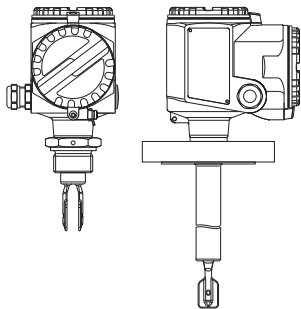


## 简明操作指南

# Liquiphant M FTL50/51-#####7#

限位开关



|        |    |
|--------|----|
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小心！

= 禁止；导致操作错误或  
仪表损坏。

## 安全指南

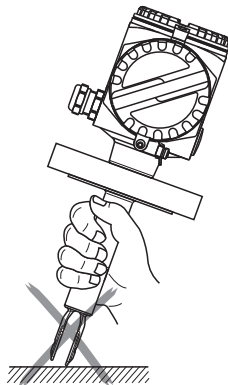
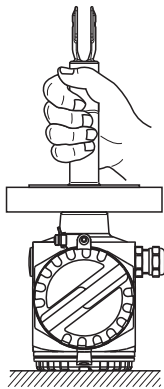
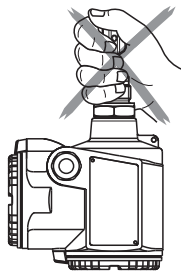
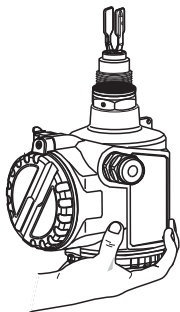
Liquiphant M FTL50、FTL51 用于液体限位检测。

使用不当可能会导致应用危险。

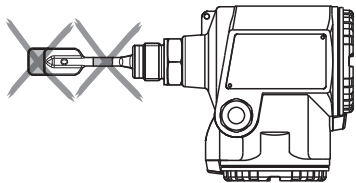
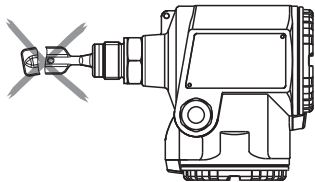
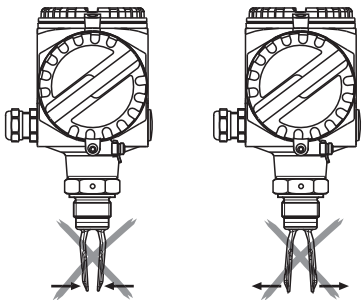
仅允许经授权的合格专业人员进行 Liquiphant M FTL50、FTL51 的安装、电气连接、调试、操作和维护，必须严格遵守《操作手册》、相关标准、适用法规和证书（取决于实际应用）中的要求。

在仪表附近安装易于操作的电源开关。将电源开关标识为仪表断路器。

操作  
握住外壳、法兰或延长管。



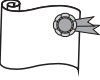
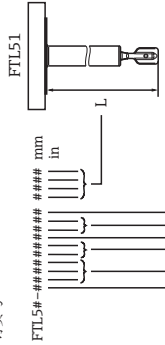
禁止弯曲  
禁止截短  
禁止拉伸





ENDRESS+HAUSER  
LIQUIPHANT M

订货号



|   |                         |                                |  |
|---|-------------------------|--------------------------------|--|
| A | *                       |                                |  |
| B | ATEX II 3 G             | EEx nC II T6, WHG              |  |
|   | ATEX II 3 D             | T85°C* <sup>3</sup>            |  |
| C | ATEX II 3 G             | EEx nA II T6, WHG              |  |
|   | ATEX II 3 D             | T85°C* <sup>3</sup>            |  |
| D | *                       | WHG                            |  |
| E | ATEX II 1/2 G           | EEx de IIC T6, WHG             |  |
| F | ATEX II 1/2 G           | EEx ia IIC T6, WHG             |  |
|   | ATEX II 1/2 D           | T80°C* <sup>3</sup>            |  |
| G | ATEX II 1/2 G           | EEx ia IIC T6                  |  |
|   | ATEX II 1/2 D           | T80°C* <sup>3</sup>            |  |
| H | ATEX II 1 G             | EEx ia IIC T6                  |  |
| I | ATEX II 1/2 G           | EEx de IIC T6                  |  |
| J | ATEX II 1 G             | EEx ia IIC T6, WHG             |  |
| K | ATEX II 1/2 G           | EEx d IIC T6                   |  |
| L | ATEX II 1/2 G           | EEx d IIC T6, WHG              |  |
| M | NEPSI Ex ia IIC T6      |                                |  |
| N | NEPSI Ex d IIC T6       |                                |  |
| P | FM IS, Cl. I, II, III,  | Div. 1, Gr. A-G                |  |
| Q | FM XP, Cl. I, II, III,  | Div. 1, Gr. B-G, E5 => Gr. A-G |  |
| R | FM NI, Cl. I,           | Div. 2, Gr. A-D                |  |
| S | CSA IS, Cl. I, II, III, | Div. 1, Gr. A-G                |  |
| T | CSA XP, Cl. I, II, III, | Div. 1, Gr. A-G                |  |
| U | CSA 通用型                 |                                |  |
| V | TIIS Ex ia IIC T3       |                                |  |
| W | TIIS Ex d IIB T3        |                                |  |
| X | TIIS Ex ia IIC T6       |                                |  |
| 7 | TIIS Ex d IIC T3        |                                |  |
| 8 | TIIS Ex d IIC T6        |                                |  |
| Y | *                       |                                |  |

| A##<br>B##<br>C##<br>D##<br>F##<br>K##<br>N## | 法兰                     |                      | 10 | 11 |
|---|------------------------|----------------------|----|----|
| GE2   | R 3/4,                 | DIN 2999, 316L       |    |    |
| GE5   | R 3/4,                 | DIN 2999, AlloyC4合金  |    |    |
| GE6   | R 3/4,                 | DIN 2999, AlloyC22合金 |    |    |
| GF2   | R 1,                   | DIN 2999, 316L       |    |    |
| GF5   | R 1,                   | DIN 2999, AlloyC4合金  |    |    |
| GF6   | R 1,                   | DIN 2999, AlloyC22合金 |    |    |
| GM2   | NPT 3/4, ANSI,         | 316L                 |    |    |
| GM5   | NPT 3/4, ANSI,         | AlloyC4合金            |    |    |
| GM6   | NPT 3/4, ANSI,         | AlloyC22合金           |    |    |
| GN2   | NPT 1, ANSI,           | 316L                 |    |    |
| GN5   | NPT 1, ANSI,           | AlloyC4合金            |    |    |
| GN6   | NPT 1, ANSI,           | AlloyC22合金           |    |    |
| GQ2   | G 3/4,                 | ISO 228, 316L        |    |    |
| GQ5   | G 3/4,                 | ISO 228, AlloyC4合金   |    |    |
| GQ6   | G 3/4,                 | ISO 228, AlloyC22合金  |    |    |
| GR2   | G 1,                   | ISO 228, 316L        |    |    |
| GR5   | G 1,                   | ISO 228, AlloyC4合金   |    |    |
| GR6   | G 1,                   | ISO 228, AlloyC22合金  |    |    |
| GW2   | G 1,                   | ISO 228, 316L        |    |    |
|   |                        |                      |    |    |
|   |                        |                      |    |    |
|   |                        |                      |    |    |
|   |                        |                      |    |    |
| TC2   | DN2.5-38 (1...1 1/2"), | ISO 2852, 316L       |    |    |
|   | Tri-Clamp卡箍            |                      |    |    |
| TE2   | DN40-51 (2"),          | ISO 2852, 316L       |    |    |
|   | Tri-Clamp卡箍            |                      |    |    |
| YY9   |                        |                      |    |    |
|   |                        |                      |    |    |

\*1 无

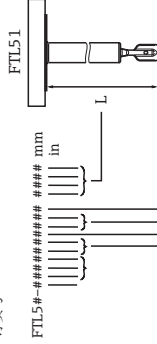
\*2 其他

\*3 不适用于PBT认证

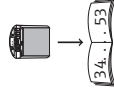
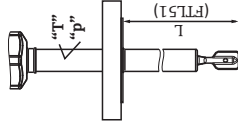


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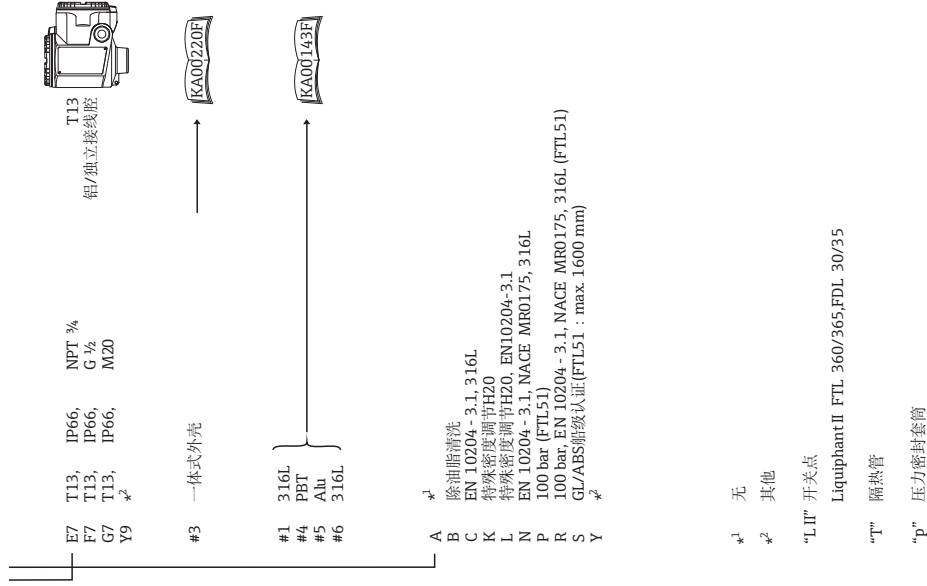
订货号

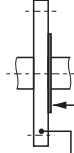


|    |   |                            |
|----|---|----------------------------|
| AA | mm, 316L,                               | Ra < 3.2 µm/80grit (FTL50) |
| BB | mm, AlloyC4,                            | Ra < 3.2 µm/80grit         |
| BE | in, 316L,                               | Ra < 3.2 µm/80grit         |
| CB | in, AlloyC4,                            | Ra < 3.2 µm/80grit         |
| CE | "L II", 316L,                           | Ra < 3.2 µm/80grit         |
| DB | "L II", AlloyC4,                        | Ra < 3.2 µm/80grit         |
| DE | "L II", AlloyC4,                        | Ra < 3.2 µm/80grit         |
| IA | mm, 316L,                               | + "T" (FTL50)              |
| JB | mm, AlloyC4,                            | + "T"                      |
| JE | in, 316L,                               | + "T"                      |
| KB | in, AlloyC4,                            | + "T"                      |
| KE | in, 316L,                               | + "T"                      |
| LB | "L II", 316L,                           | + "T"                      |
| LE | "L II", AlloyC4,                        | + "T"                      |
| QA | mm, 316L,                               | + "p" (FTL50)              |
| RB | mm, AlloyC4,                            | + "p"                      |
| RE | in, 316L,                               | + "p"                      |
| SB | in, AlloyC4,                            | + "p"                      |
| SE | "L II", 316L,                           | + "p"                      |
| TB | "L II", AlloyC4,                        | + "p"                      |
| TE | "L II", AlloyC4,                        | + "p"                      |
| YY |   |                            |
| A  | FEL50A, PROFIBUS PA                     |                            |
| 1  | FEL51, 19...253 V AC                    |                            |
| 2  | FEL52, 10... 55 V DC, PNP               |                            |
| 4  | FEL54, 19...253 V AC, 19...5 V DC, DPDT |                            |
| 5  | FEL55, 11... 3.6 VDC, 8/16mA            |                            |
| 6  | FEL56, NAMUR, L-H                       |                            |
| 7  | FEL57, PFM                              |                            |
| 8  | FEL58, NAMUR, H-L                       |                            |
| 9  |   |                            |









**ANSI B 16.5**

- AA2 1¼", 150 lbs, RF, 316/316L
- AB2 1¼", 300 lbs, RF, 316/316L(FTL51)
- AC2 1½", 150 lbs, RF, 316/316L
- AD2 1½", 300 lbs, RF, 316/316L(FTL51)
- AE2 2", 150 lbs, RF, 316/316L
- AE5 2", 150 lbs, RF, AlloyC4 > 316/316L
- AE6 2", 300 lbs, RF, AlloyC22 > 316/316L
- AF2 2", 300 lbs, RF, 316/316L
- AG2 2", 600 lbs, RF, 316/316L(FTL51)
- AJ2 2½", 300 lbs, RF, 316/316L(FTL51)
- AL2 3", 150 lbs, RF, 316/316L
- AM2 3", 300 lbs, RF, 316/316L(FTL51)
- AN2 3", 600 lbs, RF, 316/316L(FTL51)
- AP2 4", 150 lbs, RF, 316/316L
- AQ2 4", 300 lbs, RF, 316/316L(FTL51)
- AR2 4", 600 lbs, RF, 316/316L(FTL51)
- AS2 1", 150 lbs, RF, 316/316L

**EN 1092-1**

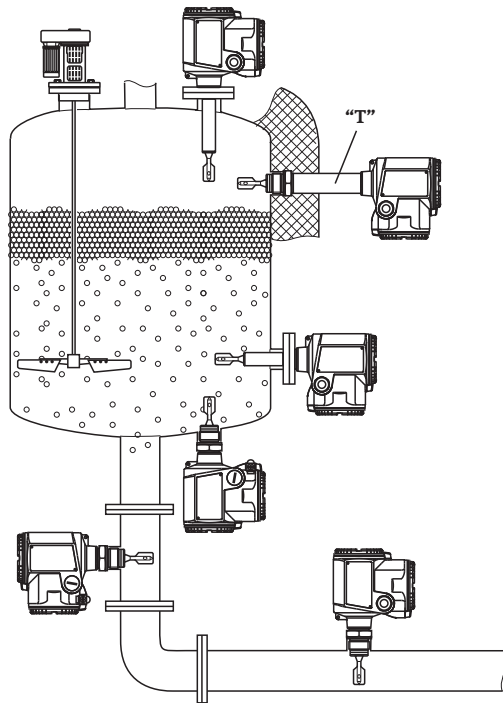
- BA2 DN32, PN6 A, 316L
- BB2 DN32, PN25/40 A, 316L
- BC2 DN40, PN6 A, 316L
- BD2 DN40, PN25/40 A, 316L
- BE2 DN50, PN6 A, 316L
- BG2 DN50, PN25/40 A, 316L
- BH2 DN65, PN6 A, 316L
- BI2 DN50, PN100 A, 316L (FTL51)
- BK2 DN65, PN25/40 A, 316L
- BM2 DN80, PN10/16 A, 316L
- BN2 DN80, PN25/40 A, 316L
- BQ2 DN100, PN10/16 A, 316L
- BR2 DN100, PN25/40 A, 316L

|      |        |             |                |
|------|--------|-------------|----------------|
| B12  | DN80,  | PN100 A,    | 316L (FTL51)   |
| B82  | DN25,  | PN25/40 A,  | 316L           |
| CA2  | DN32,  | PN6 B1,     | 316L           |
| CA5  | DN32,  | PN6,        | AlloyC4 >316L  |
| CA6  | DN32,  | PN6,        | AlloyC22 >316L |
| CE2  | DN50,  | PN6 B1,     | 316L           |
| CE5  | DN50,  | PN6,        | AlloyC4 >316L  |
| CE6  | DN50,  | PN6,        | AlloyC22 >316L |
| CG2  | DN50,  | PN25/40 B1, | 316L           |
| CG 5 | DN50,  | PN25/40,    | AlloyC4 >316L  |
| CG 6 | DN50,  | PN25/40,    | AlloyC22 >316L |
| GJ2  | DN50,  | PN100 B2,   | 316L (FTL51)   |
| CN2  | DN80,  | PN25/40 B1, | 316L           |
| CN5  | DN80,  | PN25/40,    | AlloyC4 >316L  |
| CN6  | DN80,  | PN25/40,    | AlloyC22 >316L |
| CQ2  | DN100, | PN10/16 B1, | 316L           |
| CQ 5 | DN100, | PN10/16,    | AlloyC4 >316L  |
| CQ 6 | DN100, | PN10/16,    | AlloyC22 >316L |
| C12  | DN80,  | PN100 B2,   | 316L (FTL51)   |
| C82  | DN25,  | PN25/40 B1, | 316L           |
| C85  | DN25,  | PN25/40,    | AlloyC4 >316L  |
| C86  | DN25,  | PN25/40,    | AlloyC22 >316L |
| DG2  | DN50,  | PN40 B1,    | 316L           |
| DN2  | DN80,  | PN40 B1,    | 316L           |
| D82  | DN25,  | PN40 B1,    | 316L           |
| FG2  | DN50,  | PN40 C,     | 316L           |
| NG2  | DN50,  | PN40 D,     | 316L           |

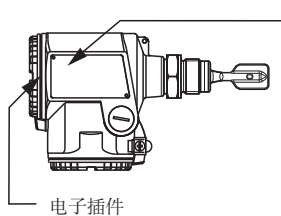
#### JIS B2220

|     |          |     |                |
|-----|----------|-----|----------------|
| KA2 | 10K 25,  | RF, | 316L           |
| KC2 | 10K 40,  | RF, | 316L           |
| KE2 | 10K 50,  | RF, | 316L           |
| KE5 | 10K 50,  | RF, | AlloyC4 >316L  |
| KE6 | 10K 50,  | RF, | AlloyC22 >316L |
| KL2 | 10K 80,  | RF, | 316L           |
| KP2 | 10K 100, | RF, | 316L           |

应用  
液体限位检测

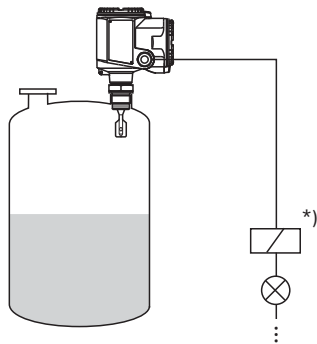


测量系统  
直接连接



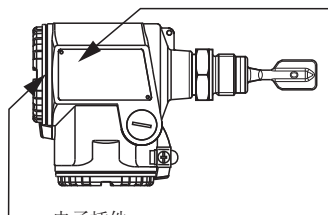
订货号：  
FTL5# - # # # # # # # # # #

FEL51  
FEL52  
FEL54



\*) 外部负载

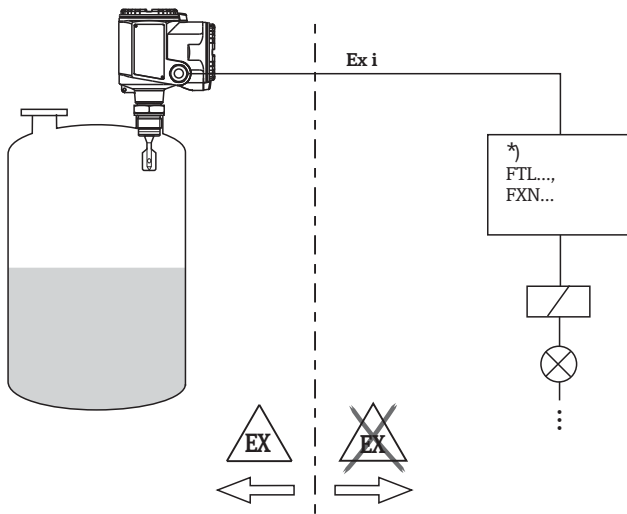
测量系统  
通过开关单元连接



电子插件

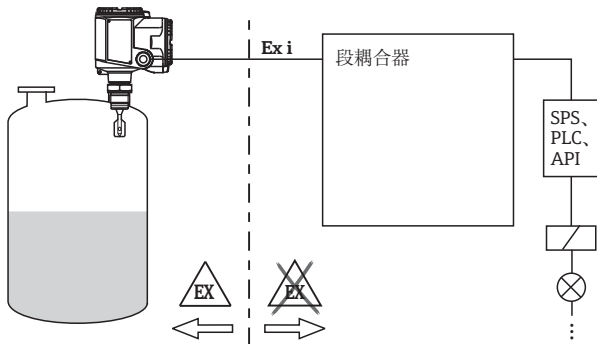
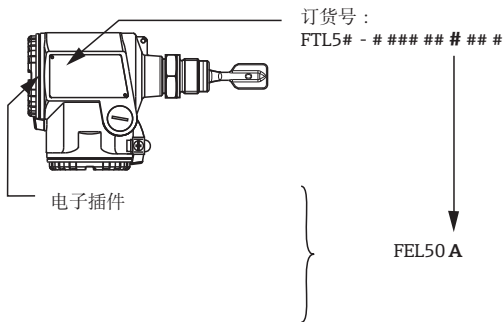
订货号：  
FTL5# - # # # # # # # # # #

FEL55  
FEL56  
FEL57  
FEL58



\*) 开关单元、PLC、隔离放大器

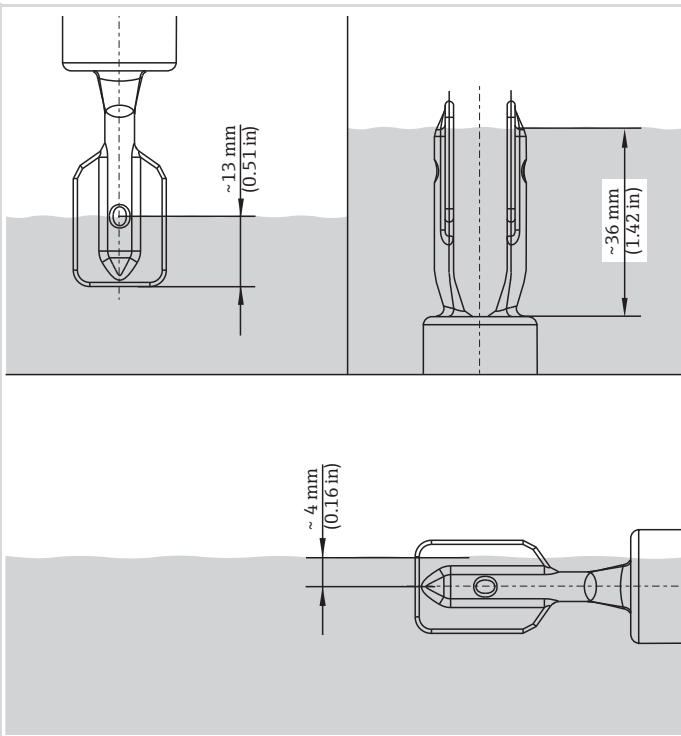
测量系统  
连接至 PROFIBUS PA





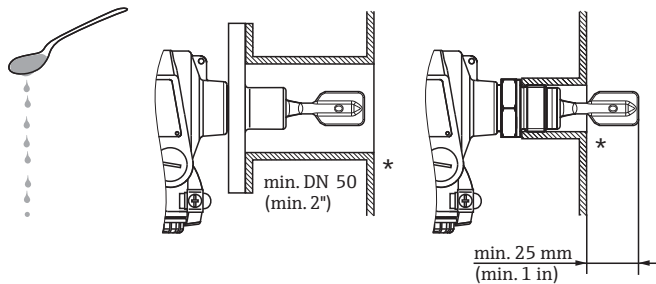
## 安装

开关点取决于安装位置



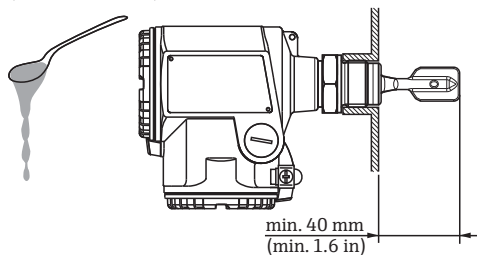
安装实例  
取决于液体粘度  $\nu$

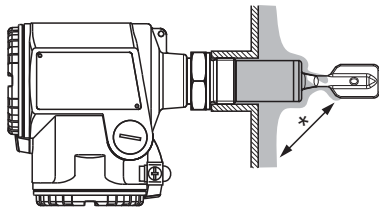
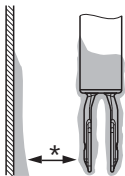
$\nu = 0 \dots 2000 \text{ mm}^2/\text{s}$   
( $\nu = 0 \dots 2000 \text{ cSt}$ )



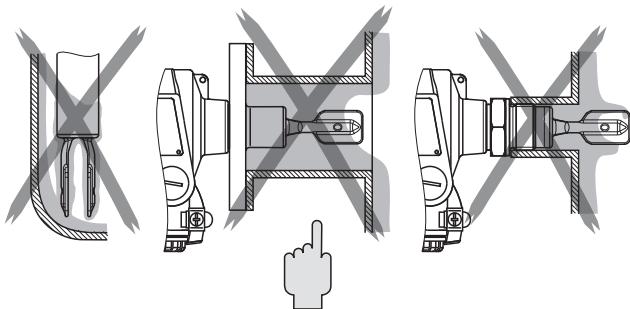
\* 去毛刺

$\nu = 0 \dots 10000 \text{ mm}^2/\text{s}$   
( $\nu = 0 \dots 10000 \text{ cSt}$ )

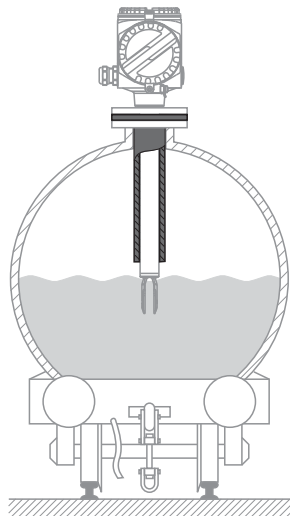
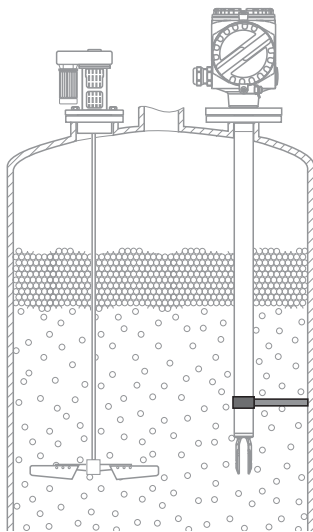




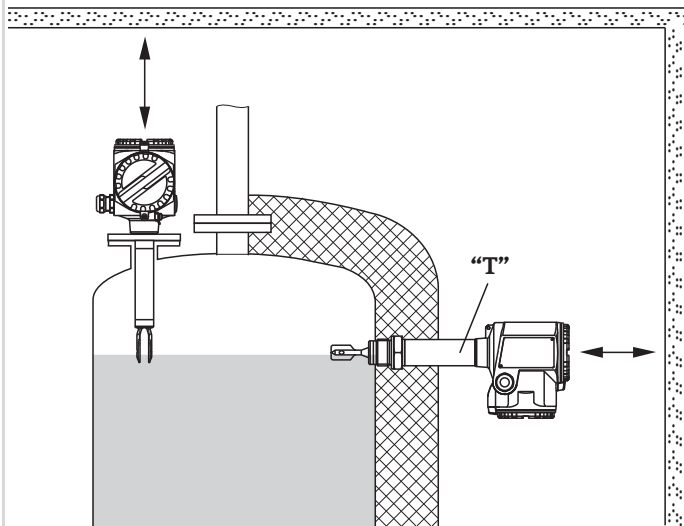
\* 安装间距！



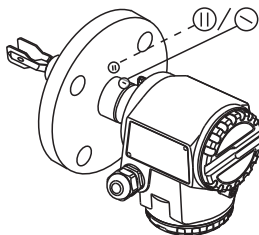
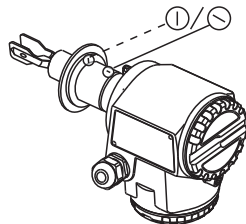
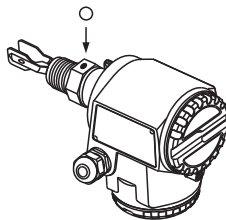
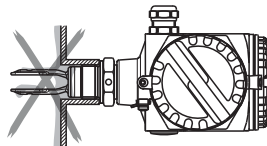
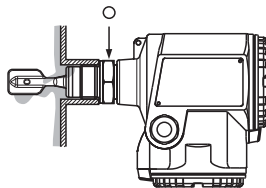
注意粘附。  
叉体不能接触粘附物。



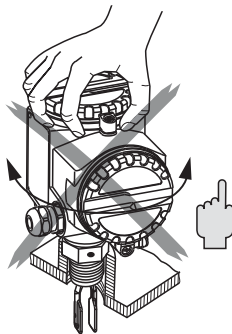
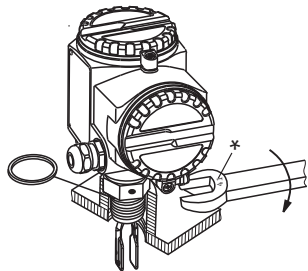
“T” = 隔热管，适用于带保温层的罐体



叉体的安装方向：  
标记向上或向下

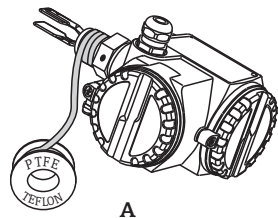


G  $\frac{3}{4}$ , 32 mm (1 $\frac{1}{4}$ "\*)  
G 1, 41 mm (1 $\frac{5}{8}$ "\*)

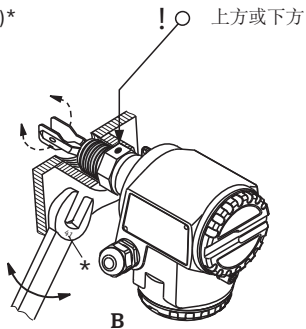


将 Liquiphant 拧入至过程连接中。  
禁止通过外壳旋转拧紧！

NPT  $\frac{3}{4}$ 、R  $\frac{3}{4}$ 、G  $\frac{3}{4}$ , 32 mm (1 $\frac{1}{4}$ "\*)  
NPT 1、R 1、G 1, 41 mm (1 $\frac{5}{8}$ "\*)

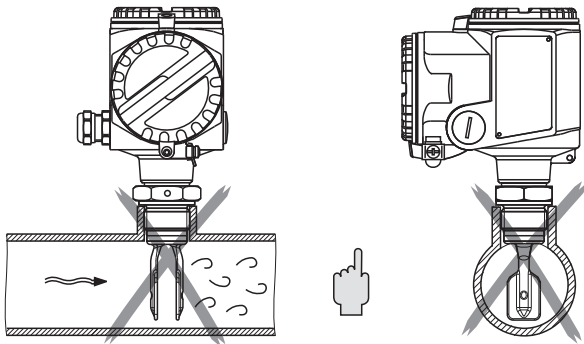
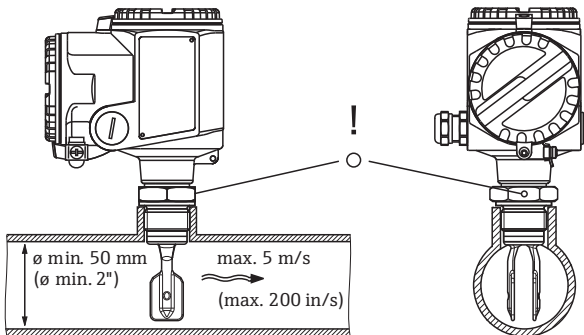


A



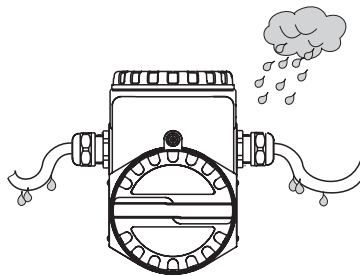
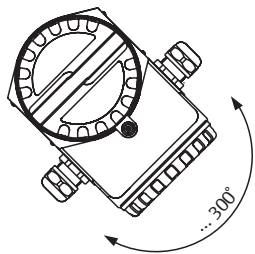
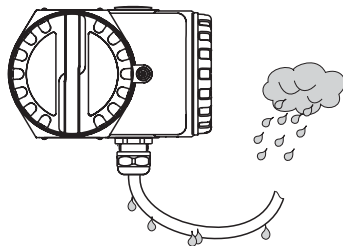
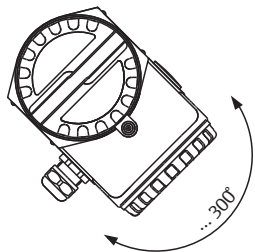
B

在管道中安装：  
标记与流向一致





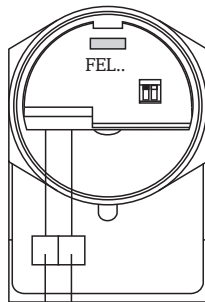
## 缆塞的安装方向



设置  
打开电子腔

①.

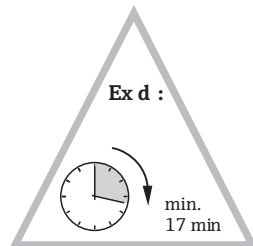
FTL50、FTL 51



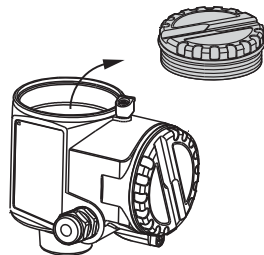
U = 0 V



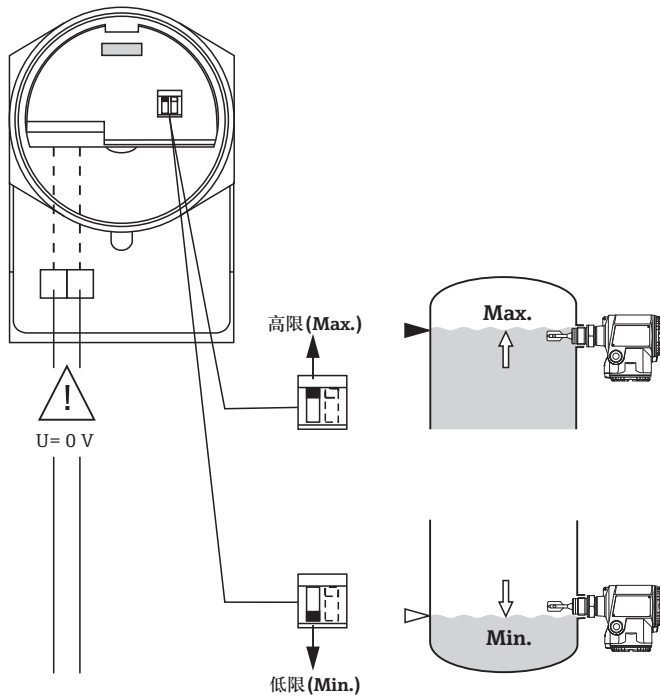
②.



③.

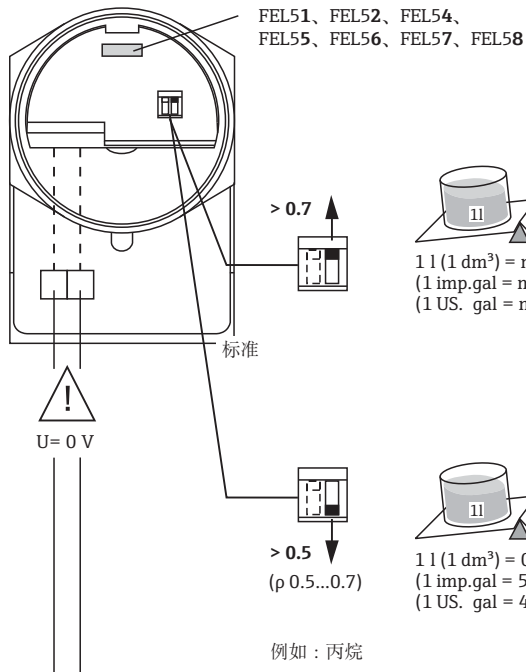


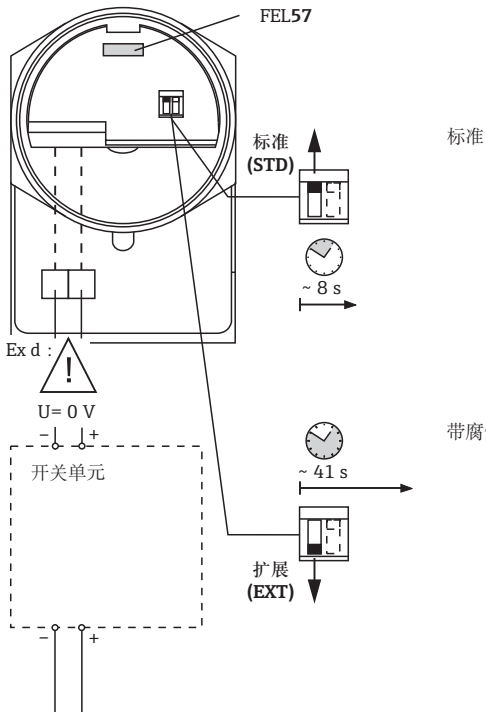
低限 (MIN) / 高限 (MAX)  
失效安全模式



液体密度。

密度 ( $\rho$ ) 测量单位 :  $\text{g}/\text{cm}^3$  或  $\text{kg}/\text{l}$





FEL57 的自检功能  
(开关单元的动作顺序请参考  
第 46 和 47 页说明)

标准

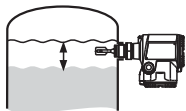
带腐蚀检测

设置设备地址  
(参数设置请参考 BA00141F)

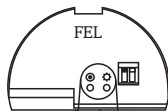


|   |   |   |   |    |    |    |    |
|---|---|---|---|----|----|----|----|
| 1 | 2 | 4 | 8 | 16 | 32 | 64 | SW |
| 0 | 0 | 0 | 0 | 0  | 0  | 0  | HW |
| 1 | 2 | 3 | 4 | 5  | 6  | 7  | 8  |

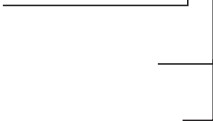
实例：  
 $2 + 8 = 10 = \text{地址}$



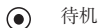
液位变化



绿 红(黄)



### LED指示灯



待机



开关状态



FEL57、FEL50A : 被覆盖



亮起



闪烁



熄灭

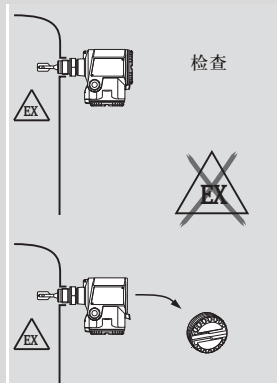


输出信号



故障

### 信号指示灯

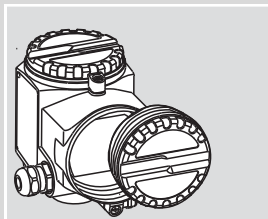


## 电气连接

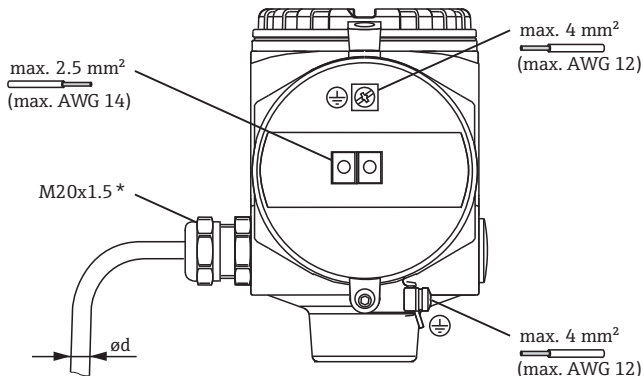
### \* 电缆入口

镀镍黄铜：

$\varnothing d = 7 \dots 10.5 \text{ mm}$  (0.28...0.41 in)



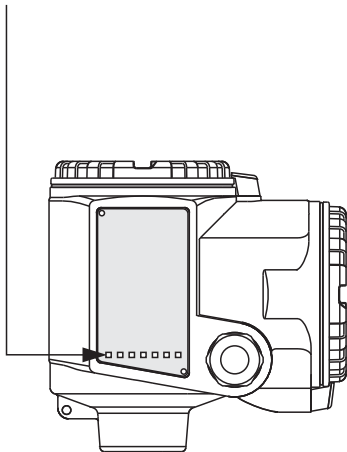
遵守国家法规！



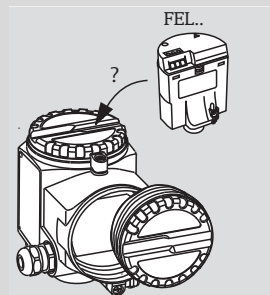


参考铭牌

- ☒ FEL..
- ☒ FEL..
- ☒ FEL..
- ☒ FEL..
- ☒ FEL..
- ☒ FEL..



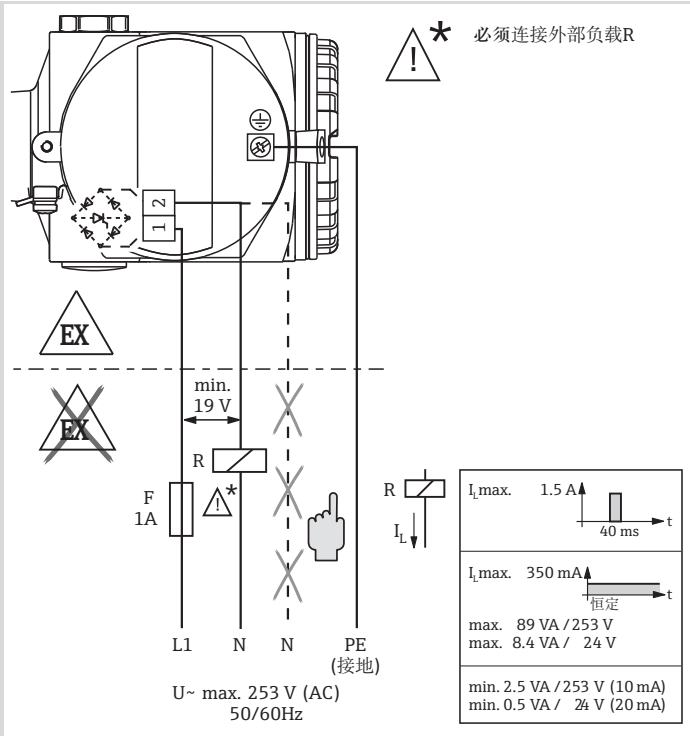
## 内置电子插件



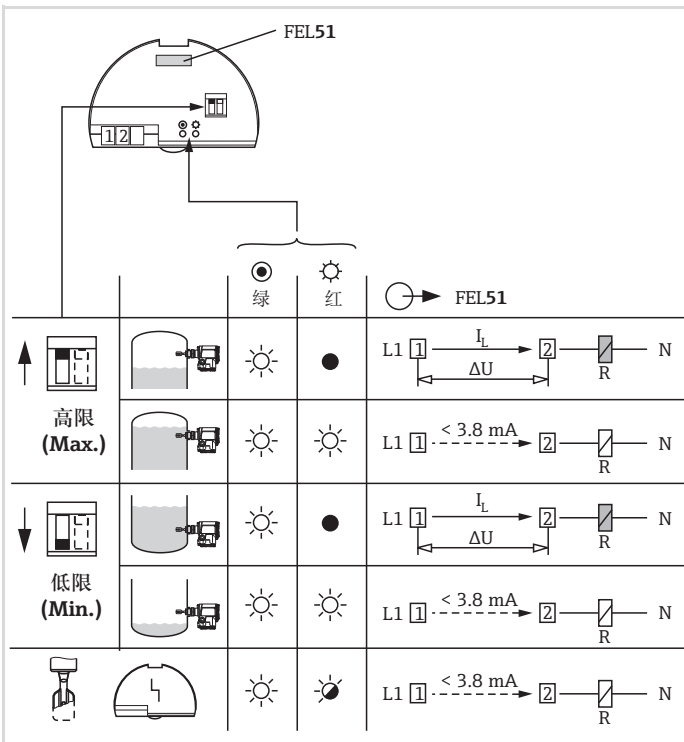
# FEL51 的电气连接

## 两线制交流供电 (AC) 连接

 损坏

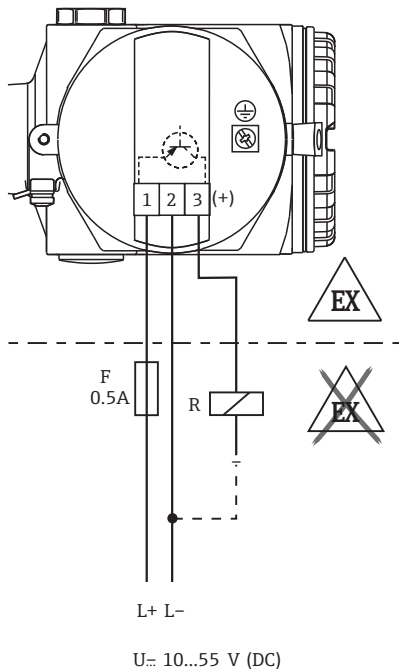


## FEL51 的功能



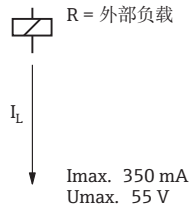
$\Delta U_{FEL51} \text{ max. } 12 \text{ V}$

FEL52 的电气连接  
直流供电 (DC) 连接 (PNP)

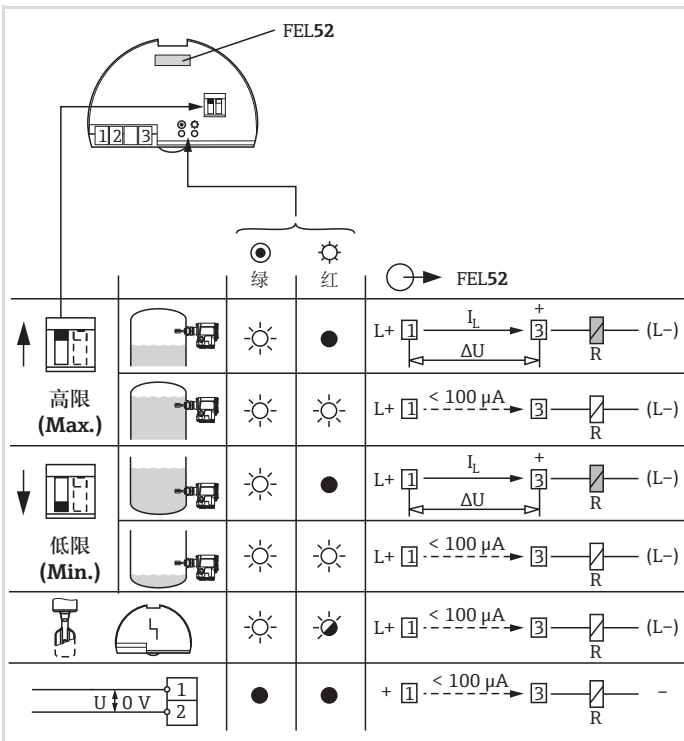


同样适用于DI模块

EN 61131-2

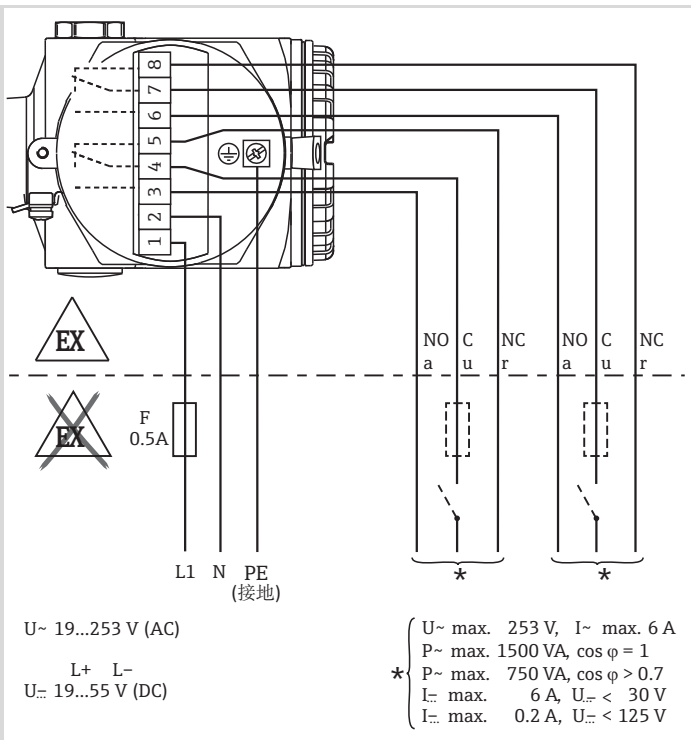


## FEL52 的功能

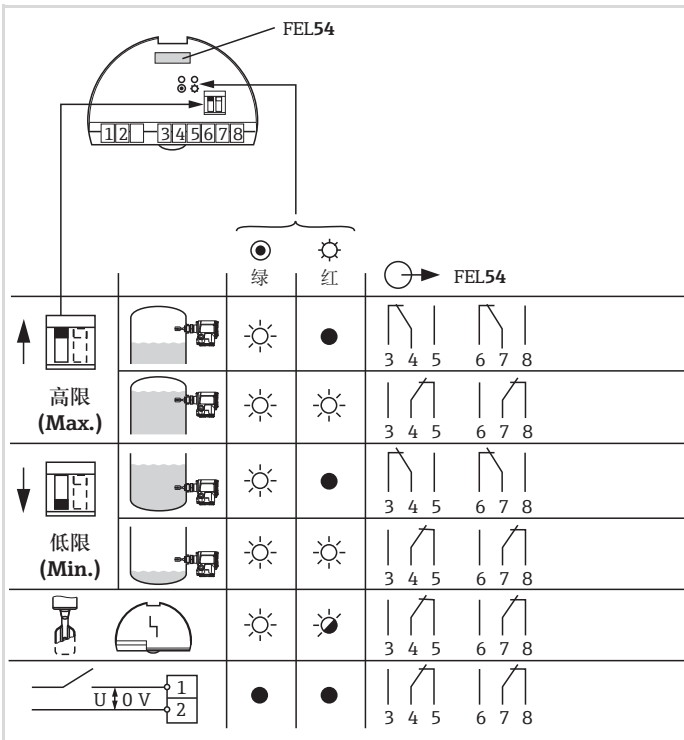


$\Delta U_{FEL52} \text{ max. } 3 V$

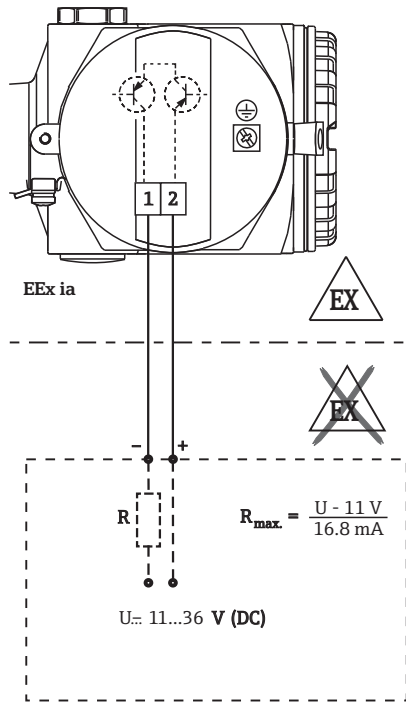
FEL54 的电气连接  
通用连接  
继电器输出



## FEL54 的功能



FEL55 的电气连接  
8/16 mA 输出

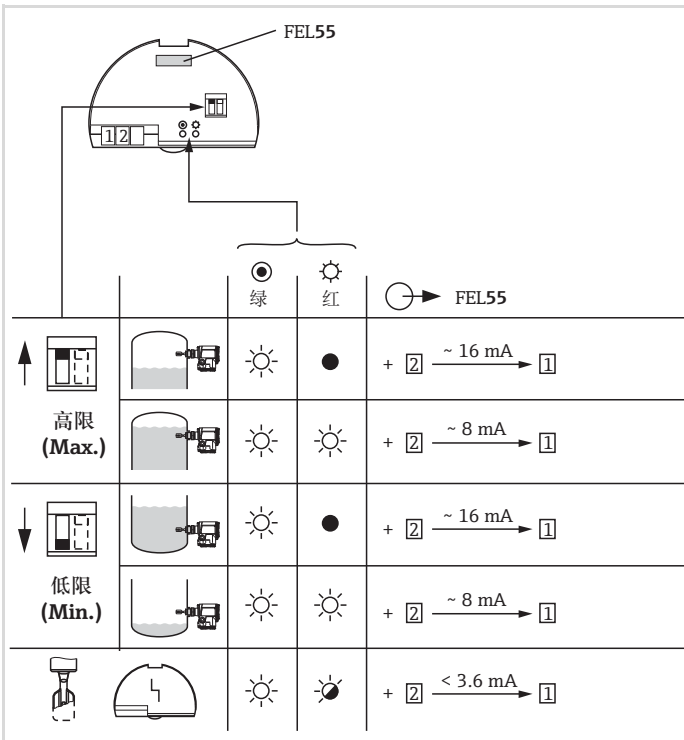


例如：PLC、AI模块

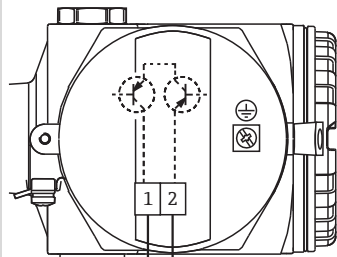
4...20 mA  
EN 61131-2



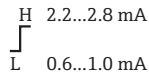
## FEL55 的功能



FEL56 的电气连接  
NAMUR 输出 L-H  
< 1.0 mA / > 2.2 mA



EEx ia

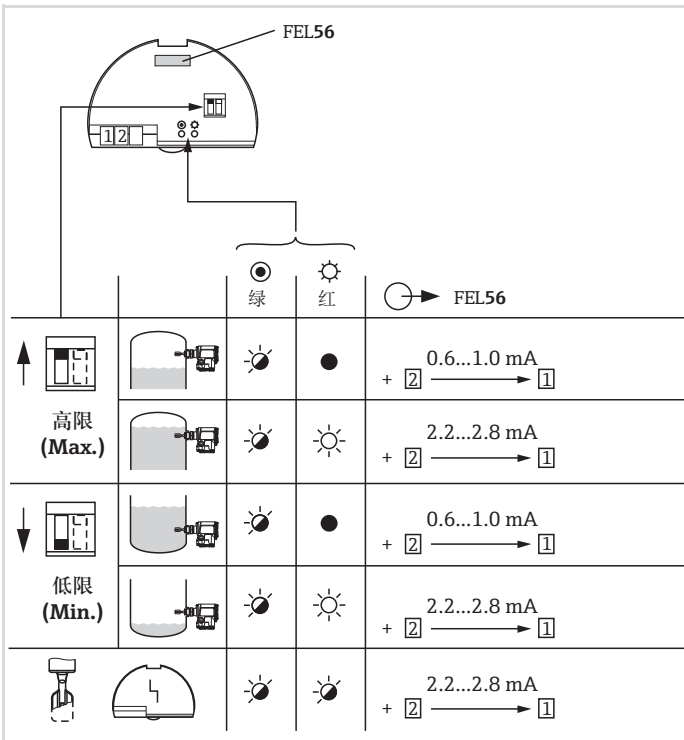


隔离放大器  
符合NAMUR (IEC 60947-5-6)标准

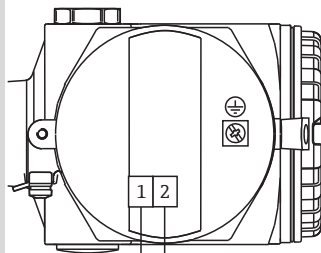
例如：  
FXN421、FXN422、  
SIN100、SIN110、  
FTL325N、FTL375N

复用器：最小工作脉冲周期为2 s

## FEL56 的功能



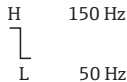
FEL57 的电气连接  
PFM 输出  
150 Hz / 50 Hz



注意功能！

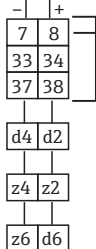


EEx ia



150 Hz

50 Hz



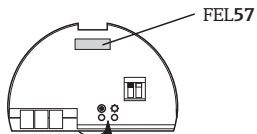
Nivotester FTL325P (通道1)、FTL320、FTL120Z

Nivotester FTL325P (通道3)

Nivotester FTL375P (通道1)、FTL370/372、FTL170Z

Nivotester FTL375P (通道2)、FTL372、FTL170Z

Nivotester FTL375P (通道3)

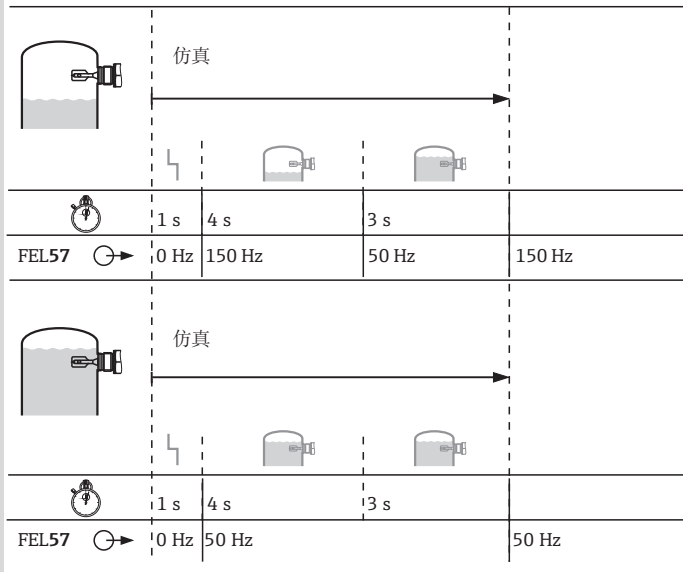
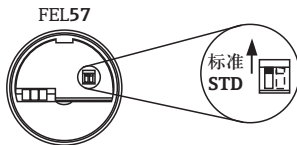


|  | ● 绿 | ⚙ 黄 | ⊙ → FEL57 |
|--|-----|-----|-----------|
|  | ☀   | ☀   |           |
|  | ☀   | ●   |           |
|  | ☀   | ☾   |           |
|  | ●   | ●   |           |

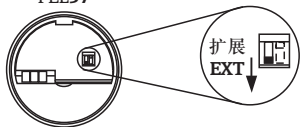
\* 开关响应



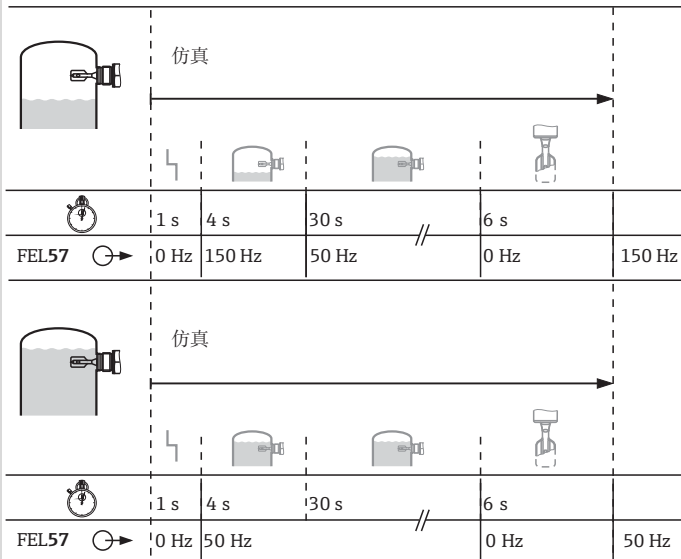
## FEL57 的功能 开关响应 (标准 (STD))

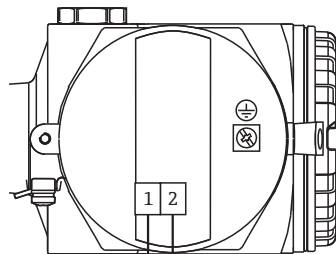


FEL57



## FEL57 的功能 开关响应 (扩展 (EXT))



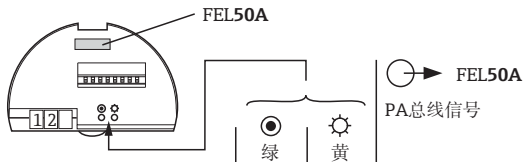


PA- PA+  
U... 9...32 V (DC)

段耦合器

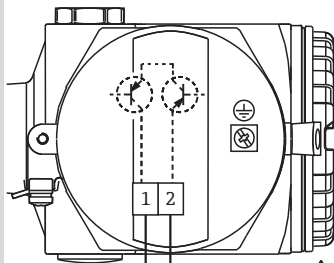
例如 : PLC



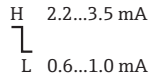


|     |  |   |   |                |
|-----|--|---|---|----------------|
| 不翻转 |  | ☀ | ● | OUT_D = 0      |
|     |  | ☀ | ☀ | OUT_D = 1      |
| 翻转  |  | ☀ | ☀ | OUT_D = 0      |
|     |  | ☀ | ● | OUT_D = 1      |
|     |  | ☀ | - | 通信             |
|     |  | - | ☀ | 状态, 参考BA00141F |
|     |  | ● | ● | ../..          |

FEL58 的电气连接  
NAMUR 输出 H-L  
> 2.2 mA / < 1.0 mA



EEx ia



H 2.2...3.5 mA

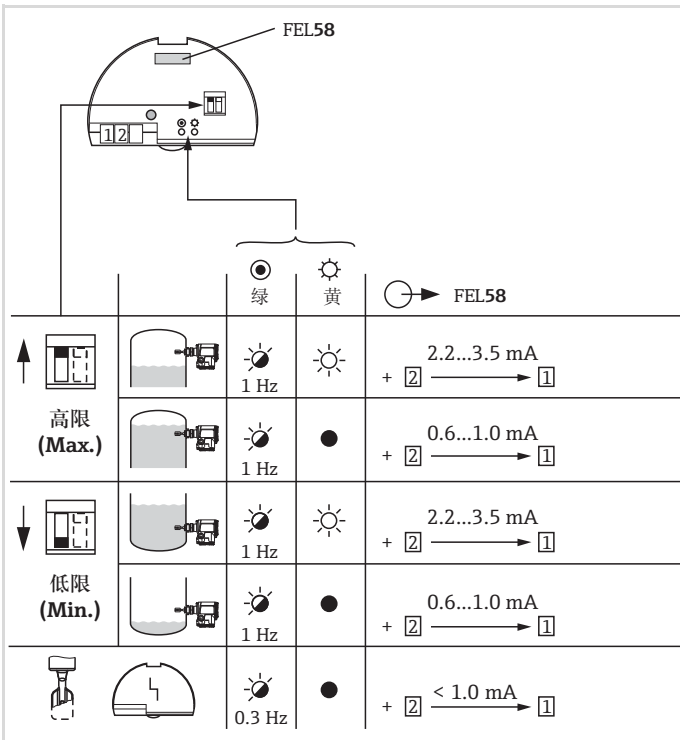
L 0.6...1.0 mA



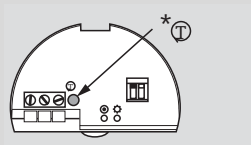
隔离放大器  
符合NAMUR (IEC 60947-5-6)标准



















例如：  
FXN421、FXN422、  
SIN100、SIN110、  
FTL325N、FTL375N

复用器：最小工作脉冲周期为2 s





















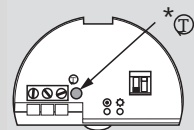
FEL58 的功能测试按钮  
高限 (MAX) 失效安全模式



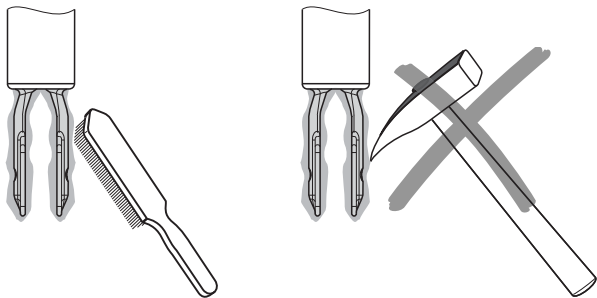
| <p>高限 (MAX)  + </p> |   |   |
|--|---|---|
| <p>1. 正常工作</p>   | <p>绿  黄 <br/>1 Hz<br/>+ 2.2...3.5 mA<br/>2 <math>\longrightarrow</math> 1</p> | <p>绿  黄 <br/>1 Hz<br/>+ 0.6...1.0 mA<br/>2 <math>\longrightarrow</math> 1</p> |
| <p>2. 按下测试按钮  &gt;3 s</p>   | <p>绿  黄 <br/>+ 0 mA<br/>2 <math>\dashrightarrow</math> 1</p>                  | <p>绿  黄 <br/>+ 0 mA<br/>2 <math>\dashrightarrow</math> 1</p>                  |
| <p>3. 松开测试按钮, 约2 s后正常工作 </p>  | <p>绿  黄 <br/>1 Hz<br/>+ 2.2...3.5 mA<br/>2 <math>\longrightarrow</math> 1</p> | <p>绿  黄 <br/>1 Hz<br/>+ 0.6...1.0 mA<br/>2 <math>\longrightarrow</math> 1</p> |

FEL58 的功能测试按钮  
低限 (MIN) 失效安全模式

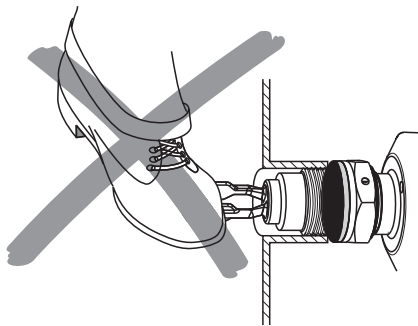
|  |   |   |
|--|---|---|
| <p>低限 (MIN)  + </p> |   |   |
| <p>1. 正常工作</p>   | <p>绿 黄<br/>  <br/>           1 Hz</p> <p>+ 2.2...3.5 mA<br/>           2 <math>\longrightarrow</math> 1</p> | <p>绿 黄<br/>  <br/>           1 Hz</p> <p>+ 0.6...1.0 mA<br/>           2 <math>\longrightarrow</math> 1</p> |
| <p>2. 按下测试按钮</p>  <p>&gt;3 s</p>  | <p>绿 黄<br/>  <br/>           1 Hz</p> <p>+ 0 mA<br/>           2 <math>\dashrightarrow</math> 1</p>         | <p>绿 黄<br/>  <br/>           1 Hz</p> <p>+ 0 mA<br/>           2 <math>\dashrightarrow</math> 1</p>         |
| <p>3. 松开测试按钮,<br/>约2 s后正常工作</p>   | <p>绿 黄<br/>  <br/>           1 Hz</p> <p>+ 2.2...3.5 mA<br/>           2 <math>\longrightarrow</math> 1</p> | <p>绿 黄<br/>  <br/>           1 Hz</p> <p>+ 0.6...1.0 mA<br/>           2 <math>\longrightarrow</math> 1</p> |



维护和清洁  
除垢



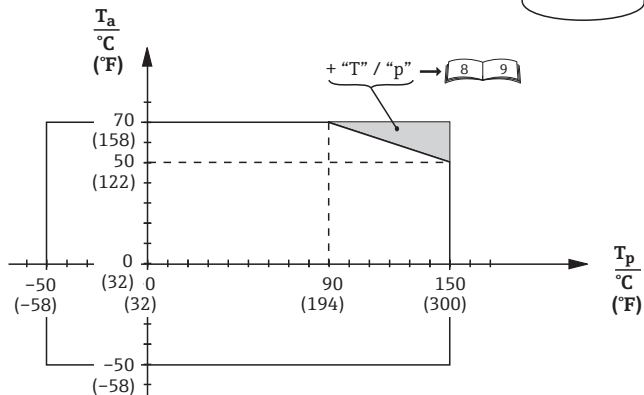
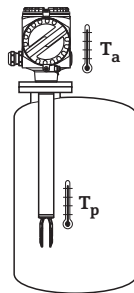
禁止踩踏！



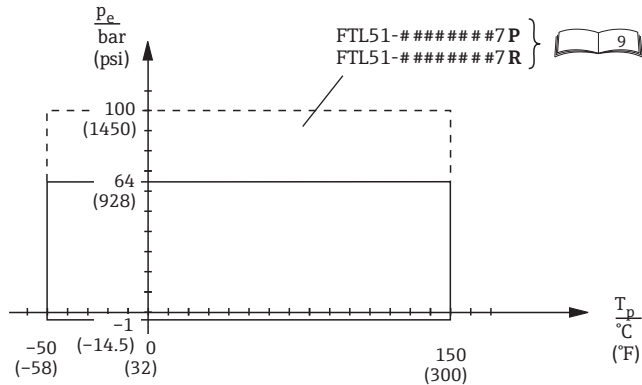
## 技术参数

环境温度  $T_a$

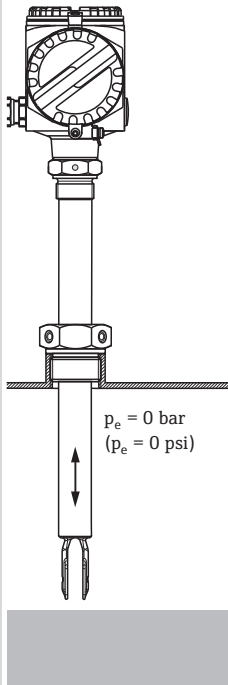
过程温度  $T_p$



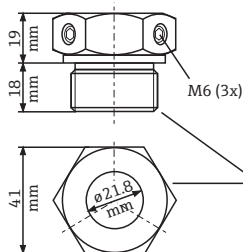
过程压力  $p_e$   
过程温度  $T_p$



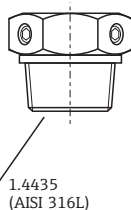




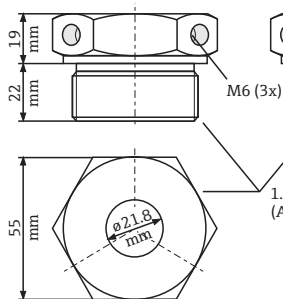
**G 1**  
52003978



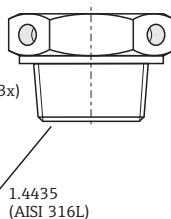
**NPT 1**  
52003979



**G 1½**  
52003980



**NPT 1½**  
52003981



附件  
滑动套管，常压操作

参考：

- KA00151F (G 1、NPT 1)
- KA00152F (G 1½、NPT 1½)
- TI00328F FTL50(H)、FTL51(H)
- TI00354F FTL70、FTL71

100 mm = 3.94 in

参考：

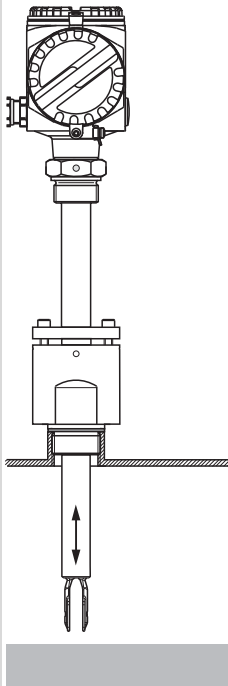
KA00153F (G 1、NPT 1)

KA00154F (G 1½、NPT 1½)

TI00328F FTL50(H)、FTL51(H)

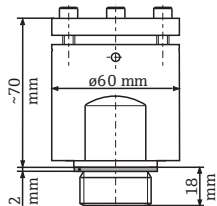
TI00354F FTL70、FTL71

100 mm = 3.94 in



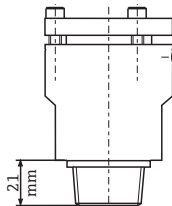
**G 1**

1.4435 (AISI 316L)  
52003663



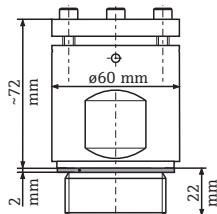
**NPT 1**

1.4435 (AISI 316L)  
52003667



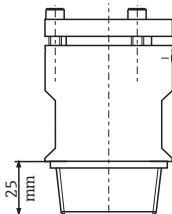
**G 1½**

1.4435 (AISI 316L)  
52003665



**NPT 1½**

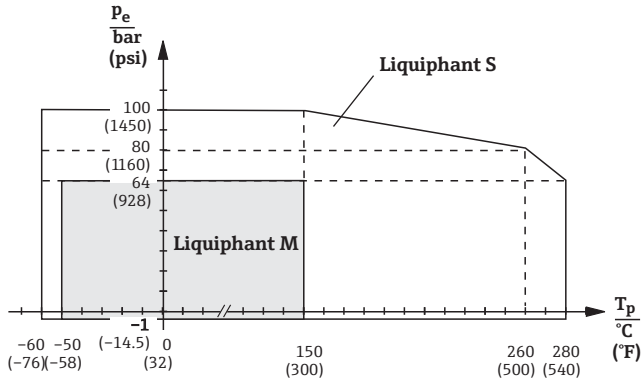
1.4435 (AISI 316L)  
52003669



高压滑动套管：

过程压力  $p_e$

过程温度  $T_p$



| 故障        | 原因   | 补救措施                                 |
|-----------|--|--------------------------------------|
| 不开关动作     | 无电源  | 检查电源                                 |
|           | 信号线故障  | 检查信号线                                |
|           | 电子插件故障<br>- FEL51 直接连接 L1 和 N                        | 更换<br>- 始终通过外部负载连接 FEL51             |
|           | 液体密度过低   | 在电子插件上设置密度 > 0.5                     |
|           | 叉体损坏   | 清洁叉体                                 |
|           | 叉体腐蚀<br>(FEL 上的指示灯: 红 / 黄闪烁,<br>FEL58: 绿色闪烁, 0.3 Hz) | 更换叉体和过程连接                            |
|           | FEL51: 连接继电器的内部阻抗过大                                  | 正确连接继电器                              |
|           | FEL51: 连接继电器的保持电流过低                                  | 阻抗与继电器并联                             |
| 开关错误      | FEL54: 触点焊接在一起 (短路后)                                 | 更换 FEL54 ; 保险丝接触回路                   |
|           | 低限 / 高限失效安全模式设置错误                                    | 在电子插件上设置正确的模式                        |
| 周期性故障切换   | 厚泡沫, 抢扰动, 起泡液体                                       | 在旁通管中安装 Liquiphant                   |
|           | 强射频干扰  | 使用屏蔽电缆                               |
|           | 强振动  | 解耦、阻尼、叉体旋转 90°                       |
|           | 外壳进水   | 拧下盖板, 拧紧缆塞                           |
|           | FEL52: 输出过载  | 减小负载, (电缆) 电容                        |
| 电源故障后开关错误 | FEL57, 开启测试期间动作<br>(功能测试)                            | 注意 FEL57 的开关响应; 电源故障后,<br>解除控制约 45 s |

#### 故障排除补充说明

叉体的开关响应异常时, 诊断插槽的针脚 4 可以测量叉体的动作频率。使用电子插件 FEL51/52/54/55/56/57/58 时, 叉体为正弦波振动, 通过幅值可以确定叉体状态。使用电子插件 FEL50A 时, 由于采用矩形脉冲信号, 仅可测量叉体的振动频率。



|        |          |
|--------|----------|
| FEL51  | 52002304 |
| FEL52  | 52002305 |
| FEL54  | 52002306 |
| FEL55  | 52002307 |
| FEL56  | 52002308 |
| FEL57  | 52002309 |
| FEL58  | 52006454 |
| FEL50A | 52010527 |

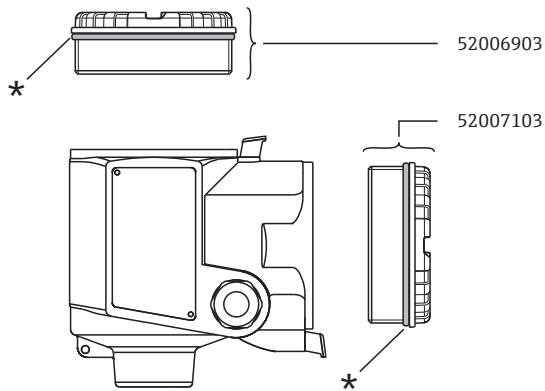
**安装要求：**

在安装过程中，请注意：

非本安回路供电的电源(电子插件)禁止与本安回路互连。

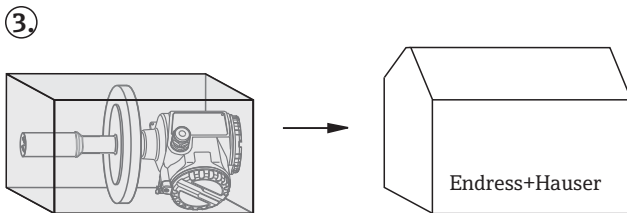
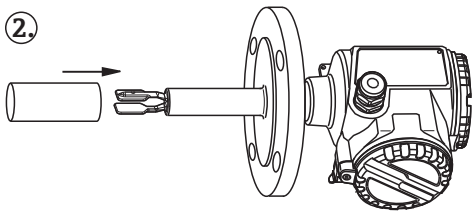
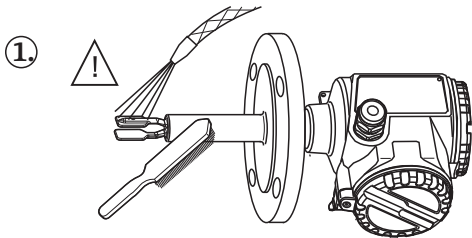
**备件**  
电子插件

## 外壳盖、密封圈



\* 使用硅润滑脂或石墨润滑

修理  
返厂修理



补充文档资料

《技术资料》

TI00328F    Liquiphant FTL50、FTL50H、FTL51、FTL51H  
TI00426F    焊座，适用于物位和压力仪表



71310291

工程师电话（微信） 15915717832

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