CHROMALOX
Advanced Thermal Technologies

Chromalox Temperature Controller Guide

Overview:

Chromalox offers a wide variety of process temperature controllers ranging from 1/32 DIN, to 1/8 DIN to DIN rail and back panel mount. There's also a range of low cost simple solutions to more capable and advanced controllers. The challenge commonly experienced, however, is what is the right controller for any given application. This guide will help identify the strengths and weaknesses of each controller that we offer to better identify the right applications. Whatever the application or need that our customers have, we have a controller to suit.

Note: This guide does not include multi-loop or overtemperature controllers (3340, 1040, 6050, 1030, etc).

Score:

Each controller will be given a score from 1-5 in four different categories: Ease of use, features, price, and space. For more details on what those categories are looking at, see below.

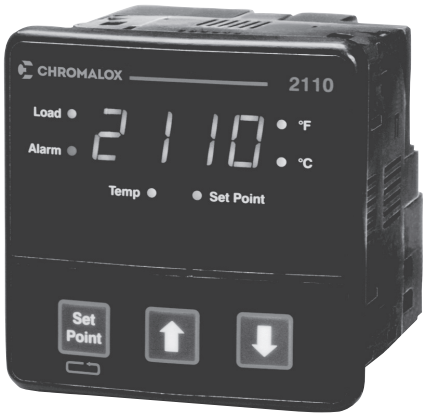
1. Ease of Use: How difficult is the unit to program? Are the menu's and screens easy to follow and navigate? Does the controller have configuration software to simplify setup and troubleshooting?
2. Features: Does the controller have diagnostics and monitoring capabilities? Can it be outfitted with communications? Does it offer analog compatibility? Are there additional features like profiling and heat/cool operation?
3. Price: What is overall price compared to other controllers? Is the price per feature in line with other controllers?
4. Space: How compact is the controller? Is it limited to front panel mount or can it be back panel or DIN mounted?

Controllers:

1. 2110
2. 3204
3. ETR-3400
4. 40 Series (4040, 6040, 8040)
5. 1020
6. 4081/4082
7. 20 Series (6020, 8020)
8. 6060
9. C4X

2110—1/4 DIN Temperature Controller

Criteria	Score
Ease of Use	5
Features	3
Price	2
Space	3
Resources: Catalog Page H-26	



OVERVIEW

The 2110 controller is a legacy product for Chromalox. It still has some useful features including 6 total outputs, but it falls short with keeping up with the newest technologies. It does have a unique edge with a 10A SSR output and 20A relay output, allowing direct control of many low amperage heaters, but the lack of input options neglects a large number of potential applications. It's build tables are short, but the price of simplification comes with missing out on additional features. The price of the controller itself is high compared to the feature list, but with the capability to negate the need for external SSR or mechanical relay, some cost can potentially be saved by user.

APPLICATIONS

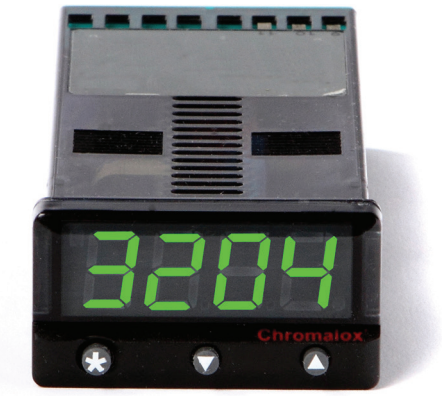
- Small amperage loads (cartridge, strip, etc) that would benefit from direct power control without the need of additional components. This is because the 2110's 10A SSR and 20A Relay output options allow the controller to be wired directly to heater load for control.
- 1/4 DIN NEMA 4X required controller where simplicity and easy operation is needed.

PRICE RANGE (2020): $474-$586

Pro's	Con's
6 Output Options	Older model
High amperage SSR and relay outputs for direct drive	Higher price vs features list
Simple build table/options	Limited input signal types
Output cards are field replaceable	No PC software
	No communications

3204—1/32 DIN Controller

Criteria	Score
Ease of Use	2
Features	2
Price	4
Space	5
Resources: Catalog Page H-28	



OVERVIEW

The 3204 controller is ideal for compact installations where some advanced features are still maintained. The 1/32 DIN footprint makes this an appealing option for customers and OEM's with limited available space, and also includes a large LED display for better visibility. The controller features auto-tuning capabilities, ramp to setpoint, and does have additional analog input and communication options. It's biggest drawback is that it is limited to only two outputs, but at the low price point, the features you do get are worthwhile.

APPLICATIONS

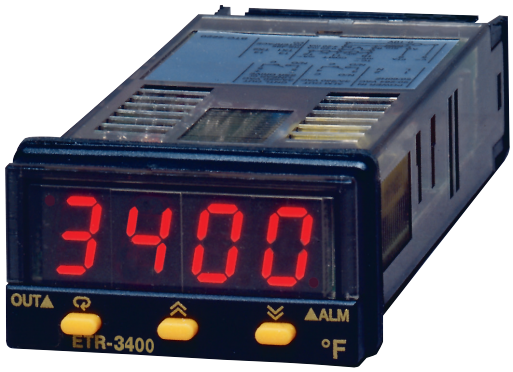
- The 3204 is ideal for compact applications where simple control is needed.
- It has a limited feature list making its price point more competitive over other 1/32 DIN controllers

PRICE RANGE (2020): $205-$277

Pro's	Con's
Compact Design	No PC Software
Large LED Display	Limited to 2 outputs
Communications and analog input options	Button navigation is done on limited screen
Low Price Point	

ETR-3400—1/32 DIN Temperature Controller

Criteria	Score
Ease of Use	2
Features	4
Price	1
Space	5
Resources: Catalog Page: H-30	



OVERVIEW

The ETR-3400 is a fully featured compact controller with features not commonly found on a 1/32 DIN controller. Universal field selectable inputs, auto-tuning of PID parameters, and numerous analog and event inputs are just a few of the advanced features included. While the 1/32 DIN footprint is nice for installation, the ease of use is not as user friendly. While the ETR-3400 does have a software package available, it is outdated and more cumbersome than current PC software packages. With a higher price tag, the ETR-3400 will not be the go to controller, but in advanced heating applications, this is a great option where space is limited.

APPLICATIONS

- Higher feature and diagnostic requirement applications where space is limited.
- Applications where faster sampling rate is required (packaging applications for example).

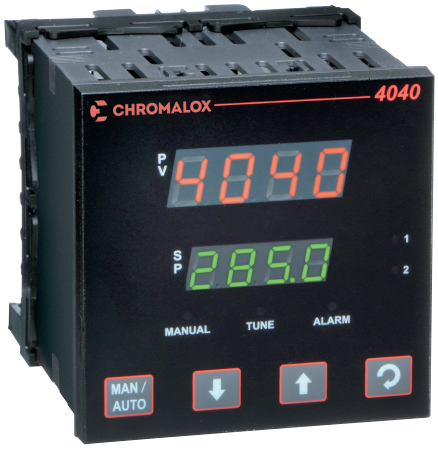
NOTE Sampling rate is how quickly the controller responds to input signals.

RANGE (2020): $295-595

Pro's	Con's
5 samples per second sampling rate	Higher price point
Extensive list if I/O options	Software is antiquated and expensive
Communications and analog input capability	Limited number of outputs
Current transformer accessories for diagnostics	Front buttons are more difficult for programming

40 Series—1/16, 1/4, 1/8 DIN Temperature Controller

Criteria	Score
Ease of Use	4
Features	4
Price	3
Space	3
Resources: **Catalog Page: H-18**	



OVERVIEW

The 40 series controllers are the staple of Chromalox controls products. They contain many useful features, are in a reasonable price range, and are flexible in how they are used. The controller features either 3 or 5 outputs depending on DIN size, auto and manual tuning, heat/cool operation, and even valve motor drive position. The versatility of the 40 series is unmatched by other controllers in our offering. The price point is middle of the line depending on the features desired, so all in all, this is a well rounded option that is suitable for many applications.

APPLICATIONS

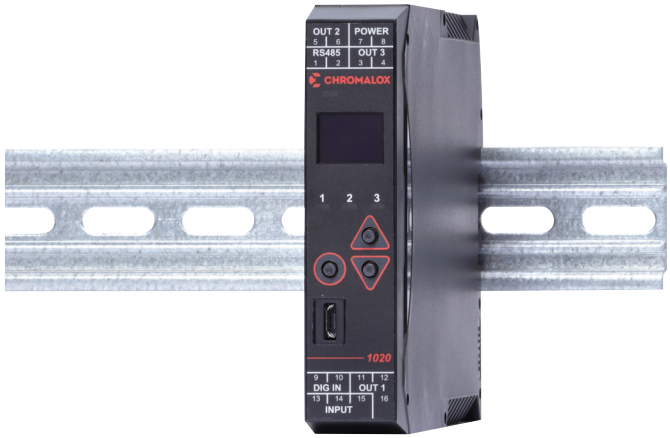
- The 40 series is the staple of Chromalox controls. While it may not be the best option in every application, it can be considered for almost any temperature heating application.

PRICE RANGE (2020): $176-$674

Pro's	Con's
Well rounded product considering feature vs price	Price point is middle of the road depending on features chosen
Customizable for a number of applications	
Multiple outputs and advanced features including heat/cool	

1020 - DIN Rail Temperature Controller

Criteria	Score
Ease of Use	3
Features	4
Price	5
Space	5
Resources: Catalog Page: H-1	



OVERVIEW

Just as the 40 series is considered the staple of Chromalox controller offering, the new 1020 is now an extension of that. Containing many of the same features as the 40 series controllers, the 1020 gives a lower cost DIN rail mount alternative to the standard front panel mount option. Coupled with the 1030 overtemperature controller, the two take up less than 2" of width in a panel, giving the DIN rail mount alternatives a lot to boast for space and cost savings. For customers who do not require the front display, or with panels in remote hard to access areas, the 1020 is a great alternative to push.

APPLICATIONS

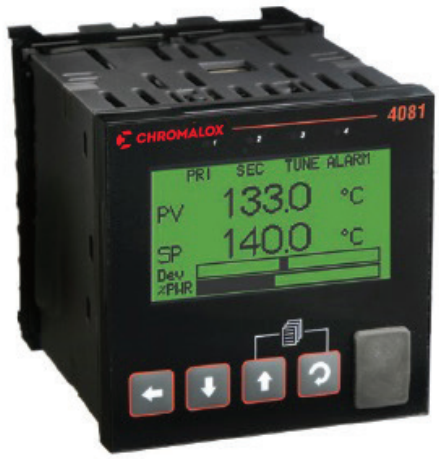
- The 1020 is ideal where front panel display is not required. It's very compact, has a low price point and has the same features as the 40 series. NEMA 7 panels or remote panels with limited access are some examples where front display may not be needed or possible. The 1020 will reduce costs and footprint.

PRICE RANGE (2020): $145-$224

Pro's	Con's
DIN rail and compact installation	No front panel installation
Lower cost point	
Contains many features despite to footprint	
New configuration software	

4081/4082 —1/4 DIN Temperature Controller

Criteria	Score
Ease of Use	2
Features	5
Price	1
Space	3
Resources: **Catalog Page: H-7**	



OVERVIEW

The 4081 and 4082 controllers offer single loop (4081) or dual loop control (4082) with an abundance of features. Full with profiling options where customers can program specific actions and settings based on time of day, duration, or values. Multiple outputs, universal inputs, communications, remote setpoint and digital inputs make the 4081 and 4082 extremely versatile in the marketplace. Due to the extensive list of features and capabilities, the 4081 and 4082 do have a higher price tag than more conventional 1/4 DIN controllers, and are a bit more complex in their use and programming, however, the software package available for the 80 series eases the pain a bit more. The 80 series controllers are a good option where more complex processes are in play, and customers are willing to pay for the additional functionality.

APPLICATIONS

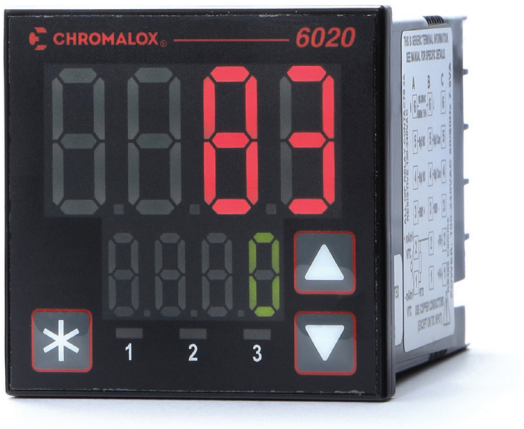
- The 4081 should be used for Heat/Cool applications over the 4040 as the outputs and logic can be easily setup for this type of control.
- Customers who have a lot of variability to the control scheme depending on time of day, day of the week, etc, should use the 4081 with its profiling capability.
- Applications requiring numerous outputs or alarms are well suited for the 4081, given it features up to 9 outputs and can be programmed with up to 7 events.

PRICE RANGE (2020): $645-$2,134

Pro's	Con's
More advanced process control with profiling feature	High price point
Most output options in Chromalox offering	More complexity in programming
Data logging	Software is by purchase only due to licensing

20 Series 6020, 8020—1/16, 1/8 DIN Temperature Controller

Criteria	Score
Ease of Use	5
Features	2
Price	5
Space	4
Resources: Catalog Page: H-1	



OVERVIEW

Chromalox 20 series controllers are a low cost and simple solution for many applications. They lack more extravagant features, but for those customers looking for cut and dry functionality at a low price point, the 20 series is the best option. Simple to use, compact size and large LED are just some benefits of the 6020 controller. Pitfalls are the limited outputs and lack of diagnostics, but for customers who do not need these features, this controller is a good fit.

APPLICATIONS

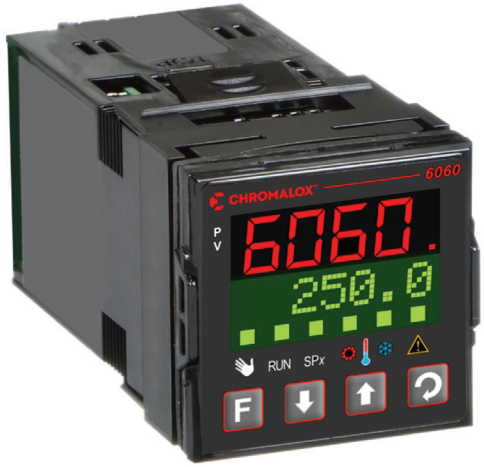
- The 6020 is a low cost and simple solution well suited for customers looking for a to-the-point controller.
- A good alternative to the more expensive 40 Series for customers just looking for simple control
- Tank heater applications utilizing simple on/off control for maintenance should be paired with a 6020.
- Even some advanced features can be used with the 6020, namely Modbus communications, to give some more flexibility to customers without breaking the bank.

PRICE RANGE (2020): $150-$246

Pro's	Con's
Low price point	Less features than the 40 series controllers
Compact and simple solution	No diagnostics
Large display considering footprint size	
Includes Modbus Communications	
PC Configuration software	

6060 Series—1/16 DIN Temperature Controller

Criteria	Score
Ease of Use	2
Features	4
Price	1
Space	4
Resources: **Catalog Page: H-15**	



OVERVIEW

Although a compact controller, the 6060 packs in a lot of powerful functionality. Ideal when more precise processing power is needed in a small space, the 6060 includes up to 6 outputs, profiling capabilities, communications, self tuning, and transmitter power supply. The trade off is the higher price point for a controller of this size. Much like the 4081/4082 and ETR-3400, this controller is ideal for applications where advanced control is held at a premium.

APPLICATIONS

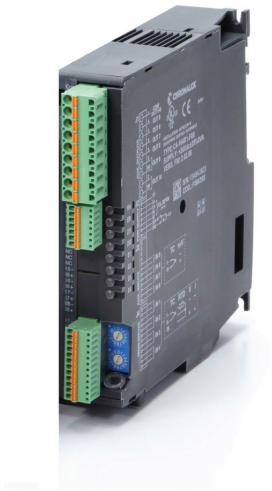
- The 6060 is suited for very particular applications. Namely where advanced control is needed in a smaller space than what the 4081 offers. With similar capabilities, including profiling, the 6060 is the 1/16 DIN counterpart at a slightly lower cost.
- With up to 6 outputs, the 6060 can be used in applications requiring numerous alarms and monitoring features. Customers wanting advanced control should consider the 6060.

PRICE RANGE (2020): $368-$625

Pro's	Con's
Multiple outputs including analog capabilities, transmitter loop powering, and communications	Configuration software is less intuitive, so programming is more difficult
Compact size	More expensive
Profiling capability	

C4X Series—DIN Rail Multi-loop Temperature Controller

Criteria	Score
Ease of Use	4
Features	4
Price	3
Space	4
Resources: **Catalog Page: H-1**	



OVERVIEW

The C4X Controller is the brains of the C4 controller extracted into a standalone multi-loop PID Controller. It features all of the same capabilities as the C4 controller, excluding the integral power control capability. The benefit of the C4X is you can still utilize the premium functionality of the C4 controller, but pair with higher amperage SSR's to exceed the C4's limit of 40A. Consider pairing with multiple CS1's for a high amperage, highly functional, and relatively lower cost option.

APPLICATIONS

- Installations requiring smaller footprint will benefit from the slim profile of the C4X, especially when paired with CS1's that match the slim design.
- When digital communications outside of Modbus are required.
- Multi-loop applications where local display is not needed. With the C-PWR software, programming and monitoring is easily achievable as long as PC access is available.

PRICE RANGE (2020): $635-$1,796

Pro's	Con's
Same features as C4 is compact package	No local display
C-PWR software for easy programming	Must pair with external power control
Lower price point for features contained	

WATLOW CONTROLLER CROSSOVER AND COMPARISON GUIDE

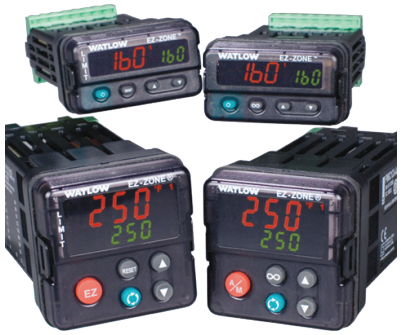
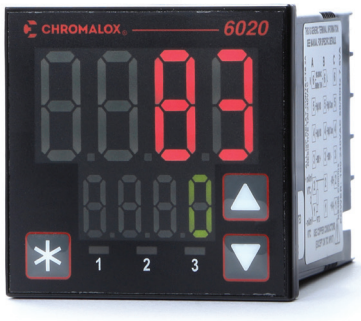
	WATLOW	CHROMALOX
		

Specification/Comparison	F4T	80 Series
Control Loops	1-4	1-2
Panel Cutout (DIN)	1/4 DIN	1/4 DIN
Input Types	TC, RTD, Analog	TC, RTD, Analog
Digital Input	6	9
Outputs	1-36	9
Relay	Yes	Yes
SSR Drive	Yes	Yes
TRIAC	Yes	Yes
Analog	Yes	Yes
Number of Alarms	14	7
Profiling/Programs	Yes / 40	Yes / 64
Remote Setpoint	Yes	Yes
Communications	Modbus TCP/IP, SCPI, Modbus RS-485	4-20mA Retransmit, Modbus RS-485, Mod-bus TCP/UP
Highlights	Field Removable I/O, Touch Screen HMI, Data logging	Graphical Display, Data Logging
Price (2020)	$663-$2,463 NET	$645-$1,944 LIST
Comparison	When selling against an F4T, it's important to find out what a customer truly needs. The F4T is very expensive because it has extra features that customers may never use or even realize they have. Chromalox 80 series controllers are more than capable to match the underlying control of the F4T at a much more competitive price point. The biggest drawback outside of functionality is the F4T includes a high resolution touch screen display that the 80 Series will not offer.	

WATLOW CONTROLLER CROSSOVER AND COMPARISON GUIDE

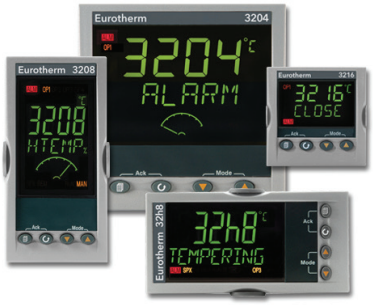
	WATLOW	CHROMALOX
		
Specification/Comparison	**EZ ZONE PM**	**40 SERIES**
Control Loops	1-2	1
Panel Cutout (DIN)	1/32, 1/16, 1/4, 1/8	1/16, 1/4, 1/8
Input Types	TC, RTD, Analog	TC, RTD, Analog
Digital Input	0-8	1
Outputs	1-12	1-5
Relay	Yes	Yes
SSR Drive	Yes	Yes
TRIAC	Yes	Yes
Analog	Yes	Yes
Number of Alarms	4	3
Profiling/Programs	No / 0	No / 0
Remote Setpoint	Yes	Yes
Communications	Modbus RTU 232/485, EtherNet/IP, Mod-bus TCP, DeviceNet Profibus DP	4-20mA Retransmit, Modbus RTU/RS-485
Highlights	Cascade control, 15A direct load control and Integrated PID and Limit controller. *Some DIN sizes are exempt from these special features	Valve Motor Drive, Heater Break Alarm
Price (2020)	$179-$718 NET	$176-$674 LIST
Comparison	The Watlow EZ Zone controller is scalable, so depending on the final model, the appropriate Chromalox crossover may vary. When competing against this controller make sure the customer advises how they are using and their true needs. The 40 Series controllers will offer the best crossover for most EZ Zone PM models, and at a better price point. If PID and Limit is included in the PM model, pair with a 6050 or 1030 to keep the price point down while still meeting same requirements. If the customer is using the EZ Zone PM to direct control small amperage loads, consider the 2110 controller as a crossover.	

WATLOW CONTROLLER CROSSOVER AND COMPARISON GUIDE

	WATLOW	CHROMALOX
		

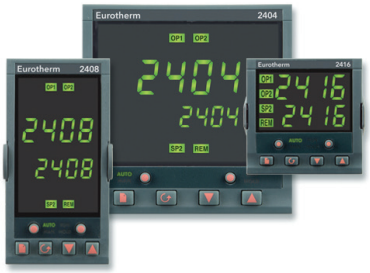
Specification/Comparison	EZ ZONE PM Express	20 Series
Control Loops	1	1
Panel Cutout (DIN)	1/32, 1/16	1/16, 1/8
Input Types	TC, RTD, Analog	TC, RTD, Analog
Digital Input	0	0
Outputs	2	3
Relay	Yes	Yes
SSR Drive	Yes	Yes
TRIAC	Yes	No
Analog	Yes	No
Number of Alarms	2	2
Profiling/Programs	No / 0	No / 0
Remote Setpoint	No	No
Communications	Bluetooth, Standard Bus	Modbus RTU/RS-485
Highlights	Can operate as limit controller	Sensor break alarm
Price (2020)	$179-$403 NET	$150-$246 LIST
Comparison	The Express version of Watlow's EZ Zone PM is a simplified and lower cost version of its counterpart. Again the full model will drive what Chromalox controller would be a suitable crossover. The 20 series would be ideal for its low cost point and capabilities, but the 2110 may also be needed if the high amperage output is used. If the customer is using the EZ Zone PM Express as a limit controller, consider the 6050 controller. Otherwise the 40 series is still a valid option to give more alarming/monitoring capabilities.	

EUROTHERM CONTROLLER CROSSOVER AND COMPARISON GUIDE

	EUROTHERM	CHROMALOX
		

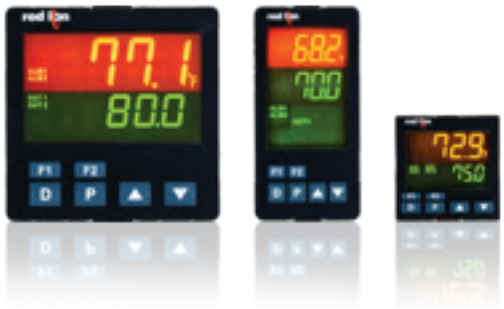
Specification/Comparison	3200 Series	40 Series
Control Loops	1	1
Panel Cutout (DIN)	1/16, 1/4, 1/8	1/16, 1/4, 1/8
Input Types	TC, RTD, Analog	TC, RTD, Analog
Digital Input	2	1
Outputs	3	1-5
Relay	Yes	Yes
SSR Drive	Yes	Yes
TRIAC	Yes	Yes
Analog	Yes	Yes
Number of Alarms	4	3
Profiling/Programs	Yes / 8	No / 0
Remote Setpoint	Yes	Yes
Communications	Modbus RTU/RS-485	4-20mA Retransmit, Modbus RTU/ RS-485
Highlights	Sensor break, loop break, heater diagnostics, program event	Valve Motor Drive, Heater Break Alarm
Price (2020)	$297-$805 NET	$176-$674 LIST
Comparison	We should have no problem competing on price when up against the Euro-therm 3200 series. Matched against our 40 series, feature for feature the 40 series only falls short on the profiling capabilities of the 3200 Series. If this is a valuable feature for the customer, con-sider using our 4081 controller.	

EUROTHERM CONTROLLER CROSSOVER AND COMPARISON GUIDE

	EUROTHERM	CHROMALOX
		

Specification/Comparison	2400 Series	80 Series
Control Loops	1	1-2
Panel Cutout (DIN)	1/16, 1/4, 1/8	1/4 DIN
Input Types	TC, RTD, Analog	TC, RTD, Analog
Digital Input	11	9
Outputs	3	9
Relay	Yes	Yes
SSR Drive	Yes	Yes
TRIAC	Yes	Yes
Analog	Yes	Yes
Number of Alarms	4	7
Profiling/Programs	Yes / 16	Yes / 64
Remote Setpoint	Yes	Yes
Communications	Modbus, DeviceNet, Profibus	4-20mA Retransmit, Modbus RS-485, Modbus TCP/UP
Highlights	Hi/Lo/Dev Alarm, Sensor break, Heater Break	Graphical Display, Data Logging
Price (2020)	$463-$1,789 NET	$645-$1,944 LIST
Comparison	The Eurotherm 2400 Series focuses on digital communication options and profiling capabilities, but does so at a high price point. With the 80 Series Chromalox controller you can get more outputs, more profile programs, and more alarms at a more competitive price. If customers are using the DeviceNet or Profibus communication options, consider using the C4/C4-IR or C4X controllers. While you lose the profiling capability, you add a number of features for diagnostics and monitoring.	

RED LION CONTROLLER CROSSOVER AND COMPARISON GUIDE

	RED LION	CHROMALOX
		

Specification/Comparison	PXU	40 Series
Control Loops	1	1
Panel Cutout (DIN)	1/16, 1/4, 1/8	1/16, 1/4, 1/8
Input Types	TC, RTD, Analog	TC, RTD, Analog
Digital Input	0	1
Outputs	2	1-5
Relay	Yes	Yes
SSR Drive	Yes	Yes
TRIAC	Yes	Yes
Analog	Yes	Yes
Number of Alarms	2	3
Profiling/Programs	No	No / 0
Remote Setpoint	Yes	Yes
Communications	4-20mA Retransmit	4-20mA Retransmit, Modbus RTU/RS-485
Highlights	Ramp/Soak	Valve Motor Drive, Heater Break Alarm
Price (2020)	$140-$180 NET	$176-$674 LIST
Comparison	The Red Lion PXU series really only boasts its analog I/O and retransmit capability. If these features are used, look at using our 40 series controllers to match, with more outputs and alarms, Modbus communication option, and potential for more aggressive price point. If meeting on price is a challenge, look at the 1020 controller to maintain the same features, but DIN Rail mount for an even lower price tag. If the customer is not using the analog I/O, cross over to our 20 series controllers for an even more aggressive price point while still maintaining the added outputs.	