Service Manual for

Syringe pump

green stream® SY-P

ARGUS 600

Made in Switzerland

CE 0120

IMPORTANT

This service manual is intended for the exclusive use of authorized persons who have been trained by ARGUS Medical AG in the maintenance and repair of the infusion apparatus mentioned above.

ARGUS Medical AG shall not assume any responsibility for any manipulations which have been carried out on the unit by a non-authorized person.

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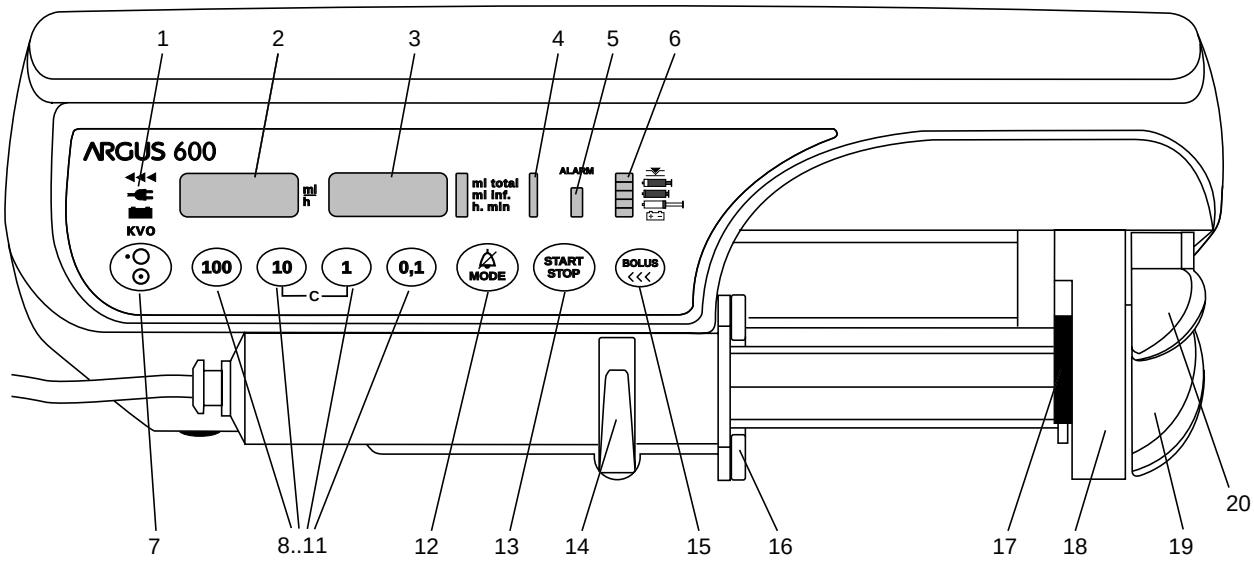
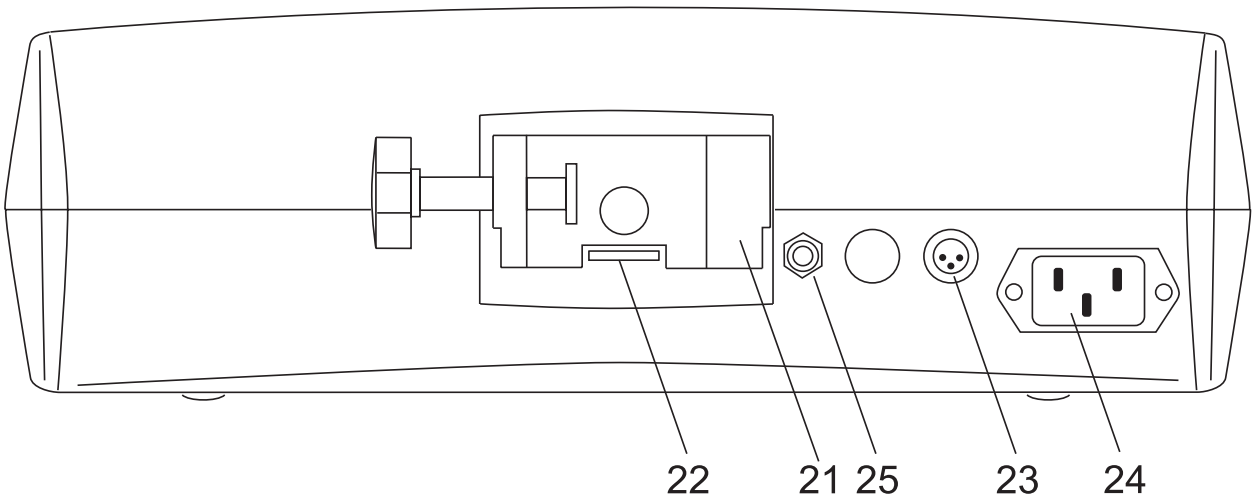
(A member of the CODAN group)



1 Display "Operation mode"
2 Display "Infusion rate"
3 Display "Total", Inf-∑, etc.
4 LED-bar "Pressure"
5 Display "Alarm"
6 Display "Alarm mode"
7 Key "ON/OFF"
8 Key "100"
9 Key "10"
10 Key "1"
11 Key "0,1"
12 Key "MODE"
13 Key "START/STOP"
14 Syringe barrel holder
15 Key "BOLUS"
16 Syringe guide
17 Beak
18 Drive unit
19 Lever for clamp
20 Clutch lever
21 Combination clamp
22 Ext. 12VDC and interface RS-232
23 Staff alert
24 Line plug
25 Equipotential plug



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IMPORTANT!
This service manual is intended for the exclusive use of authorized persons who have been trained by ARGUS Medical AG in the maintenance and repair of the ARGUS 600 syringe pump.

The service manual is meant to be used together with the user manual.

IMPORTANT!
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This manual contains the latest data available. It is subject to further modifications in accordance with technical improvements.

1 Special key inputs and configurations

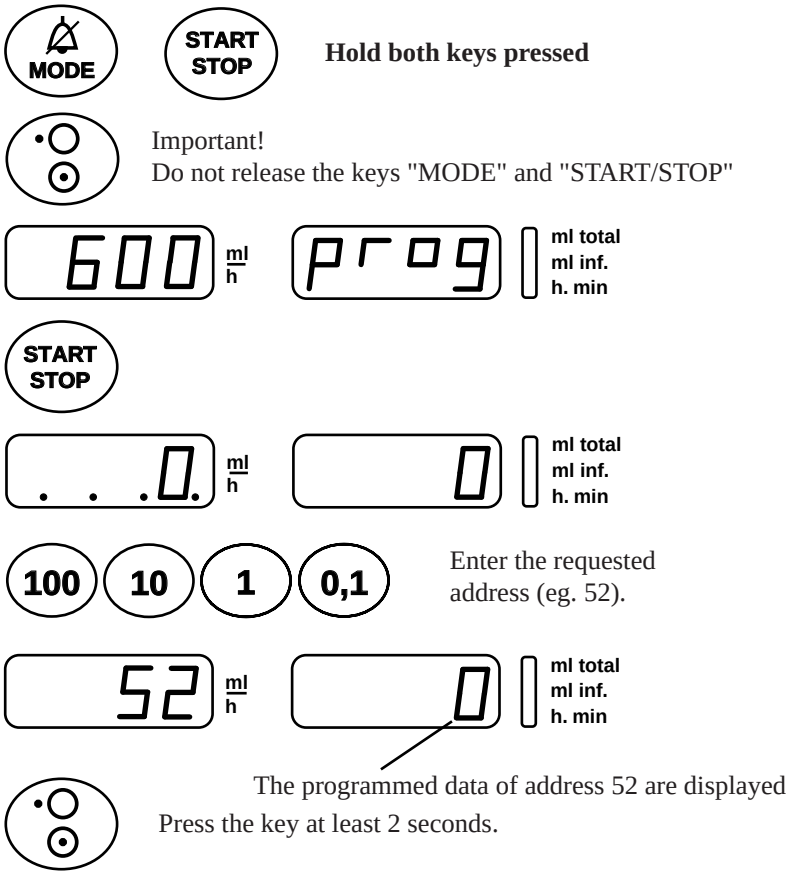
1.1 General

Caution: The configuration possibilities mentioned below constitute a modification of the pump and may only be carried out by authorized persons.

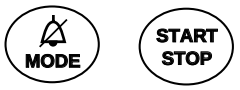
If the decimal points are flashing in a display, this display is ready to accept an input by means of the keys "100, 10, 1".

Note: Use the interrogation mode to check the present configuration without doing any modification!

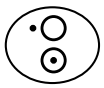
1.2 Interrogation mode



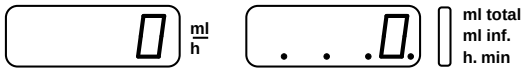
1.3 Configuration mode without PIN code

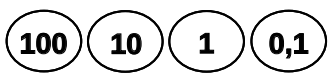


Hold both keys pressed

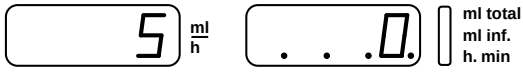


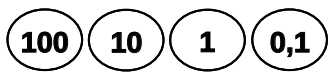
Important!
Do not release the keys "MODE" and "START/STOP"



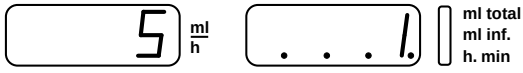


Enter the requested address (eg. 5).

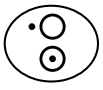




Enter the requested data (eg. 1).



Confirm data entered (acknowledgement)



1.4 Configuration mode: first input of PIN code

IMPORTANT ! Remember to make a note of your code and keep it in a safe place.

	Key	Description	Display (2)	Display (3)
1	”MODE” & ”START/STOP”	Keep both keys pressed before switching the unit on.	“ 600”	“prog”
2	“START/STOP”	Acknowledgement (write protection is inactive)	“. . . 0.”	“ 0”
3	“MODE”	Switch over to the display (3)	“ 0”	“. . . 0.”
4	“START/STOP”	Acknowledgement	“Cod ”	“- - - - ”
5	“MODE”	Switch over to the display (3)	“Cod ”	“ 0”
6	“START/STOP”	Acknowledgement	“. . . 0.”	“ 0”
7	“MODE”	Switch over to the display (3)	“ 0”	“. . . 0.”
8	“100;10;1”	Enter 1 to 4 digit code	“ 0”	“ C.C.C.C.”
9	“START/STOP”	Acknowledgement (write protection is active) Code is never visible	“. . . 0.”	“ 1”
10	“ON/OFF”	End of the programming mode		

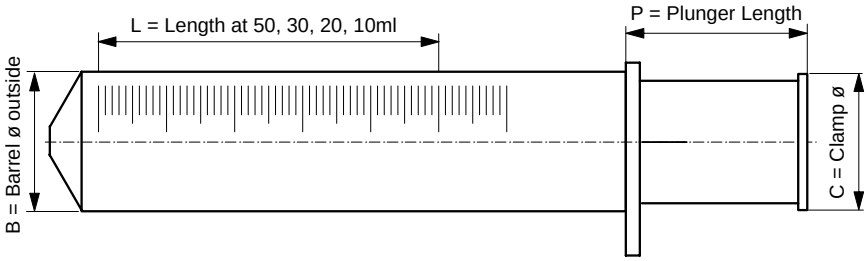
1.5 Programming mode with active write protection (code)

CAUTION! Only the code holder can carry out modifications when the write protection is active.

	Key	Description	Display (2)	Display (3)
1	”MODE” & ”START/STOP”	Keep both keys pressed before switching the unit on.	“600”	“prog”
2	“START/STOP”	Acknowledgement (write protection is active)	“. . . 0.”	“ 1 ”
3	“MODE”	Switch over to the display (3)	“ 0”	“. . . 1.”
4	“START/STOP”	Acknowledgement	“Cod ”	“- - - - ”
5	“100;10;1”	Enter code in the display (3)	“Cod ”	“ 0 ”
6	“START/STOP”	Acknowledgement	“. . . 0.”	“ 1 ”
7	“100;10;1”	Enter requested address Programmed data appear in the display (3)	“A.A.A.A.”	“X X X X”
8	“MODE”	Switch over to the display (3)	“ A A A A”	“ X.X.X.X.”
9	“100;10;1”	Enter requested data	“ A A A A”	“ Y.Y.Y.Y.”
10	“START/STOP”	Acknowledgement. If the data are accepted, entry changes to the display (2)	“A.A.A.A.”	“ Y Y Y Y”
11	“ON/OFF”	End of the programming mode		

1.6 List of the interrogation- and configuration functions:

CAUTION! Before you undertake a new configuration or replace the EPROM or the mainboard, printout the pump configuration (see chap. 2.2). Afterwards you can reenter the old not write protected values (download).



Adress (#)	Write prot.	Default value	Function	
0		0 = No	PIN code active	
1		0 = No	Run indication by running decimalpoint	
2		0 = No	Key [On/Off] only at STOP valid	
3		0 = No	Rate change only at STOP valid	
4		0 = No	Key [STOP] delayed (see #361)	
5		0 = No	2nd entry of rate (#3 = 1, #9 = 0), rate caculation disabled	
6		0 = No	Static alarm (staff alerting system)	
7		0 = No	Display elapsed- or remaining time in run mode	****
8		0 = No	Select remaining time (#7 = 1)	
9		0 = No	Rate change confirmation in stop mode	
11		1 = Yes	Recall last "ml/h" (rate) at next power on (#9 = 0)	
12		0 = No	Recall last "ml total" (endvolume) at next power on	
13		0 = No	Recall "ml inf" (volume infused) at next power on (#20 = 1)	
14		0 = No	SBS Step By Step function	
15		0 = No	Display VTBI (Volume To Be Infused)	
16		0 = No	Syringe type acknowledge at start	
17		1 = Yes	KVO (KOR), mode see #60	
19		1 = Yes	Buzzer at start	
20		0 = No	Menu "Clr" (Clear “ml inf.”) (#15 = 0)	****
23		1 = Yes	Menu: "Prl" (Pressure alarm limit)	****
24		1 = Yes	Menu: "CAP" (Battery capacity)	****
26		0 = No	Menu: "InF" (ml infused since last power up)	****
27		0 = No	Menu: "dLo" (Data-lock)	****
28		0 = No	Menu: "Stb" (Stand-by)	****
29		0 = No	Menu: "MEd" (Medication)	****
30		0 = No	Menu: "tM" (Timer alarm)	****
32		1 = Yes	Bolus (Prime always possible)	
33		1 = Yes	Menu: "boLr" (Bolus rate) (#32 = 1)	****
34		1 = Yes	Menu: "tot" (Bolus total) (#32 = 1)	****
35		0 = No	Display bolus VTBI instead bolus infused	
38		1 = Yes	Bolus application automatic (#34 = 1; #32 = 1)	
39		0 = No	Bolus total to be reset after each auto bolus	
40		0 = No	Demo mode (all menus enabled)	****
41		0 = No	Clear "ml/h" after infusion completed	
42		0 = No	Clear "ml total" after inf. completed (#41 = 1)	
43		1 = Yes	Syringe clamp diameter outside control	
44		1 = Yes	Automatic pressure release after occlusion	
45		1 = Yes	Pressure display 20/40/60/80/100 % (Bargraph ON)	
46		0 = No	Bargraph with indicator (25% steps, #45 = 1)	
47		0 = No	Standby- and battery prealarm low volume	
48		1 = Yes	Flashing numeric display at alarm	
49		0 = No	Alarm acknowledge only with key [MODE]	
55		1 = Yes	Med. disp. alternate with rate and ml inf.(#29=1)	

Adress (#)	Write prot.	Default value	Function	
60		0 = No	KVO (KOR), only after infusion completed	
65		0 = No	Clear and continue (#15 = 0)	
100		0 = No	User 10ml	[USEr -10-]
101		0 = No	B-D Plastipak 10ml	[b-d PL10]
102		0 = No	Braun Omnifix 10ml	[brn OF10]
103		1 = Yes	Codan 10ml	[Cod -10-]
104		0 = No	Fresenius Injectomat 10ml	[FrES In10]
105		0 = No	Sheerwood Monoject 10ml	[Mono -10-]
106		0 = No	ONCE 10ml	[OnCE -10-]
107		0 = No	PIC Indolor 10ml	[PIC -10-]
108		0 = No	Rymco 10ml	[ryco -10-]
109		0 = No	Terumo 10ml	[tEru -10-]
110		0 = No	Braun Injekt 10ml (#43=0)	[brn In10]
111		0 = No	Chirana-Prema 10 ml	[Chir -10-]
120		0 = No	User 20ml	[USEr -20-]
121		0 = No	B-D Plastipak 20ml	[b-d PL20]
122		0 = No	Braun Omnifix 20ml	[brn OF20]
123		1 = Yes	Codan 20ml	[Cod -20-]
124		0 = No	Sheerwood Monoject 20ml	[Mono -20-]
125		0 = No	ONCE 20ml	[OnCE -20-]
126		0 = No	Braun Perfusor 20ml	[brn PE20]
127		0 = No	Braun Injekt 20ml	[brn In20]
128		0 = No	Chirana-Prema 20ml	[Chir -20-]
129		0 = No	Terumo 20 ml	[tEru -20-]
140		0 = No	User 30ml	[USEr -30-]
141		0 = No	B-D Plastipak 30ml	[b-d PL30]
142		0 = No	Codan 30ml	[Cod -30-]
143		0 = No	ONCE 30ml	[OnCE -30-]
144		0 = No	Braun Omnifix 30ml	[brn OF30]
145		0 = No	Terumo 30 ml	[tEru -30-]
150		0 = No	User 50ml	[USEr -50-]
151		0 = No	B-D Perfusion 50ml	[b-d PE50]
152		0 = No	B-D Plastipak 50/60ml	[b-d PL50]
153		0 = No	Braun Omnifix 50/60ml	[brn OF50]
154		0 = No	Braun Perfusor 50ml	[brn PE50]
155		0 = No	Chirana-Prema 50/60ml	[Chir -50-]
156		0 = No	Codan 50ml	[Cod -50-]
157		1 = Yes	Codan Perfusion 50ml	[Cod PE50]
158		0 = No	Dispomed 50/60ml	[dISP -50-]
159		0 = No	Dispomed Perfusion 50ml	[dISP PE50]
160		0 = No	Fresenius Injectomat 50/60ml	[FrES In50]
161		0 = No	Fresenius Perfusion 50/60ml	[FrES PE50]
162		0 = No	Ivac 50/60ml	[IVAC -50-]
163		0 = No	JMS 50/60ml	[JMS -50-]
164		0 = No	Sheerwood Monoject 50/60ml	[Mono -50-]
165		0 = No	PIC Indolor 50ml	[PIC -50-]
166		0 = No	PIC Indolor Perfusion 50ml	[PIC PE50]
167		0 = No	Rymco 50ml	[ryco -50-]
168		0 = No	Terumo 50/60ml	[tEru -50-]
169		0 = No	Disoprivan 50ml (ZENECA)	[dIPr -50-]
170		0 = No	ONCE 50ml	[OnCE -50-]
171		0 = No	Braun Proinjekt 50ml	[brn Pr50]

Adress (#)	Write prot.	Default value	Function	
200		0	Medication enable value	0...8191
201		0	Medication enable value	0...8191
202		0	Medication enable value	0...8191
203		0	Medication enable value	0...8191
204		0	Medication enable value	0...8191
205		0	Medication enable value	0...8191
206		0	Medication enable value	0...8191
207		0	User medication enable value	0...8191
208		0	User medication enable value	0...7
220		5383	Display digit 1 & 2, user medication 1	0...9999
221		6982	Display digit 3 & 4, user medication 1	0...9999
222		4500	Display digit 5 & 6, user medication 1	0...9999
223		17	Display digit 7 & 8, user medication 1	0...9999
224		5383	Display digit 1 & 2, user medication 2	0...9999
225		6982	Display digit 3 & 4, user medication 2	0...9999
226		4500	Display digit 5 & 6, user medication 2	0...9999
227		18	Display digit 7 & 8, user medication 2	0...9999
228		5383	Display digit 1 & 2, user medication 3	0...9999
229		6982	Display digit 3 & 4, user medication 3	0...9999
230		4500	Display digit 5 & 6, user medication 3	0...9999
231		19	Display digit 7 & 8, user medication 3	0...9999
232		5383	Display digit 1 & 2, user medication 4	0...9999
233		6982	Display digit 3 & 4, user medication 4	0...9999
234		4500	Display digit 5 & 6, user medication 4	0...9999
235		20	Display digit 7 & 8, user medication 4	0...9999
236		5383	Display digit 1 & 2, user medication 5	0...9999
237		6982	Display digit 3 & 4, user medication 5	0...9999
238		4500	Display digit 5 & 6, user medication 5	0...9999
239		21	Display digit 7 & 8, user medication 5	0...9999
240		5383	Display digit 1 & 2, user medication 6	0...9999
241		6982	Display digit 3 & 4, user medication 6	0...9999
242		4500	Display digit 5 & 6, user medication 6	0...9999
243		22	Display digit 7 & 8, user medication 6	0...9999
244		5383	Display digit 1 & 2, user medication 7	0...9999
245		6982	Display digit 3 & 4, user medication 7	0...9999
246		4500	Display digit 5 & 6, user medication 7	0...9999
247		23	Display digit 7 & 8, user medication 7	0...9999
248		5383	Display digit 1 & 2, user medication 8	0...9999
249		6982	Display digit 3 & 4, user medication 8	0...9999
250		4500	Display digit 5 & 6, user medication 8	0...9999
251		24	Display digit 7 & 8, user medication 8	0...9999
252		5383	Display digit 1 & 2, user medication 9	0...9999
253		6982	Display digit 3 & 4, user medication 9	0...9999
254		4500	Display digit 5 & 6, user medication 9	0...9999
255		25	Display digit 7 & 8, user medication 9	0...9999
256		5383	Display digit 1 & 2, user medication 10	0...9999
257		6982	Display digit 3 & 4, user medication 10	0...9999
258		4500	Display digit 5 & 6, user medication 10	0...9999
259		1716	Display digit 7 & 8, user medication 10	0...9999
260		5383	Display digit 1 & 2, user medication 11	0...9999
261		6982	Display digit 3 & 4, user medication 11	0...9999
262		4500	Display digit 5 & 6, user medication 11	0...9999
263		1717	Display digit 7 & 8, user medication 11	0...9999
264		5383	Display digit 1 & 2, user medication 12	0...9999
265		6982	Display digit 3 & 4, user medication 12	0...9999
266		4500	Display digit 5 & 6, user medication 12	0...9999
267		1718	Display digit 7 & 8, user medication 12	0...9999
268		5383	Display digit 1 & 2, user medication 13	0...9999
269		6982	Display digit 3 & 4, user medication 13	0...9999

Adress (#)	Write prot.	Default value		Function		
270		4500		Display digit 5 & 6, user medication 13	0...9999	
271		1719		Display digit 7 & 8, user medication 13	0...9999	
272		5383		Display digit 1 & 2, user medication 14	0...9999	
273		6982		Display digit 3 & 4, user medication 14	0...9999	
274		4500		Display digit 5 & 6, user medication 14	0...9999	
275		1720		Display digit 7 & 8, user medication 14	0...9999	
276		5383		Display digit 1 & 2, user medication 15	0...9999	
277		6982		Display digit 3 & 4, user medication 15	0...9999	
278		4500		Display digit 5 & 6, user medication 15	0...9999	
279		1721		Display digit 7 & 8, user medication 15	0...9999	
280		5383		Display digit 1 & 2, user medication 16	0...9999	
281		6982		Display digit 3 & 4, user medication 16	0...9999	
282		4500		Display digit 5 & 6, user medication 16	0...9999	
283		1722		Display digit 7 & 8, user medication 16	0...9999	
306	X			Infused sum in ml (xxxxyyyy)	[xxxx . . . . ml]	
307	X			Infused sum in ml (xxxxyyyy)	[. . . . yyyy ml]	
308	X			Operating time in min (xxxxyyyy)	[xxxx . . . . ml]	
309	X			Operating time in min (xxxxyyyy)	[. . . . yyyy ml]	
310		3000		Maxima rate in 1/10ml/h (1.0...300.0 ml/h)		10....3000
311		3000		Prime rate in 1/10ml/h (1.0...300.0 ml/h)		10....3000
312		3000		Max. bolus rate in 1/10ml/h (1.0...300.0 ml/h)		10....3000
313	10 ml	10		Max. bolus total in 1/10ml (1.0...10.0 ml)		10....100
315	10 ml	610		*Syringe length (L) in 1/10mm at 10 ml volume		450....800
316		160		*Syringe plunger length (P) in 1/10mm at end of infusion		120....300
317		162		*Syringe barrel diameter outside (B) in 1/10mm		150....190
318		187		*Syringe clamp diameter outside (C) in 1/10mm		150....250
320		5000		Maxima rate in 1/10ml/h (1.0...500.0 ml/h)		10....5000
321		5000		Prime rate in 1/10ml/h (1.0...500.0 ml/h)		10....5000
322		5000		Max. bolus rate in 1/10ml/h (1.0...500.0 ml/h)		10....5000
323	20 ml	20		Max. bolus total in 1/10ml (1.0...20.0 ml)		10....200
325	20 ml	695		*Syringe length (L) in 1/10mm at 20 ml volume		500....900
326		168		*Syringe plunger length (P) in 1/10mm at end of infusion		120....300
327		214		*Syringe barrel diameter outside (B) in 1/10mm		200....240
328		238		*Syringe clamp diameter outside (C) in 1/10mm		200....300
330		5000		Maxima rate in 1/10ml/h (1.0...500.0 ml/h)		10....5000
331		5000		Prime rate in 1/10ml/h (1.0...500.0 ml/h)		10....5000
332		5000		Max. bolus rate in 1/10ml/h (1.0...500.0 ml/h)		10....5000
333	30 ml	30		Max. bolus total in 1/10ml (1.0...25.0 ml)		10....250
335	30 ml	820		*Syringe length (L) in 1/10mm at 30 ml volume		700....1000
336		160		*Syringe plunger length (P) in 1/10mm at end of infusion		120....300
337		240		*Syringe barrel diameter outside (B) in 1/10mm		220....260
338		260		*Syringe clamp diameter outside (C) in 1/10mm		200....300
340		9999		Maxima rate in 1/10ml/h (1.0...999.9 ml/h)		10....9999
341		9999		Prime rate in 1/10ml/h (1.0...999.9 ml/h)		10....9999
342		9999		Max. bolus rate in 1/10ml/h (1.0...999.9 ml/h)		10....9999
343	50 ml	50		Max. bolus total in 1/10ml (1.0...25.0 ml)		10....250
345	50 ml	900		*Syringe length (L) in 1/10mm at 50 ml volume		700....1200
346		165		*Syringe plunger length (P) in 1/10mm at end of infusion		120....500
347		294		*Syringe barrel diameter outside (B) in 1/10mm		280....340
348		310		*Syringe clamp diameter outside (C) in 1/10mm		250....370

*) only active for the respective syringe type "User 10ml" (#100), "User 20ml" (#120), "User 30ml" (#140), "User 50ml" (#150).

361		500	Key [ON/OFF] delay in ms, (additional key [STOP] if #4 = 1)	0...3000
362		2	Display brightness	1...3
363		10	Buzzer alarm volume	5...10
365		9	Pressure alarm level (n*100mbar)	2...12
367		3	Time for near empty alarm	1...15 min
368		120	Battery discharge time (min)	45...615
369		5	Automatic menu fall back delay time	5...30 s
370			Clock seconds	00...59
371			Clock minutes	00...59
372			Clock hours	00...23
374			Clock days	01...31
375			Clock months	01...12
376			Clock years	2000...2099
380	X		Last failure number (F-XX)	
381	X		Last infusion rate at failure	
382	X		2. last failure number (F-XX)	
383	X		2. last infusion rate at failure	
384	X		3. last failure number (F-XX)	
385	X		3. last infusion rate at failure	
386	X		4. last failure number (F-XX)	
387	X		4. last infusion rate at failure	
388	X		5. last failure number (F-XX)	
389	X		5. last infusion rate at failure	
390		0	Last Service-date (year and week)	yyww
391	X		2. last service-date	
392	X		3. last service-date	
393		0	Service interval in months (1...24, 0 = disabled)	
394		0	Service interval in hours (1...9999, 0 = disabled)	
395		0	Own adress for SCI (0 = no adress, or 1...127)	0...127
396		0	Inventory-no. of the pump (xxxx yyyy)	[xxxx . . . .]
397		0	Inventory-no. of the pump (xxxx yyyy)	[. . . . yyyy]
399	X	600	Data xxxx -> clears protection key	

1.7 Medication list

To display medication names, address 29 (menu "MEd") must be set to "1".

Using the special function "MEd", the following medication names can be displayed.
Refer to the EXCEL file supplied by ARGUS or your local distributor to determine medication enable values (adress 200 ... 208).

DEC medication number	HEX medication number	Medication name	DEC medication number	HEX medication number	Medication name	DEC medication number	HEX medication number	Medication name	DEC medication number	HEX medication number	Medication name
00	00	"Med "	27	1B	"Glucos 5"	54	36	"Phenylep"	81	51	"--------"
01	01	"Actilyse"	28	1C	"Heparin "	55	37	"Procaina"	82	52	"--------"
02	02	"Adrena0.1"	29	1D	"Hydrocor"	56	38	"Propafen"	83	53	"--------"
03	03	"Adrena0.2"	30	1E	"Insulin "	57	39	"Propofol"	84	54	"--------"
04	04	"Ajmalin "	31	1F	"Isoprena"	58	3A	"Rapilysi"	85	55	"--------"
05	05	"Alfentan"	32	20	"KCL "	59	3B	"Remifent"	86	56	"--------"
06	06	"Alupent "	33	21	"Ketamin "	60	3C	"Risordan"	87	57	"--------"
07	07	"Ambroxol"	34	22	"Labetalo"	61	3D	"Ropivaca"	88	58	"--------"
08	08	"Amiodaro"	35	23	"Lidocain"	62	3E	"Salbutam"	89	59	"--------"
09	09	"Amphoter"	36	24	"Liothyro"	63	3F	"Somatost"	90	5A	"--------"
10	0A	"Aprotini"	37	25	"Magnesiu"	64	40	"Streptok"	91	5B	"UserM 1"
11	0B	"Atracuri"	38	26	"Midazola"	65	41	"Sufentan"	92	5C	"UserM 2"
12	0C	"Bretyliu"	39	27	"Milrinon"	66	42	"Terbutal"	93	5D	"UserM 3"
13	0D	"Bupivaci"	40	28	"Morphin "	67	43	"Theopyli"	94	5E	"UserM 4"
14	0E	"Ceruleti"	41	29	"Nacl 0.9"	68	44	"Thiopent"	95	5F	"UserM 5"
15	0F	"Clonidin"	42	2A	"Nalbuphi"	69	45	"Tirofiba"	96	60	"UserM 6"
16	10	"Diltiaze"	43	2B	"Naloxone"	70	46	"Trinitri"	97	61	"UserM 7"
17	11	"Dobutami"	44	2C	"Neostigm"	71	47	"Urapidil"	98	62	"UserM 8"
18	12	"Dopamine"	45	2D	"Nicardip"	72	48	"Urokinas"	99	63	"UserM 9"
19	13	"Dopexami"	46	2E	"Nifedipi"	73	49	"Vasopres"	00	64	"UserM 10"
20	14	"Esmolol "	47	2F	"Nimodipi"	74	4A	"Vecuroni"	101	65	"UserM 11"
21	15	"Fentanyl"	48	30	"Nitropru"	75	4B	"Verapami"	102	66	"UserM 12"
22	16	"Flecaini"	49	31	"Noradren"	76	4C	"--------"	103	67	"UserM 13"
23	17	"Fluimuci"	50	32	"Omeprazo"	77	4D	"--------"	104	68	"UserM 14"
24	18	"Flumazen"	51	33	"Pancuron"	78	4E	"--------"	105	69	"UserM 15"
25	19	"Furosemi"	52	34	"Pentoxit"	79	4F	"--------"	106	6A	"UserM 16"
26	1A	"Glucos30"	53	35	"Phentola"	80	50	"--------"			

16 user medication names can be custom defined (UserM 1 ... UserM 16). Refer to the EXCEL file for easy definition.

1.8 Special configuration options

- Configuration of a reminder alarm for the safety standard check:
  First the service interval has to be configured either in months or in hours of operation, or both (addresses 393, 394).
  Next the last service date has to be entered on address 390. Any value greater than 0 entered at the adresses 393 and/or 394 will release the reminder alarm after the set service interval has elapsed (check also the correct settings of the internal clock).

- PC configuration tool "AConfig":
  With this additional software the pump may be configured from a PC over the serial port. This software may be available from your local distributor or our service department.

After changing the configuration a function check and a control measurement has to be made!

2 History and pump configuration printout

2.1 Connecting of the ARGUS 600 to the serial interface

Caution: The infusion pump must be disconnected from the patient before any connection over the serial interface is made!

A connection of the ARGUS 600 to a computer is useful to the read the present configuration or history of the pump. Even a simple monitoring of the pump can be done over the serial interface RS-232.
The connection of the infusion pump with your computer over the interface can be done by connecting the interface cable (part 10.058) and the following steps:

- Connect the RS-232 interface cable to outlet (22) of the infusion pump and to the serial port of your PC. Note in which port (COM1 or COM2) you have pluged in.
- Start your terminal program on your computer. A simple terminal program, e.g. "Hyper Terminal" is included in every MS-Windows 9x and Windows NT systems, but must be installed.
- Be sure that you have selected the right serial port (COM1 or COM2) and set the following communication parameters:

Bits per second:	4800 Baud
Data bits:	8 bits
Parity:	None
Stop bits:	1 bit
Protocol:	None

- Go to the next step in one of the further chapters, depending on your intention.

2.2 Configuration printout

- Switch the pump on while keeping the keys "MODE" and "START/STOP" pressed and go in the configuration mode.
- Select address **399** on the left hand display.
- Start recording text received over the serial interface, e.g. by selecting "Capture text..." in the menu of the Hyper terminal. A text file which contains the present configuration printout will now be generated.
- Enter the data **3456** on the right display of the pump.
- Press the "START/STOP" key.
- The pump will now transfer the present configuration of the pump in the format mentioned below.
- Stop the recording of the text received over the serial interface; this will also close the generated text file.
- The generated text file can be opened and printed out by any text program.

Pump configuration printout (sample):

```
/***** Configuration profile *****/       Wed 19-Jan-2002 11:29:55

Pump type               : ARGUS600
Inventory number        : 0000 0000
Software release        : V0.93 (990819-6D5C)
Infused sum             : 230ml
Operating time          : 5h32min
Last service date       : 2000 week 12

00=0   50=0   100=0   150=0   200=0400   250=0000   300=0000   350=0000
01=1   51=0   101=0   151=0   201=0000   251=0000   301=0000   351=0000
02=0   52=0   102=0   152=0   202=0000   252=0000   302=0000   352=0000
03=0   53=1   103=1   153=0   203=0000   253=0000   303=0000   353=0000
etc.
```

2.3 History printout

- Switch the pump on while keeping the keys "MODE" and "START/STOP" pressed and go in the configuration mode.
- Select address **399** on the left display of the pump.
- Start recording text received over the serial interface, e.g. by selecting "Recording text..." in the menu of the Hyper terminal. A text file which contains the history printout will now be generated.
- Enter the data **4567** on the right display of the pump.
- Press the "START/STOP" key.
- The pump will now transfer the last events registered on the pump in the format mentioned below.
- Stop the recording of the text received over the serial interface; this will also close the generated text file.
- The generated text file can be opened and printed out by any text program.

History printout (sample)

```
/***** History *****/        Mon 06-Mar-2000 08:42:44

Pump off                                          Wed 23-Feb-2000 11:54:38
Rate   = 123.0ml/h           Syringe = 156
Total  =  50.0ml             PrLimit = 900mbar
Infsum =   5.4ml             Status  = 0x0000

Pump on                                           Wed 09-Feb-2000 15:01:58
Rate   =  10.0ml/h           Syringe = 156
Total  =  50.0ml             PrLimit = 600mbar
Infsum =   9.0ml             Status  = 0x0000
etc.

The possible messages are:
Battery defective          PrLimit change             Syringe barrel, pump stop
Battery low prealarm       Pump has detected failure  Syringe clutch, pump stop
Battery low, pump stop     Pump off                   Syringe empty, pump stop
Bolus start                Pump on                    Syringe near empty
Bolus stop                 Pump start                 Syringe switch, pump stop
External power off         Pump stop (KVO)            Timer alarm, pump stop (KVO)
External power on          Rate change                Total volume reached, pump stop (KVO)
Occlusion, pump stop       Enter setup mode           Datalock on
PC configuration done      Exit setup mode            Datalock off
PC configuration failure   Infsum cleared             Pump start, ext. changed parameter
```

2.4 Monitoring of the ARGUS 600

Caution: The monitoring of the infusion pump ARGUS 600 over the serial interface of a PC is intended for demonstration purposes only; any connection with patients has not been tested under the conditions of EN 60601-1 and are not allowed.

- Switch the pump on with an inserted filled infusion set.
- Enter one of the following command directly in your terminal window or transmit the corresponding ASCII
  code over your own monitoring program. A short sample of a monitoring session is mentioned at the end of this chapter.

Command	Keystrokes in terminal	ASCII code	Description
ENQ	Ctrl+E	05H	Send status (see format below)
SO	Ctrl+N	0EH	Sets pump in remote mode
STX	Ctrl+B	02H	Start of data entry (see format below)*
‘data‘	Data	-	Data*
ETX	Ctrl+C	03H	End of data entry*
DC2	Ctrl+R	12H	Start infusion*
DC4	Ctrl+T	14H	Stop infusion*
SI	Ctrl+O	0FH	Sets pump in local mode
ACK	Ctrl+F	06H	Alarm suppression (2min)*
FS	Ctrl+\	1CH	Toggle "KVO mode"*
BEL	Ctrl+G	07H	Toggle "Buzzer at start mode"*
CAN	Ctrl+X	18H	No start test’s at next start*
ESC	Ctrl+[	1BH	Next character following ESC ("Ctrl+[") will select the pump with address "addr", if more than one is connected to the serial interface*
DC1	Ctrl+Q	11H	Enquiry of inventory number (address 396/397)
"addr"	-	0-127	Address (must be the same as in the pump configuration on address 395)* * Only valid in remote mode

Format of "data" entry:

STX	0	1	2	0	0	2	0	0	0	0	ETX
	Rate 1E2	Rate 1E1	Rate 1E0	Rate 1E-1	Total 1E2	Total 1E1	Total 1E0	Total 1E-1	Med. hex hi digit	Med. hex lo digit	

Format of "status", which will be returned by the pump after typing "Ctrl+E" in the terminal:

STX	0	1	2	0	0	2	0	0	0	0	1	0	0	9	0	0	0	0	A	B	C	D	E	ETX
	Rate 1E2	Rate 1E1	Rate 1E0	Rate 1E-1	Total 1E2	Total 1E1	Total 1E0	Total 1E-1	Infused sum 1E2	Infused sum 1E1	Infused sum 1E0	Infused sum 1E-1	PrL 1E3	PrL 1E2	PrL 1E1	PrL 1E0	Med. hex hi digit	Med. hex lo digit	Statusbyte-1	Statusbyte-2	Statusbyte-3	Statusbyte-4	Statusbyte-5	

Format statusbyte-1:

P	1	X	X	X	X	X	X
Always low	Always high	Pump type (1=A600)	Buzzer at start	Battery active	Battery low prealarm	Battery low, pump stop	Battery defective

Format statusbyte-2:

P	1	X	X	X	X	X	X
Always low	Always high	Occlusion, pump stop	Syringe barrel, pump stop	Syringe clamp, pump stop	Syringe clutch, pump stop	Syringe empty, pump stop	Syringe near empty

Format statusbyte-3:

P	1	X	X	X	X	X	X
Always low	Always high	Remote mode active	Reserved	Global Alarm	Syringe global alarm	Pump stop (KVO)	KVO active

Format statusbyte-4:

P	1	X	X	X	X	X	X
Always low	Always high	Reserved	Bolus active	Data lock active	Total volume reached, pump stop (KVO)	Timer alarm, pump stop (KVO)	Standby alarm active

Format statusbyte-5:

P	1	X	X	X	X	X	X
Always low	Always high	Pressure indicator (Adr. 46)	Bargraph-LED upper	Bargraph-LED lower+3	Bargraph-LED lower+2	Bargraph-LED lower+1	Bargraph-LED lower

A sample of a monitoring session:

- Switch the pump on with an inserted filled infusion set.
- Type "Ctrl+N" to set the pump in remote mode.
- Type "Ctrl+B", then "01200200" and then "Ctrl+C" which sets the rate to 12.0 ml/h and an infusion total of 200 ml. The rate should now be shown in the left display of the pump.
- Type "Ctrl+R" to start the infusion.
- Type "Ctrl+T" to stop the infusion.

3 Fault finding

The fault code in case of a failure is displayed by pressing "MODE" key (12). (F-XX) appears in display (3), and the source of the failure is listed in the table below:

Error	Error reason	Assembly group
F-20	Internal watchdog	Mainboard
F-21...22	ROM test	Mainboard
F-23...24	RAM test	Mainboard
F-25	CPU test	Mainboard
F-26	Invalid function menu	
F-27	EEPROM data invalid	Mainboard
F-28	RTC (real time clock) data invalid	Mainboard
F-29	Stepper motor power test	Mainboard
F-30	Plunger position calculation failed	
F-31	Check for near empty	
F-32	5Volt supply out of range	Mainboard
F-33	20Volt supply out of range	Mainboard
F-34	Pressure reference out of range (LM385 2.5V)	Mainboard
F-35	Pressure signal out of range	
F-36	Pressure result invalid	Mainboard
F-37	Pressure sensor test failed	
F-38	Barrel diameter signal test failed	
F-39	Barrel diameter signal out of range	
F-40	Clamp diameter signal out of range	
F-44...45	Address invalid for EEPROM	Mainboard
F-46	Frequency from µC or RTC out of range	Mainboard
F-47	Displayboard not present	
F-48	Key(s) too long active	Displayboard
F-54	Movement result invalid	
F-55	Frequency calculation	Mainboard
F-56...59	Volume control	Mainboard

Exceptionally a fault code may appear, which is not included in this list. In this case we recommend to change the main board.

4 Replacement of parts

4.1 Disassembly of the pump
NOTE: The exploded views in the appendix show the individual assembling steps.

CAUTION!
Switch the unit off and disconnect the mains cable from the power outlet before opening the housing. Observe the antistatic protection rules when disassembling the ARGUS infusion pump (the use of an anti-static table mat and a grounded clip are recommended, for example). Mind the battery voltage!

a Disassembly of the housing: Remove the pole clamp at the rear side. Remove 7 screws at the bottom side (6 x M4 and 1 x M3), the 2 screws at the left side cannot be removed completely. Place the upper part behind the bottom.

b Remove the main board:
Remove the battery connector and all other cables of the main board.

c Remove the syringe drive:
Remove the fixing plate and syringe guide. Unsolder the connecting leads of the strain gauge (DMS) on the power board. Move the drive head to the left and remove the syringe drive out from the housing.

d Remove the driving head:
Remove the 3 screws on the cover. **Important:** To disassemble the unit, open the cogs by hand one third (or put a coin between the cogs) then pull the cover with the levers out of the housing.

e Remove the power board:
Important: Removing the power board requires a new basic alignment. Unsolder the connecting leads of the strain gauge on the power board. Remove all cables from the board.

f Insert the power board:
Syringe holder must be in the closed position (no syringe inserted). Loosen the lock screw of the cogwheel on the syringe holder potentiometer axle. Fix the power board with the 4 screws. Note that the lock screw is accessible from above. Solder the connecting leads of the strain gauge and connect the other cables. Make sure to remove the AC power cord and operate the pump (with open housing) on battery power.

g Replace the sidewall (motor)
After each disassembly or replacing of the sidewall the basic alignment of the strain gauge must be executed to guarantee a perfect pressure monitoring.

h Replacement of the EPROM or main board
Software updates may reset automatically the configured values in the EEPROM. You are requested to upload and save or write down the present contents of the none write protected addresses before you replace the EPROM or the main board. Afterwards you have to re-enter these values in the program mode or download your saved file. If a PIN code has been used before, the same code has to be programmed again.
Charge the batterie for more than 16 hours!
Note: A pressure sensor calibration is necessary when replacing the pressure sensor, a pressure sensor calibration and a volume calibration are necessary when replacing the EEPROM!

4.2 Check the pump accuracy and the pressure alarm level

a Check the pump accuracy (Select the syringe type [Cod -50-])
Insert a **new** syringe "Codan 50ml" filled with distilled water and pump into a cup.
Pump settings: set rate at 200 ml/h, set "total" at 20 ml
Net weight result: 20 g +/-2%

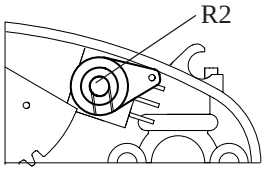
b Check the pressure alarm level
Adjust the pressure alarm limit to 900mbar (90kPa).
Insert a syringe filled with water and connect the tube on the patient side to a manometer.

Set rate of 100 ml/h, start and pump till the occlusion-alarm goes on and immediately read the pressure on the manometer: 900mbar (90kPa) ± 200mbar

4.3 Rough alignments

Plunger length (P):
- Go into the programming mode (see chapters 1.3 or 1.5)
- Select address 399
- Press key "MODE"
- Enter data 123
- Press key "SRART/STOP", the display indicates "17bd xxxx"
- Press key "MODE" until "120P xxxx " is displayed
- Loosen the lock screw of the cogwheel on the plunger potentiometer axle
- Move syringe drive (without syringe) fully to the left
- Turn the potentiometer axle in clockwise direction up to the final position and afterwards in the counter clockwise direction until approx. 700 is displayed
- Fix the lock screw!
- Control whether the full stroke can be made

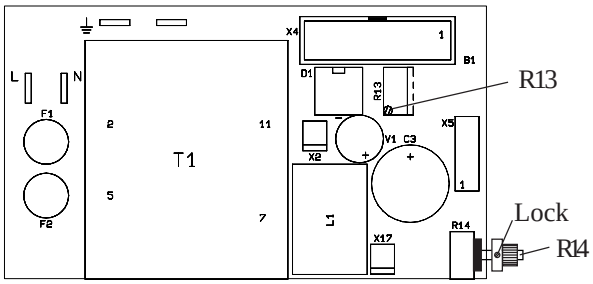
Syringe clamp diameter (cd):
- Go into the programming mode (see chapters 1.3 or 1.5)
- Select address 399
- Press key "MODE"
- Enter data 123
- Press key "SRART/STOP", the display indicates "17bd xxxx"
- Press key "MODE" until "20cd xxxx" is displayed
- Remove the syringe and make sure the clamp is fully closed
- Remove the cover of the driving head (11.212)
- Remove the clamp spring (11.210)
- Loosen the lock screw of the position lever (11.208)
- Turn carefully the potentiometer axle (R2) in counter clockwise direction up to the final position
- Turn position lever (11.208) counter clockwise until it touches the housing (see picture below)
- Fix the lock screw (make sure the position lever touches the housing)
- Re-install the clamp spring, then a value of approx. 700 is displayed
- Control whether the clamp stroke can be made



Syringe barrel diameter (bd):
- Go into the programming mode (see chapters 1.3 or 1.5)
- Select address 399
- Press key "MODE"
- Enter data 123
- Press key "START/STOP", the display indicates "17bd xxxx"
- Loosen the lock screw of the potentiometer R14 on the power board
- Turn the potentiometer axle (R14, on the power board) in the counter clockwise direction up to the final position and afterwards in the clockwise direction until approx. 700 appears in the display.
- Fix the lock screw
- Control whether the syringe barrel can make the full stroke.

Strain gauge (b):
Important: No syringe is inserted and the syringe drive is positioned on the right side.
- Go into the programming mode (see chapters 1.3 or 1.5)
- Select address 399
- Press key "MODE"

- Enter data 123
- Press key "MODE" several times until " 0.2b xxxx " is displayed.
- Adjust the screw of the trimmer (R13, on the power board) until approx. 1500 is displayed.



Power Board

4.4 Final calibration of the assembled pump

- Go into the program mode (see chapters 1.3 or 1.5).
- Select address 399.
- Press key "MODE".
- Enter data 123.
- Press key "START/STOP". The display indicates "17bd xxxx".
- Please verify that the displayed values in the right hand display are within the following ranges (without calibration part):

  Valid ranges in the right hand display :

  Syringe barrel holder unpulled: 700 ± 300

  Syringe barrel holder pulled: 4'200 ± 300

  Note: Please refer to chapter "Rough alignments" if the displayed value is out of range!
- Press key "MODE". The display indicates "120P xxxx".

  Please verify that the displayed values in the right hand display are within the following ranges (without calibration part):

  Valid ranges in the right hand display (without calibration part):

  Drive unit totally left: 600 ± 200

  Drive unit totally right: 4'400 ± 200

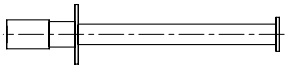
  Note: Please refer to chapter "Rough alignments" if the displayed value is out of range!
- Press key "MODE". The display indicates "20cd xxxx".

  Please verify that the displayed values in the right hand display are within the following ranges (without calibration part):

  Valid ranges in the right hand display (without calibration part):

  Clamp fully closed: 700 ± 300

  Clamp fully opened (clutch & clamp lever fully pressed): 2'000 ± 300

  Note: Please refer to chapter "Rough alignments" if the displayed value is out of range!
- Press key “MODE” until the display indicates "17bd xxxx".
- Put the calibration part-1 (no.11-194) (d=17mm ; l=120mm) in place 
- Press key "START/STOP". (Barrel diameter for 17mm will be stored).

  Note: Each stored value will be acknowledged by a sound.
- Press key "MODE". The display indicates "120P xxxx".
- Press key "START/STOP". (Plunger length for 120mm will be stored)
- Press key "MODE". The display indicates "20cd xxxx".
- Press key "START/STOP". (Clamp diameter for 20mm will be stored)
- Remove the calibration part-1.

- Put the calibration part-2 (no.11-195) (d=31mm ; l=20mm) in place. 
- Press key "MODE". The display indicates "31bd xxxx".
- Press key "START/STOP". (Barrel diameter for 31mm will be stored).
- Press key "MODE". The display indicates "20P xxxx".
- Press key "START/STOP". (Plunger length for 20mm will be stored).
- Press key "MODE". The display indicates "32cd xxxx".
- Press key "START/STOP". (Clamp diameter for 32mm will be stored).
- Remove the calibration part-2. Insert a filled 50 ml syringe and connect the patient line to the pressure measurement system.
- Press key "MODE". The display indicates "0.2b xxxx" and the pump starts to run. with a low rate. Close the line (occlusion).
- Wait until 0.2 bar is reached on the scale. At this point press the key "START/STOP" immediately to register the value for 0.2 bar.
  Note: To speed up the process increase the infusion rate in steps by pressing the key "1".
- Press key "MODE". The display indicates "1.2b xxxx".
- Wait until 1.2 bar is reached on the scale. At this point press the key "START/STOP" immediately to register the value for 1.2 bar.
  Note: To speed up the process increase the infusion rate in steps by pressing the key "1".
- Switch the pump off and on again.
- Remove the pressure in the system by opening the line.
- Make a control measurement for a pressure of 0.9 bar. To do this, select 900 mbar in the function "PrL" The pressure alarm should be released within ± 200 mbar.

4.5 Calibration of the battery capacity

Each battery is subject to a chemical process with a slowly decreasing running time. After many charge and discharge cycles the battery may not have the capacity to provide the running time shown in the menu "CAP".

To adjust the running time of the used battery please follow the steps mentioned below:

- Go in the configuration mode of the pump (see chapters 1.3 or 1.5).
- Select address "368" in the left display.
- Enter the data "615" in the right display and press the "START/STOP" key to accept the data. This will set the battery discharge time to the maximum of >10 hours.
- Switch the pump off.
- Be sure you have unplugged the line connection.
- Switch the pump on and run the pump on battery until it switches off.
- Charge the battery for more than 16 hours.
- Switch on the pump and start an infusion with a rate of 5 ml/h. The infused sum at this rate multiplied by 12 is now equal to battery operating time in minutes.
- Leave the pump running on battery until it switches off again.
- Connect pump to the AC line.

- Switch the pump on while keeping the key "1" pressed. Multiply the value in the right display by 12, this gives the capacity of the battery in minutes. Multiply this time by 0.8 and enter the result on address "368" in the configuration mode. This time defines from now on, the running time of the pump including a 15 minutes pre-alarm (valid after a full charge).

- Standard battery **6V/1.2 Ah**
  If this time is less than 2 hrs, you should replace the battery (part 12.032). If the specified time > 2 hrs is not required, the battery has to be changed only if the time less than 1.5 hrs, to respect to environmental pollution.

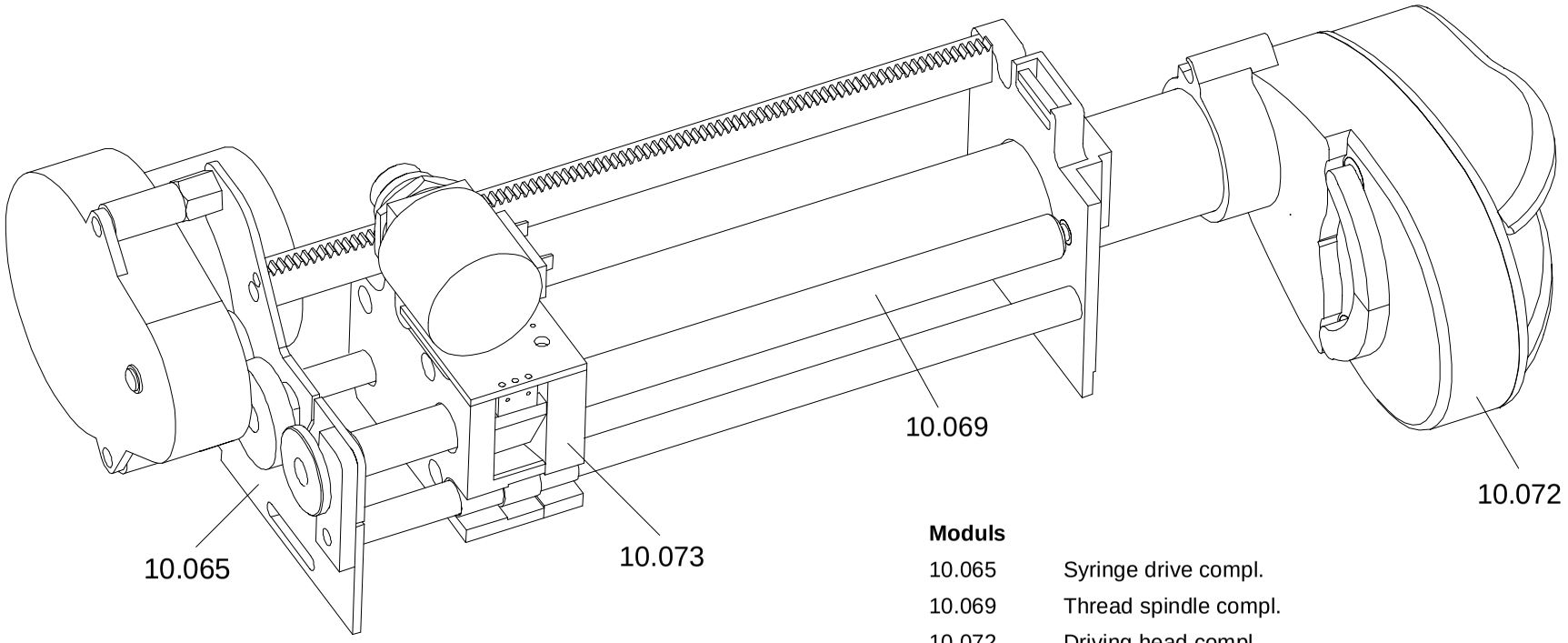
- High energie battery **6V/4 Ah**
  If this time is less than 8 hrs, you should replace the battery (part 12.026). If the specified time > 8 hrs is not required, the battery has to be changed only if the time less than 5 hrs, to respect to environmental pollution.

5 Safety standard check

Safety standard check		**ARGUS 600**	**ARGUS Medical AG**
Serial-no: ……			
Hospital/Dept./Customer:.....			
The safety standard check has to be performed at least every 24 months or after 10000 hours of operation. The check has to be done in accordance to the operation- and service manuals.			
1	Visual check for damage, cleanness and completeness:	- Housing, labels, accessories, connectors, power cable, etc.	
2	Keep key "MODE" pressed while switching on the pump	- Display shows the software release: **V** ..... - Display of 2, 4, 7, F., ml total, ml inf., h.min - Test of the green operation LEDs: Run indicator, line, battery, KVO - Test of the red alarm LEDs: Occlusion, near empty, empty, syringe, battery, ALARM	
3	Hold the barrel switch pressed and move the lever for clamp (bottom) up and down	- Alarm "Syringe" lights on and off	
4	Hold the lever for clamp (bottom) in its upper position and actuate the barrel switch	- Alarm "Syringe" lights on and off	
5	Hold the barrel switch pressed and the lever fo clamp (bottom) in its upper position, then actuat the lever for clutch (top)	- Alarm "Syringe" lights on and off	
6	Check the prime function (press the key "BOLUS" twice within 1 sec.)	- See service manual "Prime"	
7	Set rate to 111.1 ml/h and the total to 0.1 ml, press "START STOP"	- "END" reached, the acoustical alarm + LED ALARM released	
8	Test the pump at max. rate (999.9 ml/h)	- Running smooth?	
9	Check of the occlusion-alarm pressure: 50 ml syringe: CODAN: ..... Pressure increase to≥1.2 bar? Test of the occlusion-alarm-pressure	- See service manual "Final calibration" Other: ..... Preset level: ..... mbar Measured: ..... mbar	
10	Check of the pump accuracy: Rate: 200 ml/h Preset volume: 20 ml	- See service manual "Check pump accuracy..." Measured volume: .....ml	
11	Battery check by setting the rate to 5 ml/h, disconnect the line and start the pump: Running time: ..... hrs ..... min (If the specified typical 2hrs (8 hrs) of operation are not required, the battery has to be changed only if the time is <1.5 hrs (5hrs), due to environmental pollution)	- Green LED battery light? - Battery prealarm after typ. 1 hr 45 min or 7 hrs 45 min (Red LED battery alarm + acoustical alarm) - Battery alarm 15 min. after prealarm (Red LED battery alarm + ALARM + alarm acoustically) - After 6 min. the pump switches off	
12	Charge the battery min. 16 hrs.		
13	Check the external connections:	- Staff alerting system - Computer interface RS232 / External DC	
14	Electrical test according to EN60601-1 (all measurements made with a power cable 2.5 m)	- Measurements attached	
	The pump has passed the safety standard check and is safe for use.		
	Date: .....Name: .....Signature:		

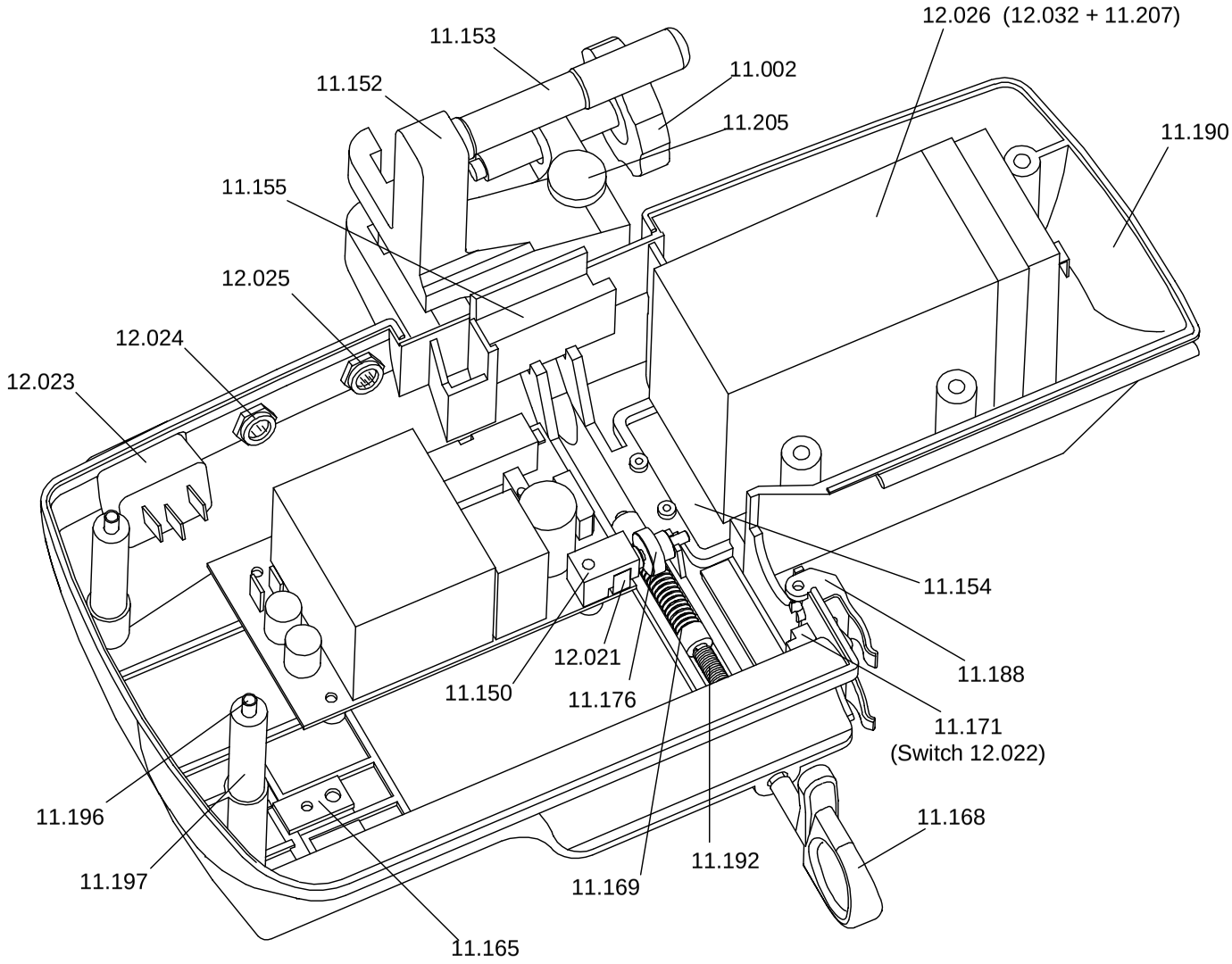
General spare parts (without drawings)

10.058	RS-232 interface cable
10.060	Power board A600
10.061	Display board A600
10.071	Main board A600 Index C
11.189	Casing cover (without fittings)
11.190	Casing base (without fittings)
11.194	Calibration part 1
11.195	Calibration part 2
11.200	Identification plate
11.201	Short instruction english
11.206	Protection (display board)
11.213	Frontpanel universal
12.030	Male plug 3 c
12.031	Male plug 7 c
12.035	Manometer 0-2,5 bar
12.036	AM pressure system



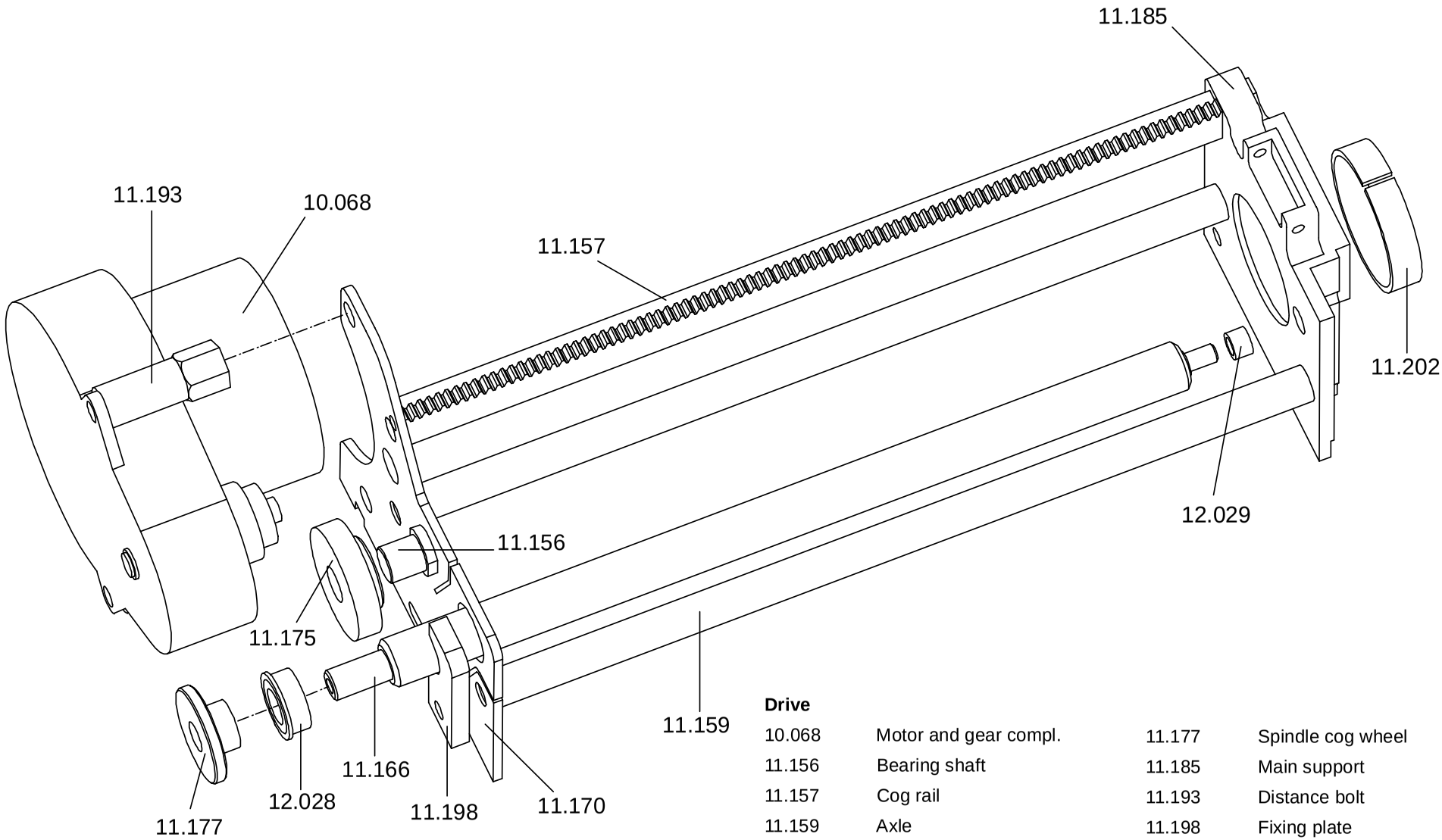
Moduls

10.065	Syringe drive compl.
10.069	Thread spindle compl.
10.072	Driving head compl.
10.073	Carrier (incl. nut) compl.



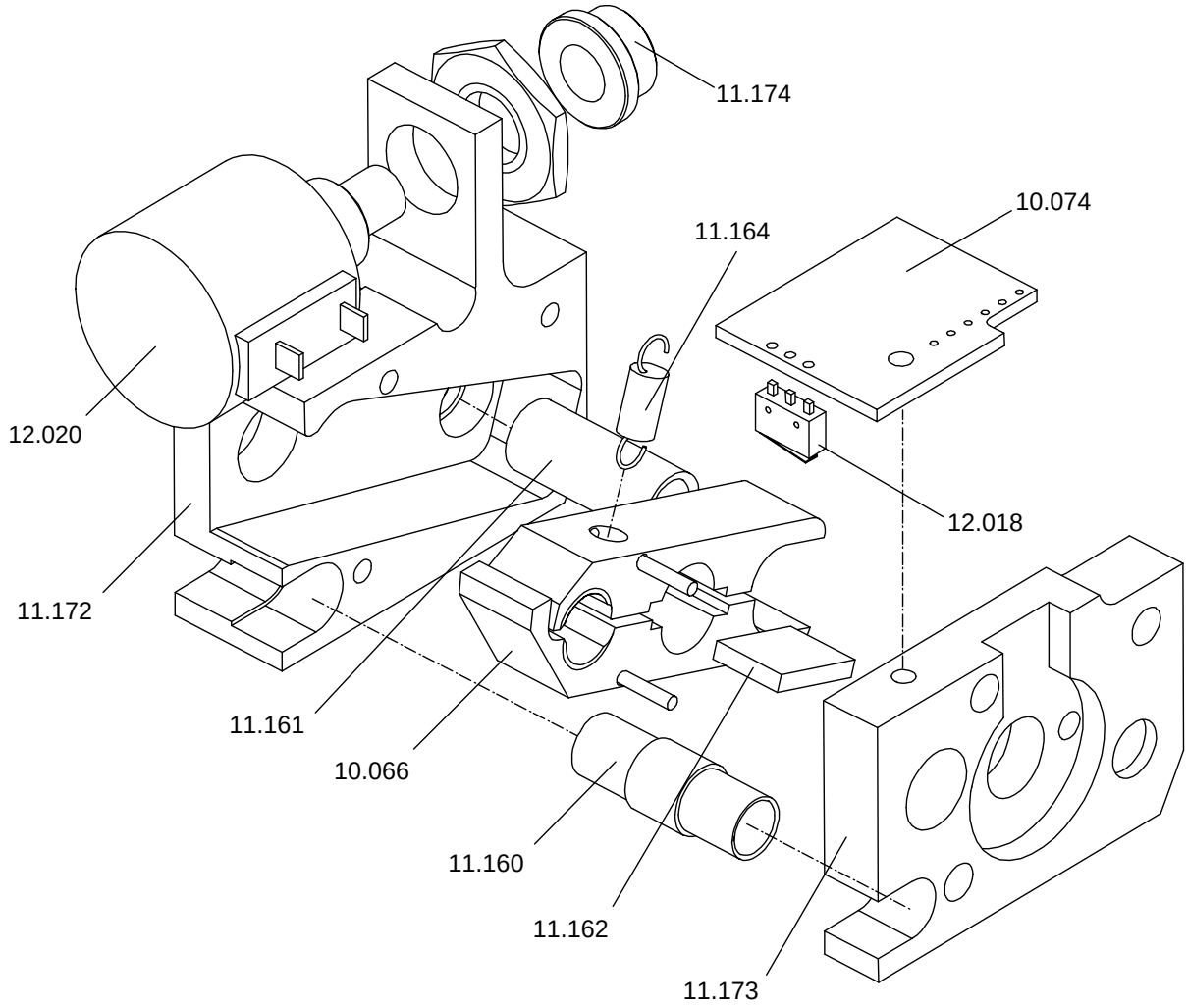
Basement

11.002	Spindle for clamp
11.150	Potentiometer holder
11.152	Combination clamp
11.153	Handle
11.154	Battery cover
11.155	Clamp holder
11.165	Fixing plate
11.168	Syringe barrel holder
11.169	Cog shaft
11.171	Switch holder
11.176	Cog wheel 24 c
11.188	Syringe guide
11.190	Casing bottom part without fittings
11.192	Pressure spring
11.196	Screw M4x50
11.197	Support
11.205	Squeeze screw
11.207	Battery holder for part-no 12.032
12.021	PCB potentiometer 10K
12.022	Pushbutton switch
12.023	Mains plug
12.024	Female receptacle 3 c
12.025	Female receptacle 7 c
12.026	Lead-acid battery 6V/4Ah
12.032	Lead-acid battery 6V/1.2Ah



Drive

10.068	Motor and gear compl.	11.177	Spindle cog wheel
11.156	Bearing shaft	11.185	Main support
11.157	Cog rail	11.193	Distance bolt
11.159	Axle	11.198	Fixing plate
11.166	Thread spindle	11.202	Sealing
11.170	Sidewall motor incl. DMS	12.028	Ball bearing
11.175	Cog wheel 36 c	12.029	Glide bearing ø3/4,5x3

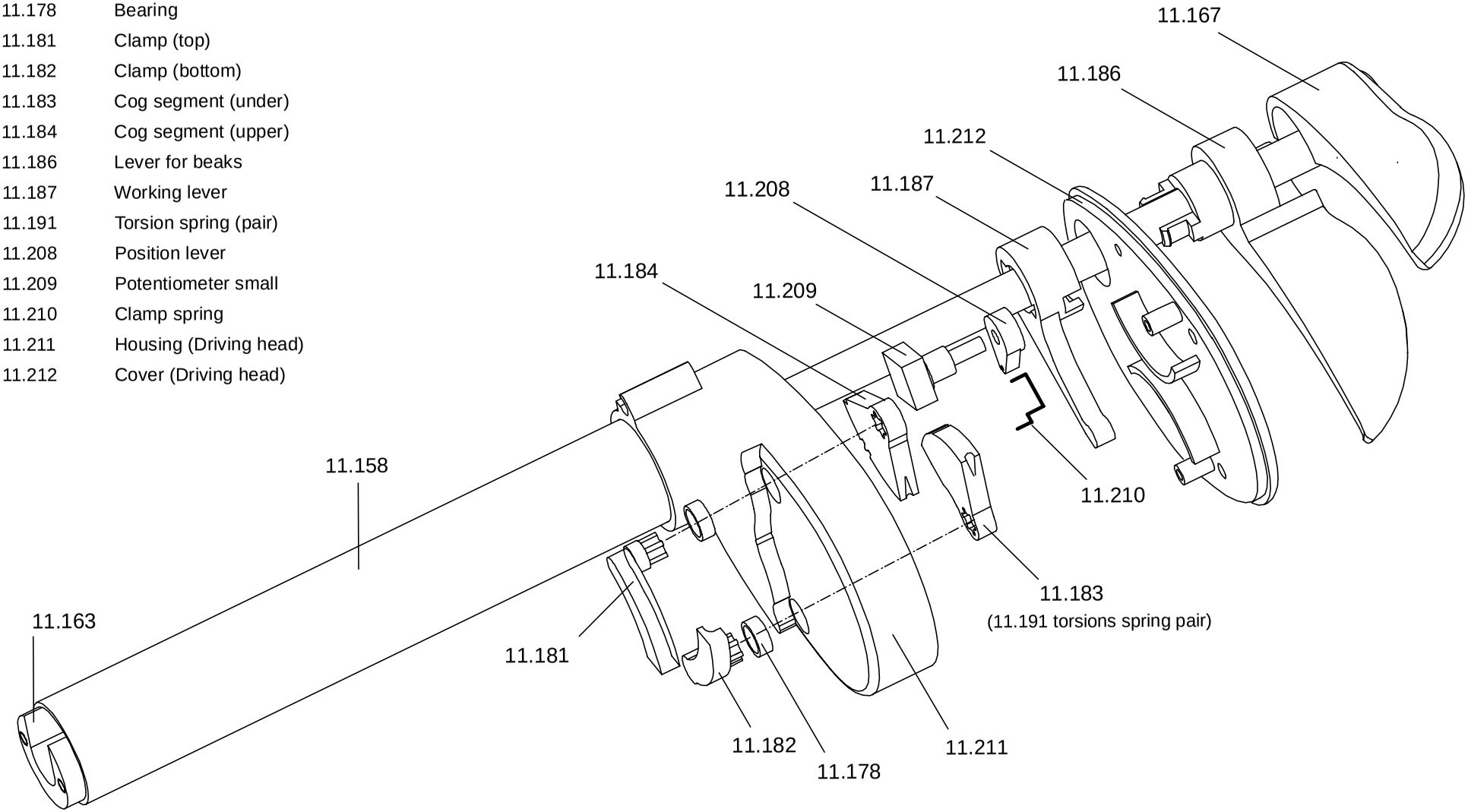


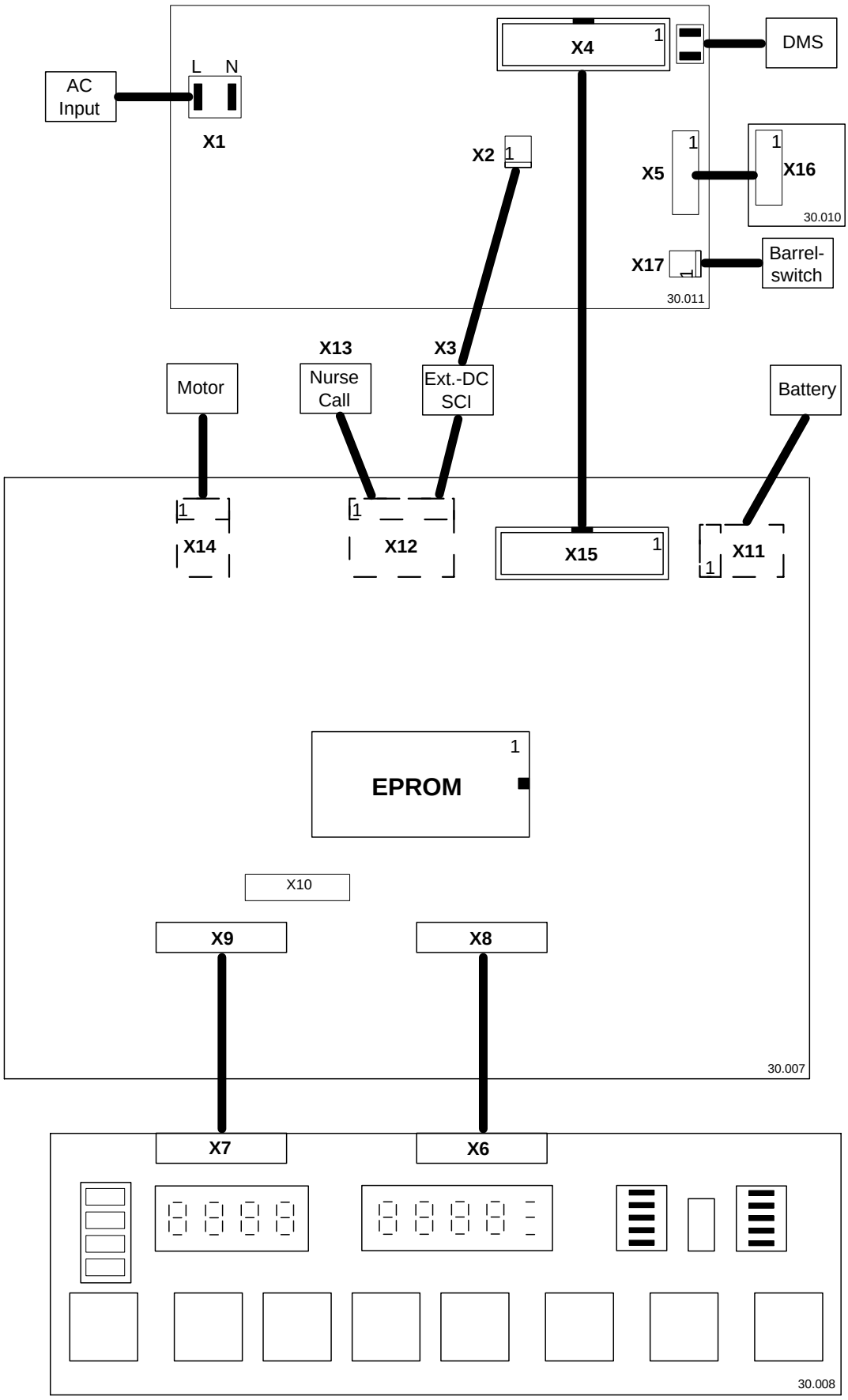
Carrier

10.066	Spindle nut compl.
10.074	Flex board with cable
11.160	Sleeve (in front)
11.161	Sleeve (in back)
11.162	Wing
11.164	Tension spring
11.172	Housing (Carrier)
11.173	Cover (Carrier)
11.174	Cog wheel 23 c
12.018	PCB micro switch
12.019	Flex cable
12.020	Potentiometer 10-turns 10K

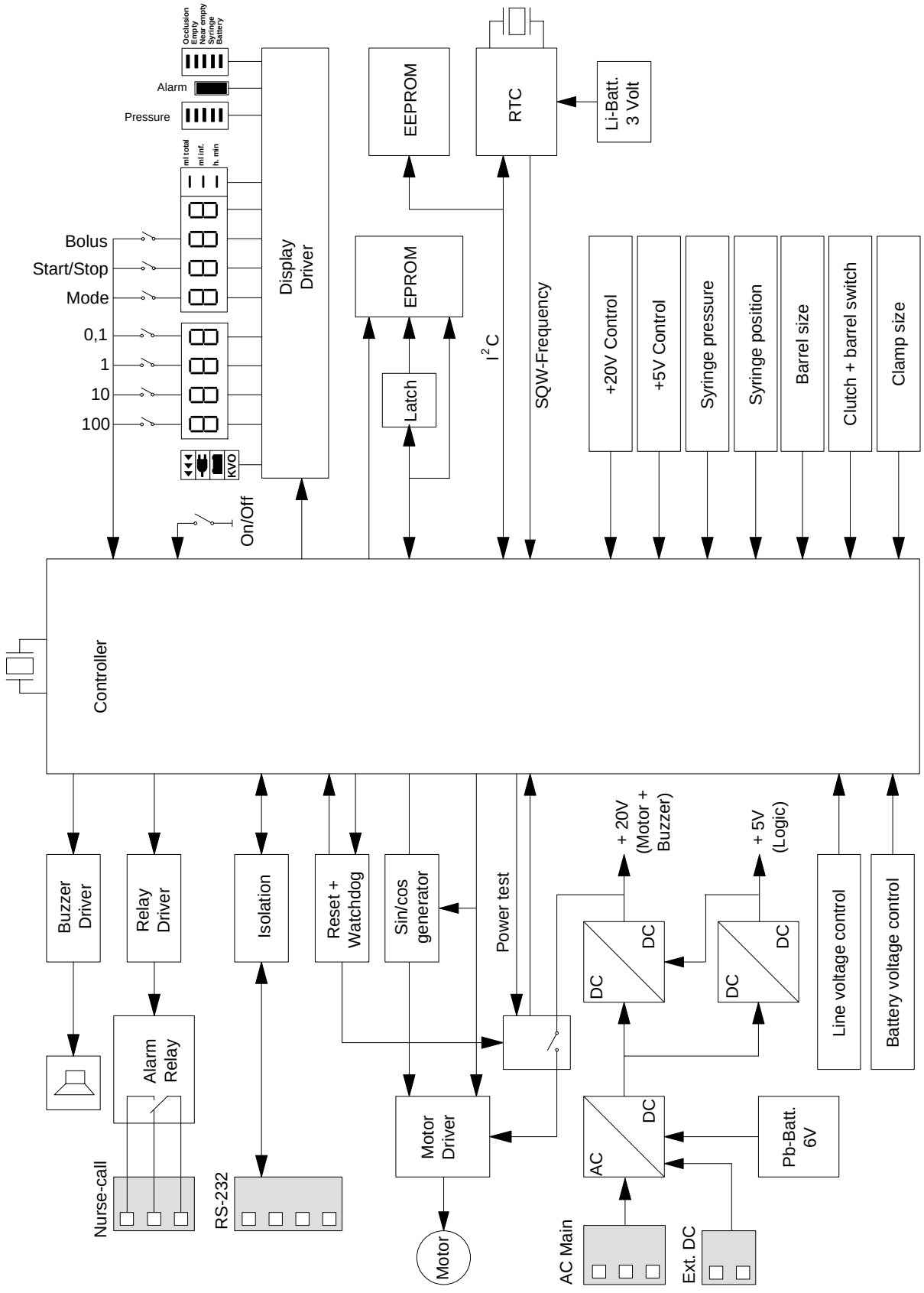
Drive head

11.158	Connection pipe
11.163	Carrier pipe
11.167	Clutch lever
11.178	Bearing
11.181	Clamp (top)
11.182	Clamp (bottom)
11.183	Cog segment (under)
11.184	Cog segment (upper)
11.186	Lever for beaks
11.187	Working lever
11.191	Torsion spring (pair)
11.208	Position lever
11.209	Potentiometer small
11.210	Clamp spring
11.211	Housing (Driving head)
11.212	Cover (Driving head)





Wiring diagram



Bloc schematic