



Documentation

The following information sheets illustrate the description below:

40-XS01-4G-E	Sectional view of the lance with main dimensions
40-W101-6G-E	Sectional view of the head of the lance with atomiser discs
00-XS01-8G-E	Diagram of hydraulic system inside the lance

General

The burnerlance 40-EH is especially suitable for use in or on an oil burner and is designed to operate spill back disc atomisers with shut-off needle. The strong spring on the actuating rod pushes the needle in closed position. This ensures a reliable shut-off under all circumstances.

Fuel, branched off from the supply line and controlled by the solenoid valve on the hydraulic block, actuates the piston for opening. The piston has a fixed travel, pulling the needle in the correct position when it opens. The end position of the actuating rod can be checked hydraulically, allowing this check to be integrated into the burner control system.

During the pre-purge period of the burner, the needle is keeping the orifice closed and the fuel circulates through the lance. This way, when firing heavy fuel, the entire hydraulic system heats up before igniting. On energising the solenoid valve, even after long idle intervals, there is immediate atomisation guaranteeing perfect ignition.

The burnerlance is suitable for supply pressures from 20 up to 40 bar and fuel temperatures up to 140°C. The ambient temperature near the coil should not exceed a maximum of 60°C.

Mounting the atomiser discs

Often a lance is delivered with the discs mounted. This is just to avoid loss of parts during transportation. The capnut then is screwed on by hand, not tightened. In this case, you should also mount the atomiser discs as described below.

The orifice and the swirler are to be built in according to information sheet 40-W101-6G-E.

To ensure adequate sealing, the sealing surfaces at the adaptor, at both sides of the swirler and at the orifice should not be damaged. Never use any additional sealant on these surfaces.

Remove the capnut from the lance. Make sure all parts involved are clean and free from any dust or other particles. Slide the swirler over the needle. It should glide smoothly. Place the orifice and the swirler, in the right order and position, straight inside the capnut as shown in sheet 40-W101-6G-E.

It is advised to apply a little "Molykote HSC" or equivalent compound, on the thread of the adaptor only, to prevent problems when dismantling the capnut after a longer period. The sealing surface of the adaptor, the inside of the lance, the needle and the atomiser discs are to be kept absolutely clean.

Now carefully slide the capnut containing the discs over the needle and screw on the nut by hand as tight as possible. Tighten the capnut firmly with a spanner. The adaptor has flat sides to hold the lance while screwing or unscrewing the capnut. These flats exclusively serve this one purpose!



Mounting the solenoid valve

The information sheet 40-XS01-4G-E shows the assembly of the solenoid valve. The coil and the solenoid with armature, o-ring 16,1x1,6 and two nuts are packed separately with the lance to prevent damages during transport.

After removal of the synthetic plug from the control block, all parts involved have to be checked to be totally clean. Place the o-ring 16,1x1,6 in the sharp edged groove in the control block ensuring that it will not be damaged or partly cut off during further assembling. Push the solenoid containing the armature straight against the o-ring and tighten the nut by hand. Tighten it just slightly with a spanner.

Now push the coil on the solenoid and tighten the nut by hand. Tighten it just slightly with a spanner.

Connections

The connections (see 00-XS01-8G-E) on the block of the lance are marked as follows:

- S** Fuel supply to the atomiser and to the hydraulics operating the needle. A filter having meshes smaller than 50 µm should be present. The pressure is to be kept over 20 bar.
- MS** The supply pressure to the atomiser is available here, allowing evaluation of this pressure by a pressure gauge or sensor.
- R** Fuel return from the atomiser. Fuel output control is achieved by connecting either a pressure or a volume regulator.
- MR** The return pressure from the atomiser is available here, allowing evaluation of this pressure by a pressure gauge or sensor.
- L** Fuel return from the hydraulics operating the needle. In principle, the fuel should be allowed to flow freely without counterpressure. If this port is connected to a circulation system with slight overpressure, it is absolutely necessary to make sure that the pressure at port "S" is 20 bar higher than the pressure at port "L" under all circumstances. Only then reliable operation of the needle is ensured.
- C** The operating pressure behind the piston on the actuating rod which moves the needle is available here, allowing evaluation of this pressure by a pressure gauge or sensor. While the needle is closed or moving, the pressure lies below the pressure at port "S". Only when the needle is completely retracted this pressure will reach exactly the same value as the pressure at port "S". Consequently, this behaviour allows hydraulic checking of the end position of the needle.

To prevent malfunction, be careful when removing the plastic plugs from the connection ports and make sure no material stays behind.

When choosing fittings, make sure that the channels inside the connection block remain fully open. Even a partial blockage at one of the channels inside will inevitably lead to malfunctioning of the burnerlance.

Never use any additional sealant on the thread. The remains getting inside the lance could lead to failures. There are no objections against the use of flat gasket rings to seal the fittings.



Function

During the pre-purge period, both the external solenoid valve in the supply line and the external volume or pressure regulator are open. The build-on coil is currentless and the valve operating the needle is closed. Thus, the spring loaded actuating rod pushes the needle against the seat of the orifice up front, keeping it closed, preventing fuel from reaching the furnace prematurely. The pressure at port "C" is 0 bar or equals the pressure in the circulation system if port "L" is connected to such a system. The fuel circulates from port "S" via the swirler in the atomiser through the lance toward port "R", heating the whole up to operating temperature.

Before opening the build-on solenoid valve, make sure the IGNITION IS TURNED ON. In addition, the external regulator and the combustion airflow are to be adjusted beforehand in such a way that the burner will START ON LOW FLAME.

The coil is marked with the relevant electrical data. As soon as one switches on the build-on coil, the fuel for actuating the needle is no longer blocked; the rod retracts the needle and the ignition causes a flame immediately. As long as the needle is open, a small fuel flow coming from the hydraulic system is leaving port "L".

During a short interval, while the piston is moving from closed to opened needle position, the pressure at port "C" always is at least 2 bar below the pressure at port "S". As soon as the piston reaches its end position, where the needle is completely opened, the pressure at port "C" equals the pressure at port "S".

An external volume or pressure regulator in the return line controls the output flow of the atomiser.

Interruption of the power supply to the build-on coil leads to immediate closing of the needle, handled by the spring. The fuel flow from the atomiser orifice stops abruptly. The pressure at port "C" drops to 0 bar or to the pressure in the circulation system if port "L" is connected to such a system. The fuel circulation from port "S" via the swirler toward port "R" maintains the temperature of the lance.

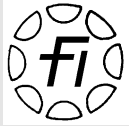
If firing heavy fuel, we advise mounting an electrical heating plate to preheat the hydraulic system in the lance for those applications where the fuel supply to port "S" often stops during longer intervals. Four threaded bores in the connection block allow mounting such a heating plate. This heater could work permanently, but it should at least be switched on in time before fuel is supplied to port "S" to achieve correct operation of the hydraulic system inside the lance.

Maintenance

The burnerlance normally does not require any maintenance. Wear or damage of the orifice, the swirler and the needle highly depend on fuel quality. These parts are easy to exchange. The only moving part is the actuating rod with the piston. After a while some wear may occur on the o-rings. Complete seal sets are available for replacement.

Before taking one of the following steps, remove the orifice and the swirler from the lance and put the capnut back on as protection for the needle and the adaptor. Always pay attention not to damage the sealing surfaces at the adaptor and the atomiser discs. Before re-assembly, make sure all parts involved are undamaged and perfectly clean.

To exchange the o-ring 12,42x1,78 on the piston, remove the coil and the other parts belonging to the solenoid valve. Remove the control block, held by 4 screws. Pull out the bearing together with the o-ring 18,72x2,62. Exchange the o-ring 12,42x1,78 and put the bearing with o-ring back in place. Now we can mount the control block, keeping in mind that the 3 bores with o-rings 2,57x1,78 should correspond with the 3 bores at the back of the connection block of the lance.



To exchange the inner o-ring 6,02x2,62, remove the coil and the other parts belonging to the solenoid valve. Remove the control block, held by 4 screws. Pull out the bearing together with the o-ring 18,72x2,62. Use a piece of wood or plastic to push back the needle head. **WARNING FOR INJURY:** The actuating rod comes out suddenly. After that, you can pull it out easily. Do not damage the head of the needle.

The actuating rod has to be taken apart to exchange the o-ring 6,02x2,62. Remove the pin that connects the holder to the rod and take the holder off. The rod in lances longer than 800 mm is – for extra guidance – provided with triangles. Each triangle is secured with a pin. Remove these pins and triangles. Clamp the free end of the rod in a bench vice with soft jaws placing the stop against the jaws. Remove the pin holding the stop and release the spring pressure by slowly opening the vice. Take off the stop, the spring, the spring disc and the disc. Polish any sharp edges on the rod and exchange the o-ring 6,02x2,62. Near the o-ring, the rod should be absolutely free of damages. Re-assemble the actuating rod in reverse order.

To exchange the needle, just remove the pin that holds it. Secure the new needle with the same pin.

To test, put the actuating rod into the burnerlance without the o-ring 12,42x1,78 and without the o-ring 18,72x2,62 on the disc. The rod should move freely. Pull it back a little, mount the o-ring 18,72x2,62 on the disc and push the rod in place. Slide the bearing over the piston in the connection block and turn it to check the fit. If fitting correctly, mount the o-ring 12,42x1,78 on the piston and push the bearing with the o-ring 18,72x2,62 back in place. Now we can mount the control block, keeping in mind that the 3 bores with o-rings 2,57x1,78 should correspond with the 3 bores at the back of the connection block of the lance.

Finally, mount the orifice and the swirler as described under "Mounting the atomiser discs" and the solenoid valve as described under "Mounting the solenoid valve".