DTS DC3 RS-485 Serial Meter

This Quick Start Guide is to familiarize the user with the connection and configuration of the DTS DC3 DIN rail mounted DC voltage, current, power & energy meter for use with:

Voltage Options up to 1000Vdc

Current Sensor Inputs
20mA Hall Effect or **mV Shunt**

RS-485 Serial Communications
Modbus RTU or **BACnet MS/TP**

Applicable DTS DC3 Models		
DTS DC3 Model #	**Measurlogic Part #**	**Description**
DTS DC3-T4-SB-A-3	**DTSDC-0026**	• 400Vdc Input • 3 x mV Shunt (Configurable for 50mV to 100mV Output) • 24Vdc Aux Powered • RS-485 serial Modbus RTU or BACnet MS/TP
DTS DC3-T10-SB-A-3	**DTSDC-0028**	• 1000Vdc Input • 3 x mV Shunt (Configurable for 50mV to 100mV Output) • 24Vdc Aux Powered • RS-485 serial Modbus RTU or BACnet MS/TP
DTS DC3-J4-SB-A-3	**DTSDC-0022**	• 400Vdc Input • 3 x 20mA Hall Effect (Configurable for Unidirectional or Bidirectional) • 24Vdc Aux Powered • RS-485 serial Modbus RTU or BACnet MS/TP
DTS DC3-J10-SB-A-3	**DTSDC-0034**	• 1000Vdc Input • 3 x 20mA Hall Effect (Configurable for Unidirectional or Bidirectional) • 24Vdc Aux Powered • RS-485 serial Modbus RTU or BACnet MS/TP

If you do not see your specific meter model number above please contact Measurlogic Inc. at 303-805-5252 or info@measurlogic.com.

ATTENTION	
For more information please use the DTS DC3 installation guide **https://www.measurlogic.com/product/dts-dc/**	

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This Quick Start Guide is designed to familiarize the user with the connection and configuration of the DTS DC3 DIN rail mounted DC voltage, current, power & energy meter. Different models are available with mV Shunt or 20mA Hall Effect current sensor inputs, and RS-485 serial Modbus RTU or BACnet MS/TP communications.

Supplied Items

Check that the meter and equipment match your order specifications and has not been damaged during shipping. The following component(s) are included in the package:

- **The DTS DC3 power meter.** Check input ranges, output configuration and auxiliary power supply (if applicable) on the label of the unit. For a more detailed explanation of the part number please download the latest version of the DTS DC3 datasheet from: https://www.measurlogic.com/product/dts-dc/
- The necessary green connector plugs are fitted to the DTS meter.

Connecting the DTS DC3

Wiring Voltage and Current Inputs

The DTS DC3 accepts a DC voltage input directly up to 1000Vdc (**model dependent**). The current inputs are model dependant. Special care must be taken in connecting the DTS DC3 with shunt connections so as to avoid ground loop or accuracy issues. Refer to the appropriate wiring diagrams supplied with the meter.

If there are any questions, please contact Measurlogic before applying any measured or auxiliary power to the unit.

Input wiring terminals are clearly indicated and located on the upper side of the DTS DC3 label. The Current and Voltage terminal strips are pluggable to allow easy replacement of the DTS DC3, if required. **Removing the terminal strip should only be done once all power has been removed from the DTS DC3**. Input wiring terminals accept up to 2.5 mm^2 (12 AWG) wire. The wires are connected by means of screw terminals that clamp down onto the input wires. The voltage input requires fusing (NOT INCLUDED) and should be rated at 2A fast. Please check with local code requirements to ensure correct installation.

Wiring Optional Auxiliary Power Input (AUX)

The DTS DC3 meter is powered from a DC auxiliary input in the following (**model dependent**) ranges. See the label of the unit for more information on which input range it has fitted. The Auxiliary Power inputs require fusing (NOT INCLUDED) and should be rated at 2A fast.

- 12 Vdc **OR** 24 Vdc **OR** 48 Vdc

Note: It is important to pay attention to the polarity when using a DC power supply. See label above for a reference to the polarity. Incorrect connection **will** damage the DTS DC3.

Meter Connection Wiring Diagrams

WARNING

The Voltage and Current Connections are extremely important for the DTS DC3 meter.
Please refer to the appropriate wiring diagram that was supplied with the meter.
These are also available in the "Technical" section of the DTS DC3 webpage
at https://www.measurlogic.com/product/dts-dc/

Incorrect wiring will damage the meter and void the warranty

DTS DC3 connection diagram RS-485 or Ethernet – shunt configuration (325.9 Kb) [PDF]
DTS DC3 connection diagram RS-485 or Ethernet – 4-20mA HE2 or HE4 model hall effect sensors (393.7 Kb) [PDF]
DTS DC3 connection diagram RS-485 or Ethernet – Positive Ground Topology (-48Vdc Telecom example) (444.6 Kb) [PDF]
1500 Vdc DTS DC3 connection diagram RS-485 or Ethernet – 4-20mA HE2 or HE4 model hall effect sensors (392.9 Kb) [PDF]

Please contact Measurlogic if the above links do not work or if you have any further questions!

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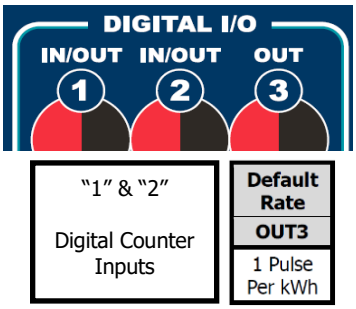
Digital Inputs and Outputs (Digital I/O)

The default DTS 310 meters indicated above are fitted with 2 x digital inputs and a pulse output as standard. They are grouped together with a single 6 way pluggable terminal.

Wiring the Digital Pulse Output

The single digital output – marked "OUT 3" is pre-configured to function as a pulse corresponding to measured kWh. **The default pulse rate is 1 Pulse per kWh**. This is user configurable to a different rate, if required, using our DTS Config software configuration tool

Digital Output (Marked 3)



- The digital output is a **potential-free NO (Normally Open) solid state relay** output.
- The maximum switching voltage is 50Vdc and the maximum switching current is 100mA.
- The relay closure pulse width is 100ms. The minimum time between any two pulses is 100ms.
- **The default pulse rate is 1 pulse per kWh.** This can be changed using DTS Config.
- A suitable wire gage is 18-22 AWG. For longer distances (>100ft) use 18 AWG.

Wiring the Digital Inputs

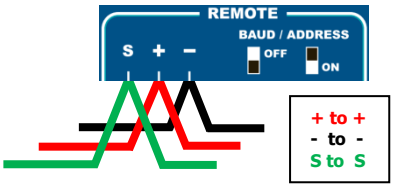
The two digital inputs – marked "IN/OUT 1" and "IN/OUT 2" are pre-configured to function as general counters. The counter value will match the number of contact closures on its particular input. Any scaling of these counters, if required, needs to be done in the Master application / device. The digital inputs can also function as level status inputs.

Digital Inputs (Marked 1, 2)

- The digital inputs accept dry contacts or NPN open collector inputs.
- A suitable wire gage is 18-22 AWG. For longer distances (>100ft) use 18 AWG.

RS-485 Serial Communications Wiring

RS-485 is a Daisy Chained Bus terminated at both ends with 120 Ohms.
DO NOT use a STAR or RING configuration.



- RS-485 Connection is by means of a pluggable 3-pin screw terminal
- Use 18-22 AWG, 2-core, shielded, twisted pair cable

The meter communicates through its RS-485 port using the Modbus RTU or BACnet MS/TP protocol. See below for the protocol selection switch settings. To connect multiple DTS meters on the same RS-485 network the meters should be daisy chained together. Connect the wires at the terminal plug, so avoid creating stubs on the bus.

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DC Current Sensor Output Types

Different model numbers of the DTS DC3 are required depending on the Current Sensor Output Type:

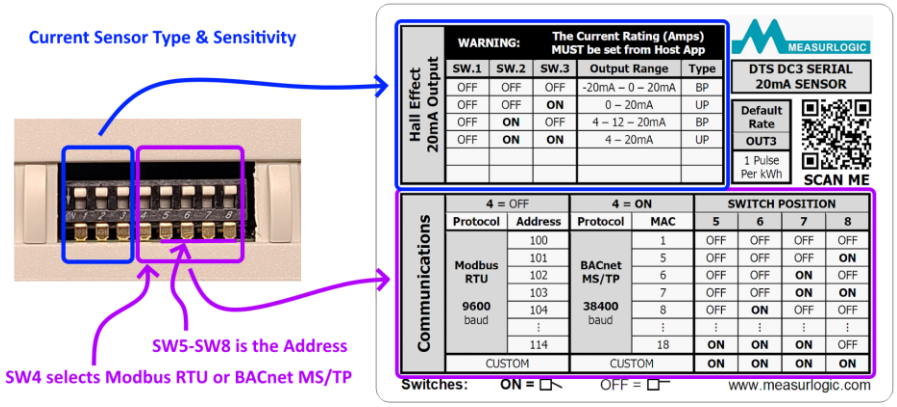
- DTS DC3-**J**x-SB-A-x For 20mA Hall Effect Sensors
- DTS DC3-**T**x-SB-A-x For mV Shunts Sensors

ATTENTION

Ensure that the model number of your DTS DC3 meter matches your Current Sensor Output Type.

The DTS DC3 energy serial meter has an 8-way DIP switch situated next to the pluggable 6-way I/O terminal.

- [SW.1..SW.3] are used to configure Current Sensor Type and Sensitivity (Highlighted in BLUE in diagram below).
- The Sensor Rating (Amperage) must be set using DTS Config.



ATTENTION – SWITCHES [SW.1..SW.3]

- The DTS DC3 will be shipped with all the Sensor switches in the "**OFF**" position.
- The DTS DC3 switches **MUST** be setup by the user to match the Sensor Range.
- The DTS DC3 **Sensor Rating** current **MUST** be set using DTS Config.

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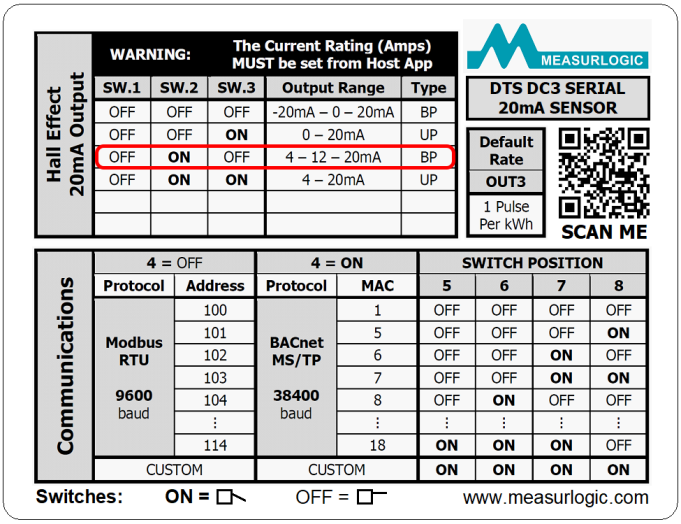
20mA Hall Effect Sensors

The **DTS DC3-Jx-SB-A-x** meters are compatible with the following current sensors **ONLY**:

- **20mA Hall Effect Sensors** – This type of current sensor has a 20mA output and may be capable of measuring unidirectional or bidirectional currents. It is an active device so does need to be powered. A Hall Effect sensor is isolated from the line it is measuring. The current rating (Amperage) of the Sensor must be specified when ordering and cannot be changed in the field.
  - The switches [SW.1..SW.3] on the DTS meter are used to set the output range of the sensor.
  - **The Sensor Rating (Amperage) cannot be set using the switches and MUST be set using DTS Config.**

Switch Label Lookup Examples	Corresponding Switch Settings



Hall Effect 20mA Output

WARNING: The Current Rating (Amps) MUST be set from Host App				
SW.1	SW.2	SW.3	Output Range	Type
OFF	OFF	OFF	-20mA – 0 – 20mA	BP
OFF	OFF	**ON**	0 – 20mA	UP
OFF	**ON**	OFF	4 – 12 – 20mA	BP
OFF	**ON**	**ON**	4 – 20mA	UP

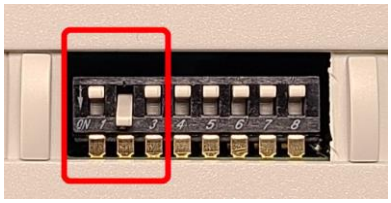
MEASURLOGIC
DTS DC3 SERIAL 20mA SENSOR
Default Rate
OUT3
1 Pulse Per kWh
SCAN ME

Communications

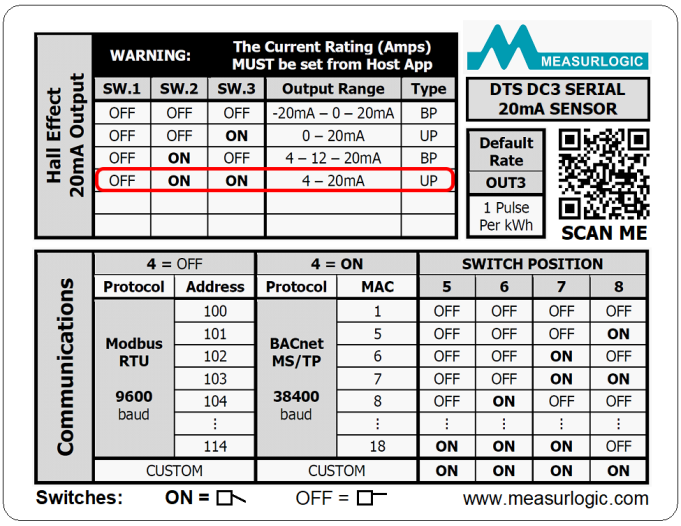
4 = OFF		4 = ON		SWITCH POSITION			
Protocol	Address	Protocol	MAC	5	6	7	8
Modbus RTU 9600 baud	100	BACnet MS/TP 38400 baud	1	OFF	OFF	OFF	OFF
	101		5	OFF	OFF	OFF	**ON**
	102		6	OFF	OFF	**ON**	OFF
	103		7	OFF	OFF	**ON**	**ON**
	104		8	OFF	**ON**	OFF	OFF
	⋮		⋮	⋮	⋮	⋮	⋮
	114		18	**ON**	**ON**	**ON**	OFF
CUSTOM		CUSTOM		**ON**	**ON**	**ON**	**ON**

Switches: ON = ◻╲ OFF = ◻⊢ www.measurlogic.com

20mA Hall Effect Sensor with 4-12-20mA Bidirectional Output



Current Rating of Sensor is set using DTS Config



Hall Effect 20mA Output

WARNING: The Current Rating (Amps) MUST be set from Host App				
SW.1	SW.2	SW.3	Output Range	Type
OFF	OFF	OFF	-20mA – 0 – 20mA	BP
OFF	OFF	**ON**	0 – 20mA	UP
OFF	**ON**	OFF	4 – 12 – 20mA	BP
OFF	**ON**	**ON**	4 – 20mA	UP

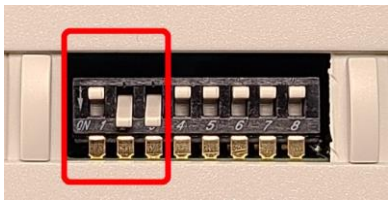
MEASURLOGIC
DTS DC3 SERIAL 20mA SENSOR
Default Rate
OUT3
1 Pulse Per kWh
SCAN ME

Communications

4 = OFF		4 = ON		SWITCH POSITION			
Protocol	Address	Protocol	MAC	5	6	7	8
Modbus RTU 9600 baud	100	BACnet MS/TP 38400 baud	1	OFF	OFF	OFF	OFF
	101		5	OFF	OFF	OFF	**ON**
	102		6	OFF	OFF	**ON**	OFF
	103		7	OFF	OFF	**ON**	**ON**
	104		8	OFF	**ON**	OFF	OFF
	⋮		⋮	⋮	⋮	⋮	⋮
	114		18	**ON**	**ON**	**ON**	OFF
CUSTOM		CUSTOM		**ON**	**ON**	**ON**	**ON**

Switches: ON = ◻╲ OFF = ◻⊢ www.measurlogic.com

20mA Hall Effect Sensor with 4-20mA Unidirectional Output



Current Rating of Sensor is set using DTS Config

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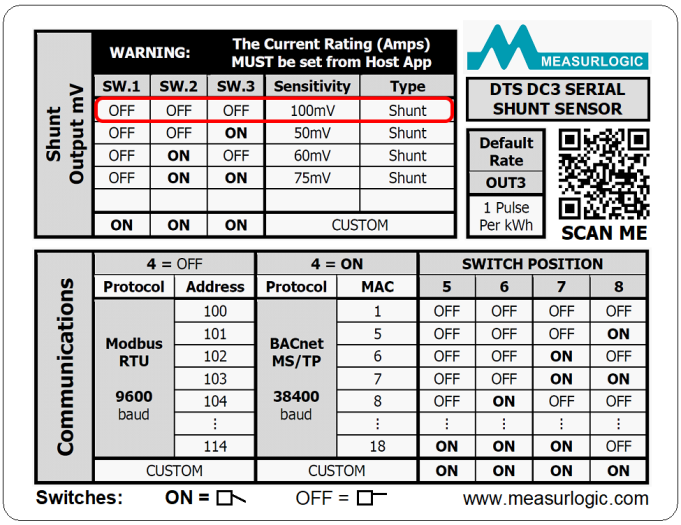
mV Shunt Sensors

The **DTS DC3-Tx-SB-A-x** meters are compatible with the following current sensors **ONLY**:

- **mV Shunts** – This type of current sensor has a mV output voltage that is proportional to the current flowing through the shunt. The most common output voltages are 100mV and 50mV. A shunt should never be used at more than 66% of its rated current, so please factor that in when sizing your shunt. The current rating (Amperage) of the Sensor must be specified when ordering and cannot be changed in the field.
  - The switches [SW.1..SW.3] on the DTS meter are used to set the output voltage of the sensor.
  - **The Sensor Rating (Amperage) cannot be set using the switches and MUST be set using DTS Config.**

Switch Label Lookup Examples	Corresponding Switch Settings



Shunt Output mV

WARNING: The Current Rating (Amps) MUST be set from Host App				
SW.1	SW.2	SW.3	Sensitivity	Type
OFF	OFF	OFF	100mV	Shunt
OFF	OFF	ON	50mV	Shunt
OFF	ON	OFF	60mV	Shunt
OFF	ON	ON	75mV	Shunt
ON	ON	ON	CUSTOM	

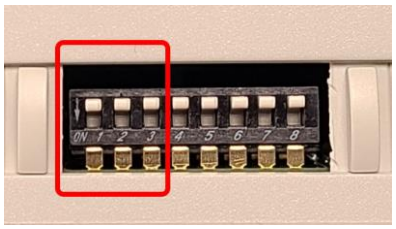
MEASURLOGIC
DTS DC3 SERIAL SHUNT SENSOR
Default Rate
OUT3
1 Pulse Per kWh
SCAN ME

Communications

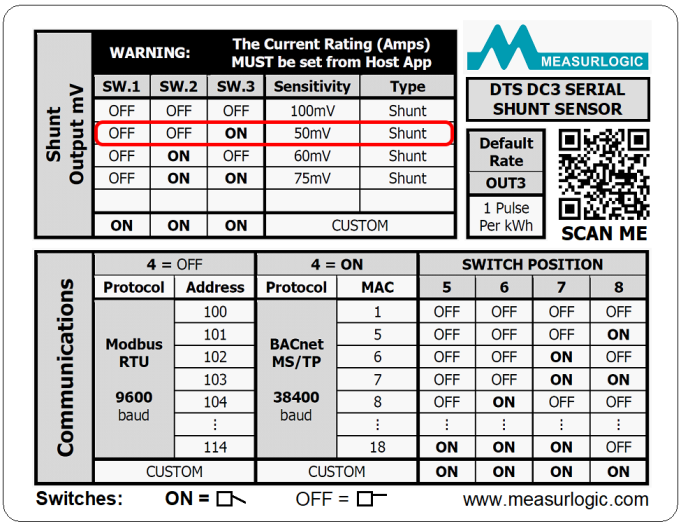
4 = OFF		4 = ON		SWITCH POSITION			
Protocol	Address	Protocol	MAC	5	6	7	8
Modbus RTU 9600 baud	100	BACnet MS/TP 38400 baud	1	OFF	OFF	OFF	OFF
	101		5	OFF	OFF	OFF	ON
	102		6	OFF	OFF	ON	OFF
	103		7	OFF	OFF	ON	ON
	104		8	OFF	ON	OFF	OFF
	⋮		⋮	⋮	⋮	⋮	⋮
	114		18	ON	ON	ON	OFF
CUSTOM		CUSTOM		ON	ON	ON	ON

Switches: ON = ◻◹ OFF = ◻◺ www.measurlogic.com

100mV Shunt Sensor



Current Rating of Sensor is set using DTS Config



Shunt Output mV

WARNING: The Current Rating (Amps) MUST be set from Host App				
SW.1	SW.2	SW.3	Sensitivity	Type
OFF	OFF	OFF	100mV	Shunt
OFF	OFF	ON	50mV	Shunt
OFF	ON	OFF	60mV	Shunt
OFF	ON	ON	75mV	Shunt
ON	ON	ON	CUSTOM	

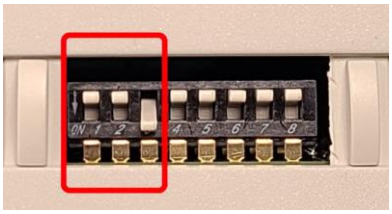
MEASURLOGIC
DTS DC3 SERIAL SHUNT SENSOR
Default Rate
OUT3
1 Pulse Per kWh
SCAN ME

Communications

4 = OFF		4 = ON		SWITCH POSITION			
Protocol	Address	Protocol	MAC	5	6	7	8
Modbus RTU 9600 baud	100	BACnet MS/TP 38400 baud	1	OFF	OFF	OFF	OFF
	101		5	OFF	OFF	OFF	ON
	102		6	OFF	OFF	ON	OFF
	103		7	OFF	OFF	ON	ON
	104		8	OFF	ON	OFF	OFF
	⋮		⋮	⋮	⋮	⋮	⋮
	114		18	ON	ON	ON	OFF
CUSTOM		CUSTOM		ON	ON	ON	ON

Switches: ON = ◻◹ OFF = ◻◺ www.measurlogic.com

50mV Shunt Sensor



Current Rating of Sensor is set using DTS Config

WARNING

Please refer to the Shunt Sensor wiring diagram that was supplied with the meter

Incorrect wiring will damage the meter and void the warranty

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Communications Parameters – Selected using the Switch Settings

The DTS DC3 energy serial meter has an 8-way DIP switch situated next to the pluggable 6-way I/O terminal. SW.4 is used to select between Modbus RTU and BACnet MS/TP protocols. [SW.5..SW.8] is used to select the device address (Highlighted in PURPLE in the diagram below).

ATTENTION – SWITCHES [SW.4..SW.8]

- The DTS DC3 will be shipped with all comms switches in the "**OFF**" position.
- The default setting is Modbus RTU, 9600 baud, address 100.

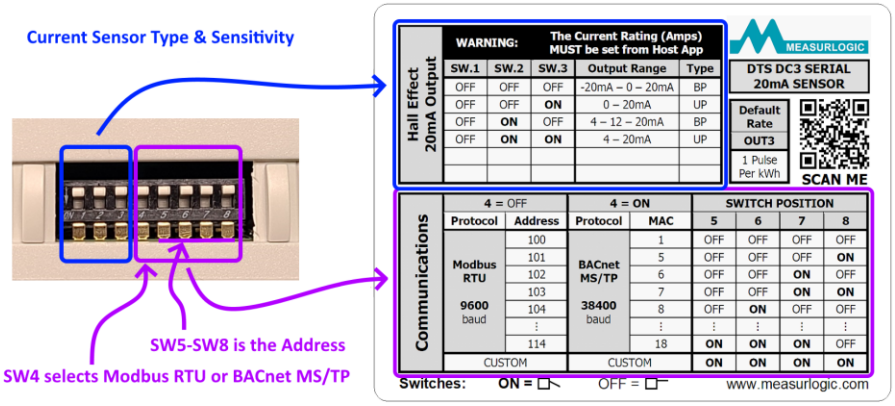
The DTS DC3-3x-SB-A-x meter communication group of switches is sub-divided as follows:

- **Serial Protocol** – The serial protocol is selected using SW.4, where the OFF position is Modbus RTU and the ON position is BACnet MS/TP. The protocol is always determined by this SW.4 even for the custom configuration.
  - The baud rate for Modbus RTU when using the switch options is 9600.
  - The baud rate for BACnet MS/TP when using the switch options is 38400.

- **Device Address** – As only 4 switch positions [SW.5..SW.8] are available, the choices of device addresses is tailored to be the most suitable for the protocol selected: *(Please see the next section for custom communications settings.)*

  - **Modbus RTU** – All four switches in the OFF position is the Measurlogic default Modbus address of 100. The further Modbus Address options are 101 through to 114 as shown in the table.

  - **BACnet MS/TP** – All four switches in the OFF position is the generally accepted MAC address of 1 for new devices. It is recommended that the MAC address is changed to another value during commissioning. Note that the further MAC address switch options are 5 through 18 as shown in the table. The MAC address is automatically added to 473000 to generate the Device ID.



Communications Parameters – Custom Settings

If the switches [SW.5..SW.8] are all in their "**ON**" position, then "CUSTOM" communications parameters can be set for baud rate, address/MAC, Device ID. The protocol is always determined by SW.4 even for the custom configuration. We recommend the following procedure:

Step	Description	Modbus RTU	BACnet MS/TP
1	Select the desired protocol, and set switches [SW.5..SW.8] all OFF	SW.4 is OFF	SW.4 is ON
2	Verify that the meter communicates at	Modbus 100 at 9600 baud	BACnet MAC 1 at 38400
3	Power OFF the meter		
4	Set the switches [SW.5..SW.8] all ON		
5	Power ON the meter		
6	The meter will communicate with the same parameters as above	Modbus 100 at 9600 baud	BACnet MAC 1 at 38400
7	Change the communication parameters as desired	Use DTS Config	Use YABE
The custom communication parameters will be persistent and will be retained if power is lost to the meter. After custom communications parameters are configured, DO NOT change [SW.4..SW.8]. Doing so, will revert to the communication parameters defined by the switches and the custom parameters will be lost.			

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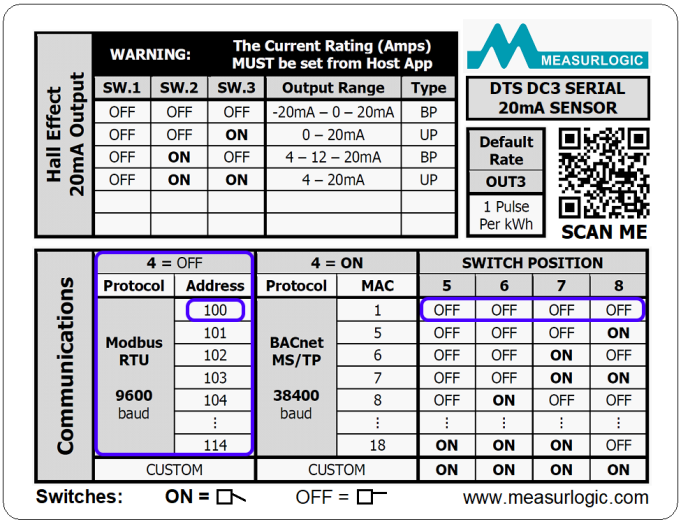
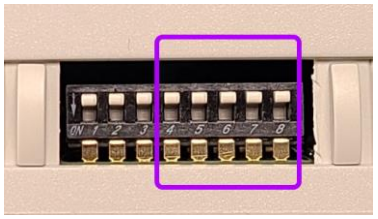
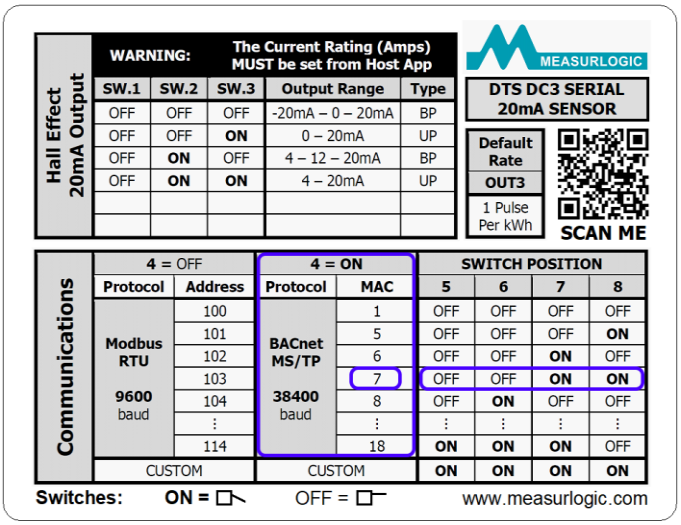
Switch Label Lookup Examples	Corresponding Switch Settings



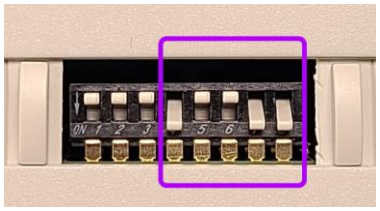
Protocol Modbus RTU
Baud Rate 9600
Modbus Address 100

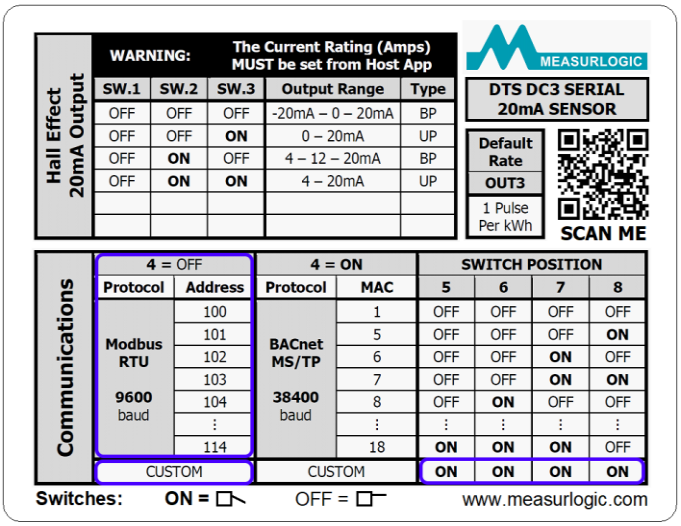


As shipped communications parameters

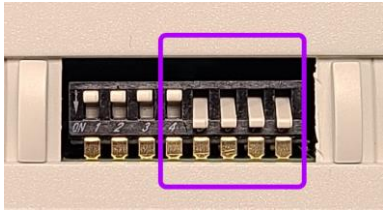


Protocol BACnet MS/TP
Baud Rate 38400
MAC Address 7
Device ID 473007





Protocol Modbus RTU
Baud Rate CUSTOM
Modbus Address CUSTOM



After custom communications parameters are configured, DO NOT change [SW.4..SW.8].

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