DTS SMX
Surface mounting, outdoor rated
Revenue grade electrical sub-meter

⚠	**IMPORTANT INFORMATION**	
	For proper operation the DTS SMX must be correctly installed and configured for the application. Please see overleaf for a quick start summary checklist of the essential tasks.	**SCAN ME**

The full "DTS SMX – Installation Guide" can be found under "Technical" in the "Data Sheets & Downloads" section on the DTS SMX page on the Measurlogic website. Please scan the QR Code.

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1 QUICK START SUMMARY CHECKLIST

Unless the custom meter configuration option was ordered, the DTS SMX meter will be shipped with its factory default configuration. Therefore, for proper operation the DTS SMX must be correctly installed and configured to suit the application. This section is a quick reference for the essential items.

The section numbers and page numbers in this table are hot links to the relevant sections in the document.

Description	Section	Page
1.1 Overview Please review the supplied items, model number and any supplied CTs to ensure that you have received the correct items and that the DTS SMX model is suitable for your application.	2.1 2.3 2.4	5 6 7
1.2 Hardware Installation Please review the safety guidelines, and mounting requirements and guidelines for information about the hardware mounting of the DTS SMX meter.	2.3	6
1.3 Voltage Connections Connect the DTS SMX meter to the service voltage. The method of connection will depend on whether the service single or three phase, with or without a neutral connection.	4.3 4.4	12 13
1.4 Current Connections This section contains example of the connection of different types of CTs (333mV, Rogowski Coils and 5A), the use of multiple 333mV CTs in parallel. **The CT Rating and Current Sensor Type MUST be set on the switches.**	4.5 4.6 6.3.2.1	14 18 26
1.5 Communications Ethernet Modbus TCP & BACnet_IP. Serial Modbus RTU or BACnet MS/TP. Switch setting for serial protocol, baud rate and addressing.	6.1 6.2 6.3.1	23 23 24
1.6 Input/Output Input/Output connections. Pulse weight switch settings.	4.7 6.3	19 24

2   PRODUCT OVERVIEW

The one revenue grade meter for all applications.

Your new DTS SMX energy sub-meter is one of the most versatile meters available on the market. The DTS SMX can operate in any environment, requires no external power source to operate, and works with all UL or ETL listed 333mV and 1A/5A current transformers (model dependent).

For ease of installation, the DTS SMX is designed to mount on any surface and comes standard with a bright backlit LCD display.

Some of the exciting features provided with the DTS SMX are

- field user-configurable CT ranges

- Fused Voltage Terminals

- Auto-topology Phase Detection and on-board CT Algorithms for automatic correction of reversed field mounted CTs

For remote configurability, your DTS SMX comes with our freely downloadable *DTS Config* software tool

The DTS SMX provides you very accurate data acquisition and is certified to ANSI C12.20 Class 0.5 Revenue Grade. Whether communicating via an RS-485 or Ethernet connection, the DTS SMX supports most accepted protocols, including Modbus RTU, Modbus TCP, BACnet MS/TP, BACnet/IP, SNMP, DNP 3.00 or LonWorks.

Also, if in the future, you decide to integrate renewable energy sources, the DTS SMX will conveniently operate as a Bi-Directional **NET** meter. Easily integrates with Building Automation Systems and Energy Monitoring Software.

Designed and Manufactured in the USA and complies with the Buy American Provisions of ARRA Section 1605.

Thank you for choosing Measurlogic and a meter from the DTS Family.

2.1   Supplied Items

Check that the meter and equipment matches your order specifications and has not been damaged during shipping. Verify that the following item(s) match with the corresponding model from the data sheet:

- Installation Guide

- DTS SMX power & energy meter

- 3x Pre-installed fuses for line voltage inputs

- 6-Pin green pluggable screw terminal connector for digital inputs and/or outputs (**if applicable**)

- 3-Pin green pluggable screw terminal connector for serial communications wiring (**if applicable**)

- 3-Pin green pluggable screw terminal connector for DC auxiliary power input wiring (**if applicable**)

2.2 Document Conventions

SYMBOLS

⚠	ATTENTION – PLEASE CONSULT THE INSTALLATION MANUAL
⚡	WARNING – RISK OF ELECTRICAL SHOCK

2.3 Product Specification
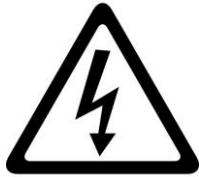
WARNING
Verify that the model of DTS SMX that was shipped is used for the correct installation. Failure to use the correct CT's or connecting too high a voltage can result in permanent damage to the DTS Meter.

DTS SMX - Ax-xx-x-F-xx

2.3.1 Current Inputs

Current Inputs	Value	Description	Notes
A	3	333mV CT or Rogowski Coil CT	Any 333mV CT is acceptable
	5	1 Amp or 5 Amp CT	**User supplied shorting blocks** are required with these CT's
	9	Unburdened CT (Legacy)	Only use the CT's that came with the unit

Note: Make sure that the DIP Switch settings on the DTS SMX are set to the correct CT Primary. See section 6.3.1 on page 24. If all Dip Switch settings on the DTS SMX are "off" please contact Measurlogic.

2.3.2 Service Type

Service Type	Value	Description	Neutral Required	Neutral Optional
F	N	(1P 2W, 1P 3W, 3P 4W) 120 – 277Vac L– N	●	
	2	(3P 3/4W) 208 – 240 Vac L– L		●
	4	(3P 3/4W) 480 Vac L– L		●
	6	(3P 4W) 600Vac L– L	●	

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2.4   DTS SMX Layout

The following figure shows the layout of the DTS SMX as well as the section number and pages of the installation guide that describe how to interact with each of the features of the DTS SMX.

Note that not all features listed here are included with every DTS SMX. Please refer to the model number to determine which features are included.

- Voltage and CT connection, Section 4.4, Page 13

- Digital I/O, Section 4.7, Page 19

- Serial Communications, Section 6.2, Page 23

- Ethernet Communications, Section 6.1, Page 23

- DIP Switch Setting, Section 6.3, page 24

Ethernet Communications

Serial Communications

Digital I/O

DIP Switches

CT Connections

Voltage Connections
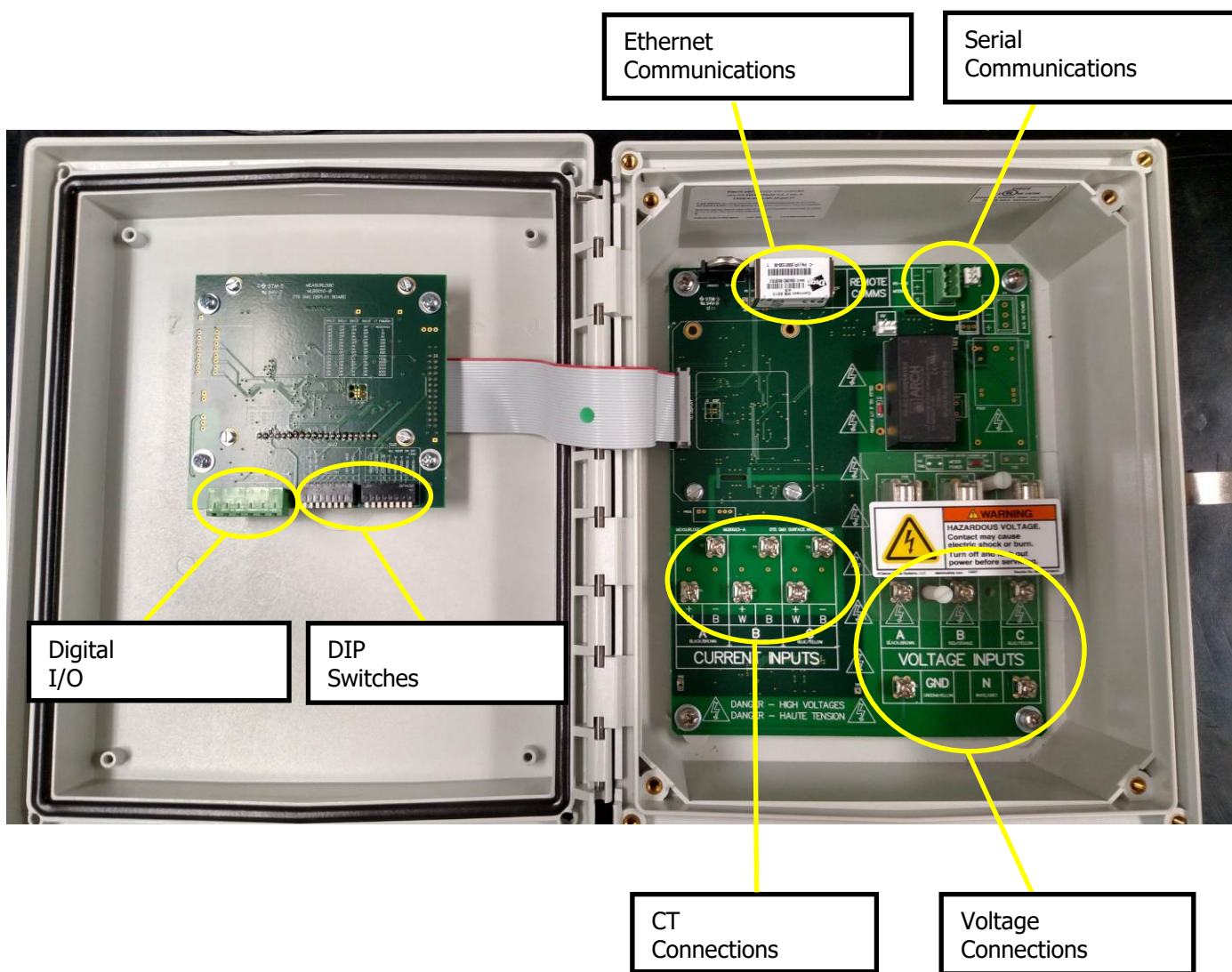
3   INSTALLATION

3.1   Safety Guidelines

<table>
<tr><td rowspan="2"></td><td>**WARNING**</td></tr>
<tr><td>The following installation instructions are intended for qualified personnel only. To avoid the risk of electrical shock and personal injury, do not perform additional tasks not stated in this procedure unless you are qualified to do so.</td></tr>
</table>

Always adhere to the following safety guidelines:

- Only qualified personnel or **licensed electricians** should handle the installation. Input voltages to the DTS SMX can be hazardous.

- Follow all applicable local and national electric codes.

- Verify input voltage and current are within thresholds for the specific DTS SMX model. (See Product Specification on page 6)

- Use only UL or ETL listed current transformers. **ONLY USE CURRENT TRANSFORMERS THAT ARE SPECIFIED BY THE MODEL OF DTS SMX. USE OF ANY OTHER CURRENT TRANSFORMER OTHER THAN THE ONE SPECIFIED BY THE DTS MODEL CAN RESULT IN PERMANENT DAMAGE TO THE DTS SMX.**

- Ensure that the in-line fuses located on the main board of the DTS SMX are fitted and securely fastened.

- Avoid any electrostatic discharge while dealing with any of the internal components of the DTS SMX by first touching a grounded structure prior to handling internal components.

- Before applying power make sure that all current transformer and voltage connections are securely connected to the main board of the DTS SMX.

- If the DTS SMX is installed incorrectly any built in safety features may no longer be functional.

- Before opening the DTS SMX ensure that all power running to the DTS SMX is removed.

- Under normal operation the DTS SMX should be secured with a **user supplied lock** to ensure there is no unauthorized access to the live connections in the enclosure.

3.2 Product Dimensions
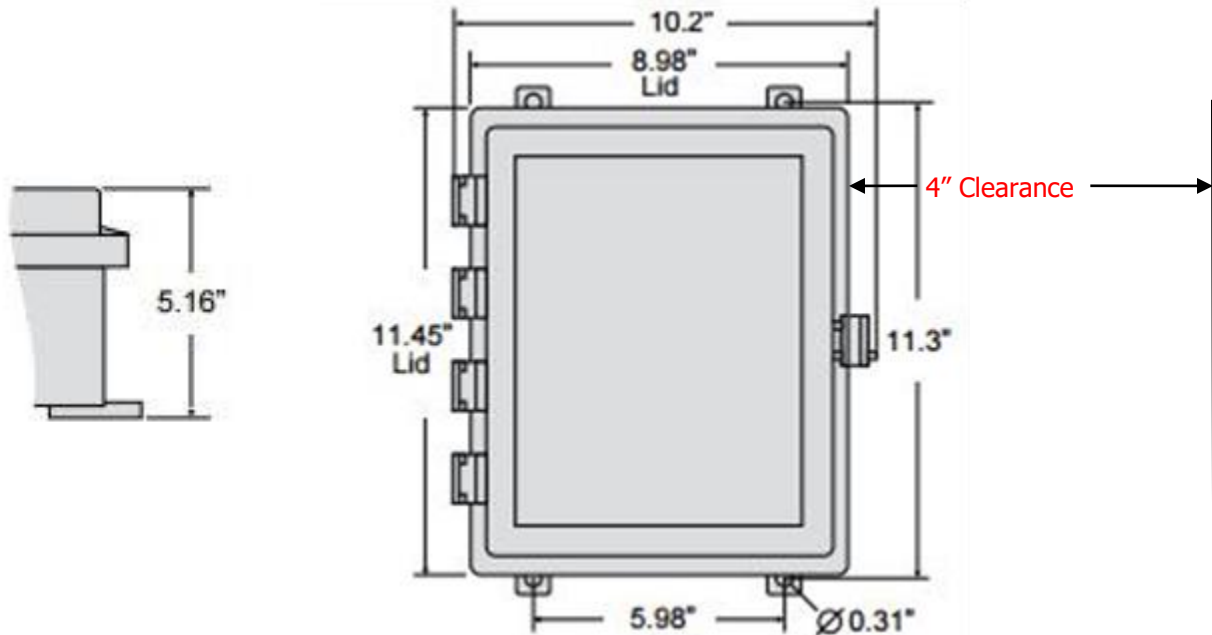
- Make sure that holes are spaced 5.98" (159 mm) horizontally and 11.3" (287 mm) vertically.

- Screw heads should have a diameter greater than 0.31" (7 mm) or utilize a suitably sized washer.

3.3 Mounting Requirements and Guidelines

⚠	**ATTENTION**
	Make sure to follow the following mounting requirements and guidelines when mounting the DTS SMX.

When mounting the DTS SMX make sure to follow these guidelines:

- Mount the DTS SMX as close as possible to the electrical panel being monitored.

- Make sure there is at least 4" of space between the latch of the lid and any obstruction.

- Make sure that the lid can fully open and close without any interference.

- Position the DTS SMX such that the labeling and screen can be read from the upright position.

- Do not use the DTS SMX enclosure as a guide to drill mounting holes. This can damage the DTS SMX enclosure.

- When mounting the DTS SMX, make sure to choose the appropriate fastener or anchor for the type of wall that the DTS SMX will be mounted on.

- It is recommended that two separate conduits be run for voltage and current connections.

- If installing the DTS SMX outdoors, run the electrical conduits from the bottom of the DTS SMX to the electrical panel being monitored. If necessary install drip hook/loops to allow water to flow away from the DTS SMX or electrical panel.

- Only UL or ETL rated conduits and glands should be used.

- Only UL or ETL Current Transformers should be used.

- A spade or ring lug termination is recommended for optimally secure voltage and current connections.

- A UL or ETL certified circuit-breaker or fused disconnect must be installed within easy reach of the DTS SMX. The circuit-breaker or fused disconnect must be marked as the disconnecting device for the DTS SMX.

- 14 to 12 AWG wire should be used for the voltage and ground with a 300V or 600V insulation depending on installation type.

- Use the breaker guide below to determine the type of breaker to use for installation. The breaker is used to protect the wiring from the breaker panel to the inputs of the DTS SMX.

BREAKER GUIDE	
Gauge of Wire	Recommended Breaker
14	15 Amp 3-Pole Breaker
12	20 Amp 3-Pole Breaker

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4   CONNECTING TO THE DTS SMX

4.1   Silver Barrier Terminals for Voltage and Current Transformer Inputs

The DTS SMX meter is equipped with silver barrier terminal blocks for external voltage and current transformer connections to the meter, and their function is clearly marked on the silkscreen of the main circuit board.

Silver Terminals	Value
Wire Stripping Length	7mm to 8mm (about 0.3")
Torque Value	0.8 N m (7.02 lb in)
Suitable Screwdriver	Philips #2

Although it is possible to insert the stripped ends of the wires directly into the silver terminal blocks, it is recommended to use either spade or ring crimp connectors, as these made a more secure connection. Spade connectors are preferred since these can be inserted without having to fully remove the screw.

	Spade Connectors			
	AWG	Color	ElecDirect *	DigiKey *
Voltage (20A CB)	12	Yellow	561075	A0898-ND
Voltage (15A CB)	14	Blue	561062	A0978-ND
333mV CTs	18-22	Red	561049	A0975-ND
Rogowski CTs	24	Red	561049	A0975-ND

	Ring Connectors			
	AWG	Color	ElecDirect *	DigiKey *
Voltage (20A CB)	12	Yellow	561033	A0969-ND
Voltage (15A CB)	14	Blue	561018	A0964-ND
333mV CTs	18-22	Red	561002	A0957-ND
Rogowski CTs	24	Red	561002	A0957-ND

4.2   Pluggable Green Terminals for Digital I/O and RS-485 Communications

Green Terminal Plugs	Value
Wire Gauge Range	24 to 12 AWG
Wire Stripping Length	7mm to 8mm (about 0.3")
Torque Value	0.5 N m (4.43 lb in)
Suitable Screwdriver	3.0mm or 3.5mm flat head

The digital input and output connections on the display circuit board on the door and the RS-485 communications use green terminal plugs. The stripped ends of the wires can be fitted directly into the terminal cages of the green terminals plugs. If you would prefer to use ferrules for multi-strand wires, here is a list of parts required.

	Ferrules			
	AWG	Color	ElecDirect *	DigiKey *
Pulse or Digital Inputs	18-22	Red	FER-18-8D	288-1015-ND
RS-485 Comms	18-22	Red	FER-18-8D	288-1015-ND

For convenience, part numbers and links are provided for ElectDirect and DigiKey but any equivalent part is acceptable.

4.3 Voltage Connections

The DTS SMX comes with easy to use voltage connection points and in-line fuse connections.

⚠	ATTENTION
	Voltage connections should come from the same lines that the CT's will be connected to.

In-line fuse clips. See section 5.1 for fuse details.

Silver Voltage screws. Terminate voltage connections here.

If present, terminate GROUND here

If present, terminate NEUTRAL here

Use appropriate breaker and wire for voltage connections. See section 3.3 for reference.

VOLTAGE INPUTS

GND
GREEN&YELLOW

N
WHITE/GREY

A
B ←Source
C
N

Load→

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4.4 Voltage Connections (Medium Voltage with 2 PTs)

Potential Transformers (PTs) need to be used to monitor medium voltage applications. Normally two delta PTs are used without a neutral connection. This section shows the wiring connection for these two PTs.

WARNING
Extreme care should be exercised with medium voltage applications. The connection diagram shown below is a simplified connection diagram only. Connect the PTs strictly according to national code and as recommended by the PT manufacturer.

In-line fuse clips. See section 5.1 for fuse details.

Silver Voltage screws. Terminate voltage connections here.

If present, terminate GROUND here

No NEUTRAL Connection

VOLTAGE INPUTS

GND GREEN&YELLOW   N WHITE/GREY

Primary fusing shown is illustrative only. Actual fusing is normally an integral part of the PT itself.

Use wiring according to national code and as recommended by the PT manufacturer.

A

←Source   B   Load→

C

N

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4.5 333mV and Rogowski Coil CT

⚠	**ATTENTION**
	Make sure that your model of DTS SMX is approved for the following wiring guidelines.
	Note: CTs should be connected to the same panel as the voltage connections.

4.5.1 Single Phase 2/3 Wire Example

Make sure CT arrows point TOWARDS the LOAD

←Source

Breaker →

Load→

A
B
C
N
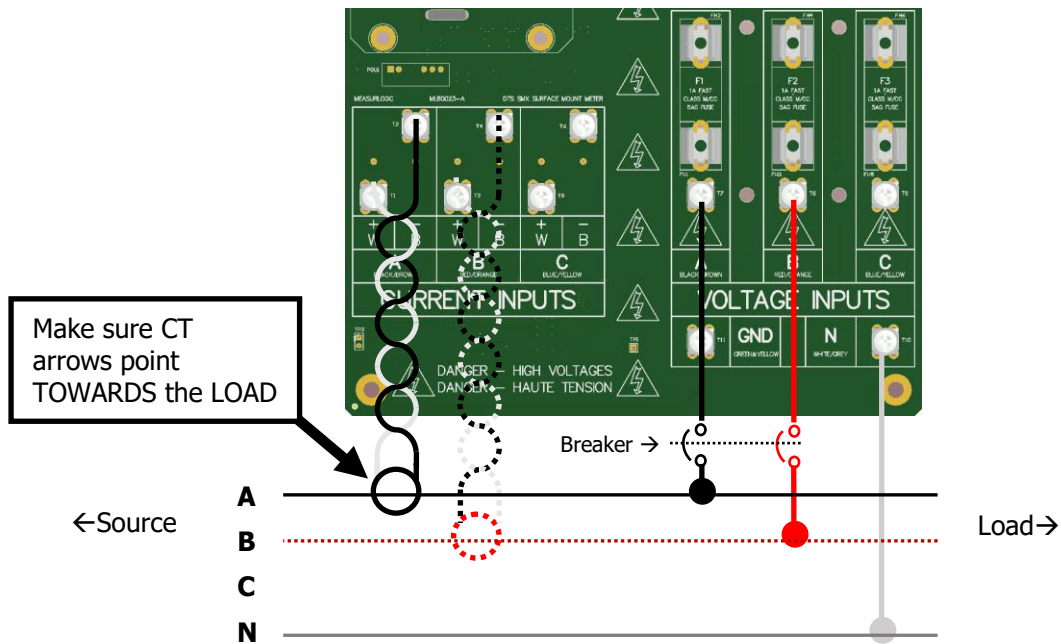
4.5.2 3-Phase with Optional Neutral (Model Dependent)

Make sure CT arrows point TOWARDS the LOAD

←Source

Breaker →

Load→

A
B
C
N
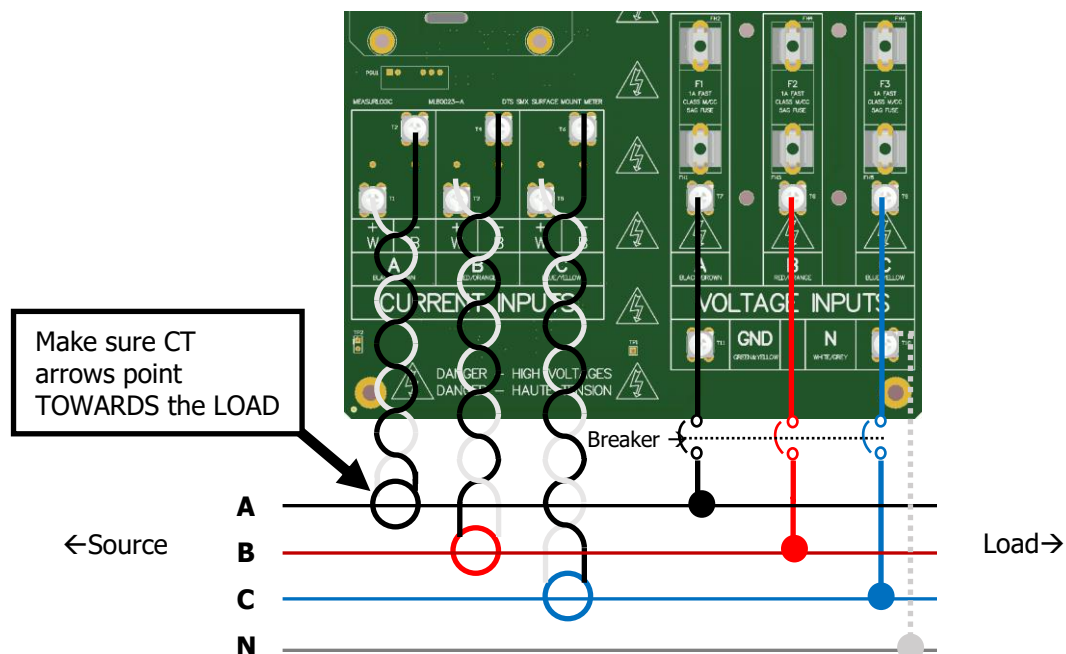
4.5.3 Connecting the CTs from Multiple Loads to the Screw Terminals

The DTS SMX allows for ease and flexibility when monitoring multiple branches as a **Total Load**. The DTS SMX allows multiple CT sensors to be connected in parallel via the screw terminals.

When using parallel CT sensors, the following guidelines must be followed to ensure accurate measuring.

- All CT sensors **must have a 333mV output**. (Rogowski CTs cannot be connected in parallel.)

- All CT sensors must be of the **same manufacturer/model number and current rating**.

- A full set of CT sensors must be used for each load.

- The pair of wires from the CT sensor to the screw terminal must be twisted.

- All CT sensors must be terminated at the screw terminal.

- A maximum of 3 loads can be monitored at once (Contact Measurlogic if more than 3 loads must be monitored).

- The measured phase current will be the total current across all the loads on that phase.

- The CT primary rating for the DTS SMX must be set to the **CT rating * Number of CT sets.**

- The example below shows how to calculate the service current for figure 3.1.1.

Service Current for Figure 3.1.1	
Number of CT Sensor Sets	2
CT Rating	100 Amps
CT Primary	200 Amps
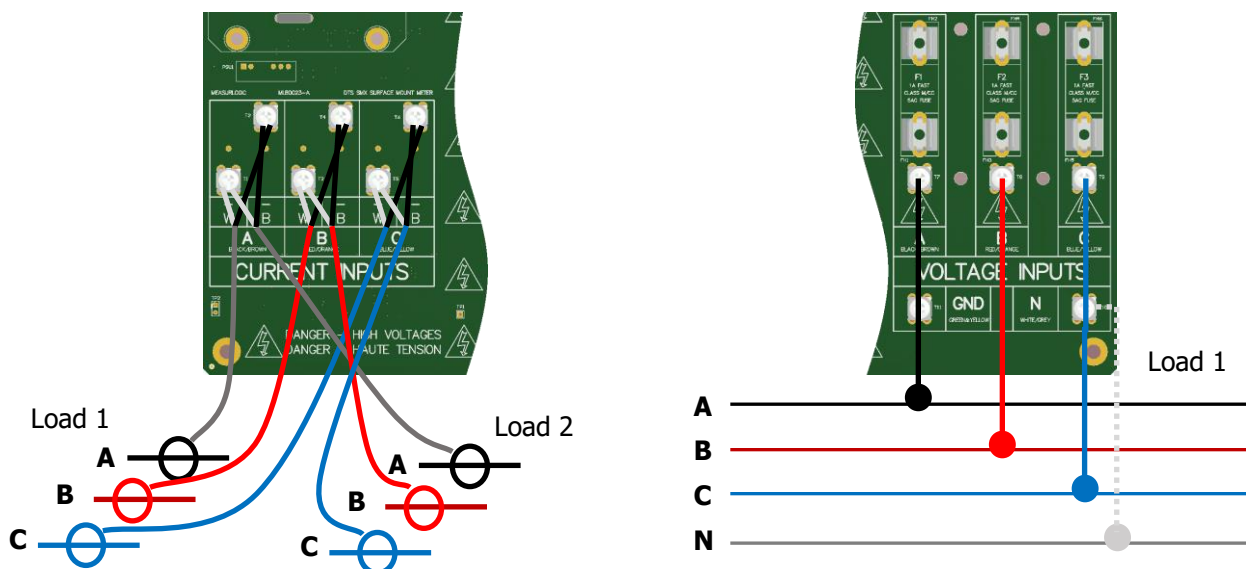
4.5.4 Connecting the CTs from Multiple Loads to the 333mV CT Daughter Board: (CPCC-1172 ML)

The optional 333mV CT daughter board (**Part number CPCC-1172 ML**) for the DTS SMX provides an easier way to connect up to three (3) CTs per phase to the DTS SMX meter. This daughter board will be factory fitted when ordered with the DTS SMX meter. **The technical details in Section 4.5.3 also apply to this section.**

ATTENTION
• Do NOT connect to the silver screws
• Terminate on the GREEN shorting connectors ONLY
• The silver screws must NOT be removed
• **See Section 4.5.3 for CT Primary Settings**
Note: CTs should be connected to the same panel as the voltage connections.

Do NOT remove or connect wires to SILVER screws

Only connect the corresponding CTs to the green connectors

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4.5.5 Connecting Multiple Loads through One Set of 333mV CTs

The total of multiple loads may be measured by passing all the conductors of each phase through the CT for that phase. This example shows three loads. **The technical details in Section 4.5.3 also apply to this section.**

ATTENTION
• Do NOT connect to the silver screws
• Terminate on the GREEN shorting connectors ONLY
• The silver screws must NOT be removed
• **See Section 4.5.3 for CT Primary Settings**
Note: CTs should be connected to the same panel as the voltage connections.

Do NOT remove or connect wires to SILVER screws

Only connect the corresponding CTs to the green connectors

This wiring can also be done without the optional 333mV CT daughter board shown here. See current connections in image in section 4.5.2.
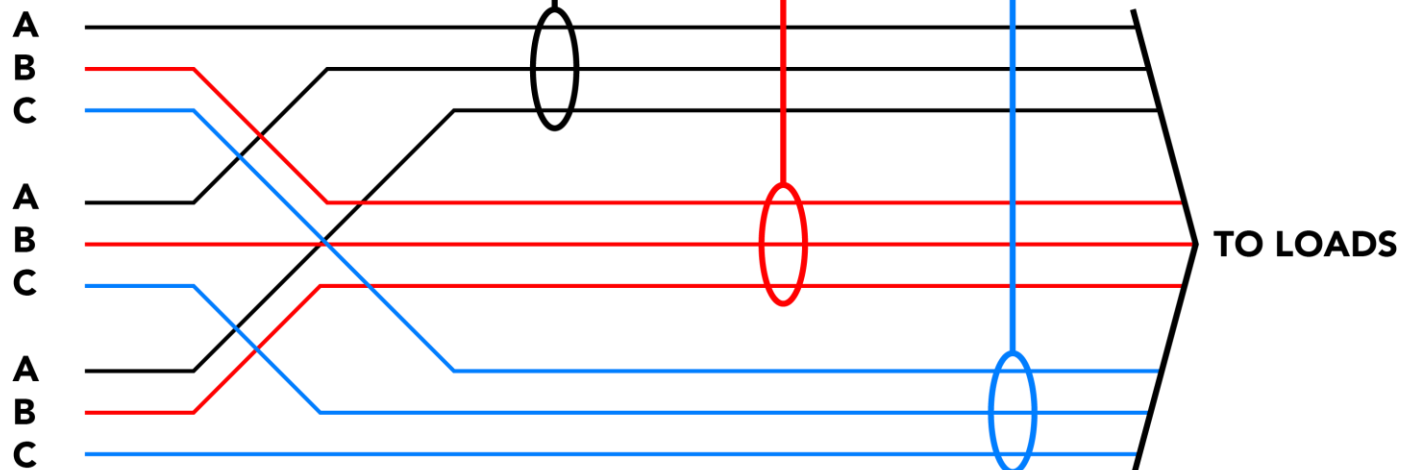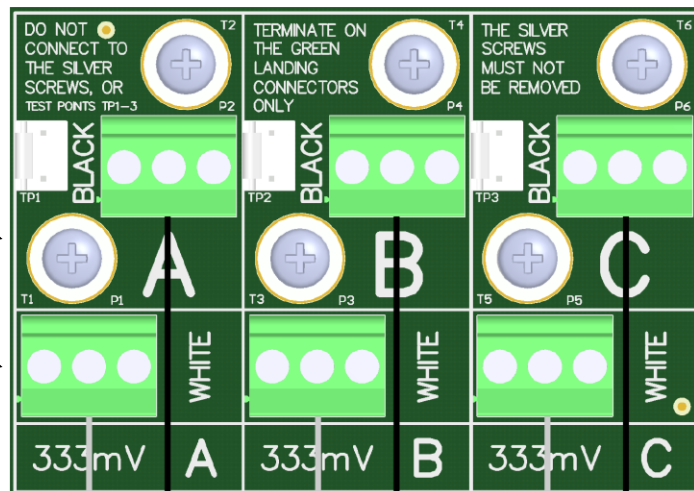
4.6 5 Amp Secondary CT Daughter Board (CPCC-1160 ML)

SMX units rated for 5 Amp CT's come with a 5 Amp connection daughter board (**Part Number CPCC-1160 ML**) factory pre-installed as seen in the diagram below.
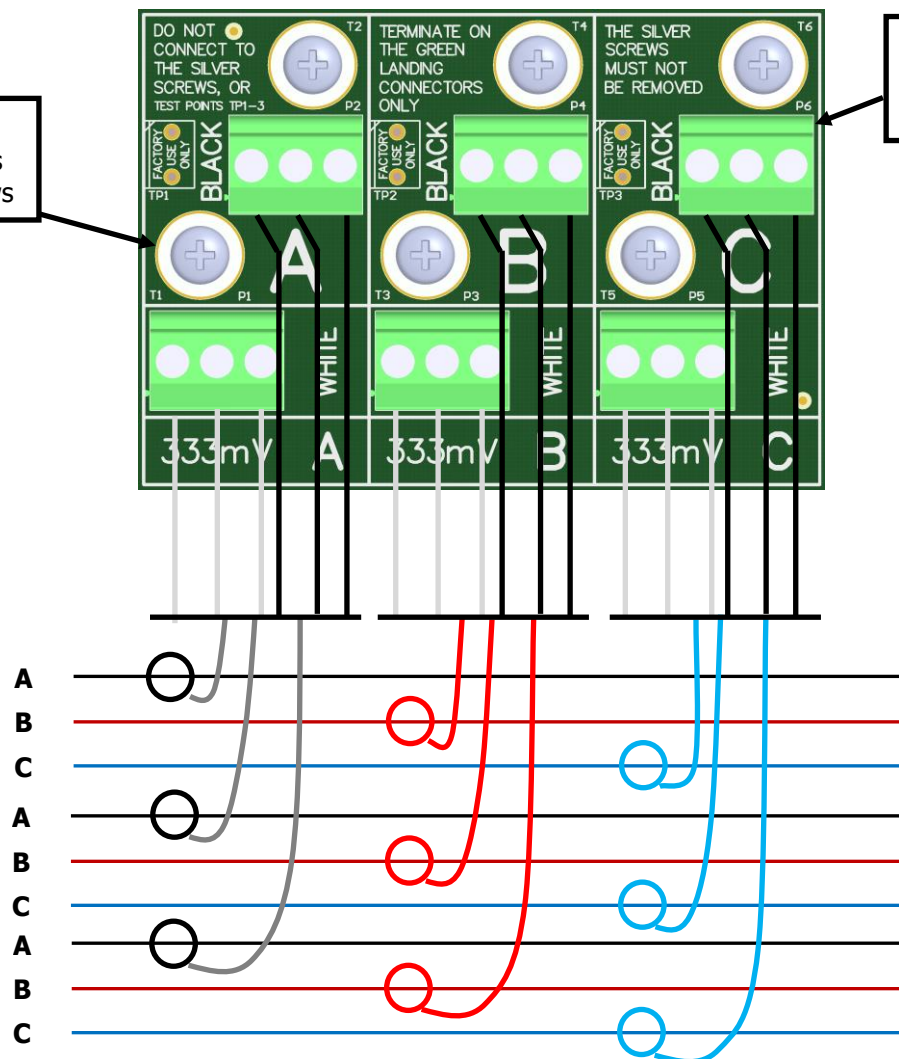
ATTENTION
• Do NOT connect to the silver screws
• Terminate on the GREEN shorting connectors ONLY
• The silver screws must NOT be removed
Note: CTs should be connected to the same panel as the voltage connections.

Do NOT remove or connect wires to SILVER screws

Terminate BLACK and WHITE wires on GREEN connectors.

Feed WHITE Wire through CTs on Main Board

Make sure CT arrows point TOWARDS the LOAD

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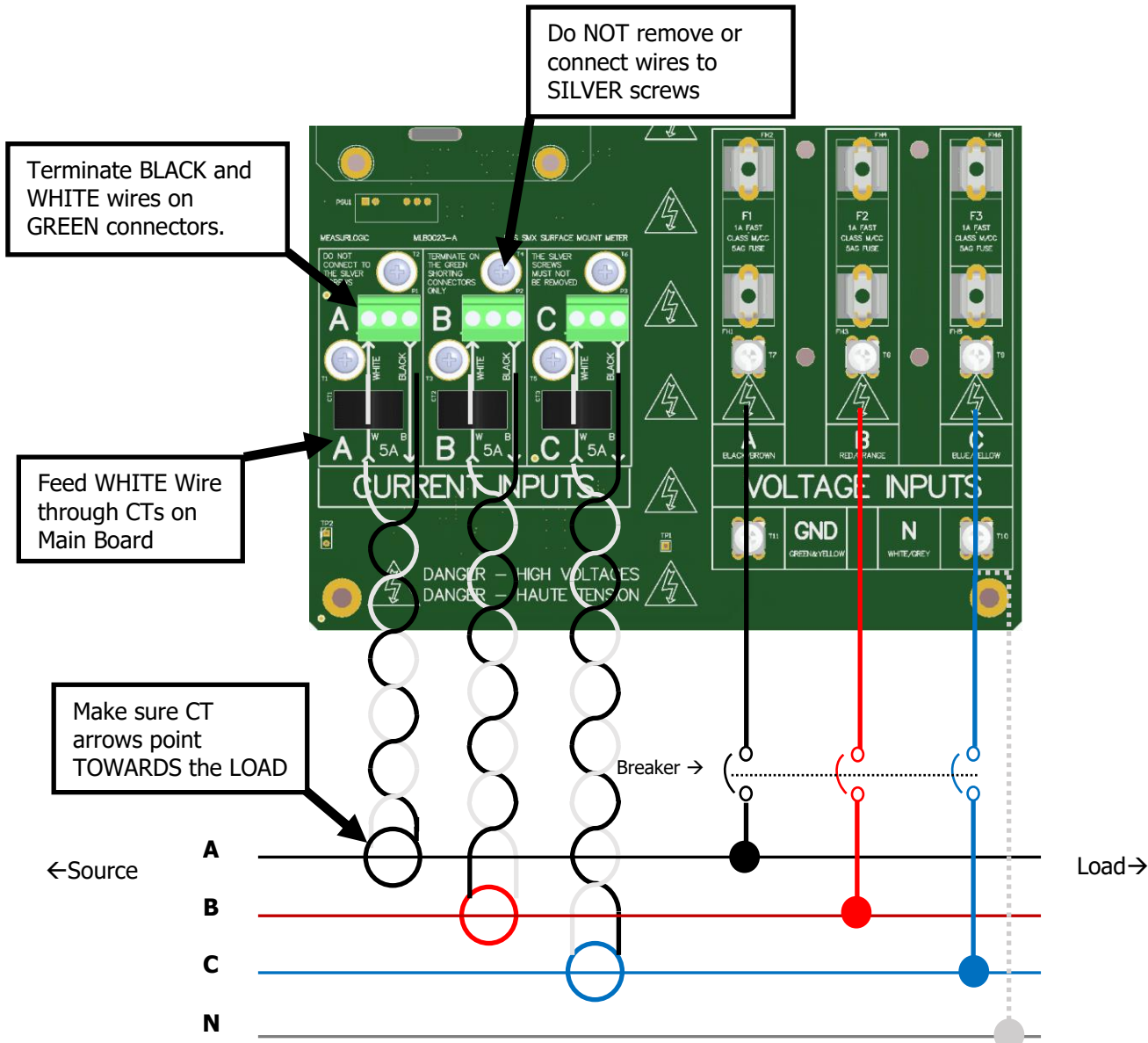
4.7 DTS SMX Digital I/O Circuit (Optional)

The DTS SMX has 3 pairs of terminals on the bottom of the door-mounted display circuit board which are dedicated to digital inputs and outputs. These terminals support multiple hardware configurations, depending on the model ordered.

I/O Ordering Option	DIGITAL I/O		PULSE OUT
	Ch1	Ch2	Ch3
-P	---	---	Output
-A	Input	Input	Output
-3	Output	Output	Output
-1	Input	Input	---
-N	---	---	---
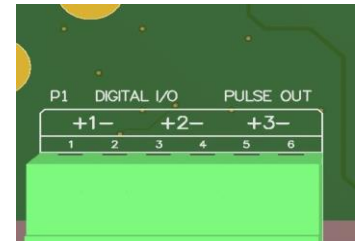
Digital I/O Ch1-Ch3
(left to right)
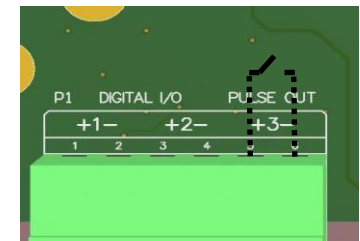
Counter / digital input module

4.7.1 Digital Outputs

- The DTS digital outputs are potential-free solid state N.O. relays that can be configured using DTS Config for energy pulses or threshold triggers.

- Ch3 *(marked "PULSE OUT" on the silkscreen)* on the SMX is dedicated to the meter's kWh pulse output. See Section 6.3.2 for the pulse rate settings (Switches 2.1 and 2.2).

- Other digital outputs (if fitted) may be used for pulsing or threshold triggers.

4.7.2 Digital Inputs

- The DTS digital inputs on Ch1 and Ch2 *(marked "DIGITAL I/O" on the silkscreen)* accept dry contacts or NPN open collector inputs.

- The DTS digital inputs can be configured using DTS Config as level status inputs and/or linked to a General Counter for input pulse counting.

DIGITAL INPUT & OUTPUT WIRE GAUGE INFORMATION
- Suitable wire gauge is 18/2 to 22/2 AWG   - The wire pair does not need to be shielded or twisted.   - For longer distances (>100ft) use 18/2 AWG.

5   Maintenance and Service
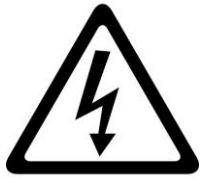
WARNING
Make sure to disconnect power to the DTS SMX prior to changing the battery or voltage fuses. Failure to do so may result in electric shock or arc risk.

The only user serviceable parts inside the DTS SMX are the voltage fuses and coin cell battery. The detailed parts specifications and replacement procedures can be found in sections 5.1 and 5.2.

There are NO other user serviceable parts in the DTS SMX, and no regular maintenance is required. If additional maintenance is needed, please contact Measurlogic Inc.

5.1   Voltage Fuses

The DTS SMX is fitted with three in-line fuses. See section 5.1.2 for the replacement procedure.

5.1.1   Voltage Fuse Specifications

The voltage inputs are fitted with fusing appropriate for the model of meter ordered (represented by F1-F3 in the diagrams below) and are rated at 2A 600Vac for 480V systems or 2A 250V for 208V systems.

Description:	1 3/8" or 1 1/2" Long 2A Fast-acting type fuse
Manufacturer:	Littlefuse or equivalent
Manufacturer Part Number:	BLS 2 or equivalent
Nominal Voltage (V):	250Vac or 600Vac (Service Dependent)
Current Rating (A):	2

5.1.2   Fuse Location and Replacement

- Remove the plastic safety cover from the fuses by unscrewing the plastic nuts located in figure 4.1a

- Remove the blown fuse from its holding clip and replace with the new fuse.

- **DO NOT** wedge a flat head screwdriver or other type of device into the clip to remove the fuse. This can damage the fuse clip.

- Replace the plastic safety cover and nuts

Figure 4.1a

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5.2 Battery

The DTS SMX is fitted with a 3V coin cell battery to support essential core functions. The battery life is typically 5 years or more. See section 5.2.2 for the replacement procedure.

5.2.1 Battery Specifications

Description:	Lithium Battery Non-Rechargeable (Primary) 3V Coin, 20.0mm
Manufacturer:	Panasonic or equivalent
Manufacturer Part Number:	CR2032
Nominal Voltage (V):	3
Nominal Capacity (mAH):	225
Continuous Standard Load (mA):	0.2
Operating Temperature (C):	-30 ~ 60

5.2.2 Battery Location and Placement
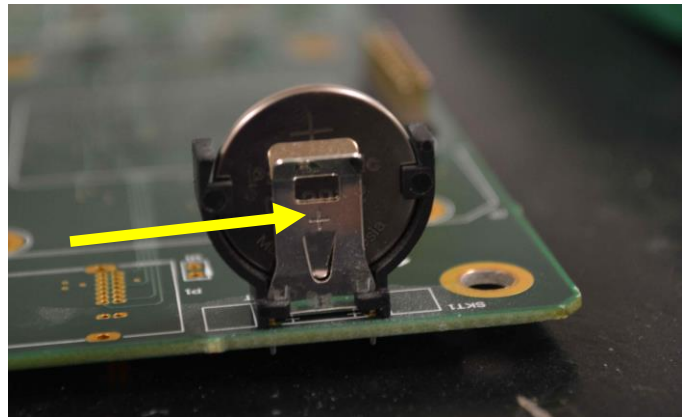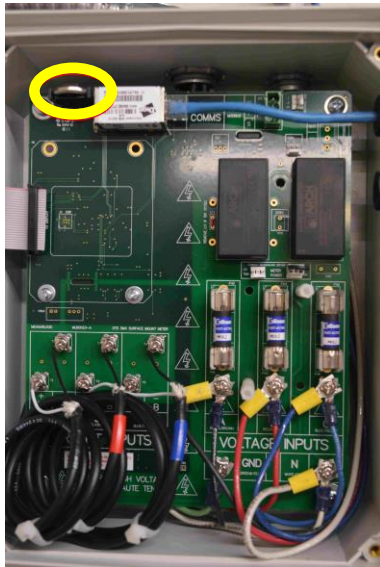
Figure 4.2a – Location of battery

Figure 4.2b – Battery Orientation

- The coin cell battery is located in the upper left on the main board of the DTS SMX as shown in figure 4.2a.

- When replacing the battery make sure that the "+" side of the battery is facing the same direction as the "+" marking on the battery clip as seen in Figure 4.2b.

5.2.3 Disposal

Button cell batteries contain so little lithium that they never qualify as a reactive hazardous waste. These batteries are safe for disposal in the normal municipal waste stream. Disposal of large quantities of undischarged lithium batteries should be performed by permitted, professional disposal firms knowledgeable in Federal, State and local hazardous material and hazardous waste transportation and disposal requirements.

Please check your local and state regulations on how to properly dispose of your lithium coin cell batteries.

5.2.4 First Aid

If you get electrolyte in your eyes, flush with water for 15 minutes without rubbing and immediately contact a physician.

If you get electrolyte on your skin wash the area immediately with soap and water. If irritation continues contact a physician.

If a battery is ingested, call the National Capital Poison Center (NCPC) at 202-625-3333 (Collect) or your local poison center immediately. Lithium coin batteries lodged in the esophagus should be removed immediately. Leakage, chemical burns and perforation can occur within hours of ingestion.

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6   DTS SMX COMMUNICATIONS INTERFACE

The DTS SMX has either a Serial or Ethernet TCP/IP communications interface depending on the model ordered. Protocols that are supported are:

Ethernet		Serial RS-485		Serial FT-10	
Modbus TCP	(-EB)	Modbus RTU	(-SM)	LonWorks	(-SL)
BACnet_IP	(-EB)	BACnet MS/TP	(-SB)		
SNMP V1	(-ES)				
DNP3	(-ED)				

6.1   Ethernet Communications

Ethernet Port with Link/Activity LEDs

Ethernet communication is available through the standard Ethernet RJ45 socket mounted on the top of the main circuit board. Modbus TCP, BACnet/IP, SNMP, and DNP3 Ethernet are the protocols available, **depending on the model ordered**. Modbus TCP is always simultaneously available alongside any other ordered protocol. Connect to an Ethernet switch or router by means of a standard, straight Cat5 Ethernet cable. Each DTS with Ethernet connectivity has a globally unique MAC address which is listed on the label. By default, the meter is set to a static **IP address** of **192.168.1.150** and the default **Modbus Address, BACnet Device ID, and DNP Addresses** is **100.**
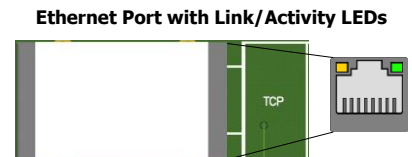
The IP address can be changed to any valid IP address using the **DTS Toolbox** utility**.** Download the latest version from https://www.measurlogic.com/software-drivers/. Alternatively, an e-mail can be sent to info@measurlogic.com to request the latest version of the DTS Toolbox, its Quick Start Guide, specific protocol documentation, or MIB files for SNMP devices.

Ethernet meters must be ordered to suit your primary protocol (BACnet_IP, SNMP, DNP3). The Modbus TCP protocol is always available in addition to the primary protocol.

6.2   RS-485 2-Wire Communications

Serial RS-485 2-Wire Port

The RS-485 port communicates using either the Modbus RTU **or** BACnet MS/TP protocol, **depending on the model ordered**. Connection is made by means of a pluggable 3-way screw terminal that accepts up to 2.5 mm^2 (12AWG) wire. Suggested communications wire is 18-22 AWG twisted pair shielded cable. To connect multiple DTS SMX meters on the same RS-485 communications bus, the meters should be daisy-chained together.
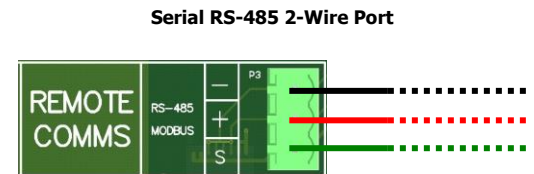
Do not connect the meters in a STAR, RING, or other wiring topology that is not a daisy-chained BUS.

Only one serial protocol can be used at a time on the RS-485 bus.

6.3 Configuring the DIP Switches – Communications Settings, CT Ratings and Other Options

The DTS SMX has two 8-way DIP switches that provide the user a simple and flexible interface for configuration. The **right hand side** block of DIP switches (SW1) are used to set up the device's address and baud rate for RS-485 interfaces, while the **left hand side** block of DIP switches (SW2) control display, digital output, and CT ratio options.

6.3.1 Serial Communications Settings (Modbus RTU & BACnet MS/TP)

<u>**Switch 1 (Not used for Ethernet Models)**</u>

- Baud Rate (Switch position 1)
- Address/MAC (add switch weight when ON)
- Switches 2-8 OFF – Fixed Default Address 100
- **ALL** switches ON – DTSConfig configurable.
- BACnet Device ID = 473000 + MAC address
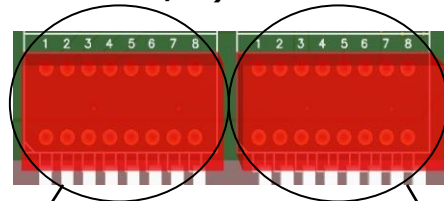
Switch 2	Switch 1
Display/Pulse/CT Settings	Communications

Description	Switch Position Meaning and Weight							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
9600 Baud Rate	OFF							
19200 Baud Rate for Modbus RTU 38400 for BACnet MS/TP	ON							
Modbus Address or BACnet MAC & Device ID		64	32	16	8	4	2	1
Default Address 100		OFF	OFF	OFF	OFF	OFF	OFF	OFF
Set Address/baud with DTSConfig	ON	ON	ON	ON	ON	ON	ON	ON
EXAMPLE	OFF	ON	ON	OFF	ON	OFF	OFF	ON
	9600	64	32	-	8	-	-	1
	Address / MAC = 64 + 32 + 8 + 1 = 105							
	Baud Rate (Switch Position 1) = 9600							

⚠️

ATTENTION
For DTS SMX meters with firmware version V3.1950 and later, the serial protocol can be switched between Modbus RTU and BACnet MS/TP using switch SW3.4 as per section 6.3.2.1 on page 26.

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6.3.2   CT Ratings, Digital Output Mapping and Backlight

<u>Switch 2</u>

- Switch 2 controls 3 separate functions through the binary states of the switches:

Description	Switch SW2 Position							
	.1	.2	.3	.4	.5	.6	.7	.8
Backlight								X
CT Primary Current Rating			X	X	X	X	X	
Pulse Rate for Output 3	X	X						

- Positions 1-2 dictate the mappings for Digital Output 3. The table below represents the different settings. If the switches are both set to the OFF position, the digital output will be **configurable** through the communications interface instead.

Switch 2.1-2.2 - Digital Output Mapping		
SW 2.1	SW 2.2	Mapping
OFF	OFF	CONFIGURABLE
OFF	ON	1 pulse / 0.1kWh
ON	OFF	1 pulse / 0.5kWh
ON	ON	1 pulse / 1.0kWh (Default)

- Position 8 controls the display backlight. Position the switch **ON** for a backlight and **OFF** for no backlight.

- Positions 3-7 indicate the CT Rating of the 333mV or 5A CTs. The tables below represent the switch settings for various CT Primary Current Ratings. If the switches are all set to the OFF position, the CT ratio will be **configurable** through the communications interface instead. If Rogowski Coil CTs are being used, please see the following pages for more details.

ATTENTION
The latest version of the display board is shown in section 6.3.2.1 on page 26.
If your display board does not look like this, please see the legacy display board versions shown in section 9.1.1 starting at page 30.

<u>Switch 3– Current Sensor Type and Sensitivity, Serial Protocol and Quadrant Mode</u>

- See tables on the next page for details.

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6.3.2.1 Legend table is on a white label placed on the display PCB (MLB0010-C).

The additional switch SW3 is used to set the Current Sensor Type, Protocol and Quadrant Mode

Switch 2.3-2.7 - CT Primary Selection					
SW 2.3	SW 2.4	SW 2.5	SW 2.6	SW 2.7	CT Primary
OFF	OFF	OFF	OFF	OFF	Custom
OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	ON	OFF	5
OFF	OFF	OFF	ON	ON	20
OFF	OFF	ON	OFF	OFF	25
OFF	OFF	ON	OFF	ON	50
OFF	OFF	ON	ON	OFF	75
OFF	OFF	ON	ON	ON	100
OFF	ON	OFF	OFF	OFF	125
OFF	ON	OFF	OFF	ON	150
OFF	ON	OFF	ON	OFF	200
OFF	ON	OFF	ON	ON	250
OFF	ON	ON	OFF	OFF	300
OFF	ON	ON	OFF	ON	400
OFF	ON	ON	ON	OFF	450
OFF	ON	ON	ON	ON	500
ON	OFF	OFF	OFF	OFF	600
ON	OFF	OFF	OFF	ON	750
ON	OFF	OFF	ON	OFF	800
ON	OFF	OFF	ON	ON	900
ON	OFF	ON	OFF	OFF	1000
ON	OFF	ON	OFF	ON	1200
ON	OFF	ON	ON	OFF	1500
ON	OFF	ON	ON	ON	1600
ON	ON	OFF	OFF	OFF	2000
ON	ON	OFF	OFF	ON	2500
ON	ON	OFF	ON	OFF	3000
ON	ON	OFF	ON	ON	4000
ON	ON	ON	OFF	OFF	5000
ON	ON	ON	OFF	ON	Reserved
ON	ON	ON	ON	OFF	Reserved
ON	ON	ON	ON	ON	Reserved

Appearance of the MLB0010-C Display PCB (With White Label)

OFF=UP   ON=DOWN
Example: SW2 shown set to 1 Pulse per kWh, CT = 200A and display backlight on.

Switch 3.5 – 2 or 4 Quadrant	
SW 3.5	Mode
OFF	2 Quadrant – Consume Only
ON	4 Quadrant – Net Metering

Switch 3.8-3.6 – Current Sensor Type				
SW 3.8	SW 3.7	SW 3.6	Sensor Sensitivity	Sensor Type
OFF	OFF	OFF	333mV	CT
OFF	OFF	ON	140mV	Rogowski Coil mV Per 1000A 60Hz
OFF	ON	OFF	70mV	
OFF	ON	ON	120mV	
ON	OFF	OFF	400mV	
ON	OFF	ON	350mV	
ON	ON	OFF	Reserved	
ON	ON	ON	Custom	

Switch 3.4 – Serial Remote Protocol			
SW 3.4	RS-485 Serial Protocol	SW 1.1	Baud Rate
OFF	Modbus RTU	OFF	9600
		ON	19200
ON	BACnet MS/TP	OFF	9600
		ON	38400

SW1.2-SW1.8 – Serial Address
Modbus Address or BACnet MAC as per Section 6.3.1 on page 24
Not Applicable for Ethernet Models

Notes:

1. The switch setting option to support 350mV per 1000A output Rogowski Coil CTs is available for DTS SMX meters with firmware version V3.2710 and later only.

2. For meter firmware versions V3.2700 and lower, please use the "Custom" setting and configure the Rogowski Coil output using the "Electrical Settings" page under the "Configure" menu in DTS Config.

3. Wherever changing any of the settings on SW2 or SW3, please use the two informational pages on the display to confirm the desired settings have correctly been interpreted by the DTS SMX meter.

4. These informational screens are shown at power up and after every three cycles of the measurement values pages.

ATTENTION
The white switch settings label in the lid of the DTS SMX meter shows the switch settings that are valid for the firmware version resident in that DTS SMX meter.

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7 LED Definitions

The DTS SMX is equipped with 3 LEDs – **STATUS**, **REMOTE** and **PULSE.**

7.1 Status LED

The STATUS LED continuously flashes GREEN when the meter is powered on and running normally.

7.2 Remote LED

The REMOTE LED is a communications activity indicator. The LED will flicker GREEN when the DTS SMX receives data on the BUS and AMBER when the DTS SMX transmits data in response.

7.3 Pulse LED

The PULSE LED flashes AMBER when the DTS SMX pulses the digital output relay after the specified amount of energy has elapsed.

8 INSTALLATION OF DTS CONFIG AND MONITORING SOFTWARE

- DTS Config is a program used to easily monitor and configure meters from the DTS family from your local PC or across the LAN.

- Download the latest version of DTS Config from http://www.measurlogic.com/software-drivers/. Alternatively, an e-mail can be sent to info@measurlogic.com to request the latest version of DTS Config.

- Access the **DTSConfigSetup** file to begin the installation process

- Follow the instructions on the screen.

8.1 Setting the Real Time Clock using DTSConfig

Use DTSConfig to set the DTS meter time. Select the "Time" tab on the "Configure" page, where you can either read the current time in the meter, or to set the meter time using the appropriate buttons. To set the time:

- Press the **"Set Meter Time"** button to **set the time in the meter**, using the current time and time zone of the PC.
- The **"Time Zone"** drop down list can then be used to **set the meter to a different time zone**.
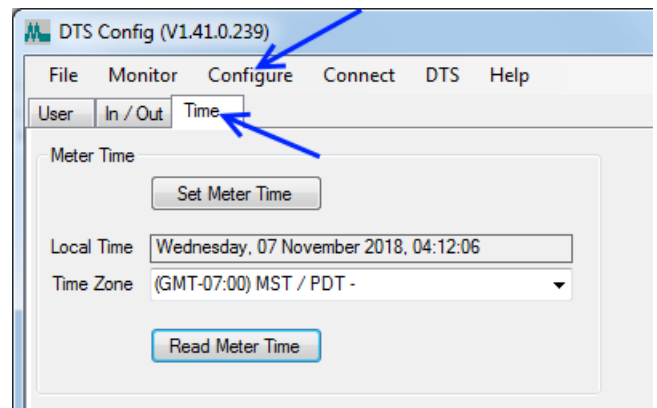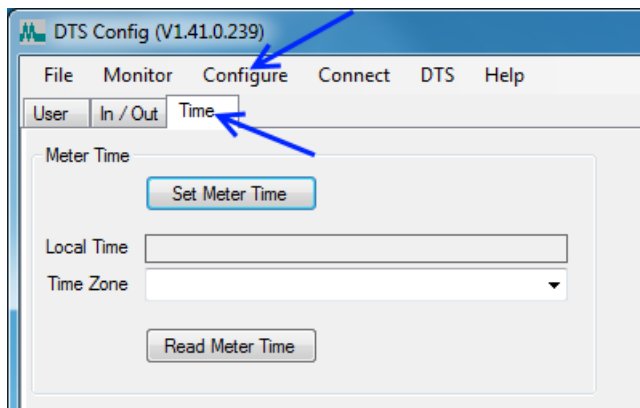
The time can also be set remotely using Modbus (see our standard Modbus map document)

The following is a typical diagram showing connections of one or more DTS SMX meters to a Master Application.

8.2   DTS SMX to Server

Red Wire = +
Green Wire = Gnd or Shield
Black Wire = −
(18-24 AWG 2 wire shielded cable)

Serial to Ethernet Converter

1 or more Server Applications

LAN

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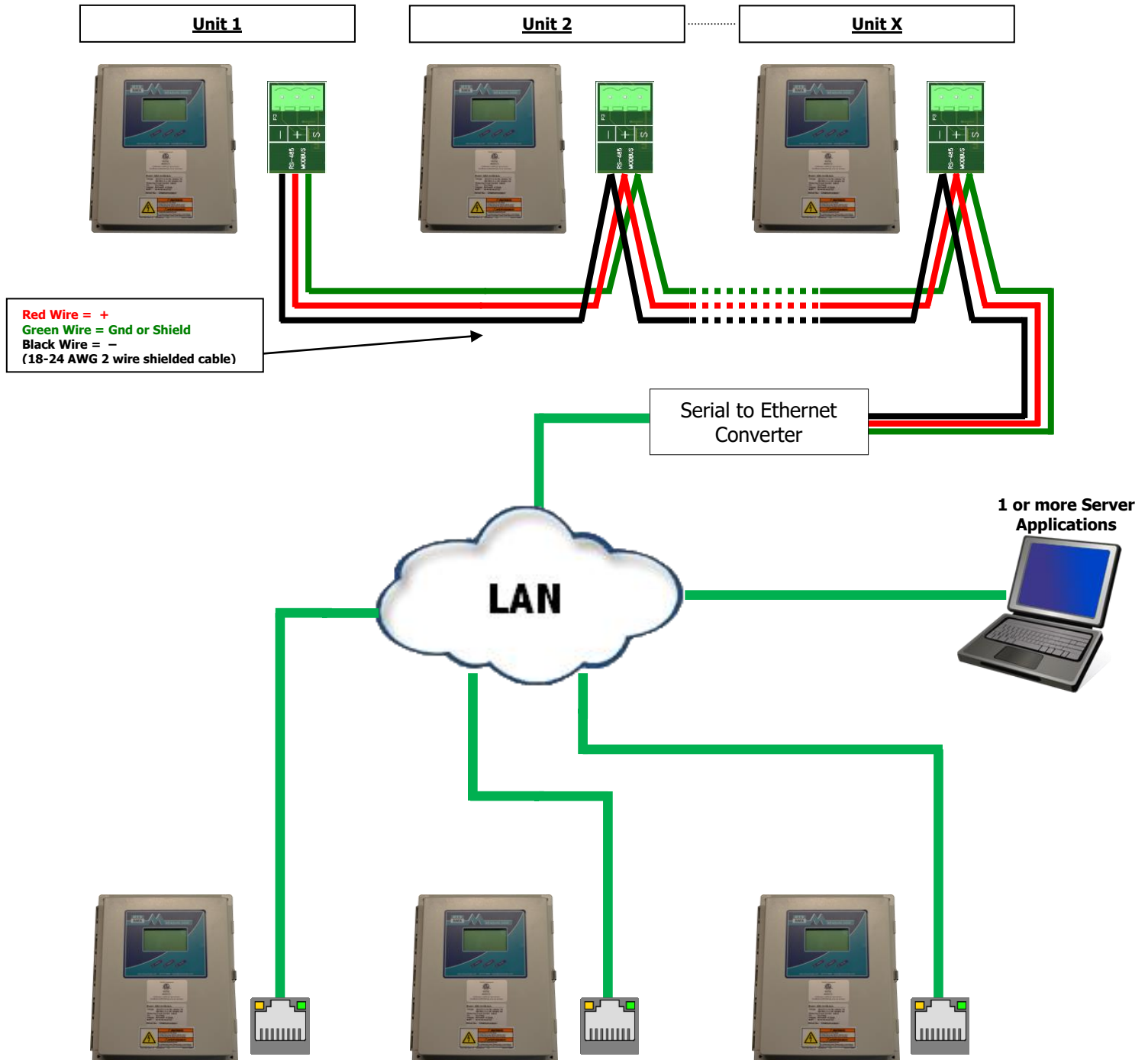
9   LEGACY DTS SMX VERSIONS

The information in the above sections of this document pertain to the latest hardware and firmware capabilities. If you encounter a DTS SMX with older hardware or firmware, please use the information below. This is especially important for the switch settings.

ATTENTION
For convenience, the information below is shown from the newest to oldest.

9.1   Configuring the DIP Switches – Communications Settings, CT Ratings and Other Options

ATTENTION
Compare the photos below to the actual hardware in your meter to determine which section is applicable.

9.1.1   CT Ratings, Digital Output Mapping and Backlight

The Digital Output Mapping (SW2.1 & SW2.2) and Backlight (SW2.8) are the same for all versions. These switches are detailed in section 6.3.2 on page 25.

However, the number of switches and the CT Rating table contents varies between versions.

The following legacy display versions follow (oldest is shown last):

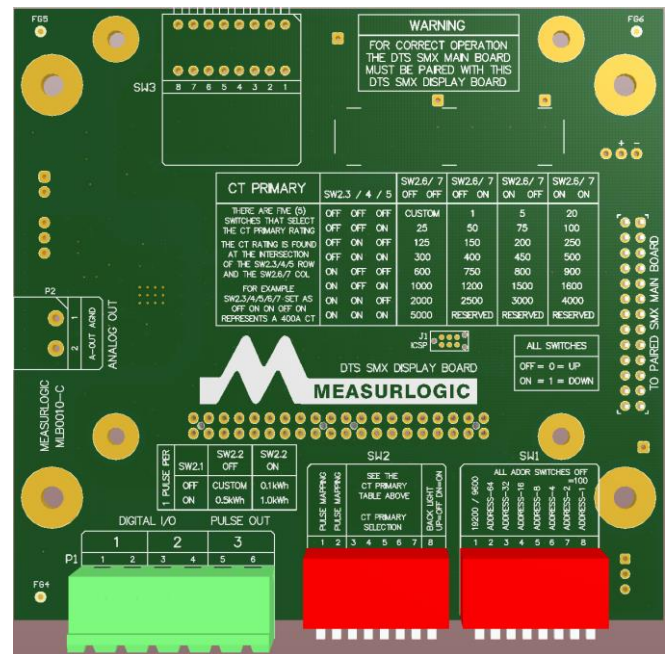- Legend table printed on the silkscreen on the display PCB itself (MLB0010-C)

- Legend table is on a white label placed on the display PCB (MLB0010-B)

- Legend table printed on the silkscreen on the display PCB itself (MLB0010-B)

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9.1.1.1 Legend table printed on the silkscreen on the display PCB itself (MLB0010-C)

The 5 switch positions SW2.3, SW2.4, SW2.5, SW2.6 and SW2.7 are used to set the CT Primary (32 options).

Switch 2.3-2.7 - CT Primary Selection					
SW 2.3	SW 2.4	SW 2.5	SW 2.6	SW 2.7	CT Primary
OFF	OFF	OFF	OFF	OFF	Custom
OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	ON	OFF	5
OFF	OFF	OFF	ON	ON	20
OFF	OFF	ON	OFF	OFF	25
OFF	OFF	ON	OFF	ON	50
OFF	OFF	ON	ON	OFF	75
OFF	OFF	ON	ON	ON	100
OFF	ON	OFF	OFF	OFF	125
OFF	ON	OFF	OFF	ON	150
OFF	ON	OFF	ON	OFF	200
OFF	ON	OFF	ON	ON	250
OFF	ON	ON	OFF	OFF	300
OFF	ON	ON	OFF	ON	400
OFF	ON	ON	ON	OFF	450
OFF	ON	ON	ON	ON	500
ON	OFF	OFF	OFF	OFF	600
ON	OFF	OFF	OFF	ON	750
ON	OFF	OFF	ON	OFF	800
ON	OFF	OFF	ON	ON	900
ON	OFF	ON	OFF	OFF	1000
ON	OFF	ON	OFF	ON	1200
ON	OFF	ON	ON	OFF	1500
ON	OFF	ON	ON	ON	1600
ON	ON	OFF	OFF	OFF	2000
ON	ON	OFF	OFF	ON	2500
ON	ON	OFF	ON	OFF	3000
ON	ON	OFF	ON	ON	4000
ON	ON	ON	OFF	OFF	5000
ON	ON	ON	OFF	ON	Reserved
ON	ON	ON	ON	OFF	Reserved
ON	ON	ON	ON	ON	Reserved

Appearance of the MLB0010-C Display PCB (Silkscreen Legend Only)

ATTENTION
If Rogowski Coil CTs are being used with the meter then DO NOT change the "CT Primary" settings on Switch 2. It is possible that this configuration may have Switch 3 fitted, but Switch 3 will NOT be functional. Only display boards with the white label as shown in section 6.3.2.1 on page 26 have Switch 3 functionality.

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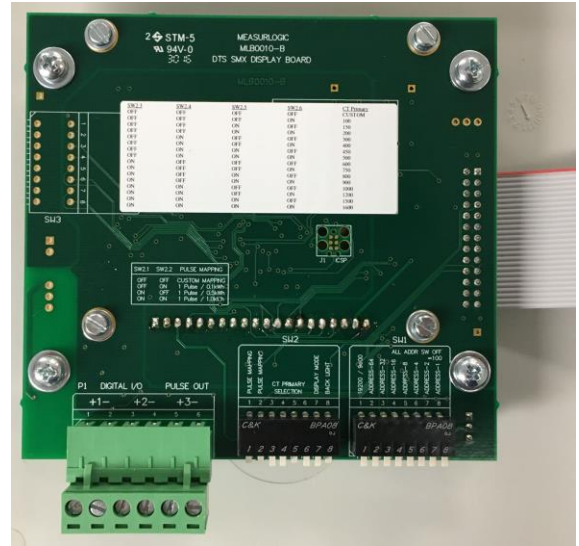**web: www.measurlogic.com**

9.1.1.2 Legend table is on a white label placed on the display PCB (MLB0010-B)

The 4 switch positions SW2.3, SW2.4, SW2.5 and SW2.6 are used to set the CT Primary (16 options).

Remember that if present, the CT Table shown on a printed white sticker ALWAYS take precedence.

Switch 2.3-2.6 - CT Primary Selection					Appearance of the MLB0010-B Display PCB (With White Label)
SW 2.3	SW 2.4	SW 2.5	SW 2.6	CT Primary	
OFF	OFF	OFF	OFF	CONFIGURABLE	
OFF	OFF	OFF	ON	100	
OFF	OFF	ON	OFF	150	
OFF	OFF	ON	ON	200	
OFF	ON	OFF	OFF	300	
OFF	ON	OFF	ON	400	
OFF	ON	ON	OFF	450	
OFF	ON	ON	ON	500	
ON	OFF	OFF	OFF	600	
ON	OFF	OFF	ON	750	
ON	OFF	ON	OFF	800	
ON	OFF	ON	ON	900	
ON	ON	OFF	OFF	1000	
ON	ON	OFF	ON	1200	
ON	ON	ON	OFF	1500	
ON	ON	ON	ON	1600	

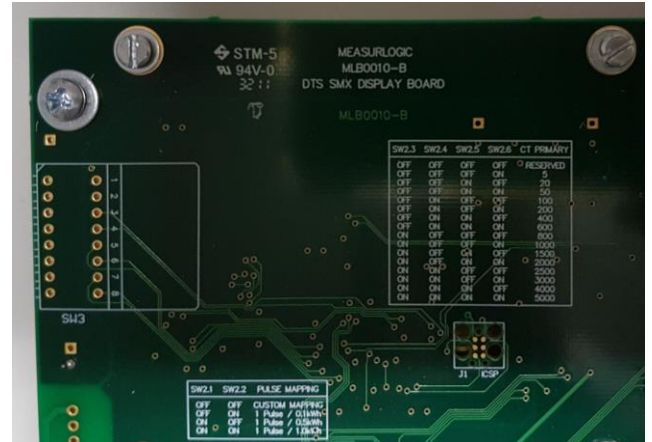| ATTENTION |
|---|
| **If Rogowski Coil CTs are being used with the meter, then All the CT Primary switches MUST be left in the OFF position.** |
| **DO NOT change the "CT Primary" settings on Switch 2.** |

9.1.1.3   Legend table printed on the silkscreen on the display PCB itself (MLB0010-B)

The 4 switch positions SW2.3, SW2.4, SW2.5 and SW2.6 are used to set the CT Primary (16 options).

Switch 2.3-2.6 - CT Primary Selection					Appearance of the MLB0010-B Display PCB (Silkscreen Legend Only)
SW 2.3	SW 2.4	SW 2.5	SW 2.6	CT Primary	
OFF	OFF	OFF	OFF	CONFIGURABLE	
OFF	OFF	OFF	ON	5	
OFF	OFF	ON	OFF	20	
OFF	OFF	ON	ON	50	
OFF	ON	OFF	OFF	100	
OFF	ON	OFF	ON	200	
OFF	ON	ON	OFF	400	
OFF	ON	ON	ON	600	
ON	OFF	OFF	OFF	800	
ON	OFF	OFF	ON	1000	
ON	OFF	ON	OFF	1500	
ON	OFF	ON	ON	2000	
ON	ON	OFF	OFF	2500	
ON	ON	OFF	ON	3000	
ON	ON	ON	OFF	4000	
ON	ON	ON	ON	5000	

ATTENTION
If Rogowski Coil CTs are being used with the meter, then All the CT Primary switches MUST be left in the OFF position. **DO NOT change the "CT Primary" settings on Switch 2.**