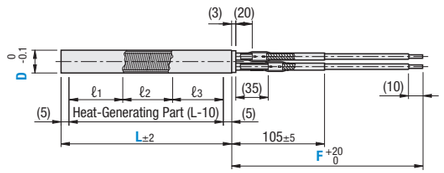
Cartridge Heaters

Uniform Heating

Cartridge Heaters – Uniform Heating

RoHS 10

MCHC



Terminal Selection

- N No Crimp Terminal
- M With Round Crimp Terminal
- Y With Y-Shaped Crimp Terminal

		ℓ_1	ℓ_2	ℓ_3
Length Ratio		1	1	1
Winding Ratio*	A	1.1	1	1.1
	B	1.3	1	1.3

*Winding ratio of nickel-chrome wire

ⓘ When the length of heat-generating part is not a multiple of 3, it is produced based on adjusting the length ratio to approx. 1: 1: 1.

Material: Heater : 304 Stainless Steel
Lead Wire : See Below
Terminal : Copper (Tin Plating)

ⓘ Maximum Operating Temperature: 600° C
ⓘ Maximum Operating Temperature means value at the sheath part. Please pay attention to Lead Wire Heat Resistance Temperature and be sure to put the lead wire out of the mounting hole.

Uniform Heating

Part Number Type	Part Number ⓘ Winding Ratio	Part Number D	L 10 mm Increment	V (Voltage)	W (Electrical Power) 10 W Increment	F (Lead Wire Length) Lead Wire Type	F (Lead Wire Length) 10 mm Increment	Terminal	Electrical Power Density (W/cm²)
MCHC	A 1.1:1:1.1	8	150–300	100	70–600	B G T M	100–1000	N M Y	2≤W/cm²≤15 ⓘ W/cm²=W/{Dπ(L-10)/100} Calculate with the electrical power density of heat-generating part, not with the overall length.
				200	70–1000				
	B 1.3:1:1.3	10		100	90–600				
				200	90–1000				
		12		100	110–600				
				200	110–1200				

ⓘ Winding Ratio is the winding ratio of Nickel-chrome wire. (Refer to the diagram and Selection Point below.)

Lead Wire Type

Symbols	Selection	Heat Resistance Temperature	Features
B	Tin Plated Annealed Copper Fiber Glass Braided Wire	180°C	General Use
G	Silicon Rubber + Tin Plated Annealed Copper Wire	180°C	For chemical and water resistant items
T	Teflon + Nickel Plated Annealing Copper Wire	260°C	For chemical, water and weather resistant items
M	Mica Polyimide-Wound Silica + Nickel Coated Copper Wire	400°C	For heat resistant items

Type of Terminal

Symbols	Type of Terminal	Nominal Size of Screw
N	No Crimp Terminal	—
M	Crimp Terminal – Round Type	M4
Y	Crimp Terminal – Y-Shaped	M4

Part Number Example

Part Number			-	L	-	V	-	W	-	F Lead Wire		-	Terminal
Type	Winding Ratio	D								Lead Wire Type	Length		
MCHC	A	8	-	200	-	V100	-	W300	-	G	500	-	M

Features

– This heater has different winding Ratio's of Nickel-chrome wire in one cartridge heater from conventional ones.
– Compared with conventional cartridge heaters, the temperature on the heated object will be more uniform.
– Comparison with Conventional Cartridge Heaters

	Conventional Cartridge Heaters	Cartridge Heaters Uniform Heating Type (MCHC)
Winding Method of the Nickel-chrome Wire of Heater on Each Part	Uniform	Low winding turns on the center part (ℓ_2).
Heat Capacity Distribution	Uniform	Low capacity on the center part (ℓ_2).
Temperature Distribution of Heated Object	The temperature of the center of the heater may be relatively high (temperature unevenness).*	Better balance of temperature distribution (uniform heating effect) than conventional heaters.

*The temperature of the center part increases easily because radiation is hard and the heat may accumulate.

This heater is more effective than conventional ones when higher uniform heating is required. (Ex.) Heating board for welding seal, engraving heating, roller heating and heating board of rubber welding machine, etc.

Selection Point

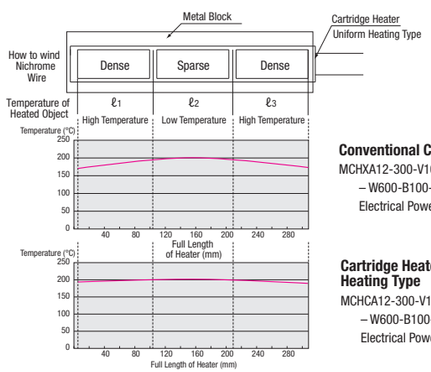
– Calculate the total wattage required for heating metal block. Refer to **P.3777**.
– Select the distribution ratio of Nickel-chrome wire from A or B Type.
A Type: Improving the temperature consistency of heated object.
B Type: Temperature on the both ends of heated object is low obviously.
The temperature consistency may not be improved even if either type is used.

Precautions for Use

ⓘ Do not let heater run idle in the atmosphere. Operating the heater when heat-generating part is out of heated products, the wire may break due to abnormal heating.
ⓘ Although the temperature uniformity improves compared to the conventional cartridge heaters, completely uniform heating is not guaranteed. Uniform heating may not go into effect depending on the operating condition.
ⓘ Because the uniform heating effect varies depending on slight difference of the operating condition (such as the shape, size of the heated object and the air flow, etc.), even for the products of the same type, the stability of the uniform heating effect cannot be guaranteed.
ⓘ Keep the temperature around the lead wire end at 130°C or below.

Actual Measurements of Temperature Distribution of Cartridge Heater Uniform Heating Type

– The heat-generating part is divided into three parts, and winding method of Nickel-chrome wire for each part is different.
– The balance of the temperature distribution improves because the temperature of ℓ_2 becomes low compared to the conventional cartridge heaters.



Conventional Cartridge Heaters
MCHXA12-300-V100
– W600-B100-N
Electrical Power Density 5.5 W/cm²

Cartridge Heaters of Uniform Heating Type
MCHCA12-300-V100
– W600-B100-N
Electrical Power Density 5.5 W/cm²

Heated Object: 303 Stainless Steel (30 x 30 x 300)
Point of Temperature Measurement: ℓ_1, ℓ_2, ℓ_3 Center Part of Each Surface

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Cartridge Heaters

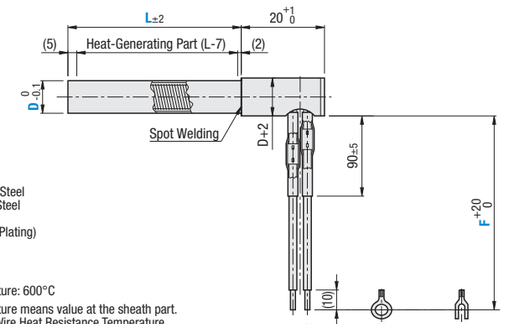
L-Shaped

Cartridge Heaters – L-Shaped

RoHS 10

MCHL
MCHZL

Break Resistant, Internal Connection



Material : Heater : 304 Stainless Steel
Collar : 304 Stainless Steel
Lead Wire : See Below
Terminal : Copper (Tin Plating)

ⓘ Maximum Operating Temperature: 600°C
ⓘ Maximum Operating Temperature means value at the sheath part. Please pay attention to Lead Wire Heat Resistance Temperature and be sure to put the lead wire out of the mounting hole.

Terminal Selection
N No Crimp Terminal
M With Round Crimp Terminal
Y With Y-Shaped Crimp Terminal

L-Shaped

Part Number Type	Part Number D	L 1 mm Increment	V (Voltage)	W (Electrical Power) 10 W Increment	F (Lead Wire Length) Lead Wire Type	F (Lead Wire Length) 10 mm Increment	Terminal	Electrical Power Density (W/cm²)
MCHL MCHZL	*6	50–250	100	50–500	B G T M	100–1000	N M Y	2≤W/cm²≤15 ⓘ W/cm²=W/{Dπ(L-7)/100} Calculate with the electrical power density of heat-generating part, not with the overall length.
			200	100–600				
	8	50–400	100	50–600				
			200	50–1200				
	10	50–600	100	50–600				
			200	50–1200				
	12		100	50–800				
			200	50–1600				
	14		100	50–800				
			200	100–1600				

ⓘ MCHL not available from L301-L600 for D6, and from L401-L600 for D8. ⓘ MCHZL not available from L50-L600 for D6, and from L401-L600 for D8
*D=6 is for MCHL only.

Lead Wire Type

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Type of Terminal

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Part Number Example

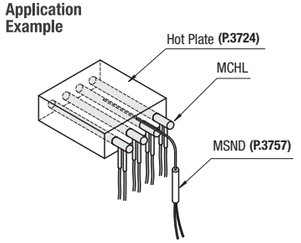
Part Number		L	-	V	-	W	-	F Lead Wire		-	Terminal
								Lead Wire Type	Length		
MCHL12	-	300	-	V100	-	W350	-	M	1000	-	Y

Cartridge Heaters Features of L-Shaped Type

Space-Saving: Saves space by bending the lead wire in L-shape at the exit point.

Lead Wire Selection: Lead wire can be selected depending on the operating ambient temperature.

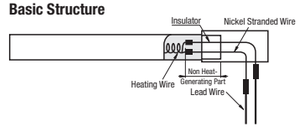
Application Example



Features of Cartridge Heaters (Break Resistant / Internal Connection)

Heater wires are less prone to breakage. Break Resistant Internal Connection Type employs a connection with heat-generating wire and nickel stranded wire in the sheath and a connection with nickel stranded wire and lead wire outside the sheath. As the nickel pins are not exposed, the heater has more resistance against bending.

Basic Structure



Precautions for Use

ⓘ Do not let heater run exposed in the atmosphere. Operating the heater when heat-generating part is out of heated products, the wire may break or ignite due to abnormal heating.
ⓘ Keep the temperature around the collar at 180°C or below.
ⓘ Keep the temperature around the lead wire exit at 130°C or less.