Manual Code BL449

FW Series Gas Mixing Panels

BSL Gas Technologies Limited

Installation and Operating Instructions

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FW Series Gas Mixing Panels

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Introduction

This manual details the installation, operational and safety procedures for the mixing panel. **Please read all sections before installation**

BSL Gas Technologies Ltd make a range of standard panels suitable for industrial applications and each of these panels are pre-set to suit the customers' specific needs prior to despatch. **The capacities shown below are approximate, and are dependent on inlet pressure, outlet pressure and gas type.**

25m³/h Mixing Panel - BSL Basic Stock Code Number FW1

50m³/h Mixing Panel - BSL Basic Stock Code Number FW2

100m³/h Mixing Panel - BSL Basic Stock Code Number FW3

Safety Note

Mixing panels and gas control panels are manufactured in strict accordance with recognised national and international codes. There shall be no modification to the design without written authorisation from BSL Gas Technologies Limited. Records are kept of design, installation, maintenance and any modifications carried out.

Before using the equipment, customers must obtain gas data and safety documentation from their gas supplier. It is the customer's responsibility to ensure that users of this equipment conform to the data provided by the gas supply company.

A risk assessment must be completed for the entire system before using the mixing panel. This should include actions required in case of fire or gas leakage. Consult your gas supplier if in doubt.

Use only those gases specified by the labels on the mixing panel. Where appropriate, components are cleaned for Oxygen use. If one of the gases is Oxygen, then both gas supply systems must also be cleaned to Oxygen standards. Note that CO_2 in particular may sometimes contain hydrocarbons and special filtration may be required if mixing it with Oxygen.

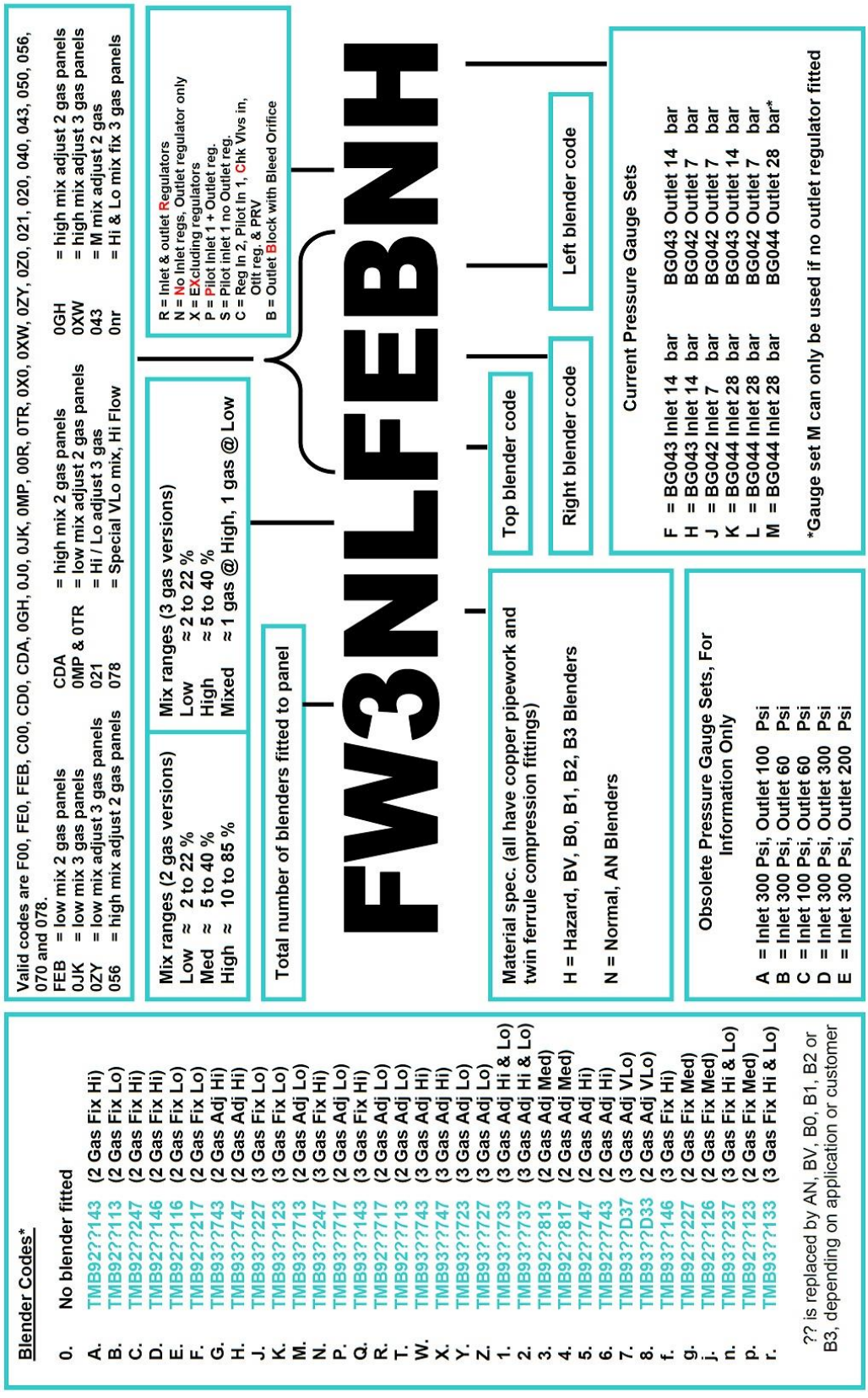
Minimum mixed gas outlet flow rate is 1 l/min, except for Hydrogen or Helium where it is 5 l/min. If the process does not allow this, then an appropriate constant bleed must be provided.

Gases must be clean, dry, and fully vaporised. Liquid gas may damage the equipment or cause injury.

FW Series Gas Mixing Panels

BSL Gas Technologies Limited

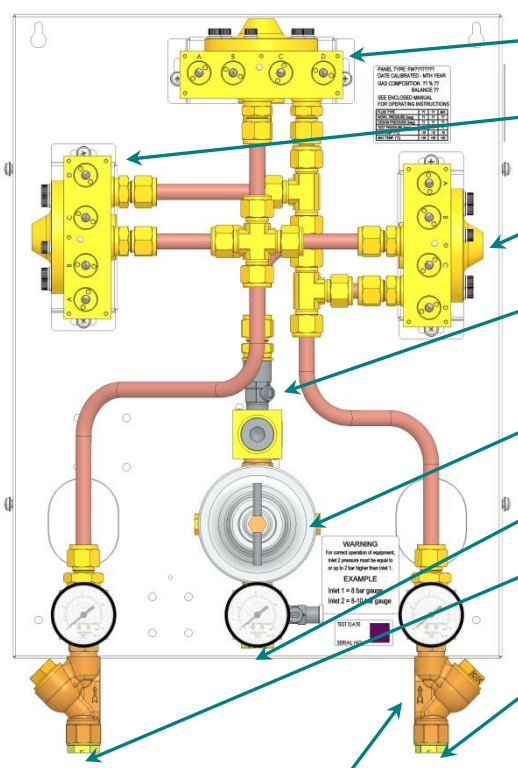
FW Series Panel Stock Code Numbers



FW Series Gas Mixing Panels

System Description

The mixing panel is designed to mix two or three gases by means of pre-set gas mixers and supply the resulting mixed gas into a pipeline distribution system. The panel is fitted with 1, 2 or 3 of BSL Gas Technologies patented mixing valves, depending on the capacity. The gas mixers work on a pressure balance principle with an interlock so that both inlet gases must be present for there to be a mixed gas output. Each mixer has been configured internally to suit the gas application / customer and gas mixture required from the system. The equipment should not be tampered with and or adjusted by non-qualified personnel. Gas mixing valve outlets are manifolded together where necessary to provide the correct gas flow for the panel design.



Top gas mixing valve

Left gas mixing valve

Right gas mixing valve

Isolating valves.
Must be fully open.

Pressure Regulator

Mixed gas outlet G1/2

Inlet 1 - 1/2" BSPT

Inlet 2 - 1/2" BSPT

Inlet mesh strainers (50 micron), may be omitted by special customer request. If strainers are omitted, panel inlet connections become G1/2

Inlet 3 - 1/2" BSPT
3 Gas versions only

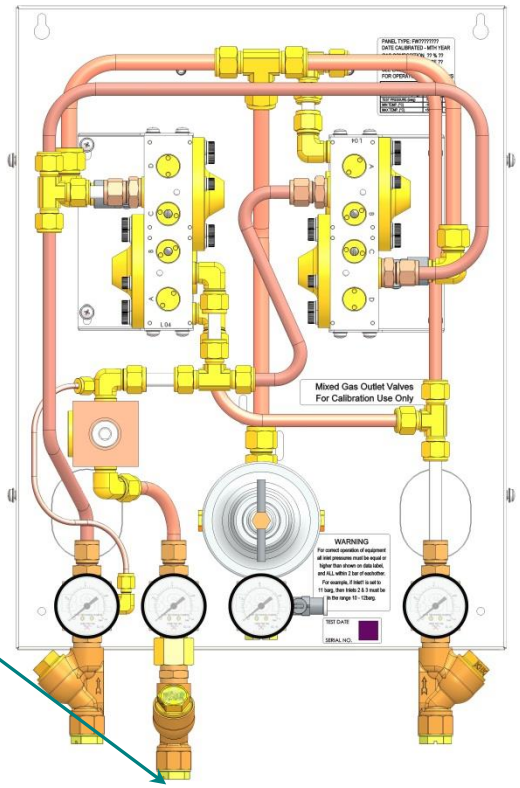


Fig 1

Inlet Gas Supply

As standard, pressure regulators, non-return valves and pressure relief valves are not provided for the gas inlets. It is the responsibility of the customer to provide gases at the correct pressure and to fit pressure relief valves (if required) to ensure that the design pressure is never exceeded.

It is important for the correct operation of the equipment that inlet gas supply pressures are at or below the limits specified on the panel data label. However, the pressures of the inlet gases must also be within a specific range relative to each other - an additional label will be attached to the panel back plate and or cover giving details of the required relationship between all the inlet gases. Mixing panel performance and gas mixture control will be impaired if the instructions on this label are not followed.

The gases supplied to the panel must be clean, dry and fully vaporised. Liquid gas may damage the system or cause injury.

Gas supply lines to panel must be clean and free of debris. Unless their omission is specially requested by the customer, the mixing panel inlets and individual gas mixing valves are fitted with 300 mesh filters to protect them from dirt ingress caused by making pipe connections to the panel. They are not designed to filter the gas supply itself. If there is any doubt about the cleanliness of the gas, then a filter of 0.01 μm or better should be installed in the gas supply line close to the mixing panel. In the case of CO_2 it is sometimes necessary to fit a 0.01 μm coalescing filter **and** an activated carbon filter to ensure that any impurities in the gas or plasticizer from hose linings is removed. Liquid CO_2 is a powerful solvent and may carry dissolved oil or extract plasticizers from flexible hose linings. Contamination of this sort will affect the gas mix.

If Oxygen is used then all gas supplies, upstream and downstream pipework and accessories must be of suitable construction and cleaned to Oxygen standards.

Mixed Gas Outlet

A pressure regulator is optionally fitted to the mixed gas outlet. This is adjustable 0 to 15.5 bar. Please note that panel will only produce the rated capacity with the gases and inlet and outlet pressures specified on the customer's original order. Pressure relief valves are not fitted in the mixing panel. In the event of component failure, the mixed gas pressure could equal the gas supply pressure. If equipment downstream of the mixing panel cannot withstand this pressure, then the customer must install suitable pressure relief valves.

Gas Mixture Accuracy

Unless a specific gas mixture tolerance has been requested by the customer and acknowledged as achievable by BSL, the tolerances specified in BS EN ISO 14175:2008 Table 3 shall apply to factory calibrated pre-set type panels or replacement gas mixing valves for same.

Component Gas Nominal Concentration %	Allowable Tolerance
>5	±10% of the nominal value
1<5	±0.5% absolute
<1	Not specified in the standard*

*Note that BSL continue to apply the ±0.5% absolute tolerance to this mixture class

FW Series Gas Mixing Panels

Installation Instructions

This panel is designed for vertical wall mounting either inside or a sheltered outdoors location.

Remove the cover to provide access to the four mounting holes (2 keyholes at top, 2 round holes at bottom). Secure to wall using 5mm diameter screws of a type to suit the wall construction.

See fig 2 for recommended pipe work and filter layout

Data Table

The following information is for guidance only; panel flow capacity is highly dependent on the specific combination of gases being mixed, the accuracy of the mixture required and the inlet and outlet pressure conditions. BSL Gas Technologies are always happy to advise on the most suitable equipment for a customer application, please contact us.

Product Code	Approximate capacity at 8 barg supply and 3.5 barg mixed gas	Mounting centres (horizontal) mm	Mounting Centres (vertical) mm	Inlet and outlet connections	Overall Dimensions mm	Design Temperature Range °C	Weight kg
FW1NL-----	25m³/h	340	460	G1/2	385x500x190	-20 to +50	14
FW2NL-----	50m³/h	340	460	G1/2	385x500x190	-20 to +50	18
FW3NL-----	100m³/h	340	460	G1/2	385x500x190	-20 to +50	22
FW1NH-----	19m³/h	340	460	G1/2	385x500x190	-20 to +50	14
FW2NH-----	38m³/h	340	460	G1/2	385x500x190	-20 to +50	18
FW3NH-----	75m³/h	340	460	G1/2	385x500x190	-20 to +50	22
FW1HL-----	25m³/h	340	460	G1/2	385x500x190	-20 to +50	18
FW2HL-----	50m³/h	340	460	G1/2	385x500x190	-20 to +50	22
FW3HL-----	100m³/h	340	460	G1/2	385x500x190	-20 to +50	26
FW1HH-----	19m³/h	340	460	G1/2	385x500x190	-20 to +50	18
FW2HH-----	38m³/h	340	460	G1/2	385x500x190	-20 to +50	22
FW3HH-----	75m³/h	340	460	G1/2	385x500x190	-20 to +50	26
FW2HH0GHN-	35m³/h	340	460	G1/2	385x500x190	-20 to +50	24
FW2HL0MPN-	35m³/h	340	460	G1/2	385x500x190	-20 to +50	24
FW1HL0J0N-	25m³/h	340	460	G1/2	385x500x190	-20 to +50	23
FW2HL0JKN-	70m³/h	340	460	G1/2	385x500x190	-20 to +50	30
FW3_H566N-	65m³/h	560	516	G1/2	615x555x190	-20 to +50	31
FW3_LRTTN-	65m³/h	560	516	G1/2	615x555x190	-20 to +50	31
FW2HL0S3RN	75m³/h	340	460	G1/2	385x500x190	-20 to +50	28
FW3HLS3VRN	120m³/h	560	516	G1/2	615x555x190	-20 to +50	42

A Typical FW Installation

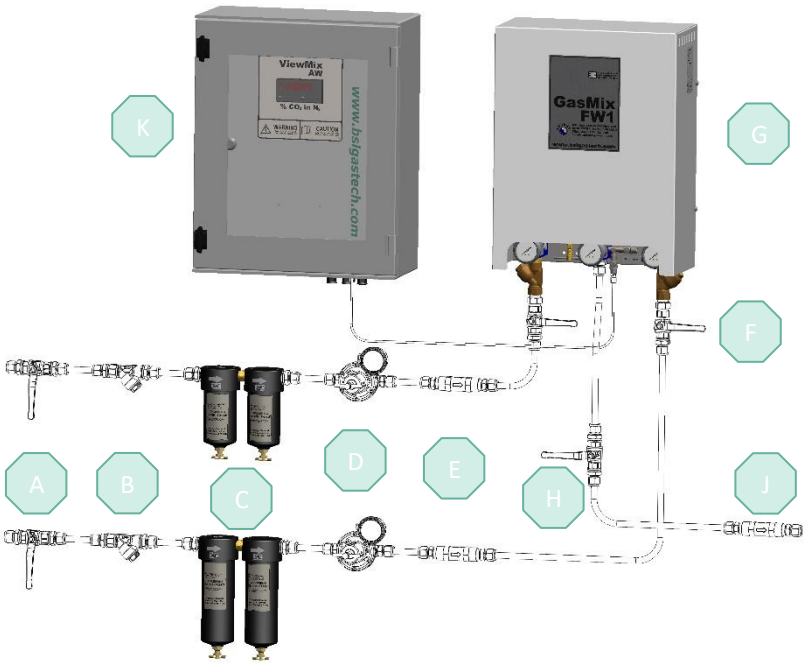


Fig 2

A Isolating valves for entire mixed gas system
B Coarse filtration to extend service life of fine filtration
C Fine filtration (0.01µm particulate plus activated carbon filter if CO_2 is present)
D Inlet pressure control for mixing panel
E Non-return valves to prevent cross-contamination of pure gas supply systems
F Isolating valves local to FW mixing panel to facilitate maintenance
G FW mixing panel
H Isolating valve for downstream equipment
J Non-return valve to prevent back flow from downstream equipment or pressure sources
K Online gas analyser – BSL Gas Technologies ViewMix AW type shown.

Initial Start Up

Mixing panels require a supply of clean, dry gas. Before connecting ensure that all supply lines are purged clear of dust, grit, pipe scale and moisture. Check that gas supply pressures are correct, refer to panel data label.

- Close isolation valve downstream of mixing panel.
- Slowly open gas supply valves to the mixing panel.
- Open the pipeline isolation valve and purge all trapped air from the pipeline to the process. Note that purging to atmosphere may result in depleted oxygen levels. Ensure that purged gas is exhausted safely.
- If one of the supply gases is Hydrogen, then provision should be made to purge the whole installation with an inert gas before admitting Hydrogen or using the mixing panel.

Shutdown

Close gas isolation valves to mixing panel.

Daily Checks

The customer should check the following items daily:

- Mixing panel is operating correctly.
- Pressures are correct.
- The installation for audible leaks.
- The installation for general damage.
- All safety notices are in position and visible.
- Any new equipment fitted since the last inspection which could affect the safe operation of the mixing panel. Consult BSL Gas Technologies Ltd if in doubt.

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Adjusting the Gas Mixture

With the exception of some special panel versions (see page 11) the gas mixture is pre-set, and on-site adjustment is not recommended because it consumes a lot of gas and requires the availability of a range of suitable flow meters and a calibrated gas analyser. Same day recalibration of mixing panels at BSL Gas Technologies' factory or the supply of replacement gas mixing valves to be exchanged at site is preferred if a new mixture is required. Please contact BSL Gas Technologies for advice.

Maintenance Instructions

Routine maintenance of the gas mixers is not required. It is recommended that the gas mixture calibration be checked against a known good analyser on an annual basis, and that mixers be fully refurbished by BSL Gas Technologies every 5 years.
On site servicing is normally limited to replacement of pressure gauges but mixing valve assemblies and pressure regulators may be replaced if required.

Spare Parts

For spare parts and or information on service and or re- calibration, please contact:-

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Customer's Notes

Panels for Special Applications

BSL Gas Technologies Ltd can also offer versions of the FW series panels for special purposes, please contact us with your requirements. One example of this is the FW2 type panel with user adjustable mixture setting.

FW1, FW2 and FW3 Panels with User Adjustable Mixture Setting

These panel types follow the same basic layout as the standard FW series, but use modified mixing valves that incorporate an end-user accessible adjustment mechanism. To change the gas mixture, insert the key provided in the hole as shown, turn clockwise to increase mix, and counter- clockwise to decrease. The mixture setting is indicated on the scale. BSL Gas Technologies recommend that customers use a gas analyser at the point of use. Replacement keys are available as spare parts from BSL Gas Technologies Ltd. See figure 3 below.

Fig 3

FW Series Gas Mixing Panels

FW2 and FW3 Mixing panels for high pressure applications

These panel types follow the same basic layout as the standard FW series but use a range of high-pressure mixing valves, that also incorporate an end-user accessible adjustment mechanism. Which facilitates mixes of 1%-22% with inlet pressure up to 32 bar and outlet pressures up to 28 bar.

FW Series Gas Mixing Panels

FW1 and FW2 panels for three component gas mixtures

These panel types follow the same basic layout as the standard FW series, but use modified mixing valves that incorporate the ability to add a third component to the mixed gas produced by the panel.

FWX Assemblies

Developed to combine the components from a best practice gas mixer installation in a simple floor mounted assembly to reduce the time spent at a customer's site during the installation phase of a project, the FWX range is the newest addition to the FW mixing panel product family.

Fig 4

Available options include BSL Gas Technologies' recommended specification filters for all gas mixture combinations, pressure relief valves to protect the customer's downstream equipment and leak detection flow meters that customers can use as part of their mixed gas piping system maintenance programs.