

Documentation

The following information sheets illustrate the description below:

24-WC01-4G-E	Sectional view of the lance with main dimensions
24-W101-6P-E	Sectional view of the head of the lance with atomiser and reverse disc
00-WB01-8G-E	Diagram of pneumatic/hydraulic system inside the lance

General

The burnerlance 24-HA-APR-E with shut-off needle is especially suitable for use in or on an oil burner and is designed to operate 24-Y atomisers with compressed air or steam. The strong spring on the actuating rod pushes the needle in closed position. This ensures a reliable shut-off under all circumstances.

Compressed air, controlled by an external 3/2 solenoid valve, actuates the piston for opening as illustrated in sheet 00-WB01-8G-E. The piston has a fixed travel, pulling the needle in the correct position when it opens.

During the pre-purge period of the burner, the needle is keeping the central orifice in the reverse disc closed and the fuel circulates through the lance at pre-set supply pressure. This way, when firing heavy fuel, the entire system heats up before igniting. On energising the 3/2 solenoid valve, even after long idle intervals, there is immediate atomisation guaranteeing perfect ignition.

An internal volume regulator in the supply line controls the output flow of the atomiser. Turning the regulator shaft changes the aperture inside the regulator, consequently changing the fuel flow rate. Both flanges at the regulator shaft are marked with a "+", a scale in 15° steps and a "-". The pointer mounted on one side of the regulator shaft shows the actual position of this shaft.

The burnerlance is suitable for supply pressures up to 16 bar and fuel temperatures up to 140°C.

Mounting the atomiser parts

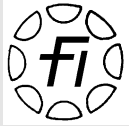
Often a lance is delivered with the atomiser parts mounted. This is just to avoid loss of parts during transportation. The capnut then is screwed on by hand, not tightened. In this case, you should also mount the atomiser parts as described below.

The atomiser and the reverse disc are to be built in according to information sheet 24-W101-6P-E.

To ensure adequate sealing, the sealing surfaces at the adaptor, at both sides of the reverse disc and at the atomiser 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. Place the atomiser and the reverse disc, in the right order and position, straight inside the capnut as shown in sheet 24-W101-6P-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, the reverse disc and the atomiser are to be kept absolutely clean.



Now carefully screw on the capnut, containing the atomiser and the reverse disc, 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!

Connections

The connections (see 00-WB01-8G-E) on the block of the lance are marked as follows:

- O** Fuel supply, via the built-in regulator, to the atomiser. A filter having meshes smaller than 50 µm should be present. The pressure depends on the desired behaviour for the atomiser.
- M** The fuel supply pressure at the atomiser is available here. The mounted pressure gauge shows the actual value. A sensor allowing evaluation of this pressure could be mounted instead.
- A** Compressed air or steam supply to the atomiser. The pressure either is kept constant or under control of a constant differential pressure system. The way of control and the pressure only depend on the behaviour desired for the atomiser.
- R** Fuel return from the lance. 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 "O" is at least 1 bar higher than the pressure at port "R" under all circumstances. Only then reliable circulation and correct behaviour of the atomiser are ensured.
- C** Compressed air supply and return for needle actuation. A filter having meshes smaller than 50 µm should be present. The needle opens correctly at a pressure between 5 and 15 bar. The returning air should be allowed to flow freely without counterpressure. Only then reliable closing of the needle is possible.

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

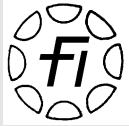
When choosing fittings, make sure that the channels inside the connection block remain fully open. Even a partial blockage at one of the channels inside will inevitably lead to malfunctioning of the burnerlance.

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 internal volume regulator are open. The solenoid valve operating the needle is currentless. Thus, the spring loaded actuating rod pushes the needle against the seat of the central orifice in the reverse disc up front, keeping it closed, preventing fuel from reaching the furnace prematurely. The pressure at port "C" is 0 bar. The fuel circulates from port "O" via the regulator through the lance via the transverse bores in the by-pass guide toward port "R", bringing the whole up to operating temperature.

Atomising pressure in the lance starts building up after the compressed air or steam to port "A" has been switched on. Before opening the needle, make sure the IGNITION IS TURNED ON. In addition, the internal regulator, the atomising air or steam pressure and the combustion airflow are to be adjusted beforehand in such a way that the burner will START ON LOW FLAME.



As soon as one switches on the solenoid valve operating the needle, the pressure at port "C" increases to 5 bar or more, the rod retracts the needle and the ignition causes a flame immediately. The circulation stops due to the needle covering the transverse bores in the by-pass guide. As long as the needle is open, a small fuel flow still is leaving port "R".

The air or steam pressure at port "A" either is kept constant or under control of a constant differential pressure system. The integrated volume regulator in the supply line controls the output flow of the atomiser. Turning the regulator shaft changes the flow through the regulator. The marking of "+" and "-" always refers to the throughput of the regulator. The throughput of the regulator is at minimum with the pointer at "-". Turning the regulator shaft towards "+" increases the throughput of the regulator. Therefore, for an air or steam atomiser, the output of the atomiser will be at maximum if the pointer is at "+".

The flanges have a scale with 15° division. This scale allows reproducible adjustment of the regulator during operation.

The throughput of the regulator always is related to a certain pressure difference between the inlet and the outlet of the regulator. The pressure drop across the regulator and the maximum throughput depend on the actual atomiser and system particulars. In order to benefit from the maximum angle of travel, the choice of the size for the regulator should be made in such a way that its maximum throughput fits the actual atomiser. Here also system particulars should be taken into account.

Interruption of the power supply to the solenoid valve at port "C" leads to immediate closing of the needle, handled by the spring. The fuel flow from the atomiser stops abruptly. The pressure at port "C" drops to 0 bar. The fuel circulation from port "O", via the regulator and the transverse bores in the by-pass guide, toward port "R" maintains the temperature of the lance.

The air or steam supply to port "A" should continue at least 10 seconds after the needle has been closed. This cleans the atomiser to prevent blockage due to radiated heat from the furnace.

If firing heavy fuel, we advise mounting a heating device to preheat the lance for those applications where the fuel supply to port "O" often stops during longer intervals. Normally it is sufficient to apply an electrical heating plate just to preheat the connection block at the lance. 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 "O" to achieve correct operation of the control system inside the lance.

Maintenance

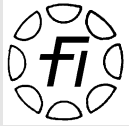
The burnerlance normally does not require any maintenance. Wear or damage of the atomiser, the reverse disc and the needle highly depend on fuel quality. The atomiser and the reverse disc are easy to exchange.

The exchange of the needle can only be done by the manufacturer because this needle always is adapted to the lance during assembly.

The only moving parts inside the lance are the regulator shaft and the actuating rod with the piston.

After a long period of operation, depending on fuel quality, wear on the sleeve or on the regulator shaft can occur, resulting in an increase of leak flow at minimum throughput.

After a while some wear may occur on the o-rings. Complete seal sets are available for replacement.



Regulator repairs

In case of wear of the sleeve or of the regulator shaft, it is advised to return the burnerlance to the factory for repair. It is not recommended to perform this kind of repairs without proper tools and test equipment. The regulator shaft and the sleeve are being manufactured within close tolerances to avoid operation difficulties after such repairs.

To exchange the o-rings in the flange, remove the pointer, held by 1 screw. Remove any damages and polish any sharp edges at both ends of the regulating shaft. Remove both flanges, each held by 2 screws, but leave the regulating shaft in its place. Carefully remove both o-rings from their grooves using a sharp needle without damaging the flanges in any way. Before re-assembly, make sure all parts involved are undamaged and perfectly clean. In case the regulator shaft has come out by accident, put it back in the correct position. Otherwise, the regulator will not function at all afterwards. Put the new o-rings in place. Near the o-rings, the regulator shaft should be absolutely free of damages. Re-assemble in reverse order.

The position of the pointer on the regulator shaft has been pre-set at the factory. Both ends of the regulator shaft have a pit for fixing the pointer in the correct position. If the regulator shaft is mounted properly and the pointer is fixed again using this pit, the characteristic of the regulator will not change after replacement of o-rings.

Needle actuation repairs

Before taking one of the following steps, remove the atomiser and the reverse disc 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, at the reverse disc and at the atomiser. Before re-assembly, make sure all parts involved are undamaged and perfectly clean.

To exchange the o-ring 25,12x1,78 on the piston, remove the pressure gauge and the cover, held by 4 screws. Pull out the bearing together with the o-ring 33,00x2,62. Exchange the o-ring 25,12x1,78 and put the bearing with o-ring back in place. Now we can mount the cover, keeping in mind that the bore with o-ring 2,57x1,78 should correspond with the bore at the back of the connection block of the lance.

To exchange the inner o-rings 6,02x2,62, remove the pressure gauge and the cover, held by 4 screws. Pull out the bearing together with the o-ring 33,00x2,62. 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-rings 6,02x2,62. Remove the pin that connects the needle to the rod and take the needle 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, the disc and the between disc. Polish any sharp edges on the rod and exchange the o-rings 6,02x2,62. Near the o-rings, the rod should be absolutely free of damages. Re-assemble the actuating rod in reverse order.

To test, put the actuating rod into the burnerlance without the o-ring 25,12x1,78 and without the o-rings 18,72x2,62 on the discs. The rod should move freely. Pull it back a little, mount both o-rings 18,72x2,62 on the discs 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 25,12x1,78 on the piston and push the bearing with the o-ring 33,00x2,62 back in place. Now we can mount the cover, keeping in mind that the bore with o-ring 2,57x1,78 should correspond with the bore at the back of the connection block of the lance.

Finally, screw on the pressure gauge and mount the atomiser and the reverse disc as described under "Mounting the atomiser parts".