(To be completed, filled in, signed
and stamped by the principal)

ANNEXURE 'A'

Material	REQUIREMNT OF ELECTRONIC GAS FLOW COMPUTERS
Tender Enquiry No	PROC–FE/CB/PROD–4547/2019
Due Date	
Evaluation Criteria	FULL

SCHEDULE OF REQUIREMENT

Sr No	Description	Unit	Quantity	Unit Price (FOB)	Total Price (FOB)	Unit Price C & F BY AIR	Total Price C & F BY AIR	Deviated From Tender Spec. If Any
1	SOLAR POWERED FIELD MOUNTED ELECTRONIC GAS FLOW COMPUTER FOR GAS MEASUREMENT, DETAILED SPECIFICATIONS ARE ATTACHED AT ANNEXTURE–Y	Number	20					
2	CONFIGURATION MACHINE WITH LATEST SPECIFICATION INCLUDING LICENSED PROGRAMMING TOOLS,CONFIGURATION AND O& M SOFTWARE WITH DATA CABLE & ACCESSORIES. DETAIL SPECIFICATIONS ARE ATTACHED AT ANNEXURE–Z	Number	6					

Note:

1. **: Bid bond: -** Pursuant to tender clause # 2.2, 11.4, 13 & 35.3.2, bid bond amounting to USD 3,400/- (USD Three Thousand Four Hundred only) or equivalent in Pak Rupees should be submitted with the technical bid.

2. **Bid Bonds & Performance Bank Guarantees**: List of Banks for Bid Bonds & Performance Bank Guarantees is available in Foreign Tender Document on OGDCL website. Bid Bonds & Performance Bank Guarantees submitted from other than the mentioned Banks are not acceptable.

3. **Evaluation Criteria**: FULL CONSIGNMENT WISE ON C&F BY AIR KARACHI BASIS.

4. **Delivery Period:** 06 Months

5. **Shipment from ACU member Countries**: In case of shipment from ACU member countries, the LC beneficiary should be of that particular country from where the consignment is being shipped.

6. **Terms and conditions**: -Bidders are advised to carefully read all the terms and conditions of the Tender Document available at OGDCL website in the master tender document and attached technical Terms & Conditions.

7. **Following payments methods will be applied;**

    i. **Tender value less than or equal to US$ 200,000:**

    Payment to the Contractor/ bidder in foreign currency shall be made by establishing in favor of the Contractor an irrevocable Letter of Credit (hereinafter called the L/C). 70 % Payment (s) under the L/C will be made for the FOB/ CFR / CPT (as the case may be) price of material of each shipment upon submission of the shipping documents. Balance 30% Payment will be released after receipt, inspection and acceptance of material.

    ii. **Tender value more than US$ 200,000:**

    Payment to the Contractor/ bidder in foreign currency shall be made by establishing in favor of the Contractor an irrevocable Letter of Credit (hereinafter called the L/C). 80 % Payment (s) under the L/C will be made for the FOB/ CFR / CPT (as the case may be) price of material of each shipment upon submission of the shipping documents. Balance 20% Payment will be released after receipt, inspection (in addition of pre-shipment inspection) and acceptance of material.

OIL & GAS DEVELOPMENT COMPANY LIMITED

TENDER DOCUMENT FOR PROCUREMENT & COMMISSIONING OF SOLAR POWERED FIELD MOUNTED ELECTRONIC GAS FLOW COMPUTERS

SEPTEMBER -2019

SCOPE & SPECIFICATIONS

1. General

For the Electronic Gas Measurement system (20) Nos. of Solar Powered Field mounted Gas Flow Computers are required for various fields at Custody transfer points for fiscal metering.

The basic function of Gas Flow Computer is to compute instantaneous flow rates in accordance with AGA 3 latest edition through receiving inputs / Process variable (PVs) i.e. Differential pressure (DP), Static Pressure (SP) from primary source i.e. orifice assembly and direct input from RTD for gas temperature measurement and receiving inputs i.e. electrical/ live signals from online Gas chromatograph (GC), Moisture Analyzer and from Dew point analyzer for HDCP etc.

Hence to achieve desired performance level in order to calculate accurate measurement; sealed Bids are hereby invited for Procurement, Supply, Commissioning and Testing of Online Gas Flow Computer. The Bidders will prepare and submit their Bids, as per instructions given in this document.

2. Delivery Period

The timely delivery shall be the essence of the Contract, as OGDCL has to meet for completion of the Projects. Accordingly, the Supplier is required to supply the online Gas Flow computer within 06 months after establishment of LC.

The prospective Bidder shall carefully study and examine the Tender

Document and Instructions and comply with all requirements of preparation of the Bid. Failure to furnish all requirements as per Tender Document or submission of a Bid not substantially responsive to the Tender Document in every aspect may result in the rejection of the Bid.

Appropriate portions of the Technical Bid and Commercial Bid and addenda or selected sections of the above Tender Document will be incorporated in the contract that will be executed with the successful bidder.

3. Technical Details

The technical proposal shall contain following information/details and documents necessarily;

- Equipment Data sheets
- Technical specification and Technical literature for the required Gas Flow Computer being proposed as per requirements of Tender Document.
- Manufacturer shall provide specific Make, Model, Country of Origin, Ordering code with description and detailed specifications clearly of the all required equipment.
- Guarantee/ Warrantee of quoted Equipment.

4. Specifications

Field Mounted solar powered Gas Flow Computers shall have integral multivariable sensor for measurement of DP, SP & Temperature, Standard firmware supports calculations to calculate standard volume based on actual gas volume as per AGA-3 & AGA-7 1992/2013 (volume, mass/density, and mass/relative density) with actual pressure and temperature, compressibility factor per AGA-8 (detailed, Gross-I or Gross-II methods)

The basic functions of the gas Flow Computer is to compute instantaneous flow rates and to maintain cumulative non-resettable totals of:

i. Volume MCF/hour

ii. Volume (MMSCFD);

iii. Energy (MMBtu);

iv. Produce data for current, hourly, daily and monthly reports;

v. The FC shall be capable of accepting input from GC, Moisture Analyzer/ Dew point Analyzer and produce data/ reports of all associated systems;

vi. Detect, enunciate and log alarms;

vii. Transfer data to local printer / laptop computer;

viii. Maintain cumulative contract month (batch) and daily totals;

ix. Record data of pressure, differential pressure & Temperature and associated equipment connected with FC for monitoring and reporting purposes;

x. Simple selection of Engineering units shall be user selectable between either U.S. or metric for each parameter;

xi. Regarding gas composition, the flow computer shall communicate with a gas chromatograph (GC) to obtain updates using Serial or Ethernet, to get/record gas composition on a regular basis;

xii. Receive manual updates for gas composition through configuration software by using Laptop.

xiii. Use a fixed gas composition through laptop;

xiv. Produce on demand a hard copy listing of the current constants and algorithms used by the FC;

xv. The FC system shall have the local display for displaying parameters;

xvi. FC electronic boards shall be tropicalized or otherwise made environmentally compatible for all applications Class1, Div 2 Groups A, B, C, D, Temperature Code T4;

xvii. IEC 61131 capability;

xviii. The FC shall have communication ports (Rs-232, Rs-485 & Ethernet communication) for local and remote monitoring & control;

xix. Battery backup of RAM (rechargeable or non-rechargeable) shall be provided as an integral part of the FC to protect the loss of RAM contents in case of power supply fail;

(xx) The battery system is to have a 2-year life minimum;

5.   Gas Flow & properties calculation options

- The firmware supports user selectable following gas Flow & properties calculation options AGA 3 1992/2013 or latest revision for volume, mass/density, and mass/relative API14.3, API14.9, API 5 with latest revisions.
- ISO 5167 1991/1998/2003 (orifice, Venturi, and nozzle)
- AGA 7 2006 (pulsed turbine, PD, and ultrasonic).
- AGA 11 2013 (Coriolis pulses)
- AGA 8 1994 (Detailed, Gross 1 and Gross 2)
- NX-19 1962, MOD, VDI/VDE 2040
- ISO 12213 2009 (parts 2 and 3)
- GPA standards / 2172 2009 (including saturated vapor calculation) and ASTM D3588.
- ISO 6976 1995 (Superior and Inferior, incorporating Technical Corrigendum 2 [1997]   and 3 [1999]).

6.   Operational Functions

- All totalizing and compensating functions other than field data input conversion, shall use digital, not analog, methods.
- Loss of field analog signals by sudden excursion outside the operating range shall cause the gas flow computer to alarm and adopt the last good value, or previous 24 hours' average value.
- Totalize flow rate indicates the total mass and total volume on no resettable digital readout.
- Perform calculations including the computation of mass, volume flow rates and BTU

total in accordance with AGA-Report 3, AGA-Report 8, AGA-Report 5, GPA standard and ASTM D3588.

- When a measured variable, for example pressure, is overridden by a fixed constant because of signal failure or manual entry, the override condition shall be evident from the process variable display.

7. Data Signals Input

Differential pressure, static pressure and flowing temperature input signals shall be scanned at least every second. A check of ROM and RAM contents on a continuous basis is required.

Normalized, gas molar composition characterized up to C9+ (inclusive of water vapor), Gross Real Heating Value, Molecular Weight and Relative Density) from the GC. Data transmission shall be via a MODBUS protocol serial link.

8. Computation

- FC shall be capable of computing gas compressibility from AGA-3 Detail Composition Method. And super compressibility using AGA-8.
- The overall measurement accuracy of analog to digital conversions (ADC), if used, shall be better than $\pm0.03\%$ of input signal span. The accuracy of all calculations performed by a microprocessor shall be demonstrably better than $\pm$ 0.001% of reading. Rounding errors should be demonstrably without bias and have no effect on the required accuracy.
- The FC's are required to store hourly averages of quantity, differential pressure, static pressure, flowing temperature and relative density inclusive of date and time. The hourly quantity transaction will begin and end at the end of each hour or any time a constant flow parameter is changed.

- The FC shall be providing with a maintenance mode of operation. When this mode is selected, the transmission of data to the host will be accumulated in a separate set of registers. There shall be no interaction between the maintenance and normal registers.

9. Alarms

All alarms shall be shown on the front panel or laptop and printable.

10. Meter Run Operation

The gas flow computer shall be capable of performing the following meter run operations.

i. Gas flow computer shall display following for its meter run:
- Totalized mass;
- Gross volume;
- Standard volume;
- Temperature;
- Pressure;
- Density;
- Flow rate etc.

ii. GC data & BTU values of the streams shall also be displayed.

11. Fiscal Measurement

- The gas flow computer routines for fiscal measurement/ calculations shall comply with AGA-Report 3, GPA standard and ASTM D3588 for volumetric flow, mass flow and BTU calculations.
- The interval between the computer readings of process variables shall not exceed one second.

- The interval between each cycle for computation of instantaneous flow rate and totalized flow shall be less than one second.
- A complete flow calculation cycle shall not exceed two seconds.
- A complete AGA-Report 8 calculation cycles shall not exceed ten seconds.
- Algorithm and rounding off error for computation of fiscal quantities shall be within ±0.001% of the computed value.

12. Calculations

12.1 Heating Value Calculation

All heating values measurement shall be based on GPA standard, AGA Report#5 and ASTM D3588.

12.2 Mass Flow Rate Calculation

All mass flow rate measurement shall be based on AGA-Report # 3.

The gas mass flow rate through the meter run shall be continuously computed from the measured data of the gas at flowing conditions. Flow computations shall be based on mass units, in accordance with AGA-Report # 3.

12.3 Volumetric Flow Rate Calculation

In addition to providing a gas mass flow rate and total mass, the Gas Metering System shall also calculate volumetric flow rate in SCFD and total volume in ft^3. The Supplier shall provide the formula for these two calculations.

13. Power Source

Primary Power Source of Flow Computer should be solar power. The complete solar power system including charge controller, batteries etc. should be supplied by the vendor.

The battery shall be capable to power the FC under normal operating conditions without charging up to minimum 05 days.

Power system must be able to provide power to flow computer while it is using all functions, including communication with gas chromatograph (flow computer being Modbus master), multivariable sensor input, RTD input, analog inputs / outputs, digital inputs / outputs, Ethernet communication, Wi-fi communication and LCD display.

Solar Power System to be provided by vendor must include the following as minimum:

- Vendor recommended complete solution of Solar power including solar panel, charge controller, rechargeable battery and solar regulator etc.
- Battery will be mounted inside flow computer enclosure or external enclosure.
- External enclosure (if required) should be provided by Vendor.
- Battery enclosure should be weatherproof.
- System including battery, enclosure and solar regulator should be suitable for installation in Class I, Division 2 location.
- Power system must support backup for all above mentioned functions for at least 10 days.
- Vendor must submit power consumption calculations with the bid.

14. Configuration Machine

The Vendor/ Packager shall be responsible for the provision of configuration machines with licensed configuration and all general purpose software shall be used for data downloading/ uploading, maintenance. Calibration, troubleshooting etc.

Note: The Vendor/ Packager shall be responsible for the provision of (06) nos. of configuration machines/ Laptops with all licensed software installed and on USB. Software including Operating system, Antivirus with protecting software tools, MS Office suit, Flow Computer Configuration software and all associates flash & utility software etc.

(Complete specifications of Configuration machine are placed at Annexure –Z)

15. Commissioning

The Supplier shall perform complete pre-commissioning and commissioning of all supplied equipment.

16. Commissioning spares

- It is mandatory that the Packager / Manufacturer shall supply all required commissioning spares for each units.
- The cost of commissioning spares shall be included in Financial Evaluation.

17. Site services

- The Supplier shall be responsible for installation supervision, start-up and pre-commissioning and commissioning of Online Gas Flow Computer and for training of the OGDCL personal at site.
- The training shall be both classrooms oriented as well as hands on training on the system for the operation and Maintenance personnel.
- The Supplier shall provide the custom designed training for personnel during commissioning phase.

18. Warranty

- Supplier shall have final and total responsibility for the performance of the FC System supplied.
- The Supplier will have to provide the warranty/guarantee for one year (minimum 12 months) faultless functioning of the unit from the data of commissioning including free of cost repair maintenance, procurement and installations of parts and have maximum accuracy in accordance with AGA-3. The Supplier shall clearly state how site support will be provided

during the System warranty period (Min. 12 months from Commissioning).

19. Inspection & Testing

- Before shipment, during inspection, testing, the Gas Flow Computers shall be continuously energized over a minimum period of at least 72 hrs. During this period, Packager/ Manufacturer shall perform hardware checks, configuration settings, software downloading & uploading and to detect faults/ failure of any component. If any failures replacements should be made, these should be logged in the final test reports. Quality assurance and testing shall be designed to simulate as closely as possible local conditions.

- All equipment will be subject to inspection by the OGDCL's appointed representatives. The Packager/ Manufacturer shall afford full facilities to the officials during the time of Open box pre-shipment course of manufacture and shall arrange access to any sub-Packager/ Manufacturers work where necessary.

- The Packager/ Manufacturer shall ensure that adequate notice, in writing is given to the OGDCL to enable them to arrange their visits to suit the manufacturing program in accordance with the conditions of the requisition documents.

- All test and inspection data shall be legible including the name and signature of the Packager/ Manufacturer and where applicable the inspector.

- All defects in materials detected as a result of testing shall be repaired or replaced by the Packager/ Manufacturer at no cost to the OGDCL. If the correcting of any error or defect involves serious alternations requiring replacement of parts, the approval of the OGDCL shall be obtained before proceeding with such corrections. Also if the correction of the error requires witnessing by the OGDCL officials or a change in certificates issued by the OGDCL officials the correction shall be properly corrected and signed by both parties.

- If any part of the equipment is damaged after tests have been completed, retesting of the affected parts is mandatory.

- All formal testing will be conducted in accordance with a written test procedure. The Packager/ Manufacturer's standard test procedures shall be forwarded to the OGDCL for approval. Each formal acceptance test must be signed by the Packager/ Manufacturer's and the OGDCL's representatives at the successful completion of the test.
- The Packager/ Manufacturer shall supply all necessary materials to support the inspection and testing.

18.1   Inspection / Performance Tests:

- Performance Tests / Specific Tests shall be conducted at the original point of manufacture facilities. The Performance Tests / Specific Tests shall be conducted in accordance with the Manufacturer's standard test procedures.
- The Packager/ Manufacturer shall be responsible for generating the Performance Tests / Specific Tests procedures.
- The pass/fail criteria shall be 100% correct performance otherwise the faulty item shall be rectified or replaced at the Packager/ Manufacturer's cost.
- These tests shall include the testing and acceptance of both hardware and proprietary system software. All hardware diagnostic programs shall be run at the start of these tests. These shall be the diagnostic programs, which have been used for processing the system at the Packager/ Manufacturer's facilities.
- Expanses including airfare, boarding & lodging, Visa processing fees shall be borne by the Packager/ Manufacturer for not less than Two (02) nominated officials of the OGDCL for total (05) working days excluding travelling time.
- Packager/ Manufacturer should quote above Inspection /Testing expenses separately. These expenses will be the part of Financial evaluation.

20. Terms & Conditions

i. Bidder shall provide OEM Authority letter for supply/distribution.

ii. Bidder/Manufacturer shall be responsible for the provision of all the technical data, detailed specification sheets and other related to the Online Flow computer in Hard/ Soft Copies.

iii. Bidder/Manufacturer shall be responsible for full compliance of Tender document, Data sheet and all related annexures.

iv. Bidder/Manufacturer shall be responsible for provision of Configuration machines as per annexure-Z.

v. Bidder/Manufacturer shall be responsible to provide certificates / OEM sureties to prove the Compliance to the latest revision AGA Report # 3 and associated calculations.

vi. Successful Bidder/Manufacturer shall be responsible to provide performance testing and Calibration Certificates of FCs at the time of delivery.

vii. Successful Bidder/Manufacturer shall be responsible to provide all licensed Operating system software, configuration, application software and backup configuration software of FC and Configuration machines

viii. Bidder/Manufacturer shall be responsible to provide all types of commissioning spares and accessories.

ix. Bidder/Manufacturer shall be responsible to provide fully equipped configuration machines with latest specification along with latest version of Operating systems and all configuration software.

x. Bidder/Manufacturer shall be responsible to provide Certificate of origin.

xi. Bidder/Manufacturer shall be responsible to provide Test Certificates / Benchmark certificates,

xii. Bidder/Manufacturer shall have at least 10 years' experience in the supply / manufacturing of same type of material.

xiii.   Bidder/Manufacturer shall be responsible for provision of OEM standard Warrantees / Guarantees of all equipment.

xiv.   Bidder/Manufacturer shall provide support for the hardware &software for a minimum period of 10 years.

- (END) -

	Annexure-Y	DETAILED DATA / SPECIFICATION SHEET SOLAR POWERED FIELD MOUNTED ELECTRONIC GAS FLOW COMPUTER

1.0 General

1.1	Required Quantity Gas Flow Computers (Complete units in all respects)	20 nos.
1.2	Service	Custody Transfer
1.3	Volume (Maximum flow)	0-100 MMSCFD
1.4	Manufacturer's Product manufacturing experience of same type of material	Minimum10 years
1.5	Operating Temperature (ambient)	Minimum -5 °C to +60°C (14 °F to +140 °F)
1.6	Mounting	Pipe Mount. Pipe mount bracket must be supplied with the unit.
1.7	Security	Multi-level role-based access, user account authentication, password encryption.

2.0 Electrical Specification

2.1	Power source (Primary)	Solar Power System including Solar panels,charge controlar rechargeable batteries[should be provided by vendor/supplier]
2.2	Power Supply	6 - 28 VDC with auotmatic selectable power modes betwen low and standard power modes.
2.3	Power Consumption	Less than 5 watt
2.4	Data back up battery	Lithium coin cell type [Life expectancy of 5–7 years with power & 1year without power]
2.5	Electrical Area Class	Class 1, Division 2, Group C & D or (Exia) T4

3.0 Computational Functionality

3.1	Gas Flow calculations for computation of mass, volume, and energy flow rates.	• AGA 3 1992/2013 or latest revision for volume, mass/density, and mass/relative API14.3, API14.9, API 5 with latest revisions • ISO 5167 1991/1998/2003 (orifice, Venturi, and nozzle) • AGA 7 2006 (pulsed turbine, PD, and ultrasonic) • AGA 11 2013 (Coriolis pulses) • AGA 8 1994 (Detailed, Gross 1 and Gross 2) • NX-19 1962, MOD, VDI/VDE 2040 • ISO 12213 2009 (parts 2 and 3) • GPA standards / 2172 2009 (including saturated vapor calculation) and ASTM D3588. • ISO 6976 1995 (Superior and Inferior, incorporating Technical Corrigendum 2 [1997] and 3 [1999]).
3.2	Measurement Units	US and Metric [user selectable]
3.3	Super Compressibility calculations	AGA-8, Gross I or Gross II or detailed, ISO 12213 2009 (Part 2 & 3).

4.0 Functionality

4.1	The primary function of the FC	To compute instantaneous flow rates of gas by receiving inputs of the following: i) Differential pressure against orifice plate, ii) Static pressure, iii) Temperature of gas [direct input from RTD] iv) Gas Chromatograph data, v) Moisture analyzer/ dew point Analyzer. Flow Copmuter shall have integral Multi variable Transmitter

5.0 Flow Computer Technical specs / Features

5.1	Solar Powered field mounted Microprocessor-based gas flow computer	Field mounted solar powered (CPU) of FC minimum: • NXP Kinetis K61 series CPU with an ARM Cortex M4 processor. • IEC 61131 capability • API 21.1 compliance for Custody transfer, • Built-in WIFI for connection to laptop / PC.

5.2	Diagnostics	Battery & external voltage monitor, SRAM battery status etc
5.3	Memory	SRAM minimum 8 MB, for holding current states of all variables and historical archives. Flash 128 MB,for firmware image and configuration files.
5.4	Clock Type	Real-time clock and Watchdog Timer min 1000 milliseconds
5.5	Hazardous Area Certifications	CSA C/US, ATEX and IECEx Certification Class1, Div 2 Groups A, B, C, D, Temperature Code T4
5.6	Housing / Enclosure	Explosion proof and flame-proof made die-cast Aluminum. Protection class NEMA 4X / IP66.
5.7	Report Generation	Current, hourly, daily and monthly reports, Live inputs from GC, HCDP and Moisture analyzers with date and time stamps, Alarming, data & Event logging Current, hourly, daily and monthly reports of PT, TT, DPT, Total volume/energy(MMSCF/MMBTU), Maintain cumulative contract month (batch) and daily totals. etc.
5.8	Local Display	LCD /LED type 16-20 characters per line, Minimum 4 lines in display for displaying totalized gross volume MMSCFD, Energy MMBTU, orifice differential pressure, temperature, Static pressure, density (Sp.Gravity) , GC and HCDP/ moisture analyzer data etc.
5.9	Standard/ Base Inputs & Outputs	Yes with minimum following I/Os: (02) nos. Analog channels 4 to 20 mA or 1 to 5 Vdc accuracy of 0.05% of span for analog input and o.1% of span for analog output. (02) nos. Discrete channels (01) no. RTD/PRT
5.10	Communication ports:	(03) serial ports [support DNP3, MODBUS® RTU/ASCII, master or slave], (01) Ethernet port [supports Modbus over TCP/IP protocol] (01) one Wi-Fi port communications using DNP3 protocol. [Supports multiple communications protocols including DNP3, Modbus master and slave (ASCII and RTU) on the three serial ports and DNP3 on the Mobile SCADA port]. • COM1 – 4-wire serial communications. Software selectable for RS-232, RS-422, or RS-485 operation. • COM2 & COM3– 2-wire serial communications. Software selectable for RS-232 or RS-485 operation. • COM4 – Wi-Fi (802.11 b/g) communications • COM5 – Ethernet 10/100 Base-T supports up to 7 sessions (1 Modbus Master, up to 3 DNP3.
5.11	Connectivity and data communication	Yes with Gas Chromatagraph, HCDP, Moisture/ Dew point analyzers interface etc.
5.12	Alarms and Events & data logging	• 61 days hourly history • 10 months daily history • 10 months Weekly logs • 60 months Monthly logs The flow computer shall have standard periodic logs available providing hourly, daily, weekly, and monthly history including flow weighted average data, totals, and gas composition. The flow computer shall provide pre-formatted EFM reports for hourly, daily, weekly, monthly and calibration reports. The format of the reports can be .csv, and .pdf and secure pdf.

6.0 Sensors/ Transducer		
6.1	Integral built Multivariable Transmitters/Transducers	Yes. The integral MultiVariable sensor / Transmitter must have Static Pressure and Differential Pressure and has a stainless steel coplanar flange, a stainless steel (316L) diaphragm, and silicone fill fluid.
6.2	Static & Differential Pressure Accuracy	+ /- 0.075% of user calibrated Spans
6.3	Process Temperature	- 40 to 230 Degree F
6.4	Static Pressure	0-3000 Psi
6.5	Differential Pressure	0-1000 inches H2O
6.6	Temperature Accuracy	+/- 0.15 Deg.C
7.0 Accessories		
Solar Power System		
7.1	Solar Power System	Vendor recommended complete solution including all accessories
7.2	Solar Power System Battery efficiency	10 days under normal operating conditions in case of non charging mode
7.3	Battery Enclosure	Battery will be mounted inside flow computer enclosure or [external enclosure should be provided by Vendor]
7.4	External Battery enclosure (If required)	Weatherproof suitable for Class I, Div II location
Configuration Machine		
7.5	Configuration machine (Laptop)	Yes (Qty: 06 nos.) Latest specification equipped with licenced configuration softwares & tools/ Flash files, Software and drivers for configuration of FC [if required], Detailed specsification at **Annexure- Z**
7.6	Configuration Software and drivers for configuration machine	Window based user friendly licensed software able to monitor, configure, service, maintenance, troubleshooting, calibration and saving reports. Can be installed on multiple machines.
7.7	Interfacing for data Communication with Laptop/ Desktop	Flow computer shall be connected to Laptop/ desktop through WiFi connection.
Manifold		
7.8	5 Valve Manifold	**Yes Total 20 nos.** Material 316 SS. Flanged transmitter ends and 1/2" NPT for connection to orifice fitting. Double bypass type natural gas industry pattern. Complete with flange seals and boltings for integral mounting to MVS sensor.
RTD		
7.9	RTD with threded barstock thermowell for 3/4" MNPT process connection for 4", 6",8" pipeline.	Yes with each FC. i) **04** Nos. for 4" line ii) **08** Nos. for 6" line iii) **08** Nos. for 8" line
8.0 COMMISSIONING		
8.1	Commssioning of all FCs at various Field locations by Vendor/ Packager/ Supplier	Yes
9.0 Documentation		
9.1	Calibration Certificates	Yes
9.2	Certificate of Origin	Yes
9.3	Certificate of Conformity	Yes
9.4	Documentation	Startup/Configuration/O&M manual on CD.
9.5	Vendor' Warrantees / Guarantees	**12 months** from commissioning or 18 months after shipment

Annexure- Z

Configuration machine / Laptop

Flow Computer Configuration Laptop	
Processor	Core i7 hexa Core or latest
Processor Generation	8th Gen or Latest
RAM	16 GB
Storage	1TB HDD
Display	17" or more
Operating System	Windows 10 Pro (Licensed)
Office Tools	MS Office, Adobe PDF Reader (Licensed)
Warranty	1 Year