

Using This Retrofit Guide

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Specification sheets on Watlow product may be obtained at <http://www.watlow.com/literature/specsheets/>
User Manuals on Watlow product may be obtained at <http://www.watlow.com/literature/prodtechinfo/>
Additional information on other Watlow products may be obtained by visiting <http://www.watlow.com/>

To locate a controller, search on the part number such as 965A-1CD0-00RG. Use the Help feature in Adobe Reader on how to search documents.

If there are multiple listings, then the retrofit is conditional upon field use. Select the appropriate selection. The User's Manual is included at the bottom of this document when available.

Before selecting a replacement controller:

1. Know the application.
 - Temperature range
 - Sensor type
 - Is the sensor upgradable if required?
 - Additional input requirements – remote set points, secondary sensor or events
 - Output required – control, alarm, event
 - Is the power-switching device upgradable?
 - Operating voltage of controller
 - Mounting requirements – panel space
 - Is a safety limit device required?
2. Know the product.
 - Inputs – type and number of
 - Control function – direct (cool) or reverse (heat)
 - Outputs – switched DC, SSR, or mechanical relay
 - Communication requirements
 - Which control features are required? (cascade, slidewire, differential, remote control, other)
3. Use your best judgment for selecting a replacement controller. All applications require close examination of input, output and the control mode needs to have the controller function properly.
4. Safety: Remember to make sure all redundant safety equipment is in place and working when retrofitting equipment. If a system has been retrofitted without the proper safety equipment, you could be liable if an accident occurs.

This is only a guide to replacement controllers. If you have doubts, please call (507) 454-5300 and ask for technical support or email wintechsupport@watlow.com. We're here to help. The suggested replacement will differ in fit and form. Please review the replacement controller specifications for suitability. Carefully check the notes for additional information that may apply.

Your comments or suggestions on the Retrofit Guide are welcome. Please send comments or corrections to: Technical Writer, Watlow Controls, 1241 Bundy Boulevard, P.O. Box 5580, Winona, MN 55987-5580; phone (507) 454-5300; fax (507) 452-4507. This Retrofit Guide is copyrighted by Watlow Winona, Inc., © February 2004 with all rights reserved. (1455)

Abbreviation & Terminology

(as used in this document)

0.5 – 0.5 amperes of current switching capability

2A – 2 amperes of current switching capability

5A - 5 amperes of current switching capability

10A – 10 amperes of current switching capability

15A – 15 amperes of current switching capability

12-24 – Supply voltage can be between 12 to 24 Volts

100-240 – Supply voltage can be between 100 to 240 Volts

100 ohm DIN – refers to 100-ohm platinum RTD that has a DIN curve.

100 ohm JIS – refers to 100-ohm platinum RTD that has a JIS curve.

1/32 DIN – Deutsche Industrial Norm standard for panel mounted controller, hole size is cut to 1.78”w x 0.88”h.

1/16 DIN – Deutsche Industrial Norm standard for panel mounted controller, hole size is cut to 1.78”w x 1.77”h.

1/8V DIN – Deutsche Industrial Norm standard for panel mounted controller, hole size is cut to 1.78”w x 3.63”h.

1/8H DIN – Deutsche Industrial Norm standard for panel mounted controller, hole size is cut to 3.63”w x 1.77”h”

1/8S DIN – Deutsche Industrial Norm standard for panel mounted controller, hole size is cut to 2.68”w x 2.68”h.

¼ DIN – Deutsche Industrial Norm standard for panel mounted controller, hole size is cut to 3.63”w x 3.63”h.

Action – determines the direction of control. Heat (reverse acting) or Cool (direct acting).

Auto Reset – the limit will automatically reset on a power cycle but requires manual reset on limit trip.

Cascade – a control algorithm in which the output of one control loop provides a set point for another loop. The second loop, in turn, determines the control action.

Ch – Channel refers to an analog input. There are single and dual channel controllers.

Control Mode – the method that a controller uses to switch the outputs such as PID, ON/OFF, and Manual.

Differential - control algorithm in which the output is based on the difference of the inputs plus set point.

DIN – Deutsche Industrial Norm, a set of technical, scientific and dimensional standards developed in Germany. RTD sensors with the DIN curve change resistance at a rate of 0.00385 ohms/ohms/C.

DIN Rail – standard DIN EN50022 mounting method for attaching devices onto a metal rail.

Fixed – refers to a set point that is fixed at one value.

High Limit - device will deactivate output on a temperature rise above set point.

Inductive Load – any device that has a wire winding such as solenoids, electromechanical relays or transformers.

Input – refers to the sensor types that may be connected.

Integral – the set point in integral (on board) to the controller.

JIS – Joint Industrial Standards, a set of technical, scientific and dimensional standards developed in Japan. RTD sensors with the JIS curve change resistance at a rate of 0.00396 ohms/ohms/C.

Line Voltage – the voltage required powering the electronics of the controller.

Low Limit - device will deactivate output on a temperature drop below set point.

On/Off – a method of control that turns the output full on until set point is reached and then off until the process error exceeds the hysteresis.

Open Brd – the form factor of this controller is an open circuit board mounted on four standoffs.

Manual Reset – the limit must be reset on a power cycle and requires manual reset on limit trip.

Multi RSP – multiple remote set potentiometers were supported. Each allowed the set point to be selected and adjusted.

Relay – refers to an electromechanical relay.

Remote – set point is adjusted using a remote potentiometer.

Panel – the form factor of this controller is mounted through a hole cut in the panel.

PI – Proportional and Integral, a control mode with two functions: proportional action dampens the systems response, and integral corrects for droop.

PID – Proportional, Integral, and Derivative, a control mode with three functions: proportional action dampens the systems response, integral corrects for droop, and derivative prevents overshoot and undershoot.

Potted – the circuit board and electronics are encased in epoxy.

Proc – Process input may accept 0-5, 1-5, 0-10 volts or 0-20 and 4-20 mA.

Profiling – Controller will perform a sequence of programmed steps.

Programmable – The feature is changeable in the field through jumpers and/or parameter selection.

RTD – Resistance Temperature Detector, a sensor that is 100 ohms at 0 degrees C and made of platinum material.

SSR – Solid State Relay, these devices will switch AC voltage only and require a load to latch on.

Sw DC – Switched DC, a time proportioning DC output used to drive DC input solid state relays.

t/c – Thermocouple sensor device made by joining two dissimilar metals whose standards is identified by a letter.

Temp Range – the range over which the controller could have the set point adjustment.

Thermistor – a sensor that changes resistance as the temperature changes. Similar but not the same as an RTD.

Universal – Input can be a thermocouple, 100 ohm DIN RTD or process (volts or milliamperes)

VAC – Volts Alternating Current

VAC/DC- Volts Alternating Current or Direct Current

VDC – Volts Direct Current

VTB Sw DC – Variable Time Base Switched Direct Current, a time proportioning DC output where the cycle time is variable.

These notes are used to signify areas of concern in changing to a retrofit choice. These notes are also printed at the end of the retrofit listing.

Note 1: Retrofit controller requires a substitution of a 100 Ohm RTD sensor for the thermistor.

Note 2: Mounting and dimensions of retrofit controller are different. Verify that sufficient panel space and depth is available.

Note 3: Retrofit controller outputs are different. Add external interposing mechanical or solid state relay if applicable.

Note 4: Retrofit controller has a programmable, not fixed set point. Lock set point using controller's lockout parameter.

Note 5: For DIN rail mounting or sub-panel mounting, purchase DIN rail adapter p/n 0822-0586-P001 for 1/32 DIN or p/n 0822-0586-P002 for 1/16 DIN.

Note 6: Add a suppressor, Watlow p/n 0804-0147-0000, for inductive loads.

Note 7: Retrofit does not have equivalent action (as example, no manual reset)

Note 8: Retrofit controller does not have dual dial scale.

Note 9: Hardware lockout is not available on retrofit.

Note 10: Retrofit controller does not have user selectable line voltage.

Note 11: Retrofit does not support remote set point or retransmit. Check if pins 13, 14, 15 or 16 have termination. If wires are on these pins, select a different retrofit.

Note 12: Retrofit controller does not have user selectable control action.

Note 13: Solid state sensor required for humidity. See <http://www.vaisala.com>

Note 14: Retrofit controller does not have user selectable control mode.

Note 15: Use auxiliary event board A007-1732-F4B8

Note 16: Retrofit communications are different, consult specifications.

Note 17: Verify retrofit input range matches application.

MDR to Solid State Alternatives Cross Reference

HG Series Watlow Part

Number	Durakool Equivalent	Product Description	Potential Solid State Alternatives
HG30-1KD1-0000	LF-701120AC	(30A NEW)(25A OLD), 1 POLE, 120VAC COIL	DB10-60K2-0000, CZ34-A60V-AC1, SSR-480-50A-AC1
HG30-4KD1-0000	LF-70124AC	(30A NEW)(25A OLD), 1 POLE, 24VAC COIL	DB10-60K1-0000, CZ34-A60V-AC2
HG30-6KD1-0000	LF-70124DC	(30A NEW)(25A OLD), 1 POLE, 24VDC COIL	DB10-60C0-0000, CZ34-A48V-DC1, SSR-480-50A-DC1
HG30-9KD1-0000	LF-701208ACDV	(30A NEW)(25A OLD), 1 POLE, 208/240VAC COIL	DB10-60K3-0000, SSR-480-50A-AC1
HG30-1KD2-0000	LF2-701120AC	(30A NEW)(25A OLD), 2 POLE, 120VAC COIL	DC20-60K2-0000, CZ34-A60V-AC1 (2PCS.), SSR-480-50A-AC1 (2 PCS.)
HG30-4KD2-0000	LF2-70124AC	(30A NEW)(25A OLD), 2 POLE, 24VAC COIL	DC20-60K1-0000, CZ34-A60V-AC2 (2 PCS.)
HG30-6KD2-0000	LF2-70124DC	(30A NEW)(25A OLD), 2 POLE, 24VDC COIL	DC20-60C0-0000, CZ34-A48V-DC1 (2PCS.), SSR-480-50A-DC1 (2 PCS)
HG30-9KD2-0000	LF2-701208ACDV	(30A NEW)(25A OLD), 2 POLE, 208/240VAC COIL	DC20-60K3-0000, SSR-480-50A-AC1 (2pcs.)
HG30-1KD3-0000	LF3-701120AC	(30A NEW)(25A OLD), 3 POLE, 120VAC COIL	DC30-60K2-0000, CZ34-A60V-AC1 (3PCS.), SSR-480-50A-AC1 (3 PCS.)
HG30-4KD3-0000	LF3-70124AC	(30A NEW)(25A OLD), 3 POLE, 24VAC COIL	DC30-60K1-0000, CZ34-A60V-AC2 (3 PCS.)
HG30-6KD3-0000	LF3-70124DC	(30A NEW)(25A OLD), 3 POLE, 24VDC COIL	DC20-60C0-0000, CZ34-A48V-DC1 (3 PCS.), SSR-480-50A-DC1 (3 PCS)
HG30-9KD3-0000	LF3-701208ACDV	(30A NEW)(25A OLD), 3 POLE, 208/240VAC COIL	DC30-60K3-0000, SSR-480-50A-AC1 (3 pcs.)
HG35-1LD1-0000	1035A120AC	35A, 1 POLE, 120VAC COIL	DB10-60K2-0000, CZ34-A60V-AC1, SSR-480-50A-AC1
HG35-4LD1-0000	1035A24AC	35A, 1 POLE, 24VAC COIL	DB10-60K1-0000, CZ34-A60V-AC2
HG35-6LD1-0000	1035A24DC	35A, 1 POLE, 24VDC COIL	DB10-60C0-0000, CZ34-A48V-DC1, SSR-480-50A-DC1
HG35-9LD1-0000	1035A208ACDV	35A, 1 POLE, 208/240VAC COIL	DB10-60K3-0000, SSR-480-50A-AC1
HG35-1LD2-0000	2035A120AC	35A, 2 POLE, 120VAC COIL	DC20-60K2-0000, CZ34-A60V-AC1 (2PCS.), SSR-480-50A-AC1 (2 PCS.)
HG35-4LD2-0000	2035A24AC	35A, 2 POLE, 24VAC COIL	DC20-60K1-0000, CZ34-A60V-AC2 (2 PCS.)
HG35-6LD2-0000	2035A24DC	35A, 2 POLE, 24VDC COIL	DC20-60C0-0000, CZ34-A48V-DC1 (2PCS.), SSR-480-50A-DC1 (2 PCS)
HG35-9LD2-0000	2035A208ACDV	35A, 2 POLE, 208/240VAC COIL	DC20-60K3-0000, SSR-480-50A-AC1 (2pcs.)
HG35-1LD3-0000	3035A120AC	35A, 3 POLE, 120VAC COIL	DC30-60K2-0000, CZ34-A60V-AC1 (3PCS.), SSR-480-50A-AC1 (3 PCS.)
HG35-4LD3-0000	3035A24AC	35A, 3 POLE, 24VAC COIL	DC30-60K1-0000, CZ34-A60V-AC2 (3 PCS.)
HG35-6LD3-0000	3035A24DC	35A, 3 POLE, 24VDC COIL	DC20-60C0-0000, CZ34-A48V-DC1 (3 PCS.), SSR-480-50A-DC1 (3 PCS)
HG35-9LD3-0000	3035A208ACDV	35A, 3 POLE, 208/240VAC COIL	DC30-60K3-0000, SSR-480-50A-AC1 (3 pcs.)
HG50-1MD1-0000	1050A120AC	50A, 1 POLE, 120VAC COIL	DC10-60K2-0000, CZ50-A48V-AC1, SSR-480-50A-AC1
HG50-4MD1-0000	1050A24AC	50A, 1 POLE, 24VAC COIL	DC10-60K1-0000, CZ50-A48V-AC2
HG50-6MD1-0000	1050A24DC	50A, 1 POLE, 24VDC COIL	DC10-60C0-0000, CZ50-A48V-DC1, SSR-480-50A-DC1
HG50-9MD1-0000	1050A208ACDV	50A, 1 POLE, 208/240VAC COIL	DC10-60K3-0000, SSR-480-50A-AC1
HG50-1MD2-0000	2050A120AC	50A, 2 POLE, 120VAC COIL	DC21-60K2-0000, CZ50-A48V-AC1 (2 PCS.),SSR-480-75A-AC1 (2 PCS.)
HG50-4MD2-0000	2050A24AC	50A, 2 POLE, 24VAC COIL	DC21-60K1-0000, CZ50-A48V-AC2 (2 PCS.)
HG50-6MD2-0000	2050A24DC	50A, 2 POLE, 24VDC COIL	DC21-60C0-0000, CZ50-A48V-DC1 (2 PCS.), SSR-480-75A-DC1 (2 PCS.)
HG50-9MD2-0000	2050A208ACDV	50A, 2 POLE, 208/240VAC COIL	DC21-60K3-0000, SSR-480-75A-AC1 (2 PCS.)
HG50-1MD3-0000	3050A120AC	50A, 3 POLE, 120VAC COIL	DC31-60K2-0000, CZ50-A48V-AC1 (3 PCS.),SSR-480-75A-AC1 (3 PCS.)
HG50-4MD3-0000	3050A24AC	50A, 3 POLE, 24VAC COIL	DC31-60K1-0000, CZ50-A48V-AC2 (3 PCS.)
HG50-6MD3-0000	3050A24DC	50A, 3 POLE, 24VDC COIL	DC31-60C0-0000, CZ50-A48V-DC1 (3 PCS.), SSR-480-75A-DC1 (3 PCS.)
HG50-9MD3-0000	3050A208ACDV	50A, 3 POLE, 208/240VAC COIL	DC31-60K3-0000, SSR-480-75A-AC1 (3 PCS.)
HG60-1PD1-0000	1060APS120AC	60A, 1 POLE, 120VAC COIL	DC11-60K2-0000, SSR-480-75A-AC1
HG60-4PD1-0000	1060APS24AC	60A, 1 POLE, 24VAC COIL	DC11-60K1-0000
HG60-6PD1-0000	1060APS24DC	60A, 1 POLE, 24VDC COIL	DC11-60C0-0000, SSR-480-75A-DC1
HG60-9PD1-0000	1060APS208ACDV	60A, 1 POLE, 208/240VAC COIL	DC11-60K3-0000, SSR-480-75A-AC1
HG60-1PD2-0000	2060APS120AC	60A, 2 POLE, 120VAC COIL	DC21-60K2-0000, SSR-480-75A-AC1 (2 PCS.)
HG60-4PD2-0000	2060APS24AC	60A, 2 POLE, 24VAC COIL	DC21-60K1-0000
HG60-6PD2-0000	2060APS24DC	60A, 2 POLE, 24VDC COIL	DC21-60C0-0000, SSR-480-75A-DC1 (2 PCS.)
HG60-9PD2-0000	2060APS208ACDV	60A, 2 POLE, 208/240VAC COIL	DC21-60K3-0000, SSR-480-75A-AC1 (2 PCS.)
HG60-1PD3-0000	3060APS120AC	60A, 3 POLE, 120VAC COIL	DC31-60K2-0000, SSR-480-75A-AC1 (3 PCS.)
HG60-4PD3-0000	3060APS24AC	60A, 3 POLE, 24VAC COIL	DC31-60K1-0000
HG60-6PD3-0000	3060APS24DC	60A, 3 POLE, 24VDC COIL	DC31-60C0-0000, SSR-480-75A-DC1 (3 PCS.)
HG60-9PD3-0000	3060APS208ACDV	60A, 3 POLE, 208/240VAC COIL	DC31-60K3-0000, SSR-480-75A-AC1 (3 PCS.)

MDR to Solid State Alternatives Cross Reference

HG Series Watlow Part Number	Durakool Equivalent	Product Description	Potential Solid State Alternatives
HG30-1AA2-0000	2030APS120AC	30A, 2 POLE, 120VAC COIL	DC20-60K2-0000, ES40-3120-AC00, SSR-480-50A-AC1 (2PCS.)
HG30-4AA2-0000	2030APS24AC	30A, 2 POLE, 24VAC COIL	DC20-60K1-0000, ES40-3024-AC00, CZ34-A48V-AC2 (2 PCS.)
HG30-6AA2-0000	2030APS24DC	30A, 2 POLE, 24VDC COIL	DC20-60C0-0000, CZ34-A60V-DC1 (2PCS.), SSR-480-50A-DC1 (2 PCS.)
HG30-9AA2-0000	2030APS208ACDV	30A, 2 POLE, 208/240VAC COIL	DC20-60K3-0000, ES40-3220-AC00, SSR-480-50A-AC1 (2 PCS.) DC30-60K2-0000, ES40-3120-AC00, SSR-480-50A-AC1 (3 PCS.), CZ34-A48V-AC1 (3 PCS.)
HG30-1AA3-0000	3030APS120AC	30A, 3 POLE, 120VAC COIL	DC30-60K1-0000, ES40-3024-AC00, CZ34-A48V-AC2 (3 PCS.)
HG30-4AA3-0000	3030APS24AC	30A, 3 POLE, 24VAC COIL	DC30-60C0-0000, CZ34-A60V-DC1 (3 PCS.), SSR-480-50A-DC1 (3 PCS.)
HG30-6AA3-0000	3030APS24DC	30A, 3 POLE, 24VDC COIL	DC20-60K3-0000, ES40-3220-AC00, SSR-480-50A-AC1 (3 PCS.)
HG30-9AA3-0000	3030APS208ACDV	30A, 3 POLE, 208/240VAC COIL	
HG80-1AB1-0000	CF-702	80A, 1 POLE, 120VAC COIL	DD10-60K2-0000
HG80-4AB1-0000	CF-701	80A, 1 POLE, 24VAC COIL	DD10-60K1-0000
HG80-6AB1-0000	CF-707	80A, 1 POLE, 24VDC COIL	DD10-60C0-0000
HG80-9AB1-0000	CF-713	80A, 1 POLE, 208/240VAC COIL	DD10-60K3-0000
HG80-1AB2-0000	CF2-702	80A, 2 POLE, 120VAC COIL	DD10-60K2-0000 (2 PCS.)
HG80-4AB2-0000	CF2-701	80A, 2 POLE, 24VAC COIL	DD10-60K1-0000 (2 PCS.)
HG80-6AB2-0000	CF2-708	80A, 2 POLE, 24VDC COIL	DD10-60C0-0000 (2 PCS.)
HG80-9AB2-0000	CF2-713	80A, 2 POLE, 208/240VAC COIL	DD10-60K3-0000 (2 PCS.)
HG80-1AB3-0000	CF3-702	80A, 3 POLE, 120VAC COIL	DD10-60K2-0000 (3PCS.)
HG80-4AB3-0000	CF3-701	80A, 3 POLE, 24VAC COIL	DD10-60K1-0000 (3 PCS.)
HG80-6AB3-0000	CF3-708	80A, 3 POLE, 24VDC COIL	DD10-60C0-0000 (3 PCS.)
HG80-9AB3-0000	CF3-713	80A, 3 POLE, 208/240VAC COIL	DD10-60K3-0000 (3 PCS.)
HG1M-1AC1-0000	CFC-718	100A, 1 POLE, 120VAC COIL	NA
HG1M-4AC1-0000	CFC-717	100A, 1 POLE, 24VAC COIL	NA
HG1M-6AC1-0000	CFC-723	100A, 1 POLE, 24VDC COIL	NA
HG1M-9AC1-0000	CFC-734	100A, 1 POLE, 208/240VAC COIL	NA
HG1M-1AC2-0000	CFC2-727	100A, 2 POLE, 120VAC COIL	NA
HG1M-4AC2-0000	CFC2-726	100A, 2 POLE, 24VAC COIL	NA
HG1M-6AC2-0000	CFC2-733	100A, 2 POLE, 24VDC COIL	NA
HG1M-9AC2-0000	CFC2-734	100A, 2 POLE, 208/240VAC COIL	NA
HG1M-1AC3-0000	CFC3-708	100A, 3 POLE, 120VAC COIL	NA
HG1M-4AC3-0000	CFC3-707	100A, 3 POLE, 24VAC COIL	NA
HG1M-6AC3-0000	CFC3-721	100A, 3 POLE, 24VDC COIL	NA
HG1M-9AC3-0000	CFC3-734	100A, 3 POLE, 208/240VAC COIL	NA
HG2M-1AD1-0000	DFC-301	150A, 1 POLE, 120VAC COIL	NA
HG2M-4AD1-0000	DFC-307	150A, 1 POLE, 24VAC COIL	NA
HG2M-6AD1-0000	DFC-310	150A, 1 POLE, 24VDC COIL	NA
HG2M-9AD1-0000	DFC-311	150A, 1 POLE, 208/240VAC COIL	NA
HG2M-1AD2-0000	DFC2-301	150A, 2 POLE, 120VAC COIL	NA
HG2M-4AD2-0000	DFC2-307	150A, 2 POLE, 24VAC COIL	NA
HG2M-6AD2-0000	DFC2-310	150A, 2 POLE, 24VDC COIL	NA
HG2M-9AD2-0000	DFC2-311	150A, 2 POLE, 208/240VAC COIL	NA
HG2M-1AD3-0000	DFC3-301	150A, 3 POLE, 120VAC COIL	NA
HG2M-4AD3-0000	DFC3-307	150A, 3 POLE, 24VAC COIL	NA
HG2M-6AD3-0000	DFC3-310	150A, 3 POLE, 24VDC COIL	NA
HG2M-9AD3-0000	DFC3-311	150A, 3 POLE, 208/240VAC COIL	NA

HG Series Mercury Displacement Relay

User's Manual



ISO 9001



Registered Company
Winona, Minnesota USA

Watlow Controls, 1241 Bundy Blvd., P.O. Box 5580, Winona, MN, USA 55987-5580, Phone: (507) 454-5300, Fax: (507) 452-4507

WMDR-XUMN-1097

June 1997

Supersedes: WMDR-XUMN Rev A00



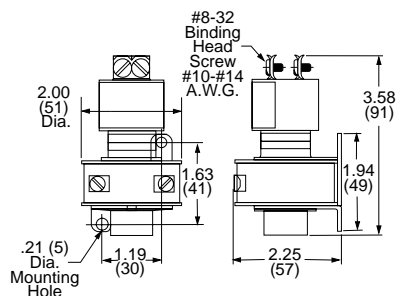
Made in the U.S.A.

Printed on Recycled Paper 10% Postconsumer Waste

Dimensions

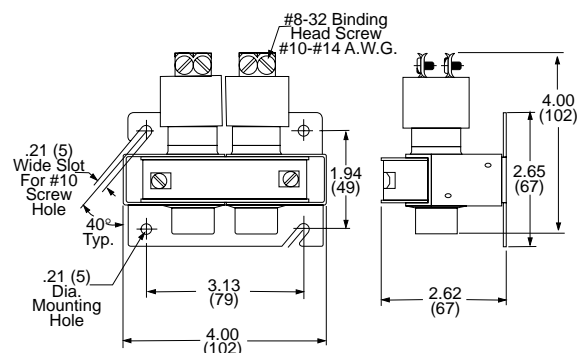
30 Amp Models HG30-XKDX-0000

1 Pole

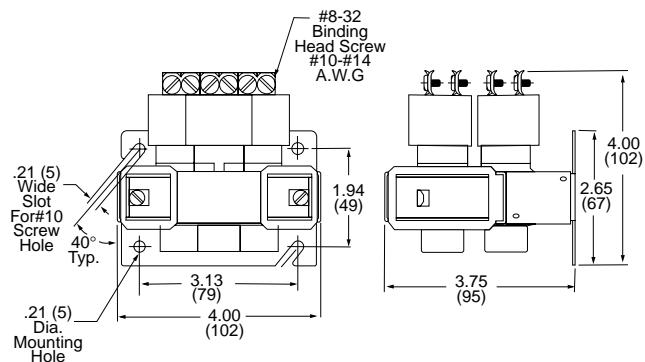


NOTE:
Watlow recom-
mends that ring termi-
nal lugs be used
with stranded wire
on all binding head
screw terminals.

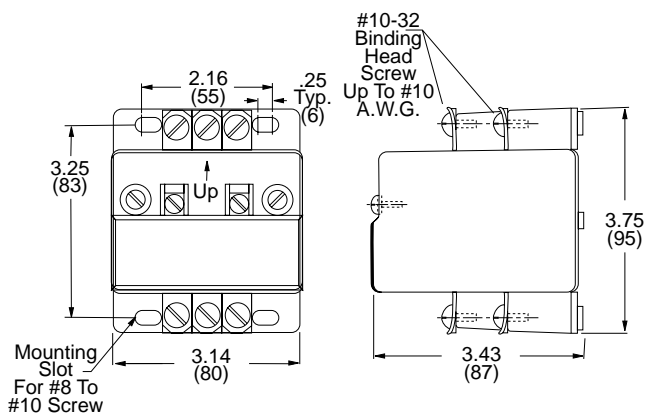
2 Pole



3 Pole



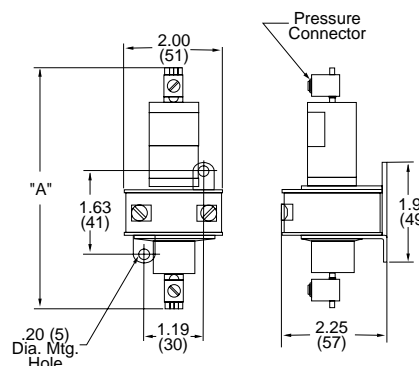
Definite Purpose Relay Foot Print HG30-XAAX-0000



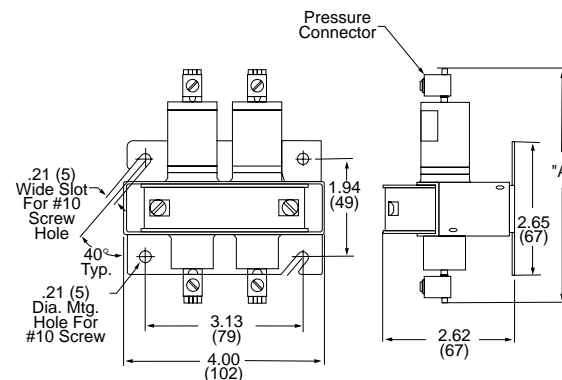
All 35, 50, and 60 Amp Models

	"A" Dimensions	Pressure Connectors
HG35-XLDX-0000	4.62 (117)	#4-14 A.W.G.
HG50-XMDX-0000	4.62 (117)	#4-14 A.W.G.
HG60-XPDX-0000	5.12 (130)	#1 - 8 A.W.G.

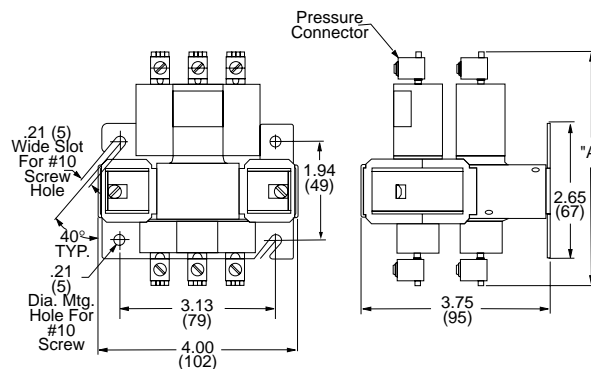
1 Pole



2 Pole



3 Pole



⚠ WARNING: Mercury displacement relay must be mounted vertically. Failure to do this will prevent the contacts from turning off, which will supply full voltage to the load. Failure to follow this guideline could result in damage to equipment, and personal injury or death.

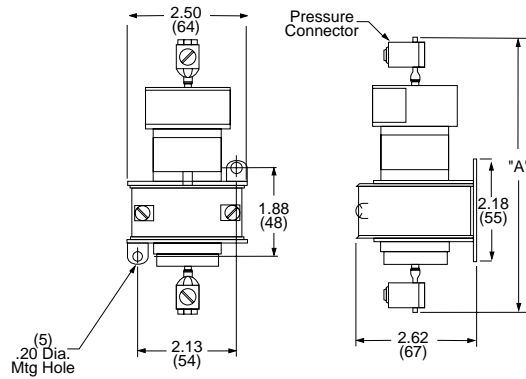
⚠ WARNING: Mercury displacement relay contacts will switch ac current only. Not for use with dc current. Failure to follow this guideline could result in damage to equipment, and personal injury or death.

Dimensions

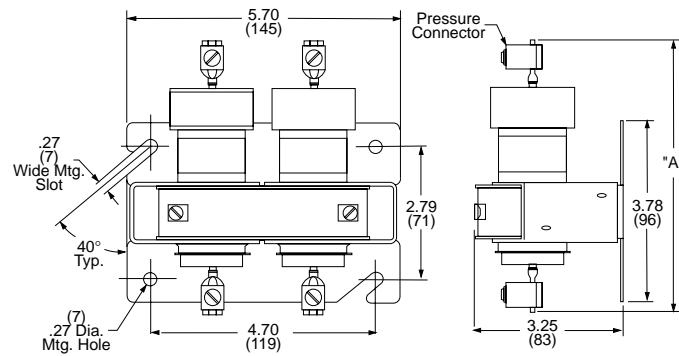
All 80, 100, and 150 Amp Models

	"A" Dimensions	Pressure Connectors:
HG80-XABX-0000	5.77 (147)	#1-8 A.W.G.
HG1M-XACX-0000	5.77 (147)	#1-8 A.W.G.
HG2M-XADX-0000	6.40 (163)	#1/0 - #2 A.W.G.

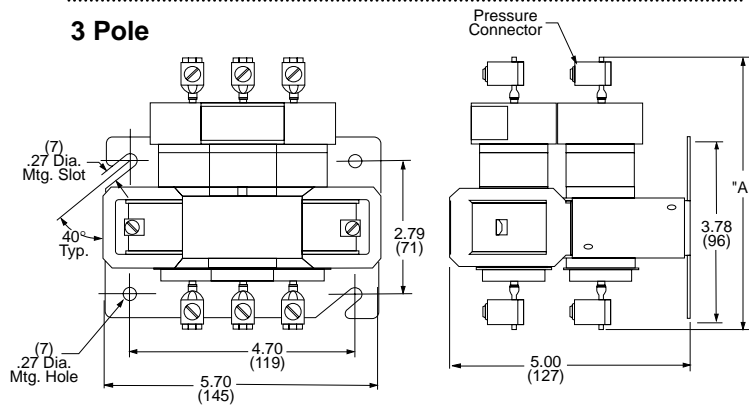
1 Pole



2 Pole



3 Pole

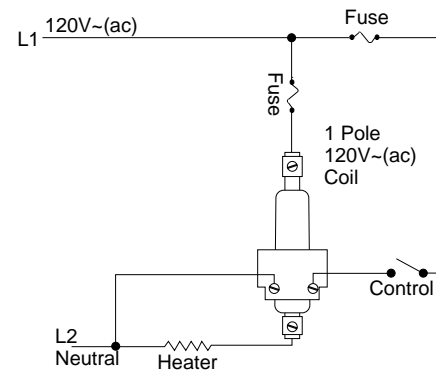


Wiring

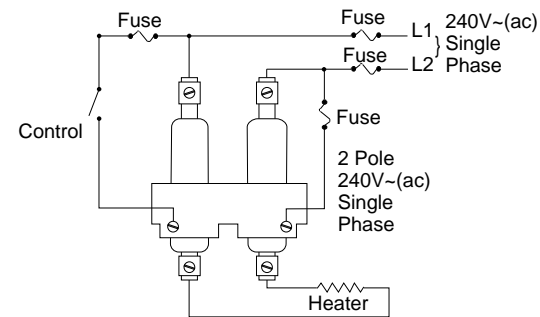
⚠ WARNING: Wiring must conform to National Electric Code (NEC) safety standards, as well as locally applicable codes. Failure to do so could result in personal injury or death. See page 6 for fusing recommendations.

⚠ Use copper conductors only.

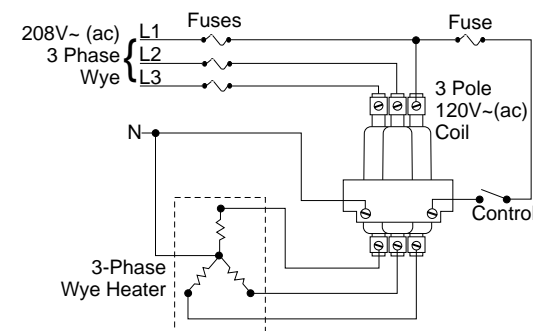
1 Pole Wiring Example



2 Pole Wiring Example



3 Pole Wiring Example



Field Coil Power Requirements

HG30-XAAX-0000

Voltage	1 Pole		2 Pole		3 Pole	
	Current	Power	Current	Power	Current	Power
24V~ (ac)	NA	NA	0.456A	10.9VA	0.510A	12.2VA
120V~ (ac)	NA	NA	0.121A	14.5VA	0.106A	12.7VA
208V~ (ac)	NA	NA	0.055A	11.4VA	0.055A	11.4VA
240V~ (ac)	NA	NA	0.063A	15.1VA	0.062A	14.9VA
24V= (dc)	NA	NA	0.240A	5.8W	0.250A	6.0W

HG30-XKDX-0000 HG35-XLDX-0000 HG50-XMDX-0000 HG60-XPDX-0000

Voltage	1 Pole		2 Pole		3 Pole	
	Current	Power	Current	Power	Current	Power
24V~ (ac)	0.235A	5.6VA	0.529A	12.7VA	1.270A	30.5VA
120V~ (ac)	0.057A	6.8VA	0.133A	16.0VA	0.224A	26.9VA
208V~ (ac)	0.030A	6.2VA	0.075A	15.6VA	0.111A	23.1VA
240V~ (ac)	0.035A	8.4VA	0.087A	20.9VA	0.128A	30.7VA
24V= (dc)	0.146A	3.5W	0.266A	6.4W	0.470A	11.3W

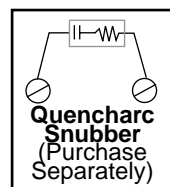
HG80-XABX-0000 HG1M-XACX-0000 HG2M-XADX-0000

Voltage	1 Pole		2 Pole		3 Pole	
	Current	Power	Current	Power	Current	Power
24V~ (ac)	0.930A	22.3VA	2.310A	55.4VA	5.060A	121.4VA
120V~ (ac)	0.195A	23.4VA	0.448A	53.8VA	0.968A	116.2VA
208V~ (ac)	0.097A	20.2VA	0.280A	58.2VA	0.482A	100.3VA
240V~ (ac)	0.112A	26.9VA	0.323A	77.5VA	0.563A	135.1VA
24V= (dc)	0.219A	5.2W	0.572A	13.7W	0.555A	13.3W

Temperature Control Output to MDR Coil Input

Please refer to the Field Coil Power Requirements when selecting the correct temperature control output.

Example: An HG35-1LD3-X000 requires 224mA to energize the coil and could be used with Watlow temperature control output options 'B' or 'K' (i.e. 988A-XXBB-XXXX or 988A-XXKK-XXXX) models. The best selection is the 'B' output option because it includes an RC snubber across the output. If you select the 'K' option, it is recommended that you also purchase a Quencharc® snubber separately (Watlow part number 0804-0147-0000). Place the snubber across the MDR coil terminals to protect the temperature control solid state output. When placing the snubber across the coil of a 2 and 3 pole relay, you may have to add some lead wire to the snubber. The MDR coil is an inductive load and the snubber will reduce the flyback voltage produced by the MDR coil when it de-energizes. See below.



Note: Watlow temperature control solid state outputs will not drive VDC coils directly. Refer to the coil current specifications above and any temperature control output specifications as required by the application.

Ordering Information

WMDR-XMNN-1099

	HG	-		-	00
Amperage					
30	=	30 Amp			
35	=	35 Amp			
50	=	50 Amp			
60	=	60 Amp			
80	=	80 Amp			
1M	=	100 Amp			
2M	=	150 Amp			
Coil Voltage					
1	=	120V~ (ac)			
4	=	24V~ (ac)			
6	=	24V= (dc)			
9	=	208/240V~ (ac)			
Option					
KD	=	30 Amp (Standard)			
LD	=	35 Amp			
MD	=	50 Amp			
PD	=	60 Amp			
AA	=	30 Amp (Definite Purpose Relay Footprint)			
AB	=	80 Amp			
AC	=	100 Amp			
AD	=	150 Amp			
Poles					
1	=	1 Pole (Not For Option "AA")			
2	=	2 Pole			
3	=	3 Pole			
Type					
00	=	Standard (Includes Definite Purpose Relay Footprint)			
XX	=	Custom			

Returns

1. Call Customer Service: 507-454-5300, or fax: 507-452-4507, for a Return Material Authorization (RMA) number before returning any item for repair.
2. Make sure the RMA number is on the outside of the carton, and on all paperwork returned. Ship on a freight prepaid basis.
3. A restocking charge of 20% of the net price applies for all returned stock controls and accessories in like new condition and within 120 days after shipment. Non-stock and modified stock items are not returnable.
4. If the unit is unrepairable, it will be returned to you with a letter of explanation. Repair costs will not exceed 50% of the original cost.

Recycle

To provide proper disposal, Watlow accepts used MDRs. Phone (507) 454-5300 for an Return Materials Authorization (RMA) number. Contact your Watlow representative for details.

Warranty

The Mercury Relay is warranted to be free of defects in material and workmanship for 18 months after delivery to the first purchaser for use, providing that the units have not been misapplied. Since Watlow has no control over their use, and sometimes misuse, we cannot guarantee against failure. Watlow's obligations hereunder, at Watlow's option, are limited to replacement, repair or refund of purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse, abuse or improper fusing.

Specifications

WMDR-XSPN-1098

Model Number	HG30-XKDX	HG30-XAAX	HG35-XLDX	HG50-XMDX	HG60-XPDX	HG80-XABX	HG1M-XACX	HG2M-XADX
Contact Type	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.
Maximum Load Current ac	30A	30A	35A	50A	60A	80A	100A	See Table Below
(typ) Contact Resistance	4mΩ	4mΩ	4mΩ	4mΩ	4mΩ	4mΩ	4mΩ	4mΩ
Load Wire Terminations	10-14AWG bhs	10-14AWG bhs	4-14AWG pc	4-14AWG pc	1-8AWG pc	1-8AWG pc	1-8AWG pc	1/0-2AWG pc
Coil Wire Terminations	#6-32bhs up to #12AWG	#6-32bhs up to #16AWG	#6-32bhs up to #12AWG	#6-32bhs up to #12AWG	#6-32bhs up to #12AWG	#6-32bhs up to #12AWG	#6-32bhs up to #12AWG	#6-32bhs up to #12AWG
Load Type	Resistive	Resistive	Resistive	Resistive	Resistive	Resistive	Resistive	Resistive
Maximum Load Voltage ac	480/600**	480/600**	600****	600****	480/600****	480***	480***	480/600
Load Frequency	50/60 Hz.	50/60 Hz.	50/60 Hz.	50/60 Hz.	50/60 Hz.	50/60 Hz.	50/60 Hz.	50/60 Hz.
Pull-in Time	70 mS	50 mS	70 mS	70 mS	70 mS	90 mS	90 mS	90 mS
Drop-out Time	90 mS	70 mS	90 mS	90 mS	90 mS	140 mS	140 mS	140 mS
Operating Ambient	-35 to 55°C	-35 to 55°C	-35 to 55°C	-35 to 55°C	-35 to 55°C	-35 to 55°C	-35 to 55°C	-35 to 55°C
Storage Temperature	-40 to 100°C	-40 to 100°C	-40 to 100°C	-40 to 100°C	-40 to 100°C	-40 to 100°C	-40 to 100°C	-40 to 100°C
Hg - Mass/Contact	1.82 oz.	0.84 oz.	1.75 oz.	1.75 oz.	1.75 oz.	8.93 oz.	8.93 oz.	9.46 oz.
Weight : 1 Pole	1.0 lbs.	1.0 lbs.	1.0 lbs.	1.0 lbs.	1.0 lbs.	2.0 lbs.	2.0 lbs.	2.5 lbs.
2 Pole	2.0 lbs.	2.0 lbs.	2.0 lbs.	2.0 lbs.	2.0 lbs.	3.5 lbs.	4.0 lbs.	4.5 lbs.
3 Pole	2.5 lbs.	2.0 lbs.	3.0 lbs.	3.0 lbs.	3.0 lbs.	4.5 lbs.	7.0 lbs.	7.0 lbs.

Agency Approvals

- UL, File #ULE177629
- CSA File #LR22416

HG2M-XADX Load Current Table

Volts	120	208	240	277	480	600
Amps	150	140	135	130	120	120

Note: The 150 Amp relay (HG2M-XADX) is not UL or CSA approved.

** UL listed to 480V~ (ac); CSA certified to 600V~ (ac)

*** UL listed to 480V~ (ac)

**** UL listed and CSA certified to 600V~ (ac)

Fusing

To prevent the MDR from rupture in the event of a heater short circuit, you should always fuse the MDR load circuit. Watlow recommends a Bussmann type JJN or JJS (Class T) fuse or equivalent. Select a fuse size 1.25 times the connected load or the next size above, but do not exceed 1.6 times the MDR rating. To fuse the MDR field coil, you can use Bussmann fuse number MDL-2 for coils up to 240V~ (ac). For coils up to 480V~ (ac), use Bussmann fuse number JJS-1.

Note: pc = pressure connector
bhs = binding head screw

Note: Watlow recommends that you do not exceed 30 cycles per minute.

Note: Watlow recommends that ring terminal lugs be used on all binding head screw terminals.

Note: When replacing Watlow MD style relays, consider the HG60 model if larger gauge or multiple wires are required. See the load termination specification above.

⚠ WARNING: Install high or low temperature control protection in systems where an overtemperature or undertemperature fault condition could present a fire hazard or other hazard. Failure to install temperature control protection where a potential hazard exists could result in damage to equipment and property, and personal injury or death.