

# Instructions for Using HYDROCAM Tensioners

(applies for all HYDROCAM Tensioners unless otherwise stated)





**Caution !**

**Using high-pressure equipment can be dangerous if necessary precautions are not taken before and during use.**

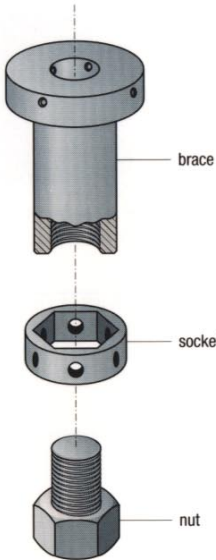
**For your safety, follow these instructions:**

- Never use damaged parts (quick couplers, hoses, screwed couplers, manometer, etc).
- Prior to integrating the components into the circuit, be sure that they have been tested at more than the used pressure.
- Never sharp bend the hoses and never unscrew connected coupling connectors.
- Check that the quick-coupling connectors are properly installed and that the other coupling connectors are properly screwed.
- Always use a tested or calibrated manometer (or pressure sensor) to check the pressure in the circuit, and test the manometer for proper operation at regular intervals.
- Never modify the equipment parts by drilling, milling, lathing, soldering, etc.
- Check that the stud (or the bolt) which is to be tightened is in good condition: no cracks, no permanent deformation, etc.
- When you screw the brace on the bolt, make sure that the bolt does not turn and that the brace grips the bolt over at least 0.8 d.
- Never stand opposite the brace when applying tractive force.
- Never exceed the pressure which corresponds to the maximum load indicated for a part (brace, reaction nut ...).
- Never exceed the pressure indicated on the hydraulic body of the bolt tensioner.
- Always wear goggles and a helmet.

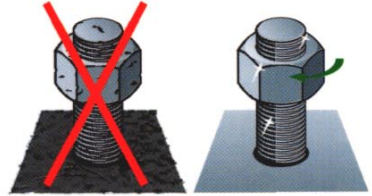
# Instructions 1 to 5 must be followed for every type of tensioner

- 1**
- Choose the Hydrocam tensioner which best suits your application.
  - Choose the brace and the socket which correspond to the bolt to be tightened.

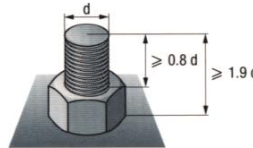
(Please refer to the brochure "HYDROCAM Bolt Tensioners Industrial Tightening Systems").



- 3**
- Clean the bolt and the nut to be tightened.
  - Ensure that the nut can be screwed on by hand (only for tightening).



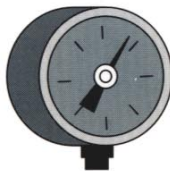
- 4**
- Screw down the nut until it touches the assembly (only for tightening).
  - Ensure that the dimension of the bolt end protruding from the nut/bearing face contact is at least equal to 1.9 times the diameter of the bolt, and that the bolt end protruding from the nut is at least equal to 0.8 times the bolt diameter.



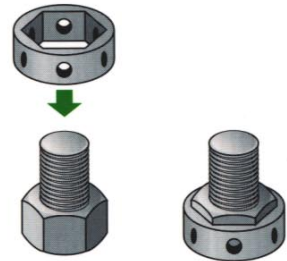
- 2**
- Check that the bolt-tightening hydraulic load was correctly determined based on the following:
    - the material class and the dimensions of the bolt
    - the required final residual tightening load.

- Determine the hydraulic pressure as a function of the model and the dimensions of the tensioner.

**Attention**  
Never exceed the pressure which corresponds to the maximum bolt load.



- 5**
- Place the socket around the standard hexagonal assembly nut.



**Note:** If you are using a special nut with radial holes for the Tommy bar, step n° 5 is not necessary.

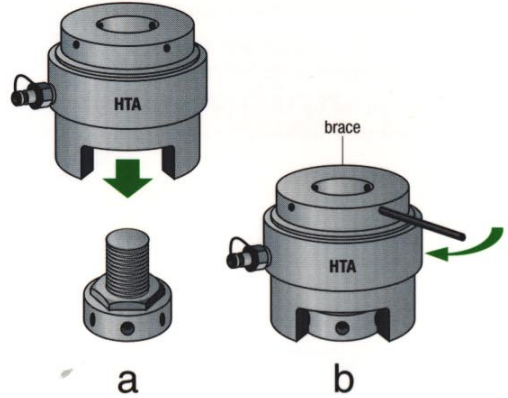
## To install the tensioner

These steps differ depending on the tensioner type.

### 6A HTA and HTS Tensioners

- Place the tensioner (hydraulic body and skirt) on the bolt.
- Screw the brace on the bolt then unscrew the brace a quarter-turn\* for it must not be blocked on the tensioner piston.

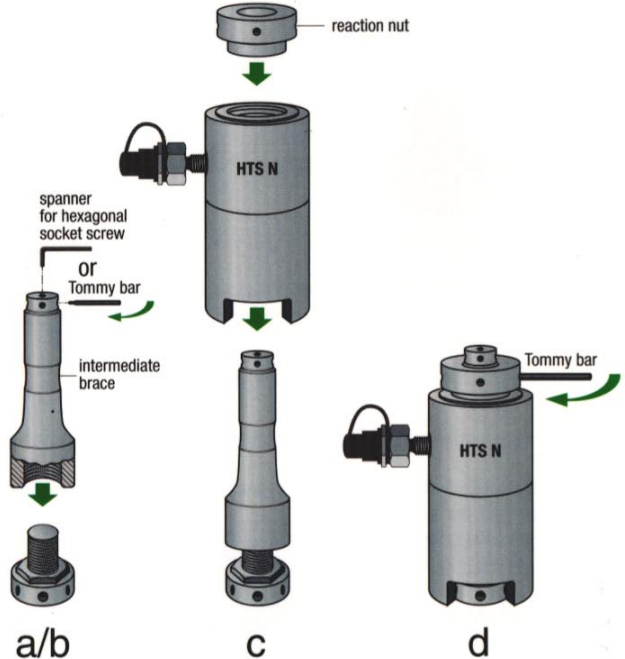
\* half-turn for untightening



### 6B HTS N Tensioner

- Screw the intermediate brace on the top of the bolt.
- Ensure that the bolt length extending beyond the nut is at least 0.8 times the bolt diameter.
- Lower the hydraulic body/skirt unit onto the intermediate brace.
- Screw the reaction nut onto the thread of the intermediate brace, then unscrew the reaction nut one-quarter-turn\*, for it must not be blocked against the piston.

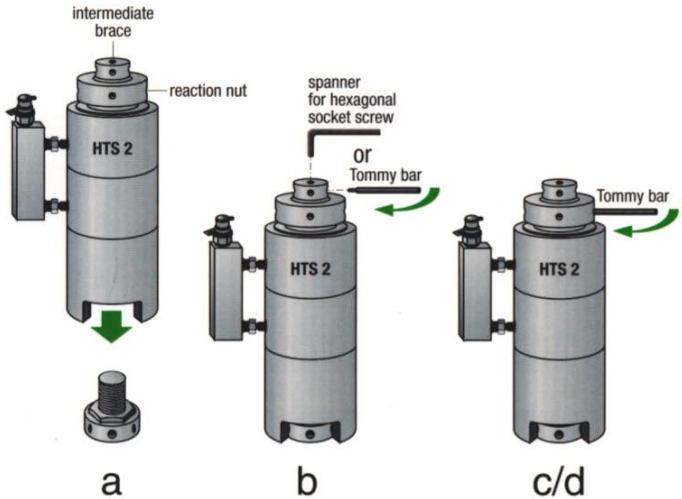
\* half-turn for untightening



# 6C

## HTS 2 and HTH R Tensioners

- Place the tensioner unit, with the reaction nut screwed on the intermediate brace, on top of the bolt.
- Screw the intermediate brace with the reaction nut on the stud through the tensioner body. Depending on the case, use a Tommy bar or a spanner for hexagonal socket screw.
- Ensure that the brace screwed onto the bolt grips a length which is least 0.8 times the bolt diameter.
- Adjust the height of the reaction nut by screwing it in contact with the piston, then unscrew it one quarter-turn\*.



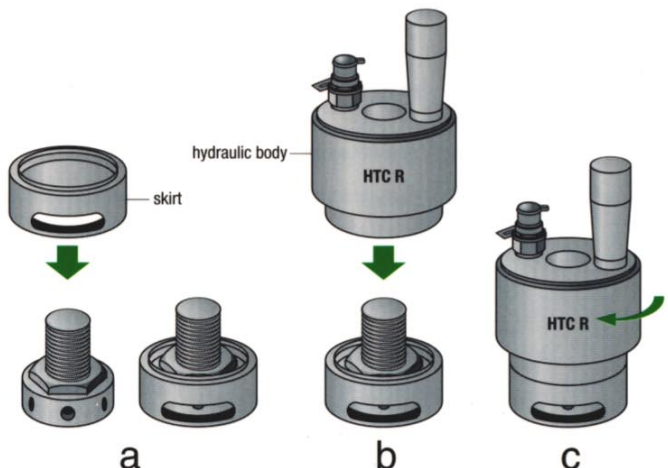
\* half-turn for untightening

**Note:** For the HTS 2 and HTH R tensioners, you can also follow the 6B step to install the tensioner.

# 6D

## HTC R Tensioner

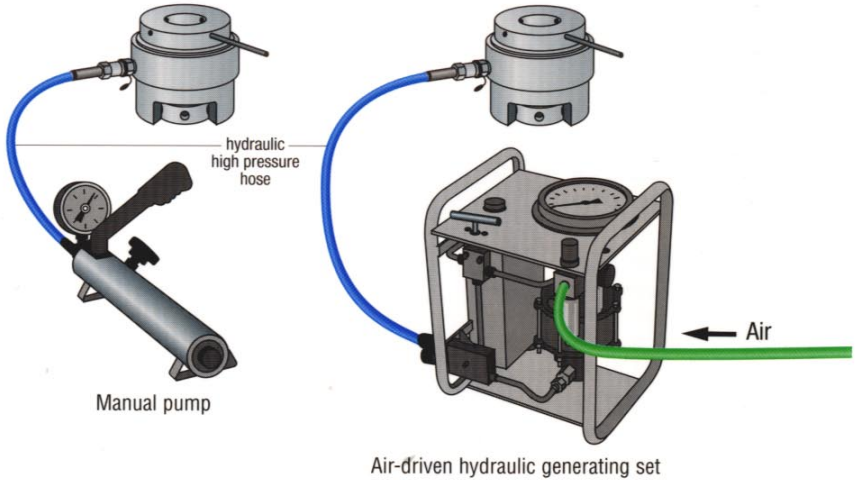
- Place the skirt around the application nut
- Screw the hydraulic body on the bolt, and unscrew one quarter-turn\* to avoid blocking it against the skirt bearing face.
- Ensure that the body is correctly screwed on the bolt.



\* half-turn for untightening

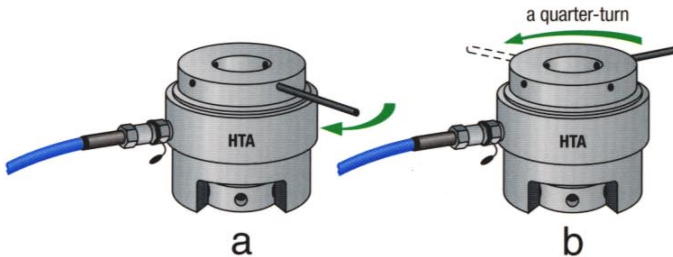
## To tighten (or untighten) the bolt

7



Connect the tensioner hydraulic nipple to the manual pump or to the air-driven hydraulic generating set using high pressure hose. Ensure that the self-sealing quick-coupling connectors for the hose and the manual pump or hydraulic generating set are properly connected (the outside sliding sleeve on the female coupler must be perfectly back in its initial position).

8



*This step changes depending on the type of tensioner.*

### For HTA, HTS, HTS N and HTS 2 Hydrocam Tensioners

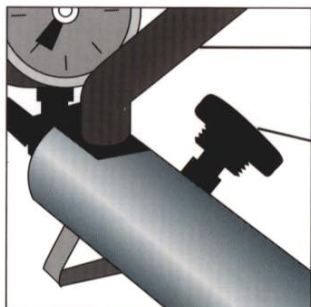
- If necessary, return the piston to the bottom of the cylinder by screwing the brace or the reaction nut using the Tommy bar.
- Then unscrew the brace or the reaction nut a quarter-turn\* to avoid blocking it against the piston.

\* half-turn for untightening

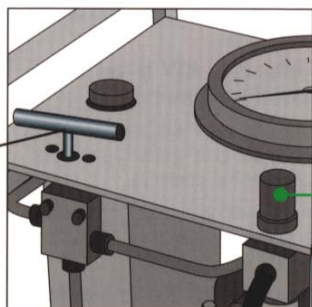
### For HTH R and HTC R Hydrocam Tensioners

Steps "a" and "b" are not required since there is automatic piston return. Leave the pressure release valve on the manual pump or the hydraulic generating set open during the time required for the complete return of the piston.

# 9



Manual pump



Air-driven hydraulic generating set

- Close the pressure release valve (3) on the manual pump or air-driven hydraulic generating set.
- Pressurize the tensioner by activating the lever (1) on the manual pump or by turning the control knob (2) on the hydraulic generating set.
- When pressure is reached, stop the lever on the manual pump, or adjust the pressure to the selected value by turning up or down the control knob on the hydraulic generating set.

**Attention:** During the pressurization step, be careful not to exceed the maximum piston stroke. When you see the red line on the piston or on the nut (HTH R), the limit has been reached.

If this occurs during tightening operation, you must screw down the application nut, release the pressure, rescrew the brace or the reaction nut at least one quarter-turn, and begin the pressurizing step over again.

If this occurs during untightening operation, you must check that the application nut is released and then proceed with immediate unscrewing. For a non-loose nut, you must release the pressure, rescrew the brace or the reaction nut one quarter-turn, and proceed with the unscrewing in two steps or more. During the first step, the application nut will only be partially unscrewed.

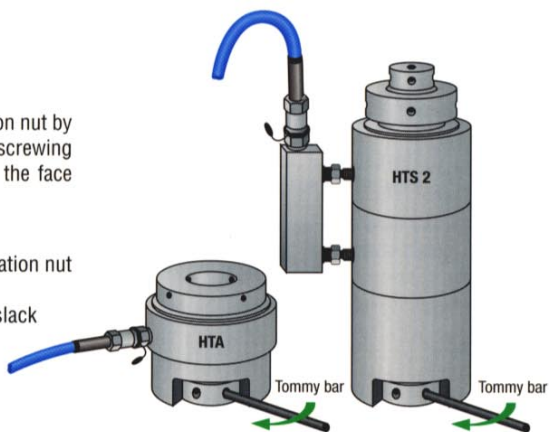
# 10

## Screwing down

Using the Tommy bar, screw the application nut by turning in the screwing direction. The screwing down must provide a clear contact with the face onto which you are screwing.

## Unscrewing

Using the Tommy bar, unscrew the application nut by turning in the unscrewing direction. Unscrewing must provide sufficient slack between the nut and the face onto which it was initially screwed to account for the relaxation of the parts after pressure release.

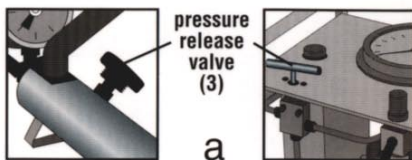


# 11

These steps differ depending on the tensioner type.

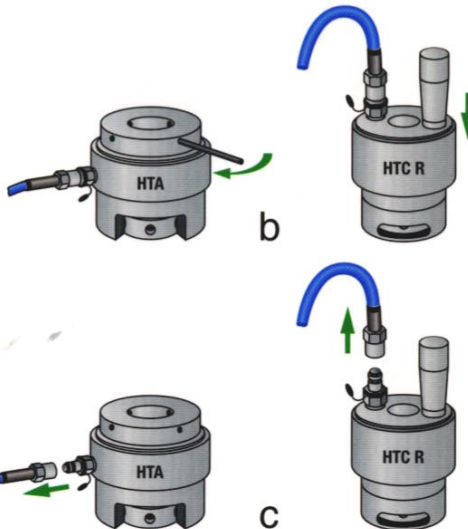
## For HTA, HTS, HTS N and HTS 2 Hydrocam Tensioners

- Open the pressure release valve (3) on the manual pump or hydraulic generating set to release the pressure.
- Screw the tensioner brace or reaction nut to return the piston to the bottom of the cylinder.
- Disconnect the hose from the tensioner.



## For HTH R and HTC R Hydrocam Tensioners

- Open the pressure release valve (3) on the manual pump or the hydraulic generating set to release the pressure.
- Wait until the piston has returned automatically.
- Disconnect the hose from the tensioner.



**Important:** To guarantee the final tightening load, we recommend performing steps 9, 10 and 11 twice. In this case, after the first operation, piston return is not necessary. However, piston return is indispensable after the second operation.

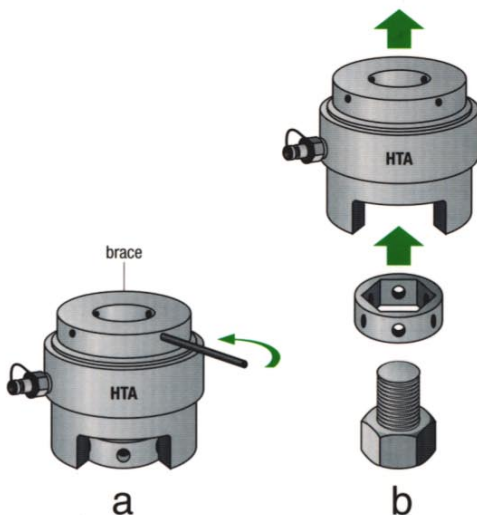
## To remove the tensioner

# 12A

## HTA and HTS Tensioners

- Unscrew the brace.
- Remove the tensioner and take off the socket.

The tensioner is ready to be used on the next bolt.





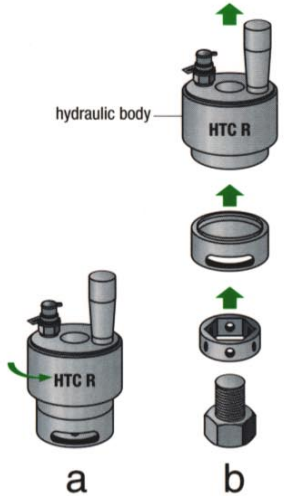
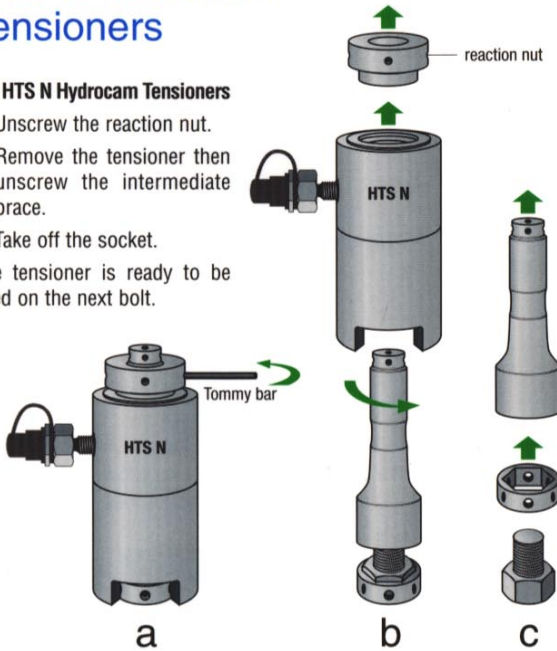
# 12B

## HTS N et HTC R Tensioners

### For HTS N Hydrocam Tensioners

- Unscrew the reaction nut.
- Remove the tensioner then unscrew the intermediate brace.
- Take off the socket.

The tensioner is ready to be used on the next bolt.



### For HTC R Hydrocam Tensioners

- Unscrew the hydraulic body.
- Take off the tensioner and the socket.

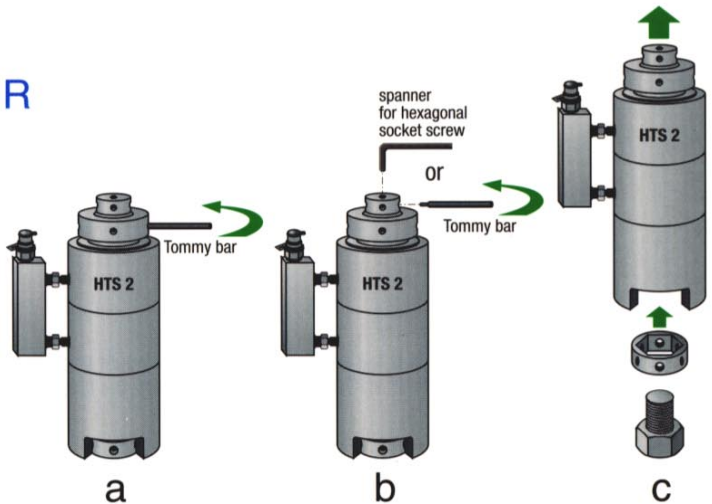
The tensioner is ready to be used on the next bolt.

# 12C

## HTS 2 et HTH R Tensioners

- Unscrew the reaction nut.
- Unscrew the intermediate brace using the Tommy bar or the spanner.
- Remove the tensioner unit and take off the socket.

**Note:** For the HTS 2 and the HTH R tensioner types, you can also follow sequence 12 B.



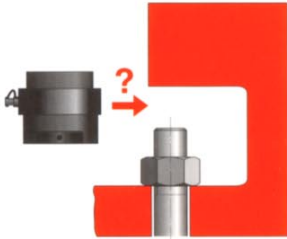
**Avoid**



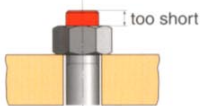
Insufficient flat area around the bolt



Bearing area is slanted with respect to the bolt axis

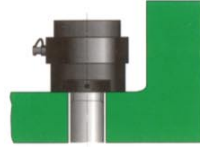


Not enough room to fit the tensioner

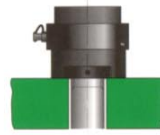


The protruding end of the bolt is too short

**Recommended**



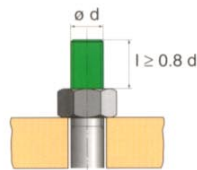
The lower part of the skirt must be in full contact with the assembly



The skirt/assembly contact surface must be perpendicular to the bolt axis



Design enough clearance to install the tensioner

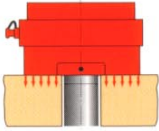


The length of the protruding end of the bolt on which the tensioner is screwed must equal or exceed  $l \geq 0.8 d$

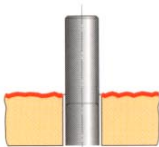
# Problems for which Pilgrim Decline all responsibility

problems for which SKF declines all responsibility.

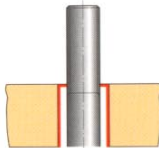
## Avoid



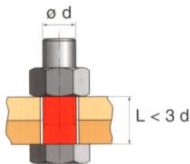
The tensioner is too big for the bolt and its operating pressure is too low



Surface is too rough

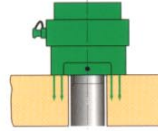


Diameter of the bolt hole is too big

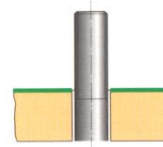


L/d ratio is too small

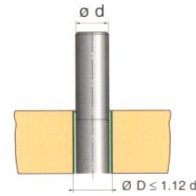
## Recommended



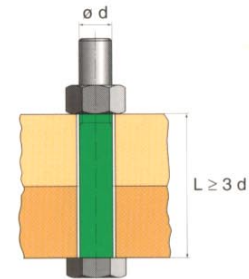
Tensioner diameter must be adapted to the bolt, and must operate under high pressure for the best tensioner and tightening performance



Good surface condition is required under the Hydrocam tensioner (at least  $R_{e\sqrt{6.3}}$ )



The bolt hole diameter must be as small as possible



The L/d ratio must be as high as possible

To optimize your assembly:  
plan to tighten bolts with tensioners and design your assembly accordingly from the very start



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