

**PETRA DEVELOPMENT AND TOURISM REGION AUTHORITY  
(PDTRA)**



**سلطة إقليم البترا التنموي السياحي**

**شراء وتوريد وحده حلقيه ووحدات قياس ضغط متوسط**

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**RFP Ref. 2/2013**

**Deadline: 13 /2/2013**

## نموذج كتاب عرض المناقصة

### Letter of Tender

المشروع : ..... العطاء رقم : .....

إلى السادة (صاحب العمل) : .....  
لقد قمنا بزيارة الموقع والتعرف على الظروف المحيطة به، كما قمنا بدراسة شروط العقد، والمواصفات، والمخططات، وجداول الكميات، وملحق عرض المناقصة، والجداول الأخرى، وملحق العطاء ذات الأرقام:..... المتعلقة بتنفيذ أشغال المشروع المذكور أعلاه. ونعرض نحن الموقعين أدناه أن نقوم بتنفيذ الأشغال وإنجازها وتسليمها وإصلاح أية عيوب فيها وفقا لهذا العرض الذي يشمل كل هذه الوثائق المدرجة أعلاه مقابل مبلغ إجمالي وقدره:..... أو أي مبلغ آخر يصبح مستحقا لنا بموجب شروط العقد.

إننا نقبل تعيين "مجلس فض الخلافات" بموجب "الفصل العشرين" من شروط العقد وسوف نقوم بالاتفاق على تعيين أعضائه حسب ملحق عرض المناقصة.

نوافق على الالتزام بعرض المناقصة هذا لمدة (٩٠) يوما من تاريخ إيداع العروض، وأن يبقى العرض ملزما لنا، ويمكنكم قبوله في أي وقت قبل انقضاء مدة الالتزام هذه. كما نقر بأن ملحق عرض المناقصة يشكل جزءا لا يتجزأ من "كتاب عرض المناقصة".

نتعهد في حالة قبول عرضنا، أن نقدم ضمان الأداء المطلوب بموجب المادة (٢/٤) من شروط العقد، وأن نباشر العمل بتاريخ أمر المباشرة، وأن ننجز الأشغال ونسلمها ونصلح أية عيوب فيها وفقا لمتطلبات ووثائق العقد خلال "مدة الإنجاز".

وما لم يتم إعداد وتوقيع اتفاقية العقد فيما بيننا، وإلى أن يتم ذلك، فإن "كتاب عرض المناقصة" هذا مع "كتاب القبول أو قرار الإحالة" الذي تصدرونه يعتبر عقدا ملزما فيما بيننا .

ونعلم كذلك بأنكم غير ملزمين بقبول أقل العروض قيمة أو أي من العروض التي تقدم إليكم.

حرر هذا العرض في اليوم: ..... من شهر: ..... عام: .....

توقيع المناقص: ..... شاهد: .....

## ملحق عرض المناقصة

	رقم المادة	البيان
اسم صاحب العمل:	٢/٢/١/١	سلطة اقليم البترا التنموي السياحي
عنوانه:	٣/١ و	البترا - الاردن ص ب ( ٢٨ )
اسم المهندس :	٤/٢/١/١	
عنوانه:		
اسم المقاول:	٣/٢/١/١	
عنوانه:	٣/١ و	
كفالة المناقصة	التعليمات	( ٥% ) من قيمة دخول العطاء
كفالة اصلاح العيوب	التعليمات	( ١٠% ) من قيمة العقد
مدة الإنجاز للأشغال	٣/٣/١/١	( ١٠٥ ) يوما تقويميا من تاريخ أمر المباشرة
فترة الإشعار بإصلاح العيوب	٧/٣/١/١	( ٣٦٥ ) يوما تقويميا
القانون الذي يحكم العقد	٤/١	القوانين الأردنية السارية المفعول
اللغة المعتمدة في العقد	٤/١	اللغة العربية
لغة الاتصال	٤/١	اللغة العربية
المدة التي سيمنح فيها المقاول حق الدخول إلى الموقع	١/٢	(٧) أيام تقويمية من تاريخ أمر المباشرة
قيمة ضمان الأداء	٢/٤	( ١٠% ) من "قيمة العقد المقبولة"
قيمة ضمان الأداء خلال فترة الإشعار بإصلاح العيوب (ضمان اصلاح العيوب)		( - % ) من قيمة العقد

مطلوب	٩/٤	نظام توكيد الجودة
	٥/٦	أوقات العمل المعتادة
(١٥) يوما، وتعتبر هذه الفترة مشمولة ضمن مدة الإنجاز	١/٨	الفترة المحددة لمباشرة العمل بعد التاريخ المحدد للمباشرة
( ٥٠ ) دينار عن كل يوم تأخير	٧/٨	قيمة تعويضات التأخير
جمعية المحكمين الأردنيين	٣/٢٠	الجهة التي تعين أعضاء مجلس فضّ الخلافات

## نموذج كفالة المناقصة

### Form of Tender Guarantee

المشروع: ..... العطاء رقم: .....

إلى السادة (صاحب العمل): ..... لقد تم  
إعلامنا أن المناقص: شركة: ..... سيتقدم بعرض  
للمناقصة للمشروع المنوه عنه أعلاه استجابة لدعوة العطاء، ولما كانت شروط العطاء تنص على أن يتقدم المناقص  
بكفالة مناقصة مع عرضه، وبناء على طلبه، فإن مصرفنا:  
بنك ..... يكفل بتعهد لا رجعة عنه أن يدفع لكم مبلغ:  
..... عند ورود أول طلب خطي منكم وبحيث يتضمن الطلب ما  
يلي:

- أ - أن المناقص، بدون موافقة منكم، قام بسحب عرضه بعد انقضاء آخر موعد لتقديم العروض أو قبل انقضاء  
صلاحية العرض المحددة بـ (٩٠) يوماً، أو
- ب- أنكم قد قمتم بإحالة العطاء عليه، ولكنه أخفق في إبرام اتفاقية العقد بموجب المادة (٦/١) من شروط العقد،  
أو
- ج- أنكم قد قمتم بإحالة العطاء عليه، ولكنه أخفق في تقديم ضمان الأداء بموجب المادة (٢/٤) من شروط  
العقد.

وعلى أن يصلنا الطلب قبل انقضاء مدة صلاحية الكفالة البالغة (٩٠) يوماً وينعين إعادتها إلينا، كما أن هذه الكفالة  
تحكمها القوانين المعمول بها في الأردن.

توقيع الكفيل / البنك: .....

المفوض بالتوقيع: .....

التاريخ: .....

## نموذج اتفاقية العقد

### Form of Contract Agreement

المشروع: توريد وشراء وحده حلقيه ووحدات قياس العطاء رقم: لوازم ٢٠١٣/٢

حررت هذه الاتفاقية في هذا اليوم ..... من شهر ..... لسنة ٢٠١٣..

بين

صاحب العمل .....سلطة إقليم البترا التنموي السياحي .. على اعتباره "الفريق الأول"

و

المورد ..... على اعتباره "الفريق الثاني"

لما كان صاحب العمل راغبا في أن يقوم المقاول بتنفيذ أشغال مشروع: .....  
ولما كان قد قبل بعرض المناقصة الذي تقدم به المقاول لتنفيذ الأشغال وإنجازها وإصلاح أية عيوب فيها  
وتسليمها وفقا لشروط العقد،

فقد تم الاتفاق بين الفريقين على ما يلي:

١ - يكون للكلمات والتعابير الواردة في هذه الاتفاقية نفس المعاني المحددة لها في شروط العقد المشار إليها فيما بعد.

٢ - تعتبر الوثائق المدرجة تاليا جزءا لا يتجزأ من هذه الاتفاقية وتتم قراءتها وتفسيرها بهذه الصورة:

- أ - "كتاب القبول" .....
- ب - "كتاب عرض المناقصة" .....
- ج - ملاحق المناقصة ذات الأرقام: .....
- د - شروط العقد (الخاصة والعامة)
- هـ - المواصفات وكما هو وارد في نموذج استدرج العروض المرفق بطيه .

و - المخططات

ز - والجداول المسعرة (جداول الكميات والجداول الأخرى)

٣ - "قيمة العقد المقبولة" ( )

"مدة الإنجاز" ( ) يوما تقويميا

٤ - إزاء قيام صاحب العمل بدفع الدفعات المستحقة للمقاول وفقا للشروط، يتعهد المقاول بتنفيذ الأشغال وإنجازها وإصلاح أية عيوب فيها وتسليمها وفقا لأحكام العقد.

٥ - إزاء قيام المقاول بتنفيذ الأشغال وإنجازها وإصلاح أية عيوب فيها وتسليمها، يتعهد صاحب العمل بأن يدفع إلى المقاول قيمة العقد بموجب أحكام العقد في المواعيد وبالأسلوب المحدد في العقد.

وبناء على ما تقدم فقد اتفق الفريقان على إبرام هذه الاتفاقية وتوقيعها في الموعد المحدد أعلاه وذلك وفقا للقوانين المعمول بها.

الفريق الأول (صاحب العمل)

الفريق الثاني (المقاول)

التوقيع: ..... التوقيع: .....

الاسم: ..... الاسم: .....

الوظيفة: ..... الوظيفة: .....

وقد شهد على ذلك: ..... وقد شهد على ذلك: .....

## نموذج كفالة المناقصة

### Form of Tender Guarantee

المشروع: ..... العطاء رقم: .....

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..... عند ورود أول طلب خطي منكم وبحيث يتضمن الطلب ما  
يلي:

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صلاحية العرض المحددة بـ (٩٠) يوماً، أو

ب- أنكم قد قمتم بإحالة العطاء عليه، ولكنه أخفق في إبرام اتفاقية العقد بموجب المادة (٦/١) من شروط العقد،  
أو

ج- أنكم قد قمتم بإحالة العطاء عليه، ولكنه أخفق في تقديم ضمان الأداء بموجب المادة (٢/٤) من شروط  
العقد.

وعلى أن يصلنا الطلب قبل انقضاء مدة صلاحية الكفالة البالغة (٩٠) يوماً ويتعين إعادتها إلينا، كما أن هذه الكفالة  
تحكمها القوانين المعمول بها في الأردن.

توقيع الكفيل / البنك: .....

المفوض بالتوقيع: .....

التاريخ: .....



## نموذج ضمان الأداء (كفالة حسن التنفيذ)

### Performance Guarantee

إلى السادة: .....

إعلامكم بأن مصرفنا: ..... قد كفل بكفالة

مالية، المقاول: .....

.....

بخصوص العطاء رقم ( / )

المتعلق بمشروع: ..... بمبلغ: ( )

..... دينار أردني

..... وذلك لضمان تنفيذ العطاء

المحال عليه حسب الشروط الواردة في وثائق عقد المقاول، وأنا نتعهد بأن

ندفع لكم - بمجرد ورود أول طلب خطي منكم المبلغ المذكور أو أي جزء تطلبونه منه بدون أي تحفظ أو شرط - مع

ذكر الأسباب الداعية لهذا الطلب بأن المقاول قد رفض أو أخفق في تنفيذ أي من التزاماته

بموجب العقد - وذلك بصرف النظر عن أي اعتراض أو مقاضاة من جانب المقاول على إجراء الدفع.

وتبقى هذه الكفالة سارية المفعول من تاريخ إصدارها ولحين تسلم الأشغال المنجزة بموجب العقد المحدد مبدئياً بتاريخ

..... شهر ..... من عام ..... ما لم يتم تمديدتها أو تجديدها بناء على

طلب صاحب العمل.

توقيع الكفيل / مصرف: .....

المفوض بالتوقيع: .....

التاريخ: .....

## شروط خاصة اضافيه

- ١- مرفق بالعرض كتاب دولة رئيس الوزراء بخصوص الاعفاء الجمركي والضريبي للمواد والمعدات المستخدمة في مشروع الطاقة المتجددة / البترا والذي هو منحة من شركة متسوبيشي اليابانية .
- ٢- يحق للسلطة استثناء اي بند بحسب ما تقتضيه الحاجة دون ابداء اي اسباب .
- ٣- هذا العطاء هو عمل مشترك مابين السلطة وشركة توزيع الكهرباء EDCO ويجب على المتقدم اعتماد جميع الفحوصات KEMA,CESIOC or IPH من قبل EDCO عند ايداع العروض او التعهد بذلك بعد اختيار العرض المتقدم .
- ٤- سوف يكون هنالك علامات تفضيليه للشركة التي تقوم بالتوريد خلال مدة اقل .
- ٥- العرض الفني المقدم يتم اعتماده من شركة EDCO .
- ٦- التوريد في متسودعات السلطة في البترا محافظة معان .
- ٧- تقدم السلطة المخاطبات اللازمة لمدير عام الجمارك بان تتعهد السلطة باستخدام جميع معدات العرض في مشروع الطاقة المتجددة / البترا .
- ٨- اي استفسارات ترسل بشكل خطي لقسم العطاءات في السلطة على الايميل التالي :  
( [n.erawadieh@pra.gov.jo](mailto:n.erawadieh@pra.gov.jo) ) او هاتف رقم ( ٠٧٩٥٥٩٣٧٠٥ )
- ٩- تقدم العروض بالظرف المختوم في صندوق العطاءات لدى السلطة في مدينة البترا محافظة معان خلال المدة الذي تحدد في اعلان استدراج العروض .
- ١٠- يحق للسلطة الغاء العطاء دون ابداء الاسباب .
- ١١- يحق للسلطة زيادة او نقصان العطاء بنسبة ٢٥% وبنفس الاسعار الوارده .

**Technical Specifications**  
**Of**  
**“33 kV RMUs”**

## SECTION 1

### Electrical Design Data

#### System Particulars

Nominal system voltage	KV	33	11
Highest system voltage	KV	36	12
System fault level for (3)second	KA	16	20
Earthing system		Solidly Earthed	Solidly Earthed
System Frequency	HZ	50	50

#### Equipment Withstand Voltages

Nominal system voltage	KV	33	11
Impulse Withstand voltage (1.2/50 $\mu$ s wave)peak	KV	170	75
Power frequency withstand voltage	KV	70	28

## Outdoor Bushings

Nominal system voltage between phases	KV	33	11
Minimum total creepage distance	mm	1152	384

## Cable Box Clearances

The minimum cable box clearances under compound or fluid shall be as follows:

Nominal system voltage between phases	KV	33	11	Below 1 KV
Minimum clearance between phases	mm	135	45	20
Minimum clearance phase to earth	mm	96	32	20

The minimum cable box clearance in air filled boxes, live metal to live metal & unshrouded shall be as follows:

Nominal system voltage between phases	KV	33	11
Minimum clearance between phases	mm	534	178
Minimum clearance phase to earth	mm	345	115

## SECTION 2

### OUTDOOR MV RING MAIN SWITCHGEAR

#### 1 Types of Switchgear

The switchgear to be offered by the Tenderer shall be of the metal enclosed type with IP54 as specified in Schedules and shall comply with the relevant IEC recommendation or equivalent national standard. The major IEC standards applicable are:

IEC 62271-200 Metal Enclosed Switchgear

IEC 62271-102 Disconnectors And Earthing Switches

IEC 62271-105 Switch fuse Combination

IEC 62271-103 Switches for Rated Voltages Above 1 kV and Less Than 52 kV

For the purpose of this specification a ring main unit shall consist of two fault making and load breaking fully rated circuit switches and a TEE-OFF unit consisting of fuse switch in one complete assembly. The Tee-OFF shall be used to control and protect distribution synthetic or other transformers up to 2000KVA.

Ring main units shall be extensible or non-extensible switchgear units as required in schedules. The switchgear shall be air or SF6 or vacuum insulated, liquid filled switchgear units are not required, it shall be motorized that operate with the AC volt motor/DC volt motor with charger.

The tenderer is required to offer both extensible and non-extensible types of switchgear unit assemblies in his tendered response (if required).

## **2 General Construction**

Non-extensible switchgear units shall preferably comprise of one complete modular unit. Extensible switchgear designs shall comprise of individual modular units. Either type unit provided shall be capable of being installed either indoors or outdoors.

The construction shall be robust and be designed to prevent the spreading of damage due to fire, short-circuit or other causes. Where SF6 is utilized as an insulant a pressure relief valve shall be installed to prevent an excessive build up of pressure in the event of an internal fault. The switchgear shall be designed to prevent accidental contact with live parts.

Tee-Off units shall be provided of the protection and isolation of 33/0.415KV and 11/0.415KV distribution transformers. The distribution transformers typically range in size from 100 to 2000KVA. The Tee-Off units shall comprise of a fuse switch. The time limited fuse shall be capable of being changed to various ratings to cover the different limited ratings of the transformer.

## **3 Ratings**

Each complete switchgear unit shall have short-circuited rating as specified in the Section (1) of this specification. The rated duration of short-circuit for the complete switchgear



equipment shall be (3) second at a current not less than the rated short-circuit capacity specified.

Switch disconnectors, fuse switches shall be capable of carrying continuously the rated current stated in below without overheating of the contacts or any current carrying part.

<b>Type</b>	<b>Rated Current</b>
Switch Disconnector	630 Amps
Tee-Off Fuse Switch	200 Amps

#### **4 Fuse Switch and Switch Disconnectors**

Fuse switch disconnectors shall be capable of making and breaking short circuit faults in accordance with the quantities, factors and service requirements specified in the relevant IEC recommendation or equivalent national standard. Each switch disconnector shall be capable of making short-circuit faults in accordance with the requirements of the relevant IEC recommendation or national standard and shall be capable of making and breaking full load currents.

Unless otherwise approved by a recognized independent testing authority, the manufacturer shall carry out in the presence of the Engineers the making and breaking type tests specified. The engineers may agree to the omission of these tests if the Contractor submits for approval satisfactory details of independently witnessed tests which have been carried out on this type of equipment under identical conditions as stated in this Specification.

## 5 Operating Mechanisms

### (a) General:

The operating mechanisms of all switchgear units shall be of the 'Independent Manual' type with a quick make and break feature, such that the operating speeds are independent of the operator. If springs are used for this purpose provision shall be made so that in the event of a spring breakage the mechanism can still be safely opened even if the quick break feature is lost. Spring breakage shall not prevent the mechanism from closing sufficiently to carry the rated current without overheating.

With SF6 insulated switchgear the operating mechanisms, where practicable, shall be mounted outside the SF6 tank.

Integral earthing arrangements shall be a feature of both fuse switch and switch disconnectors.

Earth switch ratings shall be as follows:

Type	Short Circuit Making Capacity	Short Time Current (3 Second)
Fuse Switch	5.4 KA	2.1KA
Switch Disconnectore	40 KA (Peak)	18 KA
Tee-Off Switch Disconnector	5.4 KA	2.1 KA

The operating mechanism shall be constructed so that it is not possible to change from the "ON" position to "EARTH" position without first moving to the "OFF" position and operating a mechanical interlock.

All operating handles shall be arranged for operation from the front of the ring main unit at a suitable height, and all indicators and instruction labels shall also be visible from the front of the unit.

(b) Fuse Switch Disconnectors

The fuse switch disconnector shall be of the trip-all phases type, such that operating of one of the three fuses disconnects all three phases by means of a striker pin arrangement. Operating of a fuse shall lock the fuse switch in the "OFF" position. The equipment shall be constructed so that it is not possible to open the fuse chamber door when the fuse switch is in the "ON" position. With the fuse switch in the "OFF" position and fuse chamber door "OPEN" it shall not be possible to "CLOSE" the fuse switch. It shall only be possible to close the fuse switch when the fuse chamber door is closed and secured.

Input terminals shall be provided to facilitate the externally tripping of the fuse switch from a pair of volt free contacts.

An integral earthing switch shall have a fault making capacity adequate for the transformer feed-back conditions.

(c) Switch Disconnectors

Each switch disconnector shall have three positions "ON", "OFF" and "EARTH". The integral earth switch shall have fully rated making capacity and interlocked cable testing facilities shall be provided for the ring cables.

(d) Indicators

Approved direct driven mechanically operated indicators shall be provided on all switchgear operating mechanisms to show whether the unit is in the "ON", "OFF" or "EARTH" positions.

## **6 Interlocking Gear**

Maintenance and safety interlocks shall be of the mechanical or key operated type and shall be provided to prevent the following operation:-

- (a) Isolation or selection of a circuit when a switch is closed. Attempted isolation or selection shall not trip the switch.
- (b) The closing of switches without the interlocking selectors correctly positioned for the proposed operation.
- (c) Access to circuit test connections without the circuit first being isolated and earthed.

When key interlocking is employed, any attempt to remove the trapped key shall not cause closing or opening of the associated equipment.

Where switchgear is fitted with means for mechanical or electrical operation, interlocks shall be provided so that it is impossible for the electrical and mechanical devices to operate simultaneously.

The earthing devices shall be provided with interlocks to ensure correct operation. Padlocking facilities shall be provided for the purpose of preventing inadvertent earthing.

## **7 Testing Facilities**

All switchgear units shall be provided with facilities to enable applied high voltage tests to be carried out on the units and associated H.V cabling.

To facilitate high voltage testing where access to busbar or circuit terminations is restricted, device shall be provided to extend the termination points to a readily accessible position.

## **8 Busbars**

Unless otherwise approved, shall be of electrolytic copper in the form of circular section rod or rectangular section strip. All conductors shall be kept as short and straight as possible and be adequately supported so as to prevent deflection, under rated short circuit conditions.

Each phase conductor of the primary busbars, including all through joint and tapping connections shall be spaced at such intervals to give the necessary clearance for the voltage rating.

Primary busbars, connections and their supports shall be of an approved type and shall be capable of carrying the short-time current associated with their short-circuit ratings for a period of (3) second.

Where busbar supports etc., use insulation of moulded or resin bonded material it shall have a durable anti-hygroscopic surface finish with high anti-tracking properties.

The connections from busbars in individual units shall have a continuous current rating of not less than that of the equipment comprising the unit.

At all points where connections or joints occur, the busbars and connecting pieces shall be tinned or silver-plated. The resistance of any length of conductor containing a joint shall not be greater than that of an equal length of conductor without a joint. Clamps, where used, shall be of high tensile steel.

Primary busbars and connections shall be clearly marked and shall be displaced for standard phase sequence Red (R), Yellow (Y), and Blue (B) or equivalent counting from front to rear, top to bottom or left to right as viewed from the switching device operating mechanism side. Busbars shall be readily extensible and on duplicate busbar equipment without shut-down of the complete switchboard or without taking existing circuits out of service.

The general construction and layout of the busbars, connections and supports shall be to Engineers' approval.

## **9 Padlocking**

If required by the Engineer, padlocking facilities, including padlocks with 8 mm hasps, shall be provided for fuse switches and switch disconnectors for locking the operating handles in the "ON", "OFF" or the "EARTH" positions.

Padlocking facilities shall also be made available on all selector and trip mechanisms and cubicle access doors.

Once locked-off unit shall be inoperable or accessible where cubicle access doors are installed.

## **10 Insulation and Shrouding**

Where busbar and live connections are contained in the same compartment as terminals for outgoing cable connections, the busbars and live connections shall be shrouded or insulated so as prevent accidental contact with live metal during cabling operations with equipment alive.

All switchgear unit shall have their live terminals fully shrouded so that where access is required as part of the normal operation of the switchgear accidental.

Contact with live metal is prevented. Typically, this shall be for H.V. fuse replacement or cable testing.

All insulation used in the switchgear construction shall be of approved grade and manufacture and be as stated in Schedule A.

For tropical use, suitable material shall be used and treated after all machining has been carried out, to exclude moisture and mould growth.



## **11 Cable Boxes**

Cable boxes where specified, shall be in accordance with BS 2562, or equivalent, be of approved design and fitted with glands suitable to receive the cables specified in Schedule A.

All cable termination boxes shall be of the dry type. The cable termination boxes shall be of an approved design and shall be suitable for satisfactory termination of 150 to 300 mm<sup>2</sup> Copper or Aluminum SWA XLPE or equivalent.

One set of compression tinned copper lugs suitable for the specified cables shall be supplied with each box.

Provision shall be made for earthing the body of each cable box. The terminals shall be marked in a clear and permanent manner.

The minimum clearances to earth and between phases shall be as specifies in Section 1.

All precautions necessary to permit the termination of XLPE or equivalent cables etc, to the offered cable box at the clearances specified in Section1 e.g. heat shrink terminations, bushing boots, glands etc., shall be stated in the Tender return.

Cable box bushings shall be complete with tinned copper or brass cable termination sockets of the seated type suitable for receiving the cable conductors.

An approved termination shall be provided for earthing the body of the cable box.

Cooling tubes or radiators shall not be fixed to the side of the transformer on which the terminals are fitted unless approved by the Engineer.

For cable connections, the incoming/outgoing and transformer feeders must be connected from bottom-front of the RUM.

## **12 Cable Glands**

Unless otherwise specified cable glands shall be in accordance with BS 6121 and shall be provided as follows:

### **- 33 and 11KV Cable glands**

Each cable box shall have universal glands secured to the cable box by bolts, preferably four in number. Gland fixings are also to be suitable to accept standard glands for use with XLPE or equivalent.

The minimum clearance between gland and floor level shall be 460 mm to facilitate cable terminations.

## **13 Terminals:**

### **13.1 General**

All cable terminals shall be of adequate size to ensure that no overheating takes place at the rated current. Pinch screw acting directly on cable cores shall not be employed. A brass sweating ferrule shall be supplied for terminating the cable and the ferrule clamped in the pinch screw socket if the use of the pinch screws cannot be avoided.

### **13.1 H.V. Terminal Arrangements**

H.V. terminals for cable connections or direct switchgear mounted transformers shall be positioned in a horizontal plane on the side of the transformer. The phase markings shall be c.b.a.n. – A.B.C. left to right when facing the terminals. The flange entry to be generally in accordance with BS 2562 or equivalent.

### **13.2 Terminal Bushing Insulators**

Cast resin bushing assemblies when approved by the Engineer shall be in accordance with BS 3816 and be designed to withstand short circuits no less onerous than those specified for the associated equipment. The bushing assemblies shall not be affected by continuous immersion in transformer liquid at 105 deg. C

The total creepage distance and the protected creepage distance over the external surface of bushings and insulators shall not be less than the minimum values specified in Section 1. The protected creepage distance refers to that part of the insulator which is protected against rain at right angles to the axis of the bushing. For post insulators comprising standard units, the above requirements shall, unless otherwise specified, be met by the addition of an approved number of additional units to the normal assembly.

For rated voltage below 36KV the filling medium of bushing insulators shall be subject to the approval of the Engineer.

Any stress shield shall be considered an integral part of the bushing assembly.

Bushing flanges shall not be of a shape which may trap air. Outdoor bushing insulators and fittings and their mounting arrangements shall be designed so as to avoid pockets in which water can collect.

All neutral bushings shall be identical to the associated phase bushings.

All bushings connected to the H.V. winding shall have a voltage rating equivalent to the highest voltage ratio of the transformer and be suitable for carrying the specified current rating under the prevailing site condition.

Stresses due to expansion and contraction in any part of the insulator, or connected conductors, or equipment, shall not lead to the development of defects in the bushings.

Porcelain insulators shall be sound, free from defects and thoroughly vitrified so that the glaze is not depended upon for insulation. The glaze shall be smooth, hard, of uniform shade and shall completely cover exposed parts of the insulator. The insulators shall be unaffected by the atmospheric conditions due to weather, proximity to the coast, fumes, ozone, acids, dust or rapid changes of temperature between – 6 deg. C and plus 55 deg. Under working conditions.

The porcelain shall engage directly with hard metal, and where necessary, an approved resilient material shall be interposed between the porcelain and the fittings. All porcelain clamping surfaces in contact with gaskets shall be accurately ground and free from glaze. All fixing material used shall be of approved quantity and applied in an approved manner, and shall not enter chemical action with the metal parts of cause fracture by expansion in service. Where cement is used as fixing medium, cement thickness shall be as small and even as possible, and proper care shall be taken to center and locate the individual parts correctly during cementing.

Resin bonded paper insulators shall be in accordance with BS Standards, of approved design and method of manufacture, and shall retain their insulating characteristics in service. Special precautions shall be taken to exclude moisture from paper insulation during manufacture and assembly. The surfaces of all paper insulators shall be finished with

approved non-hygroscopic varnish which can not be easily damaged.

Toughened glass shall be sound and free from defects or blemishes which might adversely affect the life of the insulator. All exposed glass parts shall have a smooth surface.

#### **14 Instrumentation**

Instruments shall comply with the relevant IEC or equivalent national standard. The scales shall be clearly marked over the full range of the instrument.

#### **15 Fuses**

All H.V. fuses shall be of the cartridge type of the appropriate duty, category and conform to the relevant IEC or British Standards. They shall be fully interchangeable with those of any other make which conform to the dimensions prescribed in the standards. The fuse-links shall be fitted with striker-pins to actuate the common trip-bar of the fuse switch and shall be suitable for operation in the insulating medium which is appropriate.

All L.V. protection fuses shall be of the cartridge type installed in suitably rated fuse holders.

## **16 Earthing**

All switchgear units shall have a main earth extended across the full length of the complete unit assemble.

All metal parts other than those forming part of an electrical circuit shall be connected in an approved manner to a hard drawn, high conductivity copper earth busbar which shall run the full length, and be bolted to the main frame, of the switchgear. At the position where joints occur, the earth busbar shall be tinned copper. The earth busbar shall be rated to carry currents equal in magnitude and duration to that associated with the short-circuit rating of the equipment.

The design and construction of the equipment shall be such that all metal parts, other than current carrying parts are earthed before the primary connections are made.

Where earthing is effected through a circuit-breaker, it is preferred that the facilities shall be integral in the design and construction of the switchgear.

## **17 Automation**

The Tenderer shall indicate the extent to which the switchgear offered as part of his tender return; can be modified at future date for remote operation. Remote operating of the switchgear shall include both remote opening and closing of individual switches.

**18 Document To Be Submitted With The Offer**

The following items must be attached and submitted with the offer:

- Catalogues, technical leaflets, **drawings** ...etc.
- Type Test certificates from one of these laboratories (KEMA, CESI or IPH)
- Reference lists for similar products.

**Note: Any offer received without technical details; PDTRA has the right to reject that offer during evaluation without any prior notice.**



**Technical Specifications**  
**Of**  
**“ Measuring Unit ”**

## I. Specifications Of KWH Static Meters

### A. Reference Standard:

◆ International Standard specifications IEC 62052/53–62052/21-62052/11 etc... or an equivalent specification.

### B. Technical Specifications

#### B.1 General

- ◆ The meter shall be of Class 1 for indoor and outdoor domestic applications with:
  - Frequency 50 Hz
  - Relative Humidity up to 90 %
  - Electromagnetic Compatibility of 15kV according to IEC61000-4-2
  - Electromagnetic RF Fields 80MHz-2GHz, typical 30 V/m according to IEC61000-4-3
  - Fast Transient Burst 4 kV for main circuits, 2 kV for auxiliary circuits, to IEC61000-4-5
  - Insulation strength of 4kVAC at 50Hz for 1 minute
  - Insulation strength Pulse Voltage 1.2/50microsec, 8kV main circuits, 6 kV auxiliary circuits according to IEC 62052-11
  - Impulse withstand voltage of 10kV.
  
- ◆ Any meters, which are found to have errors of 1% or more when transported by the purchaser to the purchaser's test room and tested with the covers removed or in position shall be replaced by the supplier at no cost to the purchaser.
  
- ◆ The tenderer/manufacturer of the meters offered shall supply proof that he has been manufacturing meters similar to those specified in this document, for at least 5 years. The Tenderer shall submit with his offer a list of supply Authorities using similar meters to those offered as references and the current re-certification period

required by law in the country of manufacturer. The Tenderer shall also submit evidence that the meters can be expected to operate for at least 20 years and remain within limits of error of +/- 2% during that time. This has to be confirmed by an official certificate/letter from an Official Institute like OFGEM/GB, or NMI.

- ◆ The battery life shall not be less than 20 years, the meter shall continue to operate even if the battery is lost for any reasons. The battery should not be used if the meter is connected to power.
- ◆ The expected operational time of the meter has to be confirmed by an official organisation like OFGEM, or NMI. A certificate or confirmation to this effect has to be provided.
- ◆ The meter shall include two ways IrDA or Local Flag communications port (According to IEC62056-21/IEC61107 Mode C).
- ◆ A Hand Held Unit (HHU) with Windows based software application shall be provided for easy setting of RTC time and change of the tariff structure.
- ◆ The meter base, terminal cover of extended type and main cover should be made of suitable rigid plastic non-transparent material of adequate mechanical and insulation qualities.
- ◆ The meter is tamper-proof design and construction.
- ◆ Non volatile memory shall have a retention time not less than 20 years even in case of power failure.
- ◆ The meter shall not be affected by power failure, as it contains early detection means of power failure, which permits control circuits to store consumption data, and configure the circuit for this failure.

- ◆ The meters shall not generate waves or harmonics which might affect the neighbouring electrical instruments or super imposed on power.
- ◆ The meter is provided with a clock, a calendar to get real time and date. It is provided with a backup power means that ensure the operation of the clock during the power failure and doesn't need periodic replacement.
- ◆ The meter could be programmed by a minimum of 2 KWH rates controlled by internal timing circuitry and a built in tariff time switch module. The meter shall provide a minimum of 4 switching times and be capable of providing different programmable tariff structures for summer and winter season.
- ◆ The meter shall include a built-in time switch of base time shall be taken from crystal oscillator. This time switch shall be programmed to meet tariff scheme and the following requirements:
  1. The summer and winter tariffs
  2. The day and night KWH tariffs.
  3. The monthly reading of (KWH),
  4. The monthly reading of (KWH, KVARH and MD.). just for CT Operated Meters.
  5. The monthly readings of all stored values.
  6. Automatic and manual reset facility shall be provided .
- ◆ The equipment in this specification should be capable of accepting any size of conductor in the range 6 mm<sup>2</sup> up to 25 mm<sup>2</sup> of stranded copper conductor and PVC insulated.
- ◆ The meter drawing should be provided under terminals cover.

- ◆ The meter shall be provided with an internal built-in RTC (Real Time Clock), time and calendar, to indicate real time and date (TOU). Date and time must be available in the display during normal operation.
- ◆ The programmable tariff software application shall provide different programmable tariff structures (with minimum 4 daily switching times) with day light time saving according to the Jordan Standard. It shall be possible to change date, time as well the tariff program with notebook or a simple HHU which has to be quoted by the tenderer. The HHU application shall be in the form of Windows based application with industry standard features.
- ◆ The meter's register shall be reset to zero after reaching the maximum range, and not be permitted to reset to zero under any other circumstances.
- ◆ A high contrast, large character Liquid Crystal Display (LCD) must be provided with light illumination and uses information on the display to indicate the active element.
- ◆ An auto cycle display with a programmable switch-over time (0-30 sec.) between the different registers must be provided.
- ◆ The rated shelf life of the LCD screen shall not be less than 20 Years for continuous operation (In Normal operation).
- ◆ A push button for reading the display manually must be provided.
- ◆ The Non-volatile memory minimum retention time shall not be less than 20 years.
  
- ◆ The meter shall be equipped with LED for meter testing, calibration and operation, and the meter constant shall be in the form of Impulse/kWh.
- ◆ **The meter shall be completely tamper proof, facilitated with up-to-date anti-fraud protection with all fraud events that shall be record in meter's history.**
  - **The meter shall detect and record the accurate energy consumption correctly even under tampering conditions. Under these conditions, which occur by opening terminals box or meter's cover, a visual annunciation appears on the LCD screen or in the form of LED at the meter front.**

- The meter shall be single wire measurement, so if the neutral wire is removed, the meter shall detect and record the accurate energy consumption.
  - The meter records the accurate consumption under reverse run conditions (Absolute energy measurement).
  - The meter should not be influenced by external strong DC magnetic fields.
- ◆ **High-level Anti-Tampering Meter**  
 As a further option, the Purchaser may prefer meters provided with a high-level anti-tampering meter for applications in areas with high non-technical losses. This high-level anti-tampering meter should detect and still measure the right energy under the following load conditions:
- Load connected to incoming supply terminals.
  - Load fully connected (returned) to earth.
  - Load partially returned to earth.
  - Load connected to incoming terminals as well as partial to earth.
  - Load fully connected to earth as well as to the incoming terminals.
  - Other anti-tampering features.
- ◆ The meter's software shall be user-friendly including all controllable parameterization features such as multi level of security for down loading and up loading the data. The software module could be upgraded frequently without extra charges while the Electricity Distribution Company (EDCO) owns all software management properties.

**The offer shall include the cost of the Original Software.**

◆ **SERVICE EXPERIENCE OF METERS**

Tenderers shall provide the information required below for the service experience of the Meters:

<b>Customer</b>	<b>Brief description</b>	<b>No. of units supply And type of meter</b>	<b>project budget</b>	<b>No. of years in service</b>

◆ **DEVIATION FROM SPECIFICATION IF ANY COMPLETED BY THE TENDERER**

<b>Item No.</b>	<b>Brief description</b>	<b>Deviation</b>

◆ LIST OF TYPE TEST CERTIFICATES FOR THE METERS

- All type test certificates covering the equipment offered to IEC recommendations shall be submitted with the tender. Failure to provide copies of these type test certificates/reports will result in rejection of the tender.
- The Tender should submit with his offer type test certificates/reports, according to IEC standard from an independent & international recognized testing laboratory such as KEMA, IPH, CESI, for materials similar to the tender materials as an evidence of his capability to manufacture such materials.
- Type test certificates shall be submitted.
- The expected operational time of the meter has to be confirmed by an official organisation like OFGEM, or NMI. A certificate or confirmation to this effect has to be provided.

Type test made on identical designs of equipment to those offered	Certificate No.	Certificate Authority



## B .2 Technical Specifications of the three phase CT operated meters

<b>Nominal Voltage</b>	(400 ± 10 %) V.
<b>Rated Current</b>	(5) A.
<b>Measured Quantities</b>	Four Rates KWH, Single Rate KVARH With Maximum Demand.
<b>Connection</b>	Four wires
<b>Accuracy</b>	Class 0.2 for KWH, Class 1 for KVARH.
<b>Display</b>	<p style="text-align: right;">Display screen:</p> <ul style="list-style-type: none"> <li>• Fully electronic (LCD), display is retained during loss of power.</li> <li>• 7 digits at least, display area for each digit not less than 20 mm<sup>2</sup>.</li> <li>• The registers shall reset to zero after</li> </ul>
<b>Historical Data</b>	<ul style="list-style-type: none"> <li>• Display at least the latest billing period.</li> <li>• Stores historical data for at least 12 billing periods.</li> </ul>
<b>Relative Humidity</b>	Zero to 90 % or better
<b>Temperature Range</b>	<p>–5 °C to 70 °C ambient temperature.</p> <p style="text-align: center;">For electronic components inside the meter up to 80 °C.</p>
<b>Degree of protection</b>	IP 51
<b>Data retention</b>	Not less than 20 years (unpowered)
<b>Annunciation on LCD screen</b>	<p>A symbolic annunciation is present on the LCD screen to indicate the following:</p> <ul style="list-style-type: none"> <li>• Phase presence indication.</li> <li>• Phase sequence monitoring.</li> <li>• Applied tariff.</li> <li>• Tamper and fraud detection.</li> <li>• Opened meter cover or</li> </ul>

	terminal box.
<b>LED for meter testing</b>	<ul style="list-style-type: none"> <li>• Impulse/KWH</li> <li>• Impulse/KVARH</li> </ul>
<b>Communication ports</b>	<ul style="list-style-type: none"> <li>• Local – Flag to IEC 1107.</li> <li>• RS-485.</li> </ul>

**C. The tariff scheme of EDCO meters in present time:**

- ◆ The KWH tariff Periods are (23:00-7:00) o'clock for low tariff and (7:00-23:00) o'clock for the high tariff.
- ◆ The (MD) KW periods are (19:00-22:00) o'clock for summer season peak load and (17:00-20:00) o'clock for winter season peak load.
- ◆ The integration period to be adjusted at 30 minutes.
- ◆ The KVARH shall be normal reading (one rate).
- ◆ Monthly reset after automatic storage of all readings shall be on the first day of every month at 00:00 o'clock.
- ◆ The summer season starts on the last FRIDAY of March every year at 03:00 o'clock.
- ◆ The winter season starts at the last FRIDAY of October every year at 01:00 o'clock.

- ◆ In the summer season, the clock is usually advanced automatically one full hour over the winter season time.
- ◆ The change of seasons and daylight savings time occur concurrently.
- ◆ Jordan local time is (GMT + 3 hour) in the summer season and (GMT + 2 hour) in the winter season.

**Note: All the above settings shall be programmable to meet any possible changes.**

#### D. **Property Plates**

- ◆ The meters shall be individually identified by a 10-digit alphanumeric code as follow:

The first six digits shall be identified and approved by EDCO.

6<sup>th</sup> to 10<sup>th</sup> digits represent the individual meter number, which should be advised by the purchaser.

Example: XXXXX 00000.

In additional, this 10-digit serial number shall be presented by a barcode to be read by a hand held unit.

- ◆ The meter nameplates shall be marked "**Property of EDCO**". The meter nameplate shall be approved by EDCO.

### E. **Sample meters and it's Software**

- ◆ Sample non-returnable meters, one for each of the items listed in Schedule 'A' and identical to the designs offered, shall be hand-carried and submitted with the Tender on the specified date for opening Tenders. These representative samples will be closely examined and will undergo mechanical, electrical and accuracy tests at the EDCO Test Station in Amman. Failure of the samples to meet the mechanical and electrical Specifications set out in this Document will entitle the Purchaser to reject the Tender.
- ◆ These samples shall be programmed to meet the previous EDCO Tariff scheme.
- ◆ A sample of programming software should be submitted with the offer.

### F. **DRAWINGS, CATALOGUES AND REQUIREMENTS**

The Tenderer must submit with his offer all the specifications, software manual, indicating ratings, weights, dimensions and time current characteristics of the offered materials.

<b>Description</b>
<p><b>. Class 0.5 Programmable Three phase 4-wire, 4 Rates KWH &amp; KVARH meters, with MD, CT Operated, rated 400 volts, and 5 amps, as specified</b></p>

## II. Measuring Unit

One panel of 33kV metal enclosed switchgear, 630A, 16kA symmetrical breaking capacity, single busbar, connected in series with the transformer unit indoor type complete with all control equipment as detailed below:-

- One set of 400A, 3-Phase busbars.
- One set of 3 current transformers, Ratio 20/5A Class 0.2FS 1.
- One set of 3 voltage transformers, Ratio 33000/110V Class 0.5.
- One power analyzer with memory and hand reset facility (class 0.5) with the following measurements:
  - Current (Present and max. values) at each phase.
  - Voltage (Phase to Phase).
  - Power Factor (Total and Per phase).
  - Active, Reactive, Apparent power (Total and Per phase).
  - Active, Reactive, Apparent power (Present and max. values).
- Two combined multi tariff KWH (class 0.2) and KVARH (class 0.5) Automatic Meter Reading meters, (static type), suitable to operate on fiber optics communication media. Its type to be subjected to EDCO's approval.
- One set of current (120% of the full rated value), voltage (110% of the rated value), and watt programmable transducers for SCADA system.
  - Set of test links for currents & voltages with 20% spare

## SCHEDULES AND GUARANTEES

<u>SCHEDULE NO.</u>	<u>DESCRIPTION</u>
A	SCHEDULES OF REQUIREMENTS & PRICES
B	MEASURING UNIT
C	SPARE PARTS PRICES
D	MANUFACTURER, PLACES OF MANUFACTURE AND TESTING PLACE
E	LIST OF TYPE TEST CERTIFICATES
F	LIST OF SERVICE EXPERIENCE
G	DEVIATIONS FROM SPECIFICATIONS

**SCHEDULE(A-1)**

**SCHEDULE OF REQUIREMENTS & PRICES FOR RMUs**

To complete the equipment detailed below the Contractor shall provide the necessary cable boxes, compound, all auxiliary apparatus for control boards and their supporting steelwork, panel wiring, fuses interlocking gear, holding-down bolts, screen, guards, labels and all necessary sundries whether specified in detail or not.

ITEM NO.	DESCRIPTION	QTY AND UNIT	PRICE JD
1.	Supply and delivery 33KV Non-Extensible, Outdoor type Ring Main switchgear including <b><u>TWO</u></b> on load 630A <b><u>SF6</u></b> switch-disconnectors for incoming and outgoing and <b><u>ONE</u></b> on load 200A fuse switch-disconnector; excluding HRC fuses complete as specified.	1Set	
a.	<b>Option 1:</b> AC motor with all accessories for the above mentioned RMU	3 set (set/RMU)	
b.	<b>Option 2:</b> DC motor with charger and batteries for four hours and all accessories for the above mentioned RMU	3 set (set/RMU)	
	<b>TOTAL PRICE OF ITEMS</b>		

## SCHEDULE(A-2)

### SCHEDULE OF REQUIREMENTS & PRICES FOR CABLE CONNECTORS (TARMINATIONS) FOR RMUS

Prices of required cable connectors (terminations) are to be completed by the Tenderer, suitable for external 33 KV three core 150mm<sup>2</sup>, Cu conductor ,XLPE,SWA cables that will be connected to the incoming / outgoing feeders in the RMUs

ITEM NO.	DESCRIPTION	QTY AND UNIT	PRICE JD
2.	33KV three phase completed cable connector for above mentioned cable Manufacturer& type.....	3 Kits	
	<b>TOTAL PRICE</b>		

5. Cost for two engineers from EDCO & PDTRA to attend factory specified tests for one week .....currency .....

6. Cost of complete type tests according to IEC publication .....  
currency .....

Note: The above cost of type test price shall however be used if the Employer requires any test in the KEMA – NETHERLAND HV Testing Laboratory.

**\* IMPORTANT NOTE: PDTRA HAS THE RIGHT TO ACCEPT PARTIAL OFFERS AND TO AWARD PART OF THE ITEMS OR QUANTITIES WITHOUT ANY LIMIT OR NOTICE.**



**SCHEDULE (B)**

**SCHEDULE OF REQUIREMENTS OF CURRENT & VOLTAGE**

**MEASURING UNIT**

ITEM NO.	DESCRIPTION	QTY AND UNIT	PRICE JD
1	36KV 630A Busbar set	1	
2	36KV Cable for Connection Cable Termination	1	
3	current transformers, Ratio 20/5A Class 0.2FS 1	3	
4	voltage transformers, Ratio 33000/110V Class 0.5.	3	
5	Multi-function meter Bi-directional (suitable for net metering)	1	
6	Local/remote selector switch	1	
7	36KV 2A fuse	3	
8	LV control panel	1	
9	Voltage indicator	1	
10	Current test terminal block	1	
11	voltage test terminal block	1	
12	indoor type metal enclosed ring main unit mainframe	1	
	<b>TOTAL PRICE OF Measuring Unit</b>		

**SCHEDULE (C)**

**SCHEDULE OF REQUIREMENTS OF SPARE PARTS**

**RECOMMENDED SPARES FOR**

**OUTDOOR RMU's**

The quantities and description of spare parts is to be recommended by the Tenderer, for operation and maintenance of the ring main units stated in Schedule of prices for a period of three years

<b>ITEM NO.</b>	<b>DESCRIPTION</b>	<b>QTY AND UNIT</b>	<b>PRICE</b>
1.	Spares for 33kV RMU		
2.	Spares for current & voltage measuring unit		
	<b>TOTAL PRICE OF SPARE PARTS</b>		

The Tenderer should submit full lists of spares with itemized prices for each of the above items in separate sheets.

**SCHEDULE (D)**  
**MANUFACTURERS, PLACES OF**

**MANUFACTURE AND TESTING PLACE**

DESCRIPTION	MANUFACTURER	PLACE OF MANUFACTURE	PLACE OF TESTING
<p>. 33KV RMU</p> <ul style="list-style-type: none"> <li>- Disconnecter Switch</li> <li>- Housing</li> <li>- Fuses</li> <li>- voltage indicator</li> <li>-motor</li> <li>-measuring unit</li> <li>*current transformers</li> <li>*voltage transformers</li> <li>*Multi-function meter</li> <li>*36KV 2A fuse</li> <li>*LV control panel</li> <li>*Voltage indicator</li> <li>*Current test terminal block</li> <li>*voltage test terminal block</li> </ul>			

**SCHEDULE (E)**

**LIST OF TYPE TEST CERTIFICATES FOR TEST  
EQUIPMENT**

Tenderers shall provide the information required below for the type test certificates from a recognized testing station covering the equipment offered to IEC recommendations & shall be submitted with the tender.

Failure to provide copies of type test certificates/reports will result in rejection of the tender.

<b>Type test made on identical designs of equipment to those offered</b>	<b>Certificate No.</b>	<b>Certificate Authority</b>

**SCHEDULE (F)**

**SERVICE EXPERIENCE OF RMU**

Tenderers shall provide the information required below for the service experience of the RMU.

<b>Customer</b>	<b>No. of units supply</b>	<b>Rated voltage</b>	<b>No. of years in service</b>

**SCHEDULE (G)**

**DEPARTURE FROM SPECIFICATION IF ANY**

**TO BE COMPLETED BY THE TENDERER**

<b>ITEM NO.</b>	<b>BREIF DESCRIPTION</b>	<b>DEPARTURE</b>

## SUMMARY OF PRICES

ITEM NO.	DESCRIPTION	Total Price J D
1.	Complete 33KV RMU.	
2.	33KV three phase cable connector.	
3.	Measuring Unit .	
4.	Spare parts.	
	<b>TOTAL CONTRACT PRICE</b>	

