

**Saudi Electricity Company**



**الشركة السعودية للكهرباء**

**SEC DISTRIBUTION MATERIALS SPECIFICATION**

**42-SDMS-03**

**DATE: 16-12-2007G**

**42-SDMS-03**

**SPECIFICATIONS**

**FOR**

**INSIDE ROOM FIBER GLASS REINFORCED  
POLYESTER METER BOXES**

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subject to change or modification without any notice**



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**1. SCOPE:**

This specification describes the minimum technical requirement for design, materials, manufacture, testing, performance and supply of fiberglass reinforced polyester boxes to be used inside the meters rooms for Kilo Watt Hour (KWH) meters in the distribution system of Saudi Electricity Company (SEC).

These boxes are to be installed on the surface of masonry walls without external support. The internal wiring, supports for Kilo Watt Hour meters and circuit breakers, earthing and bonding, terminal blocks and cable clamps are to be supplied and fixed by the manufacturer. The molded case circuit breakers MCCB's and KWH meters will be supplied and installed by SEC.

**2. CROSS REFERENCE:**

2.1 The technical and dimensional details of both the KWH meter and the MCCB which will be installed inside the meter box shall be as per the following specifications:

- Specification for Bottom Connected Kilo Watt Hour meters No. 40-SDMS-01 latest revision.
- Specification for Electronic Kilo-Watt-Hour Meter No. 40-SDMS-02 latest revision.
- Specification for Low Voltage Molded Case Circuit Breakers For Service Connections No. 37-SDMS- 01 latest revision.
- Specification for Lugs and Connectors For MV/LV Distribution System No. 12-SDMS- 02 latest revision.
- Specification for Low Voltage Power and Control Cables No. 11-SDMS- 01 latest revision.

2.2 This specification shall be read in conjunction with SEC specification No. 01-SDMS-01 (latest revision) titled "General Requirement for all Equipment/ Materials", which shall be considered as an integral part of this specification.

2.3 This specification shall be read in conjunction with SEC purchase order, as applicable.



### 3. APPLICABLE CODES AND STANDARDS:

The latest revision of the following codes and standards shall be applicable for the equipment/material covered in this specification. In case of any deviation, the vendor/manufacturer may propose equipment/ material conforming to an alternate code or standard. However, the provisions of SEC standard shall supersede the provisions of these standards in case of any difference.

- 3.1 SASO SSA775 Fiber glass reinforced polyester meter boxes.
- 3.2 SASO SSA774 Method of testing fiber glass reinforced polyester meter boxes.
- 3.3 IEC 60529 Degrees of protection provided by enclosures (IP code).
- 3.4 IEC 60947-7-1 Low voltage switchgear & controlgear.  
Part seven (7): Auxiliary equipment.  
Section one (1): Terminal block for copper conductor.
- 3.5 ASTM A-153 Standard specification for zinc coating (hot dip) on iron and steel hardware.
- 3.6 IEC 60335-1 Safety of household and similar electrical appliances.
- 3.7 DIN-53453 Testing of plastics, Impact flexural test.
- 3.8 DIN-53452 Testing of plastics, Flexural test.
- 3.9 DIN-53480 Tracking resistance test.
- 3.10 DIN-53482 Measurement of the electrical resistance of non-metallic materials.
- 3.11 DIN-65382 Tensile test of impregnated yarn test specimens.
- 3.12 DIN-53458 Determination of dimensional.
- 3.13 DIN-53388 Exposure to daylight under glass test.
- 3.14 DIN-53472 Absorption of water.

In case of any deviation from the listed standards, it should be indicated in the list of deviations submitted by the supplier.



#### 4. SERVICE CONDITIONS:

- 4.1 Meter Boxes shall be suitable for operation under the service conditions as per SEC latest revision of General Specification No. 01-SDMS-01 latest revision.
- 4.2 The inside room meter boxes with all accessories and fittings shall withstand the temperature of 75°C plus the effect of any internal heating at their installed locations.

#### 5. SYSTEM CONDITIONS:

The boxes shall be suitable for installation in a system of the given characteristics:

Frequency	60 Hertz
No. of Phases	3
No. of Wires	4
Voltage	127/220 ± 5% 220/380 ± 5%
Neutral	Solidly grounded

However for detailed system conditions refer to the latest revision of SEC general specification No. 01-SDMS-01 latest revision.

#### 6. CLASSIFICATION OF METER BOXES:

The inside room meter boxes are classified as given below:

1. Complete set of meter boxes designed for four (4) consumers, suitable for whole current meters up to 150 Amps each, as per Drawing No. SEC/IRMB-01.
2. Main cable junction box with terminal block and isolation links rated up to 400 Amps. complete with all cable clamps necessary for supporting incoming cables as per Drawing No. SEC/IRJB-01.

#### 7. MATERIAL DESIGN AND CONSTRUCTION:

##### 7.1 Enclosure:

The body and cover of the meter boxes shall be made of non-inflammable, impact proof, heat resistant, self extinguishing, hot molded, fiberglass reinforced polyester with at least 25% of fiberglass by weight. It shall be ultra-violet resistant, non-hygrosc-



copic and insulating, 3 mm minimum thick. The boxes shall be covered by SASO approved epoxy coating to prevent surface degradation and for ultra-violet protection. Boxes made of other plastic material can be offered as alternative.

The inside room meter boxes used by SEC should consist of combination of identical separate boxes attached together to form a single unit.

It shall consist of two boxes for fixing KWH meters and its associated circuit breakers, plus two other boxes one located between the meter boxes to accommodate the extendable main busbar for feeding the meter boxes above and below. The other box to be attached at the bottom to accommodate the consumer terminal blocks.

It shall be supplied pre-assembled, completely wired and delivered to SEC ready for use as per drawing no. SEC/IRMB-01.

The junction box shall be supplied as a separate assembled unit to facilitate connection of incoming cable to the metering units. It shall consist of combination of three boxes, attached together to form a single unit, the upper one used for busbar connection while the middle one is used for incoming cable termination and isolation links and the bottom one to be used for cable fixing clamps as per drawing no. SEC/IRJB-01.

7.1.1 The inside room meter boxes shall have adequate mechanical strength to withstand rough handling as may be expected in normal uses.

7.1.2 All ferrous fasteners used shall be made of either stainless steel, brass or hot-dip galvanized.

7.1.3 The protection degree for The inside room meter boxes shall be IP 4X as per IEC 60529.

7.1.4 The boxes shall be vermin, dust and weatherproof.

7.1.5 Knobs for fixing covers shall be made of durable hard material and for fixing SEC sealing arrangement.

7.1.6 Four millimeter diameter holes for fixing the source of supply number plates (30mm x 80mm) and consumer number plates (30mm x 80mm) shall be provided on the covers as indicated in the drawings No. SEC/IRMB-01 and SEC/IRJB-01.

7.1.7 All wall mounting supports shall be with 4mm diameter holes, evenly distributed along the length of the box assembly to support the weight of the fully assembled



units including meters and circuit breakers, minimum number of six holes is required.

7.1.8 All fixing supports shall be from inside the box, any external metallic support brackets for off wall fixation is not accepted.

7.1.9 The design and construction of the inside room meter boxes shall guarantee the safety of personnel against electrical shocks and satisfactory performance at rated current without exceeding permissible temperature rise within enclosure.

7.1.10 The finished color of the boxes shall be light gray (RAL-7035).

7.1.11 SEC monogram shall be molded on the front side of the meter box cover.

#### 7.2 **Meter Window and Protective Cover:**

The meter window shall be U.V. resistant, unbreakable, transparent, minimum 2 mm thick, heat resistant, non-hygroscopic insulating, polycarbonate (Lexan 143-R). It shall be fixed to the front cover and replaceable from inside. The meter window shall be fully covered to protect against sunshine by a separable movable flap cover top hinged and bottom latchable made of the same material as of the boxes. The hinges shall be made of durable material. As per drawing no. SEC/MB-09.

#### 7.3 **Bill Pocket:**

The bill pocket shall be 2 mm minimum thick, unbreakable, heat and ultra-violet resistant, non-hygroscopic, insulating and transparent pocket shall be fixed to the front of the movable flap cover of each meter window to accommodate the electricity bill. It shall be made of polycarbonate (Lexan 143-R or better), As per drawing SEC/MB-09.

#### 7.4 **Breaker Window:**

The breaker window shall be same as meter window, but it shall be top hinged and bottom fastening with sealable retaining type M4 screws, and replaceable from inside.

#### 7.5 **Cable Bushing and Cable Clamp:**

7.5.1 Incoming cable bushings for main cable junction box shall be dust, tamper and temperature proof, rigid PVC and provided in the base of the boxes to accommodate 80 mm inside diameter conduit.





7.5.2 Galvanized metallic cable clamps fitting 2mm thick shall be provided inside the box to support the incoming cables up to 300 mm<sup>2</sup>.

#### 7.6 **Breakers and Meter Mounting Rails:**

Hot-dip galvanized steel rails equipped with sliding spring-loaded steel nuts size M4, suitable for a range of MCCB's and KWH meters of various sizes, shall be provided.

#### 7.7 **Internal Wiring:**

7.7.1 The manufacturer shall carry out internal wiring and supply the meter boxes ready for use. All internal connections shall be with 35mm<sup>2</sup> flexible single core copper cables 750 volts, insulated as per SEC specification No. 11-SDMS-01 latest revision, and supported by insulated clamps or ties, stripped and sleeve ended and already crimped to fit in the terminals of the equipment to be installed by SEC, such as, meters, circuit breakers, etc. The rated temperature of internal wiring shall be rated 90 °C.

7.7.2 The manufacturer shall carry out internal wiring and supply the main cable junction box ready for use. All internal connections shall be with 120mm<sup>2</sup> soft drawn single core copper cables 750 volts, insulated as per SEC specification No. 11-SDMS-01 latest revision. The rated temperature of internal wiring shall be rated 90 °C.

7.7.3 Number of wires to be supplied in the meter box is as follows:

- a) Four wires from main busbar, three phase wires to the source side of the circuit breaker and one neutral wire to the neutral side of the KWH meter.
- b) Three wires from each load side of the circuit breaker to the phase terminals of the KWH meter.
- c) Four wires from each KWH meter to each consumer's terminal block.
- d) The neutral and grounding of meter box and consumer shall be connected to the neutral busbar. However the neutral of consumer shall be connected to the neutral of SEC incoming source through the KWH meter.

7.7.4 The cable clamps of the incoming and outgoing cables and any exposed metal works shall be bonded to the neutral busbar with 10mm<sup>2</sup> insulated copper conductor.

7.7.5 Provision shall be made also on the neutral busbar for connecting an earth electrode externally to the meter box. An extra free clamp shall be provided on any neutral busbar.



### 7.8 Power Terminal Blocks

The incoming and the outgoing terminal blocks shall be suitably designed for easy connection for bottom entry of 4-core copper/aluminum XLPE cables. Terminals shall be protected against accidental short circuit. Dangers of loose connections and over heating of terminals due to vibration or unscrew shall not be permitted.

Incoming and outgoing terminal blocks shall be provided with phase barriers and removable and sealable covers of insulated material. The covers shall not be interchangeable and shall bear the marking "SEC Terminals" and "Customer Terminals".

#### 7.8.1 Incoming terminal blocks:

Incoming terminal blocks shall be made of tin plated copper/bronze or brass with slotted head hexagonal screws. Terminals shall be front mounted and removable. It shall be designed for continuous current rating of 400 Amps and shall be suitable for fixing one cable up to 4x300mm<sup>2</sup> aluminum with the use of cable lugs. The outgoing side of it must be capable of accepting 120mm<sup>2</sup> copper, single core wires per phase, as per Drawing No: SEC/IRJB-01.

#### 7.8.2 Outgoing consumer terminal blocks:

Each outgoing terminal block shall be designed for a continuous current rating of 150 Amps., and shall be suitable for incoming cable size of 35 mm<sup>2</sup> and outgoing consumers copper cable size of 4x50 mm<sup>2</sup> without the use of cable lugs.

### 8. TESTING:

- 8.1 One (1) complete assembled unit (meter box plus one main cable junction box) shall be type tested in an independent testing laboratory for all the applicable tests as per SASO 774 and IEC 60529.
- 8.2 Terminal blocks shall be type tested in an independent testing laboratory as per IEC 60947-7-1 at an ambient temperature of 55°C.
- 8.3 Certified type test reports for both meter box and terminals shall be submitted along with the tender documents.



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8.4 SEC may wish to witness the tests, or visit the factory during manufacturing, the supplier should give adequate notice of manufacturing program and test to be witnessed.

### 9. MARKING:

9.1 The following information shall be clearly embossed on the outer surface of the meter box and main cable junction box covers by means of hot molding method:

- 9.1.1 SEC Monogram
- 9.1.2 SEC Item Number
- 9.1.3 Manufacturer's Name

9.2 Year of manufacturing shall be legibly marked at a suitable place inside the meter box cover and body.

9.3 Purchase order number shall be legibly marked at a suitable place inside the meter box body.

9.4 Colored cables shall be used for the internal wiring. The arrangements of these cables shall be from left to right as per the followings:

PHASE	COLOR
Phase One (1)	Red
Phase Two (2)	Yellow
Phase Three (3)	Blue
Neutral (N)	Black
Earth (E)	Green and Yellow

9.5 Terminal blocks shall be indelibly numbered from left to right as per the following:

- Phases: 1, 2 and 3
- Neutral: N
- Grounding: E

### 10. PACKING AND SHIPMENT:

10.1 Each assembled unit (the meter box / main cable junction box) and its accessories shall be separately packed and shall be delivered ready for service.



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- 10.2 Packing shall be protected against damage during shipment and handling up to installation site.
- 10.3 Packing shall be designed to prevent entry of dust, ingress of moisture and other foreign matters.
- 10.4 Packing shall be marked with the following:
- 10.4.1 Manufacturer's name
  - 10.4.2 Country of origin
  - 10.4.3 SEC item number
  - 10.4.4 SEC purchase order number
  - 10.4.5 Weight in kilogram
  - 10.4.6 Handling instructions
- 10.5 Supplier shall contact Materials Management Department for additional packing, handling, and shipment instructions, as applicable.
- 10.6 Packing note in Arabic and English shall be included in each case giving description of goods packed.

**11. GUARANTEE:**

- 11.1 Vendor shall guarantee the meter box / main cable junction box against all the defects arising out of faulty design, workmanship or defective material for a period of one (1) year from the date of installation or two years from the date of delivery whichever comes first. SEC certificates for date of installation shall be accepted by the vendor.
- 11.2 If no exception/deviations are taken to this specification and no list of deviations is submitted, it shall be deemed that, in every respect, the offered the meter box / main cable junction box and their accessories conform to this specification.

**12. SUBMITTALS:**

The following documents shall be submitted with the tender.

- 12.1 The vendor shall complete and return one copy of the attached Data Schedule with quotation. In addition to Data Schedule, clause by clause compliance to this specification shall also be confirmed / submitted.



- 12.2 Detailed dimensional drawing of the meter box / main cable junction box showing internal and mounting arrangements of wiring and all accessories including that for KWH meters and circuit breakers, where applicable.
- 12.3 Detailed drawings of cover, meter window and protective cover, breaker access window, bill pocket and terminals.
- 12.4 Diagram for the internal wiring indicating color codes or numbers for each wires and terminals.
- 12.5 Material description of each component shall be indicated in the drawing.
- 12.6 Copies of type test certificates.
- 12.7 Samples conforming to approved design shall be submitted for approval.



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**TECHNICAL DATA SCHEDULE****Inside Room Fiberglass Reinforced Polyester Meter Boxes****(Sheet 1 of 3)**

SEC Inquiry No: \_\_\_\_\_ Item No: \_\_\_\_\_

SEC REF.	DESCRIPTION	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
7	MATERIAL, DESIGN & CONSTRUCTION		
7.1	Enclosure:		
	Material	Hot Molded Fiberglass Reinforced Polyester	
	Impact Strength	KJ/m <sup>2</sup>	As per Clause 3
	Flexural Strength	Mpa	As per Clause 3
	Tensile Strength	Mpa	As per Clause 3
	Tracking Resistance		As per Clause 3
	Surface Resistivity		As per Clause 3
	Specific Resistivity	Ohm/cm.	As per Clause 3
	Martens Deflection Temperature Under Load.	°C	As per Clause 3
	Vica Softening Point	°C	As per Clause 3
	Continuous Temperature Resistance	°C	
	Color Fastness		As per Clause 3
	Tropicalization and Resistance To Mold and Fungus Growth		As per Clause 3
	Water Absorption	mg	As per Clause 3
	Limit Oxygen Index	% O <sub>2</sub>	As per Clause 3
Flammability		As per Clause 3	
Hot Wire Resistance	Stuff	As per Clause 3	
Resistance to splash and vapors		----	



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13.

**TECHNICAL DATA SCHEDULE**

Inside Room Fiberglass Reinforced Polyester Meter Boxes  
(Sheet 2 of 3)

SEC Inquiry No: \_\_\_\_\_ Item No: \_\_\_\_\_

SEC REF.	DESCRIPTION	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
7.1.3	Protection Degree	IP-4X	
7.1.10	Color	Light Grey (RAL-7035)	
7.2	Meter Window Material	Polycarbonate (Lexan-143-R)	
7.3	Bill Pocket Material	Polycarbonate (Lexan-143-R)	
7.7.2	Internal Wire Size	35mm <sup>2</sup> flexible	
7.8.1	Incoming Terminal Block		
	Rating in Amps	400 Amp	
	Suitable for single cable connection with isolator	Yes	
	Cable sizes	300mm <sup>2</sup>	
7.8.2	Outgoing Consumer Terminal Block		
	Rating in Amps	150 Amp	
	Suitable for Cable Sizes	50mm <sup>2</sup>	
	<b>Overall Dimensions:</b>		
	Meter Box Height mm		
	Meter Box Width mm		
	Meter Box Depth mm		
	Meter Box Weight Kg		
	Meter Box Shipping Weight Kg		
8	Testing:		
8.1	Type test report for meter box enclosed	Yes / No	
8.2	Type test report for terminal block enclosed	Yes / No	



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13.

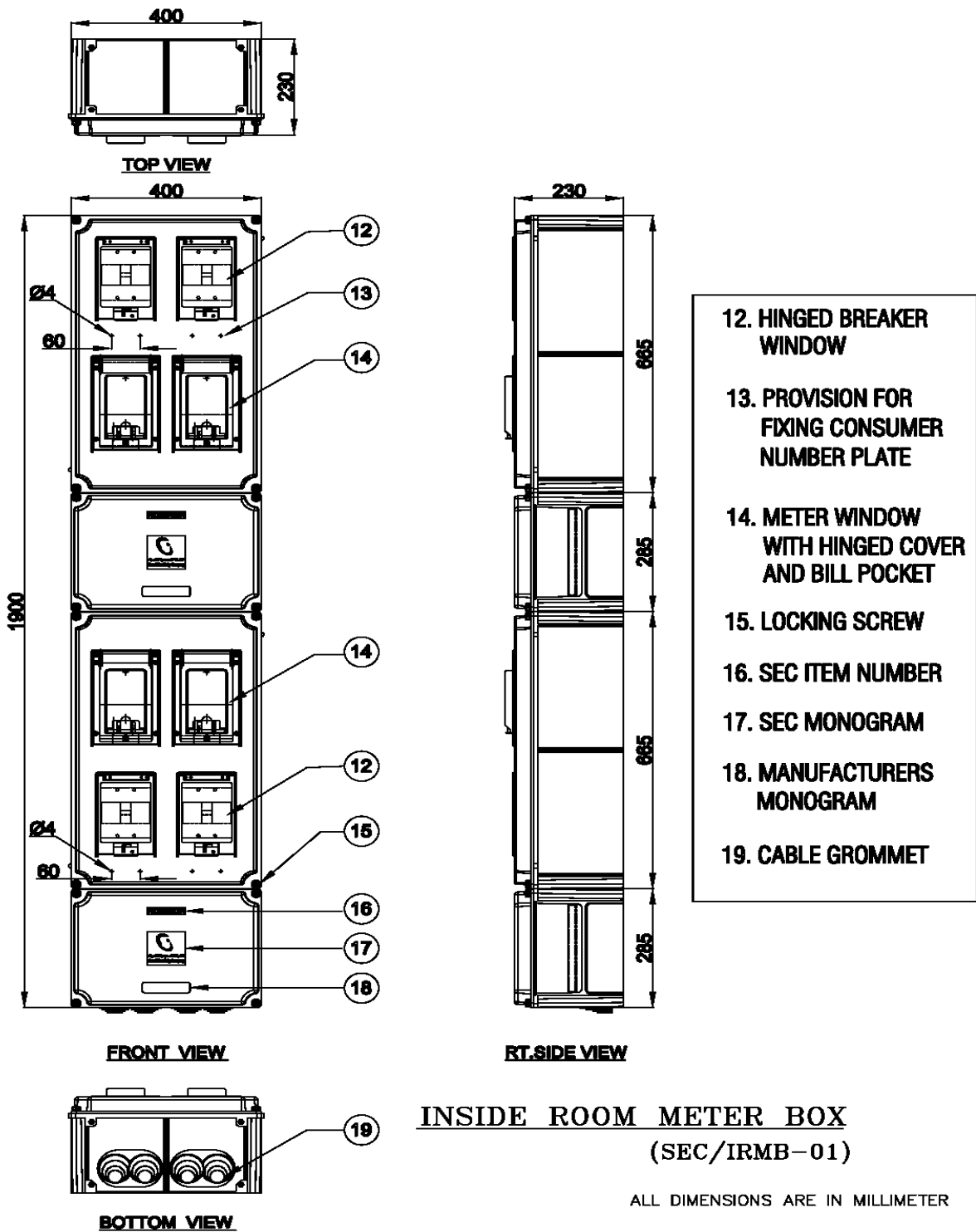
**TECHNICAL DATA SCHEDULE**  
**Inside Room Fiberglass Reinforced Polyester Meter Boxes**  
**(Sheet 3 of 3)**

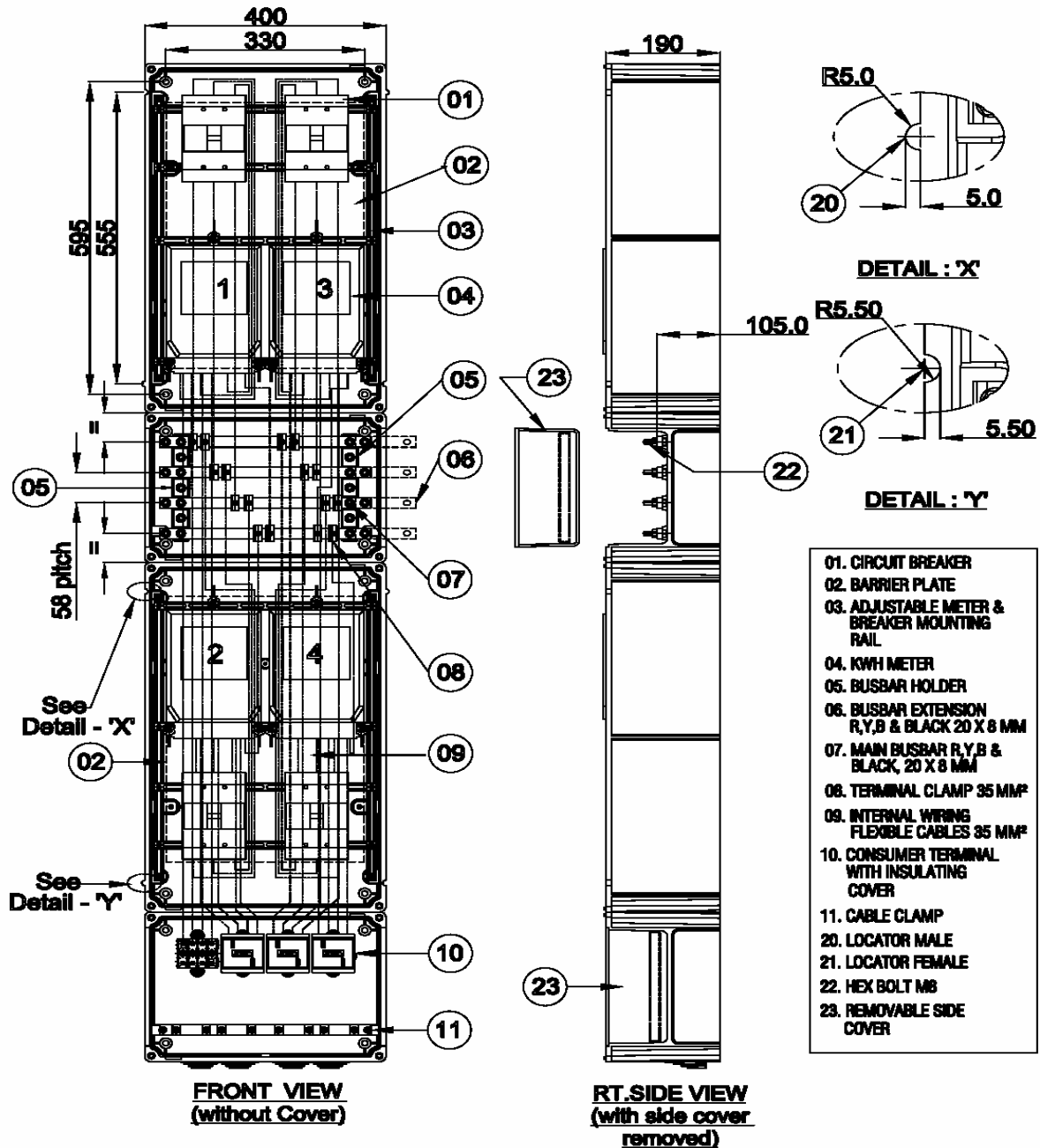
SEC Inquiry No: \_\_\_\_\_ Item No: \_\_\_\_\_

- A) Additional Technical Information or Features Specified by SEC.
- B) Additional Supplementary Data or Features Proposed by Bidder / Vendor / Supplier.
- C) Other Particulars to be filled-up by the Bidder/Vendor/Supplier.
- D) List of Deviations and Clauses to which exception is taken by the Bidder / Vendor / Supplier (Use separate sheet, if necessary).

Description	Manufacturer of Material/Equipment	Vendor/Supplier
Name of Company		
Location and Office Address		
Name & Signature of Authorized Representative with Date		
Official Seal / Stamp		

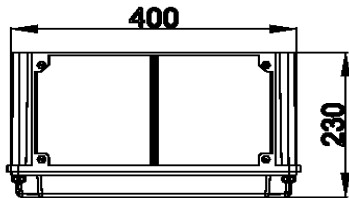




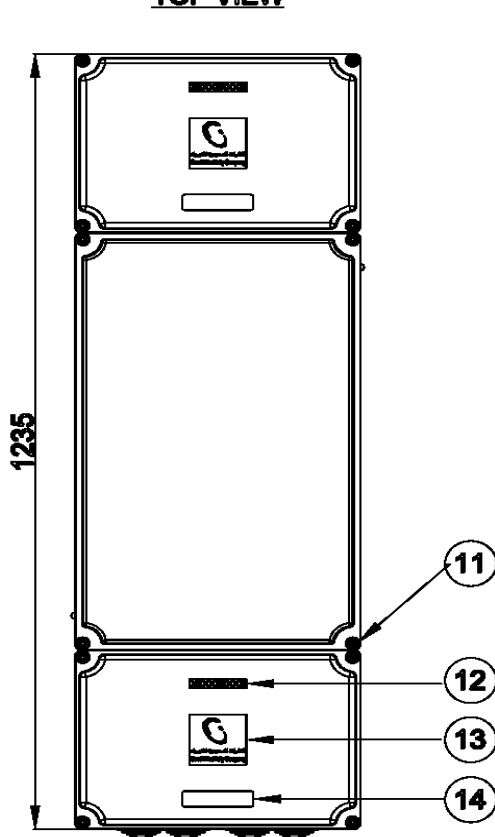


INSIDE ROOM METER BOX-INTERNAL DETAILS (SEC/IRMB-02)

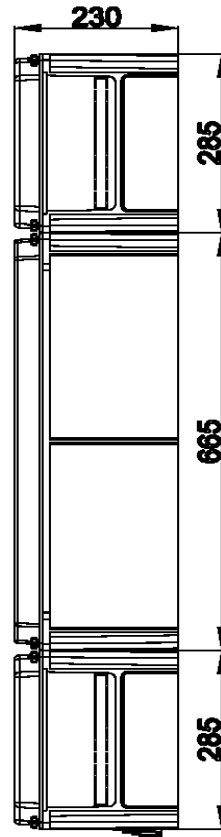
ALL DIMENSIONS ARE IN MILLIMETER



**TOP VIEW**

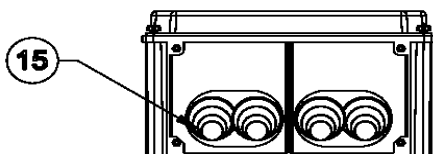


**FRONT VIEW**



**RT. SIDE VIEW**

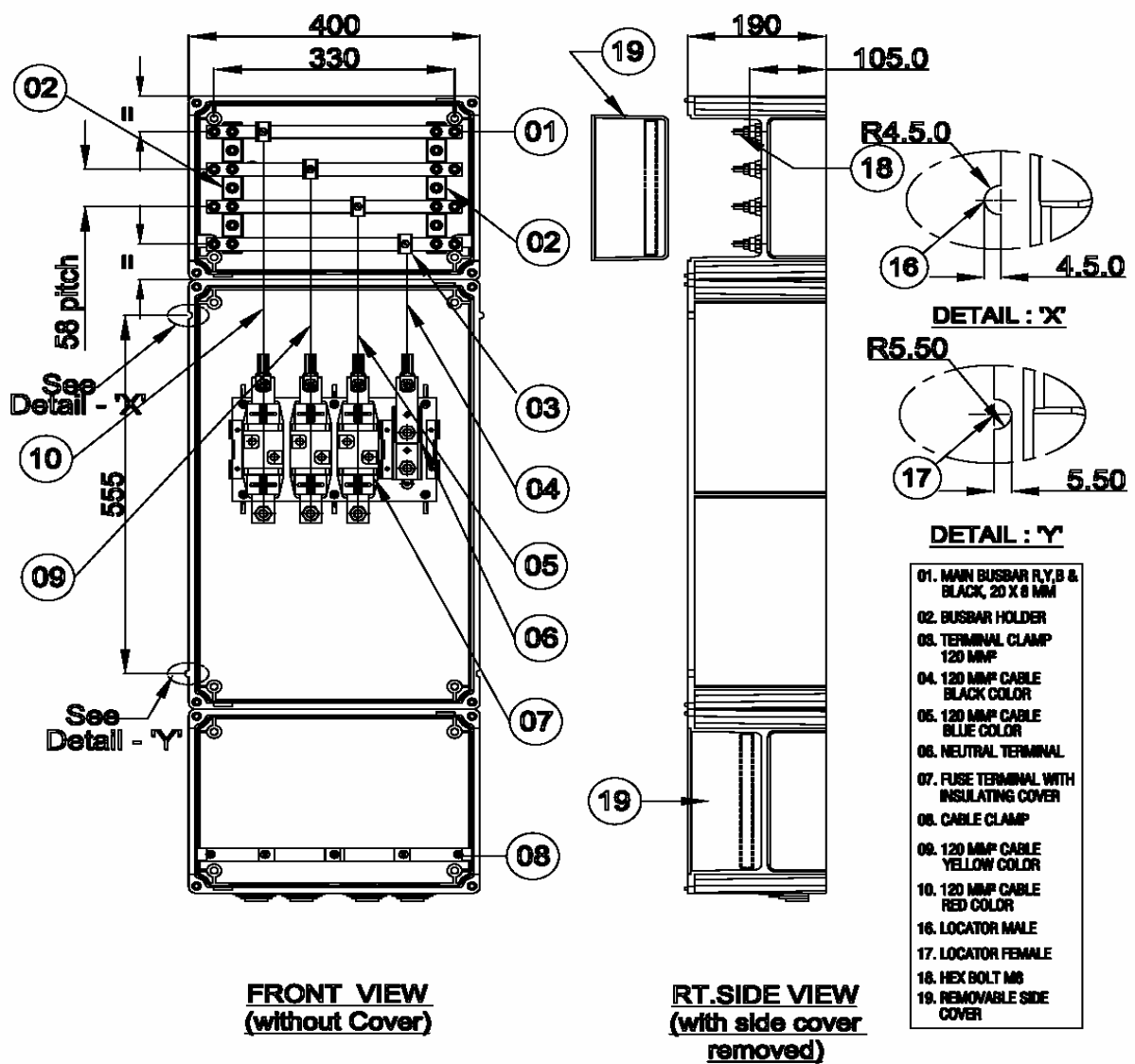
- 11. LOCKING SCREW
- 12. SEC ITEM NUMBER
- 13. SEC MONOGRAM
- 14. MANUFACTURERS MONOGRAM
- 15. CABLE GROMMET



**BOTTOM VIEW**

**INSIDE ROOM METER BOX—MAIN  
CABLE JUNCTION BOX  
(SEC/IRJB-01)**

ALL DIMENSIONS ARE IN MILLIMETER



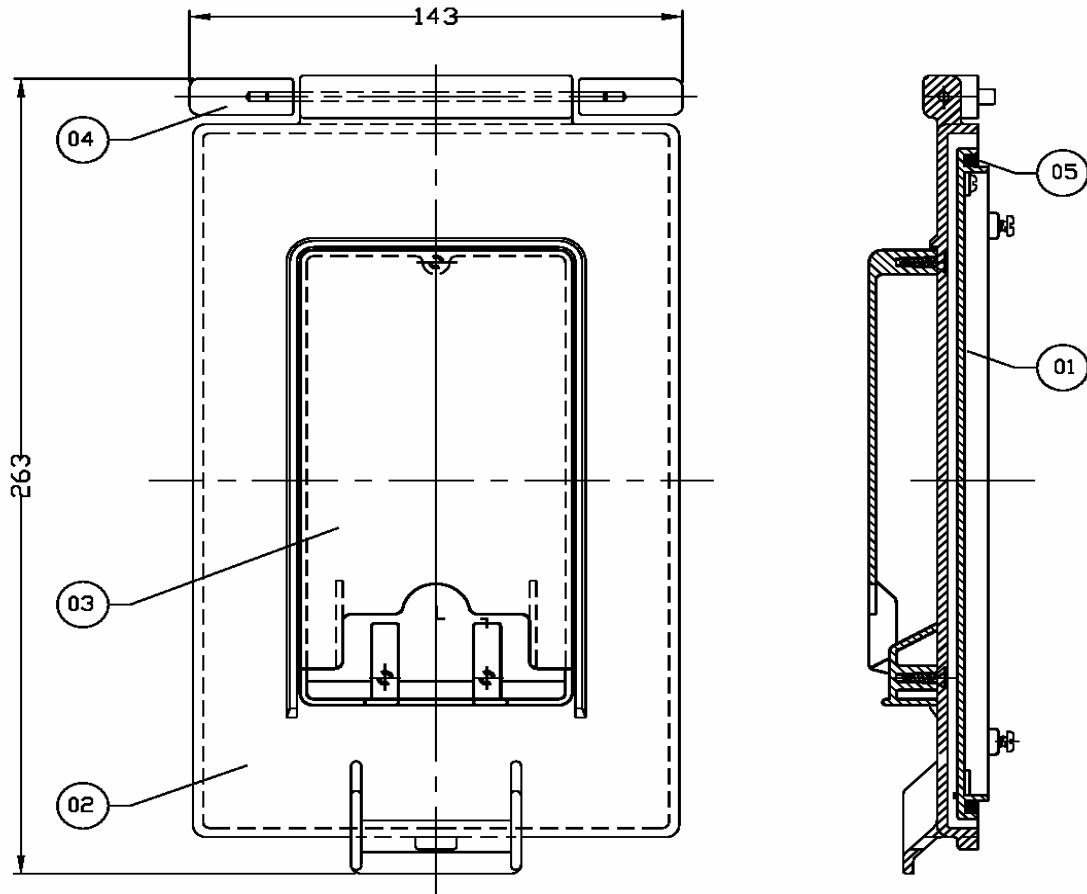
**FRONT VIEW**  
(without Cover)

**RT.SIDE VIEW**  
(with side cover removed)

- 01. MAIN BUSBAR R,Y,B & BLACK, 20 X 8 MM
- 02. BUSBAR HOLDER
- 03. TERMINAL CLAMP 120 MMF
- 04. 120 MMF CABLE BLACK COLOR
- 05. 120 MMF CABLE BLUE COLOR
- 06. NEUTRAL TERMINAL
- 07. FUSE TERMINAL WITH INSULATING COVER
- 08. CABLE CLAMP
- 09. 120 MMF CABLE YELLOW COLOR
- 10. 120 MMF CABLE RED COLOR
- 16. LOCATOR MALE
- 17. LOCATOR FEMALE
- 18. HEX BOLT M6
- 19. REMOVABLE SIDE COVER

**INSIDE ROOM METER BOX**  
**MAIN CABLE JUNCTION BOX-INTERNAL DETAILS**  
**(SEC/IRJB-02)**

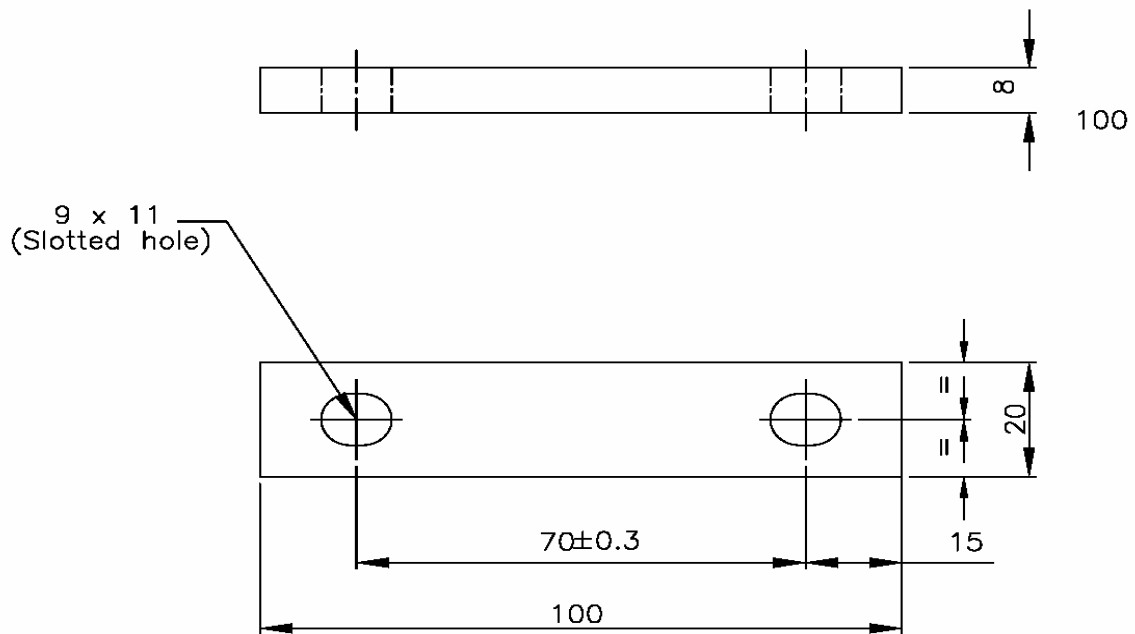
ALL DIMENSIONS ARE IN MILLIMETER



NO.	DESCRIPTION
1	METER WINDOW
2	U.V. COVER
3	BILL POCKET
4	PIVOT
5	GASKET

**METER WINDOW  
ASSEMBLY  
SEC/MB-09**

ALL DIMENSIONS ARE IN MM.



EXTENSION BUSBAR  
(SEC/IREB - 01)

Material : Copper , 20 x 8mm thk. Treatment : Tin Plating

NOTE:

1.Should be free from Sharp corners.

ALL DIMENSIONS ARE IN MILLIMETER