Fuel unit type BFPH

Catalog

Contents

Danfoss A/S Burner Components Division operates a Quality- and Environmental Management System which has been certified to ISO 9001 and ISO 14001.

Application

Danfoss fuel unit type BFPH is equipped with a hydraulic cut-off function.

The BFPH is available in versions for 1725 and 3450 RPM. The hydraulic cut-off function provides a perfect cut-off at high speed.

Code numbers

Type	Speed (rpm)	Rotation	Nozzle port location*	Mounting	Strainer capacity (GPH)	**Code no.**
		Seen from shaft end				
BFPH	3450	R.H.	R.H.	Flange or 2.12 in hub or 1.25 in hub	3	**071N1151**
BFPH	3450	R.H.	L.H.		3	**071N1153**
BFPH	3450	L.H.	R.H.		3	**071N1155**
BFPH	3450	L.H.	L.H.		3	**071N1157**
BFPH	1725	R.H.	R.H.		3	**071N1152**
BFPH	1725	R.H.	L.H.		3	**071N1154**
BFPH	1725	L.H.	R.H.		3	**071N1156**
BFPH	1725	L.H.	L.H.		3	**071N1158**

* The 1/4" NPTF suction port in the side is always placed opposite to the nozzle port

Function BFPH

Oil is drawn from the inlet port (S) through the strainer (H) to the gear wheel (C). The oil flows from the gear wheel (C) across constriction (F) and valve (D) - which is forced open by the spring power - back to the return side.
At an increased oil flow from the gear wheel, the pressure drop across constriction (F) will increase and the pressure on the front of the diaphragm (M) will exceed the pressure on the back.

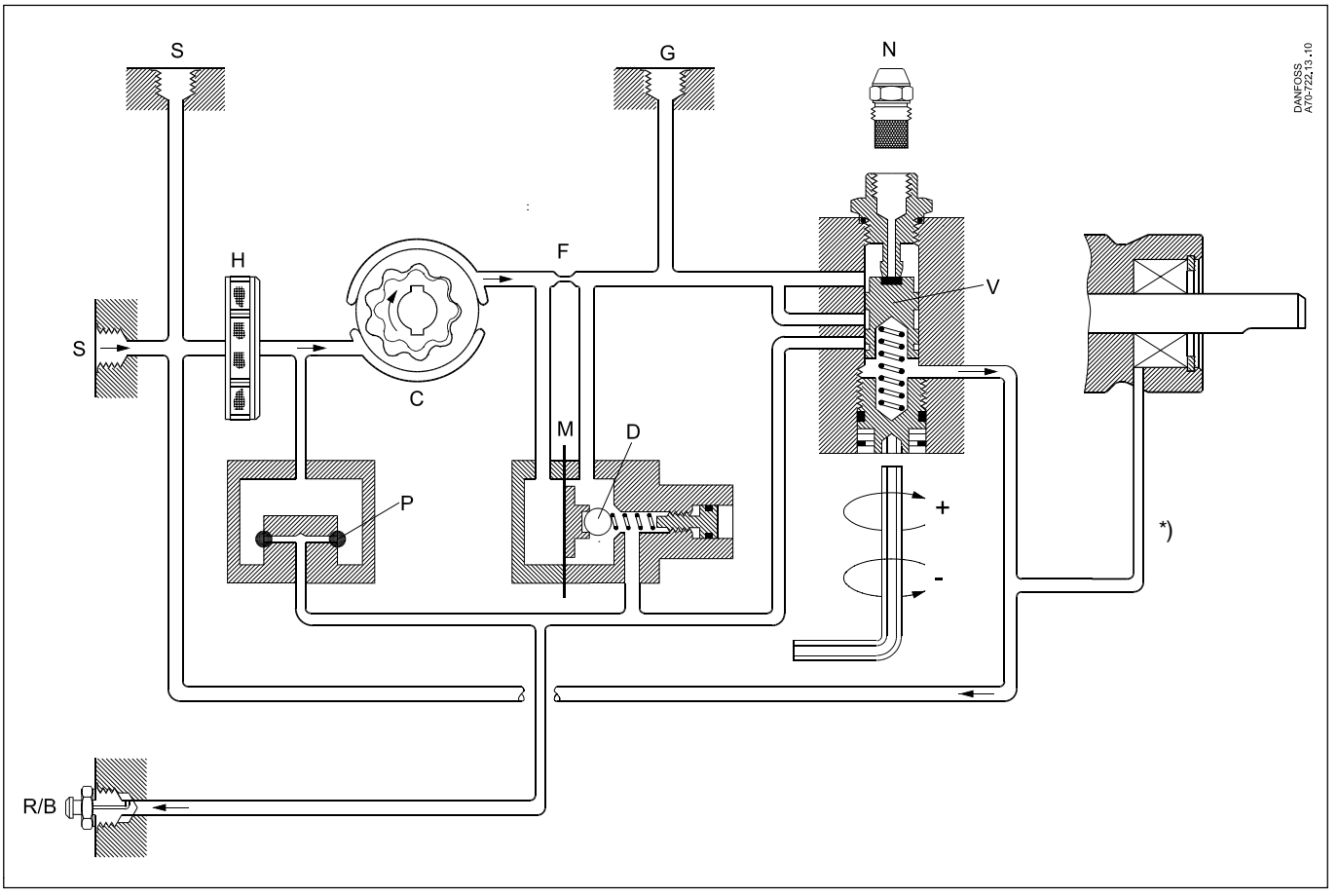
The spring power is overcome, and valve (D) closes. The pressure now rises to the value set for valve (V) and oil is admitted to the nozzle port (N). On a two-pipe installation the excess oil returns to the tank through the return port (R) since (R) is open and the by-pass valve (P) is closed.

On a one-pipe installation, the return plug/ bleeding plug (R/B), is mounted, resulting in the opening of the by-pass valve (P) and re-circulating of the oil to the suction side.

When the burner motor stops, the internal flow in the pump will fall.

As the pressure differential across the diaphragm is reduced, valve (D) opens. Valve (V) will close and cut off the oil flow to the nozzle.

Bypass valve (P) also ensures suction capability on one pipe installations where the oil tanks are below pump level.



*) Shaft seal lubrication circuit.

Technical data

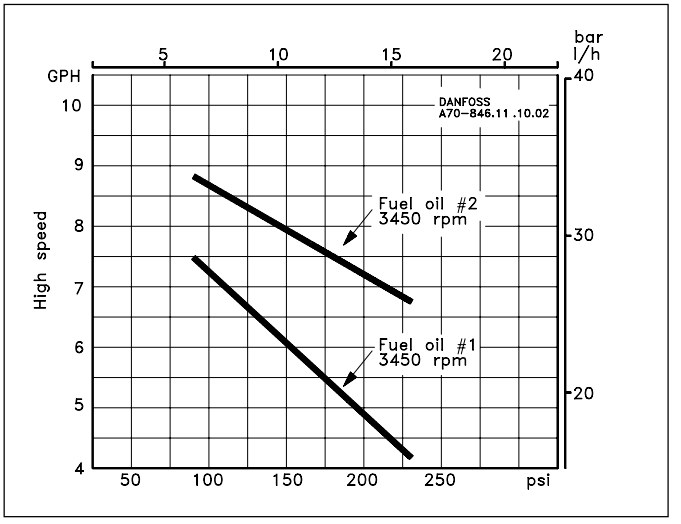
Type		BFPH	
Medium		Kerosene, fuel oil # 1 or # 2	
UL, CSA strainer rating [1]		3 GPH	
Fuel units for		1725 rpm	3450 rpm
Gearwheel capacity [2]		9 GPH	15 GPH
Max. starting torque		0.80 lbf in	
Pressure range	for oil # 2	100 - 160 psi	100 - 210 psi
	for lighter oil	100 psi	100-210 psi @ 2 GPH 100-150 psi @ 3 GPH
Factory setting		P_e = 100 psi	
Max. permissible press. on suction side		P_e = 30 psi	
Max. ambient temperature		158 °F	
Media temperature		14 °F to +158 °F	

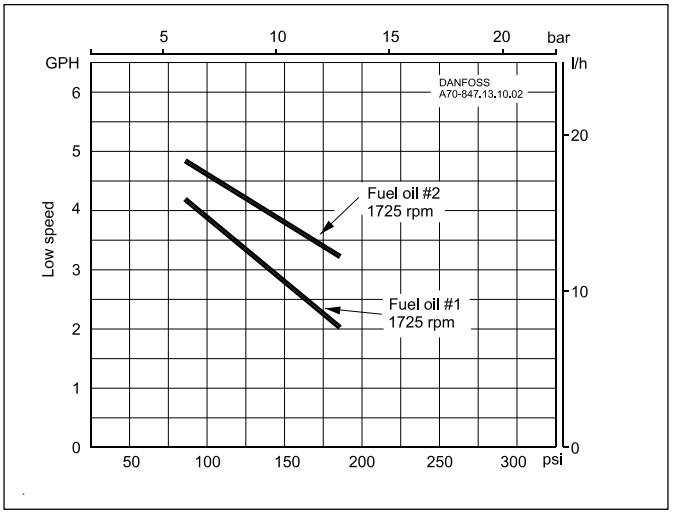
Please note!

[1]) The built in strainers in BFPH are approved as primary filters up to the GPH marked on the pump. If the pumps are used for higher capacities according to the curves, line filter equal to or greater than the maximum firing rate must be installed.

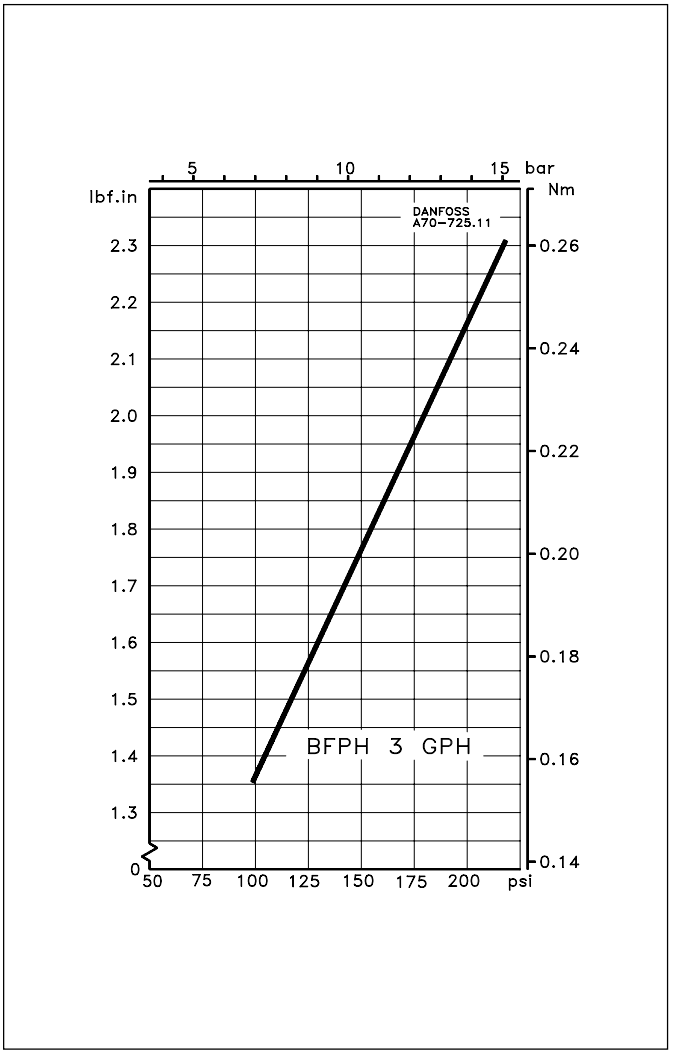
[2]) At 100 psi, fuel oil # 2 and 10 in Hg vacuum at the inlet.

Capacity

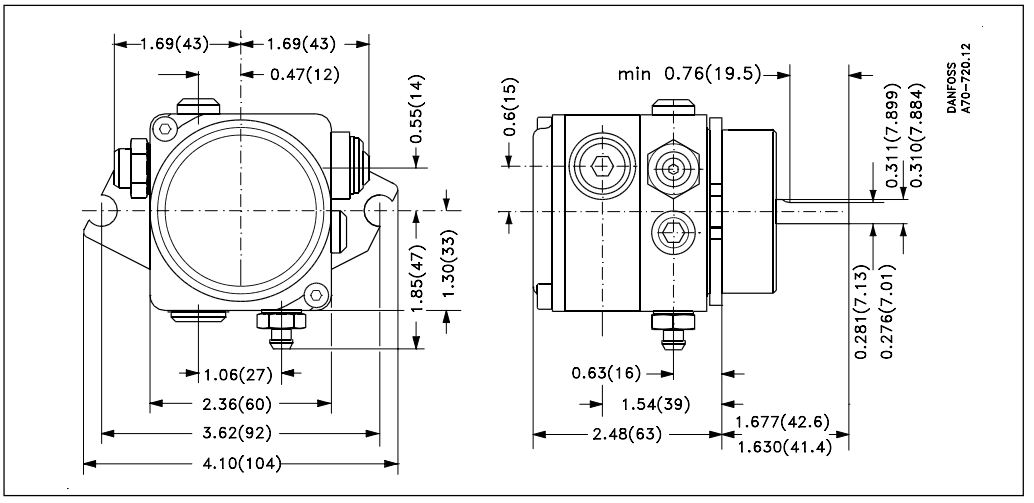




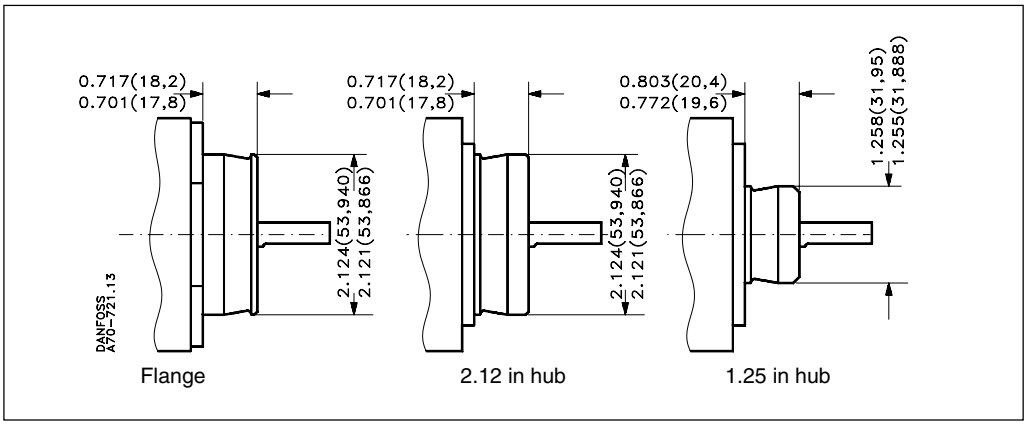
Torque



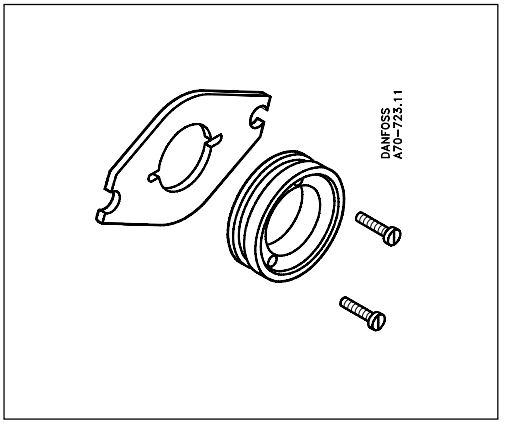
Dimensioned sketch BFPH



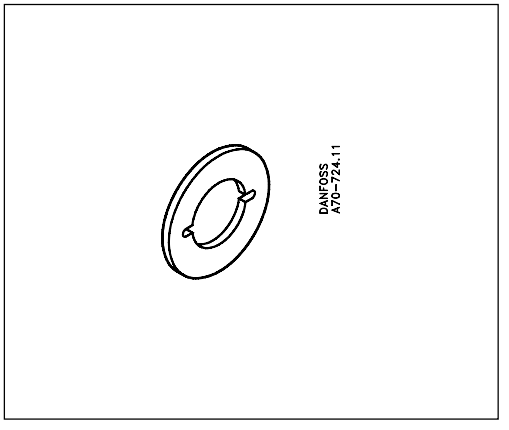
Neck types



Mounting



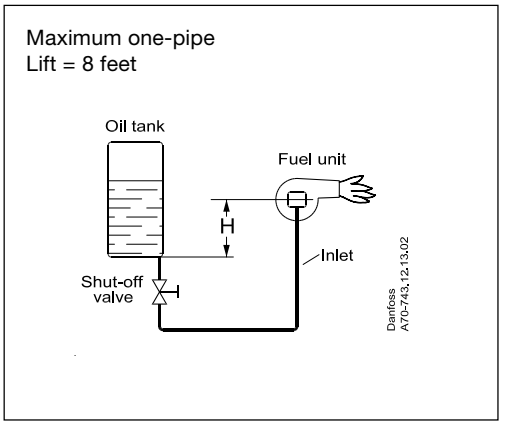
The BFPH flange model can be used as a 2.12 inch hub or 1.25 in hub model:



2.12 in hub: Remove the flange holder ring, turn it upside down and remount it. If it is preferred not to keep the flange on the hub model remove the flange and mount distance ring spare part no. 071N1405.

1.25 in hub: Remove flange holder ring and flange.

One-pipe system Suction line length



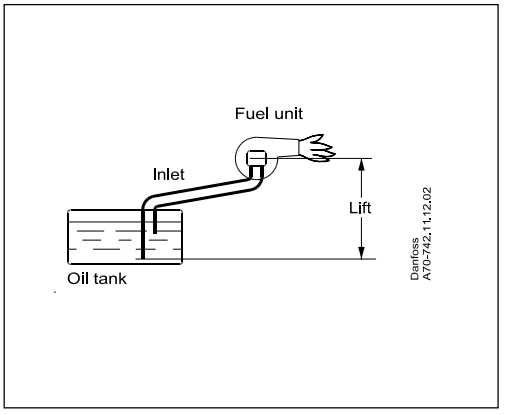
Suction line lenght in feet including vertical and horizontal length:
H = Head in feet
Q = Firing rate (Actual nozzle output) in GPH

$$\text{3/8" line length} = \frac{6\text{-}0.75H}{0{,}0086 \times Q} = \text{feet}$$

$$\text{1/2" line length} = \frac{6\text{-}0.75H}{0.00218 \times Q} = \text{feet}$$

If tank is above fuel unit change - to +

Two-pipe system Suction line length



Suction line length in feet including vertical and horizontal length.

Calculation basis:
Viscosity 57 SSU = 9.6 cSt.
Tube wall thickness .035".

Pumpsize	3 GPH			
Lift	1725 rpm		3450 rpm	
Feet	3/8" OD Tubing	1/2" OD Tubing	3/8" OD Tubing	1/2" OD Tubing
0'	150	150	91	150
2'	132	150	80	150
4'	114	150	68	150
6'	94	150	57	150
8'	74	150	45	150
10'	57	150	34	134
12'	37	150	23	90
14'	19	75	–	45

Installation guidelines

Maximum pressure on inlet and return line at the fuel unit must not exceed 30 psi.
A pressure greater than that may cause damage to the shaft seal. Non-hardening oil pipe dope is recommended for all thread connections, as teflon tape pieces may cause troubles in pump and nozzle. Use of Teflon tape or thread sealants containing Teflon voids warranty. It is suggested that a quality filter is installed in the supply line.

Do not use check valves or equivalent components in oil lines or restrict oil flow back to the supply tank by any means, (especially not in gravity feed systems), unless a means of pressure relief is installed. Thermal expansion of the oil during off-cycle/burner shutdown can create high pressure within the supply line that can cause damage to the shaft seal and/or cover of the fuel unit, or to the piping.

All installation must be made in accordance with local and national codes. Pumps should only be installed by qualified installers.

Troubleshooting guide

Cause	Remedy	
No oil flow at nozzle	Check all oil piping and electrical wiring to unit for proper connections. Make sure oil is in tank. Proceed with trouble shooting as follows: ♦ Open the valve on the inlet line. ♦ Bleed the fuel unit in accordance with the instructions. ♦ Fit pressure gage and vacuum gage to the pump to check pressure and vacuum. ♦ Check the coupling between motor and fuel unit. ♦ Start the burner and check the fuel unit direction of rotation.	♦ Check the fuel unit installation. If there is still no sign of oil at the nozzle, check: • To see that the inlet and return lines have not been swapped over. • That the solenoid valve operates, or if appropriate, why it does not operate. • That the oil nozzle is not clogged. • That the oil safety valve in the inlet line is not the wrong way round. • That the inlet line does not leak and that it has not been crushed flat. • That the strainer is not clogged.
Pulsating pressure	Fuel unit pressure variations can produce poor combustion since the oil volume as well as the atomizing pattern will change.	Possible reasons are: ♦ Air in the oil as a consequence of leaks or too high a vacuum in the inlet line, (half-closed shut-off valve, clogged strainer, blocked check valve in the inlet line, crushed inlet line, etc.). ♦ Dirt in the fuel unit pressure regulating valve. ♦ Pump/motor coupling slip, i.e. speed variations.
Nozzle cut-off ineffective	An oil burner starts and stops about ten or twelve thousand times a year. If the nozzle cut off is ineffective the boiler will become very sooty internally. Fuel units having a cut-off function are designed to cut off oil to the nozzle when revolutions per minute are high so that combustion air from the fan is sufficient to ensure a soot-free stop. Cut-off or closing is effected by either a built-in hydraulic valve or a solenoid valve installed in the nozzle line or incorporated in the fuel unit.	The reasons for poor cut-off can be as follows: ♦ Air build-up in the nozzle line, or perhaps in the nozzle or between nozzle and nozzle holder. ♦ Dirt in the hydraulic cut-off valve. ♦ Dirt in the nozzle line solenoid valve.

Pressure cannot be regulated	If the fuel unit pressure cannot be regulated, or if the pressure gage deviates, the reason can be. ♦ Coupling between motor and fuel unit defective, (no pressure reading on the gage). ♦ Pressure gage defective. ♦ Pressure gage incorrectly fitted.	♦ Pressure regulating valve defective or clogged. If this is the case, the pressure gage will show either constant high pressure or constant low pressure. ♦ Air in the oil. This will produce pulsating pressure gage readings. ♦ Wrong type of fuel unit, i.e. capacity too small in relation to nozzle capacity. Here, the pressure gage will show too low a pressure.
Fuel unit will not rotate	Is the fuel unit in fact being driven by the motor coupling/fan pulley?	The coupling or pulley could be defective or could have worked itself loose.
Fuel unit whines or makes a crackling noise	When shortly after starting, a gradually increasing whine comes from the fuel unit the most probable reason is that a valve in the inlet line is still closed. This valve will produce such a high vacuum in the inlet line that air will separate from the oil and the fuel unit will begin to shriek in protest. Depending to some extent on temperature and viscosity, the fuel unit will begin to whine at about – 15" HG (vacuum) in the inlet line. This can damage the fuel unit, therefore the valve should be opened immediately. A similar condition, with high vacuum and whine can occur if the oil filter in the inlet line is clogged; if the oil safety valve in the inlet	line has stuck in its closed position; or if the inlet line has been crushed flat. Other factors producing fuel unit whine are: a wrongly dimensioned inlet line (the internal diameter is too small for the length), also an excesive, suction height, and perhaps dirt in the inlet line. Air bubbles from a leaking inlet line can produce a crackling noise in the fuel unit. Such a defect can be confirmed by fitting a pressure gage to the fuel unit – air bubbles will cause it to jump or flutter. In other words: low vacuum and a jittery pressure gage indicate a leak in the inlet line.
Oil droplets occur at cover	BFPH fuel units produced after June 17th 2002, date code 252, have a high pressure relief function under the cover to protect the fuel unit and system against high pressure. The high pressure relief function releases a few droplets of oil at the cover when the pressure in the oil lines reaches more than 100 psi. After the high-pressure is relieved, the relief function closes and the fuel unit is tight. If the high pressure relief function has been activated it is a clear indication that there is a problem in the system that results in pressure build up. This can happen by e.g. thermal expansion of oil or a supply pump with the supply pressure set too high. Check the system for:	• Water contamination (risk of ice plugs and thermal expansion of oil). • Check valves or other restrictions in the line/lines without proper pressure relief back to tank. • Supply pressure setting in systems with supply pump. • Any other restriction that has occured. • Ensure that outdoor piping is sufficiently insulated. The system must be corrected for the cause of pressure build up in oil lines.

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