ISO 9001:2015 Quality Management System Certified by British Standards

bsi.

ANAB

ACCREDITED

ISO/IEC 17025

CALIBRATION LABORATORY

JIOLAT Group

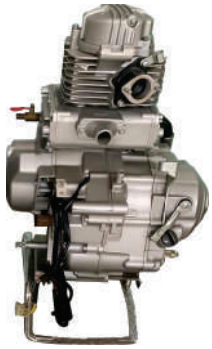
ISO 9001:2015 Company

Composition of CNG (% Valume)*

Methane	Ethane	Propane	i-Butane	n-Butane	i-Pentane
93.20	4.27	1.38	0.18	0.20	0.04

n-Pentane	Hexanes	Carbon dioxide	Nitrogen	Moisture content
0.03	0.00	0.27	0.43	2.0ppm

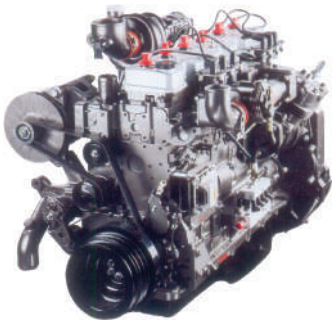
Ashok Leyland	TATA Bus & Truck	Eicher	Swaraj Mazda	Mahindra & Mahindra
1612	407	1059	S.M - T 3500	
1613	709	1075	Super - T 3500	
1616	712	1090		
1618	912	1095		
2516	1109	1110		
2518	1613	2016		
2523	1512			
3116	1510			
3118	1515			
3120	1615			
1518	2516			
Emission	B S - (I I I)	B S - (I I I) - (I V)	B S - (I I I)	



Single Cylinder
BS-IV-BS-VI

Double Cylinder
BS-IV-BS-VI

Four Cylinder
BS-IV-BS-VI



Six Cylinder
BS-IV-BS-VI

CNG / LNG / LPG / BIOGAS / PETROL GENSET HEAVY COMMERCIAL ENGINE

200 CC TO 2,00,000 CC AVAILABLE

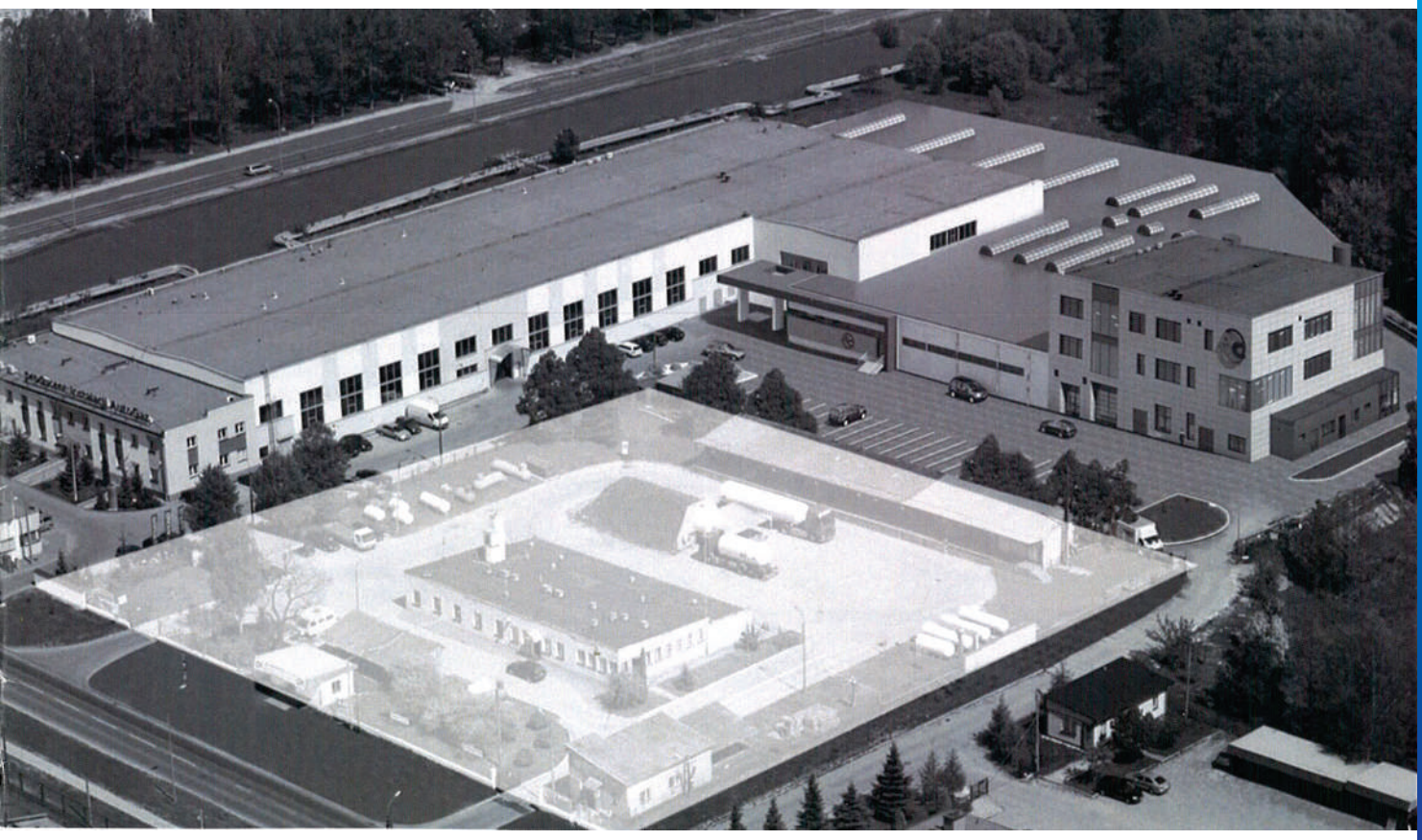
2000 K.W.	1000 K.W.	500 K.W.	400 K.W.	300 K.W.
250 K.W.	200 K.W.	150 K.W.	125 K.W.	100 K.W.
75 K.W.	50 K.W.	30 K.W.	25 K.W. 700 CC	24 K.W.
14.5 K.W. 400 CC	10.5 K.W. 250	7.5 K.W. 250 CC		

COMPANY PROFILE

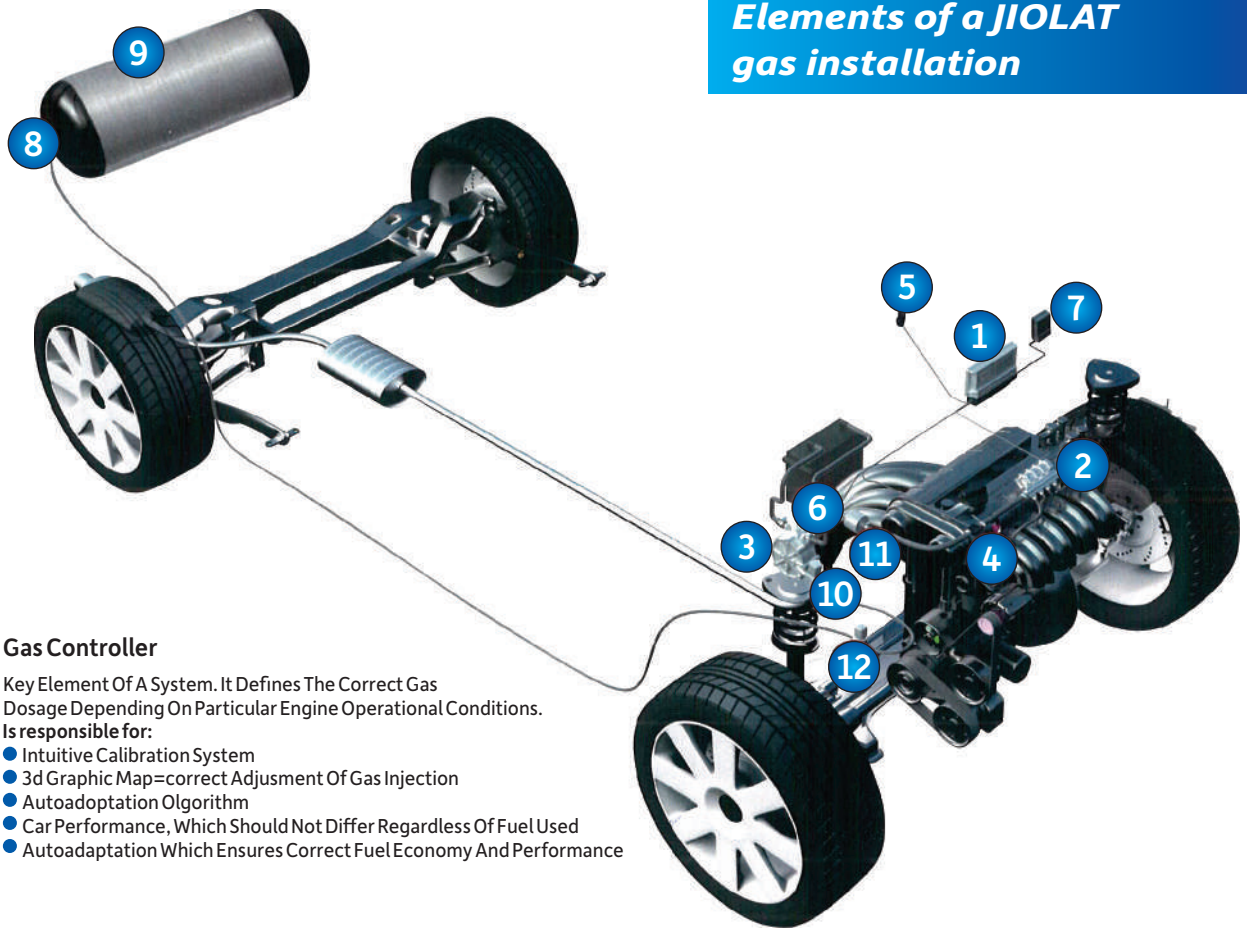
- Jiolat Group having presence in automotive industry since 1996 & Begning from 1999 for CNG parts & fuel system supplier across the india today, we are on of the company who have converted more than 35000 LMV (Petrol to CNG duel fuel mode) & 17000 HCV and 9000 LCV (Diesel to CNG mono-fuel mode). Jiolat Fuel Tech Pvt. Ltd. are part of Jiolat Group re-presenting in LMV CNG conversion along with LNG/CNG station set-up, storage facility and transpotation, also
- Our innovative approach has helped shape the modernization of CNG systems for LMV & HMV vehicles & supports to environment safety and economy of nation.
- We are having tendering works like: CNG Cylinder cascade re-test, CNG pipeline project, cylinder re-test facility approved by PESO, Nagpur for periodical testing work (for all kind of CNG Cylinders on board & CNG cascade). we democratize innovative technology and drive forward excellent ideas to their production maturity. the engineers at our facilities are consistently translating revolutionary concepts

VISION OF JIOLAT GROUP

- The company's mission is to establish it as a brand name in the field of CNG kit installation & distribution network across the india and overseas
- All base models & variants approved in indian market by ICAT, ARAI & CIRT
- to provide maximum valve to our customers by providing alternate fuel, clean energy and automotive products along with great service that is perceivably different in technology, quality and innovation.
- Start the well organize Retro-fitment centre for OEM and zero kilometer vehicle fitment Now we are having big workshop area of more than 4000 sq. meter. at for CNG Conversion Delhi NCR (**For taking care of major taxi operator group**) added for LCV / Medium / Heavy range for Buses and Truck



Elements of a JIOLAT gas installation



1 Gas Controller

Key Element Of A System. It Defines The Correct Gas Dosage Depending On Particular Engine Operational Conditions.
Is responsible for:

- Intuitive Calibration System
- 3d Graphic Map=correct Adjusment Of Gas Injection
- Autoadoptation Olgorithm
- Car Performance, Which Should Not Differ Regardless Of Fuel Used
- Autoadaptation Which Ensures Correct Fuel Economy And Performance

2 Injector Rail

It Is Responsible For Correction Dosage Of Gas In Vapor Phase.

- Does Not Require Adjustment
- Reliable - Durability Test Of Distance Of 100 000 Km
- We Obtained Our Own Homologation For The Injection Rail
- Perfect Performance, Regardless Of Circumstances And Vehicle's Load
- Easy Start-up In Cold Enviroment

3 Reducer

It Decreases The Pressure Of The Gas Coming From The Tank And Regulates It Quantity And Pressure To The Needs Of The Engine.

- Power Output Up To 250 Hp
- Small Dimension And Easy Mounting
- Well - Performing In Any Circumstances: -urban And Suburban - Low Temperature Environment
- Stable Operational Parameters
- Optimal Fuel Consumption
- Stable Engine Work

4 Pressure and temperature sensor

The Device Measures Gas Pressure, Gas Temperature Inside The Gas Line And Also Vacuum Inside The Manifold. The Measuring System Is Designed For LPG (Propane-Butane) And CNG (Methane) Gas Injection Systems In All Cars, Regardless Of Engine Power, Including Turbocharged Ones. Depending On The Type Of Sensor You Can Mount It Directly On Injector Rail (PS-04) Or In Gas Line Between Filter And Injectors (PS-02 And PS-04)

5 Petrol/Gas Switch

An Electronic Petrol/gas Switch Performs A Number Of Functions, From The Selection And Optical/acoustic Signaling Of The Operating Mode To The Indication Of The Gas Level In Vehicles Which Have Systems For Fuelling The Engine With Alternative Fuels, I.e. Autogas. Usually Switches Have Many Advantages: Attractive Design And The Arrangement Of Decorative Elements Which Are Formed As Illuminated Channels. Depending Of The JIOLAT Controller, Various Types Of Switches Are Used To Change From Cng To Petrol And Opposite Side.

6 Manometer

Manometer, Determines The Filling Status Of The Gas Tank Using The Gas Pressure Value. The Pressure Gauge Signal, Converted To Voltage Is Also Used To Control The Gas Level Indicator On The Petrol CNG Switch

7 Timing Advance Processor

Timing Advance Processor Is A Microproxessor Based Device For Changing The Spark Lead Angle Of Engines Powered With LPG Or CNG. Due To The Higher Actane Number Of Gas Fuel, The Combustion Time Of The Air And Gas Mix Is Longer Than In The Case Of Air And Petrol Mix. The Refore, Ignition Of The Air And Gas Mix Should Accur Earlier Than In The Case Of Petrol. Timing Advance Processor Improves Response Of An Engine Powered With Gas, Reduces Gas Fuel Consumption. And Re-Duces The Risk Of Back-fire In The Case Of Previous Generation Systems. Timing Advance Processor Has Been Designed For Installation In Cars Equipped With An Induction Crankshaft Position Sensor (tap 03/1) Or With Hall Effect Or Optical Crankshaft Position Sensor (Tap 03/2). Tap Is Suitable Maximum Two Digital Camshaft Position Sensors.

8 Manual Gas Valve

The Regulator Is Adjusted To Control The Downstream Pressure, With Will Limit The Maximum Flow Of Gas Out Of The Cylinder. CNG Valves Are Manufactured With High Quality Standards And Can Be Equipped With All Safety Devices: Thermo Fuse, Burst Disc, Excess Flow Valve, Manual Tap, Solenoid Valve. CNG Valves Are Available In Different Models, In Several Configurations And, Upon Request, In Personalized Versions As Well.

9 CNG Cylinder

Tank Components Secure The Correct Pressure Inside The Tank. Set Of Valves (forming) A Single Element) Provides Comfort And Safety Of The System.
Ensured With Sofisticared Examination Procedue:

- Hydraulic Pressure Test,
- Pressure Weariness Tests Run In Various Temperature Conditions
- Fire - Proof Test,
- Resistance Ta A Bullet-shot Test

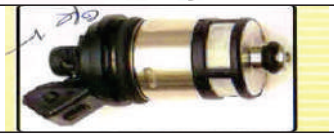
10 Elektrovalve

11 Gas filter

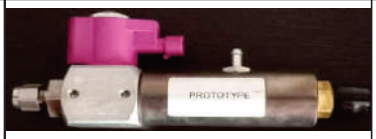
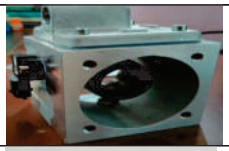
12 Filling valve

The Filling Valve Is Used To Fill The Tank With CNG Gas. Different Adapters Can Be Used To Adjust The Refueling Valve To Market Requirements. Because Of The High Pressure Of The CNG Gas, The Refueling Valve Must Be Assembled In A Professional Manner With The Attached Fastening Element And The Mechanical Connections Checked For Tightness.

Example Of CNG / Assembly To Diesel Conversion Automotive Heavy Vehicle Kit Bus & Truck

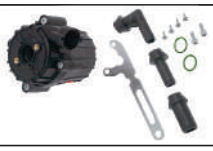
Sl. No.	Item	Model/Specification	Qty/per	Picture	Remarks
1	ECM	LNG ECM 4&6&8 CYLINDER	1		
2	REGULATOR	CNG HIGH PRESSURE REGULATOR	1		
3	INJECTOR	ELECTRONIC THROTTLE BODY & INJECTOR 4/6/8 CYLINDER ENGINE	1		
4	NOZZLE	COMBINED NOZZLE (FILLING VALVE)	1		
5	FILTER	HIGH PRESSURE FILTER	1		
6	HOSING	TEETH WHEEL HOSING	1		
7	SENSOR	OXYGEN SENSOR	1		
8	AIR SENSOR	AIR LOW PRESSURE SENSOR	1		
9	SENSOR	TEMPERATURE SENSOR	1		
10	SENSOR	TEETH GEAR SENSOR	1		
11	SENSOR	RPM SENSOR	1		
12	SENSOR	TIMING SENSOR	1		
13	SENSOR	MAP SENSOR	1		
14	PEDAL	ELECTRONIC THROTTLE PEDAL	1		
15	INJECTOR	ELECTRONIC FUEL INJECTOR	1		
16	REDUCER	HIGH PRESSURE CNG & LNG REGULATOR REDUCER	1		

Example Of LNG / Assembly To Diesel Conversion Automotive Heavy Vehicle Kit Bus & Truck

Sl. No.	Item	Model/Specification	Qty/per	Picture	Remarks
1	LNG Storage Tank	CDPW (Capacity is 335L)	1		ASSAY: check valve, drain valve, pressure regulating valve, major and auxiliary safety valve, gas phase valve, pressure gauge etc.
2	LNG Drain Pipe	PENDING	1		The length is determined by actual needs
3	Water Bath Vaporizer ASSY	QHQ-01	1		ASSAY: water inlet and outlet, LNG inlet and out let, vaporized, pressure gauge, surge tank etc.
4	NG Pipeline	PENDING	1		Vaporizer filter, filter solenoid valve, solenoid valve voltage regulator, voltage regulator-SFI
5	CNG Filter	GLQ-D3	1		
6	LNG solenoid valve	L-FLV	1		
7	Pressure Regulator	NIKKI4.4 bar	1		
8	Continuous Flow valve	SFI-300	1		
9	MIXER	FM-76A	1		
10	Electronic Throttle Body	0280750151 60 mm	1		
11	ECU	UC-HD-90A	1		90 Pin
12	Crankshaft position Sensor	0281002315	2		Installation of a sensor for each crankshaft and camshaft
13	Water Temperature Sensor	0281002170	1		
14	Intake Pressure Temperature Sensor	0281002437	2		TIP and MAP

15	**Spark Plug**	**M14x125**	**6**		
16	**High Voltage Ignition Cable**	IW-6018	6		
17	Ignition Coil	9201N	6		
18	Electronic Throttle pedal	Pedal Type	1		
19	Engine wiring harness	W01	1		
20	UEGO Sensor	ZFAS-U2	1		6BT
21	CNG Filter	GLQ-D3	**1**		
22	LNG solenoid valve	L-FLV	1		
23	Pressure Regulator	NIKKI4.4 bar	1		
24	Continuous Flow valve	SFI-300	1		
25	NG pistons	USHA	6		
26	Piston Ring	GOETZE	6		
27	Cylinder Liner	BANCO	1		
28	Cylinder Head assembly	TATA	1		
29	HOSING	TEETH WHEEL HOSING	1		

Example of CNG Car / assembly

Sl. No.	Item	Model/Specification	Qty/per	Picture	Remarks
1	REGULATOR	CNG PRESSURE REGULATOR	1		
2	ECM	GO-FAST 400	1		
3	Digital Switch	STAG	1		
4	Filling Valve	EMER	1		
5	Injector	STAG	1		
6	Accessories	JIOLAT	1		
7	Tube	HIGH PRESSURE TUBE	1		
8	Low Pressure hose Set	SUPER	1		
9	Wiring Harness	STAG	1		
10	Vapor Phase Filter	STAG	1		
11	Meter & Sensor	WIKA	1		
12	Tap-3 Tap-5	STAG	1		
13	Data Recorder	STAG	1		
14	Manual Gas Valve	EMER	1		

Example of LPG Car assembly

Sl. No.	Item	Model/Specification	Qty/per	Picture	Remarks
1	**LPG Pressure Reducer**	**JIOLAT**	**1**		
2	**ECM**	**STAG**	**1**		
3	Digital Switch Accessories	**STAG**	1		
4	LPG Multi Valve	**TOMESTO**	1		
5	**LPG Tank**	**ECON**	1		
6	**LPG Multi Valve**	**OMBEL**	1		
7	**Filter**	**STAG**	1		
8	**Slow Filling Valve**	**EMER**	1		
9	**Injector**	**STAG**	**1**		
10	**Accessories**	**JIOLAT**	**1**		
11	**High Pressure Tube**	**JIOLAT**	**1**		
12	**Low Pressure Hose Set**	**SUPER**	**1**		
13	**Wiring Harness**	**STAG**	1		
14	**Vapor Phase Filter With Accessories**	**STAG**	1		

JIOLAT QMAX PLUS

JIOLAT Qmax Plus Has Been Designed For Cars With Large Engi-Ne Capacity And Power In Order To Maintain Their Performance. Selecting The Auto-adaptation Method Is Optional. Intended For Automotive Use - The High-performance Processor Has Been Designed And Manufactured To Be Used In Cars Only. The Longest Warranty Periof Among All JIOLAT Products Is A Proof Of Perfection. Obd Auto-adaptation Guarantees That The Gas Injection. Is Set Accurately On The Basis Of Operating Conditions And Engine Load. The Mixture Ratio Is Not Based Solely Ion The Petrol Injection Timing Information - It Is Also Modified In Accordance With Ongoing Petrol Controller Corrections. Automotive Obd Error Conceller Enables Fully Automatic Deletion Of Selected OBD Malfunctions Without The Need For Connecting External Devices.

Controller features

Intended For Automotive

The High-Performance Processor Has Been Designed And Manufactured To Be Used In Cars Only.

Innovative ISA3 Auto-Adaptation

ISA3 Is An Innovative Approach To Auto-Adaptation Done After Actual Time Of Petrol Injection. ISA3 Is :

- Dedicated Correction Map Independent Of Rpm Correction In Relation To The Injection Timing,
- Accurate Creation Of Model Injection Timing Map, Taking Into Consideration The Engine Temperature,
- Recognising Open And Clossed Loop Modes In Real-Time.
- Viewing The Oxygen Sensor Signal Using The Vehicle OBD

OBD Auto-Adaptation

OBD Auto-Adaptation Guarantees That The Gas Injection Is Set Accurately On The Basis Of Operating Conditions And Engine Load. The Mixture Ratio Is Not Based Solely On The Petrol Injection Timing Information - It Is Also Modified In Accordance With Ongoing Petrol Controller Corrections.

Automatic OBC Error Erase

Automatic OBC Error Canceller Enables Fully Automatic Deletion Of Selected Obc Malfunctions Without The Need For Connecting External Devices.

FPE Built-in Emulator Pressure Level

FLE Built-in Fuel Level Emulator

Advantages:

- OBD Auto-Adaptation,
- Innovative ISA3 Auto-Adaptation,
- Supporting CAN and K-LINE Interfaces Compatible With OBD2/EOBD,
- Optional Extended OBD Reader With Error Auto-Deletion,
- Overlapping Fuel Types While Switching,
- Built-in Fuel Level Emulator,
- Built-In Fuel Pressure Emulator,
- Full Support of 2 Banks,
- Tight Straight Connector, 90-Pin.

JIOLAT QMAX PLUS Completion

QNEXT PLUS

Controllers Are Intended For Cars Equipped With Engines With Up To 4 Cylinders And With Indirect Fuel Injection.

Controller Features

Intended For Automotive
The High-Performance Processor Has Been Designed And Manufactured To Be Used In Vehicles Only.

Innovative ISA3 Auto-Adaptation
ISA3 Is An Innovative Approach To Auto-Adaptation Done After Actual Time Of Petrol Injection Using Some Of The OBD Parameters. ISA3 Is:

- Dedicated Correction Map Independent Of Rpm Correc-Tion In Relation To The Injection Time,
- Accurate Creation Of Model Injection Timing Map, To-King Into Consideration The Engine Temperature,
- Recognizing Open And Closed Loop Modes In Real-time,
- Viewing The Oxygen Sensor Signal Using The Vehicle OBD.

OBD Auto-Adaptation
OBD Auto-adaptation Guarantees That The Gas Injection Is Set Accurately On The Basis Of Operating Conditions And Engine Load. The Mixture Ratio Is Not Based Solely On The Petrol Injection Timing Information - It Is Also Modified In Accordance With Ongoing Petrol Controller Corrections.

Automatic OBD error erase
Automatic OBD Error Canceller Enables Fully Automatic Deletion Of Selected OBD Malfunction Without The Need For Connecting External Devices.

FPE build-in emulator pressure level

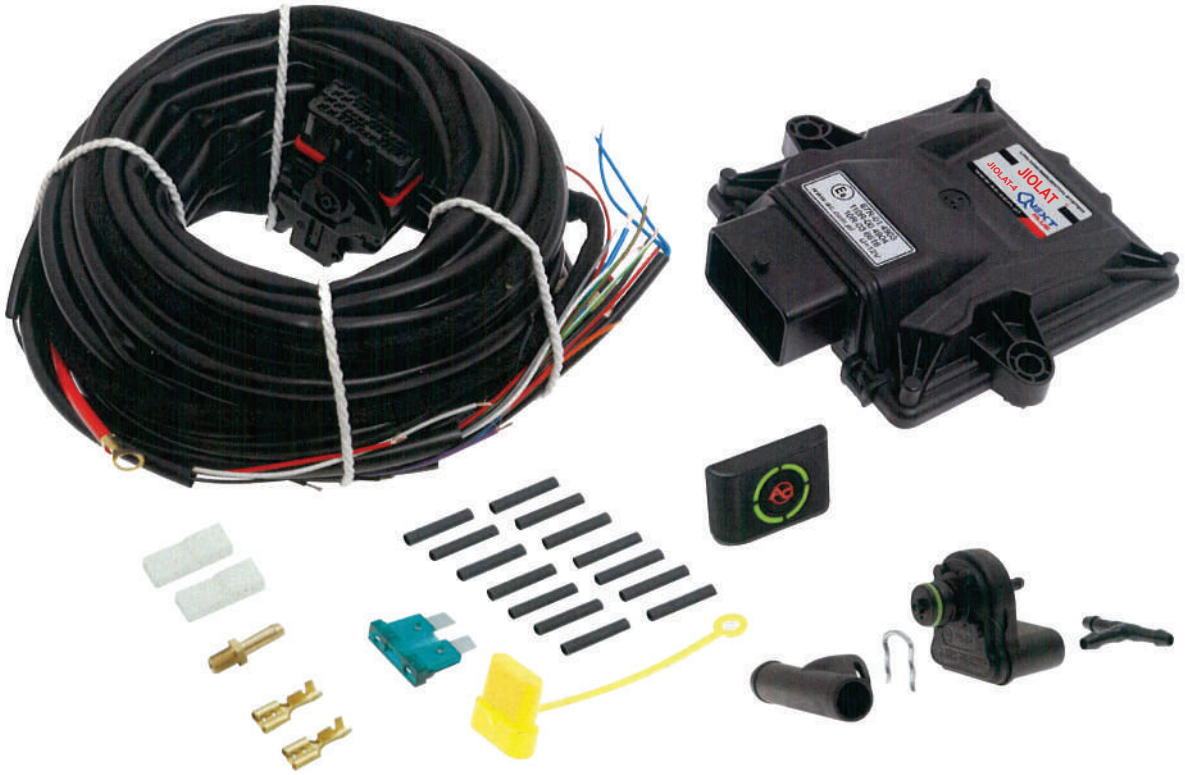
FLE build-in fuel level emulator

QUALITY by OEM TESTED

Advantages:

- OBD Auto-Adaptation,
- Innovative ISA3 Auto-Adaptation,
- Supporting CAN And K-LINE Interfaces Compatible with OBD2/EOBD,
- Optional Extended OBD Reader With Error Auto-Deletion,
- Overlapping Fuel Types While Switching,
- Elbow Connection (QBOX PLUS) Or Straight Connection (QNEXT PLUS).

JIOLAT QNEXT PLUS completion



max. 8 cylinders

JIOLAT 400 DPI

Advantages:

- accurate gas dosage within the whole RPM scope at minimal petrol consumption,
- maintaining key parameters of the engine operation as white fuelling with petrol,
- innovative gas dosing method which ensures stable engine running,
- automatic, insensible switching to gas fuelling,
- connection and calibraton similar to other JIOLAT controllers,
- using new tools which facilitate quick calibration,
- exceptional auto-calibration precision,
- built-in OBDII/EOBD adapter,
- complex self-diagnosis system,
- built-in fuel pressure emulator,
- 3D graphic map,
- supporting additional injections,
- reading ECU corrections,
- viewing operation parameters on an oscilloscope,
- transparent calibration software,
- Communication with OBD II/EOBD.

JIOLAT 400 DPI Is A Modern Sequential Gas Injection Controller. It Enables Gas Fuelling In Selected Vehicles With Direct Fuel Injection. JIOLAT 400 Dpi Is The Only Controller Available In The Market Which Is Fully Compatible With Direct Fuel Injection Technology, Increasingly Common In Modern Petrol Engines. Therefore, Using Cars Equipped With Engines With Direct Injection And JIOLAT 400 DPI Gas Installation Becomes More Economical And Eco-friendly.

Controller features

Comfort of use

Using JIOLAT 400 Dpi Ensures Comfortable, Dynamic And Economical Driving In The Full Parameter Range Guaranteed By The Producer.

Fuel efficiency and safety

JIOLAT 400 DPI Is Completely Safe For The Engine. It Guarantees Protection Of The Petrol Injectors - It Has Been Confirmed By Longrange Road Tests Carried Out By The Research And Certification Laboratory.

Average Consumption Of Gng And Petrol Has Also Been Calculated On The Basis Of The Longrange Tests. Test Results Indicate That JIOLAT 400 Dpi Provides Great Performance At Low Fuel Consumption. The CNG Consumption Slightly Higher Than The Petrol Computer Indications. The Average Petrol Consumption Is Approximately 0.5l Per Cylinder / 100 Km. Keep In Mind That These Are Approximate Values And They May Vary Due To Different Car Brands, The Technical Condition Of The Car, The Quality Of Fuel, Engine Code, Driving Style And Environment And Other Service Conditions.

The Controller Is Equipped With A Built-in Adapter Enabling Communication With Petrol Computer Via OBD II/EOBD Protocols. ISO-15765, ISO-14230, ISO-9141.

Car Models And Their Engine Codes Supported By JIOLAT 400 DPI Controller Are Available At Www.ac.com.pl, On The Controller Description Subpage.

JIOLAT 400.4 DPI Model B1 Completion

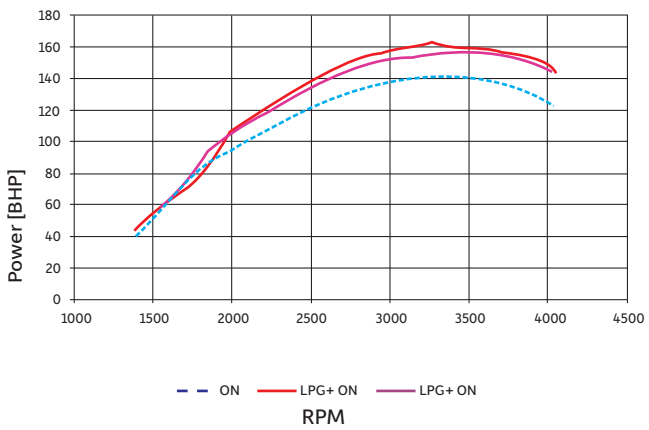
Engine Codes Supported By JIOLAT 400 DPI

JIOLAT CNG / LNG / LPG

JIOLAT CNG / LNG / LPG Controller Is An Alternative Fuelling Method For Diesel Engines With 2 To 16 Cylinders. The Whole System Is Based On Modern Technical Solutions Which Enable Dosing Gas-air Micture. It Is Then Mixed With Diesel Fuel In The Cylinder. JIOLAT Diesel Does Not Exclude The Possibility Of Driving With Diesel Fuel Only As The Gas Installation Does Not Require Modifying The Structure Of The Engine Interior During Engine Operation, The Controller Can Control The Process Of Fuel Dose Feeding. It Is Possible Thanks To Reading Signals From Exhoust Gas Temperature, Knocking Combustion, Or Oxygen Sensors.

max. 8 cylinders

Proper mixture within the whole range of engine operation is guaranteed by an advanced algorithm of accurate sequential injection and innovative auto-adaptation system. The user will quickly see measurable economical benefits.



Vehicle power according to the fuel and map settings
red - more gas
purple - less gas
blue - diesel fuel

Increasing engine power

Double LPG/CNG fuelling technology allows you to unleash the energy of the unused diesel fuel resources. Proper alignment of the gas installation with the vehicle provides a significant. increase in power and torque (10%- 30% of power), at the same time reducing the operating cost and improving the engine performance.

The system operational principle is very simple. In the case of a diesel engine with mechanical injection, gas is injected into the suction manifold. It provides better diesel combustion and additional gas combustion, thus improving the engine power. The driver has to depress the accelerator pedal less in order to maintain the same driving parameters, thus saving diesel fuel (so called saving by adding). The driver has a choice: either to drive without haste and enjoy the fuel economy or use the encreased power of the vehicle and enjoy measurable benefits. In the case of common rail engines, the operational principle is the same. However, the vehicle power can be reduced by emulating signal from CR sensor (high pressure sensor on the rail). The ECU recognizes proper diesel fuel pressure, although the pressure value is actually lower. This enables maintaining similar vehicle parameters (power, torque) as when diesel fuelled while providing significant fuel economy.

Features:

- supporting diesel engines (up to 8 cylinders) in sequential mode,
- supporting diesel engines (up to 16 cylinders) in non-sequential mode,
- optional additional LPG/CNG injection,
- advanced sequential gas injection algorithm,
- accurate gas dosing based on current engine requirement,
- measurement and control of the amount of diesel fuel injected in vehicles equipped with common rail engines,
- complex engine protection algorithm,
- exhaust gas temperature control in order to provide engine safety,
  optional reading of broadband oxygen sensor, optional mixture control by an independent broadband oxygen sensor intended for diesel engines (can be installed if the engine is not equipped with the sensor),
- supporting vehicles equipped with cruise control,
- supporting B/G LED401 electrical switch,
- the same level of power can be maintained after conversion in cars equipped with common rail engines,
- auto-calibration system,
- optional gas injection sequence modification.

Advantages:

- with additional gas injection active, the engine runs identically as when it is only diesel-fuelled,
- the system is switched on and off insensibly,
- fuel economy within the whole range of engine operation,
- engine protection provided,
- increased diesel fuel combustion efficiency,
- increased engine power.

JIOLAT DIESEL completion

max. 4 cylinders

JIOLAT GoFast

Advantages:

- Quick Installation Due To The Reduced Number Of Cables,
- Simple And Transparent Calibration Software - Only Two Panels,
- New Software Functions Can Be Added To The Processor,
- Application Can Run In Demo Mode, Without The Controller,
- Small Size - Compact Housing Resistant To Weather Conditions,
- Switch With A Built-in Buzzer, Connection Requires Only 3 Cables.

Gofast Is A Multi-Purpose Controller Intended For Most Cars (Sequential And Semi-Sequential Engines, “Full Group”). It Has Been Developed In Order To Simplify The Installation As Much As Possible And Reduce Installation And Calibration Time. The Controller Is Based On A 32-bit Processor And Automotive Components. It’s Modern And Reliable.

JIOLAT GoFast completion

Controller features

Easy installation

The Controller Is Installer-Friendly, The Number Of Cables Necessary To Connect The Controller Has Been Minimized Thus Reducing The Installation Time. No RPM Reading Cable The Controller Calculated The RPM Based On Injection Timing In Most Cases It Is Not Necessary To Connect Ignition Switch Signal Switch With A Built-in Buzzer, Connection Requires Only 3 Cables Gas Level Indicator Wpg(h) Is Supplied Directly From The Solenoid Valve Located On The Tank

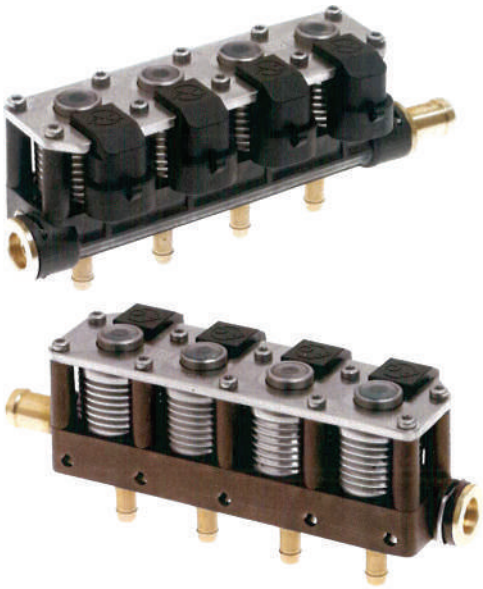
Easy calibration

All Functions Are Located On Two Panels - You Do Not Have To Switch Between Tabs Built-in Standard And Expert Modes. Standard Mode Contains The Functions Necessary To Configure The Car At Any Time You Can Press A Button To Switch To Expert Mode Which Contains Extended Controller Functions After Disconnecting The Pc Communication Cable, The Controller Restarts The Transmission Automatically Operating The Controller Via Bluetooth Next

Functionality

Hardware Platform Equipped With A High-Performance 32-bit Processor Fault-Free - Used Automotive Components New Functions Can Be Added To The Software Application Can Run In Demo Mode, Without The Controller

JIOLAT AC W02/ JIOLAT AC W02 BFC



JIOLAT AC W02, JIOLAT AC W02 BFC Injectors Are Designed For LPG And Cng Installations In All Vehicle Engines, Including Turbo Charged Engines. The Device Ensures Excellent Operating Parameters And Unification With Other Ac Products. The Rail Consists Of Four Injector Sections.

Modern Structure

The Injectors Have Been Designed To Provide Accurate Injection Timing In Any Conditions, It Has Been Achieved Thanks To Using Selected Materials. Lighter And Simpler Structure Guarantees Excellent Stability In Changing Ambient Conditions, In Particular Temperature And Pressure.

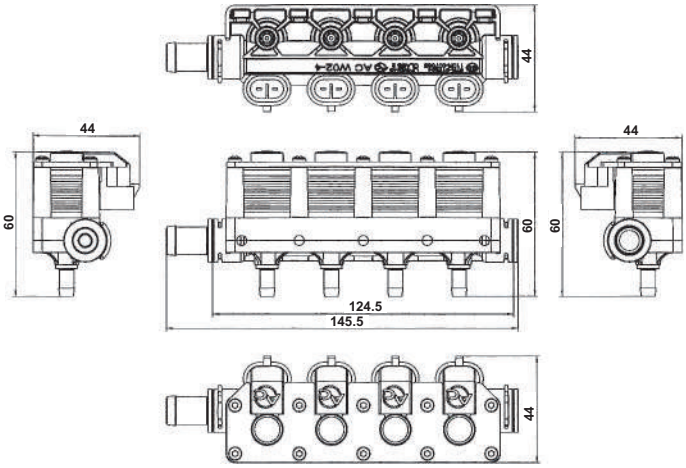
Perfect Component Connection System

The Connection System Enables A Large Number Of Mounting Position Configurations. The Exceptional Structure Enables Installation Of PS-04, An Integrated Temperature, Vacuum Pressure, And Gas Pressure Sensor, On Any Side The Device Ensures Low Inertial Response To Changes In Gas Temperature And Can Be Rotated By 360° Even After Installation In The Injector.

Measurement Accuracy

Thanks To Very Short Opening And Closing Times, JIOLAT AC W02 Injectors Respond Quickly To Minimal And Temporary Changes Of The Control Signal. The Pressure Sensor Is Located Close To The Injectors - It Provides Accurate Measurement As Well.

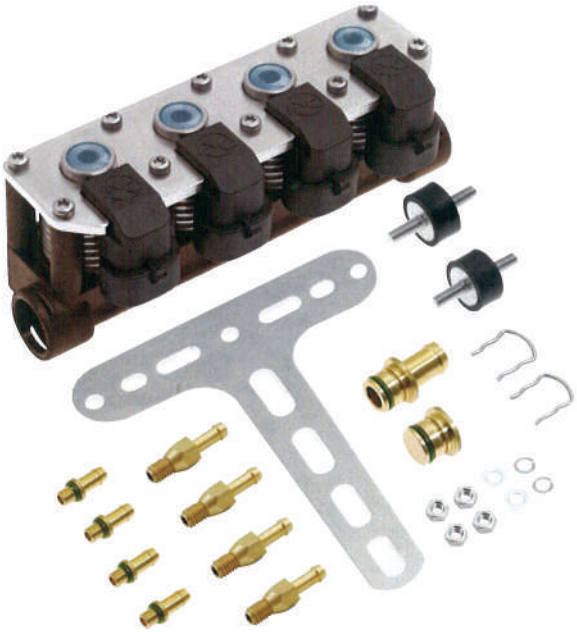
Dimensions:



Technical specification AC W02:

Gas flow through section at 1.2 bar [l/min.]	125
Operating temperature[°C]	-20 to + 120
Max. operating pressure [bar]	4,5
Opening / closing time [ms]	2,0/1,0
Suggested nozzle size	Ø 1,5: Ø 1,6: Ø 1,8: Ø 2,0: Ø 2,2: Ø 2,4: Ø 2,6 (can be drilled inde-pendenlty up to Ø 2.8 max)
Gas intet - stub pipe [mm]	Ø 12
Gas outlet - stub pipe [mm]	Ø 6
Overall dimensions [mm]	145 x 44 x 60
Service life [km]	
- in urban cycle	100 tys.
- in extra-urban cycle	200 tys.
Weight [g]	407

Completion:



Technical specification AC W02 BFC:

Gas flow through section at 1.2 bar [l/min.]	150
Operating temperature [°C]	-20 to + 120
Max. operating pressure [bar]	4,5
Opening/ closing time [ms]	2,1/1,2
Suggested nozzle size	Ø 2,4; Ø 2,6; Ø 2,8; Ø 3,0; Ø 3,2;
Gas inlet - stub pipe [mm]	Ø 12
Gas outlet - stub pipe [mm]	Ø 6
Overall dimensions [mm]	145 x 44 x 60
Service life [km]	
- in urban cycle	100 tys.
- in extra-urban cycle	200 tys.
Weight [g]	407

Standards and approvals:
JIOLAT AC W02 injector is approved with approval no. E8 67R-017064, 110R-00 7065 and is compliant with the requirements of UNECE Regulations.

JIOLAT W03

JIOLAT AC W03 BFC Injcetor Is Designed For LPG And CNG Installations In All Vehicle Engines, Including Turbo Charged Engines. The Device Ensures Excellent Operating Parameters And Unification With Other Ac Products. As A Single Section Injector, JIOLAT AC W03 Can be Installed in A Wide Range of Configurations And Settings.

Modern Structure

The Injectors Have Been Designed To Provide Accurate Injection Timing In Any Conditions. It Has Been Achieved Thanks To Using Selected Materials. Lighter And Simpler Structure Guarantees Excellent Stability In Changing Ambient Conditions, In Particular Temperature And Pressure.

Perfect component connection system

The Connection System Enables A Large Number Of Mounting Position Configurations. The Exceptional Structure Enables Installation Of Ps-04, An Integrated Temperature, Vacuum Pressure, And Gas Pressure Sensor, On Any Side. The Device Ensures Low Inertial Response To Changes In Gas Temperature And Can Be Rotated By 360° Even After Installation In The Injector.

Innovative heat dissipation system

The Housing Of The Injector Coil In The Form Of A Radiator A New Method In The Market. It Provides An Excellent Heat Dissipation System In Order To Guarantee Great Performance.

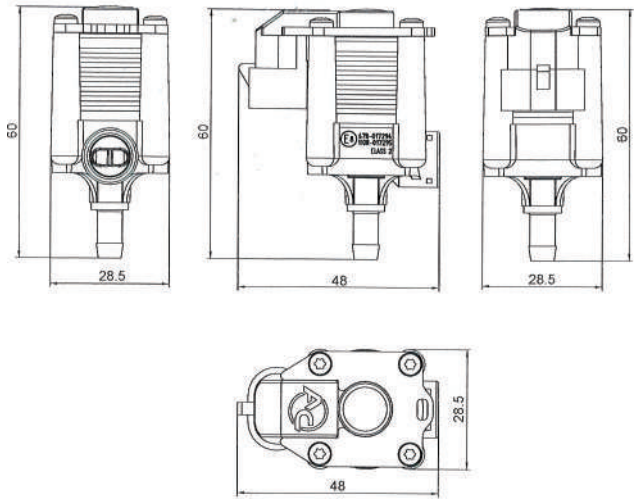
Measurement accuracy

Thanks To Very Short Opening And Closing Times, JIOLAT AC W03 Injectors Respond Quickly To Minimal And Temporary Changes Of The Control Signal. The Pressure Sensor Is Located Close To The Injectors - It Provides Accurate Measurement As Well.

Technical specification:

Przeplyw gazu przez sekcje przy cisnieniu 1,2 bar [l/min.]	125
Temperatura pracy [°C]	-20 do +120
Maksymalne cisnienie pracy [bar]	0,95 ÷ 1,2
Czas atwarcia / czas zamkniecia [ms]	2,0/ 1,0
Sugerowany rozmiar dysz	Ø 1,5; Ø 1,8: Ø 2,0; Ø 2,2; Ø 2,4; Ø 2,6 (x mozliwoscią samodzielnego rozwiercenia max. do Ø 2,8)
Wejscie gazu - krociec [mm]	Ø 6
Wyjscie gazu - krociec [mm]	Ø 6
Dimensions gabarytowe [mm]	48 x 60 x 28,5
Trwalosc [km]	
- w cyklu miejskim	100 tys.
- w cyklu pozamiejskim	200 tys.
Waga [g]	95

Dimensions:



Completion - with elbows:

Completion - with a distributor:

Standards and approvals:

JIOLAT AC W02 injector is approved with approval no. E8 67R-01 7064, 110R-00 7065 and is compliant with the requirements of UNECE Regulations.

JFPL SUPER CNG, LNG, LPG

JFPL CNG Pressure Reducer Model Super Is A Single Stage Pressure Reducer For Sequential Injection Systems. Material Grade LM6 Hindalco Tempreture -40° +120° Compact And Very Reliable, BSI ISO :9001 :2015 ISO : 15500 ICAT (CE) Standards. Approved

The Outlet Pressure Of This Reducer Is Adjustable From 1.6 To 5 Bar CNG, LNG, LPG To Obtain Always The Best Performance. Reducer Inlet Is Provided With An Adjustable Fitting That Has Also The Connection For Pressure Manometer.

JFPL CNG Pressure Reducers Is Available In Different Versions: Super And ,CNG, LNG LPG,

Safety

The High Pressure Of Cng At The Reducer Inlet Is Significantly Reduced With A Lever Valve, Thus Providing A High Level Of Safety. For Safety Purpose In High Pressure Regulator 1.Back Lock Nut (internal Safety Valves Are Installed Whereas To Balance Temperature Losses During Expansion Phase, Gas/water Heat Inter-chargers Ensure The Best Performance Irrespective Of Climatic Factors)

REDUCERS

PS-04

The Device Has A Simple And Compact Design That Allows For Quick And Easy Installation. PS-04 Design Provides A Universal And Versatile Replacement For Ps-02. 3in1 Device - Measures The Pressure, Vacuum Temperature.

- Under Pressure Connection Integrated With The Monolithic Body To Eliminate The Risk Of Leaks And Improve Resistance Compatibility Of PS-04 With The Previous Versions Of PS,
- As Well As Competitive Products Designed For LPG And Cng Injection Systems In All Engines In Spite Of Power, Including Turbo Charged Ones

Easy Installation Due To Reduced Dimensions And Compact Construction Multiple Configuration Options, Fitting Locations And Mounting Positions Use Of Modern, High-quality Sensors And Electronic Components Ensuring The Fast And Precise Transfer Of Information To The Controller Possibility To Position PS-04 On Any Side Of The W02 Injector, Which Can Be Additionally Turned By 360° Even After It Has Been Installed On The Injector Low Inertia Of Response To Gas Temperature Variations

PRESSURE SENSOR

JFPL SUPER T-1 LNG & CNG

MATERIAL GRADE :

JFPL CNG Pressure Reducer Model Super Is A Three Stage Pressure Reducer For Sequential Injection Systems. Material Grade LM6 Hindalco Tempreture -40° +120° Compact And Very Reliable, BSI ISO :9001 :2015 ISO : 15500 ICAT (CE) Standards. Approved

JFPL Super is designed for cars equipped with the CNG (so-called methane) sequential injection systems. Constant pressure of body components regardless of reducer working temperature and ambient temperature.

The reducer is made of two aluminium castings joined together with bolts and disk spring, thus providing a compact design and constant pressure of both body parts.

Exceptional Tightness

By Using Disk Springs To Join The Casing Body, The Reducer Tightness Has Been Significantly Improved.

High-strength Diaphragms

Using Top-quality Materials Provides High Resistance To Extreme Conditions Inside The Reducer (mechanical And Thermal Loads).

Three-stage Adjustment

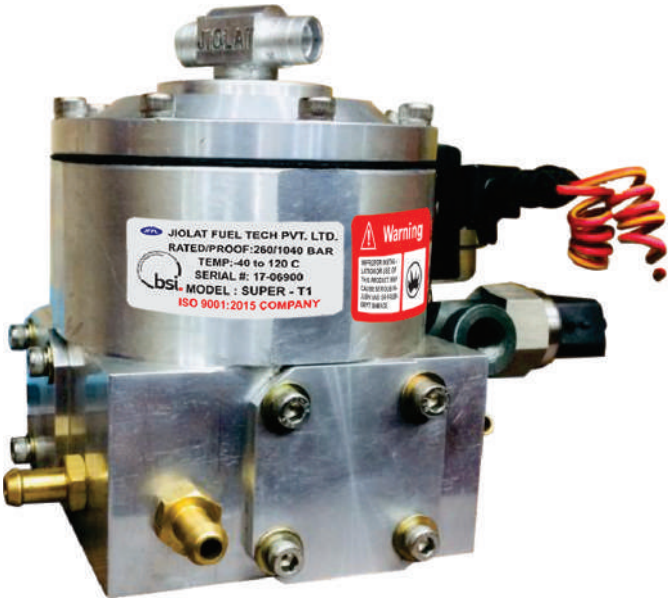
Due To The Three-Stage Adjustment System Used In The Reducer, The Dependence Of Outlet Pressure On The Level In The Tank Is Minimized. In The First Chamber, The Pressure Is Reduced To A Safe Level With A Lever Valve, And Then In The Low Pressure Chamber The Pressure Is Adjusted Smoothly With A Stem Valve Between 2.5 And 8 Bar.

Integrated Solenoid Valve

Placed Between The Reducer Chambers. It Ensures Very Low Pressure Drops At High Loads And Allows Gas Supply To Be Quickly Cut Off In An Emergency.

360° Fixture - Central Fitting Heavy Vehicles Bus & Truck & Tailor

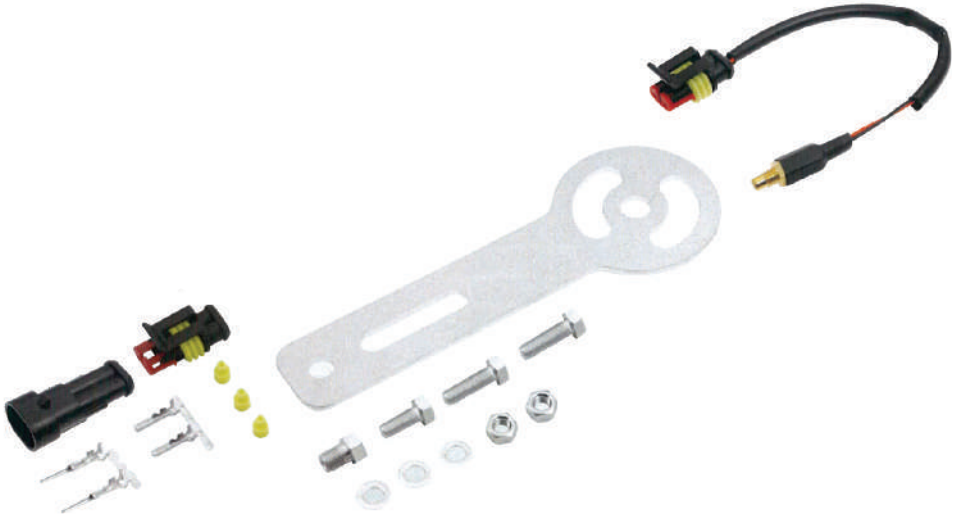
The Dedicated Mounting Bracket Allows The Reducer To Be Mounted Securely In Any Angular Position (within 360°) By Using Just One Screw. This Is A Great Advantage With More And More "tight" Engine Compartments.



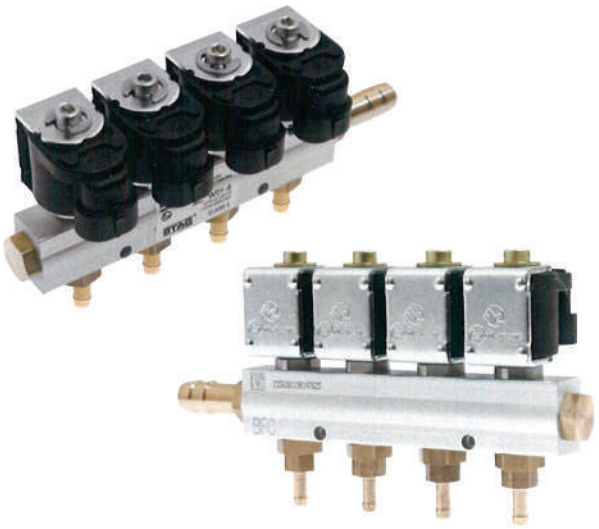
Safety

The High Pressure Of CNG At The Reducer Inlet Is Significantly Reduced With A Lever Valve, Thus Providing A High Level Of Safety. For Safety Purpose In High Pressure Regulator 1.Back Lock Nut (Internal Safety Valves Are Installed Whereas To Balance Temperature Losses During Expansion Phase, Gas/water Heat Inter-chargers Ensure The Best Performance Irrespective Of Climatic Factors).

JFPL Super T-1 Achille Designs And Manufactures Pressure Reducers For Automotive Systems, Both Sequential And Traditional, Calibrated For Different Engines And Suitable For Different Climatic Conditions.



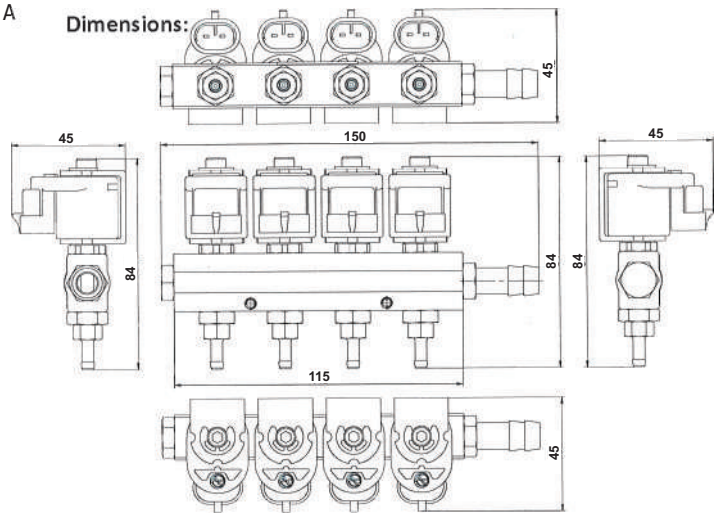
JIOLAT AC W01/ JIOLAT AC W01 BFC



Ac Injection Rail Is Designed For Autogas Sequential Injection Systems In Cars With Internal Combustion Engines. It Ensures Accurate Dosing Of Vaporized Gas To The Engine Inlet. High Durability Of All Ac Rails Has Been Confirmed By Long-range Road Tests In Different Cars And With Different Road And Weather Conditions. The Advanced Materials Used For The Construction Of Ac Injector Rails Provide Higher Durability And A Faster Response In Comparison To Traditional Solutions.

Additionally, Ac Injection Rails Are Equipped With 2 Coils In Order To Avoid Overloading Of The Control Systems. The Coils Are Equipped With IP67 Rated Connections. The Main Component Of The Rail Is A Body Made Of Anodizes Alluminium, The Connections Are Made Of Brass, The Sealing Is Made Of Rubber Compounds Compatible With Othe Components All Materials Are Compliant With The Strict Requirements Of Regulations No. 67 And 110. AC W01 Bfc Rail Supports High-power Engines With A High Fuel Demand.

Dimensions:



Advantages:

- Stable Operation,
- Improved Durability (the Rails Have Benn Tested Over A 100,000 Km Distance),
- Internal Friction Has Been Reduced By Using A Modern Slide Co-Ating
- Resistance To Contamination,
- Maintenance- Free (no Calibration),
- Trouble-free Start-up In Low Temperatures Thanks To Using High Quality Sealing Materials,
- 24-month Warranty - No Distance Limit.

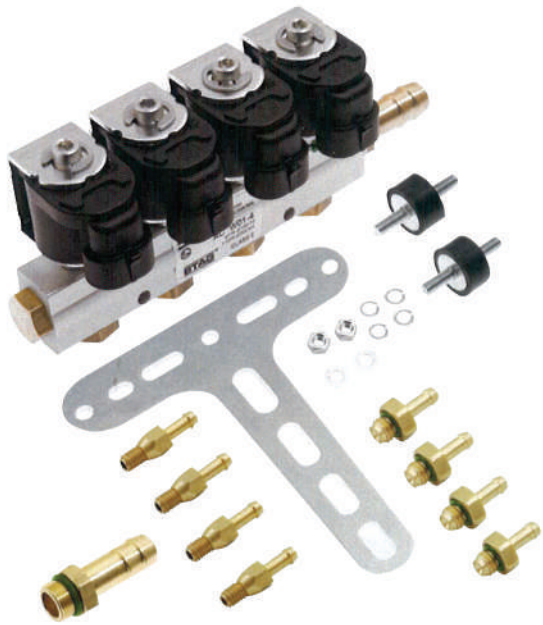
Technical Specification AC W01:

Nominal operating pressure [bar]	0,95 ÷ 1,2
Max. operating pressure [bar]	4,5
Operating temperature [°C]	-20 to +120
Injector opening time [ms]	2,1
Injectorclosing time [ms]	1,5
Performance range [kW/cylinder]	11÷ 29
Weight [kg]	0,48
Max. throughput [l/min]	90 at p= 1 [bar]
Dimensions	
Number of sections: 4	L - 54 [mm], G - 150 [mm]
Number of sections: 3	L - 27 [mm], G - 122 [mm]
Number of sections: 2	L - 50 [mm], G - 115 [mm]

Technical specification AC W01 BFC:

Nominal operating pressure [bar]	0,95 ÷ 1,2
Max. operating pressure [bar]	4,5
Operating temperature [°C]	-20 to + 120
Injector opening time [ms]	2,4
Injector closing time [ms]	1,7
Performance range [kW/cylinder]	15 ÷ 40
Weight [kg]	0,48
Max. throughput [l/min]	120 at p= 1[bar]
Dimensions	
Number of sections: 4	L - 54 [mm], G - 150 [mm]
Number of sections: 3	L - 27 [mm], G - 122 [mm]
Number of sections: 2	L - 50 [mm], G - 115 [mm]

Completion:



Standards and approvals:

JIOLAT AC W01 injector is approved with approval no. E20 67R-010973, 110R-000044 and is compliant with the requirements of UNECE Regulations.

LED 500

Innovative JIOLAT LED-500 Touch Button For Petrol/Gas Switching. Basic Features And Advantages Of Led 500:

- Cooperates with and supports the PLUS Q-generation controllers and DPI or DIESEL controllers, i.e, QBOX PLUS, NEST PLUS, QMAX PLUS, JIOLAT-400 DPI, JIOLAT-DIESEL,
- Based on the capacitive button technology (not used in such devices before),
- Elimination of the requirement for mechanical cooperation between individual button components with the use of a touch panel,
- Small symmetrical design to match the button to various types of instrument panels.
- Dedicated to the controllers OBOX PLUS, QNEXT PLUS, QMAX PLUS

LED 300/401B or 401

LED 300/401B - an analog, six-wire petrol/gas switch.

Basic features and advantages of LED300/401B:

- a built-in photoresistor allowing the automatic adjustment of the backlighting level, depending on ambient light.
- two-color illumination of the button with the logo which indicates low fuel level and operating modes.
- Integrated buzzer.
- dedicated to the classic line controllers:
  JIOLAT-300 ISA2, JIOLAT-4 PLUS, JIOLAT-300 Premium, JIOLAT-QBOX BASIC, JIOLAT-QMAX BASIC

LED 401 - an electronic, three

Basic features and advantages of LED 401:

- two-color illumination of the button with the logo which indicates low fuel level and operating modes.
- the possibility to change the direction in which the LEDs indicating the gas level are turned off depending on the position of the installation of the switch.
- integrated buzzer.
- adjustment of the volume of the buzzer.
- dedicated to the controllers QBOX PLUS, QNEXT PLUS, QMAX PLUS

LED GoFast

An electronic, 3-wire switch dedicated for autogas systems equipped with the JIOLAT GoFast controller.

The switch performs a number of functions, from the selection and optical/acoustic signaling of the working mode
to the indication of the gas level in vehicles which have systems for fuelling the engine with alternative fuels, i.e. autogas.

Basic features and advantages of LED GoFast:

- small, compact design,
- only three connection wires for faster installation,
- indication of low fuel level and three different operating modes,
- integrated buzzer,
- it works only with the controller GoFast.

LED 300

Changeover switch LED 300 with PLG level gauge indicating operating mode.

External buzzer produce sound and acustic effects.

- Dedicated to the classic line drivers:
  JIOLAT-300 ISA2, JIOLAT-4 PLUS, JIOLAT-300 Premium, JIOLAT-QBOX BASIC, JIOLAT-QMAX BASIC

JIOLAT TAP-03

The JIOLAT TAP-03 processor for the advancing timing angles has been designed foe vehicles powered by LPG/CNG as an auxiliary device to improve the efficiency of firing the fuel-air mixture by forcing the advance timing angle to change.

JIOLAT TAP-03 features and reporting system auto-calibration waveforms, which offers unlimited opportunities to work in different systems.

The device is available in two versions:

JIOLAT TAP-03/1 - has been designed for engineswith an inductive crankshaft position sensor or and up to 2 elctronic camshaft position sensors.

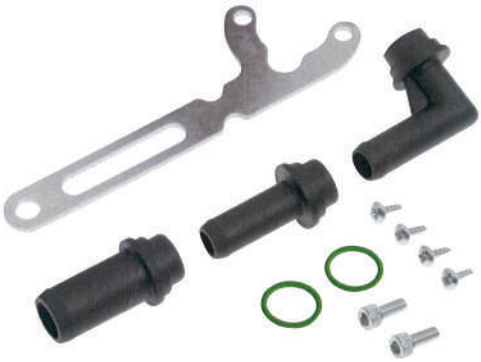
JIOLAT TAP-03/2 - has been designed for engines with a digital crankshaft position sensor and up to 2 electronic camshaft position sensors.

Manual gas valve

The regulator is adjusted to control the downstream pressure, which will limit the maximum flow of gas out of the cylinder. CNG valves are manufactured with high quality standards and can be equipped with all safety devices: thermo fuse, burst disc, excess flow valve, manual tap, solenoid valve. CNG valves are available in different models, in several configurations and, upon request, in personalized versions as well.

GF01 vapor phase filter fot LPG and CNG

The GF01 vapour phase filter has been designed for all vehicles equipped with LPG/CNG alternative fueling systems. Its task is to prevent solid and liquid particles from contaminating the vapor phase of the gas, i.e. vaporized LPG or depressurized CNG, It ensures efficient filtration and easy installation and use
Designed fot the fitter's comfort



The angle of the inlet and outlet connections (elbows) positioned. in the filter cover can be adjusted as needed. An important feature of the filter is that the connections and elboes can be replaced with other types, the same applies to R01 or R02 reducer. With such a solution, the filtter can freely control the positioning of the filter in the engine compartment. The filter element is replaced without disconnecting the gas lines. This saves time for the fitter and saves money for the driver.

Efficiency of filtration particles up to 10 um with the factory-mounted filter element. Gas entering the filter is moving spirally and towards the bottom of the filter body. Solid and liquid particles are centrifuged and left at the bottom of the filter. Additionally, in order to achieve the maximum efficiency, the filter cleans the gas stream going back upwards to remove any fine contaminants that remain.

Manometer

Manometer, determines the filling status of the gas tank using the gas pressure valve. The pressure gauge signal, converted to voltage, is also used to control the gas level indicator on the petrol/CNG switch.

Filling valve for CNG

- Filling charge valve NGV1
- Max working pressure: 260 bar
- Working temperature:-40°C+120°C
- Manual safety tap - non-return valve - available in different thread connections
- Special flow dynamic profile to avoid chattering noises during refueling

OBD Scanner

Testing and calibration:
- Allows monitoring of the engine's working parameters.
- Monitoring correction when running on CNG helps with proper system adjusment,

Awarded INPRO prize at International Fair - LPG&CNG Show 2010.

DATA RECORDER

Data Recorder constantly registers parameters from the engine and it is an irreplaceable tool in detecting flaws and errors.

- Automatically registers oscilloscope data during driving
- Easy registration of faults
- Allows quick and accurate fault detection
- 2GB internal memory (can be extended to 4GB)
- Easy to install
- It cooperates with all drivers of our production.

BLUETOOTH NEXT

The device has been designed for trouble-free, short-range communication between a JIOLAT gas injection controller and a PC with a Bluetooth module installed. Communication between electronic units is based on wireless technology, so no additional cables are required and switching between the specific electronic equipment (laptop or PC enuipped with the module) is fast and easy.

Benefits:
- wireless communication with a PC,
- connection of the device to a vehicle does not require additional cables,
- compatibility with any laptop or PC equipped with the module,
- support for all JIOLAT controllers.

CNG / LPG / BIOGAS COVERSION AUTOMOTIVE HEAVY VEHICLE KIT BUS & TRUCK

- **Application.**

  Used As The Fuel Storage Unit For Vehicle Such As Bus And Heavy Duty Truck

- **Characteristics.**

  1. Double layer Vacuum Structure With Cryogenic Insulating

  2. Two Stages Protection With Safety Valve

  3. All Tubing And Fitting Fitted On End, And Proceed By A Steel Ring Or Cover

OXYGEN SENSOR

AIR LOW PRESSURE SENSOR

TEMPRATURE SENSOR

TEETH GEAR SENSOR

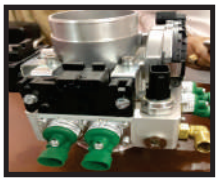
RPM SENSOR

TIMING SENSOR

MAP SENSOR

ELECTRONIC THROTTLE PEDAL

HIGH PRESSURE CNG & LNG REGULATOR / REDUCER



ELECTRONIC THROTTLE BODY & INJECTOR 4/6/8 CYLINDER ENGINE

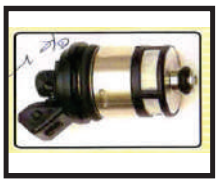
CNG HIGH PRESSURE REGULATOR

COMBINED NOZZLE (FILLING VALVE)

HIGH PRESSURE FILTER

LNG ECM 4&6&8 CYLINDER

ECM 4/6/8 CYLINDER ENGINE



ELECTRONIC FUEL INJECTOR

CNG

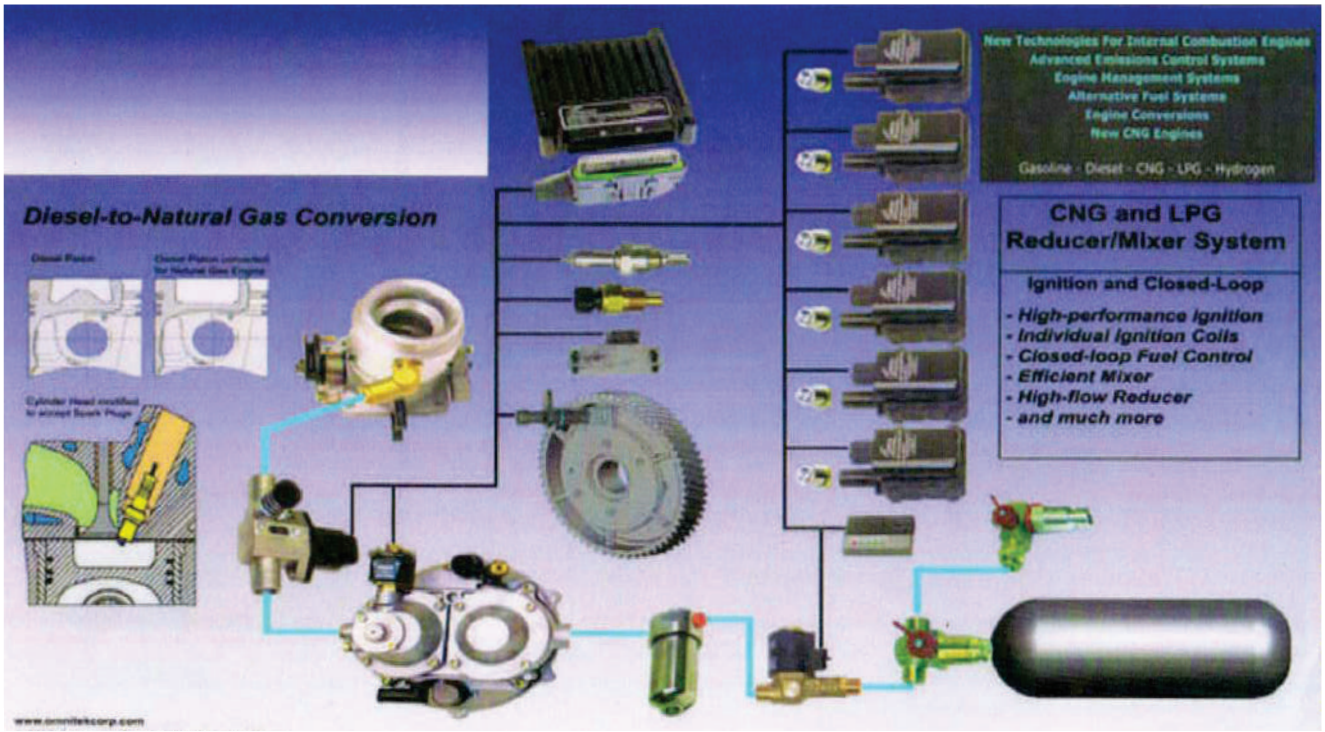
LNG

CONVERSION OF VEHICLES

It would probably be cost prohibitive to convert a diesel to CNG as opposed to a gas engine. There are too many systems not present on a diesel that are required to run a CNG setup. I also doubt that you'd have adequate means to get controllable diesel effect ignition with CNG vice diesel. If your application permits, the gas engine swap with CNG conversion is the best way to get you on the gas. There are several conversion kits out there with broad application listings.

Benefits of Conversion of Diesel Vehicles to CNG

Substitution of diesel fuel by CNG in urban buses (and trucks) is particularly advantageous because these vehicles on one hand have high specific fuel consumption and high mileage and on the other hand, need only few centrally located filling stations in view of their limited range of operation. The economic and ecological benefits of CNG driven urban buses are illustrated by the following examples: The conversion of one diesel bus to CNG saves about 145 barrels of petroleum annually at average operating conditions. Given a petroleum price of US$ 20 per barrel, this results in foreign exchange savings of US$ 2,900



per bus pey year :- CNG operation leads to a considerably reduced outlet of, in particular, visible particulate emissions (black soot) which, besides being a nuisance, is damaging to health. Depending on the specific type of conversion, a reduction of to 95 per cent from appromately 80 kg to only about 4 kg per vehicle per year is possible :- Engine noise is reduced by up to 5 dBA which corresponds to a 50 per cent reduction in noise emission. However, these potential macro-economic and ecological benefits to the national economy and the society in general can only be fully realized through a large-scale conversion programme based on micro-economic advantages for the bus operator. This means that for a successful CNG programme, the conversions of diesel buses to CNG has to be attractive, i.e. profitable, to the operator. To create such favourable conditions, the following policy guideline should be pursued:

(1) The price of CNG has to be considerably lower than that of diesel

In comparison with diesel driven vehicles, CNG buses might, depending on the conversion concept and the condition of the vehicle, have a higher fuel consumption (normally, however, one litre of diesel can be replaced by approximately one cubic metre of gas) and may require higher maintenance expenses (although it I likety to be slightly lower, e.g. in terms of lubricating oil, due to lower wear of gas engines). In any case, however, additional investment for CNG cylinders and CNG conversion equipment is system-immanent. In order to compensate for this, the price of CNG has to be considerably lower than that of diesel fuel. When diesel prices (due to low tax rates or even subsidies) are low, i.e. in range of USc 15-30 per litre, the maximum price for CNG should not exceed 50 - 60 per cent of the diesel price. Only if dieselprices are high (e.g. in Europe), CNG prices up to 75 or 80 per cent of the diesel price could be feasible. The lower limit for an un-subsidized CNG price, defined through the cost for recovery and transmission/distribution plus profit margin (albeit excluding taxes), is about USc 12 - 16 per cubic metre depending on the conditions in a specific country. This requires a minimum diesel price of USc 20 - 27 per litre for a successful CNG programme.

(2) Taxes on CNG have to be comparative to those on diesel

In most countries of the world, fuel prices are either directly regulated by goverments or considerably determined by import duties or other taxes. The level of taxation is based on certain policy considerations. In several countries of the ESCAP region, for example, taxes on diesel, essentially the fuel for the transport industry, are much lower than on gasoline which is mostly used by private cars. The objective is to support the national economy through low transport prices. Since natural gas as yet is only marginally used in road transport, existing taxation, based on other consideration, is in many cases higher than on diesel oil. To achieve the necessary price differential between CNG and diesel (as described above), taxes on CNG have to be comparative to those on diesel, thus reflecting the generally lower production cost of natural gs as compared to diesel. This would have little or no consequence to the national budget because diesel is merely substituted by CNG However, if taxes have to be increased on diesel to provide a price advantage for CNG, the additional revenues could provide the funds for a CNG incentive package.

(3) Conversion of diesel Vehicles to CNG should preferably be confined to vehicles up to the age of three years

An efficient conversions possible only with buses in good technical condition. Therefore, conversion programmes should preferably be confined to vehicle up to the age of three years. In case of older buses in technically unsatisfactory condition, a considerably higher consumption of gas (as well as poor benefits to the environment) could be expected. The conversion cost may, therefore, never be recovered or only after an unattractive period of time.

(4) As a first step, conversion should be carried out in dual fuel technology

From the overall economic and ecological points of view, optimum benefits could be achieved with new vehicles equipped with ex-factory CNG engines. However, despite lower diesel substitution rate and, accordingly, reduced environmental benefits, as a first step, the conversion of existing buses to dual fuel technology, preferably with electronically controlled gas supply and pilot injection of diesel of diesel, is the best alternative. The conversion of diesel engines to dedicated single fuel CNG engines, although more favourable in principal, is associated with some technical problems which may require higher skills to overcome than usually available.

(5) Country specific CNG demonstration projects should be initiated and supported by the Government

The success of a CNG programme depends primarity on the widespread acceptance of the programme by potential operators who need to be convinced of the advantages of CNG operation. For this purpose. the government should initiate and support projects to create awareness of the programme and to demonstrate that the operation of CNG buses is technically reliable and economically attractive. Such demonstration projects could also address specific conditions in individual countries which could not be included in these general recommendations.

LNG TO DIESEL CONVERSION AUTOMOTIVE HEAVY VEHICLE KIT BUS & TRUCK

- **Application.**

  Used As The Fuel Storage Unit For Vehicle Such As Bus And Heavy Duty Truck

- **Characteristics.**

  1. Double layer Vacuum Structure With Cryogenic Insulating

  2. Two Stages Protection With Safety Valve

  3. All Tubing And Fitting Fitted On End, And Proceed By A Steel Ring Or Cover


LNG Storage Tank


LNG Drain Pipe


Water Bath Vaporizer ASSY

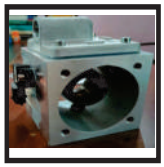

NG Pipeline


CNG Filter

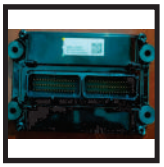

LNG Solenoid Valve


Pressure Regulator


Continuous Flow valve


MIXER


Electronic Throttle Body


ECU


Crankshaft Position Sensor


Water Temperature Sensor


Intake Pressure Temperature Sensor

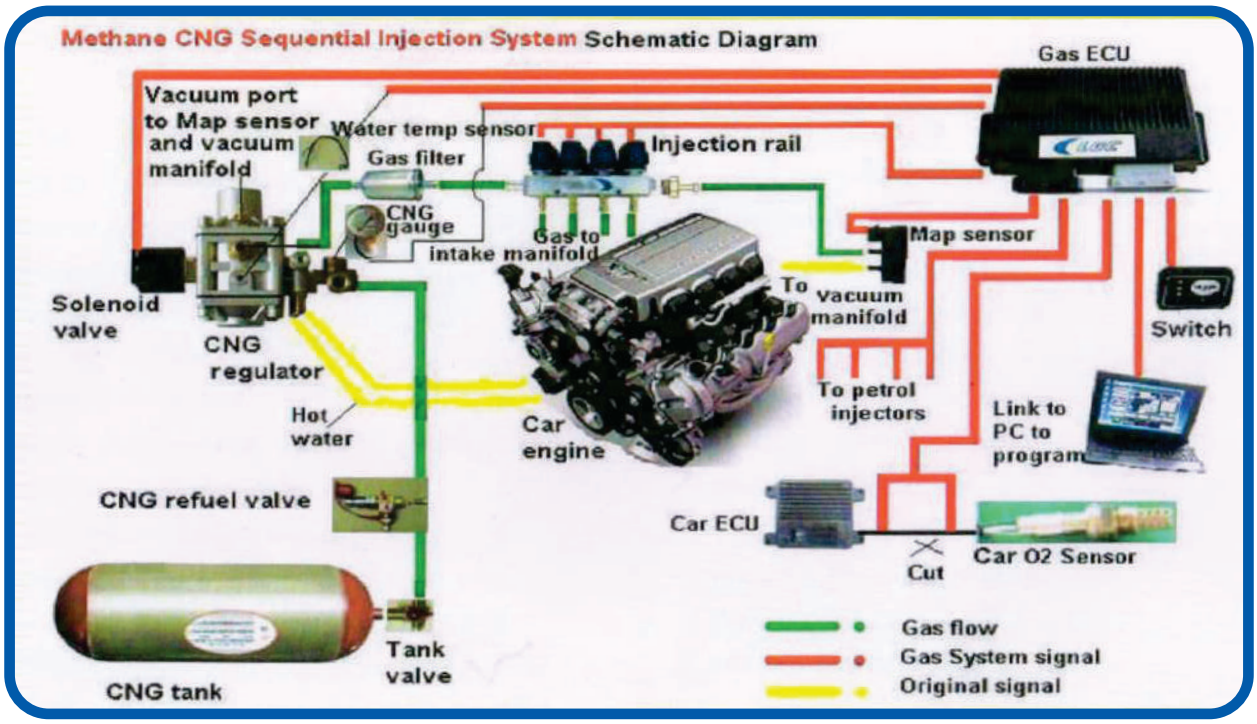
Welded Insulated Gas Cylinder

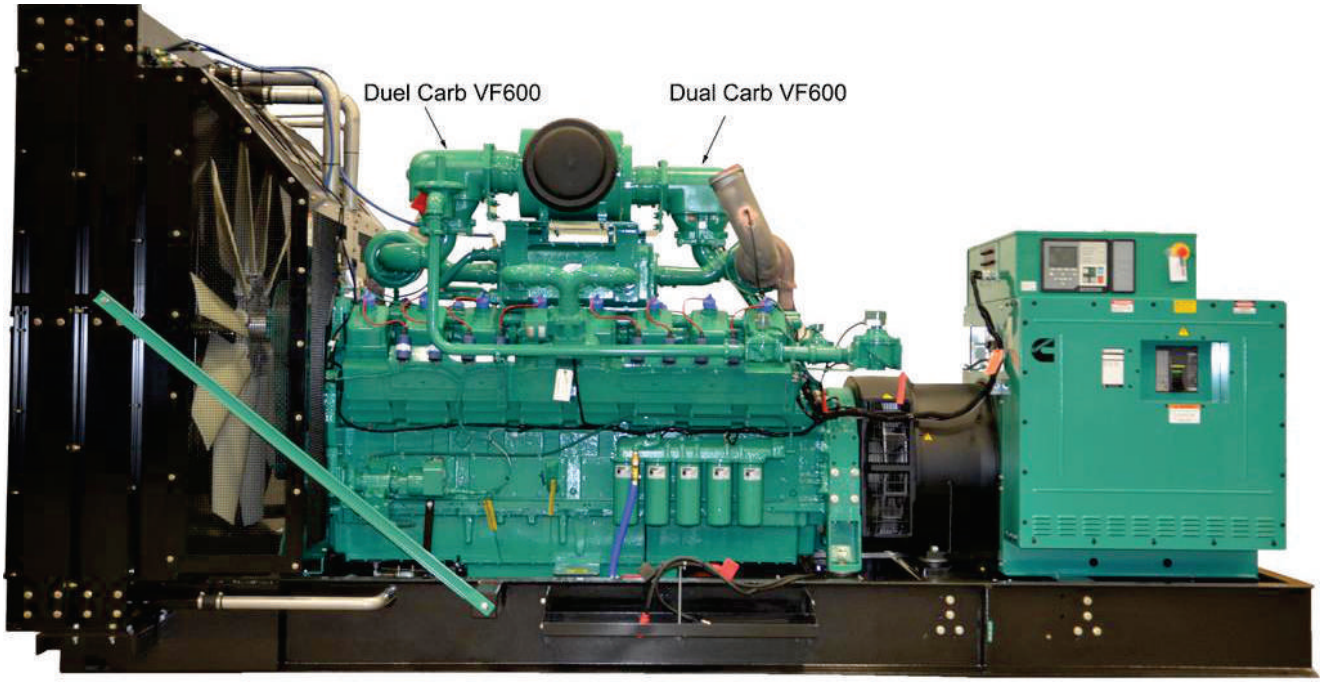
- Application.

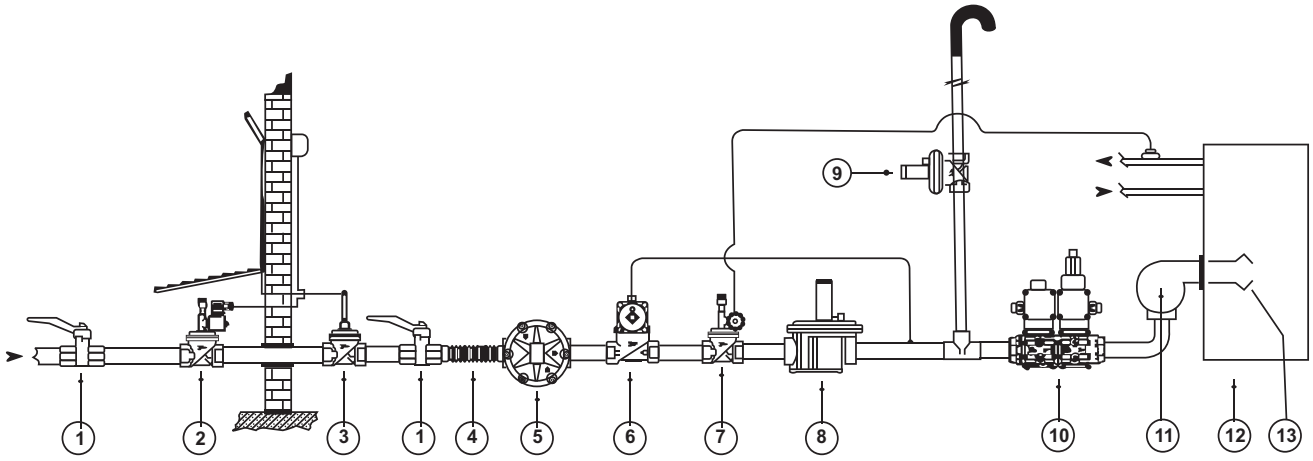
  Mainly Use As A Vessel For Storage And Transport Of Liquefied Nitrogen, Liquefied Oxygen, Liqued-Fied Argon, Liquefie Carbon Dioxide And Liquefied Natural Gas Etc, To Meet The Differnct Require-Ment Such As Industrial Users, Boiler, Restaurant And Canteen Etc

- Characteristics.

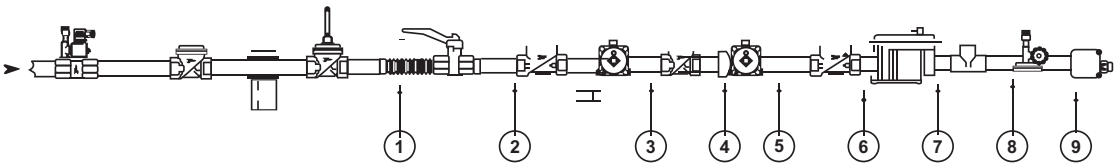
  1. With Self Booster System And Supply GAS Continously
  2. Multi-Layer Insulating Material, Highly Vaccumed, With Excellent Insulation Performance
  3. Excellent Gas Usage Rate, Liquefied Gas Supply Avoid The GAS Waste
  4. Low Storage Pressure Of Cylinder With Multi Stages Protective Device, Realize Better Effect
  5. Reasonable Frame Structure Design, Avoid The External Effect During Transport

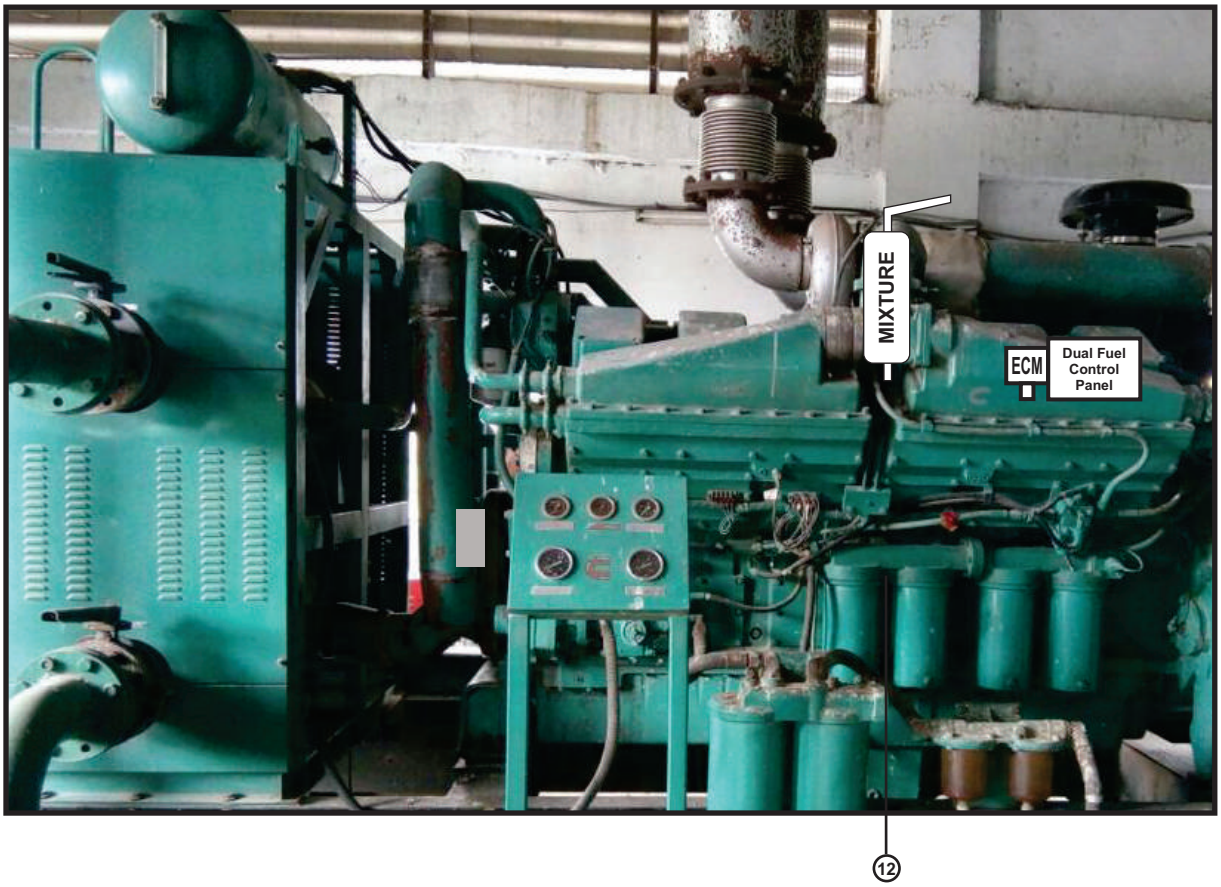


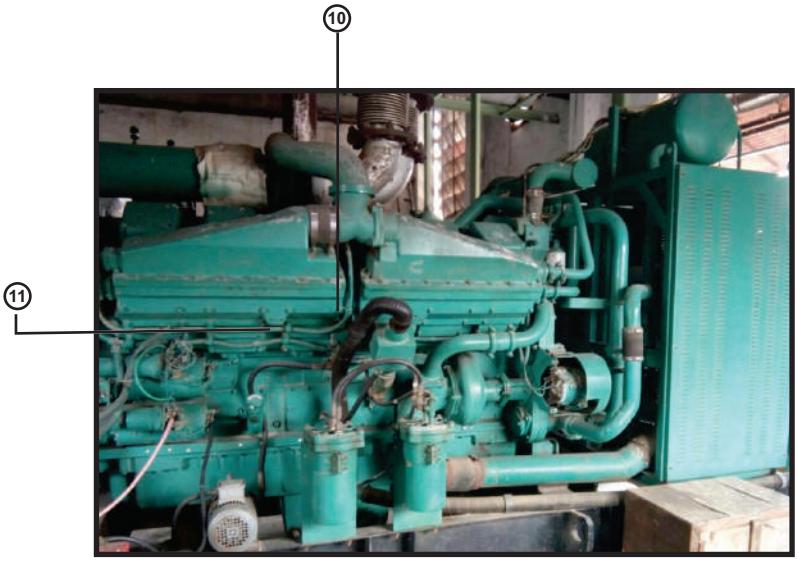




1. Ball valve.
2. Manually reset solenoid valve.
3. Jerk handle on/off valve.
4. Compensator joint.
5. Filter.
6. Max over pressure slam shut off valve.
7. Flow stop valve.
8. Pressure governer.
9. Relief valve.
10. Automatic solenoid valve.
11. Combustion head
12. Gas detector.
13. Jerk handle valve lever.







Genset 500 KVA Specification	
1	ECM
2	WIRING HARNESS
3	CONTROL PANEL
4	PNG LINE
5	SHUT OF VALVE
6	PRV
7	FILTER
8	SOLENOID
9	FILTER
10	PRV
11	ELECTRONIC FUEL GOVERNER
12	GAS AIR MIXTURE

CNG/LNG BOAT

10 HP TO 550 HP

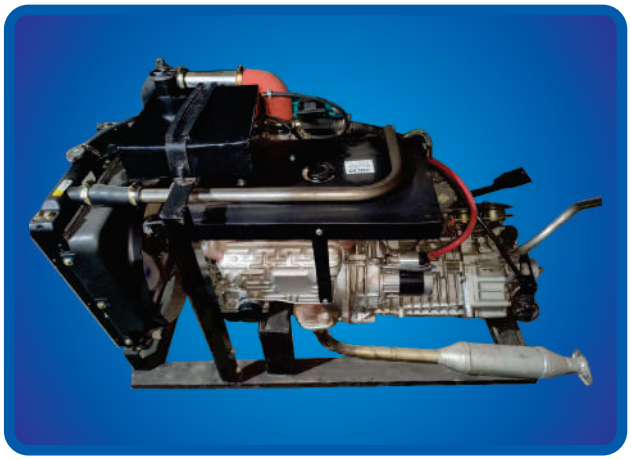
BOAT ENGINE MONO FUEL/ DUAL FUELCNG/LNG

15 HP ENGINE

Frame Dimension:
Length 36 inch, Breadth 18 inch

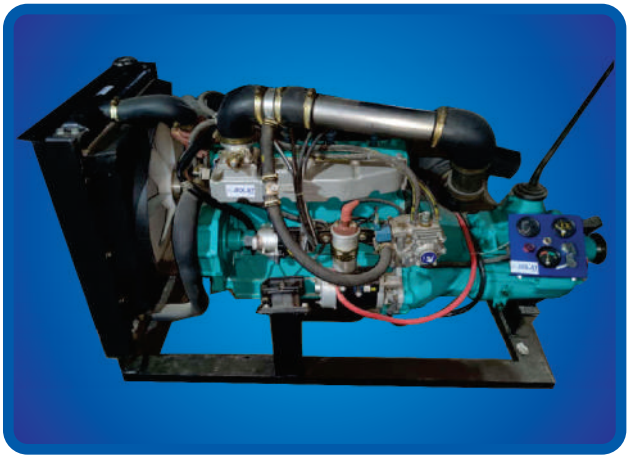
25 HP ENGINE

Frame Dimension:
Length 45 inch, Breadth 18 inch



40 HP ENGINE

Frame Dimension:
Length 48 inch, Breadth 21 inch

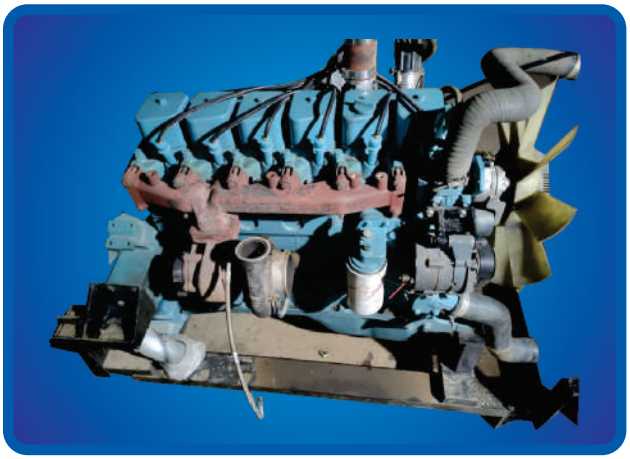


60 HP ENGINE

Frame Dimension:
Length 45 inch, Breadth 26 inch

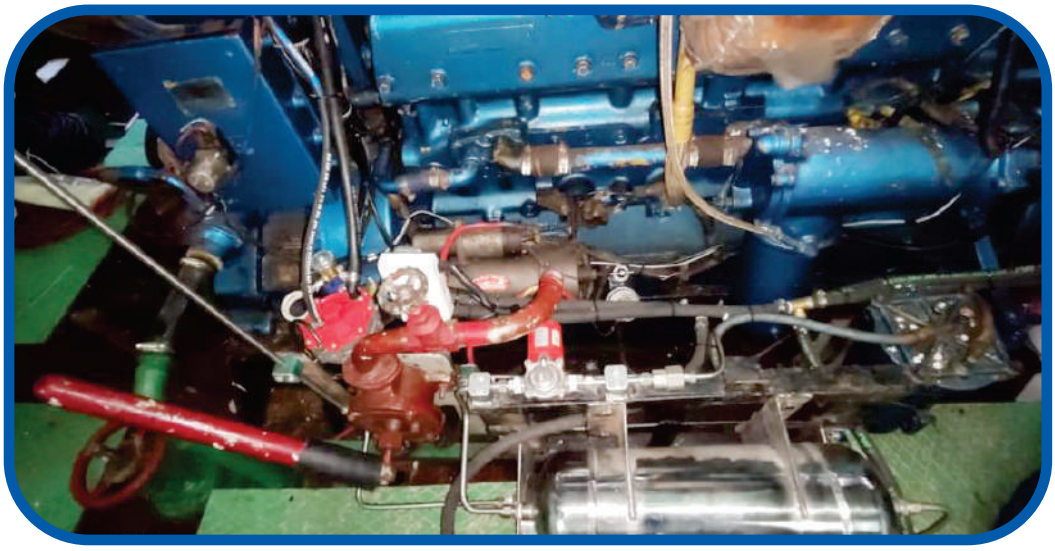
120 HP ENGINE

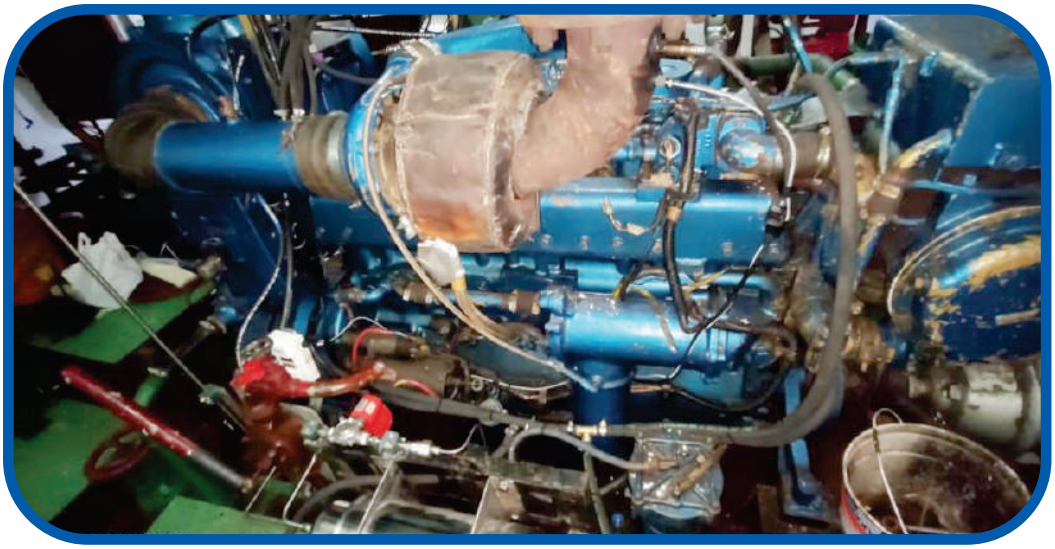
Frame Dimension:
Length 56 inch, Breadth 26 inch

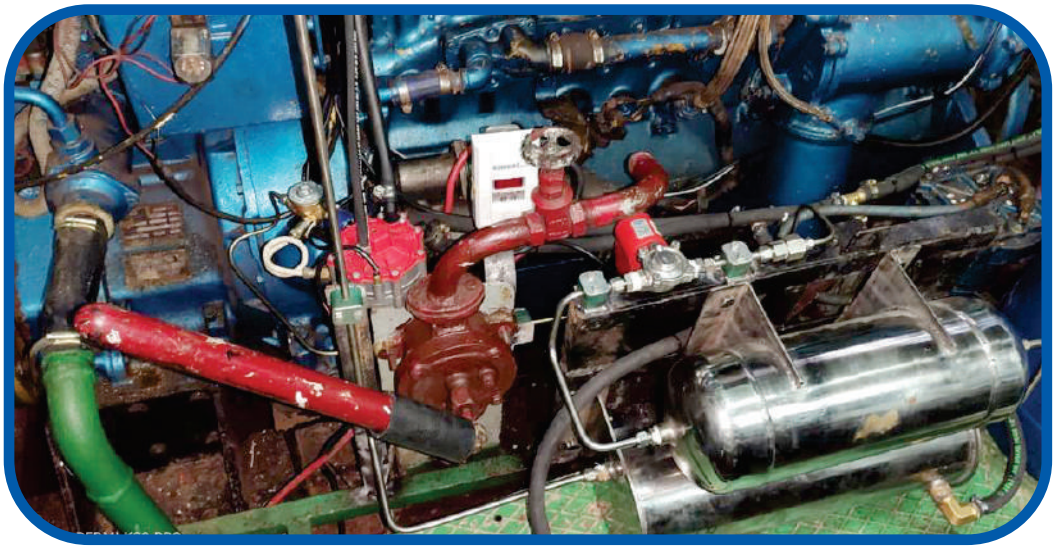


120 HP ENGINE

Frame Dimension:
Length 56 inch, Breadth 26 inch







JIOLAT
Group

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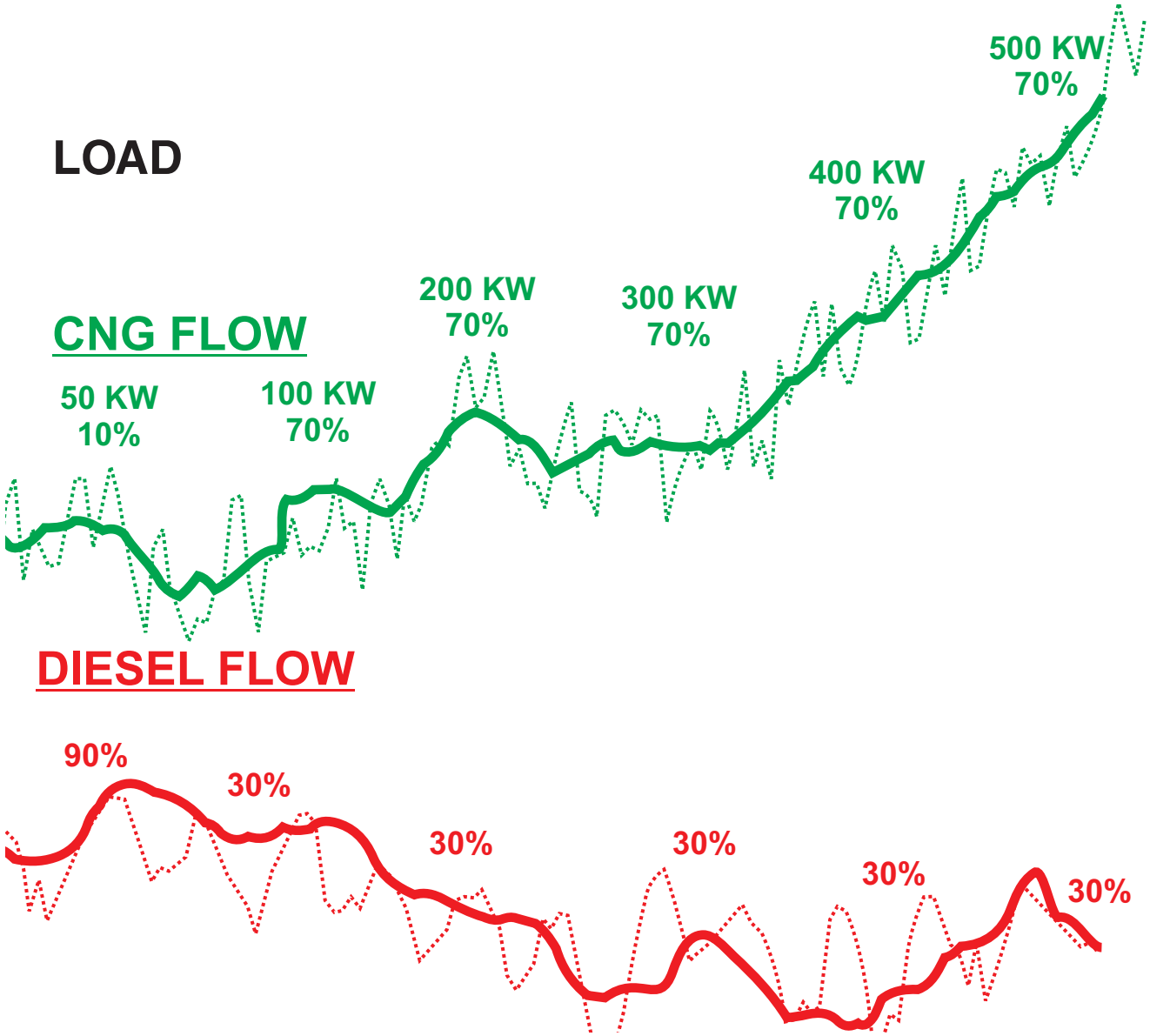
Anand Parbat, Delhi-110005
Ph. No.+91-11-28764977 / 28764978 / 28764979
Workshop : Seed Farm Road, Plot of Ram, Chander, V.P.O., Alipur, New Delhi-110036



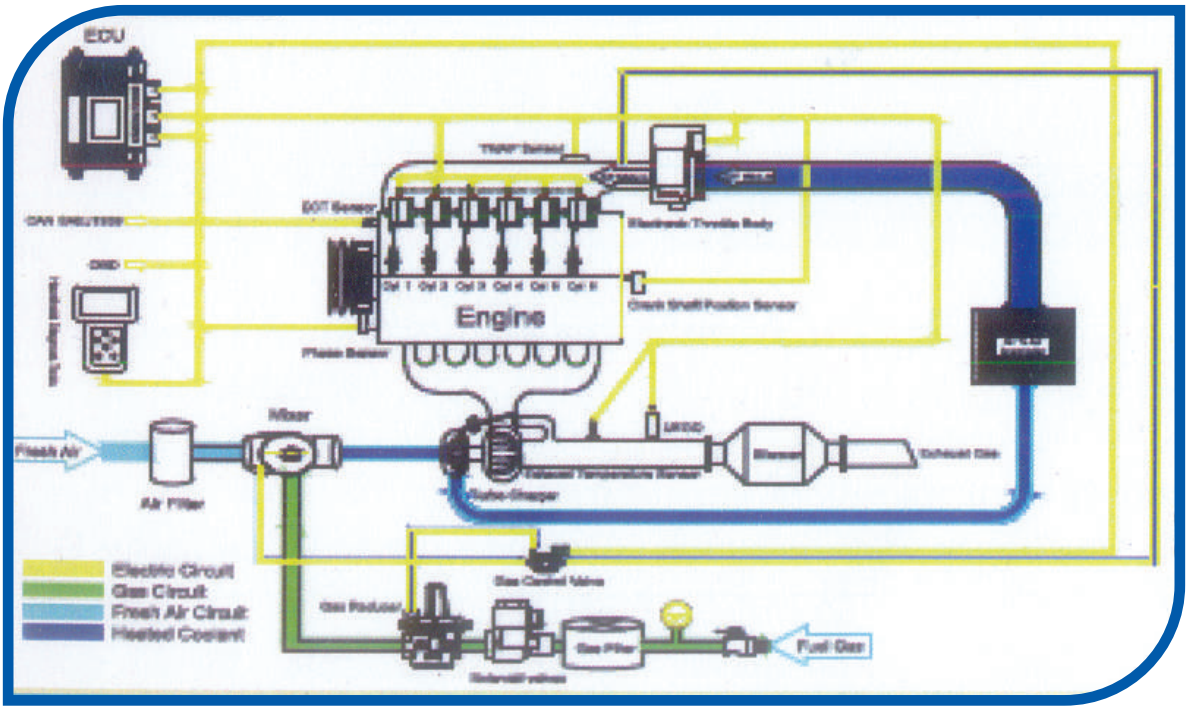
500 KVA GENSET PRICE SAVING CHART

FUEL MODE	QTY.	PRICE	PER HOUR RUNNING COST	SAVING 1 HOUR	SAVING 100 HOUR	
DIESEL	60 Ltr.	75/- Ltr.	4500/-	SAVING ↓	450000/-	
CNG	60 Kg.	35/- Kg.	2100/-	2400/-	240000/-	
DUAL FUEL	42 KG CNG 18 Ltr. Diesel	1470/- CNG 1350/- DIESEL	2820/-	1680/-	168000/-	

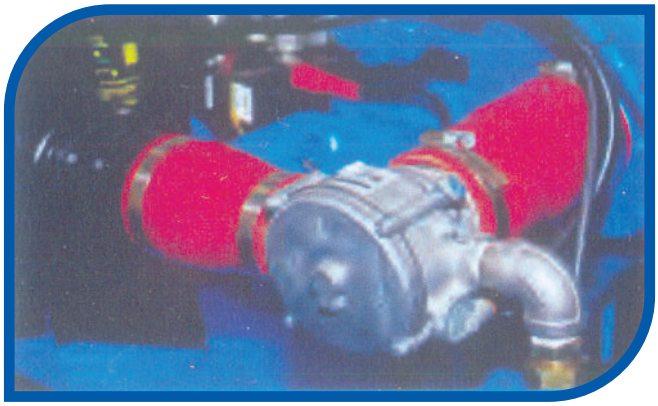
JIOLAT AUTO GAS GENSET CONTROL SYSTEM FEATURES :

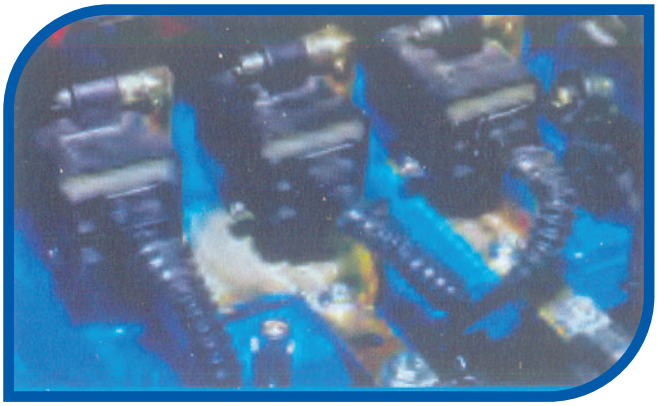
Jiolat Auto Gas Genset Control System
Is Processional Designed Base On Jiolat 15 Years' Experience

1. On Gas Engine Field, Epitomized Most Gas Genset Advantage, Features Are As Follows.
2. High Integration (freescale Dual-core Processor. Wide Band Oxygen Sensor High - Ennrgy Sequence Ihnition. EOBD)
3. Powerful, Scalable (suports A Varriety Of Control Strategies : Can Bus. Supports Multi-ECU)
4. Stability Speed Regulation
   Low Gas Consumption Rate (using Lean - Burn Technology, Theentire Process Can Be Controlled At
5. The Optimum Air-fuel Ratio, Combustion Stability And Sufficient)
6. low Echaust Temperature. Life Time.
7. Can Match Too Many Gas Supply Systems Based On Different Gas Source.
8. Support Different Ignition Solution. (sequence Ignition Sequence : Grouping Ignition)
   Close Loop Control. rich L/o Output. Multiply Communication Protocols. Real Time Diagnosis.



Jiolat Auto Gas Concentrates On The Manufacturing Providing And Service For Diesel Generator Set.gas Generator Set Gas Concentration For Many Years. We Have Delivered More Than 1 Thousand Generator Sets To Customers Over Th World.





Application :

Petroleum oil associated gas application

Applications :

Oil-associated Gas Generate, Industrial Park, Oil Processing Plants, Natural Gas

Generator Set As Backup As Backup Power

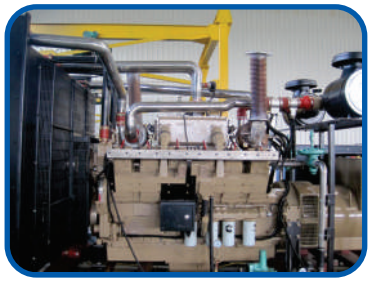
Supply Power For Well Matching Machine, Hospital, School.

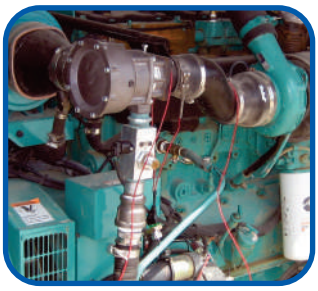
Technical Parameters of Small - Medium Power Series Natural Gas Generator Set:

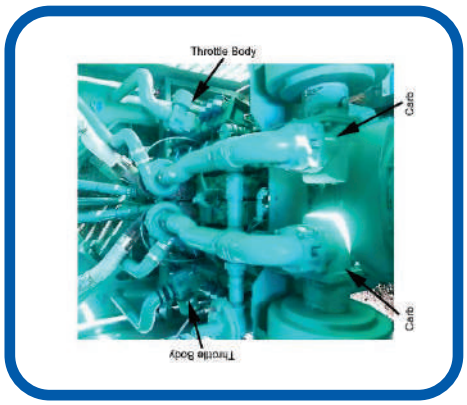
Power : 20-200 kw Speed : 1500/mm Voltage : 400v/230v Frequency : 50 Hz Exciting Method: Brushless

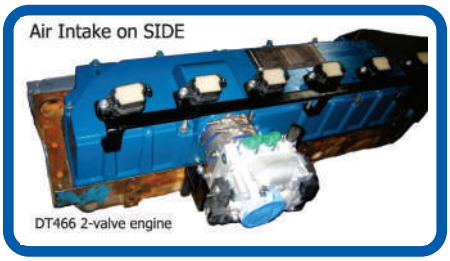
Voltage Regulation Mode : Automatic Phase-3 Phase-4 Wire

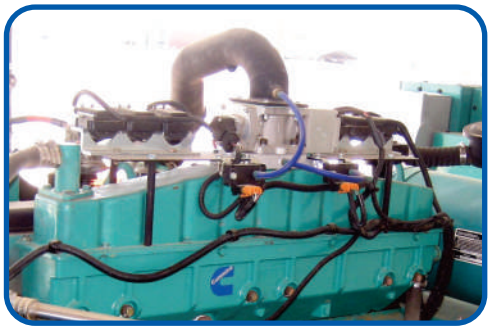
Applications Areas: Gas Pipeline Oil Associated, Gas











Biogas Application In Taizhou, Jiangsu Applications

Farming Enterprises Biogas Generator Set :

Industrial : Various Enterprises With Contaminants.

Technical Parameters of Smal-medium Power Series Natural Gas Generator Set.

Power: 20-200kw Speed : 1500r/min Voltage : 400v/230v Frequency : 50 Hz Exciting Method : Brushless

Voltage Regulation Mode : Automatic Phase :3 Phase :4 Wire

Gas Components :

Natural Ga-it Main Component Is Ch4 Witch Takes 90% of The Whole Content The Displacement of Nox. Chm And Co From Burning Are Much Lower Than The State Standards And Without Dust Pollution. Efficiency of Conversion Is 65% Which Is Same To The LPG And Higher Than Coal. Calculated. On The Same Value The Prices of Natural Gas Is Lower Than The Price of Coal And Petroleum.

Requirements For Natural Gas:

1. The Ratio Ch4 In Natural Gas-70%
2. Pressure of Batural Gas 80-200kpa, Rate of Pressure Change - 1kpa/min
3. H2s-200mg/m3
4. Noisture Content - 40g/m3
5. Impurity Particle Size - 5um, Impurity Content -30mg/nm3

If Fuel Gas Contains Higher Quality of Sulfer And Ammonia. It Not Only Corrodes The Generator Set And Corrodes The Generator Set With Precipitates

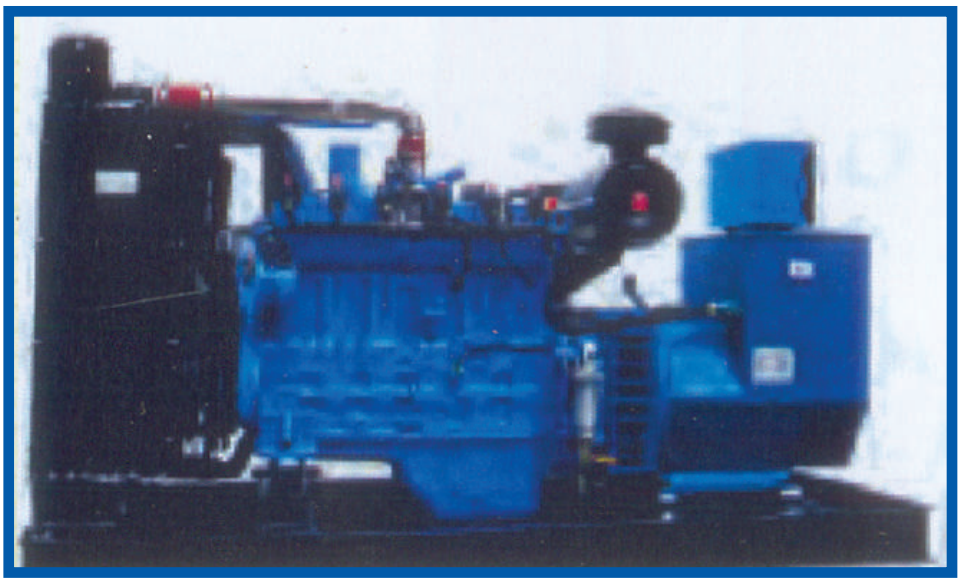
GENSET FEATHER:

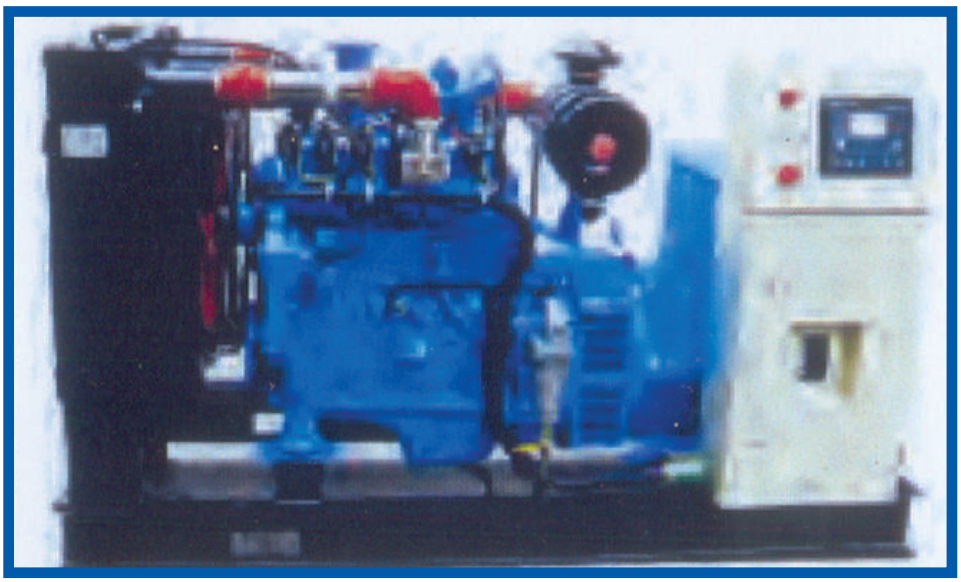
Jiolat Auto Gas Genset Feather

1. Advanced Structural Innovation (Water / Oil Cooled Turbo charger Technology, Low Technology Corrosion Resistant Valve Technology, Compression Ratio Optimization, Electrical Cabinate Integrated Institutional And More Compact, Lower Cost, Easy Maintenance)
2. Advanced Control Technology (With Jiolat Control System, To Achieve Low Pressure Combustion, Lean Burn, High - Energy Ignition, Advanced Closed-loop Control, Adaptive Fully Functional Start Eobd)
3. Low Exhaust Temperature, Long Life.
4. Free Switching Function of Genset From 50Hz=60Hz, Is Processed of Stronger Applicability And Generality, Reduce That Cost.
5. Can Use A Potentiometer To Adjust The Target Speed.
6. Our Air-fuel Ratio Control System Developed For Real Time Feed Back Via The Light From The Light Color, Brightness. on of Get Real Time Air Fuel Ratio Operating Range To Provide A Good Reference For The Running State of The Engine.
7. A Wide Range of the Gas
8. High Economic
9. Flexible Maintenance
10. High Omission.
11. All Electronic Intelligent High Automation Level

20KW 1000KW	8	20

Power range 20KW-1000KW
8 series
20 kinds of products





MODEL	PC4B24G	PC4B30G	PC4B45G	PC6B68G	PC6B100G
Prime Power	20	26	40	60	85
Standby Power	24	30	44	68	87
Brand	Prow - Best	Pro-best	Pro Best	Pro Best	Pro Best
Genset Steady Rate	<1%	<1%	<1%	<1%	<1%
Engine Model	4b3.9	4bt3.9	4btaa3.9	6bt5.9	6btaa5.9
Prime Power	24	30	45	68	100
Intake Mode	Natural Aspiration	Turbo Charged	Turbocharged And Air Cooled	Turbo Charged And Air Cooled	Turbo Charged And Air Cooled
Of Cylinders	4	4	4	4	16
Rated Speed	1500	1500	1500	1500	1500
Bore	102	102	102	102	1500
Stroke	120	120	120	.120	.120
Compression Ratio	10.5:1	10.5:1	10.5:1	10.5:1	10.5:1
Displacement	3.9	3.9	3.9	5.9	5.9
Speed Governing	Electrical	Electrical	Electrical	Electrical	Electrical
Starting Method	24v Electric Start	24velectrical Start	24 Electric Start	24v Electric Start	24v Electric Start
Lube Specification	15wcl_40	15wcl_40	15wcl_40	15wcl_40	15wcl_40
Lube Capacity	11	11	11	11	16.3
Brand 9optional)	Stamford	Stamford	Stamford	Stamford	Stamford
Model Number	P1144e	Pl144d	Ucl224d	Ucl224e	Ucl224e
Voltage	380-415	380-415	380-415	380-415	380-415
Power	20	32	40	96	96
Speed	1500	1500	1500	1500	1500
Phase	3	3	3	3	3
Power Factor	0.8	0.8	0.8	0.8	0.8
Steady Voltage Regulation	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%



PC6C133G	PC6C176G	PCN266G	PCK440G	PCK810G	PCK1000G
113	160	226	374	688	850
133	175	263	430	810	1000
PRO-BEST	PRO-BEST	PRO-BEST	PRO-BEST	PRO-BEST	PRO-BEST
<1%	<1%	<1%	<1%	<1%	<1%
6CTAAB.3	6CTAA8.9	NTAA855	KTAA19	KTAA38	KTAA50
133	176	266	440	810	1000
Turbo Charged And Air Cooled	Turbo Charged and Air Cooled	Turbo Charged and Air Cooled	Turbo Charged and Air Cooled	Turbo Charged and Air Cooled	Turbo Charged and Air Cooled
6	6	6	6	12	16
1500	1500	1500	1500	1500	1500
114	114	140	159	159	159
135	145	152	159	159	159
10.5:1	10.5:1	10.5:1	10.5:1	10.5:1	10.5:1
8.3	8.9	14	19	38	50
Electrical	Electrical	Electrical	Electrical	Electrical	Electrical
24V	24V	24V	24V	24V	24V
24V Electric Start	24V Electric Start	24V Electric Start	24V Electric Start	24V Electric Start	24V Electric Start
15WCI_40	15WCI_40	15WCI_40	15WCI_40	15WCI_40	15WCI_40
16.3	16.3	38.8	50	135	204
Stamford	Stamford	Stamford	Stamford	Stamford	Stamford
UCI274E	UCI1274G	HCI444E	HCI554C	LVI634D	LVI634G
380-415	380-415	380-415	380-415	380-415	380-415
112	145	280	400	728	1000
1500	1500	1500	1500	1500	1500
3	3	3	3	3	3
0.8	0.8	0.8	0.8	0.8	0.8
±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%



Diesel to CNG Conversion Steps For HCV & Genset

1- Disassemble Engine.

2- Checking components and replace as necessary.

3- Modify pistons for gas use (lower compression ratio)

4- Modify cylinder head for spark plugs.

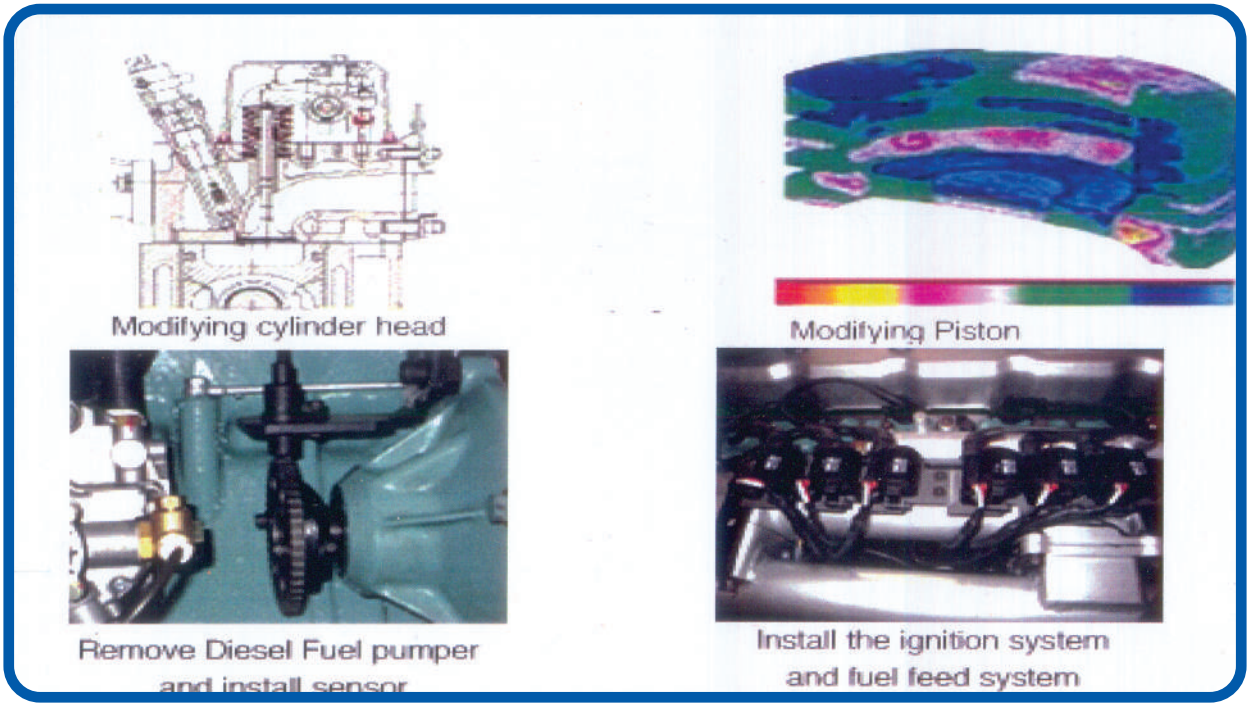
5- Install camshaft sensor and timing wheel.

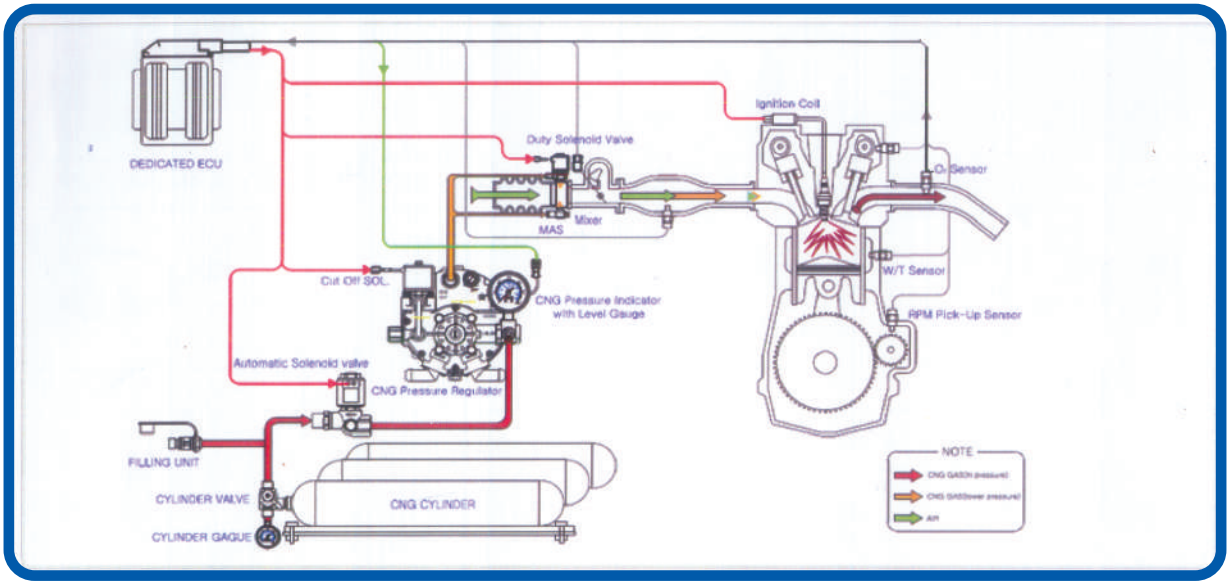
6- Reassemble engine.

7- Install throttle body, ignition system, gas mixer or fuel injectors.

8- Tuning of the engine (fuel and ignition)

Diesel to CNG Conversion Process:





Benefits of LNG
Growth in M & HCV Trucks and Buses

- Better Combustion.
- Enviromentally Friendly Clean Fuel.
- LNG Supply By Trucks Already Existing Practice.
- Attractive Savings
- Site GAS Storage Possible.
- Better Product Quality.
- Better Safety Features Due To Dispersion Properties of Methane

S N	F.Y.	M & HCV Trucks (Addition Every Year)	Buses (Addition Every Year)
1.	2014-15	1,95,918	81,653
2.	2015-16	2,58,488	92,845
3.	2016-17	2,55,267	98,126
4.	2017-18	304,664	84,658
5.	2018-19(2M)	52,223	16,522
Yearly Average		2,53,584	89,320

Data Source- ICRA Report

OUR CORPORATE CUSTOMER

GAIL

INDRAPRASTHA GAS LIMITED

ADANI

EIL

MECON मेकॉन ISO 9001 Company

इंडियनऑयल IndianOil

TATA

APSRTC Service with a smile Always Everywhere

JAYPEE GROUP

Bharat Petroleum

BGL Bhagyanagar Gas Ltd.

jp kenny

हिन्दुस्तान पेट्रोलियम HP

IOAG

HCG

CUGL Central U.P. Gas Limited

CIMFR CSIR-CIMFR, INDIA

ICAT Innovation • Service • Excellence

TAJ sats

BSES BSES Rajdhani Power Limited

ASHOK LEYLAND

DelhiTransportCorporation

MARUTI SUZUKI

OUR VALUABLE CLIENTS:

- M/s Indian Oil Corporation Ltd.
- M/s Bharat Petroleum Corporation Ltd.
- M/s Hindustan Petroleum Corporation Ltd.
- M/s Indian Oil Adani Pvt. Ltd.
- M/s Jaypee Group, Noida, UP
- M/s Adani Gas. Ltd.
- M/s Punjab Genco Ltd.
- M/s Andhra Pradesh State Road Transport Corporation, AP
- M/s Delhi Transport Corporation, New Delhi
- M/s Haryana Roadways, Sonipat
- M/s Indraprastha Gas Limited, New Delhi
- M/S Adani Gas Limited, Faridabad
- M/s Bhagyanagar Gas Limited, Hyderabad
- M/s Haryana City Gas Distribution Ltd. Haryana
- M/s Central UP Gas Limited, Kanpur U.P.
- M/s Sity Energy Limited, Muradabad, U.P.
- M/s Central Institute of Mining and Fuel Research, Jharkhand
- M/s International Centre for Automotive Technology, Manesar
- M/s Harvest Gold Industries Pvt. Ltd., Rajasthan
- M/s Taj Sats Air Catering Ltd., Delhi
- M/s BSES Rajdhani Power Pvt. Ltd., Delhi
- M/s BSES Yamuna Power Pvt. Ltd., Delhi
- M/s Agarwal Packers & Movers Ltd., Delhi
- M/s Punja Sahib Tours & Travels, Delhi
- M/s Bonn Group of Industries., Punjab
- M/s Hyundai Motors India Ltd.
- M/s Maruti Suzuki India Ltd.
- M/s Advantek Fuel Systems Pvt. Ltd.
- M/s TATA Motors Ltd.
- M/s SML ISUZU Ltd.
- M/s Ashok Leyland Ltd.
- M/s Mahendra and Mahendra Ltd.
- M/s Krishna Maruti Ltd.

Certificate :

bsi.

By Royal Charter

Certificate of Registration

QUALITY MANAGEMENT SYSTEM – ISO 9001:2015

This is to certify that: Jolat Fuel Tech Pvt. Ltd.
HR-18 A, Gali No.10
Industrial Area (Near Police Station)
Anand Parbat
Delhi
India

Holds Certificate No: FM 688681

and operates a Quality Management System which complies with the requirements of ISO 9001:2015 for the following scope:

The Design and Manufacture of CNG Pressure Regulator.

For and on behalf of BSI: Chris Cheung, Head of Compliance & Risk - Asia Pacific

Original Registration Date: 2018-02-07
Latest Revision Date: 2018-02-07

Effective Date: 2018-02-07
Expiry Date: 2021-02-06

Page: 1 of 1

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This certificate was issued electronically and remains the property of BSI and is bound by the conditions of contract.
An electronic certificate can be authenticated online.
Printed copies can be validated at www.bsi-global.com/ClientDirectory or telephone +91 11 2692 9000.
Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization.
This certificate is valid only if provided original copies are in complete set.

Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: + 44 (0)8 00 583 9001
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.
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INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY
(A Division of NATRIP Implementation Society (NATIS), Govt. of India)

C A N A 0194 — Date : 01st August 2018

CERTIFICATE

FOR COMPLIANCE TO THE CENTRAL MOTOR VEHICLES RULES.

Kit Installer / Manufacturer: M/s. JOLAT Fuel Tech Pvt. Ltd. HR-18A, Gali No. 10, Industrial Area, (Near Police Station) Anand Parbat, Delhi – 110 088

CNG Kit Identification: JFL

"Hi-Grid" BASE MODEL: GVW kg 1500; Engine Power 42 kW @ 5250 rpm; Engine cm³ 1399

TYPE: Passenger Car; Year of Manufacture: July 2018; Seating Capacity (Incl. Driver): 5 Persons; Engine cm³ Range: 1199.1 to 1600.0

Authorised Signatories: VIJAYANTA AHUJA, ASST. GENERAL MANAGER; DINESH TYAGI, DIRECTOR

Page 1 of 3

Office Address : Centre-I : Plot No.-26, Sector-3, HSIIDC, IMT-Manesar, Gurugram-122050, Haryana (India)
Centre-II : Plot No.-01, Sector-M-11, HSIIDC, IMT-Manesar, Gurugram-122050, Haryana (India)
Phone : 0124-4586111, Fax : +91-124-2290005, E-mail: team@icat.in, Website : www.icat.in
(An ISO 9001, ISO 14001 and OHSAS 18001 certified, scope wise NABL accredited and BIS recognized Test House)

INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY
(A Division of NATRIP Implementation Society (NATIS), Govt. of India)

C A N A 0196 — Date : 02nd August 2018

CERTIFICATE

FOR COMPLIANCE TO THE CENTRAL MOTOR VEHICLES RULES.

Kit Installer / Manufacturer: M/s. JOLAT Fuel Tech Pvt. Ltd. HR-18A, Gali No. 10, Industrial Area, (Near Police Station) Anand Parbat, Delhi – 110 088

CNG Kit Identification: JFL

"Hi-Grid" BASE MODEL: GVW kg 1500; Engine Power 42 kW @ 5250 rpm; Engine cm³ 1399

TYPE: Passenger Car; Year of Manufacture: April 2018; Seating Capacity (Incl. Driver): 5 Persons; Engine cm³ Range: 1199.1 to 1600.0

Authorised Signatories: VIJAYANTA AHUJA, ASST. GENERAL MANAGER; DINESH TYAGI, DIRECTOR

Page 1 of 3

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C A N A 0199 — Date : 03rd August 2018

CERTIFICATE

FOR COMPLIANCE TO THE CENTRAL MOTOR VEHICLES RULES.

Kit Installer / Manufacturer: M/s. JOLAT Fuel Tech Pvt. Ltd. HR-18A, Gali No. 10, Industrial Area, (Near Police Station) Anand Parbat, Delhi – 110 088

CNG Kit Identification: JFL

"Hi-Grid" BASE MODEL: GVW kg 1500; Engine Power 42 kW @ 5250 rpm; Engine cm³ 1397

TYPE: Passenger Car; Year of Manufacture: June 2018; Seating Capacity (Incl. Driver): 5 Persons; Engine cm³ Range: 1199.1 to 1600.0

Authorised Signatories: VIJAYANTA AHUJA, ASST. GENERAL MANAGER; DINESH TYAGI, DIRECTOR

Page 1 of 3

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C A N A 0197 — Date : 03rd August 2018

CERTIFICATE

FOR COMPLIANCE TO THE CENTRAL MOTOR VEHICLES RULES.

Kit Installer / Manufacturer: M/s. JOLAT Fuel Tech Pvt. Ltd. HR-18A, Gali No. 10, Industrial Area, (Near Police Station) Anand Parbat, Delhi – 110 088

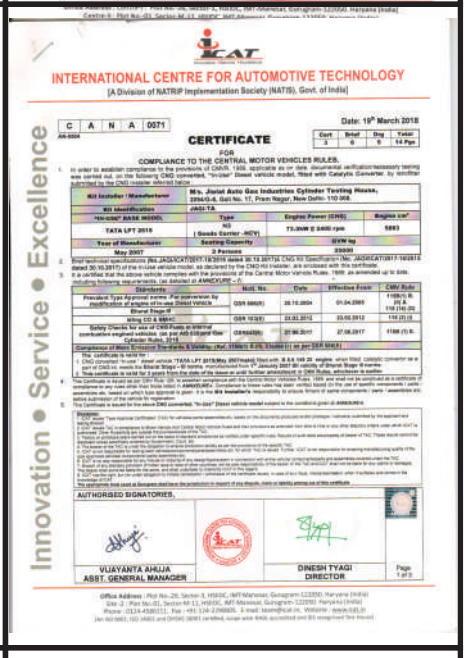
CNG Kit Identification: JFL

"Hi-Grid" BASE MODEL: GVW kg 1500; Engine Power 42 kW @ 5250 rpm; Engine cm³ 1399

TYPE: Passenger Car; Year of Manufacture: April 2018; Seating Capacity (Incl. Driver): 5 Persons; Engine cm³ Range: 1199.1 to 1600.0

Authorised Signatories: VIJAYANTA AHUJA, ASST. GENERAL MANAGER; DINESH TYAGI, DIRECTOR

Page 1 of 3



INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY
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C A N A 0071 — Date: 19th March 2018

CERTIFICATE

FOR COMPLIANCE TO THE CENTRAL MOTOR VEHICLES RULES.

Kit Installer / Manufacturer: M/s. Jolat Auto Gas Industries Cylinder Testing House, 2294/G-6, Gali No. 17, Prem Nagar, New Delhi- 110 008.

"Hi-Grid" BASE MODEL: JAG-TA

TATA LPT 2518: Type M3 (Goods Carrier –HCV); Engine Power (CNG) 73.5kW @ 2400 rpm; Engine cm³ 5883

Year of Manufacturer: May 2007; Seating Capacity: 3 Persons; GVW kg 25000

Authorised Signatories: VIJAYANTA AHUJA, ASST. GENERAL MANAGER; DINESH TYAGI, DIRECTOR

Page 1 of 3

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C A N A 0060 — Date: 16th March 2018

CERTIFICATE

FOR COMPLIANCE TO THE CENTRAL MOTOR VEHICLES RULES.

Kit Installer / Manufacturer: M/s. Jolat Auto Gas Industries Cylinder Testing House, 2294/G-6, Gali No. 17, Prem Nagar, New Delhi- 110 008.

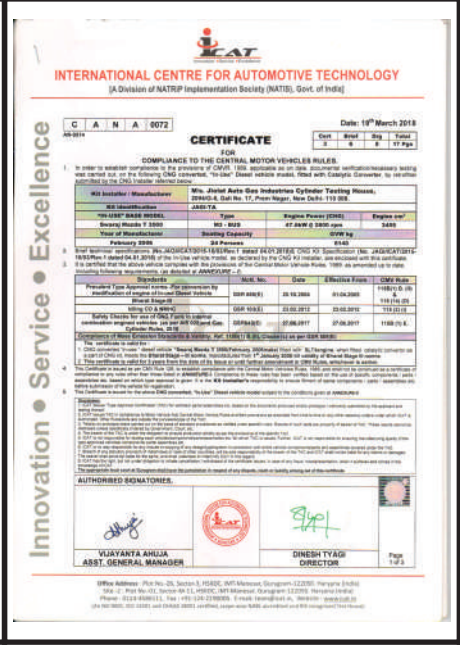
"Hi-Grid" BASE MODEL: JAG-TA

TATA 1613: Type M3 (Goods Carrier –HCV); Engine Power (CNG) 55.0 kW @ 2400 rpm; Engine cm³ 5675

Year of Manufacturer: January 2007; Seating Capacity: 3 Persons; GVW kg 16200

Authorised Signatories: VIJAYANTA AHUJA, ASST. GENERAL MANAGER; DINESH TYAGI, DIRECTOR

Page 1 of 3



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C A N A 0072 — Date: 19th March 2018

CERTIFICATE

FOR COMPLIANCE TO THE CENTRAL MOTOR VEHICLES RULES.

Kit Installer / Manufacturer: M/s. Jolat Auto Gas Industries Cylinder Testing House, 2294/G-6, Gali No. 17, Prem Nagar, New Delhi- 110 008.

"Hi-Grid" BASE MODEL: JAG-TA

Swaraj Mazda T 3500: Type M3 - B29; Engine Power (CNG) 47.5kW @ 2800 rpm; Engine cm³ 5499

Year of Manufacturer: February 2006; Seating Capacity: 3 Persons; GVW kg 6142

Authorised Signatories: VIJAYANTA AHUJA, ASST. GENERAL MANAGER; DINESH TYAGI, DIRECTOR

Page 1 of 3

INTERNATIONAL CENTRE FOR AUTOMOTIVE TECHNOLOGY
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C A N A 0070 — Date: 16th March 2018

CERTIFICATE

FOR COMPLIANCE TO THE CENTRAL MOTOR VEHICLES RULES.

Kit Installer / Manufacturer: M/s. Jolat Auto Gas Industries Cylinder Testing House, 2294/G-6, Gali No. 17, Prem Nagar, New Delhi- 110 008.

"Hi-Grid" BASE MODEL: JAG-TA

Eicher 10.75: Type M3 - B45; Engine Power (CNG) 59.5kW @ 2800 rpm; Engine cm³ 5296

Year of Manufacturer: August 2008; Seating Capacity: 3 Persons; GVW kg 8750

Authorised Signatories: VIJAYANTA AHUJA, ASST. GENERAL MANAGER; DINESH TYAGI, DIRECTOR

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