



January 13, 2020

## Product Update: TRX – 0-10V / 4-20mA Clip-In Module (p/n 3319457)

**Product Series:** TRX

**Models:** TRX085, TRX110C, TRX120, TRX150C

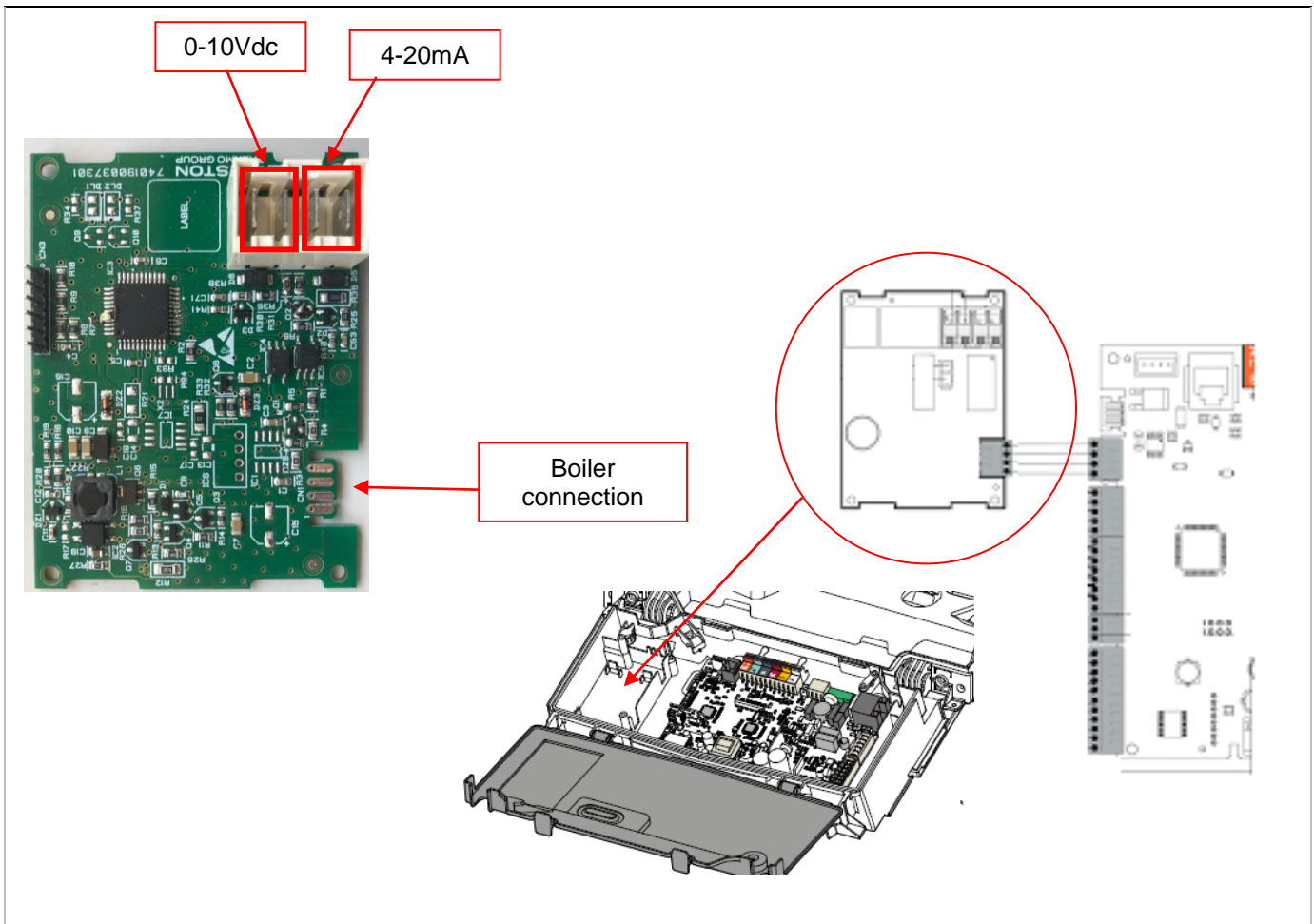
**Update:** Availability of 0-10V / 4-20mA Clip-In Module (p/n 3319457)

**Implementation Date:** January 13, 2020

A Clip-In Module is now available for the TRX, that will allow the temperature setpoint or firing rate of the boiler to be controlled by a 0-10 V or 4-20 mA signal from a 3<sup>rd</sup> party controller, i.e., a BMS (Building Management System). The module clips into the TRX control panel beneath the WiFi PCB, and plugs into the main PCB as illustrated below. The module is configured from the boiler display via menu 42 (see complete menu in the enclosed instructions).

### NOTICE

Menu 42 is only accessible when the Clip-In Module is connected. The module becomes functional when parameter 42.0.0 is set to a value other than 0; at which time the signal applied to the module dictates the operation of the boiler for CH requests. DHW requests are still handled locally by the boiler.



# 0-10V / 4-20mA Clip-In Board

## Instruction Manual

### SPECIAL ATTENTION BOXES

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important product information.

#### **WARNING**

**WARNING** indicates a potentially hazardous situation which, if not avoided, could result in personal injury or death.

#### **CAUTION**

**CAUTION used without the safety alert symbol** indicates a potentially hazardous situation which, if not avoided, may result in property damage.

#### *NOTICE*

**NOTICE** is used to address practices not related to personal injury.

#### **WARNING**

This manual must only be used by a qualified installer / service technician. Read all instructions in this manual before installing. Perform steps in the given order. Failure to do so could result in substantial property damage, severe personal injury, or death.

California Proposition 65 Warning: This product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

#### *NOTICE*

The manufacturer reserves the right to make product changes or updates without notice and will not be held liable for typographical errors in literature.

**NOTE TO CONSUMER: PLEASE KEEP ALL INSTRUCTIONS FOR FUTURE REFERENCE.**

3319456

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### For the Installer

This board must be installed by qualified and licensed personnel. The installer should be guided by the instructions furnished with the board, and by local codes and utility company requirements.

#### Installations Must Comply With:

Local, state, provincial, and national codes, laws, regulations, and ordinances.

The latest version of the *National Electrical Code, NFPA No. 70*.

### Part 1 - General Safety Information

#### **⚠ WARNING**

**Installer** - Read all instructions in this manual before installing. Perform steps in the given order.

**FAILURE TO ADHERE TO THE GUIDELINES ON THIS PAGE CAN RESULT IN SUBSTANTIAL PROPERTY DAMAGE, ELECTRICAL SHOCK, SEVERE PERSONAL INJURY, OR DEATH.**

**NOTE:** Install all components in such a manner that does not reduce the performance of any fire rated assembly.

Be sure to disconnect electrical power from the appliance and wait for associated equipment to cool before installing, wiring, or servicing.

The Clip-In Board is intended for low safety voltage inputs ONLY. Inputs A and B must be connected to SELV voltage. Do not wire any other inputs into the board.

#### **CAUTION**

Failure of the system due to freeze related damage IS NOT covered by product warranty.

Do not use this board for anything other than its intended purpose (as described in this manual). Doing so could result in property damage and WILL VOID product warranty.

High heat sources (sources generating heat 100°F / 37°C or greater, such as stove pipes, space heaters, etc.) may damage wiring. Such damages ARE NOT covered by warranty. Locate wiring away from high heat sources.

High heat sources and drafts may affect temperature readings.

Do not use the board for any purpose other than as described in these instructions. Damage to the board or other objects due to improper use or operation overload is not covered by product warranty.

The manufacturer cannot be held responsible for damages caused by improper installation or by failure to follow the instructions in this manual.

#### **NOTICE**

**UNPACKING THE BOARD** - Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

**COLD WEATHER HANDLING** - If the board has been stored in a very cold location (BELOW 32°F) before installation, handle with care until the board comes to room temperature. Failure to do so could result in damage to the board.

**NOTE:** Reference the appliance model and serial numbers when inquiring about service or troubleshooting.

### Part 2 - Installing the Clip-In Board

#### Precautions - Prior to Installation

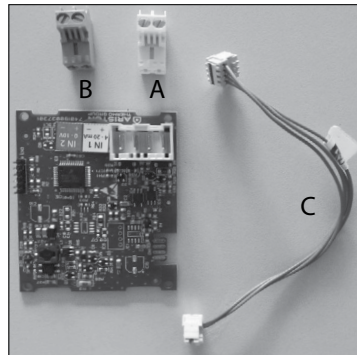
The Clip-In Board ships with a number of included components. Ensure all components are included and have not been damaged following transportation and handling. Do not proceed with installation if the components are damaged.

#### Included with Clip-In Board (See Figure 1)

- A - 4-20mA Connection
- B - 0-10 VDC Connection
- C - Wire Harness

#### Tools Required (Not Included)

- Phillips Head Screwdriver



**Figure 1 - Included Components**

#### Installation

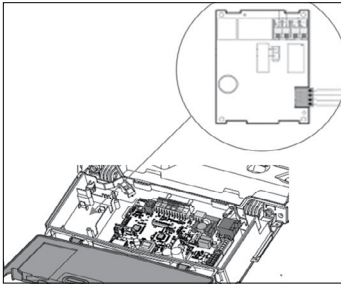
1. Power off the appliance by pulling the plug or switching off the circuit breaker. If the appliance has been operating wait for it to cool before proceeding.

#### **⚠ WARNING**

Proceeding while the appliance is powered or before it and its associated components have had a chance to cool may result in property damage, personal injury, or death.

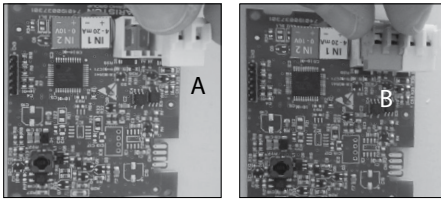
2. Open the appliance cabinet following the instructions in the appliance installation manual.

3. Pivot the appliance electronic housing forward by pushing in the tabs. See Figure 2 for Clip-In Board installation location.



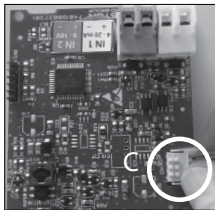
**Figure 2 - Tabs Folded Up**

4. Plug the 4-20mA (A) and 0-10 VDC (B) Connections into the Clip-In Board. See Figure 3.



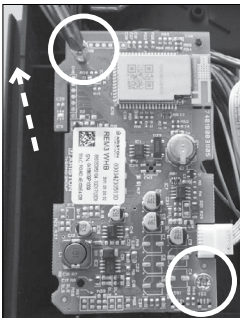
**Figure 3 - Plugging the 4-20mA (A) and 0-10 VDC (B) Connections into the Clip-In Board**

5. Plug the Wire Harness (C) into the connection provided on the Clip-In Board. See Figure 4.



**Figure 4 - Plugging the Wire Harness (C) into the Clip-In Board**

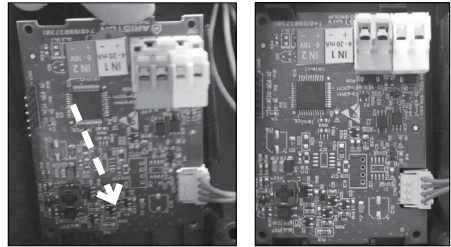
6. Use a Phillips Head screwdriver to remove the two (2) screws securing the gateway board from the electronic housing. See Figure 5.



**Figure 5 - Remove the Gateway Board**

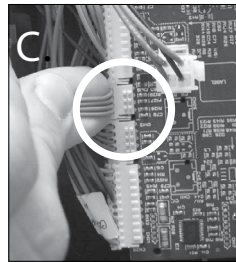
7. Remove the gateway board. DO NOT disconnect its wire harness from the main control board.

8. Install the Clip-In Board in the electronic housing as shown in Figure 6.



**Figure 6 - Install the Clip-In Board**

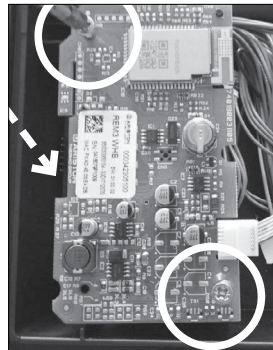
9. Connect the Clip-In Board Wire Harness (C) into the main control board. See Figure 7.



**Figure 7 - Connect the Clip-In Board Wire Harness**

10. Wire the 4-20mA (A) or 0-10 VDC (B) Connections on the Clip-In Board before proceeding.

11. Use a Phillips Head screwdriver and the two (2) removed screws to reinstall the gateway board. See Figure 8.



**Figure 8 - Reinstall the Gateway Board**

12. Close the appliance electronic housing.

13. Close the appliance cabinet.

14. Restore power to the appliance.

**Part 3 - Parameter Set**

Menu	Sub-Menu	Parameter	Description	Range	Default Setting
<b>42</b>	<b>0</b>		<b>General</b>		
42	0	0	Control Mode	0: Not Defined 1: Voltage Power 2: Voltage Temperature 3: Current Power 4: Current Temperature	0
42	0	1	BMS Max Temp		113°F (45°C)
42	0	2	BMS Min Temp		68°F (20°C)
<b>42</b>	<b>1</b>		<b>Analog Level Settings</b>		
42	1	0	Analog Control Voltage to Start Heat Demand	0÷10 (VDC)	2
42	1	1	Analog Control Voltage to Stop Heat Demand	0÷par.42.1.0 (VDC)	0.5
42	1	2	Analog Control Voltage for Maximum Heat Demand	0÷10 (VDC)	10
42	1	3	Analog Control Voltage for Minimum Heat Demand	0÷par.42.1.2 (VDC)	2
42	1	4	Analog Control Current to Start Heat Demand	0÷20 (mA)	4
42	1	5	Analog Control Current to Stop Heat Demand	0÷par.42.1.4 (mA)	2
42	1	6	Analog Control Current for Maximum Heat Demand	0÷20 (mA)	20
42	1	7	Analog Control Current for Minimum Heat Demand	0÷par.42.1.6 (mA)	4
<b>42</b>	<b>2</b>		<b>Diagnostics</b>		
42	2	0	Status	Only Visualization 1: Disabled (42.0.0 = 0) 2: Off (heating disabled) 3: Standby (no heating request) 4: Heat request 5: Configuration error	/
42	2	1	Set-Point	Only Visualization - %	/
42	2	2	Set-Point	Only Visualization - °F	/
42	2	3	Input Voltage	Only Visualization - VDC	/
42	2	4	Input Current	Only Visualization - mA	/

**Table 1 - Parameter Set Details**

## Part 4 - Description of Operation

The clip-in parameter settings can be adjusted on the boiler display or the system interface. Parameter 42.0.0 must be set for the appropriate operation when the clip-in is supplied with power for the first time.

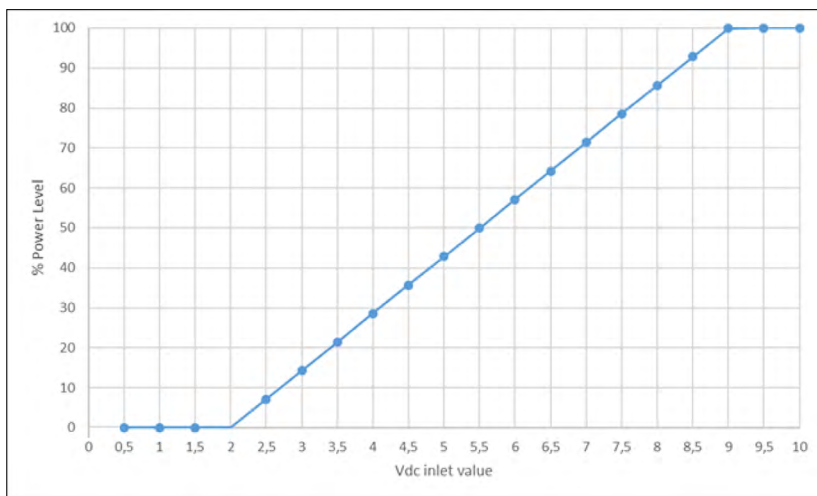
**NOTE:** When the Clip-In Board is wired and installed it is only possible for a CH demand to be made through the Clip-In. The CH demand through the Clip-In takes priority over all other kinds of requests.

### 2.1 Voltage Power (Parameter 42.0.0 = 1)

The input voltage level determines the proportional power load of the system according to the 0-10 VDC input. The shape of the proportional relation depends on the following parameters:

Parameter	Description	Example Value
42.1.0	Analog Control Voltage to Start Heat Demand	1
42.1.1	Analog Control Voltage to Stop Heat Demand	0.5
42.1.2	Analog Control Voltage for Maximum Heat Demand	9
42.1.3	Analog Control Voltage for Minimum Heat Demand	2

The following graph represents the relation to the example values:



**Figure 9 - Voltage Power Graph**

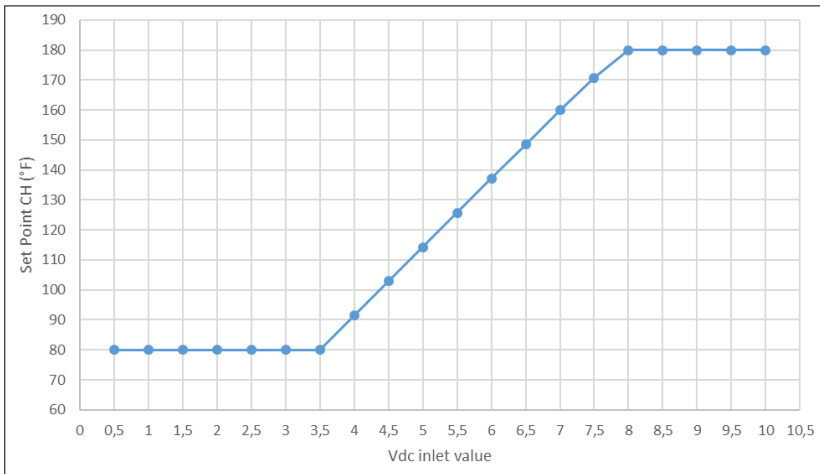
- Inlet voltage > 1 VDC - there is a central heating demand - the burner powers on
- 1 VDC < Inlet voltage < 2 VDC - boiler works at minimum power
- 2 VDC < Inlet voltage < 9 VDC - boiler works at power proportional to the inlet VDC
- Inlet voltage > 9 VDC - boiler works at maximum power (100% parameter 2.3.1)
- Inlet voltage < 0.5 VDC - the central heating demand has been met and the burner powers off

## 2.2 Voltage Temperature (Parameter 42.0.0 = 2)

The input voltage level determines the central heating setpoint of the system according to the 0-10 VDC input. The shape of the proportional relation depends on the following parameters:

Parameter	Description	Example Value
42.1.0	Analog Control Voltage to Start Heat Demand	1
42.1.1	Analog Control Voltage to Stop Heat Demand	0.5
42.1.2	Analog Control Voltage for Maximum Heat Demand	7.5
42.1.3	Analog Control Voltage for Minimum Heat Demand	3.5
42.0.1	Minimum Temp	80
42.0.2	Maximum Temperature	180

The following graph represents the relation to the example values:



**Figure 10 - Voltage Temperature Graph**

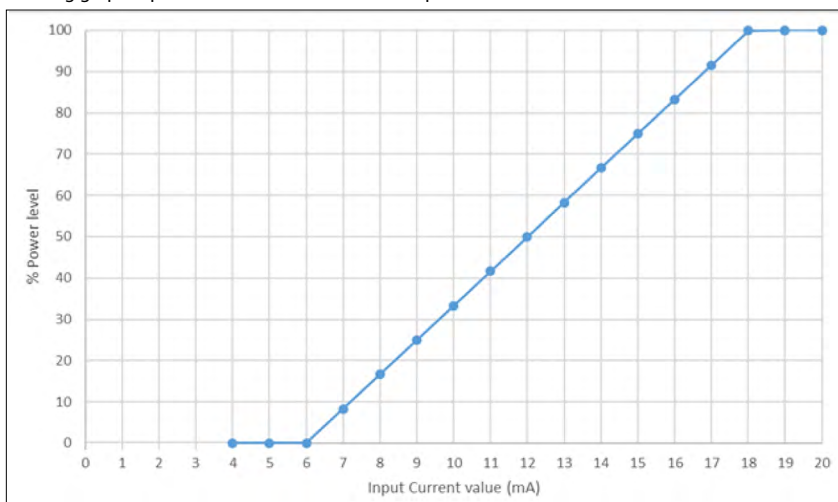
- Inlet voltage > 1 VDC - there is a central heating demand - the burner powers on
- 1 VDC < Inlet voltage < 3.5 VDC - boiler works at CH setpoint 80°F (par. 42.0.1)
- 3.5 VDC < Inlet voltage < 8 VDC - boiler works at CH setpoint proportional to the inlet VDC
- Inlet voltage > 8 VDC - boiler works at CH setpoint 180°F (par. 42.0.2)
- Inlet voltage < 0.5 VDC - the central heating demand has been met and the burner powers off

### 2.3 Current Power (Parameter 42.0.0 = 3)

The input voltage level determines the central heating setpoint of the system according to a proportional relation. The shape of the proportional relation depends on the following parameters:

Parameter	Description	Example Value
42.1.0	Analog Control Current to Start Heat Demand	5
42.1.1	Analog Control Current to Stop Heat Demand	4.5
42.1.2	Analog Control Current for Maximum Heat Demand	18
42.1.3	Analog Control Current for Minimum Heat Demand	6

The following graph represents the relation to the example values:



**Figure 11 - Current Power Graph**

- Inlet current > 5 mA - there is a central heating demand - the burner powers on
- 5 mA < Inlet current < 6 mA - boiler works at minimum power
- 6 mA < Inlet current < 18 mA - boiler works at power proportional to the inlet current
- Inlet current > 18 mA - boiler works at maximum power (100% - par. 2.3.1)
- Inlet current < 4.5 mA - the central heating demand has been met and the burner powers off

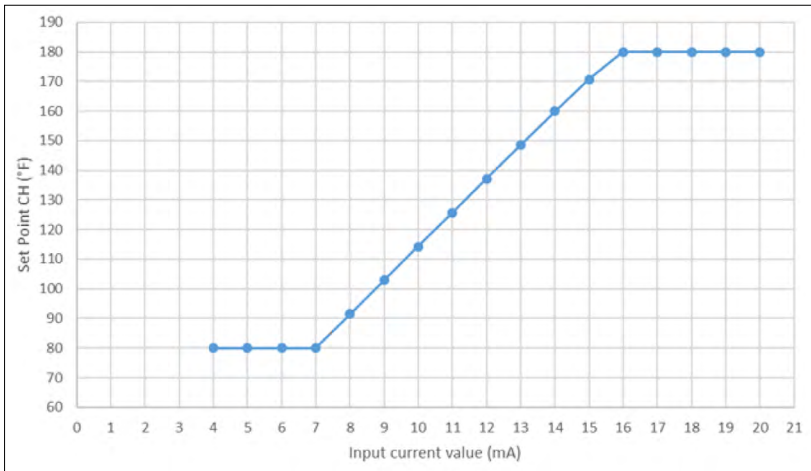


#### 2.4 Current Temperature (Parameter 42.0.0 = 4)

The input current level determines the central heating setpoint of the system according to a proportional relation. The shape of the proportional relation depends on the following parameters:

Parameter	Description	Example Value
42.1.0	Analog Control Current to Start Heat Demand	5
42.1.1	Analog Control Current to Stop Heat Demand	4.5
42.1.2	Analog Control Current for Maximum Heat Demand	16
42.1.3	Analog Control Current for Minimum Heat Demand	7
42.0.1	Minimum Temp	80
42.0.2	Maximum Temperature	180

The following graph represents the relation to the example values:



**Figure 12 - Current Temperature Graph**

- Inlet current > 5 mA - there is a central heating demand - the burner powers on
- 5 mA < Inlet current < 7 mA - boiler works at CH setpoint 80°F (par. 42.0.1)
- 7 mA < Inlet current < 16 mA - boiler works at CH setpoint proportional to the inlet current
- Inlet current > 16 mA - boiler works at CH setpoint 180°F (par. 42.0.2)
- Inlet current < 4.5 mA - the central heating demand has been met and the burner powers off