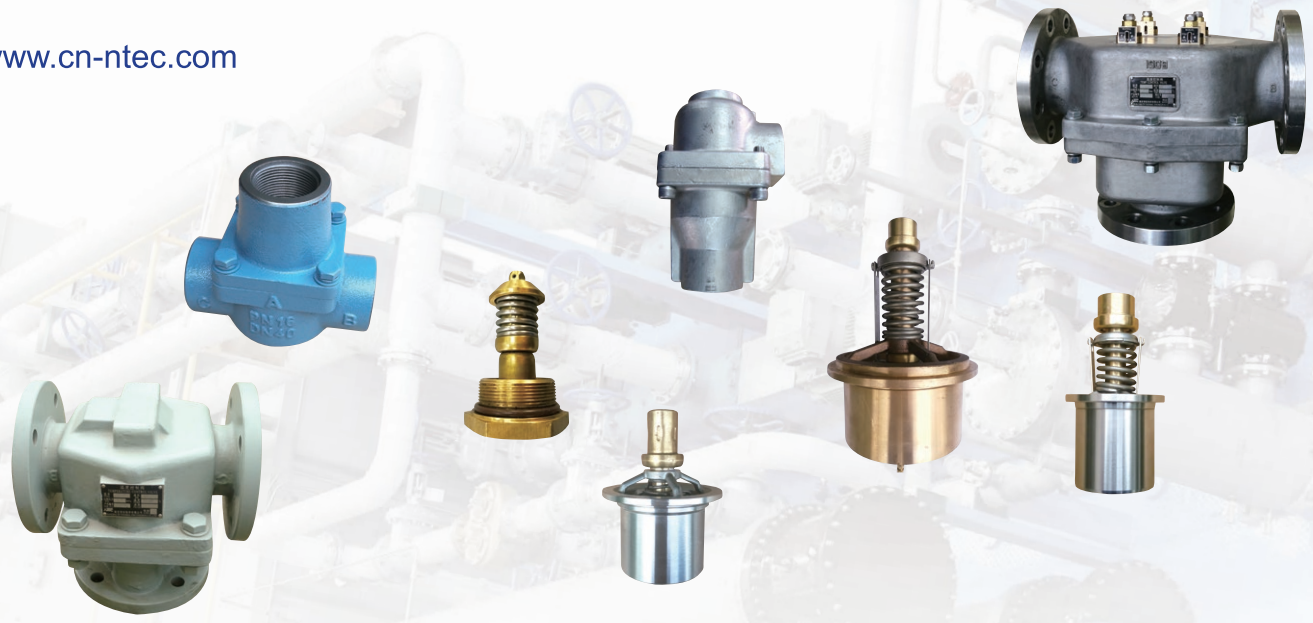
南京帝伯热学有限公司
NANJING TP THERMAL ENGINEERING CO. LTD.

# 温度控制阀及阀芯

## Temperature Control Valve & Element Assy

www.cn-ntec.com



## 特性及优点

- 采用自力式感温元件，无需外动力源，可靠性高。
- 结构紧凑，任意方向安装，使用维护成本低。
- 具有自感应特点并线性调节阀门。
- 高强度设计，抗振动、冲击能力强。
- 温控阀型式丰富，并有多种温度范围可供选择。

## Characteristics and advantages

- The Wax-element is adopted without external power source and has high reliability.
- Compact structure, installation in any direction, low maintenance cost.
- Automatic self-sensing control with positive proportional valve action.
- Robust design capable of high vibration and shock application.
- Temperature control valves are of various types and have a wide range of temperatures to choose.

| 典型应用系统 | Typical applications system | 应用场所 | Application place |
|---|---|---|---|
| 润滑油温控制 | Lubricating oil temperature control | 石油装备 | Petroleum equipment |
| 缸套水温控制 | Jacket water high temperature(HT) | 工程机械 | Construction machinery |
| 低温水温控制 | Secondary water low temperature(LT) | 动力机械 | Power machinery |
| 节水应用 | Water Saving System | 压缩机 | Compressor |

# 法兰式三通温控阀
# Flanged three-way temperature control valve

## 工作原理及基本构成 Working Principle and Basic Composition

1. 温控阀是利用石蜡受热熔化时有较高的膨胀率这一原理，调节流体流量而达到控制温度的目的。

2.温控阀由阀体和温控阀芯组成，采用法兰连接方式。

1.Temperature control valve (brief is TCV)uses the principle that paraffin has a higher expansion rate when melted by heating to regulate the flow rate of fluid and achieve the purpose of controlling temperature.

2.Temperature control valve is composed of valve body and element assy. Flange connection is adopted.

## 主要特性 Main characteristics

1.流量范围:4-450$m^3$/hr

2.适用管路通径DN25-200

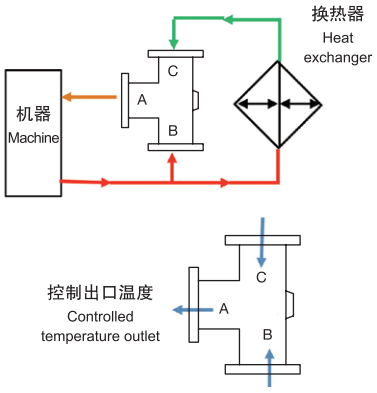
3.控制温度范围从20-110℃。

4.阀体材料有铸铁、钢、不锈钢、青铜。

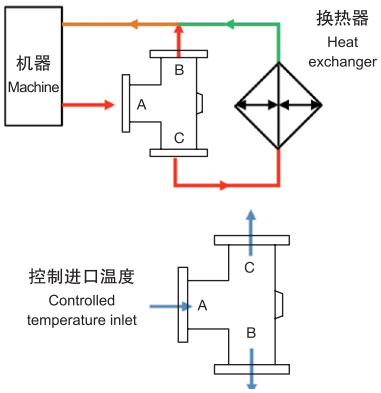
1. Flow range: 4-450 $m^3$/hr.
2. Applicable pipeline size  DN25-200.
3. The control temperature range is from 20 to 110 ℃.
4. Valve body materials are cast iron, steel, stainless steel, bronze.

## 典型安装示意图 Typical Installation Diagram

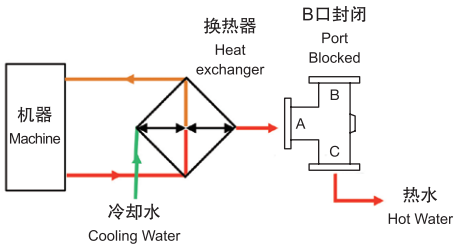
合流型
**Mixing Type**




分流型
**Dividing Type**




节水系统
**Water Saving System**

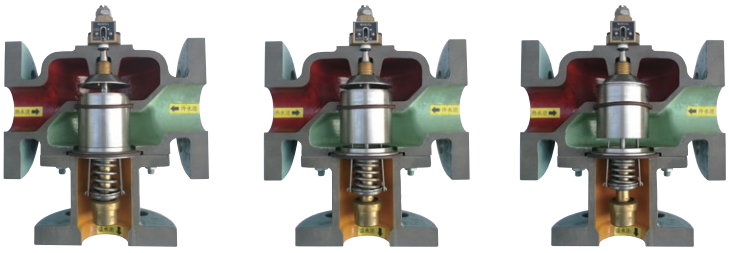



阀内必须有小流量通过，用于感受温度。
There must be a small flow through the valve for temperature sensing.

## 温控阀的动作 Temperature control action

温度控制的动力来自热敏件内感温物的膨胀，它对温度变化很敏感，膨胀产生行程和推力推动滑阀运动来调整流量。右侧图片是合流型在不同温度下滑阀动作的状态。

The power of temperature control comes from the expansion of the thermosensitive material in the element part,which is sensitive to the temperature change. Expansion produces stroke and thrust to drive the sliding valve adjust the flow rate. The pictures on the right side are mixing type, the state of sliding valve operation at different temperatures.

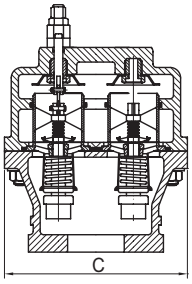


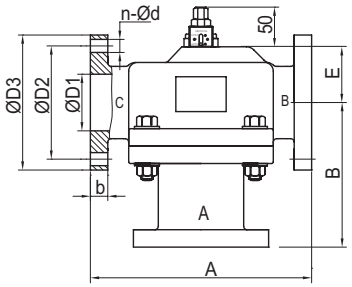
温度低状态
Low Temperature

中间温度状态
Middle Temperature

温度高状态
High Temperature

## 温控阀外形尺寸 Outline of Valve




法兰标准：GB/T 9119-2010，PN10，其它标准以图纸确认。
阀体材质为铸铁。

Flange standard: GB/T 9119-2010, PN10. Other standards are confirmed by drawings. Body material is cast iron.

铜质阀体的尺寸略有区别，请与我们联系。

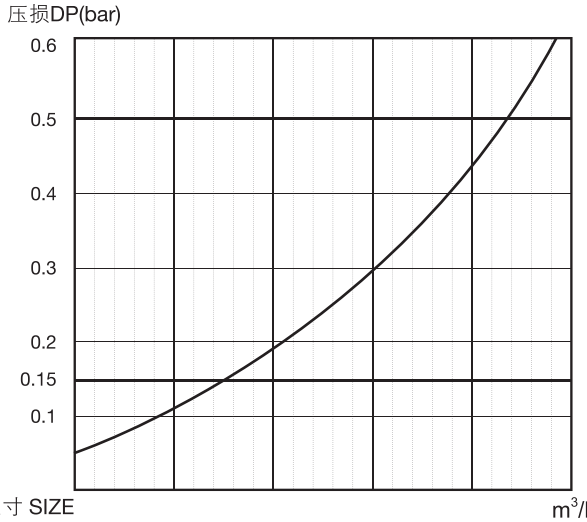
The dimensions of copper body are slightly different. Please contact us.

| 型号 Type | 尺寸 Size | | | | | | | | | 重量WT. | 阀芯 Assy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | E | D1 | D2 | D3 | b | n-Ød | Kg | 型号Type | 数量Qut. |
| LHF□-25□ | 180 | 107 | 100 | 53 | 25 | 85 | 115 | 16 | 4-Φ14 | 8 | LHX-25 | 1 |
| LHF□-32□ | 180 | 107 | 100 | 59 | 32 | 100 | 140 | 18 | 4-Φ18 | 10 | LHX-32 | 1 |
| LHFS/-40□ | 178 | 101 | 102 | 50 | 40 | 110 | 150 | 18 | 4-Φ18 | 10 | LHX-40 | 1 |
| LHFT-40□ | 220 | 130 | 116 | 64 | 40 | 110 | 150 | 18 | 4-Φ18 | 12 | LHX-40 | 1 |
| LHF□-50□ | 225 | 149 | 140 | 75 | 50 | 125 | 165 | 20 | 4-Φ18 | 18 | LHX-50 | 1 |
| LHF□-65□ | 254 | 165 | 210 | 75 | 65 | 145 | 185 | 20 | 4-Φ18 | 28 | LHX-50 | 2 |
| LHF□-80□ | 267 | 171 | 210 | 75 | 80 | 160 | 200 | 22 | 8-Φ18 | 31 | LHX-50 | 2 |
| LHF□-100□ | 403 | 217 | 280 | 60 | 100 | 180 | 220 | 24 | 8-Φ18 | 58 | LHX-50 | 4 |
| LHF□-125□ | 489 | 241 | 349 | 55 | 125 | 210 | 250 | 26 | 8-Φ18 | 88 | LHX-50 | 6 |
| LHF□-150□ | 489 | 254 | 383 | 55 | 150 | 240 | 285 | 26 | 8-Φ22 | 112 | LHX-50 | 9 |
| LHF□-200□ | 840 | 280 | 630 | 205 | 200 | 295 | 340 | 30 | 8-Φ22 | 280 | LHX-50 | 16 |

## 订货型号说明 Ording Type Explantion

| 型号Type | L | H | F | T | — | 80 | D | S | 1 | * | 60-70℃ | 代号说明 Code Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 壳体材质 Body Material | | | | T | | | | | | | | 铸铁 Cast Iron |
| | | | | G | | | | | | | | 铸钢 Cast Steel |
| | | | | S | | | | | | | | 不锈钢 Stainless Steel |
| | | | | null | | | | | | | | 青铜 Bronze |
| 通径 DN | | | | | | * | | | | | | 公称通径 DN 25/32/40/50/65/80/100/125/150/200 |
| 接口法兰 Flange Size | | | | | | | G | | | | | GB570-PN10 |
| | | | | | | | D | | | | | GB/T9119,HG20592-PN10 |
| | | | | | | | F | | | | | GB/T9119,HG20592-PN6；JB/T81-1994(第一系列) |
| | | | | | | | H | | | | | GB/T9119,HG20592-PN16，DN≥175 |
| | | | | | | | K | | | | | ANSI B16.5a-CL150,HG20615-PN20,SH3406-PN20 |
| | | | | | | | L | | | | | SH3406-PN10 |
| | | | | | | | M | | | | | ANSI B16.5a-CL300，HG20615-PN50 |
| | | | | | | | N | | | | | JB/T81-PN6(第二系列）少用 |
| | | | | | | | U | | | | | JIS5K |
| | | | | | | | V | | | | | JIS10K |
| | | | | | | | X | | | | | ND10 |
| | | | | | | | W | | | | | GB570-PN16,DN≥175 |
| 手动功能 Manual | | | | | | | | S | | | | 带手动 Has manual |
| 泄漏孔Leak hole size | | | | | | | | | null | | | 无 None |
| | | | | | | | | | 1 | | | 1-Ø 8 |
| | | | | | | | | | 2 | | | 2-Ø 8 |
| | | | | | | | | | 3 | | | 4-Ø 8 |
| 用户特殊要求Customer Special Requirement | | | | | | | | | | * | | 与客户商定 Customer special code assigned |
| 温度范围 Temperature Range | | | | | | | | | | | 40-50℃ | 与客户商定 Approved by customer |

## 流量压损曲线 Flow and Pressure Drop Curve (LHF□-型)




| 尺寸 SIZE | | | | | | m³/h |
|---|---|---|---|---|---|---|
| DN25 | 4 | 6 | 8 | 10 | 12 | 14 |
| DN32 | 6 | 9 | 12 | 15 | 18 | 21 |
| DN40 | 8 | 12 | 16 | 20 | 24 | 30 |
| DN50 | 10 | 15 | 20 | 25 | 30 | 35 |
| DN65 | 18 | 27 | 36 | 45 | 54 | 63 |
| DN80 | 20 | 30 | 40 | 50 | 60 | 70 |
| DN100 | 40 | 60 | 80 | 100 | 120 | 140 |
| DN125 | 60 | 90 | 120 | 150 | 180 | 210 |
| DN150 | 90 | 135 | 180 | 225 | 270 | 315 |
| DN200 | 135 | 190 | 260 | 320 | 390 | 450 |

## 流量系数 Flow coefficient

| DN | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|
| Kv | 19 | 26 | 35 | 44 | 80 | 88 | 175 | 260 | 392 | 570 |

Kv是流量系数，单位为公制单位
Kv is the flow cofficient in metric units.

它被定义为在16℃的温度下，通过阀门的压降为1巴时水的流量，单位为立方米/小时（$m^3/h$）。
It is defined as the flow rate in cubic meters per hour($m^3/h$) of water at a temperature of 16℃ with a pressure drop across the valve of 1 bar.

计算阀门Kv的基本公式如下：
The basic formula to find a valve's Kv is shown below:

$$Kv=Q\cdot\sqrt{\frac{SG}{DP}} \qquad DP=\left(\frac{Q}{Kv}\right)^2\cdot SG$$

Q=流量 Flow（$m^3/hr$）

DP=压降 Pressure drop（bar）

SG=流体比重（水=1）

SG-Special gravity of fluid（Water=1）

## 压损建议 DP suggestion

LHF□-型温控阀采用小压降设计，选用时建议压降在0.15-0.5bar之间。

LHF□-type temperature control valve is designed with small pressure drop.
The recommended pressure drop between 0.15 to 0.5 bar.

## 粘度修正 Viscosity correction

温控阀使用在有粘度的流体中时，在满足压力损失的前提下按比例降低流量使用。

When the temperature control valve is used in the viscous fluid, the flow rate is reduced proportionally on the premise of meeting the pressure drop.

不同粘度流体的比例系数如下：

The proportion of fluids with different viscosities are as follows:

| 粘度Viscosity（CST） | 10 | 20 | 40 | 60 | 100 | 150 | 300 | 500 |
|---|---|---|---|---|---|---|---|---|
| 比例系数Proportion | 0.9 | 0.85 | 0.8 | 0.74 | 0.7 | 0.65 | 0.62 | 0.6 |

注意：粘度要对应使用温度。
Notice:Viscosity should correspond to temperature.

## 安装和使用 Installation and Using

法兰连接式温控阀安装使用注意事项：

Notices for installation and use of temperature control valves with flange:

1.较小尺寸的阀可由连接管支撑，但不应过度弯曲。
Smaller sizes,the valve may be supported by the connecting pipe but should not be subjected to excessive bending.

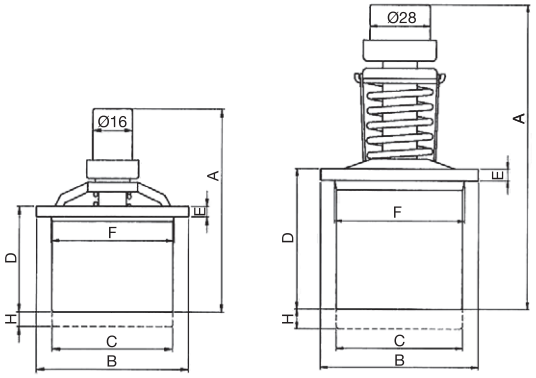
2.大尺寸的阀不应用于支撑长而粗的管道，管路必须加支撑物。
Larger sizes should not be used to support long and heavy lengths of pipe.Pipelines must be supported.

3.在拧紧连接螺栓之前，先对齐管道。
Line up the piping before tightening the connecting bolts.

4.安装时必须先消除管路应力，避免拉裂阀门。
Pipeline stress must be eliminated before installation to avoid cracking of valves.

5.只有在紧急情况或热敏件故障时才应使用手动控制。
Manual Override should only be used in case of an emergency or element failure.

## LHX-□型温控阀芯 LHX- □Element Assy

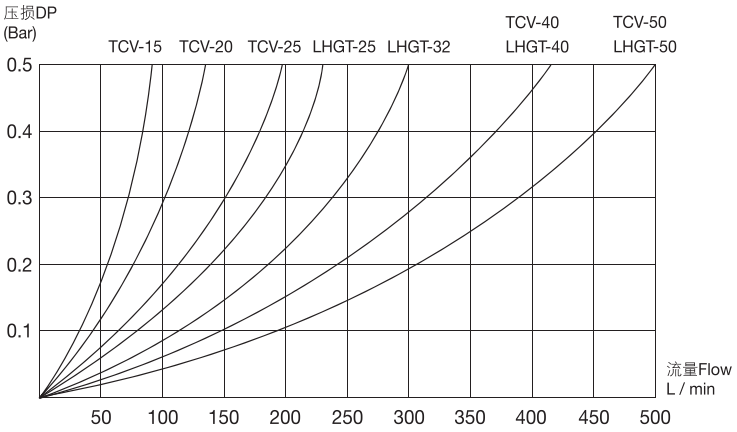



LHX-25,32,40　　LHX-50,65,114

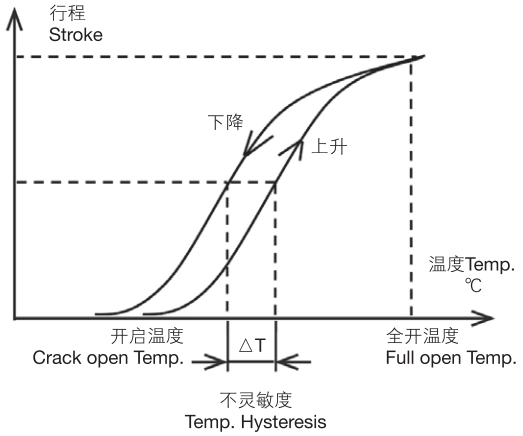
## 阀芯外形尺寸 Outline of Assy

| 阀芯型号 Type | A | ΦB | ΦC | D | E | ΦF | H | 重量WT (Kg) |
|---|---|---|---|---|---|---|---|---|
| LHX-25 | 83 | 62.5 | 40.8 | 42.5 | 3.2 | 49.5 | ≥8.5 | 0.26 |
| LHX-25B | 83 | 54 | 40.8 | 42.5 | 3.2 | 49.5 | ≥8.5 | 0.25 |
| LHX-32 | 83 | 62.5 | 45.2 | 42.5 | 3.2 | 49.5 | ≥9.0 | 0.28 |
| LHX-40 | 83 | 73 | 58 | 46.6 | 5.4 | 59.2 | ≥9.0 | 0.38 |
| LHX-50 | 142 | 73 | 58.5 | 66.3 | 5.4 | 59.7 | ≥9.5 | 0.68 |
| LHX-65 | 133 | 95 | 80 | 62 | 5.4 | 80.7 | ≥12.5 | 0.84 |
| LHX-114 | 200 | 140 | 114 | 68 | 6 | 120 | ≥18.5 | 2.36 |

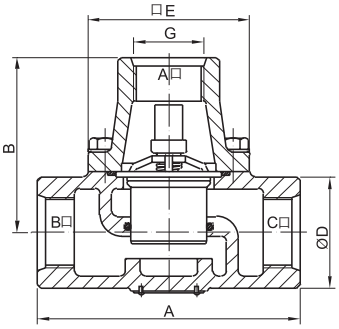
## 流量与压损图 Flow & Pressure Drop Curve




## 阀芯温度-行程图 Temp.-Stroke Curve



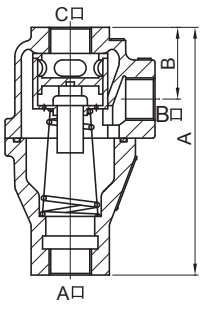

## LHGT-□型温控阀 LHGT-□ Type TCV

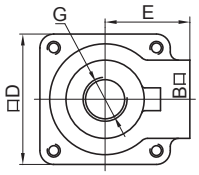



| 阀型号 Type | A | B | ΦD | □E | G | 流量Flow L/min |
|---|---|---|---|---|---|---|
| LHGT-25 | 120 | 90 | 50 | 82 | 1" | 220 |
| LHGT-32 | 156 | 104 | 66 | 96 | 11/4" | 300 |
| LHGT-40 | 156 | 104 | 66 | 96 | 11/2" | 420 |
| LHGT-50 | 170 | 116 | 80 | 100 | 2" | 500 |

阀体材质为铸铁 Body material is cast iron

## TCV-□型温控阀 TCV-□ Type TCV




| 阀型号 Type | A | B | □D | E | G | 流量Flow L/min |
|---|---|---|---|---|---|---|
| TCV□-15 | 152 | 44 | 80 | 52 | 1/2" | 90 |
| TCV□-20 | | | | | 3/4" | 130 |
| TCV□-25 | | | | | G1" | 180 |
| TCV-40 | 246 | 97 | 139 | 91 | 11/2" | 420 |
| TCV-50 | | | | | 2" | 500 |

□为阀体材质,省略为铸铁，G-钢,S-不锈钢

□refers body material,null is cast iron,G-steel,S-stainless steel.

## 常见故障解除 Common troubleshooting

如果在冷却系统中温控阀不在设定的工作温度范围内工作，应找出原因和排除故障。

If the temperature control valve in the cooling system does not work within the set working temperature range, it should find out the reasons and troubleshooting.

### ◎系统温度过低

System temperature is too cold

1.机器刚启动时，热介质温度偏低；
When the machine is just started, the temperature of the heat medium is on the low side.

2.选择的温度范围不合适；
The selected temperature range is not suitable.

3.温控阀接口安装错误；
Error installation of temperature control valve interface;

4.温控阀的尺寸选择远大于实际需求；
The size selection of temperature control valve is much larger than the actual demand.

5.外部物体的干扰阻止阀芯的关闭。
Disturbance from external objects prevents the spool from closing.

### ◎系统温度过高

System temperature is too hot

1.系统的冷却能力不够；
The cooling capacity of the system is insufficient.

2.温控阀的尺寸过小，导致压力损失过大；
The size of temperature control valve is too small, which leads to too large pressure drop.

3.内部需要密封的部位破损，导致旁通口泄漏大；
Breakage of internal parts requiring sealing, resulting in large leakage of bypass

4.热敏件长期超温工作，导致行程衰减，不能全部打开。
The long-term over-temperature work of heat sensitive parts results in travel attenuation and can not be fully opened.

5.外部物体卡在滑阀与阀座之间。
The external object is stuck between the slide valve and the seat.

## 温度单位换算表 Temperature Conversion

| ℃ | ℉ | ℃ | ℉ | ℃ | ℉ | ℃ | ℉ | ℃ | ℉ | ℃ | ℉ | ℃ | ℉ | ℃ | ℉ | ℃ | ℉ | ℃ | ℉ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 51.8 | 21 | 69.8 | 31 | 87.8 | 41 | 105.8 | 51 | 123.8 | 61 | 141.8 | 71 | 159.8 | 81 | 177.8 | 91 | 195.8 | 101 | 213.8 | 111 | 231.8 |
| 12 | 53.6 | 22 | 71.6 | 32 | 89.6 | 42 | 107.6 | 52 | 125.6 | 62 | 143.6 | 72 | 161.6 | 82 | 179.6 | 92 | 197.6 | 102 | 215.6 | 112 | 233.6 |
| 13 | 55.4 | 23 | 73.4 | 33 | 91.4 | 43 | 109.4 | 53 | 127.4 | 63 | 145.4 | 73 | 163.4 | 83 | 181.4 | 93 | 199.4 | 103 | 217.4 | 113 | 235.4 |
| 14 | 57.2 | 24 | 75.2 | 34 | 93.2 | 44 | 111.2 | 54 | 129.2 | 64 | 147.2 | 74 | 165.2 | 84 | 183.2 | 94 | 201.2 | 104 | 219.2 | 114 | 237.2 |
| 15 | 59.0 | 25 | 77.0 | 35 | 95.0 | 45 | 113.0 | 55 | 131.0 | 65 | 149.0 | 75 | 167.0 | 85 | 185.0 | 95 | 203.0 | 105 | 221.0 | 115 | 239.0 |
| 16 | 60.8 | 26 | 78.8 | 36 | 96.8 | 46 | 114.8 | 56 | 132.8 | 66 | 150.8 | 76 | 168.8 | 86 | 186.8 | 96 | 204.8 | 106 | 222.8 | 116 | 240.8 |
| 17 | 62.6 | 27 | 80.6 | 37 | 98.6 | 47 | 116.6 | 57 | 134.6 | 67 | 152.6 | 77 | 170.6 | 87 | 188.6 | 97 | 206.6 | 107 | 224.6 | 117 | 242.6 |
| 18 | 64.4 | 28 | 82.4 | 38 | 100.4 | 48 | 118.4 | 58 | 136.4 | 68 | 154.4 | 78 | 172.4 | 88 | 190.4 | 98 | 208.4 | 108 | 226.4 | 118 | 244.4 |
| 19 | 66.2 | 29 | 84.2 | 39 | 102.2 | 49 | 120.2 | 59 | 138.2 | 69 | 156.2 | 79 | 174.2 | 89 | 192.2 | 99 | 210.2 | 109 | 228.2 | 119 | 246.2 |
| 20 | 68.0 | 30 | 86.0 | 40 | 104.0 | 50 | 122.0 | 60 | 140.0 | 70 | 158.0 | 80 | 176.0 | 90 | 194.0 | 100 | 212.0 | 110 | 230.0 | 120 | 248.0 |

## 温控阀常用温度范围 Common Temperature Range of Temperature Control Valve

| | | | | | | |
|---|---|---|---|---|---|---|
| 20-30℃ | 25-35℃ | 30-40℃ | 35-45℃ | 40-50℃ | 45-55℃ | 50-60℃ |
| 55-65℃ | 60-70℃ | 65-75℃ | 70-80℃ | 75-85℃ | 80-90℃ | 85-95℃ |
| 32-40℃ | 34-42℃ | 38-47℃ | 43-54℃ | 57-66℃ | 63-72℃ | 68-78℃ |
| 72-82℃ | 74-83℃ | 79-88℃ | 55-70℃ | 82-91℃ | 81-97℃ | 90-101℃ |

其他特殊温度范围可以商定，请联系我们。
Other special temperature ranges can be agreed upon, please contact us.

## 压力单位换算表 Pressure Conversion

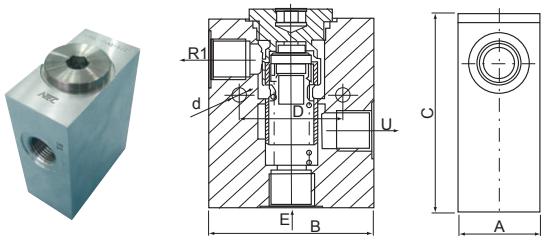
| | | PSI | Bar | Kg/cm$^2$ | Atm | KPa |
|---|---|---|---|---|---|---|
| 1 PSI | = | 1 | 0.069 | 0.07 | 0.068 | 6.89 |
| 1 Bar | = | 14.5 | 1 | 1.02 | 0.987 | 100 |
| 1 KG/cm$^2$ | = | 14.22 | 0.981 | 1 | 0.968 | 98 |
| 1 Atm | = | 14.7 | 1.013 | 1.033 | 1 | 101.3 |
| 1 Kpa | = | 0.145 | 0.01 | 0.0102 | 0.0098 | 1 |

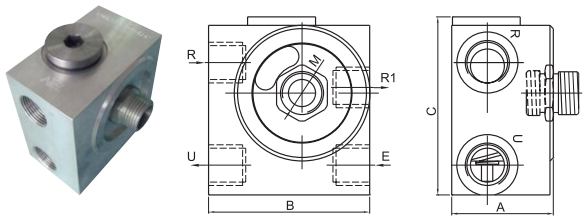
## 流量单位换算表 Flowrate Conversion

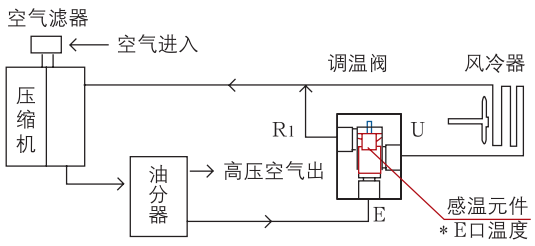
| | | m$^3$/hr | 1 Liter/min | 1 Imp Gallon/min | 1 US Gallon/min |
|---|---|---|---|---|---|
| 1 m$^3$/hr | = | 1 | 16.67 | 3.666 | 4.4 |
| 1 Liter/min | = | 0.06 | 1 | 0.22 | 0.264 |
| 1 Imp Gallon/min | = | 0.273 | 4.546 | 1 | 1.2 |
| 1 US Gallon/min | = | 0.227 | 3.787 | 0.833 | 1 |

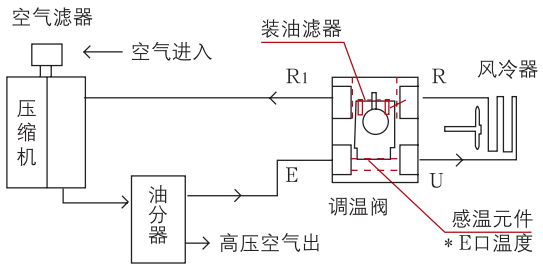
# 其他系列温控阀
# Another Type TCV

## LHGL-□型温控阀 LHGL-□ Type TCV



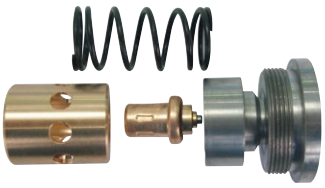




| 型号 | A | B | C | 接口 | D | n-Ød | 流量L/min |
|---|---|---|---|---|---|---|---|
| LHGL-15A1 | 40 | 80 | 105 | 1/2" | 50 | 2-Φ7 | 45 |
| LHGL-20A | 40 | 80 | 105 | 3/4" | 50 | 2-Φ7 | 70 |
| LHGL-25A | 60 | 100 | 120 | 1" | 50 | 2-Φ8 | 100 |
| LHGL-32A | 60 | 110 | 120 | 11/4" | 70 | 2-Φ10.5 | 180 |
| LHGL-40A | 82 | 140 | 130 | 11/2" | 90 | 2-Φ10.5 | 300 |

| 型号 | A | B | C | 接口 | M | 流量L/min |
|---|---|---|---|---|---|---|
| LHGL-15C4 | 60 | 80 | 105 | 1/2" | 1"-12UNF | 45 |
| LHGL-20C2 | 60 | 95 | 105 | 3/4" | 1"-12UNF | 70 |
| LHGL-25C2 | 80 | 125 | 125 | 1" | 11/2"-16UN | 90 |
| LHGL-32C3 | 80 | 130 | 135 | 11/4" | 11/2"-16UN | 180 |

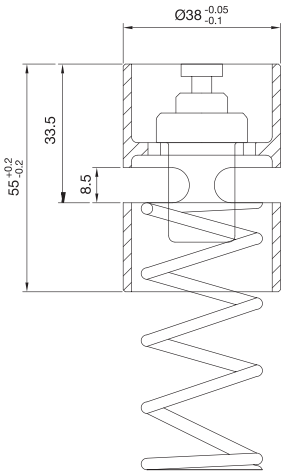
## LH-阀芯组件 LH-Element Assy



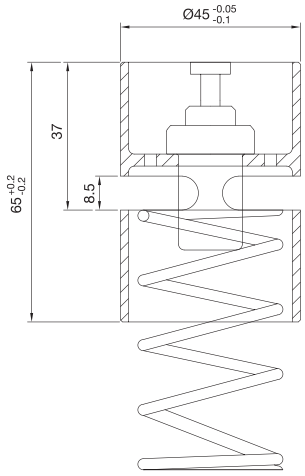
## 阀芯LFX-25 Element Assy

行程≥5mm

## LH-38恒温滑阀芯 LH- 38 Element Assy




## LH-45恒温滑阀芯 LH- 45 Element Assy




## 客户订制产品
## Custom special TCV



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