New technologies for Gas Application

- AMBIENT TYPE LPG VAPORIZER
- **POWER FREE VISE**
- **MULTI-FUNCTIONAL REGULATOR**

AMBIENT TYPE LPG VAPORIZER

Innovative atmospheric type vaporizer of LPG that does not require any electricity.

Characteristics of LPG

1) When the ambient temperature is 12 ° C, the vapor pressure of the LPG storage tank is maintained at about 7 bar.
2) When LPG TANK's natural vaporized gas is used, the vapor pressure is lowered, so the LPG liquid temperature in the TANK is lowered, and the heat exchange occurs by the temperature deviation (Δt) between the atmosphere and vaporized gas.
3) At this time, only a small amount of gas can be continuously used because of the shortage of heat transfer area (surface area outside the tank). When a large amount of gas is needed, the gas is often supplied using an LPG electro thermal vaporizer.
4) In this case, LPG is vaporized with electric power energy, so energy consumption and relative facilities should be facilitated.

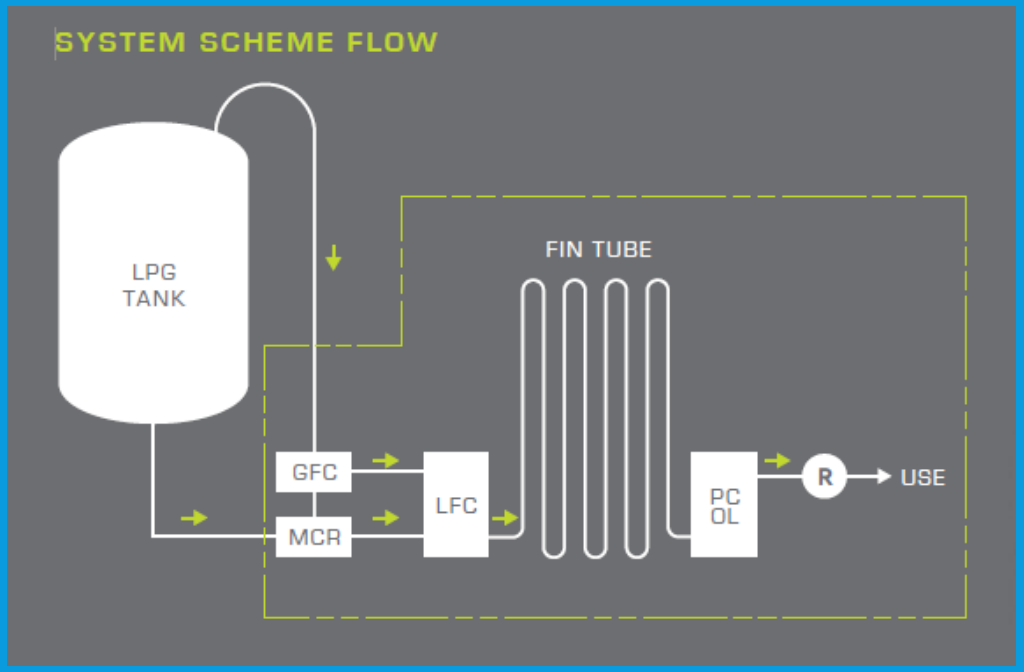
Atmospheric Pressure	Vapor Pressure LPG(C_3H_8 90%, C_4H_{10} 10%)
1.0bar	-42.4℃
2.0bar	-25.9℃
3.0bar	-16.9℃
5.0bar	+1.2℃
7.0bar	+11.2℃
10.0bar	+26.3℃

AMBIENT TYPE LPG VAPORIZER

Innovative gas supply system of LPG storage tank that does not require any electricity by combining an atmospheric vaporizer.

- ✓ ECO-FRIENDLY PRODUCT
  WITHOUT ENERGY CONSUMPTION
  (NO ELECTRICITY!)
  (NO CONTROL PANEL!)
- ✓ NO EXPLOSION-PROOF EQUIPMENT
- ✓ MAINTENANCE FREE
- ✓ SELF REGULATION

System Layout



This system consists of four key controllers;

- GFC (Gas Flow Controller)
- LFC (Liquid Flow Controller)
- MCR (Mixing Ratio Control Regulator)
- PCOL(Prevention Carry Over Liquid)

System outline

The system uses a gas feeder (GFC) that maximizes the use of evaporated gas in an LPG storage tank.

And a mixing control regulator(MCR) is producing the saturated low temperature LPG by the operation that mixes the gaseous and the liquid.

The operation method is to promote the vaporization efficiency by increasing the temperature deviation between the atmosphere temperature and the saturated LPG.

The liquid flow rate regulator (LFC) serves to supply an appropriate flow rate of liquid to preventing excessive liquid from being flowed to the fin tube.

The liquid carry over prevention device (PCOL) is a safety device that prevents the liquid overflowing by excessive using of LPG.

Reference Data and Dimension

L.P.G AMBIENT VAPORIZER.							
MODLE	CAPACITY (Kg/hr)	DIMENSION(mm)			INLET	OUTLET	EMPTY WHGHT (Kg)
		W	L	H			
SHV-30L	30	728	548	1970	20A	20A	90
SHV-50L	50	928	928	2270	20A	20A	110
SHV-100L	100	1178	1428	2470	20A	20A	220
SHV-200L	200	1678	1678	2770	25A	25A	380
SHV-300L	300	1678	1928	3470	25A	25A	550
CONDITION	AIR TEMPERATURE 0°C AMOSPHERIC PRESSURE 1atm						

AMBIENT TYPE LPG VAPORIZER

Aluminum Extruding Factory

Installed : March 2014

- LPG Tank 4.9 ton x 1 unit
- Ambient Vaporizer 100kg/h x 2 units

Shin Il Electric

Installed : April 2014

- LPG Tank 2.45 ton x 1 unit
- Ambient Vaporizer 100kg/h x 1 unit

AMBIENT TYPE LPG VAPORIZER

Injae Chemical

Installed : May 2014

- LPG Tank 1.0 ton x 1 unit
- Ambient Vaporizer 1 units

2.9Ton LPG Tank/ 100KG/Hr Vaporizer

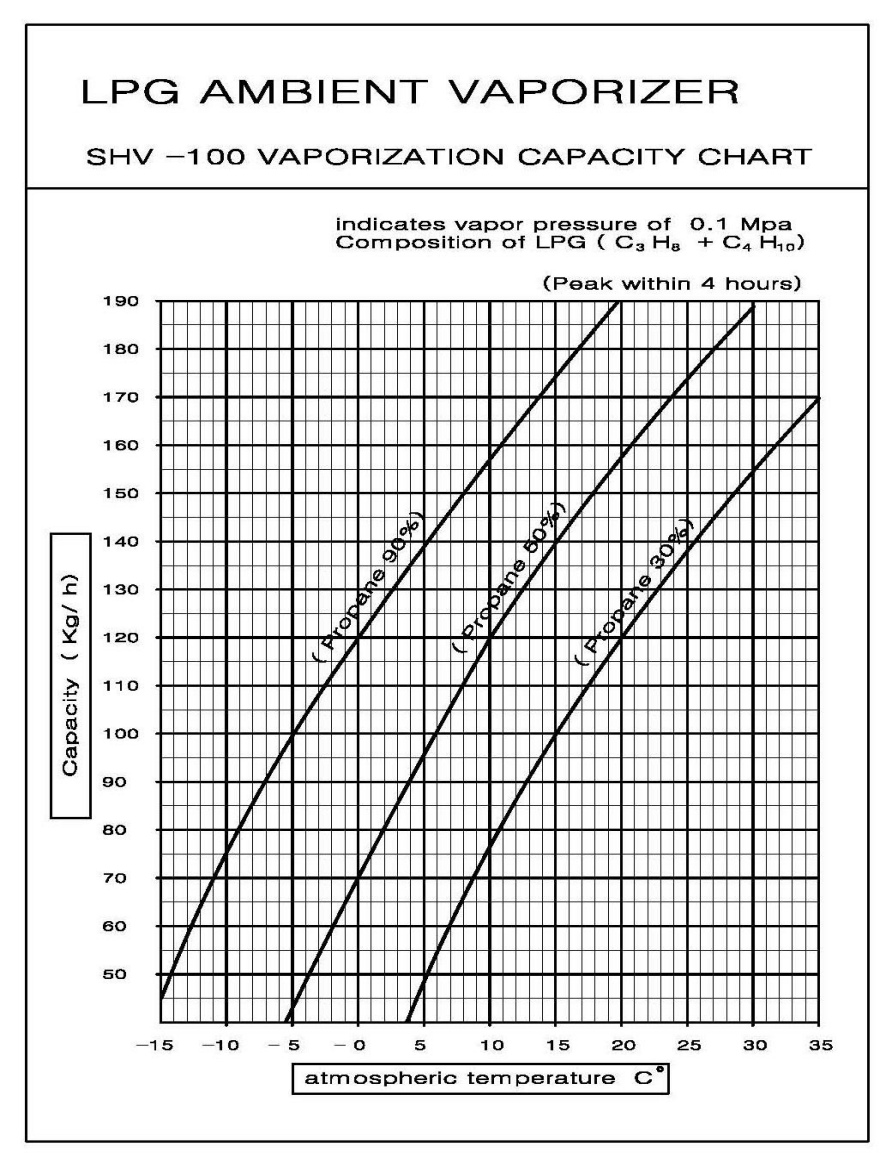
Items	Electric heating vaporizer	Atmospheric vaporizer
Electric rate	Vaporizing capacity 100kg/h Heater capacity: 14kw Electricity cost Base fee: 14kw x U$6/kw= U$84 Usage fee: 8hr/d, load rate805 = US$268 (14kw x 80% load x 8h/D x 30D x US$0.1/kw) **US$ 352/month**	None
Durability of vaporizer	Average life-year: 4~6 years Electric heater replacement: 2~3 years	Can be used semi-permanently
Facility cost	Installation cost of power line	None
Area to install	Smaller, but may be larger for security zone	Larger
Location to install	Regardless of temperature (in severely cold area, may be frozen to burst)	Average yearly temperature shall be 0°C or above. (the lowest temperature shall be -15°C or above)

Comparison Table/ Another Type vs. Modernizer

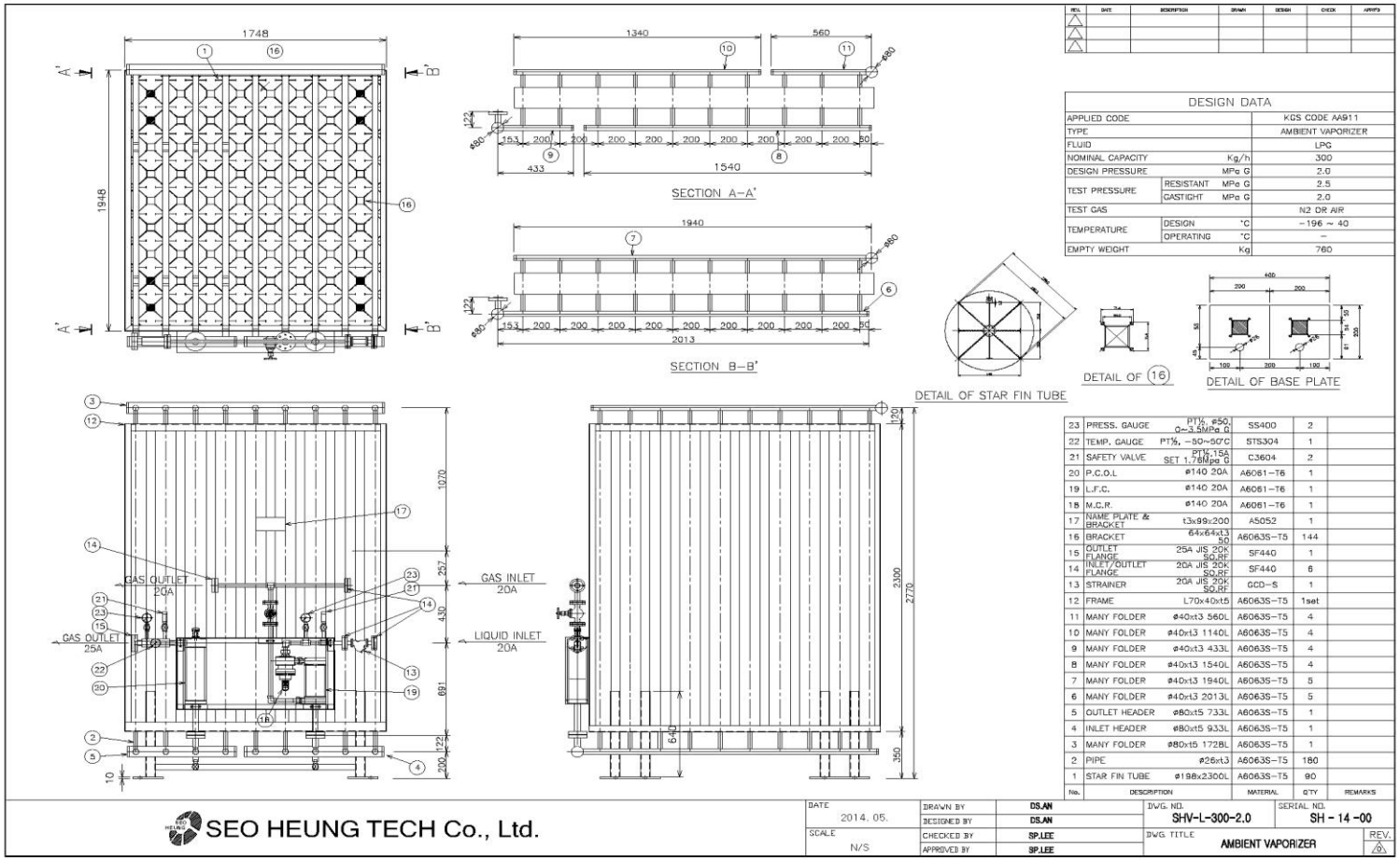
	Electricity	Size	Durability	Additional Facilities	Other Merits
Another Type	Control Power necessary	Double Size	Complicate System. More maintenance Efforts Required.	Control Box	Tree time than Korean Type No Mixing Sys.
Modernizer	**Electric Free**		**Semi permanent**	**None**	**Easy Operation**

	Product Record			2020-12-01	
	2015	2016	2017	2018	2019
50Kg/HR	5	8	4		
100Kg/HR	10	40	52	100	120
150Kg/HR		1	3		
200Kg/HR	2	6	12	50	60
250Kg/HR			1		
300Kg/HR		2	3		
Sub Toeal	17	57	75	150	180

Reference Data-Vaporization Capacity



Basic Drawing for 300kg/hr LPG Vaporizer



No.	DESCRIPTION	MATERIAL	QTY	REMARKS
23	PRESS. GAUGE PT½, ø50, 0~3.5MPa G	SS400	2	
22	TEMP. GAUGE PT½, −50~50°C	STS304	1	
21	SAFETY VALVE PT½,15A SET 1.78MPa G	C3604	2	
20	P.C.O.L ø140 20A	A6061−T6	1	
19	L.F.C. ø140 20A	A6061−T6	1	
18	M.C.R. ø140 20A	A6061−T6	1	
17	NAME PLATE & BRACKET t3x99x200	A5052	1	
16	BRACKET 64x64x13.50	A6063S−T5	144	
15	OUTLET FLANGE 25A JIS 20K SO.RF	SF440	1	
14	INLET/OUTLET FLANGE 20A JIS 20K SO.RF	SF440	6	
13	STRAINER 20A JIS 20K SO.RF	GCD−S	1	
12	FRAME L70x40xt5	A6063S−T5	1set	
11	MANY FOLDER ø40xt3 560L	A6063S−T5	4	
10	MANY FOLDER ø40xt3 1140L	A6063S−T5	4	
9	MANY FOLDER ø40xt3 433L	A6063S−T5	4	
8	MANY FOLDER ø40xt3 1540L	A6063S−T5	4	
7	MANY FOLDER ø40xt3 1940L	A6063S−T5	5	
6	MANY FOLDER ø40xt3 2013L	A6063S−T5	5	
5	OUTLET HEADER ø80xt5 733L	A6063S−T5	1	
4	INLET HEADER ø80xt5 933L	A6063S−T5	1	
3	MANY FOLDER ø80xt5 172BL	A6063S−T5	1	
2	PIPE ø26xt3	A6063S−T5	180	
1	STAR FIN TUBE ø198x2300L	A6063S−T5	90	

Power Free Vise

Innovative power free vise for connection of hose to cylinder that does not require any Monkey Spanner.

It is EASY to tighten the vise only by a little force and you can eliminate a monkey spanner in your gas filling deck.

In the conventional way, when the vise is fastened to the gas cylinders, human or material damage was frequent due to the number of times of using the tool or the repetitive tightening pressure.

However a new coupling with the valve filler has been adopted to allow easy attachment or detachment with bare hands.

This gas container charging adapter is currently pending under evaluation for patent.

POWER FREE VISE

For Gas Refill Plant

- ✓ It is easy to substitute the existing filling vises in refill stations because it is small in size and light in weight.
- ✓ Moreover, due to the easy and light fastening force which can reduce the worker's time and labor by more than 50%.
- ✓ It is possible to reduce the threading loss of the valves when connecting or disconnecting to the filling vise.

Multi-Functional Regulator for Cryogenic Tanks

Innovative design to solve the demerits of conventional cryogenic tank system

What is
MULTI-FUNCTIONAL REGULATOR?

MFR(Multi-Functional Regulator)
is newly designed to solve the demerits of conventional cryogenic tank system which is equipped with pressure build-up and economizer regulator.

Great saving by $1,000 to $10,000 / tank

1. Internal pipes are reduced.
2. Costs of valves and relief valves are saved.
3. Pipe bending and welding work are saved.
4. Fewer supports and holes.
5. Easy and accurate economizing function.

- ✓ Easy to control
- ✓ Simple to operate
- ✓ Revolutionary invention

Merits of
MULTI-FUNCTIONAL REGULATOR

1. Improved Pressure Build-up(PB) and Economizer(EC) function for cryogenic tank

    a. Existing method for EC in cryogenic tank is done by removing excess gas through differential pressure control between gas phase and liquid use line. As differential pressure is not big enough to exhaust excess gas, pressure reduction become very slow. Multi-Functional Regulator was invented to improve PB and EC function dramatically by switching flow path automatically.

    If tank pressure is set higher than PB, gas line is being vented to reduce tank pressure down to set pressure rapidly. If pressure is lowered than EC set pressure, liquid line is opened to control pressure repeatedly.

    b. If tank pressure is 0.05~0.1 MPa lower than MFR set, PB line is opened to build up tank pressure.

2. MFR advantages

a. PB / EC functions are controlled very stably.

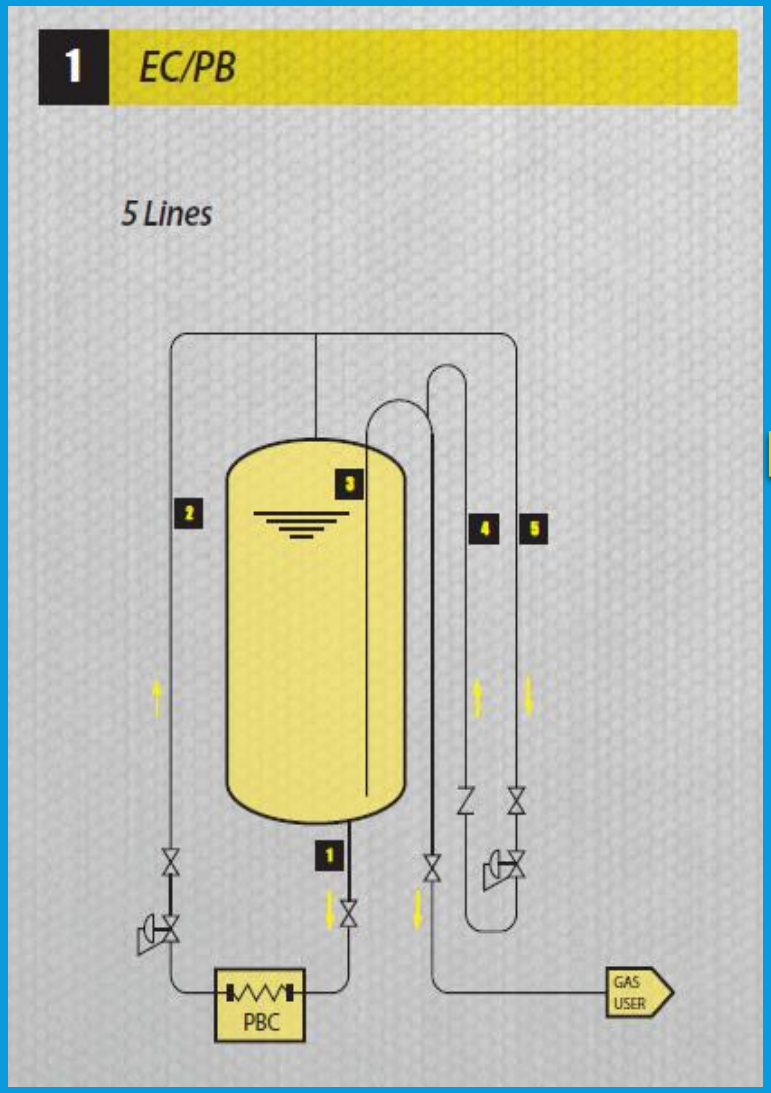
b. Internal and external plumbing are simple. Only one gas and liquid line are needed.
c. Simple to operate. Only one time setting controls multi-functions.
d. Checking set pressure after adjustment can be done at once.
e. Great saving for manufacture: piping materials, valve quantity, pipe bending, boss number, hole drilling, support number, welding cost, labor, etc.

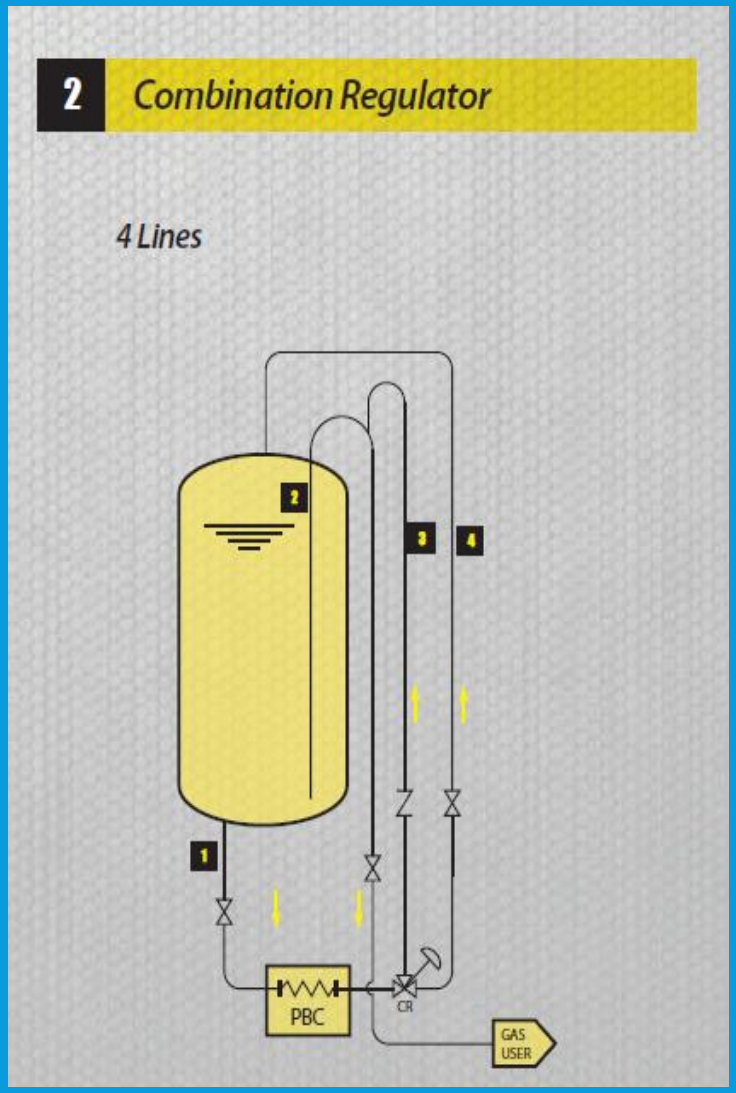
Comparison Table

Existing PB & EC Control	*Multi-Functional Regulator*
1. PB regulator / Economizer use	1. MFR use
2. Differential pressure control : Using liquid head, gas is sent to user.	2. Flow path change control : Pressure control by gas and liquid path control automatically.
3. As pressure is controlled with two sets of component (PB regulator and Economizer), operation is not easy.	3. One time set by multi-functional regulator. PB and EC are 0.05~0.1MPa difference.
4. Set point of PB and EC can be confirmed after a couple of hours when they are adjusted. Need to adjust again.	4. Set pressure of MFR can be confirmed 5-10 minutes after adjustment.
5. Need to adjust various valves and as EC is controlled by differential pressure, it takes long time for pressure stabilization.	5. Control pressure immediately and simple to operate. Due to path control, time for pressure release can be done immediately.

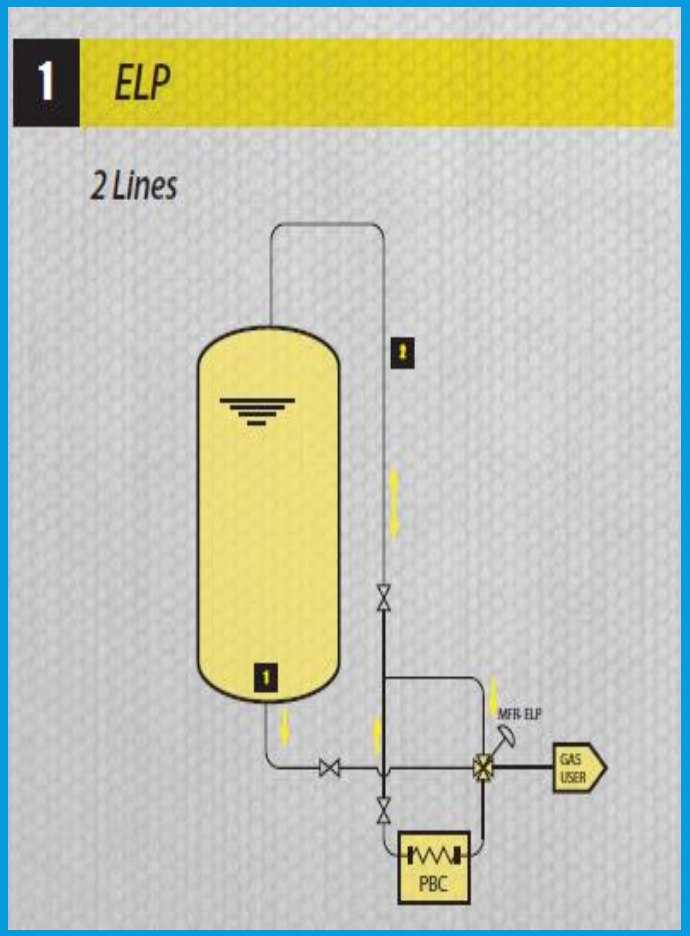
Existing System Structure

(Economizer and Pressure build up)

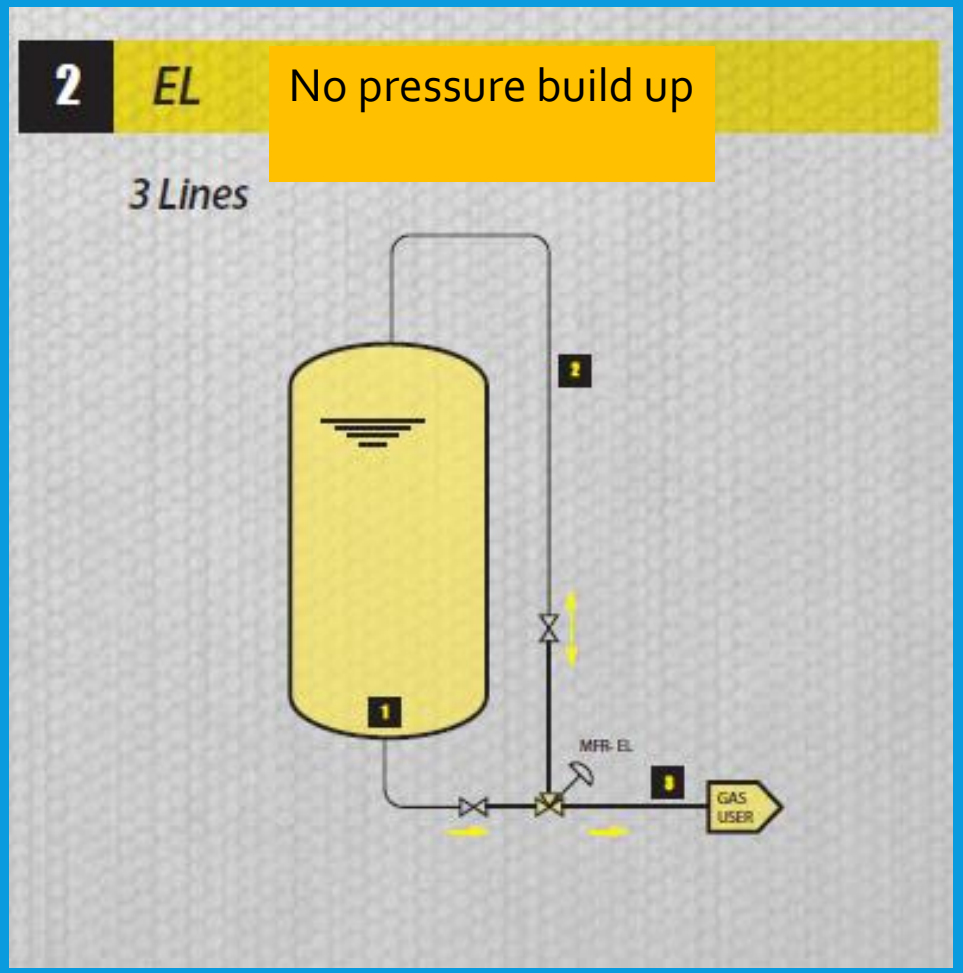




MFR System Structure



a. Only 2 lines are required.
b. Less work and material.
c. Simple and reliable operation and maintenance.



a. Solution for vent loss of existing system .
b. Easy modification and stable operation.
c. Functioning same as ELP except absence of PB.

Difference between ELP and EL model

ELP

EL

Storage tank (LO_2, LN_2, LAr, LNG) for new facility
All the function of Economizer, Pressure Build-up and Liquid Supplier are all in one.

Storage tank (LO_2, LN_2, LAr, LCO_2, LNG) for modification of existing facility.
Eligible for new tank if it is LCO_2.
Small gas users to prevent vent loss (fish farm, mixer, welding, green house)
Economizer and Liquid supplier.
(only Pressure build-up function is removed)

THANK YOU

Contact Details

CALL OR EMAIL

TEL 82 52 295 1913
FAX 82 52 295 1914
EMAIL: J H Park
<jeongho.park@modernigas.com>

OUR ADDRESS

66, Jungsansaneop-ro, Buk-gu, Ulsan, Republic of Korea,44214

VISIT OUR WEBSITE

http://www.modernigas.com