Hydraulic tensioners for chain drive systems

Crank-cam chain drive

- Position of plunger with worn chain
- Position of plunger in new engine
- Transport ring
- Oil supply bore
- Leakage gap
- Housing
- High pressure chamber
- Screw plug
- Return spring
- Valve unit
- Working position
- Minimal return stroke
- Locked position

Cam-cam chain drive

- Plunger
- Housing
- Leakage gap
- Retaining plate (option)
- Sliding pad
- Return spring
- High pressure chamber
- Oil inlet bore
- Oil under engine oil pressure
- Oil under high pressure

In the image:
- The chain tensioning element is inserted into the bore and located with a screw plug.
- The element is loaded and released by torsional vibrations from the timing drive.
- The element is compressed under load. This forces a small amount of oil out of the high pressure chamber through the leakage gap.
- When the load is released, the return spring pushes the plunger and housing apart thus tensioning the chain.
- The non-return valve opens due to the pressure difference between the high pressure chamber and the oil reservoir.
- Oil is sucked out of the oil reservoir through the valve into the high pressure chamber.
- The working position of the plunger is determined by the chain elongation.
- The ratchet system (locked position) prevents the chain tensioner from sinking down at standstill thus avoiding tooth slip.
- The design of the plunger and housing groove ensures minimal return stroke for damping and heat expansion as well as defined adjustment for chain elongation and tolerances.

In the image:
- The chain tensioning element is located in the housing which fits the cylinder head design. Due to space limitations the reservoir is provided by the oil feedback system.
- The element is loaded and released by torsional vibrations from the timing drive.
- The element is compressed under load. This forces a small amount of oil out of the high pressure chamber through the leakage gap.
- When the load is released, the return spring pushes the plunger and housing apart thus tensioning the chain.
- The non-return valve opens due to the pressure difference between the high pressure chamber and the oil reservoir.
- A sliding pad on the right side is optional.
- An oil jet can be provided for lubrication, cooling and noise reduction in the drive.