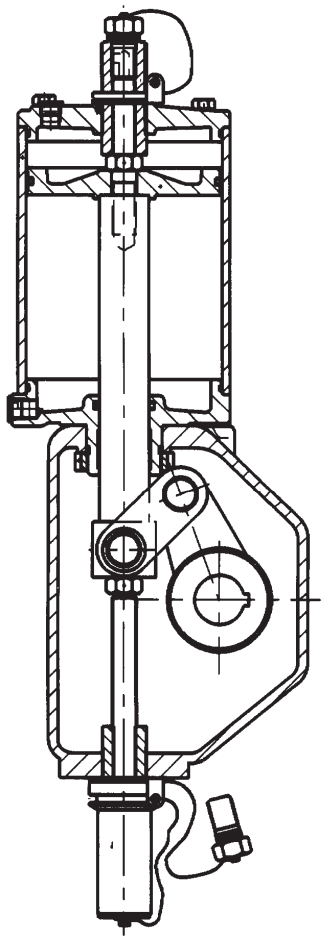
LOCKING DEVICE

For cylinder actuators
Types B_Q, B_W and B_QW
Type B_D

Installation, maintenance and operating instructions



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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL (TYPE Q, W & QW)

This locking device is designed for Neles B1-series actuators. Locking device is intended to be used for safety lock up function during service operation. These instructions contain the information needed for operating the locking device, additional information on B1-actuators are available from the instructions on installation, operation and maintenance of the model in question. The locking is carried out by a long screw, which disables the actuator piston movement. The valve locking can be done with zero backlash, which enables good tightness for example with butterfly valves.

The locking device can be recognized from type codes Q, W or QW. Letter W in type code is for locking device on cylinder head and letter Q means that locking device is installed on the bottom of the housing.

Safety lock up can be done usually to open or close position, end position of the operating range. Using both codes Q and W the locking can be adjusted to any position between open and close.

1.1 Parts and fittings

Locking device includes permanent parts (Fig. 1) and separate locking parts (Fig. 2). The locking parts are needed only when safety locking is needed, otherwise these parts are on the specified location or on the stock.

The locking device parts on actuators B1_W and B1_Q are equal exept on actuators B1J and B1JA sizes 16-32. This is important because it is possible to use same locking screw and cap cover (separate parts) for open or closed direction locking (Q or W), exept on previous mentioned actuators. See more detailed information from section 1.1.3.

Permanently mounted parts

Following parts are included in the locking device, other parts are similar to standard actuators:

270, 271	Spindle nut, (use as a limit screw)
272, 273	Lock nut (type DIN 981)
274, 275	O-ring
276, 277	Plug screw
278, 279	Hexagon socket screw
280, 281	Plug screw fastener (locking plate & wire)
285, 286	Spring pin

Separate locking parts

These parts are necessary only for safety locking, during standars opeartion use, they are dismantled.

Note: Actuator B1CQ has same part numbering as B1CW

118, 287	Cap cover
128, 288	Hexagon lock screw
162, 289	Pin fastener (pin & wire)
282, 283	Hexagon lock nut
284	Hexagon socket screw

CAUTION:
Do not open the plug screw (276, 277) or lock screw (128, 288) while the actuator is pressurized.

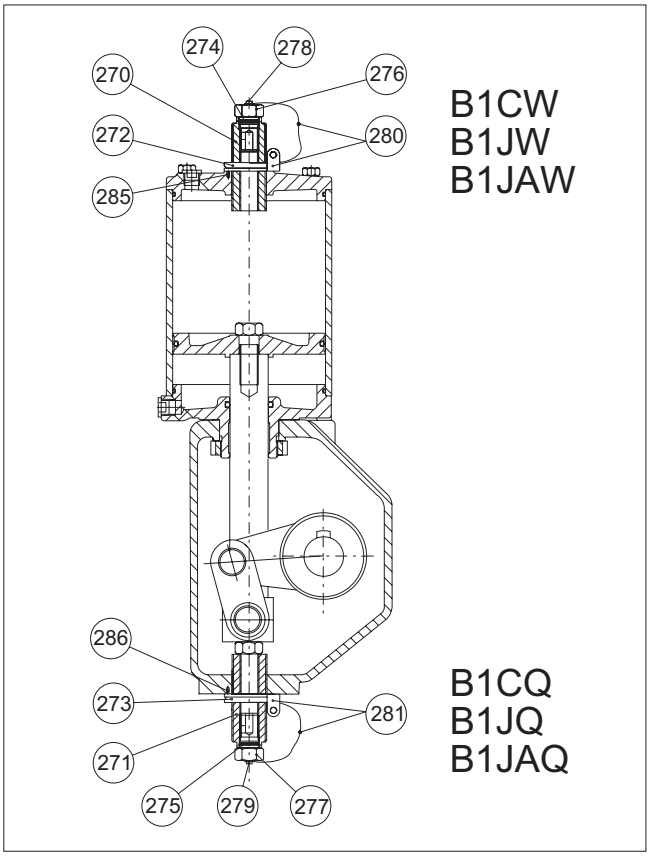

Fig. 1 Permanent parts assembly drawing

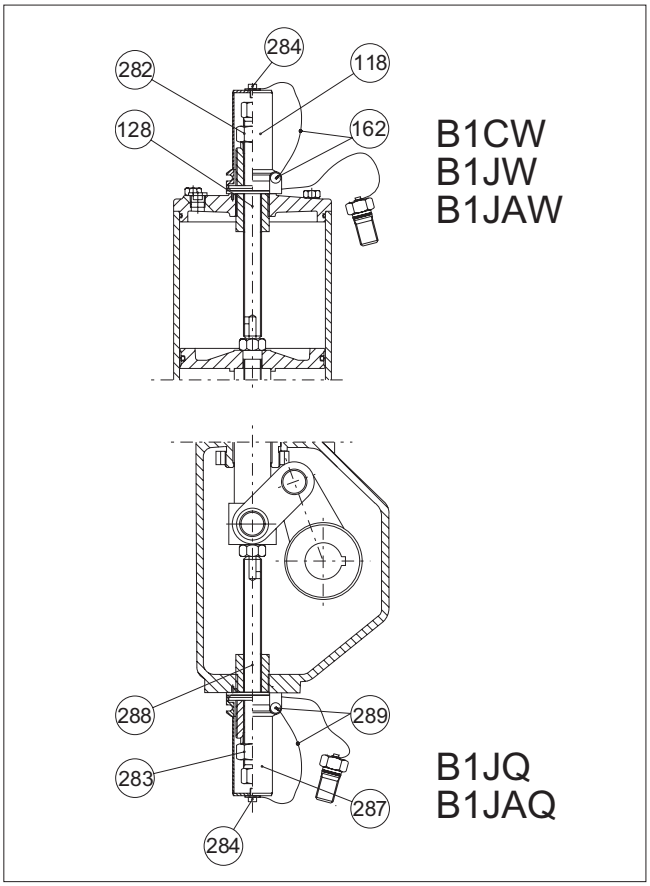

Fig. 2 Separate locking parts assembly drawing

Finding the correct locking parts for different actuators

One sizes of locking parts device sets device sets are usually suitable for many sizes of B1_Q and B1_W actuators. The possible combinations can be found out from Table 1.

a) Cap cover (118, 287) and pin (162, 289)

b) Hex. lock screw (128, 288) and hex. lock nut (282, 283)

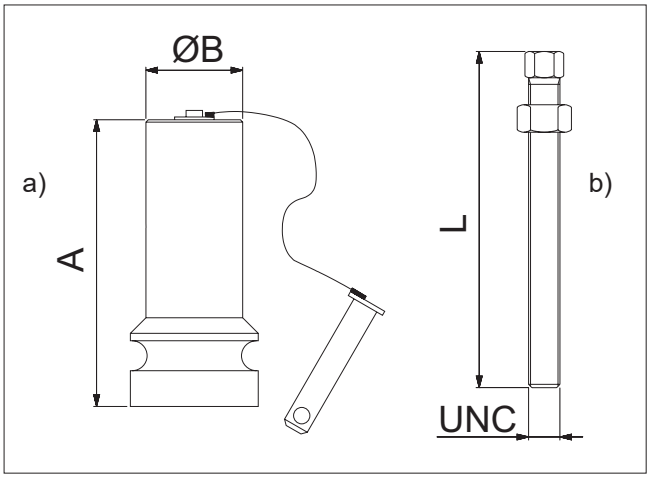

Fig. 3 a) Cap cover (118, 287) and pin (162, 289)
b) Hex lock screw (128, 288) and hex lock nut (282, 283)

Table 1 Possible combinations of type Q & W locking parts.

Actuator	Suitable locking device				Actuator	Suitable locking device			
	A	Ø B	L	UNC		A	Ø B	L	UNC
B1CQ 6	100	26	148	3/8	B1CW 6	100	26	148	3/8
B1CQ 9-20	270	42	336	3/4	B1CW 9-20	270	42	336	3/4
B1CQ 25,32	285	51	506.5	1	B1CW 25, 32	285	51	506.5	1
B1CQ40, 50	415	77	767	1 1/2	B1CW 40, 50	415	77	767	1 1/2
B1JQ 8-12 B1JAQ 8-12	270	42	336	3/4	B1JW 8-12 B1JAW 8-12	270	42	336	3/4
B1JQ 16, 20 B1JAQ 16, 20	270	42	336	3/4	B1JW 16, 20 B1JAW 16, 20	270	51	506.5	1
B1JQ 25, 32 B1JAQ 25, 32	285	51	506.5	1	B1JW 25, 32 B1JAW 25, 32	415	77	767	1 1/2

Adjustment of valve travel stops

There are two adjustable spindle nuts in the actuator, one in the cylinder head and one in the bottom of the housing. These spindle nuts limits the movement of the piston in the extreme positions.

The spindle nut (270, 271) in locking device works as a limit screw and it should be adjusted similar to standard B1-actuator limit stop screw. The spindle nut (270, 271) is secured by a lock nut (272, 273). Non-hardening sealant, for example Loctite 255, should always be used for sealing the stop screw. Be careful when adjusting the limits, because the spindle nut may come out if turned too much.

2. SAFETY PRECAUTIONS

CAUTION:

Before installation or removal of locking device make sure it is permitted to operate the valve (without disturbing the process).

CAUTION:

Air pressure must always be released before detaching any parts from the locking device!

Do not remove the plug screw (276, 277) or lock screw (128, 288) while the actuator is pressurized. It can cause an uncontrolled pressure release which may result in damage or personal injury.

CAUTION:

Be careful when adjusting actuator travel stops.

The spindle nut (270, 271) may come out if turned too much. If the actuator is pressurized it can cause uncontrolled pressure release which may result in damage or personal injury.

CAUTION:

Do not use the lock screw for manual operation of the actuator or the valve!

This may damage the actuator cylinder, housing or locking device.

CAUTION:

Double cylinder actuator requires double locking!

Double cylinder actuator construction has two pistons, therefore it also has double amount of locking devices, which are located at both ends of the actuator. Both locks need to be used for locking the actuator safely: e.g. double cylinder actuator with only either W or Q locking still requires two locking devices to be used to safely lock the actuator to open (2x W) or close (2x Q) position.

3. INSTALLATION AND OPERATION

Actuators with type code Q are designed for locking the valve closed and actuators with type code W are designed for locking the valve open. Actuators with type code QW have possibilities to lock the valve either open or closed and every position between open and closed, see Fig. 4.

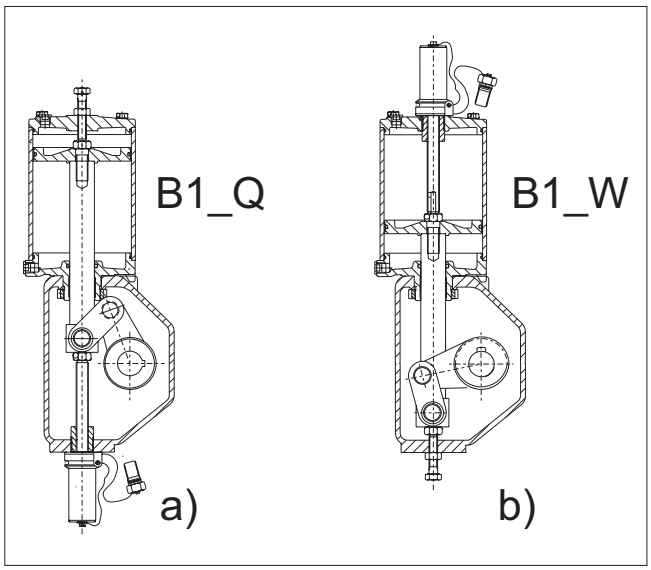

Fig. 4 a) Valve locked closed (B1_Q)
b) Valve locked open (B1_W)

CAUTION:
Do not lock from one side only to intermediate position!
Intermediate position locking requires two locking devices (QW) and both of them need to be used for safe locking.

3.1 Installing the locking device

The same instructions are valid for B1_Q and B1_W actuators. However, when the valve is locked open by B1CW or B1JAW locking device (the procedure shown in these instructions), you must be more careful because of possible air pressure in actuator cylinder.

CAUTION:
Before installation or removal of locking device make sure it is permitted to operate the valve (without disturbing the process).

CAUTION:
Air pressure must always be released before detaching the plug screw (276, 277)!

- Remove air pressure from the actuator.
- Remove the plug screw (276, 277) and turn the lock screw (128, 288) to the same thread. Turn the lock screw (128, 288) until it reaches the piston rod, see Fig.5.

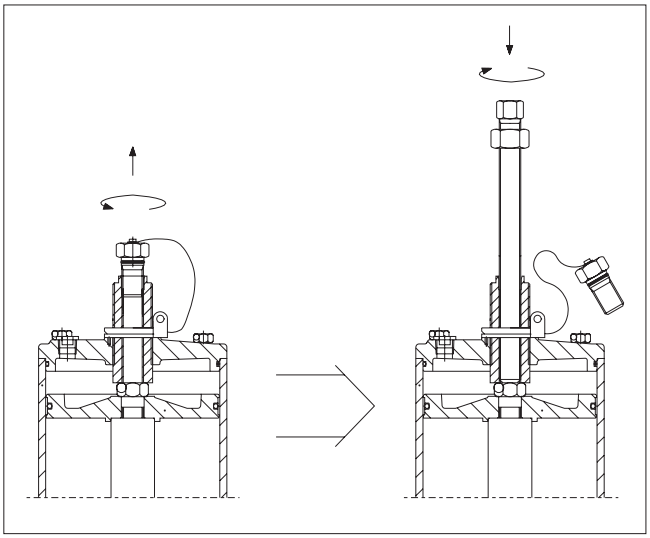

Fig. 6 Changing the plug screw (276, 277) to lock screw

- Connect air pressure and move the piston to the end position by using air pressure, see Fig. 6.

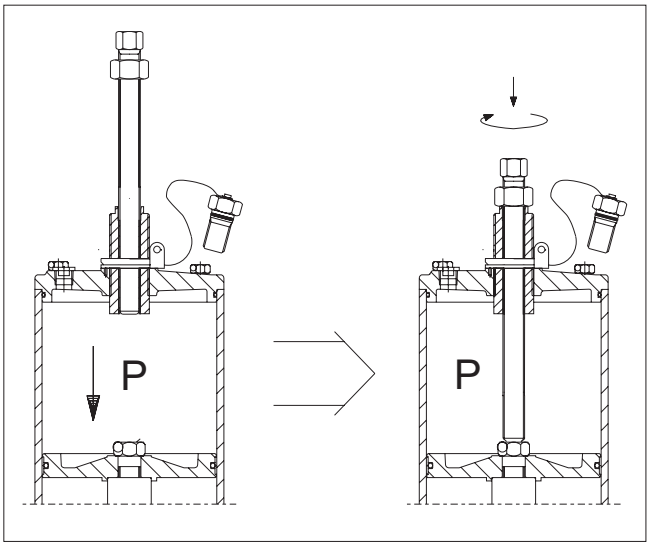

Fig. 7 Procedures to tighten the lock screw (128, 288)

Q Mechanical locking of the bottom of the housing

W Mechanical locking device for the cylinder end

CAUTION:
Do not use the lock screw for manual operation of the actuator or the valve!

- Turn the lock screw (128, 288) clockwise again until it is tightly against the piston rod. Tighten the lock nut (282, 283), see Fig. 6. You can now release air pressure.
- Install the cap cover (118, 287) and lock it up by pushing the pin (162, 289) through the holes in the locking plate (280, 281). You may want to secure the locking by a padlock or some other lock which can be pushed through the hole at the end of the pin (162, 289), see Fig. 7.

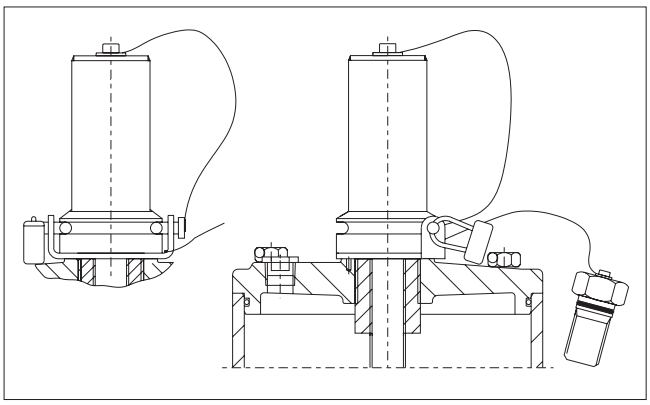

Fig. 8 The cap cover (118, 287) installed and secured by a padlock

3.2 Removing the locking device

CAUTION:
Before removing the locking device make sure it is permitted to operate the valve (without disturbing the process).

- Release air pressure from the actuator if it is pressurized.
- Pull the pin (162, 289) off from the locking plate (280, 281) and remove the lock hat (118,287).

CAUTION:
Air pressure must always be released before attaching or detaching the lock screw (128, 288)!

- Turn the lock nut (282, 283) loose and remove the lock screw (128, 288).
- Turn the plug screw (276, 277) to the thread in spindle nut (270, 271).
- Connect air pressure if it is needed to change the valve position.

4. GENERAL (TYPE D)

This is a simple service locking device option designed for Neles B1-series actuators, which can be used for locking to close position only.

Locking device is intended to be used for safety lock up function during service operation. These instructions contain the information needed for operating the locking device, additional information on B1-actuators are available from the instructions on installation, operation and maintenance of the model in question.

The type D locking system is build onto housing (leverage) section of the actuator. Standard limit stop bolt is replaced by a longer limit stop bolt together with a small hand wheel and an angle plate, so that locking to close position becomes possible with a padlock.

4.1 Parts and fittings (type D)

Type D locking device includes only parts needed during lock-up. Parts can be removed & stored as spare kit, when locking device is not needed.

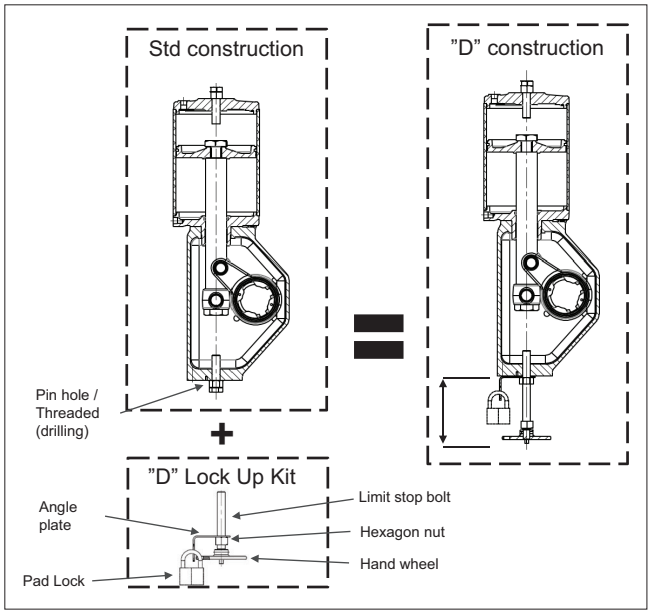

Fig. 9 Standard construction B1 actuator can be fitted with type D lock up kit afterwards in service.

Locking option type D can be used in B1 actuators sizes from 6 up to 50. It is available both in new actuator units and also as separate service kit to modify on existing actuators. Please note the additional machining needed instructed in this IMO in case of such retrofit installation.

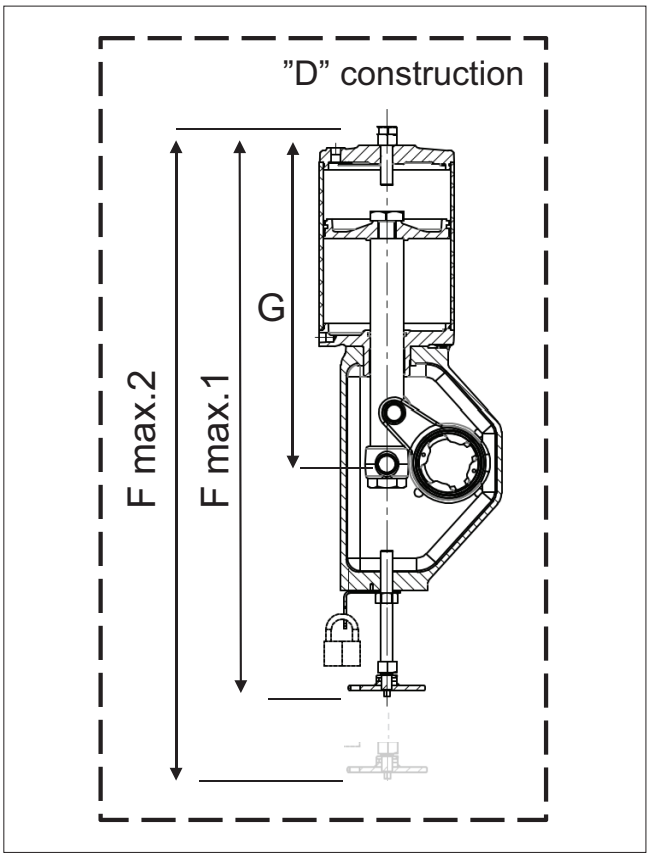

Fig. 10 Overall dimensions of Type D locking in assembly and normal operation situation.

The required space around the actuator housing is the same as with type Q locking option after installed, but extra space may be needed during installation work. Actuator travel stop open end operating limit settings needed to be reset after lock up before returning to normal operation.

For overall dimensions please refer to Fig. 9 and table 2.

Table 2 Dimensions for B1 actuators

	BC9	BC11	BC13	BC17	BC20	BC25	BC32	BC40	BC50
G	315	375	445	555	590	725	920	1150	1390
Fmax.1	602	672	799	969	1102	1322	1682	2062	2534
Fmax.2	616	690	822	937	1141	1372	1744	2119	2610
L1	183	179	201	232	283	342	400	505	606
L2	107	88	86	95	112	114	131	163	179

	BJ6	BJ8	BJ10	BJ12	BJ16	BJ20	BJ25	BJ32	BJ40
G	378	410	468	593	733	880	1088	1325	1476
Fmax.1	654	702	777	959	1168	1412	1727	2113	2456
Fmax.2	681	722	802	989	1132	1456	1782	2183	2536
L1	175	182	178	250	253	285	328	400	495
L2	115	107	89	135	117	115	115	130	155

F1 dimension = Limit stop screw adjusted at 90° Open.

F2 dimension = Limit stop screw assembly dimension.

5. SAFETY PRECAUTIONS

CAUTION:
Before installation or removal of locking device make sure it is permitted to operate the valve (without disturbing the process).

CAUTION:
Do not use the lock screw for manual operation of the actuator or the valve! This may damage the actuator housing or locking device.

6. INSTALLATION AND OPERATION (TYPE D)

6.1 Installing the locking device

Existing installed base actuators are easy to convert to include Type D Service Lock Up feature. See below steps and Fig 10.

CAUTION:
Before installation or removal of locking device make sure it is permitted to operate the valve (without disturbing the process).

CAUTION:
Air pressure must always be released before detaching any parts from the actuator!

Steps for conversion:

1. Remove standard Limit stop bolt (27) and Hexagon nut (34). -Make additional machining of housing bottom for Spring pin. See Fig. 11 & 12 and table 3.
2. Place Angle plate (167) to housing (1) bottom and secure with spring pin (166), also with screw on larger sizes.
3. Fasten Hand wheel (165) to new longer Limit stop bolt (164) by spring pin (169).
4. Screw in longer Limit stop bolt (164) and adjust to correct length setting. Adjustment length depends on if Normal operating range or Lock up to close, secure Limit stop bolt setting and Angle plate (167) with Hexagon nut (164a)
5. Service Lock Up position can be secured by additional padlock (not included in kit).

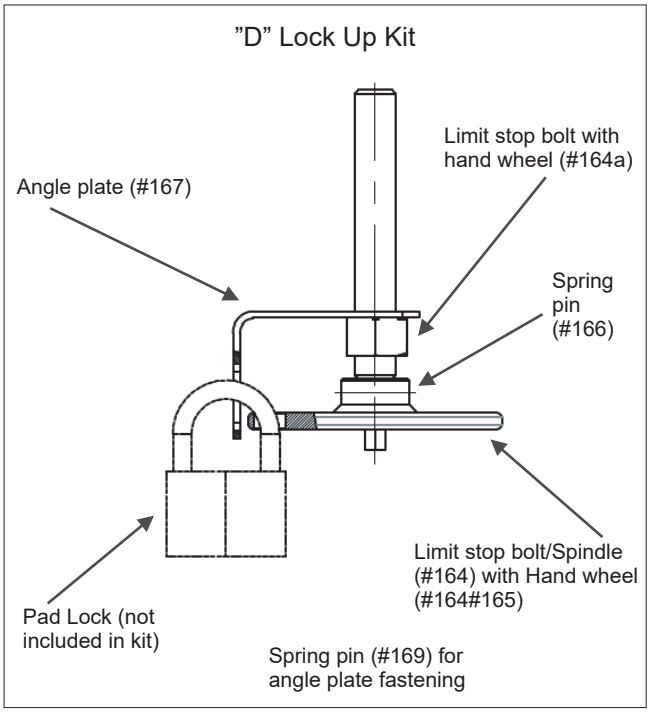

Fig. 11 Type D locking kit parts

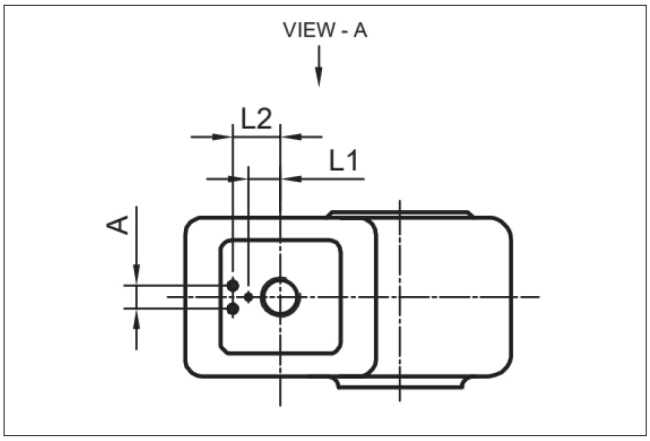

Fig. 12 Additional machining location. See table 3 also.

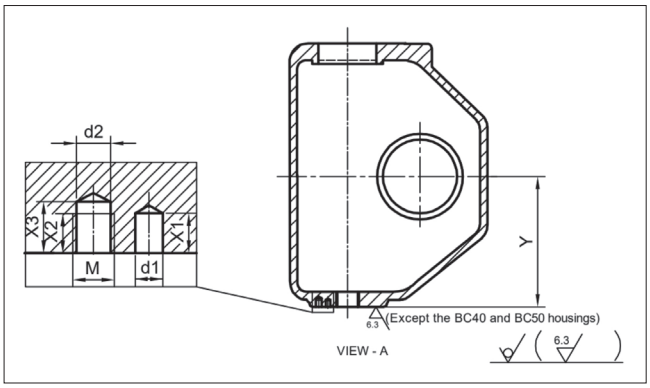

Fig. 13 Locations for Additional Machining of Housing for Angle Plate

Table 3 Dimensions for Additional Machining of Housing for Angle Plate

BCD	L1	X1	d1	A	L2	X2	X3	d2	M	Y
9	20	6	4							92
11	20	12	4							110
13	21	12	6							138
17	21	12	6							167
20	25	12	6							203
25	30	12	6							252
32				50	70	18 +2	24 +2	10.8	M12	318
40				50	70	18 +2	24 +2	10.8	M12	
50				50	70	18 +2	24 +2	10.8	M12	

6.2 Limit Stop Screw Adjustment

Limit stop screw adjustment is required to make the actuator work as intended again.

CAUTION:
Do not use the lock screw for manual operation of the actuator or the valve!

CAUTION:
Air pressure must always be released before detaching any parts from the locking device!

Limit Stops Screws adjustment steps when installing Type D locking to a standard B1 actuator

1. Operate the actuator to close position
2. De-energize the actuator
3. Measure & record L1 dimension (refer to L1 in table 4 & Fig. 13).
4. Loosen the Hexagon nut securing the Limit stop bolt setting on actuator housing side.
5. Screw in the Limit stop bolt until it makes firm contact (refer to L2 in table 4 and Fig. 13).
6. Secure Limit stop bolt Lock Up setting by Hexagon nut.
7. Secure hand wheel to Angle plate by Pad lock.

Note: Adjustment and locking steps in opposite order when returning from Lock Up to Normal operation set up.

L1 dimension = Limit stop screw adjusted at 90° Open.

L2 dimension = Limit stop screw adjusted at 0° Close (Lock Up).

Table 4 Guideline dimensions for limit stop screw adjustment

	BC9	BC11	BC13	BC17	BC20	BC25	BC32	BC40	BC50
G	315	375	445	555	590	725	920	1150	1390
Fmax.1	602	672	799	969	1102	1322	1382	2062	2534
Fmax.2	616	690	822	937	1141	1372	1744	2119	2610
L1	183	179	201	232	283	342	400	505	606
L2	107	88	86	95	112	114	131	163	179

	BJ6	BJ8	BJ10	BJ12	BJ16	BJ20	BJ25	BJ32	BJ40
G	378	410	468	593	733	880	1088	1325	1476
Fmax.1	654	702	777	959	1168	1412	1727	2113	2456
Fmax.2	681	722	802	989	1132	1456	1782	2183	2536
L1	175	182	178	250	253	285	328	400	495
L2	115	107	89	135	117	115	115	130	155

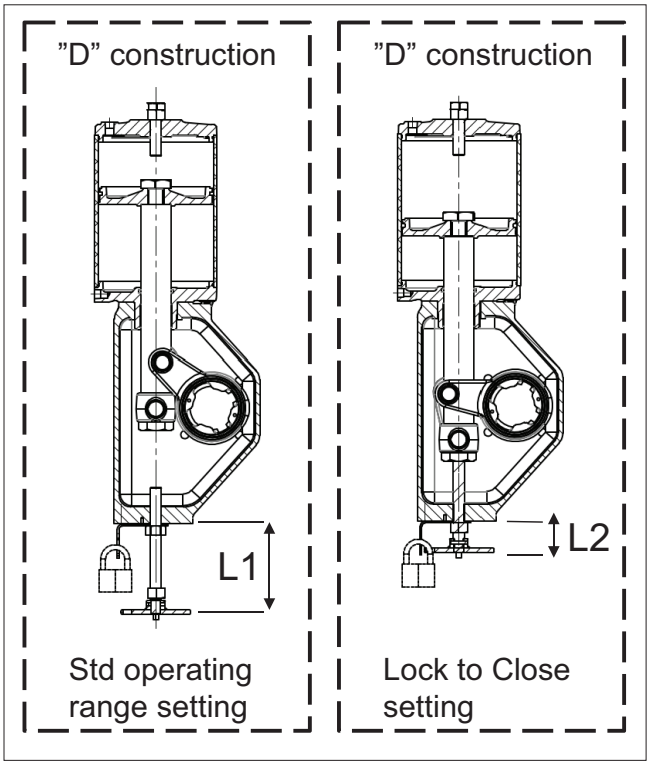

Fig. 14 Limit stop screw adjustment illustration

7. TYPE CODE

Pneumatic double-acting cylinder actuator, B1C									
1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**
B1	C	–	S	Q	U	50/120	H	E	X

1.	Product group
B1	Cylinder actuator with attachment dimensions acc. to ISO 5211

2.	Series
C	Double acting, pneumatic, protection class IP66.

3.	Construction
-	Standard construction without sign

4.	Cylinder and housing materials
-	Aluminium cylinder and EN 1561-GJL-200 housing, standard materials, without sign. Except if sign 8. is arctic version “A” then housing and piston always EN 1563-GJS-400-15.
S	Carbon steel cylinder and EN 1561-GJL-200 housing and piston. Except if sign 8. is arctic version “A” then housing and piston always EN 1563-GJS-400-15. (Not available with size 6).
B	Aluminium cylinder and EN 1563-GJS-400-15 housing and piston, (Not available with size 6). When 8. sign is “A”, without sign, standard material.
X	Carbon steel cylinder and EN 1563-GJS-400-15 housing and piston, (Not available with size 6).

5.	Special construction
-	Standard construction without sign
D	Simple Service Lock Up with mechanical locking device for piston movement limit on housing end. Locking with long screw to close position. (Not available with size 502, 602, 752).
Q	Service lock up with mechanical locking device for piston movement limit on housing end. Locking with long screw to **close** position.
W	Service lock up with mechanical locking device for piston movement limit on cylinder end. Locking with long screw to **open** position.
QW	Service lock up with mechanical locking device for piston movement limit on housing and cylinder ends. Locking with long screw to close as well as to open position.
Z	Actuator equipped with shock absorber on cylinder end, for temperatures -20... +120 °C
N	Actuator equipped with shock absorber on housing end, for temperatures -20... +120 °C
P	Actuator equipped with automatic latching device for closed position. Design is made mainly for actuator locking device of capping valve. No free motion.
T	Actuator equipped with manual latching device. Actuator can be locked to **open** position allowing about 20 degrees’ motion.

6.	INTERFACE FOR ADDITIONAL DEVICES (positioner, limit switch)
U	Interface according to VDI/VDE 3845, standard construction.

7.	Actuator size
	6/15 6/20 6/25 - 9/15 9/20 9/25 9/35 - 11/20 11/25 11/35 11/40 - 13/55 - 17/55 - 20/70 - 25/95 - 32/105 - 40/95 40/105 40/120 - 50/120 50/135

8.	Materials of seals and bearings (all versions ATEX II 2 G/D h and ATEX II 3 G/D h)
-	Standard construction without sign (-20° to +70 °C)
HL	For temperatures -20... +120 °C and long-run option L
CL	For temperatures -40... +70 °C, and long-run option L
A	For temperatures -55... +70° C. Arctic service model. Not available if 3. sign is "H" or 11. sign is "M". Size 6 not available.
F	Oversized NPT connections: fast operation
F1	Larger oversized NPT connections: faster operation
L	Long-run option
S	Super long-run option (-20 to +70 °C)
Y	Special

9.	Screw material
-	Stainless steel (standard) for sizes 6-32. Steel, zinc coated and passivated (standard) for sizes 40 and bigger. Steel, zinc coated and passivated for all sizes with steel cylinder, sign 4 is S or X.
E	Stainless steel for sizes 40 and bigger with aluminium cylinder. Stainless steel for all sizes with steel cylinder, sign 4 is S or X.

10.	Non-standard operation range
-	Standard, X=0, Y=90
X	Valve closed position is limited. **X can be any value between 0-90º.** For example, when closed position is limited to 30 º, **X = 30** (never fully closed).
Z	Valve open position is limited. **Z can be any value between 90-0º.** For example, when open position is limited to 70 º, **Z = 70** (never fully open).
XZ	Valve closed and open position are limited. For example, X = 30 (closed position is limited to 30°) For example, Z = 70 (open position is limited to 70°)

11.	Special construction
6	Protection class IP66M
7	Protection class IP67/IP67M
G	Oxygen service model
T	Tropicalization

Pneumatic spring-return cylinder actuator, B1J											
1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**
B1	J	K	A	R	S	W	U	20/70	H	E	Z

1.	**Product group**
B1	Cylinder actuator with attachment dimensions acc. ISO 5211

2.	**Series**
J	Pneumatic, spring-return, protection class IP66.

3.	**Spring option**
-	Standard construction without sign
K	Light spring
V	Strong spring

4.	**Function code**
-	Spring-to-close operation without sign
A	Spring-to-open operation

5.	**Construction**
-	Standard construction without sign

6.	**Cylinder and housing materials**
-	Aluminium cylinder and EN 1561-GJL-200 housing, standard materials without sign. Except if sign 10. is arctic version “A” then housing and piston always EN 1563-GJS-400-15.
S	Carbon steel cylinder and EN 1561-GJL-200 housing and piston. Except if sign 10. is arctic version “A” then housing and piston always EN 1563-GJS-400-15.
B	Aluminium cylinder and EN 1563-GJS-400-15 housing and piston.
X	Carbon steel cylinder and EN 1563-GJS-400-15 housing and piston

7.	**Special construction**
-	Standard construction without sign
D	Simple Service Lock Up with mechanical locking device for piston movement limit on housing end. Locking with long screw to close position.
Q	Service lock up with mechanical locking device for piston movement limit on housing end. Locking with long screw to **close** position
W	Service lock up with mechanical locking device for piston movement limit on cylinder end. Locking with long screw to **open** position
QW	Service lock up with mechanical locking device for piston movement limit on housing and cylinder ends. Locking with long screws to close as well as to open position

8.	**Interface for additional devices (positioner, limit switch)**
U	Interface according to VDI / VDE 3845, standard construction.

9.	**Actuator size**
	6/15 6/20 6/25 - 8/15 8/20 8/25 8/35 - 10/20 10/25 10/35 10/40 - 12/55 - 16/55 - 20/70 25/95 - 32/105 - 40/95 40/105 40/120

10.	**Materials of seals and bearings (all versions ATEX II 2 G/D h and ATEX II 3 G/D h)**
-	Standard construction without sign (-20° to +70 °C)
HL	For temperatures -20... +120 °C and long-run option L
CL	For temperatures -40... +70 °C, and long-run option L
A	For temperatures -55... +70 °C. Arctic service model. Not available if 5. sign is "H" or 13. sign is "M".
F	Oversized NPT connections: fast operation
F1	Large oversized NPT connections: faster operation
F2	Largest oversized NPT connections: fastest operation
L	Long-run option
S	Super long-run option. (-20... +70 ºC)
Y	Special

11.	**Screw material**
-	Standard (without sign): Stainless steel for sizes 6 through 20 with aluminum cylinder. Steel zinc coated and passivated studs and nuts for sizes 25 and bigger with aluminum cylinder. Steel zinc coated and passivated studs and nuts for all sizes with carbon steel cylinder.
E	Stainless steel for sizes 25 and bigger with aluminium cylinder. Stainless steel for all sizes with steel cylinder.

12.	**Non-standard operation range**
-	Standard, X=0, Y=90
X	Valve closed position is limited to a given angle. **X can be any value between 0-90º.** For example, when closed position is limited to 30 º, **X = 30** (never fully closed).
Z	Valve open position is limited to a given angle. **Z can be any value between 90-0º.** For example, when open position is limited to 70 º, **Z = 70** (never fully open).
XZ	Valve closed and open position are limited. For example, X = 30 (closed position is limited to 30°) For example, Z = 70 (open position is limited to 70°)

13.	**Special construction**
6	Protection class IP66M
7	Protection class IP67/IP67M
G	Oxygen service model
T	Tropicalization

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