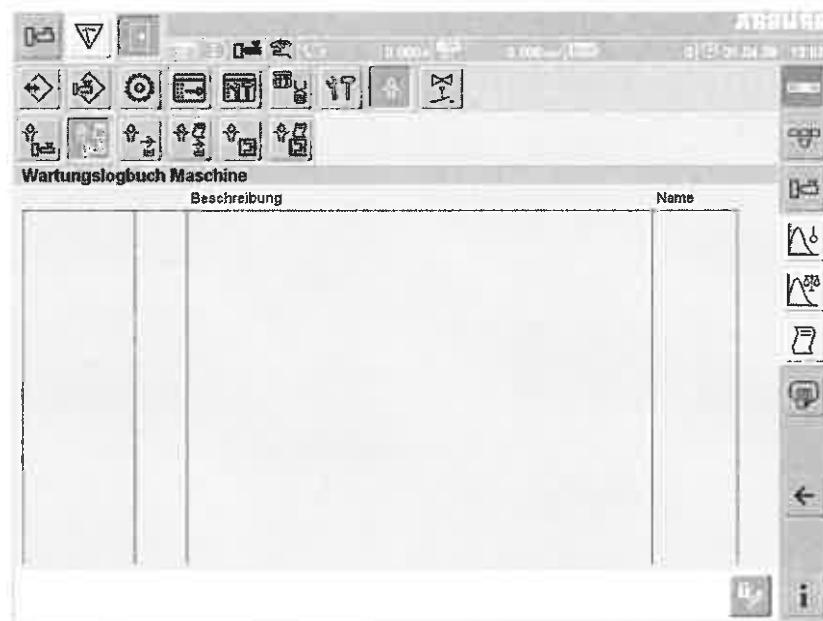
You can look in the log book at any time and see what maintenance work was carried out by which person.

Calling up the parameter screen page



Touch this key.

- The machine maintenance log book appears.



9.11.2 Maintenance of peripheral equipment

If your machine is equipped with peripheral equipment, you can enter the stipulated maintenance schedules in the controller of the injection moulding machine.

The maintenance work of the peripheral equipment will then be monitored by the SELOGICA controller in the same way as for the machine itself. All maintenance work on the peripheral equipment is also recorded in the log book.

Calling up the parameter screen page



Touch this key.

- The following parameter screen page appears:

Maintenance of peripherals
Forewarning message

Operating hours in automatic

Lubricate conveyor belt

Operating hours in automatic

Clean drier

without maintenance

without maintenance

without maintenance

Description of maintenance
fw621 [60 characters] = Clean
drier

Component	Operating hours in automatic	Time till next maintenance	Next maintenance
1	Betriebsstunden Automatik	1000 h	
2	Betriebsstunden Automatik	500 h	
3	ohne Wartung		
4	ohne Wartung		
5	ohne Wartung		

Beschreibung Wartung
fw621 [60 Zeichen] = Trockner reinigen

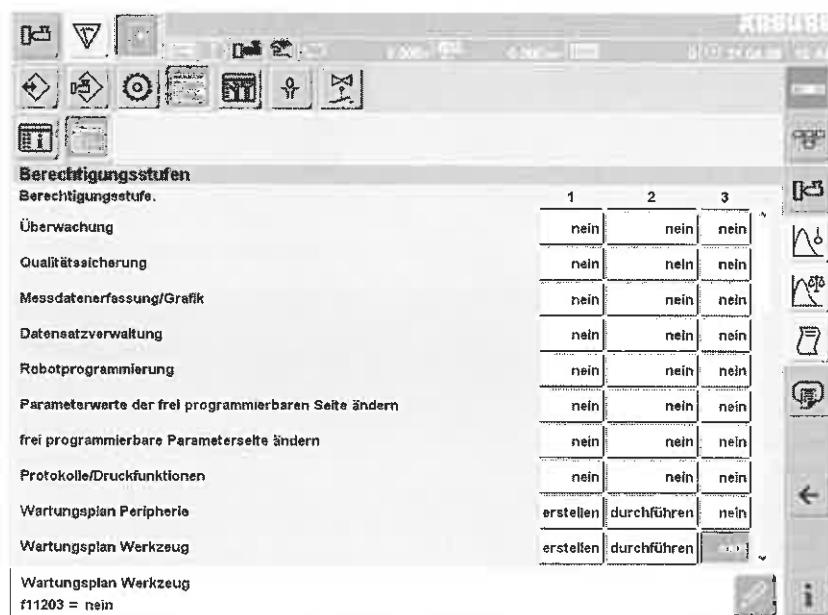
Time till next maintenance

Next maintenance

Inputting data of peripheral equipment

Data concerning the maintenance of peripheral equipment can only be entered by persons with the respective authorisation rights.

The authorisations rights are assigned by the Superuser.

Calling up the parameter screen page**User authorisation levels**

- Authorisation level
- Monitoring
- Quality assurance
- Data measurement / diagrams
- Data set administration
- Robot programming
- Editing parameter values on the freely programmable screen pages
- Editing the freely programmable parameter screen pages
- Protocol/printing functions
- Maintenance schedule of peripherals
- Maintenance schedule of mould
- Maintenance schedule of mould f11203 = no

In the "User authorisation levels" parameter screen page you can check which function is permitted to be carried out at which authorisation level.

For example in the above case, authorisation level 1 is permitted to draw up a maintenance schedule for the peripheral equipment and the mould.

Authorisation level 2 on the other hand is only permitted to carry out the maintenance work.

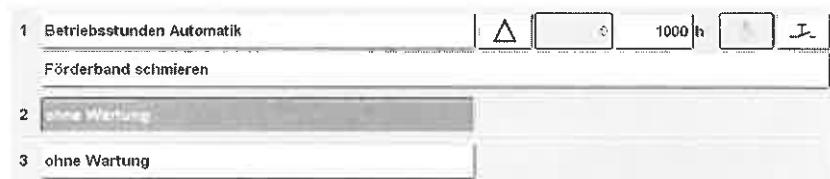
If you are authorised to define the maintenance schedule, you can call up and edit the following parameter screen pages:

Operating hours in automatic

Lubricate conveyor belt

without maintenance (= not yet assigned)

without maintenance (= not yet assigned)

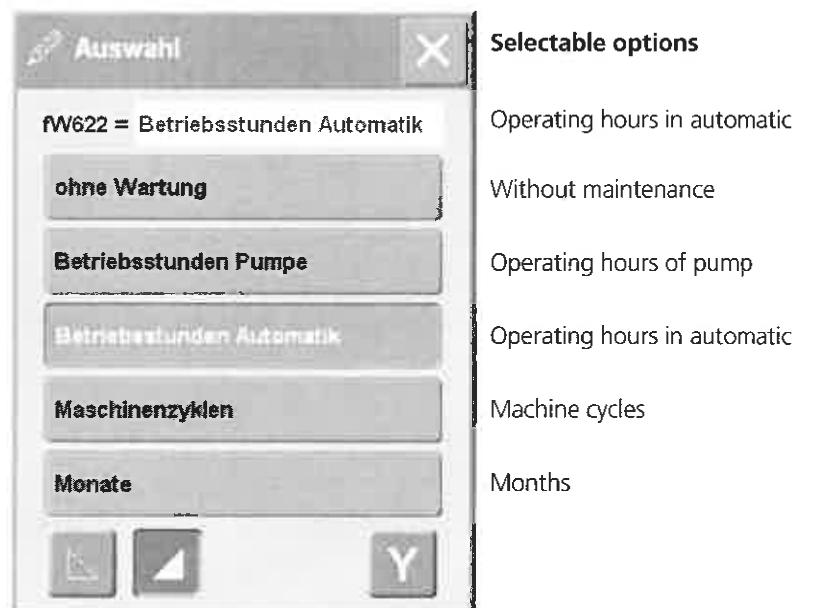


- Touch the "without maintenance" key.

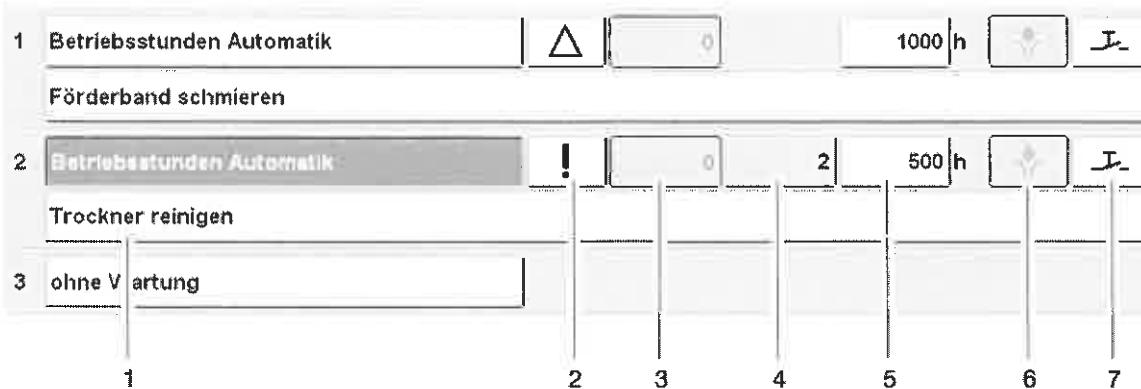


Press this key.

- The following selection mask appears:



- Select a unit for counting the period between maintenance work, e.g. operating hours in automatic and press the "Y" key.
- Further keys and a description line are displayed.



1. Description text for the maintenance work
2. Message level:
 - ◆ Forewarning message,
 - ◆ Warning,
 - ◆ Alarm.
3. Actual value
Here the units of the interval period which have already expired are displayed.
4. Maximum exceedance.
5. Interval between maintenance work.
6. Status: "Maintenance completed"
7. Acknowledge maintenance.

Maintenance log book for peripheral equipment

All maintenance work carried out on the peripheral equipment is entered in the log book as soon as the maintenance work has been carried out and confirmed.

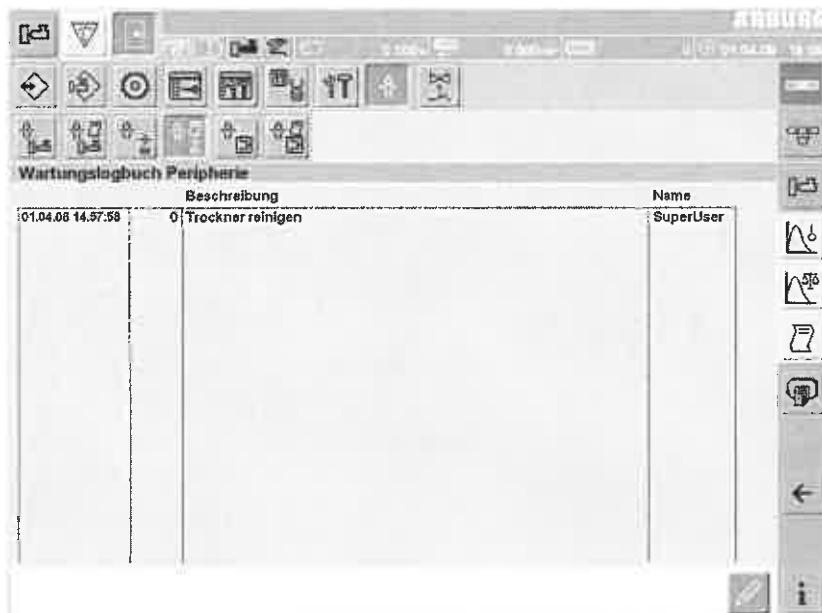
You can look in the log book at any time and see what maintenance work was carried out by which person.

Calling up the parameter screen page

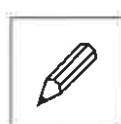


Touch this key.

- The maintenance log book for peripheral equipment appears.



In contrast to the maintenance log book of the machine, the maintenance log book of the peripheral equipment can be deleted.



Touch this key.

- A selection mask with "Delete protocol" appears.
- As soon as you touch the "Delete protocol" key, all entries are deleted.

Maintenance of mould

The data concerning the maintenance of the mould are entered in the same way as for the peripheral equipment.

In contrast to the maintenance of the machine and peripheral equipment (which is saved on the system diskette), the mould maintenance work is saved on the mould data record. When a mould is installed on the machine and the data record imported all maintenance work on the mould is acknowledged. The counter of the maintenance intervals is hereby reset to "0".

14 Part removal

14.2.7 Connecting a robot system, function check

Installation positions on top of the fixed mould clamping platen have been prepared for the installation of a robot system (see also chapter 1.1.2 "Mould installation dimensions").



WARNING

If you are operating your machine with a robot system, a certain element of danger is present in the area of action of the robot system which must be appropriately safeguarded.

For this reason, a suitable safeguard which corresponds to the accident prevention regulations must be installed!

The machine must only be operated when the safeguard is installed.

The operating authority of the machine is responsible for ensuring these safety measures are carried through.

Important information

Tell us your opinion...

... concerning this operating manual!

As a machine operator you work daily with our injection moulding machines and use this operating manual. Therefore, you know best what proves its worth in actual practice.

It is in our mutual interest that we produce an operating manual which allows you to operate the machine in the best, safest and most efficient manner.

Here you can help us:

- ◆ Take this page and answer the following questions,
- ◆ put it in a stamped envelope and send it to ARBURG.

Many thanks in advance for your cooperation!

	Yes	No
◆ Does this manual meet your requirements?	<input type="checkbox"/>	<input type="checkbox"/>
◆ How do you use this operating manual?		
- As an introduction to the subject	<input type="checkbox"/>	<input type="checkbox"/>
- To advance your knowledge of the subject	<input type="checkbox"/>	<input type="checkbox"/>
- In order to learn how to operate the machine	<input type="checkbox"/>	<input type="checkbox"/>
- As a reference	<input type="checkbox"/>	<input type="checkbox"/>
◆ Is the information in this operating manual:		
- precise?	<input type="checkbox"/>	<input type="checkbox"/>
- easy to read and understand?	<input type="checkbox"/>	<input type="checkbox"/>
- easy to apply?	<input type="checkbox"/>	<input type="checkbox"/>
- logically structured?	<input type="checkbox"/>	<input type="checkbox"/>
- complete?	<input type="checkbox"/>	<input type="checkbox"/>
- adequately illustrated?	<input type="checkbox"/>	<input type="checkbox"/>
- suitable for your technical level?	<input type="checkbox"/>	<input type="checkbox"/>
◆ What work do you carry out?	_____	
◆ Is there anything we could change in this operating manual to make it more useful to you?	1. _____	
	2. _____	
	3. _____	

Please fold this page at the marking, and send it in an envelope with window to the following address:

ARBURG GmbH + Co KG
Abt. Technische Dokumentation
Postfach 11 09

72286 Lossburg

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ARBURG locations



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Commissioning / instructional operator training

If you have ordered initial commissioning and/or instructional operator training with your ARBURG injection moulding machine, this will be carried out in accordance with the check list on the following pages.

The check lists ensure that the work is carried out systematically and that all important tasks and all matters requiring clarification are carried out.

Furthermore, the check lists provide documental evidence of the persons involved in this work.

After completion of the work, please have the check list signed and make a copy for your own records.

You will then have an internal record of who was present from your firm and who was present from ARBURG during the commissioning and/or instructional operator training of your machine.

ARBURG

PA - check list for commissioning of ARBURG injection moulding machine	Customer:	
	Customer no.:	
	Machine no.:	
	Machine model:	

Persons involved:

Name:	First name:	Position:

No.	Description	Remark	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
1.	Are the requirements for service work, such as crane, space requirement, etc., fulfilled?		<input type="checkbox"/>
2.	Remove the transport stabilisers.		<input type="checkbox"/>
3.	Connect the machine base, if applicable. Attach the machine footpads and align the machine roughly. See "Machine installation" chapter.		<input type="checkbox"/>
4.	Establish the supply connections for the electric system, cooling water and compressed air. See chapters "Electrical connections", "Cooling water connection", "Connection for compressed air".		<input type="checkbox"/>
5.	Establish the connections to the pressure accumulators, if these had been disconnected.		<input type="checkbox"/>
6.	Check the plug-in boards and plug connectors for firm seat.		<input type="checkbox"/>
7.	Retighten the screws and terminals.		<input type="checkbox"/>
8.	Provide the hydraulic oil and the micro filter unit. See chapter "Filling the system with hydraulic oil".		<input type="checkbox"/>
9.	Install the 2nd injection unit, peripheral equipment, conveyor belt and installation jig, if applicable.		<input type="checkbox"/>
10.	Install the robot system.		<input type="checkbox"/>
11.	Fill the hydraulic oil into the oil container through the micro filter unit. See chapter "Filling the system with hydraulic oil".		<input type="checkbox"/>
12.	Fill the hydraulic pump with the hydraulic oil. Let the hydraulic oil degas.		<input type="checkbox"/>
13.	Check the direction of rotation of the motor. See chapter "Checking the direction of rotation of the pump motor".		<input type="checkbox"/>
14.	Align the machine using precision spirit levels. See "Machine installation" chapter.		<input type="checkbox"/>
15.	Check the safety switches of the safety equipment for susceptibility to vibrations.		<input type="checkbox"/>

No.	Description	Remark	
16.	Check the connection between the screw and the screw coupling.		<input type="checkbox"/>
17.	Move all moving axes of the machine in "manual" operating mode.		<input type="checkbox"/>
18.	Carry out a test run at a cylinder temperature of 200 °C and low screw circumferential speed for at least 10 minutes.		<input type="checkbox"/>
19.	Check the nozzle centre and adjust it, if necessary. See chapter "Adjusting the nozzle centre".		<input type="checkbox"/>
20.	Additional work, in case of non-standard machines (insert separate sheet)		<input type="checkbox"/>
21.	Check the safety cable on the hydraulic hose for injection. See chapter "Inspecting the safety cable for the hydraulic hose".		<input type="checkbox"/>
22.	Remarks (insert separate sheet)		<input type="checkbox"/>
23.	CE labelling by ARBURG? (If marked "not applicable", the obligation for CE labelling lies with the operating authority or the body responsible for the complete system.)		<input type="checkbox"/>

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Confirmation:

I hereby confirm that I have participated in the commissioning of the machine specified on page 1.

Signature of participant 1:

Signature of participant 2:

Signature of participant 3:

Signature of participant 4:

Name of commissioning engineer: Signature: Date:

**PA - check list for
brief instruction on the
operation of ARBURG
injection moulding machines**

Customer:
Customer no.:
Machine no.:
Machine model:

Persons involved:

Name:	First name:	Position:

The participating persons must be present during the complete instruction.

No.	Description	Remark		
1.	The work stipulated in the check list for commissioning has been carried out completely.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input checked="" type="checkbox"/> done
2.	Check the filling level on the temperature control device. See "Maintenance of temperature control device" chapter.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
3.	Explain the layout and operation of the controller. See "General information on the control system" chapter.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
4.	Explain the layout of the control panels and the functions of the keys. See "The control panels" chapter.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
5.	Explain and inspect the safety devices. See chapters "Inspecting the safety devices" and "What to do in the case of malfunctions".		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
6.	Explain the equipment of the machine according to the "Machine positions" list, e.g. air blow, core pull, shut-off nozzle, peripheral equipment.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
7.	Explain the connection and function of the cooling water supply. See "Cooling water connection" chapter.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
8.	Explain the maintenance and conversion of the injection unit. See "Cleaning and maintenance work" chapter.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
9.	Heat up the cylinder module. Carry out a test run without mould. Retighten the components of the nozzle. See chapter "Nozzle cleaning, removal and installation".		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
10.	Explain the mould installation, mould height adjustment system and locking force. See "Mould installation" chapter.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
11.	Explain the mould protection. See chapter "Parameters for mould movements".		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
12.	Explain the ejector. Explain the risk of damage arising when no data is available for the ejector.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
13.	Explain the mould heating. See chapter "Temperature settings for mould heating".		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done
14.	Explain the rotary unit. See "Rotary unit" chapter.		<input type="checkbox"/>	<input checked="" type="checkbox"/> not applicable <input type="checkbox"/> done

No.	Description	Remark	
15.	Explain the rotary table and shuttle table. See chapters "Station and group assignment" and "Station sequences".		<input type="checkbox"/> not applicable <input checked="" type="checkbox"/> done
16.	Explain the stack-turning system. See chapter "Stack-turning mould technology (cube-mould technology)".		<input type="checkbox"/>
17.	Create a data set. See "Program administration" chapter.		<input type="checkbox"/>
18.	Process optimisation, quality monitoring with graphic functions. See "Quality assurance" chapter.		<input type="checkbox"/>
19.	Explain the production protocol. See "Production protocol" chapter.		<input type="checkbox"/>
20.	Explain the troubleshooting on basis of the "Valves/switches" parameter screen pages. See "Diagnostics" chapter.		<input type="checkbox"/>
21.	Explain the maintenance work in accordance with the maintenance schedule in the controller. See chapter "Maintenance and inspection work".		<input type="checkbox"/>
22.	Explain the application of the special tools, e.g. with reference to the non-return valve.		<input type="checkbox"/>
23.	Explain and simulate the alarm functions. See "Alarm functions" chapter.		<input type="checkbox"/>
24.	Answer the questions of the customer.		<input type="checkbox"/>
25.	Additional work, in case of non-standard machines (insert separate sheet)		<input type="checkbox"/>
25.	Remarks (insert separate sheet)		<input type="checkbox"/>

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Confirmation:

I hereby confirm that I have received a brief instruction on the operation of the machine specified on page 1.

Signature of participant 1:

Signature of participant 2:

Signature of participant 3:

Signature of participant 4:

Name of instructor:

Signature:

Date: