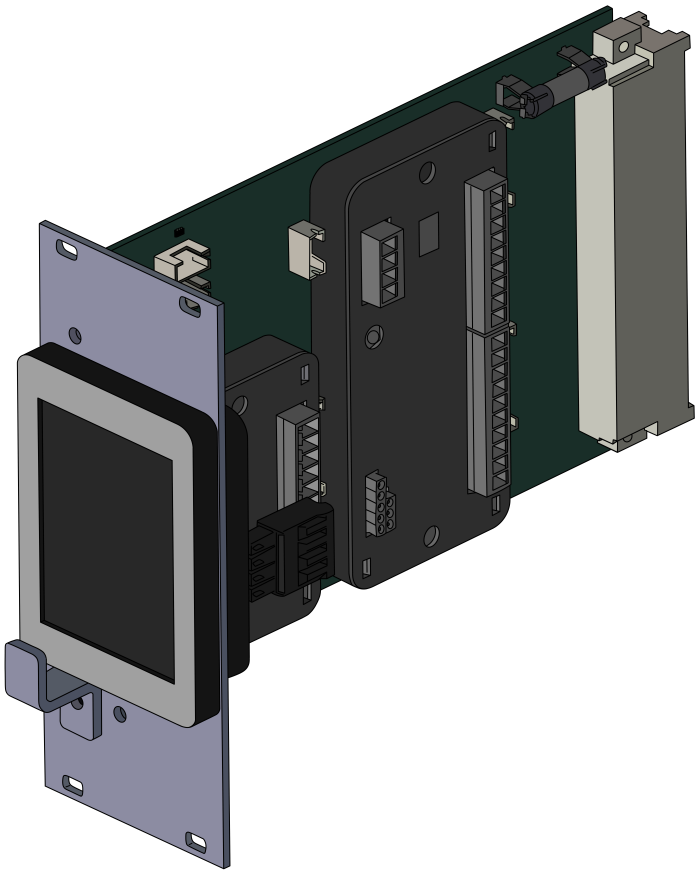
MPT-C911

User & Maintenance Manual



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Safety

The MPT-C911 is not approved as a safety device and should never be used to directly control gas valves, oxygen valves, or other safety field devices. Always use appropriate, approved safety controllers to manage safety-critical field devices.

Notes:

Parameter names used in the manual are highlighted in blue and when first referenced are followed by the parameter number(s). If the parameter is a list, it is shown as a range. If there are parameters for each zone, the parameter numbers are shown separated by ‘/‘

Examples:

- **Control Mode** (para. 11)
- **Ignition timing** (paras. 20-27)
- **Heating/Cooling limit** (para. 30/31)

Some terms within the manual are used interchangeably:

Control Input refers to the **Control Value (CV)** input to the MPT as a 4-20mA signal. Control Input and CV are used interchangeably.

Pulse time, On time, and Pulse width all refer to the amount of time an output is on.

Introduction

The MPT-C911 controller is designed to provide one or two ***zones*** of pulse control for up to eight controlled devices. The MPT-C911 is pin for pin compatible with the MPT-700 and is designed to be used in 3U rack systems - typically with flame safeguards as the controlled devices. The MPT-C911 can also be used as a stand-alone product to replace MPT-700 units not contained in a 3U rack.

External devices, such as loop controllers or PLCs, provide a 4-20mA input signal (the ***Control Input***) that the MPT-C911 uses to develop pulse outputs based on the number of outputs designated for each zone. The number of outputs for each zone can be from 0 to 8. The total number of outputs for both zones cannot be greater than 8.

There are 4 pulse algorithms available in the MPT-C911 (described in additional detail below):

1. Heating with fixed pulse width (on time is fixed, off time is calculated)
2. Heating and Cooling with fixed pulse width (on time is fixed, off time is calculated)
3. Heating with variable pulse width and spacing (on time and off times are calculated)
4. Heating and Cooling with variable pulse width and spacing (on time and off times are calculated)

While the MPT-C911 can be used as a general-purpose pulse output device, it is optimized for use as the pulse controller in Kromschröder's BGT systems, Kromschröder, Inc., Olsträd Corporation's (Combustion 911) and Thermal Products and Solutions' PF-19 pulse-fire systems or other 3rd-party systems using the MPT-700. These systems are typically used in industrial heating applications. **Note that the MPT-C911 is not approved as a safety device and should never be used to directly control gas valves.** Always use approved devices for burner control.

To view information regarding pulse-fire (what it is, why it is used, how to implement it), see the C911 web page for the MPT-C911@ https://combustion911.com/flame-safety-and-burner-control/mpt-c911/ .

Differences between the MPT-C911 and MPT-700 (not a complete list):

	MPT-C911	MPT-700
Power Supply required	24VDC	24VDC and 120/240 AC
Operator Interface	Resistive touch-screen	LEDs and pushbuttons
Zone display	Single/dual on same display based on selecting one or two zone operation	Toggles between zones one and two based on selection
Control input	4-20mA	0/4-20mA, three-point step
Modes of operation (Pulse control modes)	4 (single pulse output per controlled device)	8 (modes 5 though 8 provide separate control of gas and air valves)
4-20mA input impedance	250 Ω	200 Ω
Ignition Timing	Auto-calculated based on number of burners per zone OR manually entered	Manually entered

Getting Started with the MPT-C911

Planning

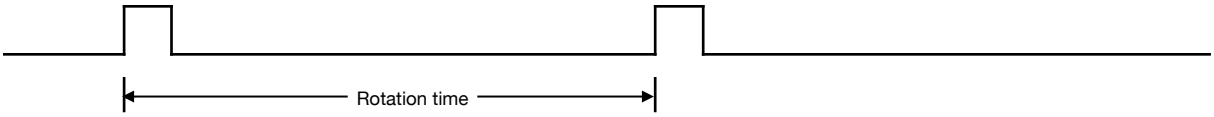
Operation of the MPT-C911 is determined by parameter settings. If the MPT-C911 is replacing an existing MPT-700, make sure the parameter settings of the MPT-700 are documented. (Depending on the supplier of the system in which the MPT-700 is installed, the parameters may be documented on the electrical schematics supplied with the system. Use Appendix A to document existing or desired parameter settings.)

If the existing parameters are not defined, at a minimum the following information is needed:

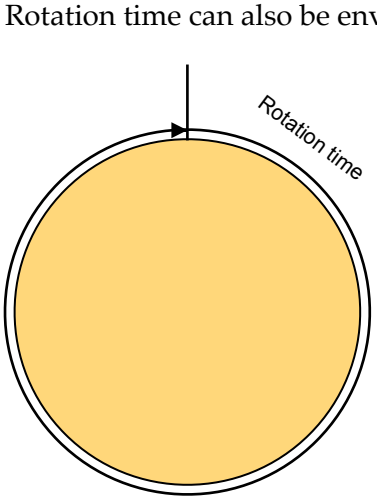
- Number of controlled zones (one or two)
- Number of burners in each zone (from 0 to 8 but not more than 8 total)
- Desired pulse control mode

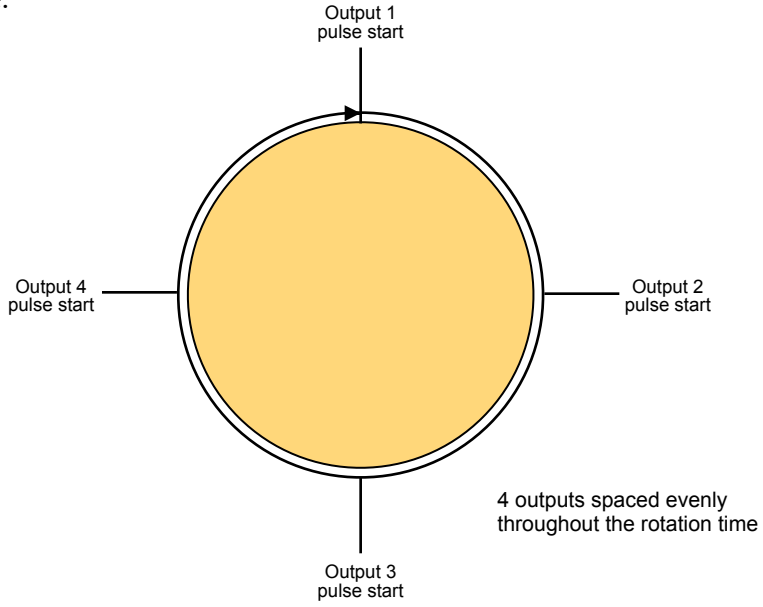
Ignition Timing and Rotation Time

Important Definition: ***Rotation time*** is the amount of time between when an output transitions from off to on and the next time the same output transitions from off to on. In all four control modes, the rotation time varies as the Control Input changes.



Rotation time can also be envisioned as a circle:





With multiple pulse outputs, spacing the ignition times (pulse start times) helps with convection in a furnace, increases uniformity, and reduces the electrical load (ok, slightly). Since the rotation time can vary, specifying the start times cannot be done in units of time. Instead the start times must be specified in unit-less terms. The MPT-C911 uses a scale of 255 to set the start times (valid start times are 1 to 255 inclusive). In the above 4-output example, the uniformly spaced start times are as follows:

Output	Pulse start “Ignition” time
1	1
2	64
3	128
4	191

As a general rule, to evenly space start times set Output 1 start time to 1 and the remaining outputs per:

*start time = (number of outputs in zone / 255) * (output # - 1)* . Round the result to the next whole digit.

> Example: For a system with eight outputs in one zone, the start time for Output 5 is:
>
> *Start time = (255 / 8) * (5 - 1) = (31.87) * (4) = 127.48* . Rounding up we get *128* as the start time for burner 5.

With the MPT-C911 there are two methods of setting the ignition timing for all outputs:

- **Automatic**: The MPT-C911 calculates the ignition timing based on the number of burners selected for each zone. The ignition timing is sequential (starting with output 1 and ending with output 8) and is evenly spaced throughout the rotation time using the formula shown above.
- **Manual**: The start times are entered individually for each output in parameters 20 through 27. This allows starts times to be “early” or “late” compared to an evenly spaced pattern and allows the order of the output pulses to be varied from a sequential pattern.*

Most applications can use the Automatic method of setting the ignition timing. See parameter 17 for more details.

* In a sequential pattern, output 1 is first, 2 is second, 3 is third, etc. In a non-sequential pattern, the order can be anything desired (for example: 2, 8, 3, 5, 7, 1, 6, 4). But remember, just because you *can* do something it doesn’t mean you *should.*

Control Modes

The MPT-C911 includes four algorithms for generating pulse outputs:

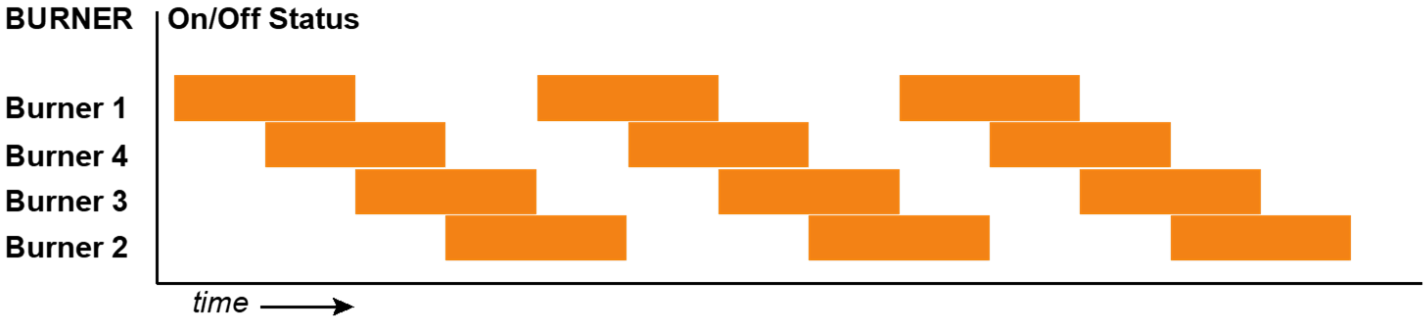
1. Heating with fixed pulse width (on time is fixed, off time is calculated)
2. Heating and Cooling with fixed pulse width (on time is fixed, off time is calculated)
3. Heating with variable pulse width and spacing (on time and off times are calculated)
4. Heating and Cooling with variable pulse width and spacing (on time and off times are calculated)

The control mode is selected via parameter 11.

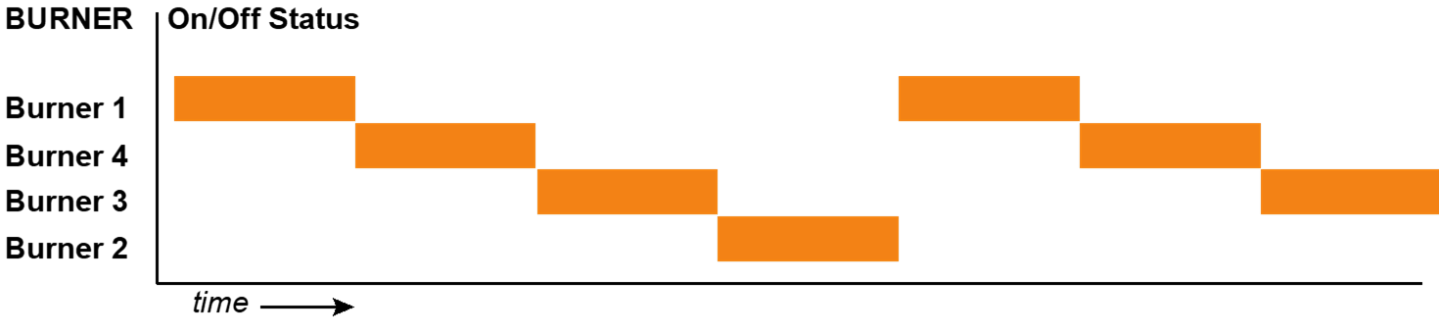
The control modes are described below. See the parameter listing for more details and to learn what parameters are used with each control mode.

Mode 1: Heating with fixed pulse width

Mode 1 is the simplest of the control modes. The fixed **Pulse width** (paras. 40-47 / 60-67) are set (independently) for each burner and the off time of each output is inversely proportional to the Control Input (CV). The higher the CV, the lower the off time). The Control Input is from 0 to 100% (4 to 20mA) and is displayed as 0 to 100%. The below two charts show a 4-output system at two different CVs.



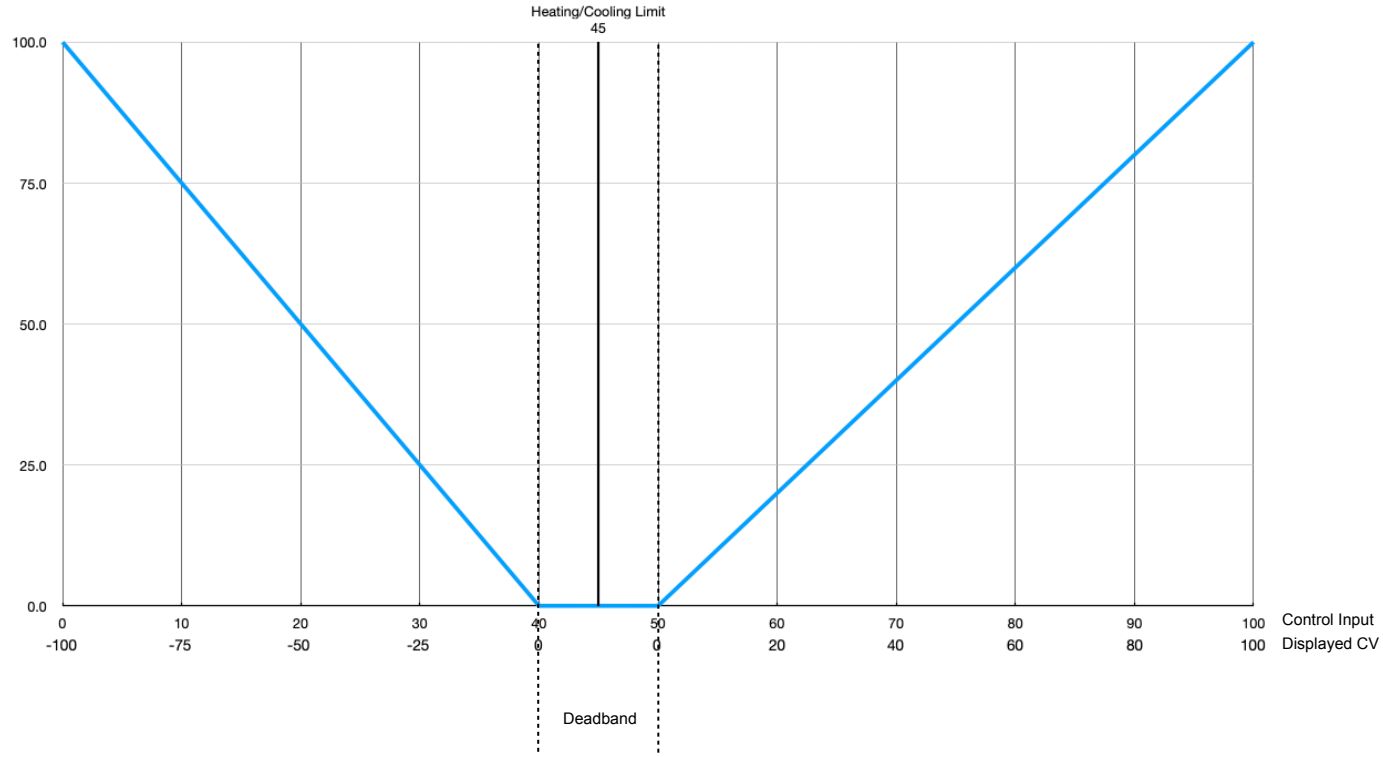
Example zone pulsing pattern (CV = 50%)



CV = 25% (Note the “on time” stays constant and off time increases)

Mode 2: Heating/Cooling with fixed pulse width

Mode 2 adds cooling to the pulse output control. By setting the **Heating/cooling limit** (breakpoint) and Deadband, the parameters determine when the MPT switches from heating to cooling. In mode 2, the Control Input is from 0 to 100% (4 to 20mA) but is displayed as -100 to 100% where 0 (zero) is the heating/cooling limit. The pulse outputs "reverse" below the **Heating/cooling limit** (para 30/31) and the heating cooling output indicates the zone is in cooling mode. A **Heating/Cooling Deadband** (para 32/33) can be added (to prevent frequent switching between heating and cooling).

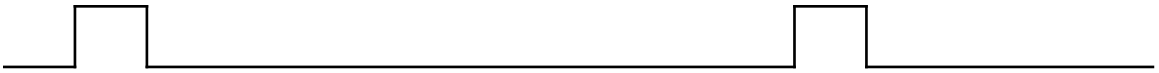


In the above example, the **Heating/cooling limit** is set to 45 and the **Heating/cooling deadband** is set to 10.

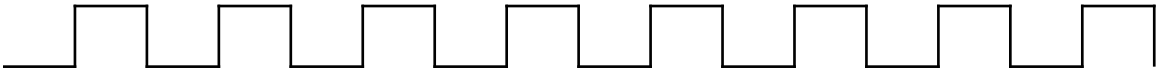
Mode 3: Heating with variable pulse width and spacing

Mode 3 is dependent on three parameter settings: **Minimum on time** (para. 48/54), **Minimum off time** (para. 49/55), and the **Setting Control Factor** (para. 28/29 - which controls the calculation for the pulse on and off times).

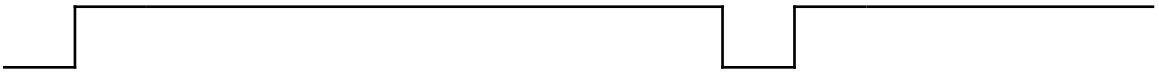
At the lowest Control Input, the pulse output time is set to the minimum on time and the off time is at a maximum value. As the Control Input approaches the **Setting Control Factor**, the on time remains at the minimum on time and the off time is reduced. Above the **Setting Control Factor**, the off time is set to the minimum off time and the on time increases as the Control Input increases.



CV = 0, Pulse width = Minimum on time, Off time at maximum



CV = Setting control factor, Pulse width = Minimum on time, Off time = Minimum off time



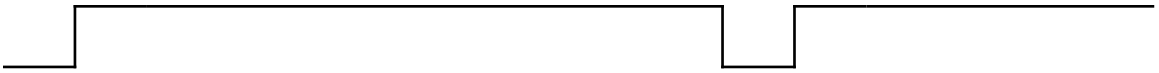
CV = 100, Pulse width at Maximum, Off time = Minimum off time

Note: The above charts do not show the effect of the **Force On** (para 34/35) and **Force Off** (para 36/37) settings. See those parameters for more information.

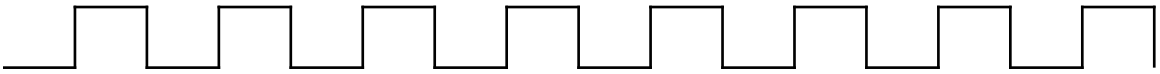
Mode 4: Heating/Cooling with variable pulse width and spacing

Mode 4 is dependent on five parameter settings: **Minimum on time** (para. 48/54), **Minimum off time** (para. 49/55), the **Setting Control Factor** (para. 28/29 - which controls the calculation for the pulse on and off times), the **Heating/cooling limit** (para 30/31) and the **Heating/Cooling Deadband** (para 32/33) .

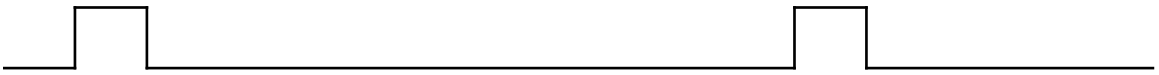
Essentially, Mode 4 combines Modes 2 and 3.



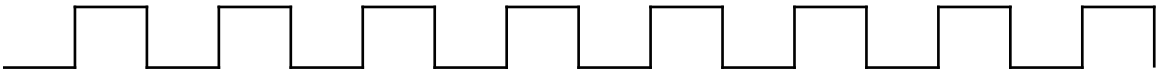
CV = 0, Pulse width at Maximum, Off time = Minimum off time, Displayed CV is -100



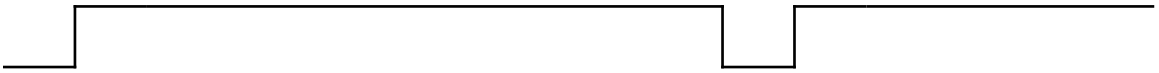
CV = -Setting control factor, Pulse width = Minimum on time, Off time = Minimum off time, Displayed CV is 0 - Setting Control Factor



CV = Heating/cooling limit (or within Heating/Cooling Deadband), Pulse width = Minimum on time, Off time at maximum, Displayed CV = 0



CV = Setting control factor, Pulse width = Minimum on time, Off time = Minimum off time, Displayed CV = Setting Control Factor



CV = 100, Pulse width at Maximum, Off time = Minimum off time, Displayed CV = 100

Note: The above charts do not show the effect of the **Force On** (para 34/35) and **Force Off** (para 36/37) settings. See those parameters for more information.

MPT-C911 Setup

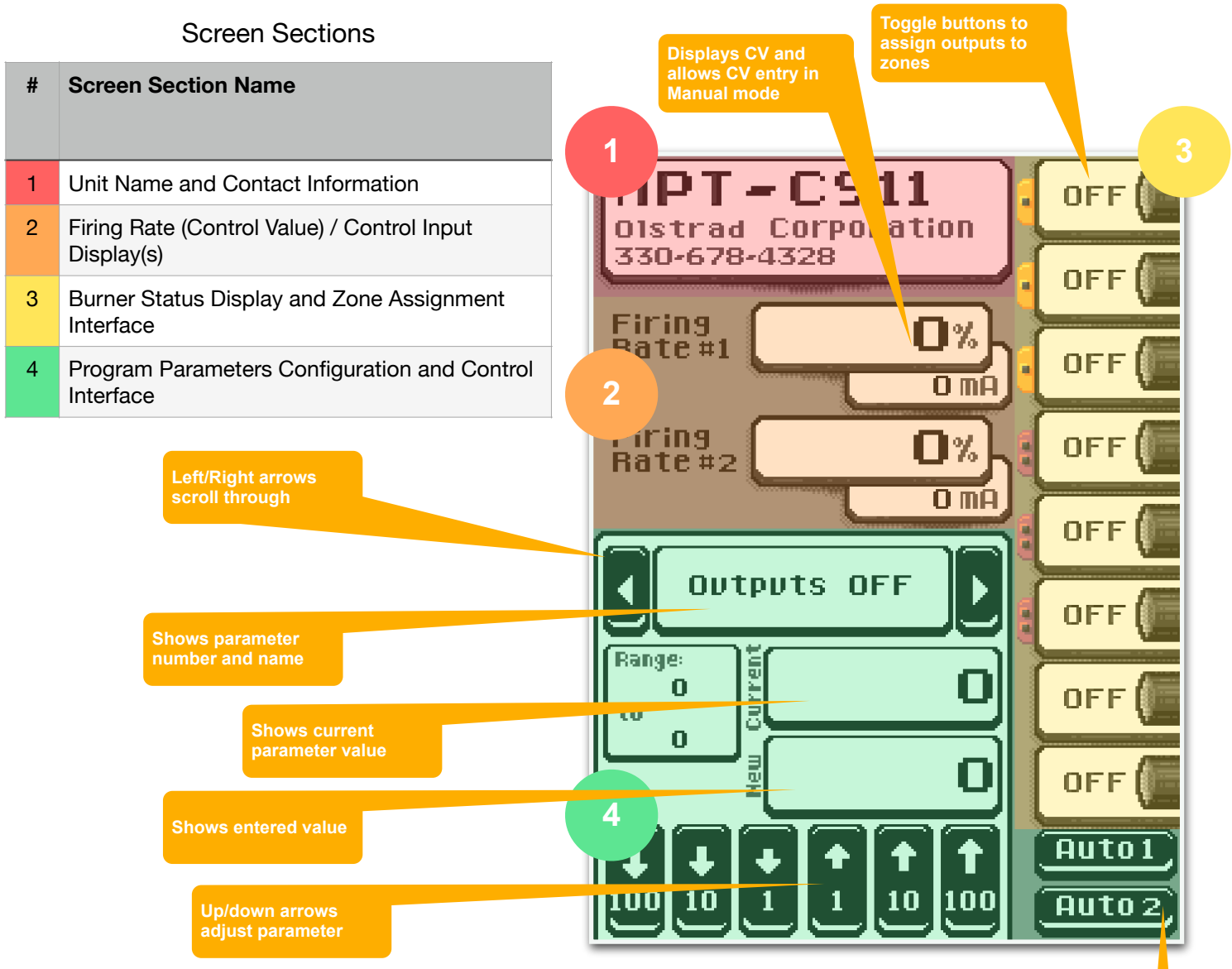
The MPT-C911 must be configured prior to operation. At a minimum, at least one output must be assigned to one zone and the **Control mode** (para. 11) must be selected. Parameters specific to the control mode should also be set.

Screen Layout

The MPT-C911 uses a resistive touch screen to display operating information, allow selection of outputs, entry of parameters, and selecting auto/manual modes. The screen is divided into 4 sections:

Screen Sections

#	Screen Section Name
1	Unit Name and Contact Information
2	Firing Rate (Control Value) / Control Input Display(s)
3	Burner Status Display and Zone Assignment Interface
4	Program Parameters Configuration and Control Interface



Some screen objects (Firing Rate 1/2, Auto/Manual/Off 1/2) are only visible when outputs are assigned to respective zones.

Entry and viewing of parameters values, assignment of outputs to zones and Auto/Manual selection require the MPT-C911 to be in Access Mode.

Access Mode (Editing Parameters)

Access Mode allows a user to:

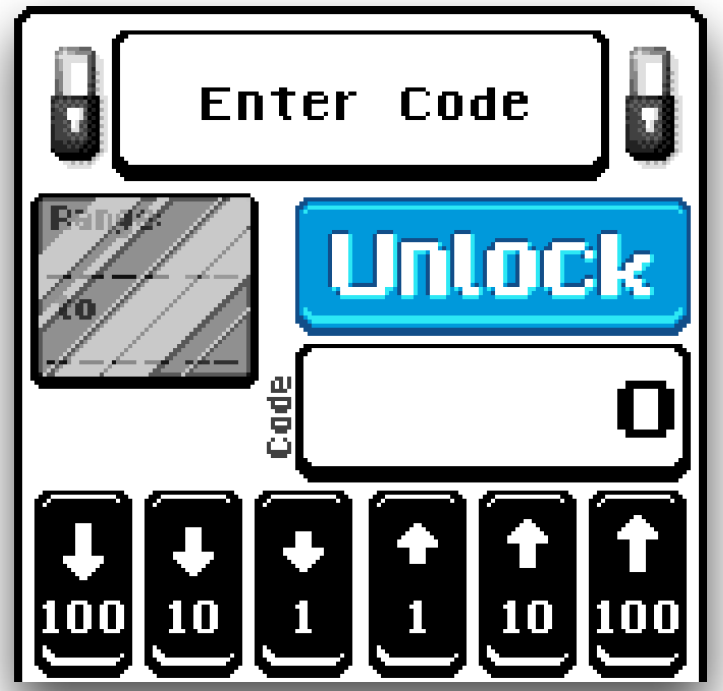
- View/Edit Parameter Values
- Assign Outputs (Burners) to Zones
- Toggle between Auto, Manual, and Off (per zone)

Entering Access Mode

To enter Access Mode, input the correct passcode and press the Unlock button. The default passcode is set to 1. (Once in Access Mode, the passcode can be changed to any number from 0 to 9 via parameter **87 - Unlock Code**.

To input the passcode, press the appropriate increment/decrement buttons until the correct value is shown in the code display.

If the passcode is input incorrectly, and the Unlock button is pressed, a small Invalid Code message will appear to the left of the code entry box.



Program Configuration Interface without Access Code

Selecting and Editing Parameters

Viewing and Editing Parameters is available when in Access Mode. The parameter scroll buttons ( ) become visible and are used to select a parameter for viewing/ editing.

- The right ( ) button increments the parameter number.
- The left ( ) button decrements the parameter number
- If applicable, the range box ( ) displays the valid range of values for the selected parameter.
- The new box ( ) displays the entered value. If no value has been entered the new box displays "-" and the current value is not altered.
- The current box ( )displays the existing value of the selected parameter.
- The numerical 100 increment/ decrement buttons ( ) increase or decrease the new value in steps of 100 (adjusting the third digit to the left of the decimal point). Shown when appropriate.

- The numerical 10 increment / decrement buttons () increase or decrease the new value in steps of 10 (adjusting the second digit to the left of the decimal point).
- The numerical 1 increment / decrement buttons () increase or decrease the new value in steps of 1 (adjusting the first digit to the left of the decimal point).
- The numerical 0.1 increment / decrement buttons () increase or decrease the new value in steps of 0.1 (adjusting the first digit to the right of the decimal point). Shown when appropriate.

Saving Parameters

To save the parameter values, use the right arrow to scroll to the end of the parameter list. The confirm (Confirm) and revert (Revert) buttons pop-up, replacing the New and Current data entry boxes.

- Pressing Confirm saves all the changes made to the parameter values and exits access mode.
- Pressing Revert discards all modified parameter values (the parameters revert to the existing values) and exits access mode.

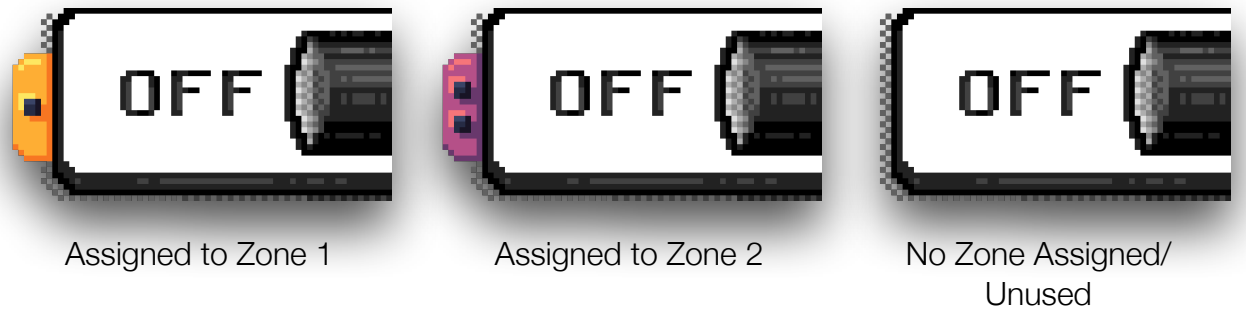
Access Mode Timeout

If the MPT-C911 has been in Access Mode for more than five minutes without user interaction, then any unconfirmed changes are discarded and the MPT-C911 exits access mode.

Assigning Burners to Zones

Assigning the Burner Outputs to zone 1 or zone 2 is done using the output assignment toggle buttons on the right edge of the display. Zone assignments are indicated using both color and dots, where:

- An orange flash and a single dot indicate an output is assigned to Zone 1.
- A purple flash and two dots indicate an output is assigned to Zone 2.
- When an output is not assigned, there is no color flash and no dots.



Assigned to Zone 1 | Assigned to Zone 2 | No Zone Assigned/ Unused

Zones can have from 0 to 8 outputs assigned to them and outputs do not need to be assigned sequentially. (For example, outputs 1,3,5,7 could be assigned to Zone1 and 2,4,6,8 could be assigned to Zone 2.)

Zone Auto, Manual, and Off

Zones normally operate in AUTO mode, where the Control Input drives the pulse control algorithm. For commissioning and trouble-shooting it is sometimes helpful to directly enter the CV or force all outputs off.

- When in Auto, the program determines the Zone CV based on the Control Input (4-20mA signal).
- When in Manual, the Zone CV is manually entered.
    - For Control Modes 1 and 3, the entered CV ranges from 0 to 100
    - For Control Modes 2 and 4, the entered CV ranges from -100 to 100
- When set to OFF, all zone pulse outputs are turned off.

NOTE: The zone AUTO buttons are visible only when outputs are assigned to a zone.

To switch between Zone Auto/Manual/Off:

- Enter Access Mode (see instructions above for entering Access Mode)
- Press the Zone 1 

button to toggle between Auto, Manual and Off for Zone 1.
- Press the Zone 2 

button to toggle between Auto, Manual and Off for Zone 2.
- The buttons toggle as shown below:

Editing the Control Value in Manual Mode

When a zone is in Manual, the CV display area becomes a data entry window.

Use the numerical increment/ decrement buttons to adjust the CV to the desired value. (See Selecting and Editing Parameters to learn about the increment / decrement buttons.)

NOTES for Manual control:

1. The CV starts at the current Control Input when entering Manual.
2. On exiting Manual, the CV immediately is set to the Control Input.
3. When leaving access mode, AUTO control is selected for all active zones.
4. On power-up, active zones are set to AUTO.

Parameters

The MPT-C911 uses many, but not all, of the same parameters as the MPT-700. There also some added parameters to manage the touch-screen.

- Parameters for the screen saver timeout, the code to enter Access (edit) mode and Auto-calculate ignition timing have been added.
- Parameters specific to Control Modes 5-8, which are not implemented in the MPT-C911, do not exist.
- Parameters that have been replaced by other entry methods (Examples: output assignment to zones, Auto/Manual selection) do not exist.

To edit parameters, follow the instructions beginning at Access Mode (Editing Parameters).

Parameters by Group

Parameter 11 - Control Mode

See Control Modes for a full description. Valid entries are 1, 2, 3, 4

Autocalculate Ignition Timing

Autocalculate calculates the Ignition Timing Output for any outputs assigned to either Zone.

Set Autocalculate to CALC to have the MPT-C911 perform the calculation. Once the calculation is complete, Autocalculate will display “Pending” until parameters have been saved.

For a description of Ignition Timing, see Ignition Timing and Rotation Time.

Useable in Control Modes 1, 2, 3, 4

Parameters 20 through 27 - Ignition Timing Output x (1 through 8)

Valid Entries are 0/1 to 255

See Ignition Timing and Rotation Time for an explanation of the Ignition timing. Set individually for each output (1 through 8). Suggestion: Use Autocalculate to set output ignition timing values and then adjust the values as desired.

Used in Control Modes 1, 2, 3, 4

Parameters 28, 29 - Setting Control Factor z (Zone 1 or Zone 2)

Valid Entries are 10 to 90 (%)

Provides a CV breakpoint used to calculate pulse widths (on times) and off times in Modes 3 and 4. See Mode 3 or Mode 4 for more information.

Below the Setting Control Factor the on time is equal to the minimum on time and the off time increases as the CV approaches 0.

Above the Setting Control Factor the off time is equal to the minimum off time and the on time increases as the CV approaches 100.

Set for any zone that has outputs assigned.

Used in Control Modes 3, 4

Parameters 30, 31 - Heating/Cooling Limit z (Zone 1 or Zone 2)

Valid Entries are 10 to 90 (%)

Provides a CV breakpoint where the zone switches from Cooling to Heating. See Mode 2 or Mode 4 for more information. The Heating/Cooling limit works in conjunction with the Heating/Cooling Deadband (see below).

Set for any zone that has outputs assigned.

Used in Control Modes 2, 4

Parameters 32, 33 - Heating/Cooling Deadband z (Zone 1 or Zone 2)

Valid Entries are 0 to 50 (%)

Provides a CV deadband centered on the Heating/Cooling Limit where the Display CV is held to 0. This prevents dithering between Heating and Cooling modes. See Mode 2 or Mode 4 for more information.

Set for any zone that has outputs assigned.

Used in Control Modes 2, 4

Parameters 34, 35 - Force on value z (Zone 1 or Zone 2)

Valid Entries are 0 / 50 to 100 (%) where 0 disables this feature.

Provides a CV limit above which all outputs are forced ON.

Use this setting to provide more linear control near as the displayed CV approaches 100 and to prevent over-cycling of control equipment as the displayed CV approaches 100 and the off times get shorter and shorter. Note that the displayed CV is not the same as the Control Input for modes 2 and 4.

When the calculated off time is less than the minimum off time, the algorithm prevents the output from pulsing ON until the minimum off time has elapsed (see minimum off time parameters below). This can have the effect of "freezing" the output pulse, with a lag in ignition time.

Based on field experience, as setting of 95 to 97 provides a good balance of control.

Set for any zone that has outputs assigned.

Used in Control Modes 1, 2, 3, 4

Parameters 36, 37 - Force off value z (Zone 1 or Zone 2)

Valid Entries are 0 /1 to 50 (%) where 0 disables this feature.

Provides a CV limit below which all outputs are forced OFF.

Use this setting to provide more linear control near as the displayed CV approaches 0. Note that the displayed CV is not the same as the Control Input for modes 2 and 4.

Based on field experience, as setting of 3 to 5 provides a good balance of control.

Set for any zone that has outputs assigned.

Used in Control Modes 1, 2, 3, 4

Parameter 38 - Force fixed CV value Z1

Valid Entries are 0 to 100 (%)

Provides a CV value that overrides the Control Input when hardware input 1 is ON (24Vdc). This input is available on pin 14z of the MPT-C911 connector or backplane terminal 1 of X0 on the Kromschröder MPT motherboard.

Applies to Zone 1 only, and only when Zone 1 is in Auto.

Used in Control Modes 1, 2, 3, 4

Parameter 39 - Force fixed CV value Z2

Valid Entries are 0 to 100 (%)

Provides a CV value that overrides the Control Input when hardware input 3 is ON (24Vdc). This input is available on pin 16z of the MPT-C911 connector or backplane terminal 3 of X0 on the Kromschröder MPT motherboard.

Applies to Zone 2 only, and only when Zone 2 is in Auto

Used in Control Modes 1, 2, 3, 4

Parameters 40 through 47 - Pulse width x S1 (1 through 8)

Valid Entries are 0.1 to 180 seconds

Sets the pulse width (on time) for outputs 1 through 8. These pulse widths are active when hardware input 2 is OFF (0V). This input is available on pin 14d of the MPT-C911 connector or backplane terminal 2 of X0 on the Kromschröder MPT motherboard.

Applies directly to outputs regardless of zone assignment

Used in Control Modes 1, 2

Parameters 60 through 67 - Pulse width x S2 (1 through 8)

Valid Entries are 0.1 to 180 seconds

Sets the pulse width (on time) for outputs 1 through 8. These pulse widths are active when hardware input 2 is ON (24V). This input is available on pin 14d of the MPT-C911 connector or backplane terminal 2 of X0 on the Kromschröder MPT motherboard.

Applies directly to outputs regardless of zone assignment

Used in Control Modes 1, 2

Parameters 48, 54 - Min On time z S1 (Zone 1 or Zone 2)

Valid Entries are 0.1 to 160 seconds

Sets the minimum pulse width (on time) for all outputs when Modes 3 or 4 are active. These values are active when hardware input 2 is OFF (0V). This input is available on pin 14d of the MPT-C911 connector or backplane terminal 2 of X0 on the Kromschröder MPT motherboard.

Set for any zone that has outputs assigned.

Used in Control Modes 3, 4

Parameters 68, 74 - Min On time z S2 (Zone 1 or Zone 2)

Valid Entries are 0.1 to 160 seconds

Sets the minimum pulse width (on time) for all outputs when Modes 3 or 4 are active. These values are active when hardware input 2 is ON (24V). This input is available on pin 14d of the MPT-C911 connector or backplane terminal 2 of X0 on the Kromschröder MPT motherboard.

Set for any zone that has outputs assigned.

Used in Control Modes 3, 4

Parameters 49, 55 - Min Off time z S1 (Zone 1 or Zone 2)

Valid Entries are 0.1 to 160 seconds

Sets the minimum (off time) for all outputs. Each output must be off for at least this amount of time before allow to turn on again. These values are active when hardware input 2 is OFF (0V). This input is available on pin 14d of the MPT-C911 connector or backplane terminal 2 of X0 on the Kromschröder MPT motherboard.

Set for any zone that has outputs assigned.

Used in Control Modes 1, 2, 3, 4

Parameters 69, 75 - Min Off time z S2 (Zone 1 or Zone 2)

Valid Entries are 0.1 to 160 seconds

Sets the minimum (off time) for all outputs. Each output must be off for at least this amount of time before allowed to turn on again. These values are active when hardware input 2 is ON (24V). This input is available on pin 14d of the MPT-C911 connector or backplane terminal 2 of X0 on the Kromschröder MPT motherboard.

Set for any zone that has outputs assigned.

Used in Control Modes 1, 2, 3, 4

Parameter 87 - Unlock code

Valid Entries are 0 to 9

Changes the Unlock code from the default (1) to this value. The unlock code is used to login to Access mode to edit/ display parameters, assign outputs to zones, and toggle Auto/Manual/Off.

Parameter 88 - Screensaver timeout

Valid Entries are 0/ 1 to 60 (minutes) where 0 disables this feature.

Sets the time, in minutes before the screens saver is activated. Setting to 0 disables the screen saver. The screen saver does not activate if the MPT-C911 is in ACCESS mode.

Parameter List

#	Name	Description	Range	Mode 1	Mode 2	Mode 3	Mode 4
11	Control Mode	Operating Control mode - determines the state of 8 outputs based on different algorithms	1 to 4	N/A	N/A	N/A	N/A
	Autocalculate Ignition Timing	Setting this parameter to Calc automatically calculates the Ignition timing for any burners assigned to a zone. Important: Select the output zone assignements before setting this parameter to Calc. Once set to Calc, the displays changes to pending until parameters are saved	Calc/Off/Pending	✓	✓	✓	✓
20	Ignition Timing Output 1	Sets the relative time at which an output pulse turns ON	0/1…255	✓	✓	✓	✓
21	Ignition Timing Output 2	Sets the relative time at which an output pulse turns ON	0/1…255	✓	✓	✓	✓
22	Ignition Timing Output 3	Sets the relative time at which an output pulse turns ON	0/1…255	✓	✓	✓	✓
23	Ignition Timing Output 4	Sets the relative time at which an output pulse turns ON	0/1…255	✓	✓	✓	✓
24	Ignition Timing Output 5	Sets the relative time at which an output pulse turns ON	0/1…255	✓	✓	✓	✓
25	Ignition Timing Output 6	Sets the relative time at which an output pulse turns ON	0/1…255	✓	✓	✓	✓
26	Ignition Timing Output 7	Sets the relative time at which an output pulse turns ON	0/1…255	✓	✓	✓	✓
27	Ignition Timing Output 8	Sets the relative time at which an output pulse turns ON	0/1…255	✓	✓	✓	✓
28	Setting Control Factor Z1	Defines the CV at which the pulse On time is equal to the pulse Off time (also = max Frequency point)	10 to 90%			✓	✓
29	Setting Control Factor Z2	Defines the CV at which the pulse On time is equal to the pulse Off time (also = max Frequency point)	10 to 90%			✓	✓
30	Heating/Cooling Limit Z1	Defines the CV at which the pulse controller switches from Heating to Cooling	10 – 90%		✓		✓
31	Heating/Cooling Limit Z2	Defines the CV at which the pulse controller switches from Heating to Cooling	10 – 90%		✓		✓
32	Heating/Cooling Deadband Z1	Defines a gap between heating and cooling (to prevent dithering)	0…50%		✓		✓
33	Heating/Cooling Deadband Z2	Defines a gap between heating and cooling (to prevent dithering)	0…50%		✓		✓
34	Force-On Value Z1	CV at which all outputs are forced on	0/50…100%	✓	✓	✓	✓
35	Force-On Value Z2	CV at which all outputs are forced on	0/50…100%	✓	✓	✓	✓
36	Force-Off Value Z1	CV at which all outputs are forced off	0/1 to 50%	✓	✓	✓	✓
37	Force-Off Value Z2	CV at which all outputs are forced off	0/1 to 50%	✓	✓	✓	✓
38	Force Fixed CV Z1	CV used when input 1 is active and Zone is in Auto (Control Input is ignored)	0,1..100%	✓	✓	✓	✓
39	Force Fixed CV Z2	CV used when input 3 is active and Zone is in Auto (Control Input is ignored)	0,1..100%	✓	✓	✓	✓
40	Pulse Width 1 S1	Output 1 pulse width, set 1	0.1 to 180 sec	✓	✓		
41	Pulse Width 2 S1	Output 2 pulse width, set 1	0.1 to 180 sec	✓	✓		

#	Name	Description	Range	Mode 1	Mode 2	Mode 3	Mode 4
42	Pulse Width 3 S1	Output 3 pulse width, set 1	0.1 to 180 sec	✓	✓		
43	Pulse Width 4 S1	Output 4 pulse width, set 1	0.1 to 180 sec	✓	✓		
44	Pulse Width 5 S1	Output 5 pulse width, set 1	0.1 to 180 sec	✓	✓		
45	Pulse Width 6 S1	Output 6 pulse width, set 1	0.1 to 180 sec	✓	✓		
46	Pulse Width 7 S1	Output 7 pulse width, set 1	0.1 to 180 sec	✓	✓		
47	Pulse Width 8 S1	Output 8 pulse width, set 1	0.1 to 180 sec	✓	✓		
48	Min On Time Z1 S1	Minimum pulse (on) time	0.1 to 160 sec			✓	✓
49	Min Off Time Z1 S1	Minimum off time, output cannot turn on until this time has elapsed	0.1 to 160 sec	✓	✓	✓	✓
54	Min On Time Z2 S1	Minimum pulse (on) time	0.1 to 160 sec			✓	✓
55	Min Off Time Z2 S1	Minimum off time, output cannot turn on until this time has elapsed	0.1 to 160 sec	✓	✓	✓	✓
60	Pulse Width 1 S2	Output 1 pulse width, set 2	0.1 to 180 sec	✓	✓		
61	Pulse Width 2 S2	Output 2 pulse width, set 2	0.1 to 180 sec	✓	✓		
62	Pulse Width 3 S2	Output 3 pulse width, set 2	0.1 to 180 sec	✓	✓		
63	Pulse Width 4 S2	Output 4 pulse width, set 2	0.1 to 180 sec	✓	✓		
64	Pulse Width 5 S2	Output 5 pulse width, set 2	0.1 to 180 sec	✓	✓		
65	Pulse Width 6 S2	Output 6 pulse width, set 2	0.1 to 180 sec	✓	✓		
66	Pulse Width 7 S2	Output 7 pulse width, set 2	0.1 to 180 sec	✓	✓		
67	Pulse Width 8 S2	Output 8 pulse width, set 2	0.1 to 180 sec	✓	✓		
68	Min On Time Z1 S2	Minimum pulse (on) time	0.1 to 160 sec			✓	✓
69	Min Off Time Z1 S2	Minimum off time, output cannot turn on until this time has elapsed	0.1 to 160 sec	✓	✓	✓	✓
74	Min On Time Z2 S2	Minimum pulse (on) time	0.1 to 160 sec			✓	✓
75	Min Off Time Z2 S2	Minimum off time, output cannot turn on until this time has elapsed	0.1 to 160 sec	✓	✓	✓	✓
87	Unlock Code	Code to enter Access Mode	1 to 10				
88	Screensaver Timeout (Min)	Screensaver timeout	0/1 to 60				

Faults

The MPT-C911 uses a CANbus network internally to communicate between the display and the IO controllers. In the event that communication fail, the display changes to an error screen and show one of the following faults:

1. STG810 timeout
2. STG850 timeout
3. Both STGs timeout
4. CAN bus off error

These are fatal errors and the unit should be removed from operation and returned to Combustion 911.

The MPT-C911 monitors the state of the Zone Control 4-20mA inputs if that zone has outputs assigned. In the event the input is out of range (< 3.5 mA or > 21mA), the Control Input is considered invalid and all outputs for that zone are set to off. The Error output turns on and the mA display for that zone turns red.

5. Zone 1 out of range
6. Zone 2 out of range

Hardware
Inputs and Outputs

K" X0 Terminal	Connector pin	Function		Input	Output
1	14z	Overrides the Zone 1 Control Value with the CV value in parameter 38. Only active if Zone 1 is in AUTO.	+12-30 Vdc	✓	
2	14d	Causes the MPT-C911 to use SET2 parameters for output pulse widths, min On times and min Off times (parameters 60-69, 74, 75).	+12-30 Vdc	✓	
3	16z	Overrides the Zone 2 Control Value with the CV value in parameter 39. Only active if Zone 2 is in AUTO.	+12-30 Vdc	✓	
4	16d	Not used			
5	14b	GND. Common (0VDC) of inputs 1-3 must be connected here.			
6	20z	Zone 1 Control Input, available as 4-20mA only. Jump to terminal 7 if not used.	4-20 mA	✓	
7	20b	Common for Zone 1 Control Input	0 Vdc		
8	20d	Zone 2 Control Input, available as 4-20mA only. Jump to terminal 9 if not used.	4-20 mA	✓	
9	20b	Common for Zone 2 Control Input	0 Vdc		
10	18z	Not used. 3-point control "open" command	+24 Vdc		
11	18b	Common for 3-point control	0 Vdc		
12	18d	Not used. 3-point control "close" command	+24 Vdc		
13	10z	Heating/Cooling signal, Zone 1. On when heating.	+24 Vdc		✓
14	10d	Heating/Cooling signal, Zone 2. On when heating.	+24 Vdc		✓
15	12z	Error. On when the MPT-C911 detects a fault. See touchscreen for source of the fault.	+24 Vdc		✓
16	6b	GND			
17	10b	0 Vdc input power			
18	2b	+24VDC input power			

For completeness, the remaining terminals on the X0 terminal strip of the Kromschröder MPT motherboard are shown below.

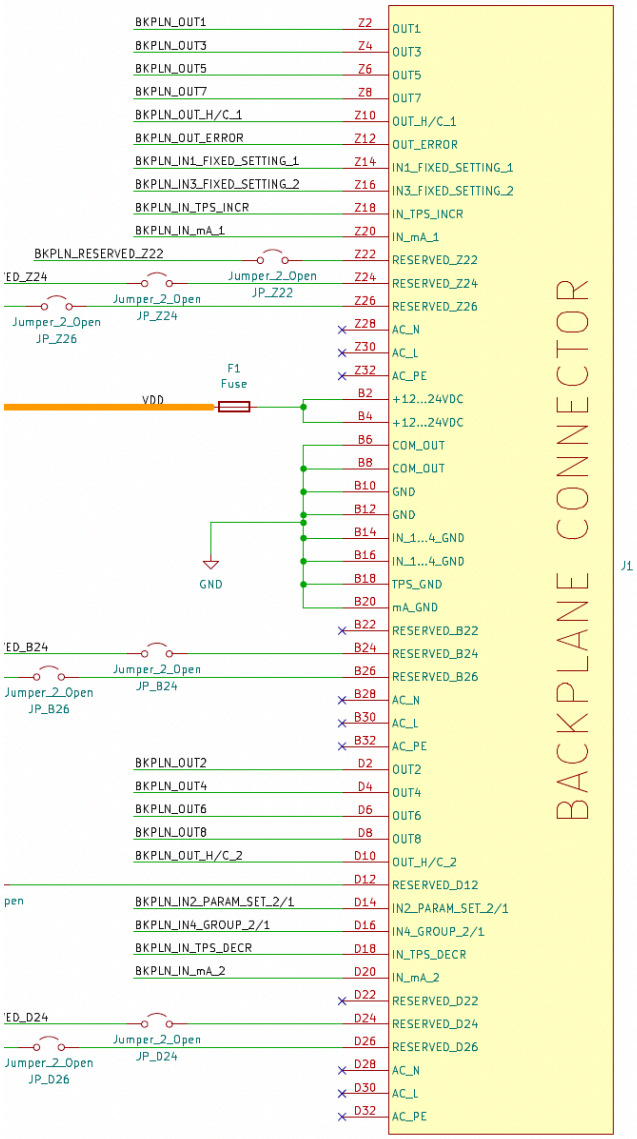
K" X0 Terminal	Function
19	Heating/Cooling Zone 2 NO contact (indicates heating)
20	Heating/Cooling Zone 2 C contact (max 24Vdc, 1A)
21	Heating/Cooling Zone 2 NC contact (indicates cooling)
22	Heating/Cooling Zone 1 NO contact (indicates heating)
23	Heating/Cooling Zone 1 C contact (max 24Vdc, 1A)
24	Heating/Cooling Zone 1 NC contact (indicates cooling)

Backplane Connector

Type F, DIN 41612, 48 pin

The MPT-C911 uses a standard Type F connector. This connector can be used with any mating connector but was selected so that the MPT-C911 is a drop in replacement for the Kromschröder MPT 700.

The MPT-C911 does not require AC power. It is powered via pins 2b and 4b with +24 Volts DC with the DC common (0 Volts DC) on pin 10b. Note that the ground and dc common pins are internally tied together.



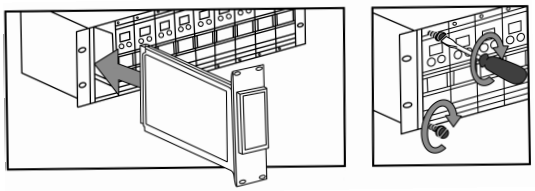
Installation

Hardware

CAUTION: Do not install the MPT-C911 with power applied! Damage to the unit could result.

NOTE: The MPT-C911 is pin for pin compatible with the MPT-700. However, the MPT-C911 does not use AC power.

1. Turn off power
2. If replacing an existing MPT, loosen the retaining screws at the top and bottom of the MPT
3. Using the front handle, gently pull the MPT loose from the 3U rack and remove.
4. Align the card-edge of the new MPT with the top and bottom slides of the 3U cage
5. Slide the MPT into the 3U cage until the connector of the MPT seats securely to the backplane. DO NOT USE EXCESSIVE FORCE AS DAMAGE TO THE MPT OR THE BACKPLANE MAY RESULT!
6. Tighten the retaining screws of the MPT to the 3-U rack.



When installing an MPT-C911 in a 3rd-party control system that does not use the 3U rack system developed by Kromschröder, (systems supplied by those other than Kromschröder, Kromschroder, Inc., Thermal Products and Solutions and Olsträd Corporation/ Combustion 911) follow the literature provided with that system.

Wiring Notes

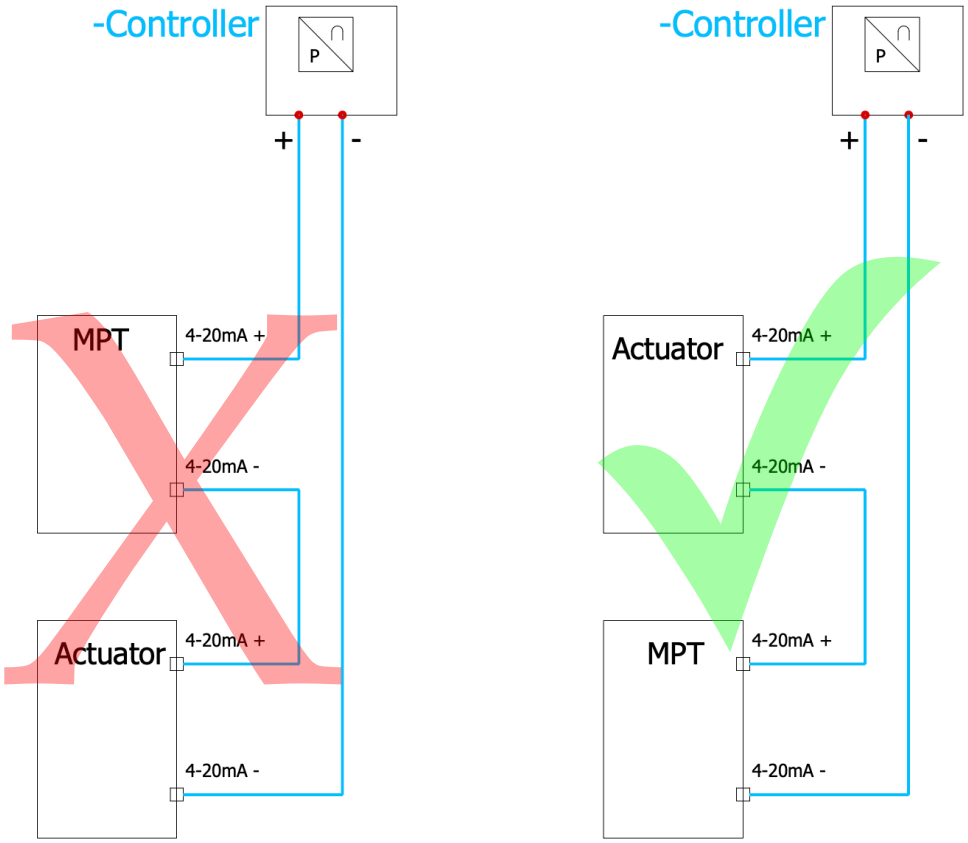
For the Type F pin connections, see Backplane Connector above.

In all installations, separate low voltage DC signal wires from AC wires.

+24V DC power must be connected to pins 2b and 4b with Common (0 Volts DC) connected to pins 6b and 8b. If using the Kromschröder MPT backplane, connect +24VDC to terminal X0-18 and 0VDC to terminal X0-17.

The digital inputs are typically +24V DC but can be from +12 to +30 V DC. The Common (0 Volts DC) must be connected to 14b or 16b (terminal X0-15 if using the Kromschröder MPT backplane).

The two 4-20mA analog inputs share a common 0 VDC connection on pin 20b. (Terminals X0-7 and X0-9 on the Kromschröder MPT backplane). Do not use the MPT-C911 analog inputs as the first device in a 4-20mA multi-device series control loop and do take into account the 250Ω input resistance. Use shielded, twisted pair cable for the analog inputs.



Specifications

Power	+24 Volts DC +/- 10%, 150mA (with all outputs on in the Kromschröder backplane), 1000mA total when used in a 3rd party system (depending on output loads) <
Internal Fuse	1A high speed
Temperature Range	-40 to 140°F / -40 to 60°C
Humidity	5 to 80%, Non-condensing
Analog Inputs	2, 4-20mA, 250Ω, 10bit ADC (effective)
Digital Inputs	3, +12..30 Volts DC, 20kΩ
Digital Outputs	8 pulse outputs, 3 signal outputs, +24 Volts DC, max 100mA per channel*, total of all outputs cannot exceed 800mA
Digital Outputs	3, +24 Volts DC, max 100mA per channel*
PCB Dimension	100mm x 160mm
Front Panel	50.8mm x 128.5mm (for 3u rack, 3 HE, 10 TE)
Weight	12.8 oz / 0.363 kg

*Note: Kromschröder PFU card digital inputs use < 7mA and the Kromschröder PFP 700 supplies a maximum of 600mA.

Appendix A. Parameter Cheat Sheet

Use this table to record existing parameter settings for an existing MPT 700 being replaced with an MPT-C911

Parameter	Description	Current Setting in MPT 700
10	setting source	
11	mode of operation	
12	equipment address	
13	equipment address	
14	setting indicator	
15	number of outputs Z1	
16	number of outputs Z2	
18	MPT version	
19	keyboard repetition rate	
20	ignition timing burner 1	
21	ignition timing burner 2	
22	ignition timing burner 3	
23	ignition timing burner 4	
24	ignition timing burner 5	
25	ignition timing burner 6	
26	ignition timing burner 7	
27	ignition timing burner 8	
28	setting control factor	
29	setting control factor	
30	heating/cooling limit Z1	
31	heating/cooling limit Z2	
32	heating/cooling dead zone Z1	
33	heating/cooling dead zone Z2	
34	continuous pulse Z1	
35	continuous pulse Z2	
36	control rate (3-pt step controller) Z1	
37	control rate (3-pt step controller) Z2	
38	fixed setting Z1	
39	fixed setting Z2	
40	pulse width, set 1	
41	pulse width, set 1	
42	pulse width, set 1	
43	pulse width, set 1	
44	pulse width, set 1	
45	pulse width, set 1	
46	pulse width, set 1	
47	pulse width, set 1	
48	minimum on time Z1, set 1	
49	minimum off time Z1, set 1	

Parameter	Description	Current Setting in MPT 700
50	delays	
51	delays	
52	delays	
53	delays	
54	minimum On Time Z2, set 1	
55	minimum Off time Z2, set 1	
56	delays	
57	delays	
58	delays	
59	delays	
60	burner 1 pulse width, set 2	
61	burner 2 pulse width, set 2	
62	burner 3 pulse width, set 2	
63	burner 4 pulse width, set 2	
64	burner 5 pulse width, set 2	
65	burner 6 pulse width, set 2	
66	burner 7 pulse width, set 2	
67	burner 8 pulse width, set 2	
68	minimum On Time Z1, set 2	
69	minimum off time Z1, Set 2	
70	delays	
71	delays	
72	delays	
73	delays	
74	minimum On Time Z2, set 2	
75	minimum off time Z2, set 2	
76	delays	
77	delays	
78	delays	
79	delays	
87	equipment code	

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Go wild!

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The information in this document contains general descriptions based on current specifications.

The company reserves the right to make changes in specifications and models as design improvements are introduced, without prior notice.