

# Master Meter/Prover

## TRG-MMP-10



Tehran Rezvan Gostar Engineering Company

HEAD OFFICE :

Unit 2 ,2<sup>nd</sup> Floor No. 71

North Sheakh Bahae St. , Tehran - IRAN

Tel & Fax : +98 21 88335725/ 88335726/ 88002217/ 88013383

Website : [www.trg.ir](http://www.trg.ir) Email : [info@trg.ir](mailto:info@trg.ir)

### Products:

- 1- Bi-Directional Pipe Prover
- 2- 4Way Valve
- 3- Detector Switch for Prover Application
- 4- Prover Sphere
- 5- Basket Type Strainer
- 6- Straightener
- 7- Sampling System
- 8- Automatic Backwash Strainer
- 9- Air Eliminator
- 10-Flow Switch
- 11-High Frequency Pulse Generator
- 12-Master Meter Prover Package**
- 13-Inflation Pump
- 14-Removal Tools
- 15-Static Mixer

## **TABLE OF CONTENT**

- 1) INTRODUCTION**
- 2) SCOPE OF MANUAL**
- 3) DEFINITIONS**
- 4) REFERENCED CODE AND STANDARDS**
- 5) BASE OF DESIGN**
- 6) MASTER METER/PROVER PACKAGE TECHNICAL SPECIFICATION**
- 7) EQUIPMENT LIST**
- 8) MASTER METER / PROVER GENERAL DESCRIPTION**
- 9) OPERATING CONDITION**
- 10) ELECTRICAL POWER**
- 11) MASTER METER / PROVER PROCESS DESCRIPTION**
- 12) CONTROL SYSTEM BLOCK DIAGRAM**
- 13) MASTER PROVER SIZE AND LENGTH CALCULATION**
- 14) MASTER PROVER CALCULATION DATA**
- 15) P&ID**
- 16) PIPING LAYOUT**
- 17) EQUIPMENT SPECIFICATION**
  - 17.1) PRESSURE TRANSMITTER
  - 17.2) TEMPERATURE TRANSMITTER
  - 17.3) PRESSURE GAUGE STRAINER
  - 17.4) TEMPERATURE GAUGE
  - 17.5) BI-DIRECTIONAL 10" PROVER

17.5.1) 4 WAY VALVE

17.5.2) QUICK OPENING CLOUSERE

17.5.3) LOCAL CONTROL PANEL

17.5.4) DETECTOR SWITCH

17.5.5) PROVER SPHERE

17.5.6) REMOVAL TOOL

17.5.7) INFLATATION PUMP

**18) PD METER**

**19) DOUBLE BLOCK AND BLEED BALL VALVE**

**20) BASKET TYPE STRAINER**

**21) ELECTRO PUMP**

21.1) PUMP

21.2) ELECTRO MPTOR

**22) PLC**

**23) MONITORING SYSTEM**

**24) GLOBE L VALVE**

**25) VENDOR LIST**

**26) MATERIALS OF CONSTRUCTION**

26.1. SKID

26.2. PIPING

26.3. ELECTRICAL

26.3.1. JUNCTION BOX

25.3.2. CABLE TRAY

26.3.3. GLAND

26.3.4. CABLES

**27) WELDING**

**28) SURFACE PREPARATION AND PAINTING**

**29) INSPECTION AND TESTING**

29.1. GENERAL

29.1.1. INSPECTION AND TEST PROCEDURE

29.1.2. HYDROSTATIC TESTING

**30) FACTORY ACCEPTANCE TEST**

30.1) WATER DRAW OF PROVER

30.2. FUNCTION TEST OF PD FLOW METER

30.3. REVIEW OF DOCUMENTATION

30.4. VISUAL / DIMENSIONAL CHECK

30.5 FUNCTIONAL TEST

30.6. VALVES

30.7. GAUGES

**31) PRECOMMISSIONING / COMMISSIONING AND START UP**

**32) DOCUMENTATION**

**33) TRAINING**

**SPARE PARTS**

## **1) INTRODUCTION**

Tehran Resvan Gostar (T.R.G.) engineering company established in 1996 as EPC contractor The Major aim of this company is Designing , Manufacturing of metering and proving system and also relative equipments and Spare parts. Here in is the manuals of Master Meter/Prover Package Which Tehran Resvan Gostar (T.R.G.) engineering company implements it in order to calibrate a master meter which will be utilizing as measurement reference for calibrating of main provers in metering stations of oil products. Main provers are used in different metering categories depending on its application. The facility include a 10” Bi-Directional Pipe Prover as a Master Prover , 4” PD Meter as a Master Meter along with a Electro Pump and Reservior Tank . This Package will be used for calibrating specially big size of Bi-Directional and Uni-Directional Pipe Prover which doing their calibration by using Water Draw Package is imposible or takes a long time .

## **2) SCOPE OF DOCUMENT**

This Manual specifies basis of design and construction of the Master Meter/Prover Package. This Manual contains Operation and Maintenance instruction. The Operation Manual is intended to familiarize operators and maintenance personal with the various elements of Master Meter/Prover Package, and to explain the functional inter-relationship between the major Package elements. In addition the manual provides detaled instructions for operation of the Package and for interpretation of the Package the data and information of Master Meter/Prover Package which is Designed and Manufactured by TRG Co. The Maintenance Manual is intended for use by personal responsible for maintenance of the above mentioned Package.

## **3) DEFINITIONS**

Within the context of this document the following words shall mean:

- a) "Must" or "shall"-a mandatory requirement for which exceptions will not normally be granted.
- b) "Should" -a preferred course of action for which exceptions will be granted for a superior course of action.
- c) "May" -an acceptable course of action for which exceptions will be granted for equal or better course of action.
- d) "Client" -Means Iranian Oil Terminals Company (I.O.T.C.) having its Head Office at Arjantin Sq. -Tehran - Iran.
- e) " Vendor"-Means Tehran Resvan Gostar (T.R.G.) engineering company having its Head Office at No. 311, Kargar Shomali Street, Tehran - Iran.
- f) Main prover” – end users prover which require to be calibrated by means of one of existing methods such as water draw or Master Meter (master meter is used when water draw is time consuming and / or impractical).

- g) “Master Meter” – one PD meter which is used as reference for calibrating of a Main Prover and will be proved by help one Master Prover.
- h) “Master prover” – is used to prove a Master Meter.

#### **4) REFERENCED CODES AND STANDARDS**

The design, manufacture and construction performed by TRG Co. are in accordance with the industry codes and standards referenced and/or applicable are listed below. The latest revision number and/or date of each referenced industry codes or standards are applicable in effect at the start of the project. Any subsequent change shall be revised for further impact:

- 4.1) Manual of Petroleum Measurement Standards Chapter 12-Calculation of Petroleum Quantities -
  - Section2 , Part 4-Calculation of Base Prover Volume by Waterdrw Method
  - Section2 , Part 5-Calculation of Base Prover Volume by Master Meter Method
- 4.2) API-MPMS 4, Chapter 4 - Proving Systems
  - Section9, Part 1 - Introduction to the Determination of the Volume of Displacement and Tank Provers
  - Section9, Part 2 - Determination of the Volume of Displacement and Tank Provers by the Waterdraw Method of Calibration
- 4.3) API -MPMS 5.1, Chapter 5 - Liquid Metering
  - Section 1, General Considerations for Measurements by Meters
- 4.4) API-MPMS 5.3, Chapter 5 - Liquid Metering
  - Section 2 - Measurement of Liquid Hydrocarbons by Displacement Meters
  - Section 3 - Measurement of Liquid Hydrocarbons by Turbine Meters
- 4.5) API-MPMS 18, Chapter 1 8 - Custody Transfer
- 4.6) API-MPMS 21, Chapter 21 - Flow Measurement Using Electronic Metering Systems
- 4.7) API-RP-500, Recommended Practice for Classification of Locations for Electrical Installations in Petroleum Refineries
- 4.8) API-RP-500, Classification of Hazardous Area
- 4.9) API RP 521 Guide for Pressure relief and depressuring systems
- 4.10) API-RP-540, Electrical Installations in Petroleum Processing Plants
- 4.11) API-RP-551, Process Measurement Instrumentation

- 4.12) API-RP-554, Process Instrumentation and Control
- 4.13) Manual of Petroleum Measurement Standards Chapter 4 – Proving System
  - Section 9—Methods of Calibration for Displacement and Volumetric Tank Provers
  - Part 2—Determination of the Volume of Displacement and Tank Provers by the Waterdraw Method of Calibration
- 4.14) Manual of Petroleum Measurement Standards Chapter 7-Temperature
- 4.15) Manual of Petroleum Measurement Standards Chapter 21.2- Calculation of Petroleum quantities Flow Measurement – Electronic Liquid Measurement
- 4.16) ASME/ANSI, B16.5 Pipe Flange and Flanged Fittings
- 4.17) ASME/ANSI, B31.3 , B31.4 Refinery (Mechanical Design)
- 4.18) IEC 60079, Electrical Apparatus for Explosive Gas Atmosphere
- 4.19) IEC 600529, Degrees of Protection Provided by Enclosure (IP code)
- 4.20) NACE MR 01-75, Sulfide Stress Cracking Resistance Metallic Material for Oil Field Equipment

## **5) BASE OF DESIGN**

Designing and Construction of the Master Prover are as per following Standard and Procedure:

### **5.1) Design and Construction:**

API Manual of Petroleum Measurement Standards, Chapter 4 Proving Systems, ASME/ANSI B31.4, ASME/ANSI B31.3, or ASME Section VIII.

### **5.2) Radiography:**

Spot or 100% in accordance with API 1104.

### **5.3) Hydrotest:**

1.5 times design pressure with chart recording as per ASME/ANSI 31.4

### **5.4) Inspection Flanges:**

Match bored, dowel pinned and O-ring groove for metal to metal seat.

### **5.5) Materials:**

Pipe - ASTM A-106/53-Gr B seamless  
Flanges and threaded fittings – ASTM A-105  
Weld fittings - ASTM A-234 WPB  
Studs - ASTM A-193-B7  
Nuts - ASTM A-194-2H  
Gaskets - Spiralwound, 304SS

-Rings – Viton

**5.6) Calibration:**

Water draw method, repeatability within 0.02 percent per API Chapter 4.9.2, Chapter 12.2.4

Chapter 12, Section 2.

**5.7) Internal Coating:**

Sandblast to white metal and 5 to 7 mils epoxy .

**5.8) External Coating:**

Sandblast to white metal and one coat zinc chromate primer.

**5.9) Standard Equipment and Trim:**

Four way diverter valve with Viton seals and Leak detection pressure switch

Detector switches – TRG-300S SS

Construction with Viton seals

Valve actuator – Hydraulic type

Sphere - Inflatable Nitrile with Accessories (pump and sizing ring)

Quick opening closure, hinged type

Thermometers - mercury in glass with 0.10°C divisions and SS thermo wells

Pressure gauges 1PSI divisions with isolation valves

Pressure relief valve

Vent Needle valves

Drain Ball valves

Semi-skid beam supports



**6) MASTER METER/PROVER PACKAGE TECHNICAL SPECIFICATION**

**6.1) GENERAL INFORMATION**

1	TAG NO.	:	<i>MM-100</i>
2	PRODUCT DESCRIPTION	:	<i>Master Meter/Prover</i>
3	MANUFACTURE / MODEL	:	<i>Tehran Rezvan Gostar Engineering Co. / TRG-05-92-10-B</i>
4	PROVER SIZE / PRESS. CLASS	:	<i>10 INCH / 150#</i>
5	INLET / OUTLET CONNECTION	:	<i>4 INCH / 4 INCH</i>
6	APPLICATION	:	<i>Prover and Meter Calibration</i>
7	AREA CLASSIFICATION	:	<i>Class 1, Div 2, Gas Group IIB, Temp. Class T3</i>

**6.2) OPERATING CONDITION**

8	FLUID	:	<i>Gas Oil ( Oil Products)</i>
9	FLOW RATE (Min._Norm._Max)	:	<i>28 _ 80 _ 100</i> <i>M3/h</i>
10	OPERATING PRESS. (Min._Norm._Max)	:	<i>2.5 _ 3 _ 3.5</i> <i>barg</i>
11	OPERATING TEMP. (Min._Norm._Max)	:	<i>5 _ 35 _ 50</i> <i>°C</i>
12	DENSITY (Min._Max)	:	<i>700 _ 1000</i> <i>Kg/M3</i>
13	VISCOSITY @ 37.8 °C	:	<i>2.0 ~ 5.5</i> <i>C.St</i>
14	RELATIVE HUMIDITY (Max.)	:	<i>0.9</i>

**6.3) PROVER CONSTRUCTION & DESIGN**

15	TYPE	:	<i>Bi-Directional Scorpion Type Pipe Prover</i>
16	MANUFACTURE / MODEL	:	<i>Tehran Rezvan Gostar Engineering Co. / TRG-05-92-10-B</i>
17	DESIGN AND CONSTRUCTION	:	<i>API Manual of Petroleum Measurement Standards,, Chapter 4.2 Proving Systems, ASME/ANSI B31.4, ASME/ANSI B31.3.</i>
9	DESIGN FLOW RATE (Min._Norm._Max)	:	<i>28 _ 80 _ 100</i> <i>M3/h</i>
18	DESIGN PRESURE	:	<i>18.7 Bar ( 275 PSI )</i>
19	DESIGN TEMPRATURE	:	<i>85 °C</i>
12	DENSITY (Min._Max)	:	<i>700 _ 1000</i> <i>Kg/M3</i>
13	VISCOSITY @ 37.8 °C	:	<i>2.0 ~ 5.5</i> <i>C.St</i>
20	PROVER LOOP SIZE / PRESS. CLASS	:	<i>10", 150 #</i>
21	PROVER CHAMBER SIZE / PRESS. CLASS	:	<i>14", 150 #</i>
22	BASE VOLUME	:	<i>1000 Liter</i>
23	FLANGE CONNECTIONS INLET/OUTLET	:	<i>4", 150 # RF, ANSI B16.5 ,125-250 AARH</i>
24	4WAY VALVE MANUFACTURE / MODEL	:	<i>TRG Co. / TB46-121H22 With Leack Detection System</i>
25	4WAY VALVE SIZE / ACTUATOR	:	<i>4" / Hydraulic Type</i>
26	4WAY VALVE TRANSIANT TIME	:	<i>4.3 Sec.</i>
27	DETECTOR SWITCH MFR. /MODEL	:	<i>Tehran Rezvan Gostar Engineering Co. / TRG-300S</i>
28	No.OF DETECTOR SWITCH /REPEATABILITY	:	<i>2 No. / 0.0005"</i>

29	MAIN POWER SUPPLY	: 400 Vac/ 18A / 3 Phase
30	DIMENSION L x W x H	: 5200mm x 1550 mm x 1950 mm
31	WIEGHT	: 3900 Kg

**6.4) FLOW METER**

32	TYPE	: Positive Displacement
33	MANUFACTURER / MODEL	: FMC / F4-S1
34	CONNECTION SIZE / PRESS CLASS	: 4" / 150# ANSI B16.5 RF
35	MAXIMUM FLOW RATE	: 100 m3/h ( 1666 L/Min )
36	K FACTOR	: 100 Pulse / Liter
37	LOCAL COUNTER	: Mech.Counter Series 600 in liter Totalizer 5 digit with reset+ 8 digit without reset
38	PULSE TRANSMITTER	: Dual Pulse Output High Frequency Pulse Resolution
39	FLOW INDICATOR	: Mechanical Type

**6.5) ELECTRO PUMP CONSTRUCTION**

40	ELECTRO MOTOR	: 15 KW / 3 Phase 400 Vac / 28A / 2925 RPM / Type ASA160MB-2
41	MOTOR PROTECTION	: Exd e IIC T4
42	PUMP MAXIMUM FLOW RATE	: 100 m3/h@30m head ~ 40 m3/h@42.5 m head
43	PUMP MAXIMUM pressure	: 4.25 barG
44	PUMP TYPE&MODEL/SEALING TYPE &MODEL	: Centrifugal - 65 – 200 / Mechanical model MG1 mfr. Eagleburgmann

**6.6) RESERVIOR TANK**

45	DIMENSION L x W x H	: 2000 mm x 835mm x 1300mm
46	VOLUME	: 2171 Liter
47	MATERIAL	: Carbon Steel
48	SERVICE	: Gas Oil (Oil Products)

**6.7) STRAINER**

49	TYPE	: Basket Type
50	CONNECTION SIZE / PRESS CLASS	: 4" / 150# ANSI B16.5 RF
51	DOOR TYPE	: Quick Opening Type
52	BASKET MATERIAL / MESH SIZE	: Stainless Steel 304 / 80
53	SERVICE	: Gas Oil (Oil Products)

**6.8) CONTROL & MONITORING**

54	CONTROL UNIT	: PLC 300 SERIES SIEMENS
55	MONITORING	: Removable LAPTOP
54	CONTROL SOFTWARE	: STEP 7 ( Siemens )
56	MONITORING SOFTWARE	: Wincc ( Siemens )

**6.9) LEVELING SYSTEM**

57	MECHANICAL GEAR JACK	: 4 x 3 ton
58	WHEEL	: 4 x 200mm OD
59	LIFTING LOG	: 4 X No.

**7) EQUIPMENT LIST**

Item No.	Tag No.	Service	Component Function	Size	QTY	Vendor
1	HOV-101	Prover By-Pass	Hand Operated DBB Ball Valve	4"	1	Vastas
2	HOV-102	Prover Inlet	Hand Operated DBB Ball Valve	4"	1	Vastas
3	HOV-103	Prover Outlet	Hand Operated DBB Ball Valve	4"	1	Vastas
4	HOV-104	Prover Outlet to TK-101	Hand Operated DBB Ball Valve	3"	1	Vastas
5	HOV-105	Master Prover Package Outlet	Hand Operated DBB Ball Valve	3"	1	Vastas
6	HOV-106	TK-101 to P-101	Hand Operated DBB Ball Valve	3"	1	Vastas
7	HOV-107	Master Prover Package Inlet to P-101 / TK-101	Hand Operated DBB Ball Valve	3"	1	Vastas
8	HOV-108	Master Prover Package Inlet to STR-101	Hand Operated DBB Ball Valve	3"	1	Vastas
9	HOV-109	P-101 to STR-101	Hand Operated DBB Ball Valve	3"	1	Vastas
10	HOV-110	P-101 TO TK-101	Hand Operated Globe Valve	2"	1	Nipon
11	HOV-111	Prover Inlet from Water Draw Package	Hand Operated DBB Ball Valve	2"	1	Nipon
12	HOV-112	Prover Outlet to Water Draw Package	Hand Operated DBB Ball Valve	2"	1	Nipon
13	PR-101	Prover	Bi-Directional Pipe Prover	10"	1	TRG
14	4WAY-101	Prover	4Way Diverter Valve with Hydraulic Actuator	4"	1	TRG
15	DS-101	Prover	Detector Switch model TRG-300S	1 1/2"	1	TRG
16	DS-102	Prover	Detector Switch model TRG-300S	1 1/2"	1	TRG
17	NA	Prover Home Chamber	Quick Opening Door size 14"	14"	1	TRG
18	NA	Prover Away Chamber	Quick Opening Door size 14"	14"	1	TRG
19	NA	Prover Skid	Metallic Wheel	10"	4	
20	NA	Prover Skid	Gear Operated Jack - each s 3000 Kg	NA	4	HANG ZHOU HENG-LI
21	NA	Prover Drain / Vent	Drain Box	1/2"	1	TRG
22	NA	Prover Drain / Vent	Needle Valve 1/2" Male x 1/2" Female	1/2"	7	Vee-Lock
23	NA	Prover Drain	Ball Valve 1" flange type 150#RF	1"	2	Alfa
24	NA	Prover Chamber Vent	Flexible Hose size 1/2" for chamber vent	1/2"	2	TRG
25	NA	Package	Skid	NA	1	TRG
26	STR-101	Prover	Strainer Basket type 150#RF	4"	1	TRG
27	PDM-101	Master Meter	PD Master Meter flange type 150#RF	4"	1	FMC
28	P-101	Circulation	Electro Pump	3"	1	UMEB
29	TK-101	Master Meter /Prover Package	Reservoir/Circulating Tank	2171L	1	TRG

**7.1) DETAIL EQUIPMENT &PART LIST**

- 7.1) 1 off 4Way Diverter Valve size 4" with Hydraulic Actuator
- 7.2) 1 off Hydraulic Power Pack
- 7.3) 2 off Detector Switch model TRG-300S
- 7.4) 2 off Quick Opening Door size 14"
- 7.5) 1 off Safety Valve 1/2" x 3/4"
- 7.6) 4 off Lifting Log
- 7.7) 4 off metallic wheel
- 7.8) 4 off Gear Operated Jack - each capacity is 3000 Kg for Leveling
- 7.9) 1 off Drain Box
- 7.10) 5 off Needle Valve 1/2" Male x 1/2" Female SS for Drain / Vent
- 7.11) 2 off Ball Valve 1" flange type 150#RF
- 7.12) 2 off Flexible Hose size 1/4" for chamber vent
- 7.13) 1 off H Beam Skid
- 7.14) 2 off Pipe size 14" SCH STD- ASTM A-106 Gr B Seamless
- 7.15) 5 off Pipe size 10" SCH STD - ASTM A-106 Gr B Seamless
- 7.16) 2 off Long Elbow size SCH STD 10"180°- ASTM A-234 WPB
- 7.17) 4 off Long Elbow size SCH STD 10" 90°- ASTM A-234 WPB
- 7.18) 20 off Flange size 10" 150# RF- ASTM A-105
- 7.18) 26 off Flange size 4" 150# RF -ASTM A-105
- 7.19) 18 off Long Elbow 90°- ASTM A-234 WPB size 4"
- 7.20) 3 off DBB Ball Valve size 4" flange type 150#RF
- 7.21) 6 off DBB Ball Valve size 3" flange type 150#RF
- 7.22) 1 off Globe Valve size 2" flange type 150#RF
- 7.23) 2 off Ball Valve size 2" flange type 150#RF
- 7.24) 1 off Strainer Basket type size 4" 150#RF with Quick Opening Door
- 7.25) 1 off PD Master Meter size 4" flange type 150#RF with Pulse Transmitter
- 7.26) 1 off Circulation Pump 4" in x 4" out 150#RF with Exd electro motor
- 7.27) 1 off 2171L Reservoir/Circulating Tank
- 7.28) 1 off Electrical Junction Box Exd type
- 7.29) 1 off Control Junction Box Exd type
- 7.30) 2 off Electrical Termination Box Exd type
- 7.31) 1 off Notebook with relative software as a Operator Station
- 7.32) 3 off Temperature Transmitter
- 7.33) 3 off Pressure Transmitter

## 8) MASTER METER / PROVER GENERAL DESCRIPTION

For fiscal and custody transfer applications, field provers are transfer standards which are used to calibrate flowmeters. The purpose of calibrating a field prover is to determine its base volume at reference conditions.

The base volume of a prover may be determined by one of two methods-water draw or master meter. The master meter method refers to a volumetric calibration procedure whereby the base volume of a displacement prover is determined by using a master meter. The Field Prover to be calibrated is piped in series with the master meter and the master prover. The master prover shall have been previously calibrated by the water draw method. Liquid is then passed through all three devices and the volume determined from the master meter, corrected to reference conditions, is regarded as the reference volume. The volume of liquid collected is then corrected for pressure and or temperature differences between the test volume and the master meter. The corrected volume is then designated the base volume of the Field Prover.

Here is a Portable Skid mounted Mster Meter/Prover Package and consists of the following main components described by means of the relevant drawings.

### a) **Master Prover**

The Master Prover is a 10" Scorpion type Bi-Directional Pipe Prover .it has two 14" chamber that is equipped with Hing Type Quick Cluser and 10" Calibration loop .The overall dimensions are L(5200mm)Xw(1550mm) x H(1950mm) . the Base Volume of prover is 1000 Liter .

The Hydraulic 4Way Valve size 4" is used for diverting the flow from one chamber to the other chamber and sealing inside the valve is done by using Inflatable Seal . This valve is equipped with pressure switch for leak detection of the valve. The transient time of the 4Way Valve is about 4.3 Secound which is too fast regarding to the other type .The 4way valve is also Manufactured by TRG Co. and its model is TB46-121H22. One of the other important equipment in Master prover is Detector Switch. The detector model is TRG-300S which is also manufactured by TRG Co.

### b) **Master Meter**

A PD Meter of FMC with the model no. of **F4-S1** is used as a **Master Meter**. The size of meter is 4" with 1666 L/min as maximum flow rate .The meter has a master meter clarence and its K factor is 100P/L .The Master Meter repeatability is better than 0.02% in 5 Run by the Master Prover. The accuracy of master meter is 0.1% .

### c) **ELECTRO PUMP**

#### c-1) **PUMP**

manufacture: Pump Iran	Type: 65 – 200
Inlet/Outlet :	80, RF, ISO # / 65, RF, ISO#
Capacity:	40 m3/h @ head: 42.5 m ~ 100 m3/h @ head: 30 m
Shaft material:	Steel St 60-2
Impeller material / Diameter:	Bronze/180 mm
RPM : 2900	

**ELCTRO MOTOR:**

manufacture: UMEB  
 Ingress Protection : IP55 SF 1 INS.CL.F  
 Power Supply : 400 VAC , 50 HZ , 28 A  
 RPM : 2925  
 Sealing : Mechincal Seal /Manufacture: Eagleburgmann / Model: MG1 TYPE:65-200

Type :ASA 160 MB-2  
 Classification : Exd e IIC T4  
 Power consumption : 15 KW

**d) RESERVIOR TANK**

VOLUME : L(2000mm)xw(835mm)XT(1300mm) – **2171 Liter**  
 Thikness : 3mm  
 Material : Carbon Steel

**e) PLC CONTROL PANEL**

The Control Box consist of PLC 300 Series from Siemens which recived data including temperature and pressure of PD Meter and inlet/Outlet of prover . By using STEP 7 , Wincc from Siemens PLC of control box can control the Package and also doing all calculation as per relative API standards Manual of Petroleum Measurement . the control box is connected to Notebook for visual moitoring and control and save and print the result and reports. Proving the PD Meter and main Prover can be done manually or Automatically.All valves on the package are hand operated .

**9) OPERATING CONDITIONS**

Item	Feed	Min.	Normal	Max.	Remarks
1	Flow rate (m3/h)	28	80	100	Liquids (Oil Products)
2	Pressure (Barg)	2.3	3	3.5	Design Pressure 18.5 (Barg)
3	Temprature(°C)	5	30	55	Design Temp. 85 (°C)
4	Density	700	-	1000	Kg/m3
5	Viscosity (Cp)	2.0 – 5.5 C.St			@ 37.8 °C

**10) ELECTRICAL POWER**

Item	Voltage level	No of phase	Frequency	Required power	Remarks
1	230 VAC	1	50 HZ	1 KW (approx.)	Non UPS
2	400 VAC	3	50 HZ	1 KW	Non UPS

**11) PIPING LAYOUT**

