STAUFF®

Universal Accumulator Charging Kit

Bladder and Diaphragm

Instruction Manual

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Universal Accumulator Charging Kit
Operating and Maintenance Instructions

Product Description

STAUFF's universal accumulator charging kit is an essential instrument for the verification, pressurisation and gas bleeding of hydraulic accumulators, suitable for most common bladder and diaphragm accumulators.

Features

The standard kit is delivered in a storage case containing the following:

1. 1 x Charging head for testing and pressurising (swivel connection M28x1.5)
2. 1 x Adaptor 1/4" BSPP
3. 1 x Adaptor 5/8–18 UNF
4. 1 x Adaptor (long) 7/8–14 UNF
6. 1 x Adaptor (short) Integrated 7/8–14 UNF
8. 1 x 0 - 100 bar/PSI safety pattern pressure gauge + adaptor SMD-20-G1/4-B-OR-W3
9. 1 x 0 - 250 bar/PSI safety pattern pressure gauge + adaptor SMD-20-G1/4-B-OR-W3
10. 1 x Adaptor 5/8–18 UNF - 0.305"
11. 1 x High-pressure gas hose (2000 mm long) for connecting to a nitrogen gas source - SKK-20-1/4" BSPP female
12. 1 x Safety goggles
13. 1 x Hex key 6 mm
14. 1 x Operating instructions

Optional Nitrogen Gas Bottle Adaptors (sold separately)

STAUFF Nitrogen Regulator (recommended)
Type 50 gas bottle adaptor
Type 51 gas bottle adaptor

Available on request

- 0 - 400 bar kit

Application

- For checking and pre-charging common types of accumulators

⚠ Maximum working pressure of this equipment (excluding individual pressure rating of gauges) is 400 bar.

Safety Instructions and Recommendations

⚠ 1. Before using the charging head carefully read the directions and safety instructions in this guide.

⚠ 2. In all cases observe the pressure limits indicated on the accumulator pressure vessels. If necessary refer to the applicable operating instructions.

⚠ 3. Before attempting to check the pre-charge pressure, the accumulator in the hydraulic circuit under pressure has to be isolated and discharged on the hydraulic side. If required immobilize it and define a safety zone.

⚠ 4. Only use nitrogen gas with a purity ≥ 99.8% (N_2) to pressurise the accumulator.

⚠ 5. STAUFF always recommends the use of a nitrogen gas regulator on the nitrogen gas bottle.

⚠ 6. The charging head (1) and pressure gauge (8 or 9) are tools for checking gas pressure and pre-charging accumulators. In cases where the gauge and gauge adaptor will be left on the accumulator, make sure that the gauge fitted is rated for the maximum system pressure of the hydraulic circuit.

⚠ 7. Never use an accumulator in a hydraulic system without it first being pre-charged with the correct nitrogen gas pressure. Failure to do this will result in bladder or diaphragm damage.

⚠ 8. Ensure safety goggles are worn when either checking or pre-charging accumulators.

⚠ 9. To ensure optimum efficiency and performance of the hydraulic circuit, the pre-charge pressure must be checked frequently. STAUFF recommends the pressure be checked initially at intervals of 1 month, 3 months and then 6 months after installation. Depending on the amount of loss of pressure (if any) over this time, a planned maintenance schedule for monitoring the pressure can then be put into operation (check annually).

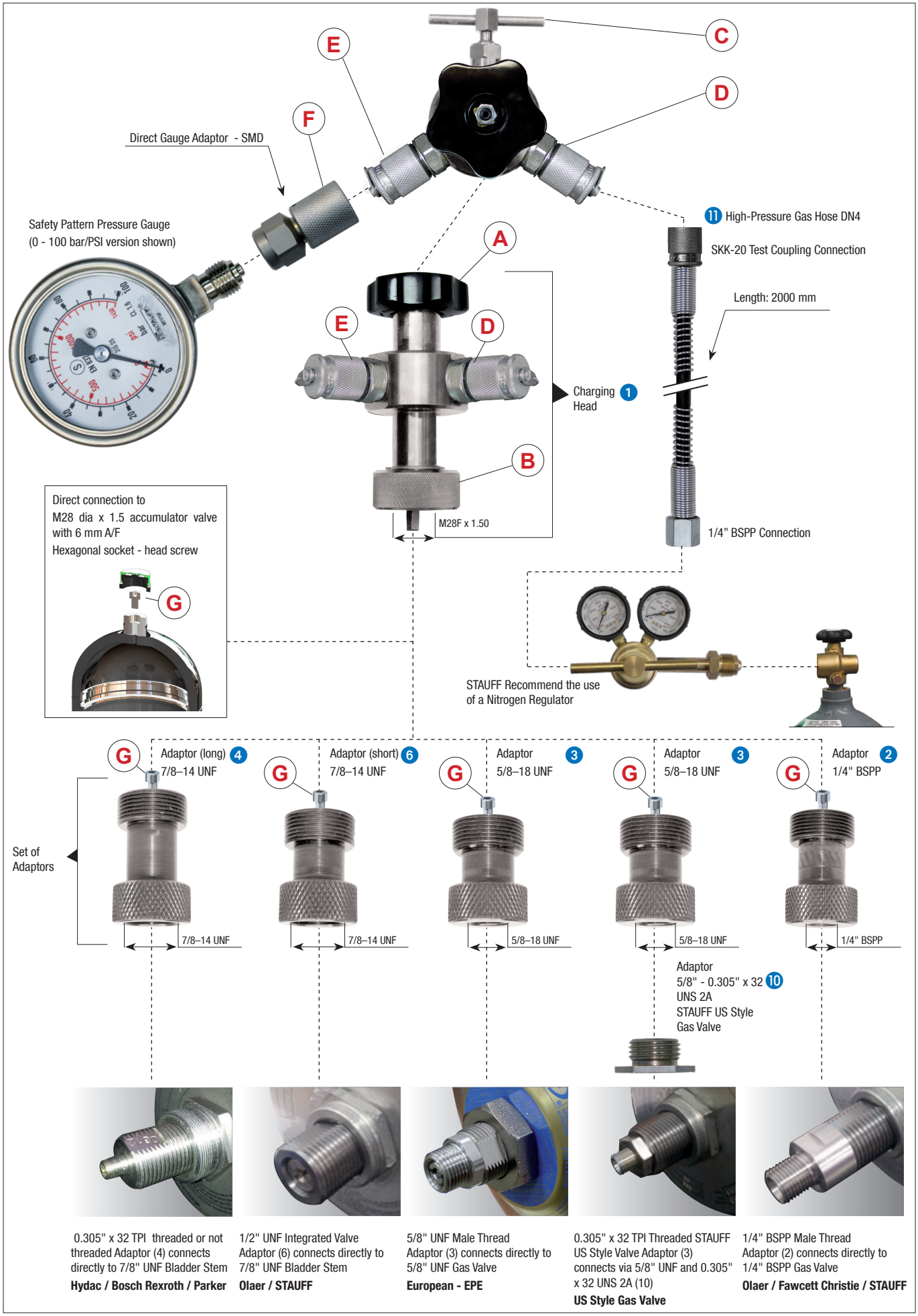
⚠ Only use “gas approved" test hose

⚠ For use with nitrogen (N_2) gas only

⚠ Safety goggles must be worn at all times

⚠ STAUFF pressure gauges are safety pattern type according to AS1349

Connection Flow Chart



0.305" x 32 TPI threaded or not threaded Adaptor (4) connects directly to 7/8" UNF Bladder Stem
Hydac / Bosch Rexroth / Parker

1/2" UNF Integrated Valve Adaptor (6) connects directly to 7/8" UNF Bladder Stem
Olaer / STAUFF

5/8" UNF Male Thread Adaptor (3) connects directly to 5/8" UNF Gas Valve
European - EPE

0.305" x 32 TPI Threaded STAUFF US Style Valve Adaptor (3) connects via 5/8" UNF and 0.305" x 32 UNS 2A (10)
US Style Gas Valve

1/4" BSPP Male Thread Adaptor (2) connects directly to 1/4" BSPP Gas Valve
Olaer / Fawcett Christie / STAUFF

Checking the Pre-charge Pressure

General

⚠ 1. Recommendation: Before proceeding to any operation concerning the initial pressurisation of an accumulator, consult the applicable operating instructions.

⚠ 2. Pressurisation limits: Ensure that the Universal Accumulator Charging Kit and any associated pressure gauge fitted are rated for the intended pressure for both pre-charging and pressure checking. Refer to the manufacturers specifications.

The nitrogen gas pressure varies as a function of the gas temperature. After each inflation and deflation of nitrogen gas, wait for the temperature to stabilise before checking the pressure (this may take several minutes depending on the accumulator size). Never exceed the maximum stated design pressure (PS or DP) of the accumulator as stamped on the vessel. If in doubt consult the manufacturer or check manufacturer's operating instructions or specifications manual.

⚠ 3. Taking into account the temperature influence on the pre-charge pressure: In order to observe the working pressures of the accumulator it is advised to adjust the inflation pressure (P0) according to the operating or control temperature. Refer to page 8 for inflation pressure corrections table.

Bladder Accumulators

Refer to page 5 for connection flow chart

- Remove the protection or gas valve cap fitted to the gas side of the accumulator
- Select the adaptor according to the gas valve fitted to the accumulator (4 or 6), (3+10), (3 or 2)
- Ensure the pin in the adaptor is backed off by unscrewing the socket head cap screw (G) in an anti-clockwise direction. To do this use the 6 mm hex key supplied in the charging kit
- Attach the appropriate adaptor to the accumulator gas valve
- Take the charging head (1) from the kit and install the pressure gauge by attaching it to the test coupling (E). Make sure the pressure gauge is compatible with the gas pressure (to be verified) and make sure the bleed valve (C) is closed
- Manually tighten the knurled ring (B) on the charging head (1) to the adaptor (4 or 6), (3+10), (3 or 2), positioning the device in such a way that the pressure gauge values can be easily read
- Open the accumulator gas valve by slowly tightening (clockwise) the lobe wheel (A) until the pre-charge pressure is indicated on the pressure gauge. DO NOT overtighten the lobe wheel (A)

Diaphragm Accumulators

Refer to page 5 for connection flow chart

- When checking the pre-charge pressure of a diaphragm accumulator fitted with a 6 mm socket head cap screw – carefully loosen the socket head cap screw (G) by turning anti-clockwise to relieve any tension
- Take the charging head (1) from the kit and install the pressure gauge by attaching it to the test coupling (E). Make sure the pressure gauge is compatible with the gas pressure (to be verified) and make sure the bleed valve (C) is closed
- Mount the charging head (1) directly to the accumulator's M28 threaded connection (no adaptor required), by tightening the knurled ring (B) on the charging head
- Once the charging head (1) is connected to the accumulator, unscrew the lobe wheel (A) anti-clockwise until the inflation pressure is indicated on the pressure gauge

Service Options

Option 1. The displayed nitrogen gas pressure (P0) is correct

Refer to page 5 for connection flow chart

- For bladder accumulators manually unscrew the lobe wheel (A) anti-clockwise. The lobe wheel (A) allows re-closing of the gas valve. A clicking sound may be heard once the valve is fully closed
- For diaphragm accumulators manually screw the lobe wheel (A) clockwise. The lobe wheel (A) allows re-closing of the socket head cap screw (G)
- Loosen the bleed valve by rotating anti-clockwise (C) to purge the charging head (1) of pressure
- For bladder accumulators remove the charging head (1) from the adaptor (4 or 6), (3+10), (3 or 2)
- For bladder accumulators unscrew the adaptor (4 or 6), (3+10), (3 or 2) fitted to the gas valve
- For diaphragm accumulators remove the charging head (1) from the M28 threaded connection and tighten the socket head cap screw (G) with supplied 6 mm hex key

⚠ **Important:** When using diaphragm accumulators with a socket head cap screw fitted, tighten the socket head cap screw (G) using the supplied 6 mm hex key

⚠ Ensure there is no gas leakage by checking with soapy water or an equivalent specific product

⚠ Ensure the gas valve cap and protection cap are refitted

Option 2. The displayed nitrogen gas pressure (P0) is too high

Refer to page 5 for connection flow chart

- Loosen the bleed valve (C) to reduce the nitrogen gas pressure of the accumulator until the required (P0) pressure after stabilization is reached (the nitrogen gas escapes to the atmosphere)
- Re-tighten the bleed valve (C)
- For bladder accumulators manually unscrew the lobe wheel (A) anti-clockwise. The lobe wheel (A) allows re-closing of the gas valve. A clicking sound may be heard once the valve is fully closed
- For diaphragm accumulators manually screw the lobe wheel (A) clockwise. The lobe wheel (A) allows re-closing of the socket head cap screw (G)
- Loosen the bleed valve by rotating anti-clockwise (C) to purge the charging head (1) of pressure
- For bladder accumulators remove the charging head (1) from the adaptor (4 or 6), (3+10), (3 or 2)
- For bladder accumulators unscrew the adaptor (4 or 6), (3+10), (3 or 2) fitted to the gas valve
- For diaphragm accumulators remove the charging head (1) from the M28 threaded connection and tighten the socket head cap screw (G) with supplied 6 mm hex key

Option 3 . The displayed nitrogen gas pressure (P0) is too low

Refer to page 5 for connection flow chart

- Remove cap from test coupling (D)
- Connect the Test 20 end of the high-pressure hose to test coupling (D)
- Connect the other end of the high-pressure hose to a nitrogen regulator
- If the accumulator gas valve is not already open loosen or tighten the lobe wheel (A) according to the accumulator type to allow the pressure to build up and register on the gauge
- Slightly open the valve on the nitrogen regulator until the required inflation pressure (P0) is reached and stabilized, close the valve of the nitrogen gas source
- For bladder accumulators manually unscrew the lobe wheel (A) anti-clockwise. The lobe wheel (A) allows re-closing of the gas valve. A clicking sound may be heard once the valve is fully closed
- For diaphragm accumulators manually screw the lobe wheel (A) clockwise. The lobe wheel (A) allows re-closing of the socket head cap screw (G)
- Loosen the drain valve (C) to purge the gas from the charging head (1)
- Carefully unscrew and remove the high-pressure hose to purge any remaining gas
- Reinstall cap to test coupling (D)
- For bladder accumulators remove the charging head (1) from the adaptor (4 or 6), (3+10), (3 or 2)
- For bladder accumulators unscrew the adaptor (4 or 6), (3+10), (3 or 2) fitted to the gas valve
- For diaphragm accumulators remove the charging head (1) from the M28 threaded connection and tighten the socket head cap screw (G) with supplied 6 mm hex key

⚠ Ensure there is no gas leakage by checking with soapy water or an equivalent specific product

⚠ Ensure the gas valve cap and protection cap are refitted

Pre-charging Accumulators Instructions

General

Prior to pre-charging an accumulator it is important that the inside of the accumulator shell be lubricated. New STAUFF accumulators are already lubricated internally during the manufacture / assembly process. For older units or accumulators that have been repaired and a new bladder installed, STAUFF recommend that the accumulator be lubricated with enough system fluid to evenly coat the inside of the shell. To ensure good lubrication lay the accumulator horizontally and rotate on its axis.

The pre-charge setting is recommended to be set to 80% - 90% of the minimum system working pressure if no specific pressure has been calculated.

⚠ **Note:** The following information applies to pre-charging new accumulators or after a bladder change when no gas pressure is present inside the accumulator.

Bladder Accumulators

Remove any plastic plugs that are fitted to the accumulator fluid port. Remove the accumulator gas valve protection cap and gas valve screw cap fitted to the gas side of the accumulator. Prepare a container to catch any fluid which may drain from the fluid port during charging.

Refer to page 5 for connection flow chart

- Select the adaptor according to the gas valve fitted to the accumulator (4 or 6), (3+10), (3 or 2)
- Ensure the pin in the adaptor is backed off by unscrewing the socket head cap screw (G) in an anti-clockwise direction. To do this use a 6 mm hex key from the charging kit
- Attach the appropriate adaptor to the accumulator gas valve
- Take the charging head (1) from the kit and install the pressure gauge compatible with the pressure (to be verified) and make sure the bleed valve (C) is open
- Manually tighten the knurled ring (B) of the charging head (1) to the adaptor, positioning the device in such a way that the pressure gauge values can be easily read
- Open the accumulator gas valve by tightening the lobe wheel (A) slowly clockwise until a small amount of resistance is felt. DO NOT over tighten the lobe wheel as it may cause damage to the gas valve core
- Refer below for applying the pre-charge pressure

Diaphragm Accumulators

Refer to page 5 for connection flow chart

- Ensure the socket head cap screw (G) is loose by untightening it using the 6 mm hex key supplied before the charging head (1) is fitted
- Take the charging head (1) from the kit and install the pressure gauge by attaching it to test coupling (E). Make sure the pressure gauge is compatible with the pressure (to be verified) and the bleed valve (C) is safely open
- Mount the charging head (1) directly to the accumulator M28 threaded connection (no adaptor required)
- Open the gas valve (socket head cap screw G) on the accumulator by unscrewing the lobe wheel (A) anti-clockwise no more than two complete turns
- Refer below for applying the pre-charge pressure

Applying the Pre-Charge Pressure (Accumulator has no gas)

Refer to page 5 for connection flow chart

- Remove cap from test coupling (D)
- Connect the Test 20 end of the high-pressure hose to test coupling (D)
- Connect the other end of the high-pressure hose to a nitrogen regulator
- Slightly open the valve of the nitrogen regulator until a small amount of gas can be heard coming from the bleed valve (C) which should be open
- After 5 seconds (0.7 Ltr - 4 Ltr) and 10 - 20 seconds (10 Ltr - 55 Ltr) slowly close the bleed valve (C). Allow the pressure to increase
- Slowly increase the pressure by opening the nitrogen regulator valve until the indicated pressure increases to the desired setting. Wait until temperature and pressure are stable, and if necessary increase the pressure again to the required setting. When the pre-charge pressure (P0) is reached and stabilized close the valve of the nitrogen gas source
- For bladder accumulators manually unscrew the lobe wheel (A) anti-clockwise. The lobe wheel (A) allows re-closing of the gas valve
- For diaphragm accumulators manually screw the lobe wheel (A) clockwise. The lobe wheel (A) allows re-closing of the socket head cap screw (G)
- Loosen the bleed valve (C) to purge the gas from the charging head (1)
- Carefully unscrew and remove the high-pressure hose to purge any remaining gas
- Reinstall cap to test coupling (D)
- For bladder accumulators remove the charging head (1) from the adaptor (4 or 6), (3+10), (3 or 2)
- For bladder accumulators unscrew the adaptor (4 or 6), (3+10), (3 or 2) fitted to the gas valve
- For diaphragm accumulators remove the charging head (1) from the M28 threaded connection and tighten the socket head cap screw (G) with supplied 6 mm hex key

⚠ Ensure there is no gas leakage by checking with soapy water or an equivalent specific product.

⚠ Ensure the gas valve cap and protection cap are refitted.

Maintenance of the STA-CK Charging Head (1)

It is recommended to check the various connections and adaptors at regular intervals for cleanliness, detection of possible defects, thread wear and sealing parts.

Contact STAUFF for more information.

⚠ Only use “gas approved" test hose

⚠ For use with nitrogen (N_2) gas only

⚠ Safety goggles must be worn at all times

⚠ STAUFF pressure gauges are safety pattern type according to AS1349

Gas Pressure Change According to Temperature Variation

Basis of Calculation

$$P0\,t2 = P0\,t1 \times \frac{t2 + 273}{t1 + 273}$$

t2 = Operating Temperature
t1 = Temperature = 20°C / 68°F

Value of the nitrogen gas inflation pressure (P0) according to the operating temperature (t2)
Example: Inflation pressure (P0) at operating temperature t2 in bar (absolute value) = 88 bar

173	183	186	193	200	207	214	221	227	234	241	248	255	261	268
164	171	177	184	190	197	203	210	216	222	229	235	242	248	255
155	162	168	174	180	186	192	198	205	211	217	223	229	235	241
147	153	158	164	170	176	182	187	193	199	205	211	216	222	228
138	144	149	155	160	166	171	176	182	187	193	198	204	209	215
130	135	140	145	150	155	160	165	171	176	181	186	191	196	201
121	126	130	135	140	145	150	154	159	164	169	173	178	183	188
112	117	121	126	130	134	139	143	148	152	157	161	166	170	174
104	108	112	116	120	124	128	132	136	141	145	149	153	157	161
95	99	103	106	110	114	118	121	125	129	133	136	140	144	148
91	94	98	101	105	109	112	116	119	123	127	130	134	137	141
86	90	93	97	100	103	107	110	114	117	120	124	127	131	134
82	85	89	92	95	98	102	105	108	111	115	118	121	124	127
78	81	84	87	90	93	96	99	102	105	108	112	115	118	121
73	76	79	82	85	88	91	94	97	100	102	105	108	111	114
69	72	75	77	80	83	86	88	91	94	96	99	102	105	107
65	67	70	72	75	78	80	83	85	88	90	93	96	98	101
60	63	65	68	70	72	75	77	80	82	84	87	89	92	94
56	58	61	63	65	67	69	72	74	76	78	81	83	85	87
52	54	56	58	60	62	64	66	68	70	72	74	76	78	81
48	49	51	53	55	57	59	61	63	64	66	68	70	72	74
43	45	47	48	50	52	53	55	57	59	60	62	64	65	67
39	40	42	43	45	47	48	50	51	53	54	56	57	59	60
35	36	37	39	40	41	43	44	45	47	48	50	51	52	54
30	31	33	34	35	36	37	39	40	41	42	43	45	46	47
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
22	22	23	24	25	26	27	28	28	29	30	31	32	33	34
17	18	19	19	20	21	21	22	23	23	24	25	26	26	27
13	14	14	15	15	16	16	17	17	18	18	19	19	20	20
8.6	9	9.3	9.7	10	10	11	11	11	12	12	12	13	13	13
4.3	4.5	4.7	4.8	5	5.2	5.3	5.5	5.7	5.9	6	6.2	6.4	6.5	3.7
-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120

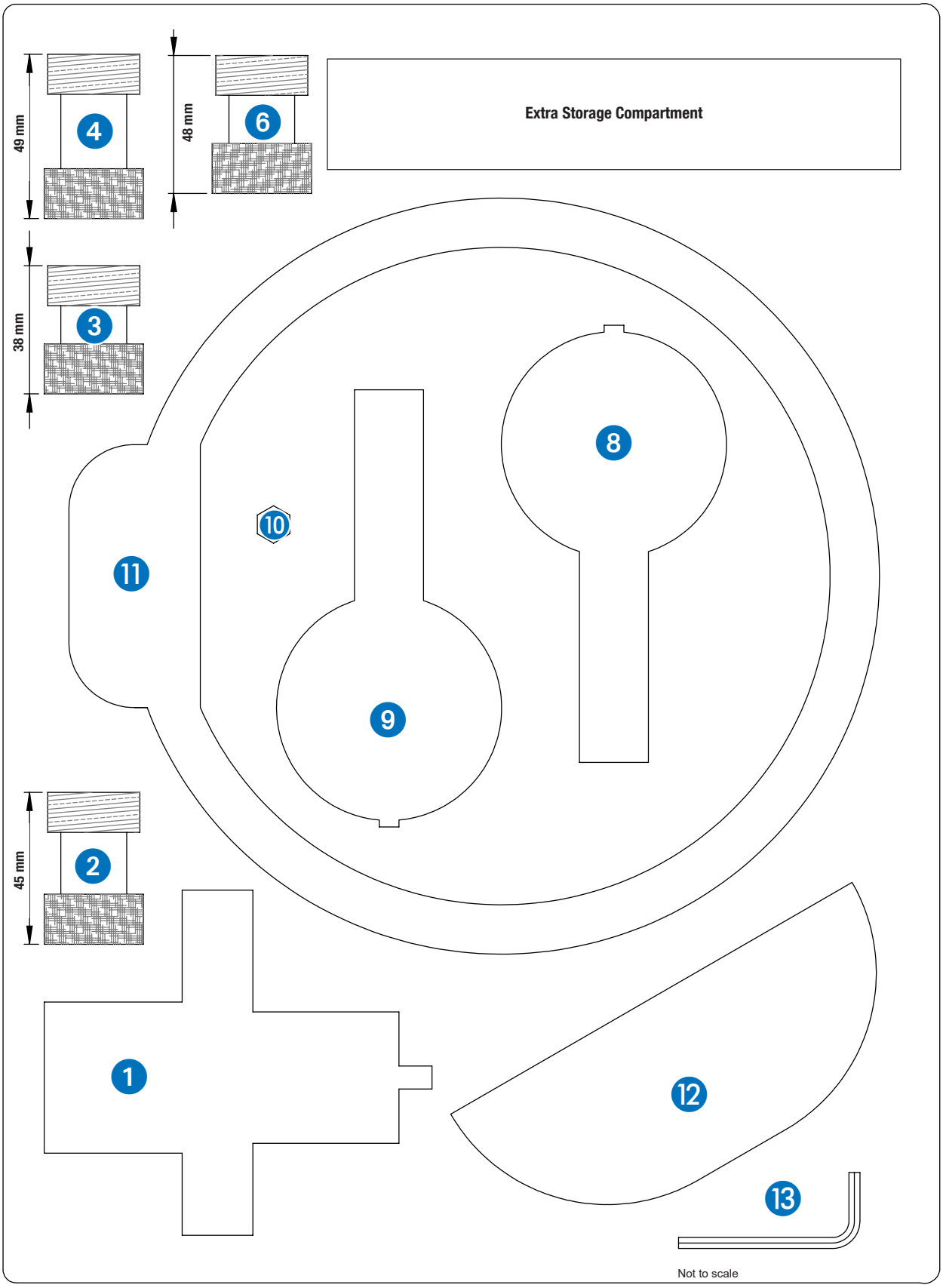
Example:

Nitrogen gas inflation pressure (P0) at 20°C / 68°F (absolute value) = 80 bar

Example:

Operating temperature t1 = 50°C / 122°F

Component Contents



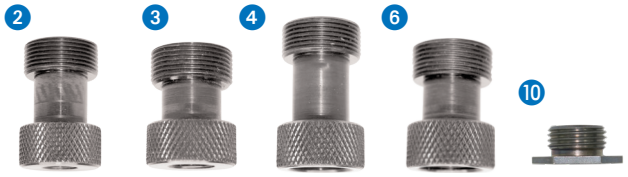
No.	Item No.	Designation
1	3426010190	STA-CK-CHRG-HEAD-M28
2	3426010223	STA-CK-ADP-M28-1/4
3	3426010220	STA-CK-ADP-M28-5/8
4	3426010852	STA-CK-ADP-M28-7/8L
6	3426010215	STA-CK-ADP-M28-7/8S

No.	Item No.	Designation
8*	6100161936	SPG-063-00100-01-S-B04-490179
9*	6100161938	SPG-063-00250-01-S-B04-490179
10	3426010854	STA-CK-ADP-5/8-0.305
11	6100017542	SGS-20/B1/4-2000-C-W3
12	3499000031	CK-GOGGLES-S
13	1930020934	CK-HEX-TOOL-06
* 8 & 9 include: 1210026219 - SMD-20-G1/4-B-OR-W3		

Component Contents

Charging head

No.	Item No.	Designation
1	3426010190	STA-CK-CHRG-HEAD-M28



Charging adaptors

No.	Item No.	Designation
2	3426010223	STA-CK-ADP-M28-1/4
3	3426010220	STA-CK-ADP-M28-5/8
4	3426010852	STA-CK-ADP-M28-7/8L
6	3426010215	STA-CK-ADP-M28-7/8S
10	3426010854	STA-CK-ADP-5/8-0.305

Gauges

No.	Item No.	Designation
8	6100161936 - Gauge 1210026219 - SMD	SPG-063-00100-01-S-B04-490179 SMD-20-G1/4-B-OR-W3
9	6100161938 - Gauge 1210026219 - SMD	SPG-063-00250-01-S-B04-490179 SMD-20-G1/4-B-OR-W3

Accessories

No.	Item No.	Designation
11	6100017542	SGS-20/B1/4-2000-C-W3
12	3499000031	CK-GOGGLES-S
13	1930020934	CK-HEX-TOOL-06

Optional

STAUFF Nitrogen Regulator (sold separately)

Item No.	Designation
6100206346	STA-NR-400-300-T51-400S-400S-G04

Optional

Adaptor to suit Chinese M14 gas valve - (sold separately)

Item No.	Designation
3426010762	STA-CK-ADP-M28-M14

Type 50 Type 51

Optional

Type 50 & 51 Gas adaptors (sold separately)

Item No.	Designation
6100065980	STA-N2-ADP-M07-50-N04
6100065981	STA-N2-ADP-M07-51-N04

Note: Component slot available in charging kit for gas adaptors

⚠ Only use “gas approved" test hose

⚠ For use with nitrogen (N_2) gas only

⚠ Safety goggles must be worn at all times

⚠ STAUFF pressure gauges are safety pattern type according to AS1349

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