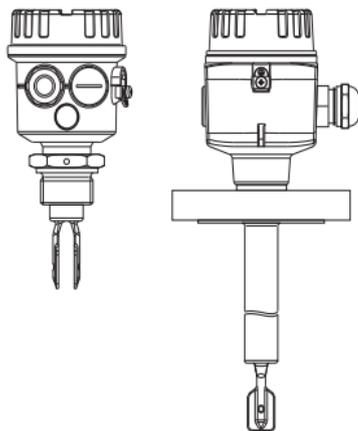


简明操作指南

Liquiphant M FTL50, FTL51

ZH- 音叉液位开关



ZH - 目录

安全注意事项	3
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小心!

= 禁止;

若不遵守会导致操作错误
或损坏设备。

ZH- 安全指南

Liquiphant M FTL50、FTL51

音叉液位开关用于液体限位检测。

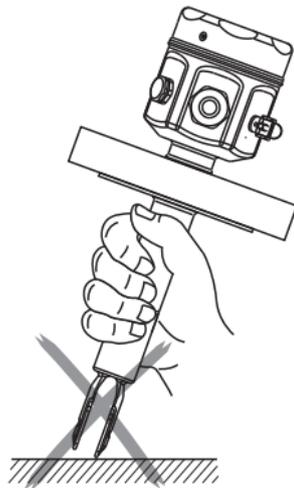
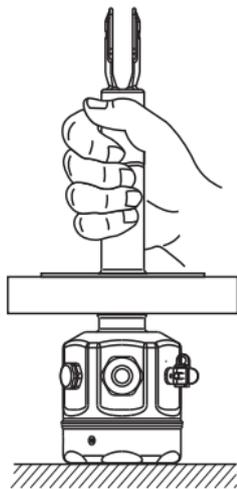
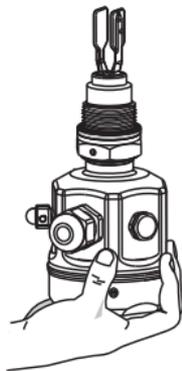
如果使用不当，可能会在实际应用场合中引发危险。

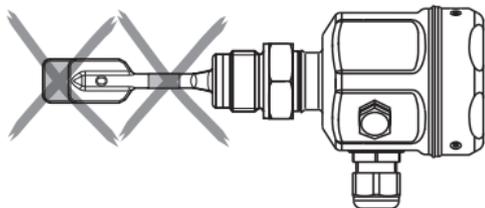
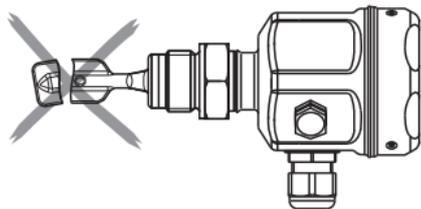
仅允许经授权的合格专业人员执行 Liquiphant M FTL50、FTL51 音叉液位开关的安装、连接、调试、操作和维护，同时严格遵守《操作手册》、相关标准和法规要求以及证书(可选)。

在设备附近安装便于操作的电源开关，并标识为设备的断路保护器。

ZH- 搬运

在搬运过程中，手握设备的外壳、法兰或延长管。





ZH- 禁止弯曲叉体
禁止截短叉体
禁止拉伸叉体



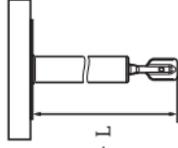
ENDRESS+HAUSER
LIQUIPHANT M

订货号

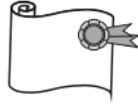
FTL5#-##### mm

ln

FTL51



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



<p>A## B## C## D## F## K## N##</p>	<p>法兰</p> 	<p>R 3/4, DIN 2999, 316L R 3/4, DIN 2999, AlloyC4 R 3/4, DIN 2999, AlloyC22 R 1, DIN 2999, 316L R 1, DIN 2999, AlloyC4 R 1, DIN 2999, AlloyC22 NPT 3/4, ANSI, 316L NPT 3/4, ANSI, AlloyC4 NPT 3/4, ANSI, AlloyC22 NPT 1, ANSI, 316L NPT 1, ANSI, AlloyC4 NPT 1, ANSI, AlloyC22 G 3/4, ISO 228, 316L G 3/4, ISO 228, AlloyC4 G 3/4, ISO 228, AlloyC22 G 1, ISO 228, 316L G 1, ISO 228, AlloyC4 G 1, ISO 228, AlloyC22</p>	<p>最大 100 bar, 150 °C</p> 
<p>GW2 G 1, ISO 228, 316L</p>	<p>法兰</p> 	<p>GW2 G 1, ISO 228, 316L</p>	<p>最大 100 bar, 150 °C</p> 
<p>TC2 TE2 YY9</p>	<p>法兰</p> 	<p>DN25-38 (1...1½"), ISO 2852, 316L Tri-Clamp DN40-51 (2"), ISO 2852, 316L Tri-Clamp</p>	<p>最大 25 bar, 150 °C 最大 40 bar, 100 °C</p> 
<p>YY9</p>	<p>法兰</p> 	<p>DN25-38 (1...1½"), ISO 2852, 316L Tri-Clamp DN40-51 (2"), ISO 2852, 316L Tri-Clamp</p>	<p>最大 16 bar, 120 °C 最大 2 bar, 150 °C</p> 

* 无

* 其他

* 不适用 PBT 材质

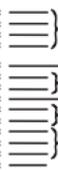


ENDRESS+HAUSER
LIQUIPHANT M

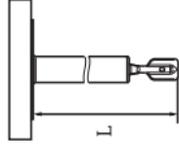
订货号

FTL5#-##### mm

in



FTL51



AA *

BB

BE

CB

CE

DB "L II",

DE "L II",

IA *

JB

JE

KB

KE

LB "L II",

LE "L II",

QA *

RB

RE

SB

SE

TB "L II",

TE "L II",

YY *

Ra < 3.2 µm/80grit (FTL50)

Ra < 3.2 µm/80grit

mm, AlloyC4,

mm, AlloyC4,

in, AlloyC4,

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

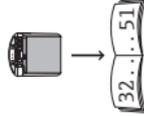
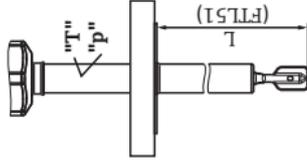
5 FEL55, 11... 3.6 V DC, 8/16mA

6 FEL56, NAMUR, L-H

7 FEL57, PFM

8 FEL58, NAMUR, H-L

9 *





E1	F27	NEMA6P, NPT ¾
E4	F16, NEMA4X, NPT ½	
E5	F13/17, NEMA4X, NPT ¾	
E6	F15, NEMA4X, NPT ½	
F1	F27, IP68, G ½	
F4	F16, IP66, G ½	
F5	F13/17, IP66, G ½	
F6	F15, IP66, G ½	
G1	F27, IP68, M20	
G4	F16, IP66, M20	
G5	F13/17, IP66, M20	
G6	F15, IP66, M20	
N4	F16, IP66, M12	
N5	F13/17, IP66, M12	
N6	F15, IP66, M12	
Y9	*²	

#3 一体式外壳 →

#7 铝, 分体式 →

A	*¹
B	PWIS 合规
C	EN 10204 - 3.1, 316L
K	特殊密度标定, H20
L	特殊密度标定, H20, EN10204-3.1
N	EN 10204 - 3.1, NACE MR0175, 316L
P	100 bar (FTL51)
R	100 bar, EN 10204 - 3.1, NACE MR0175, 316L (FTL51)
S	GL/ABS 船级社认证 (FTL51: 最大 1600 mm)
Y	*²



F16 (PBT)



F13/17 (铝)
F27 (316L)



F15 (316L)



KA220



KA163

*¹ 无

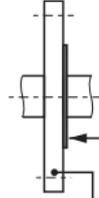
*² 其他

“LII” 开关点

Liquiphant II FTL 360/365, FDL 30/35

“T” 隔热管

“p” 压力密封衬套



ANSI B 16.5

AA2	1¼", 150 lbs, RF, 316/316L
AB2	1½", 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, Alloy C4 >316/316L
AE6	2", 300 lbs, RF, Alloy C22 >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)
A82	1", 150 lbs, RF, 316/316L

EN 1092-1

BA2	DN32, PN6 A, 316L
BB2	DN32, PN25/40A, 316L
BC2	DN40, PN6 A, 316L
BD2	DN40, PN25/40A, 316L
BE2	DN50, PN6 A, 316L
BG2	DN50, PN25/40A, 316L
BH2	DN65, PN6 A, 316L
BJ2	DN50, PN100 A, 316L (FTL51)
BK2	DN65, PN25/40A, 316L
BM2	DN80, PN10/16A, 316L
BN2	DN80, PN25/40A, 316L
BQ2	DN100, PN10/16A, 316L
BR2	DN100, PN25/40A, 316L

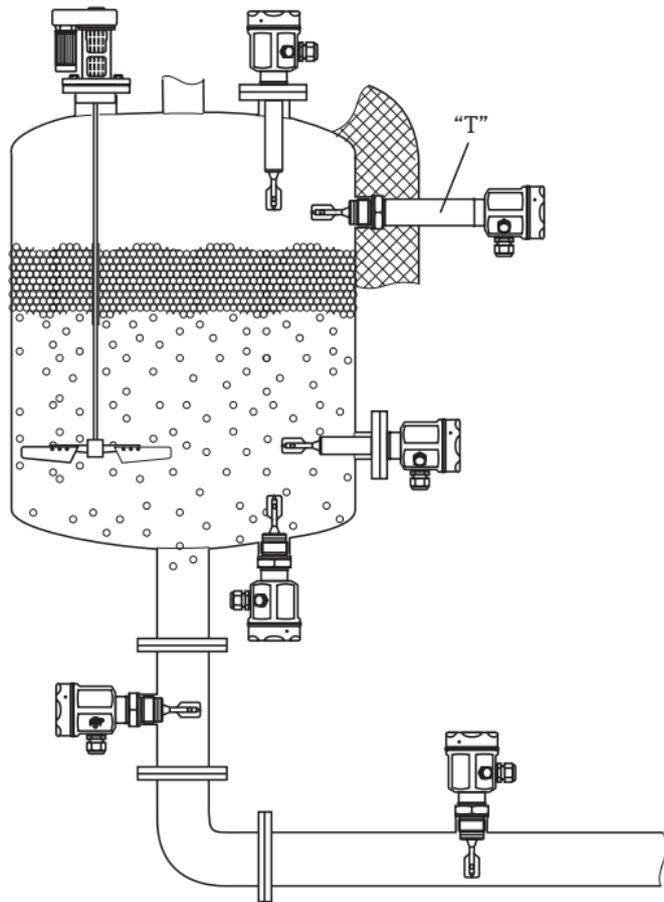
B12 DN80, PN100 A, 316L (FTL51)
 B82 DN25, PN25/40A, 316L
 CA2 DN32, PN6 B1, 316L
 CA5 DN32, PN6, AlloyC4 >316L
 CA6 DN32, PN6, AlloyC22 >316L
 CE2 DN50, PN6 B1, 316L
 CE5 DN50, PN6, AlloyC4 >316L
 CE6 DN50, PN6, AlloyC22 >316L
 CG2 DN50, PN25/40B1, 316L
 CG 5 DN50, PN25/40, AlloyC4 >316L
 CG 6 DN50, PN25/40, AlloyC22 >316L
 CJ2 DN50, PN100 B2, 316L (FTL51)
 CN2 DN80, PN25/40B1, 316L
 CN5 DN80, PN25/40, AlloyC4 >316L
 CN6 DN80, PN25/40, AlloyC22 >316L
 CQ2 DN100, PN10/16B1, 316L
 CQ 5 DN100, PN10/16, AlloyC4 >316L
 CQ 6 DN100, PN10/16, AlloyC22 >316L
 C12 DN80, PN100 B2, 316L (FTL51)
 C82 DN25, PN25/40B1, 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

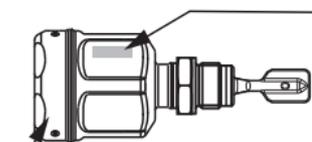
JIS B2220

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

ZH- 应用

液体限位检测

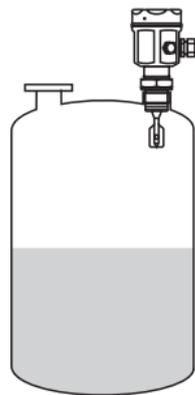




电子插件

订货号:
FTL5# - ##### # ## #

FEL51
FEL52
FEL54



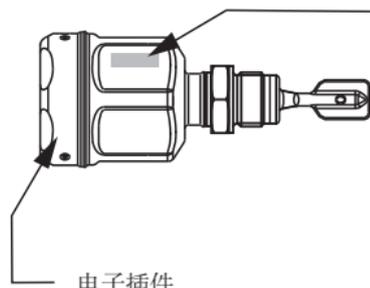
*)

*) 外部负载

ZH- 测量系统 直接连接负载

ZH- 测量系统

通过开关单元连接负载

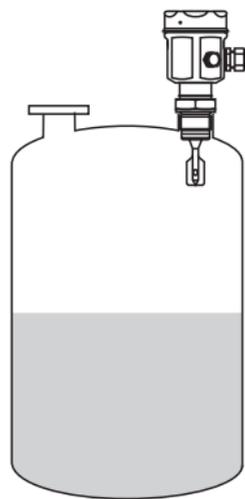


电子插件

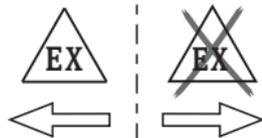
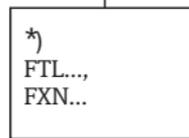
订货号:

FTL5# - # # # # # # # # # #

FEL55
FEL56
FEL57
FEL58



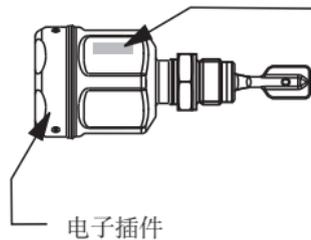
Ex i



*) 开关单元、PLC、隔离放大器

ZH- 测量系统

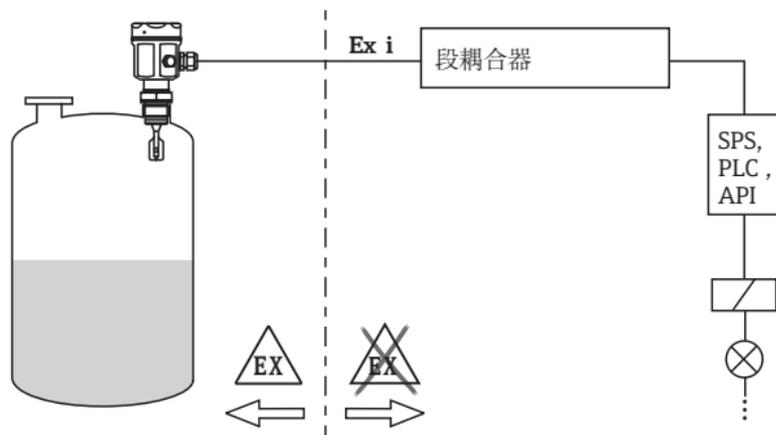
连接 PROFIBUS PA

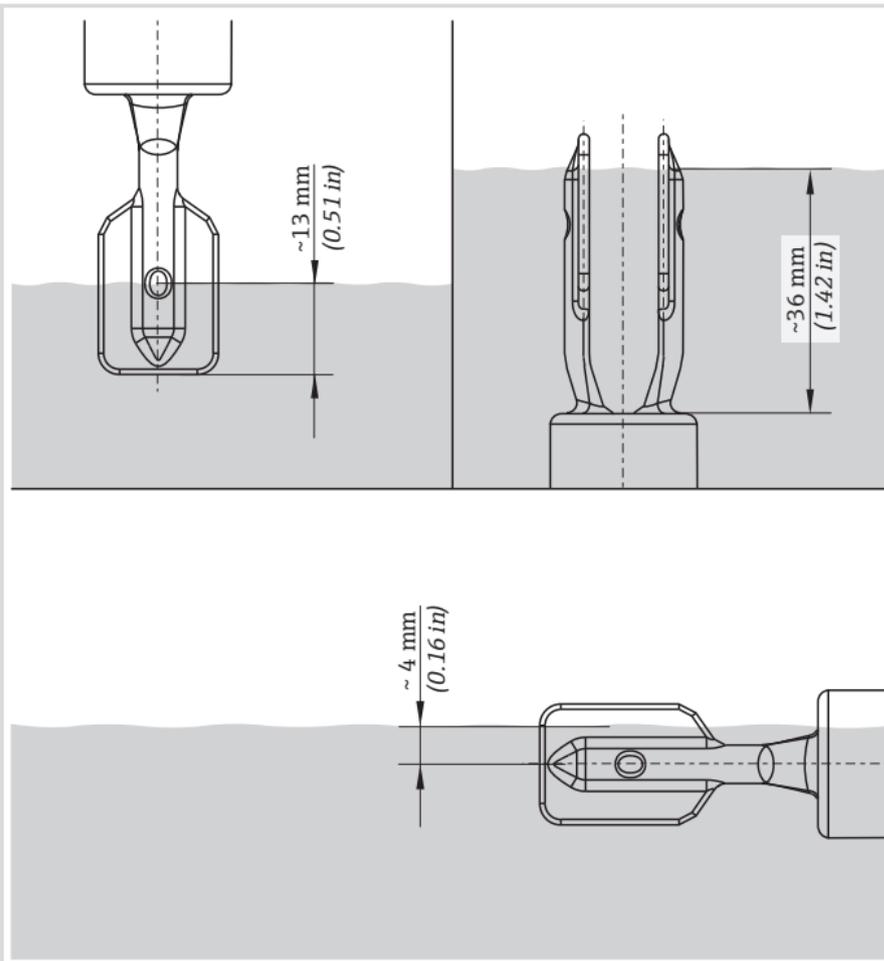


订货号:

FTL5# - # # # # # # # # # #

FEL50 A



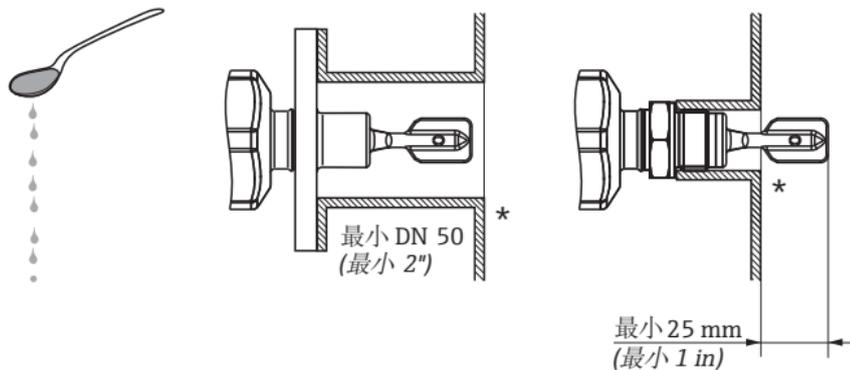


ZH- 安装

开关点取决于音叉液位开关的
安装位置

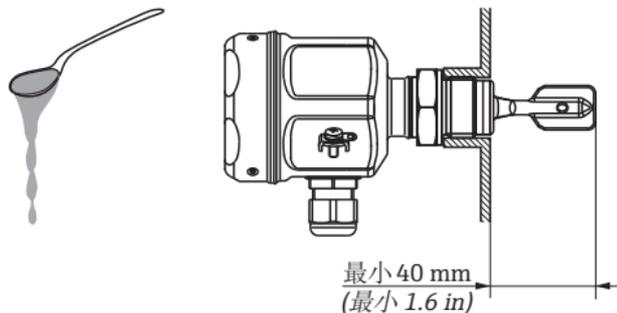
ZH- 安装实例
取决于液体粘度 ν

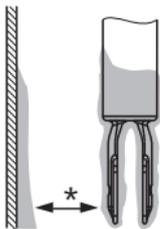
$\nu = 0 \dots 2000 \text{ mm}^2/\text{s}$
($\nu = 0 \dots 2000 \text{ cSt}$)



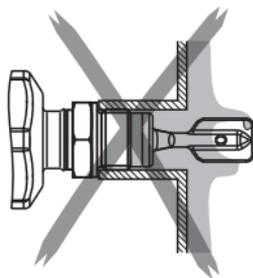
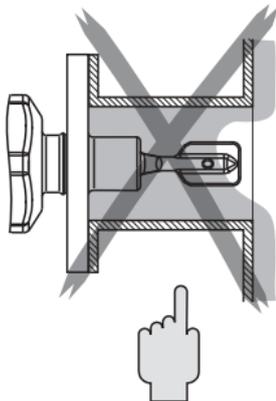
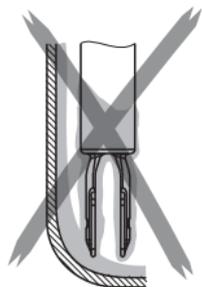
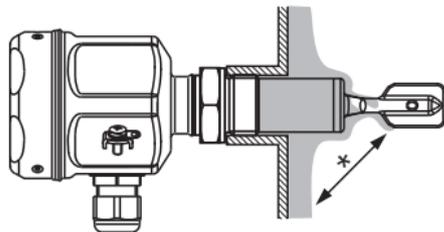
* 去除毛刺

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



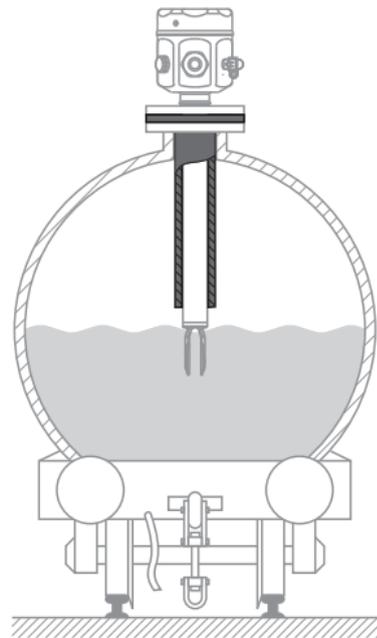
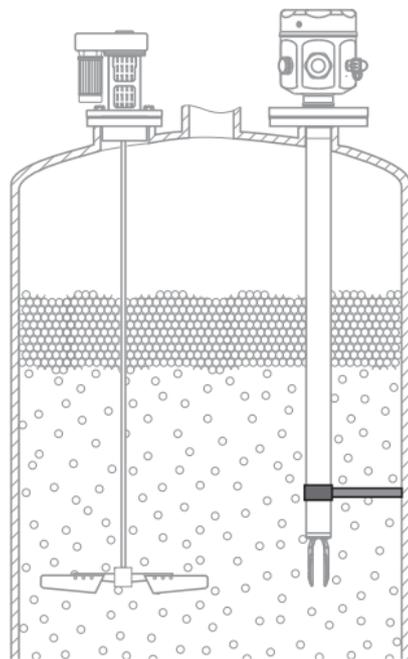


*保持充足间距!

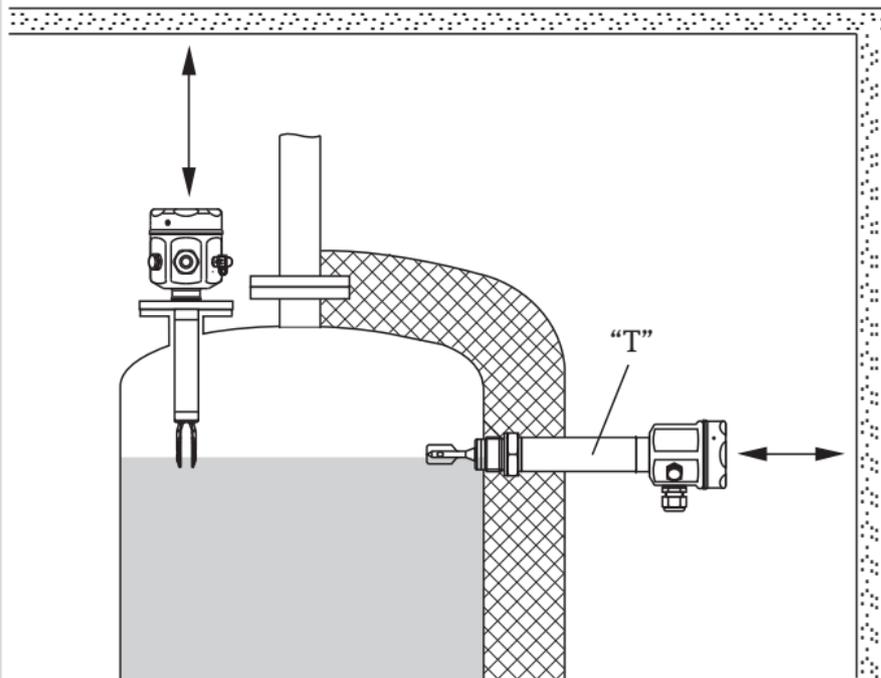


ZH- 考虑介质粘附。
避免叉体接触粘附。

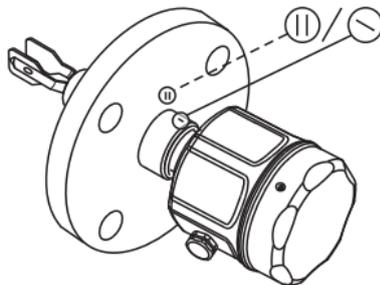
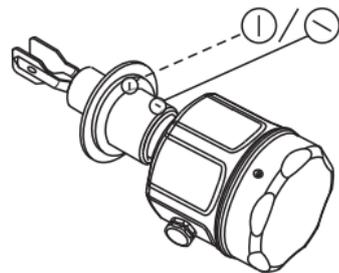
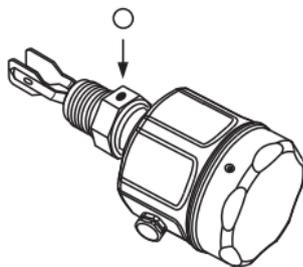
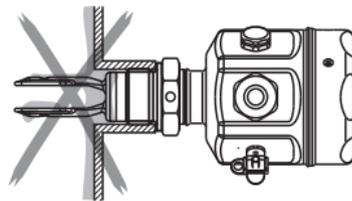
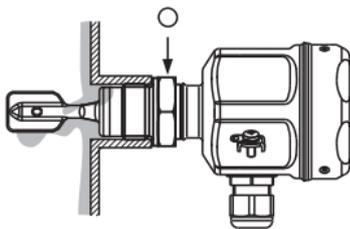
ZH- 存在动态负载时，应支撑设备



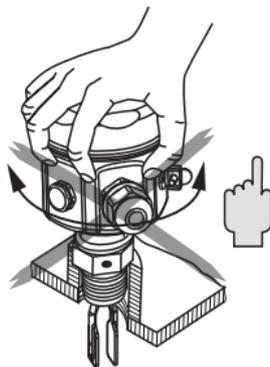
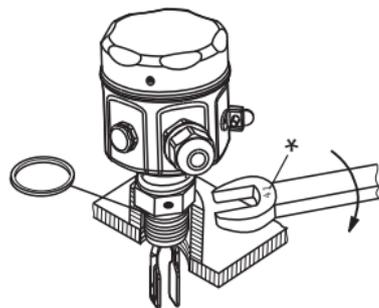
“T” = 选配隔热管，适合安装在带保温层的罐体上



ZH- 叉体安装方向:
标记朝上或朝下

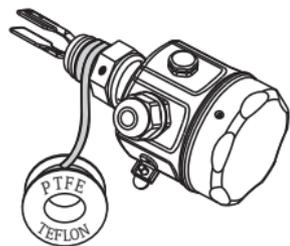


G ¾, 32 mm (1¼")*
G 1, 41 mm (1½")*

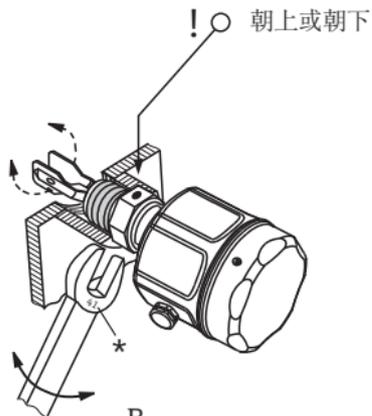


ZH- 将 Liquiphant 拧入过程连接中。
禁止握住外壳转动。

NPT ¾, R ¾, G ¾, 32 mm (1¼")*
NPT 1, R 1, G 1, 41 mm (1½")*

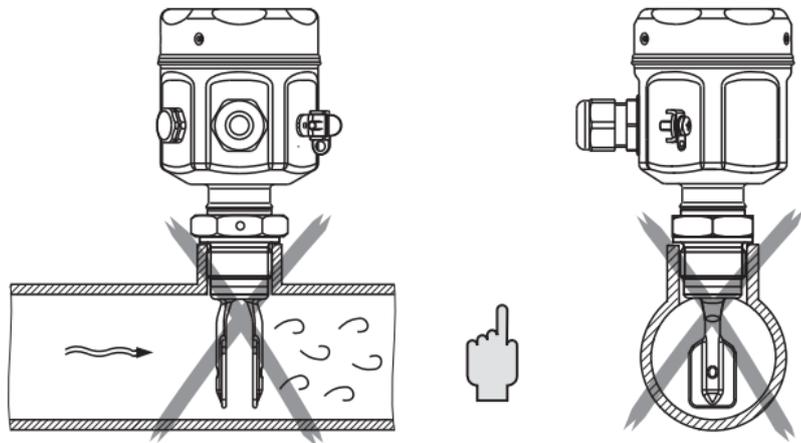
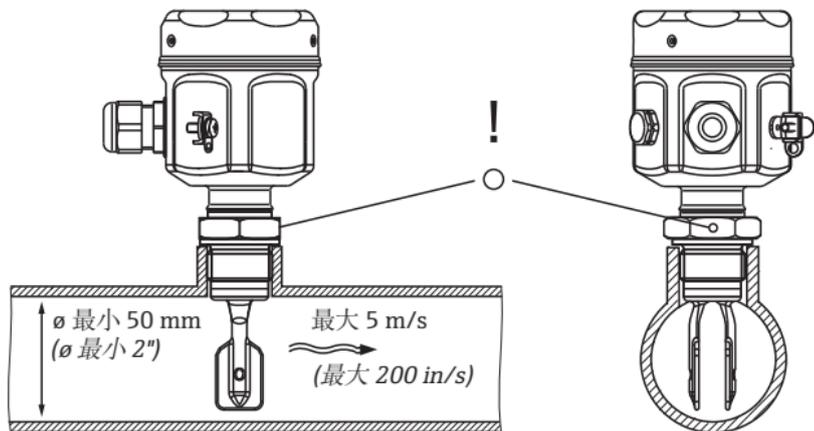


A

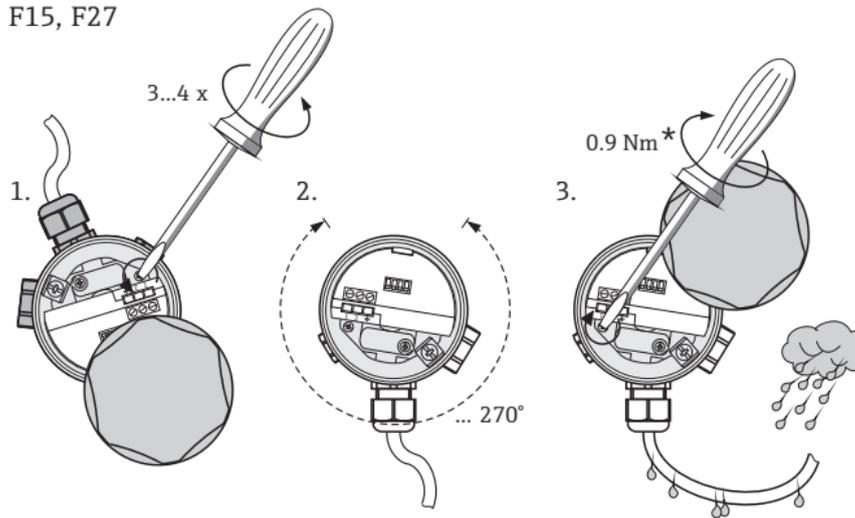


B

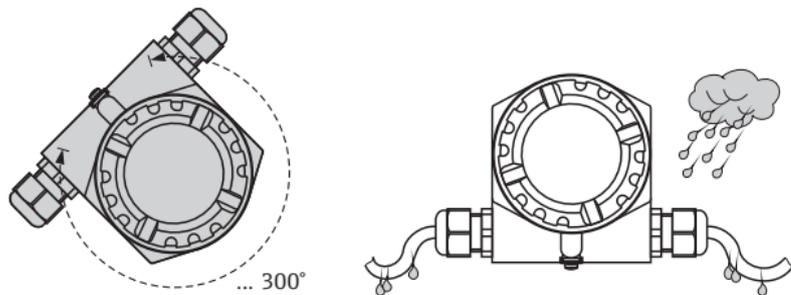
ZH- 安装在管道中时的叉体安装方向:
标记与介质流向一致



F15, F27



F16, F13, F17

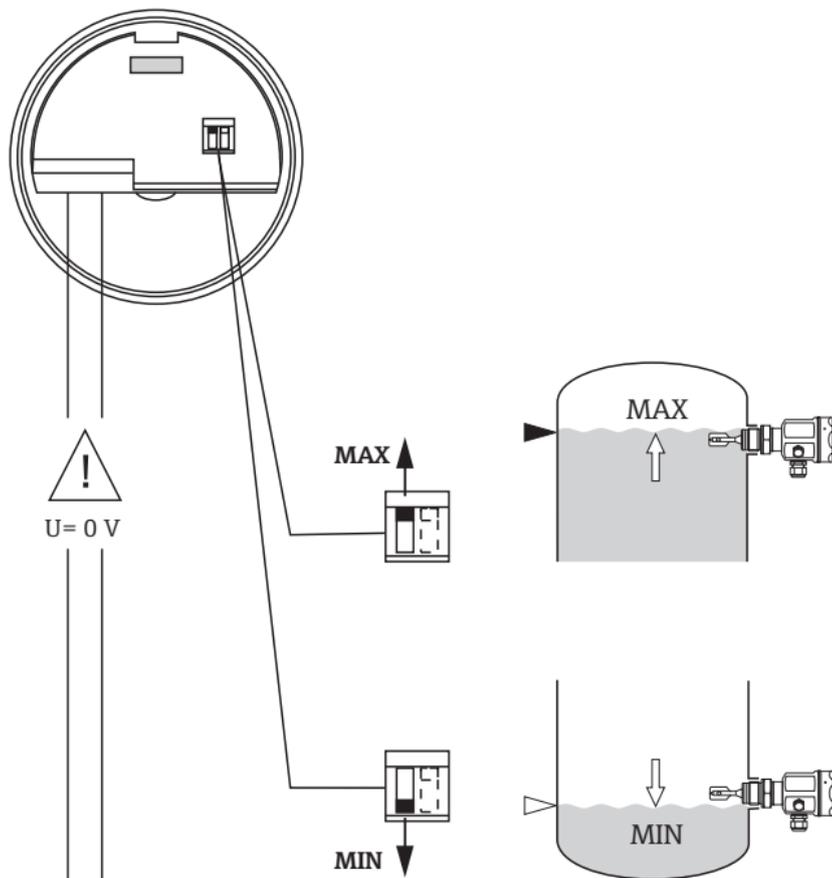


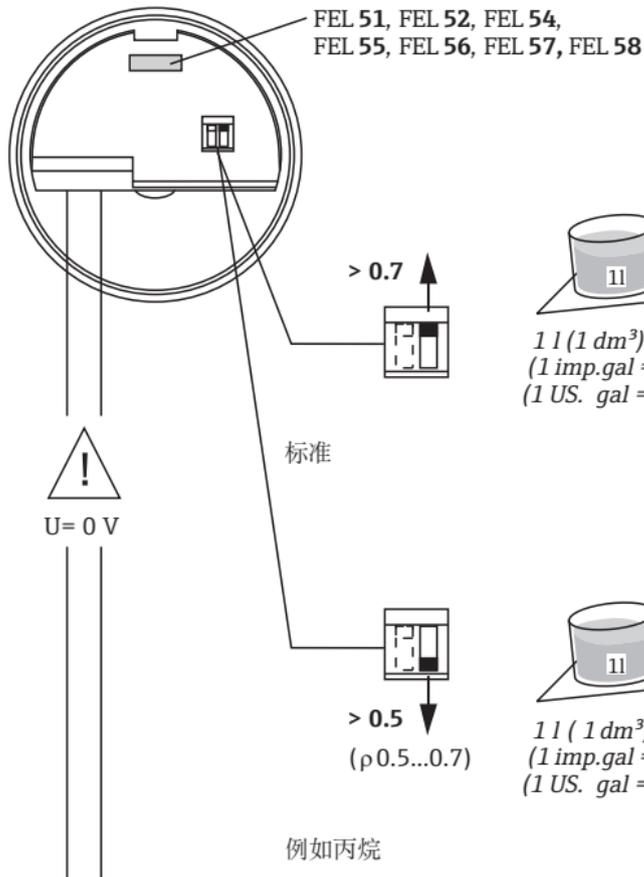
ZH- 缆塞的安装方向

* 拧紧扭矩

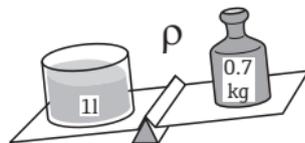
ZH- 设置

高限 (MAX) / 低限 (MIN)
检测模式

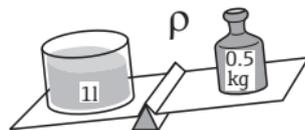




ZH- 测量液体密度。
密度 ρ 测量值单位为 g/cm^3
或 kg/l 。

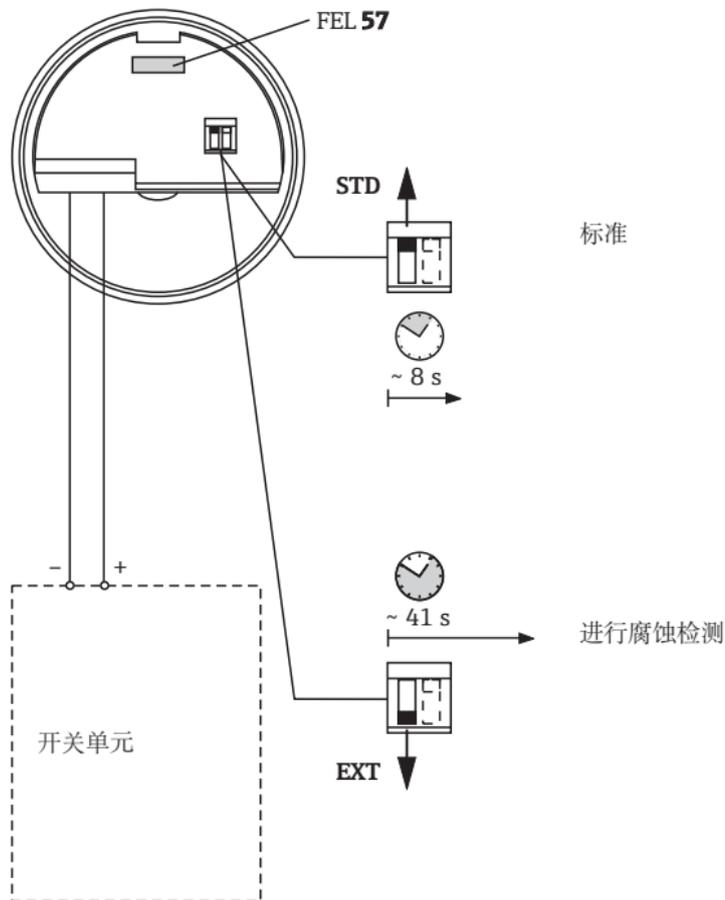


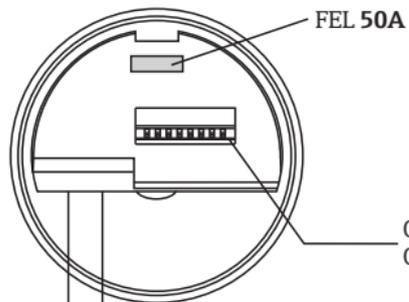
$1 \text{ l } (1 \text{ dm}^3) = \text{最小 } 0.7 \text{ kg}$
($1 \text{ imp. gal} = \text{最小 } 7.0 \text{ lbs}$)
($1 \text{ US. gal} = \text{最小 } 5.9 \text{ lbs}$)



$1 \text{ l } (1 \text{ dm}^3) = 0.5 \dots 0.7 \text{ kg}$
($1 \text{ imp. gal} = 5.0 \dots 7.0 \text{ lbs}$)
($1 \text{ US. gal} = 4.2 \dots 5.9 \text{ lbs}$)

ZH- FEL57 的自检操作
(操作步骤参见第 44 页、
第 45 页和开关单元)





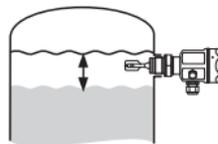
ON	1	2	4	8	16	32	64	SW
OFF	0	0	0	0	0	0	0	HW
	1	2	3	4	5	6	7	8

实例:

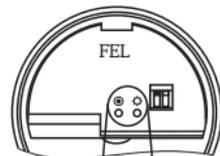
$2 + 8 = 10 = \text{地址}$

ZH- 设置设备地址
(参数设置的详细信息
参见 BA141F)

ZH- 指示灯信号



液位波动



绿色

红色
(黄色)

LED 指示灯



待机



开关状态



FEL57、FEL50A: 叉体被介质覆盖



亮起



闪烁



熄灭



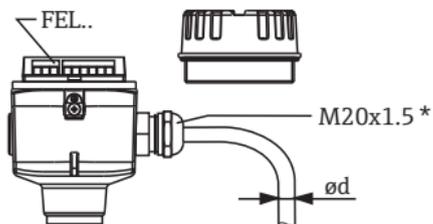
输出信号



故障

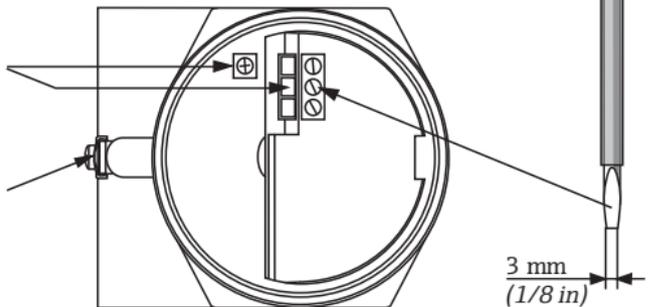


注意国家法规!



最大 2.5 mm²
(最大 AWG 14)

最大 4 mm²
(最大 AWG 12)



ZH- 连接

* 电缆入口

镀镍黄铜:

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

塑料:

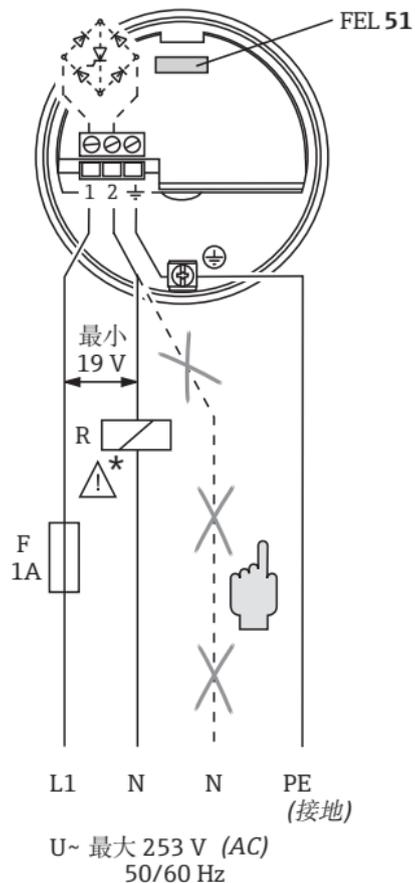
直径 $\varnothing d = 5 \dots 10 \text{ mm}$
(0.2...0.38 in)

不锈钢:

直径 $\varnothing d = 7 \dots 12 \text{ mm}$
(0.28...0.47 in)

ZH-FEL51 接线图

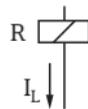
两线制连接, 交流供电型



* 必须连接外部负载 R

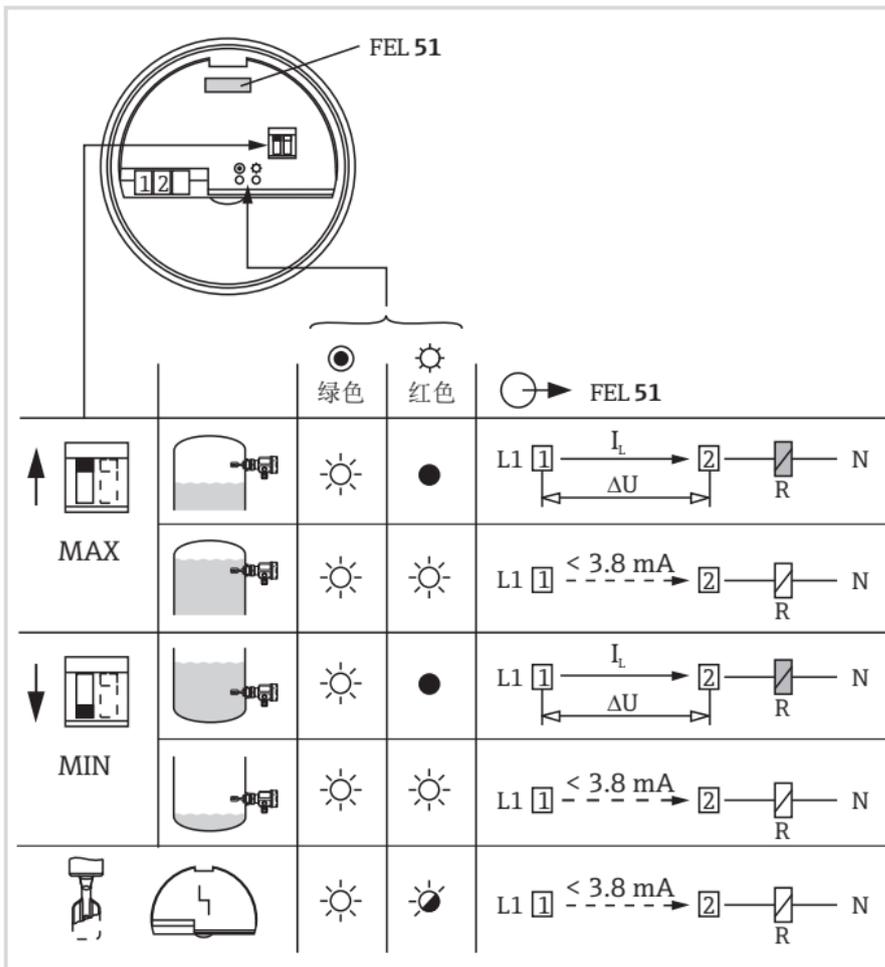


损坏设备



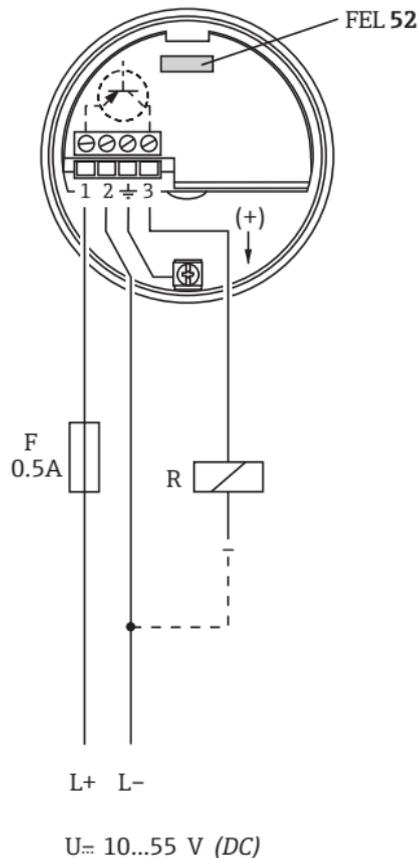
I_L 最大	1.5 A	
I_L 最大	350 mA	
最大	89 VA / 253 V	
最大	8.4 VA / 24 V	
最小	2.5 VA / 253 V (10 mA)	
最小	0.5 VA / 24 V (20 mA)	

ZH-FEL51 功能示意图



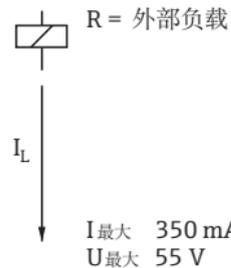
ΔU_{FEL51} 不超过 12 V

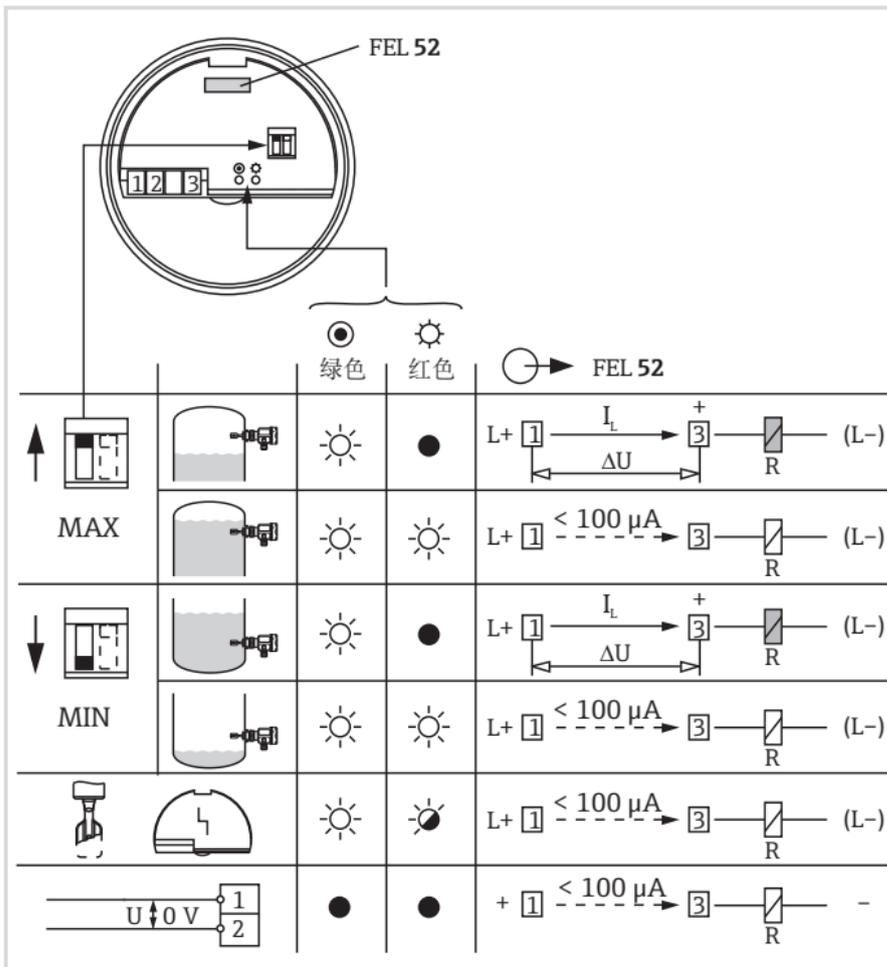
ZH-FEL52 接线图
直流连接型 (PNP)



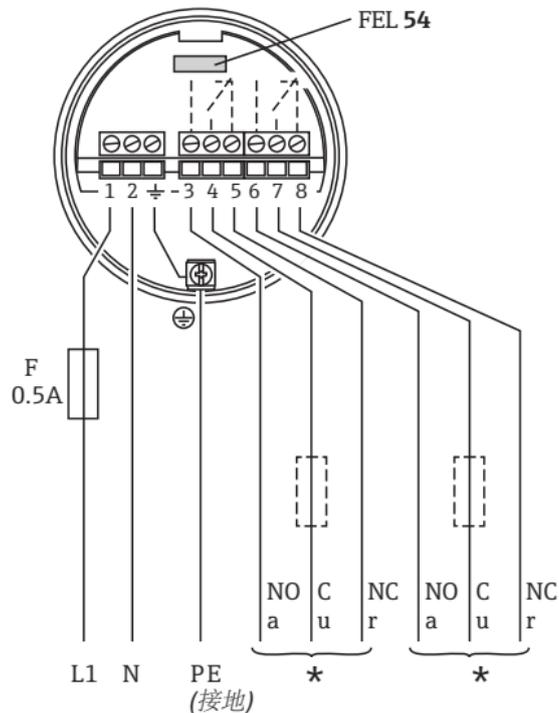
同时适用数字量输入模块

EN 61131-2



 ΔU_{FEL52} 不超过 3 V

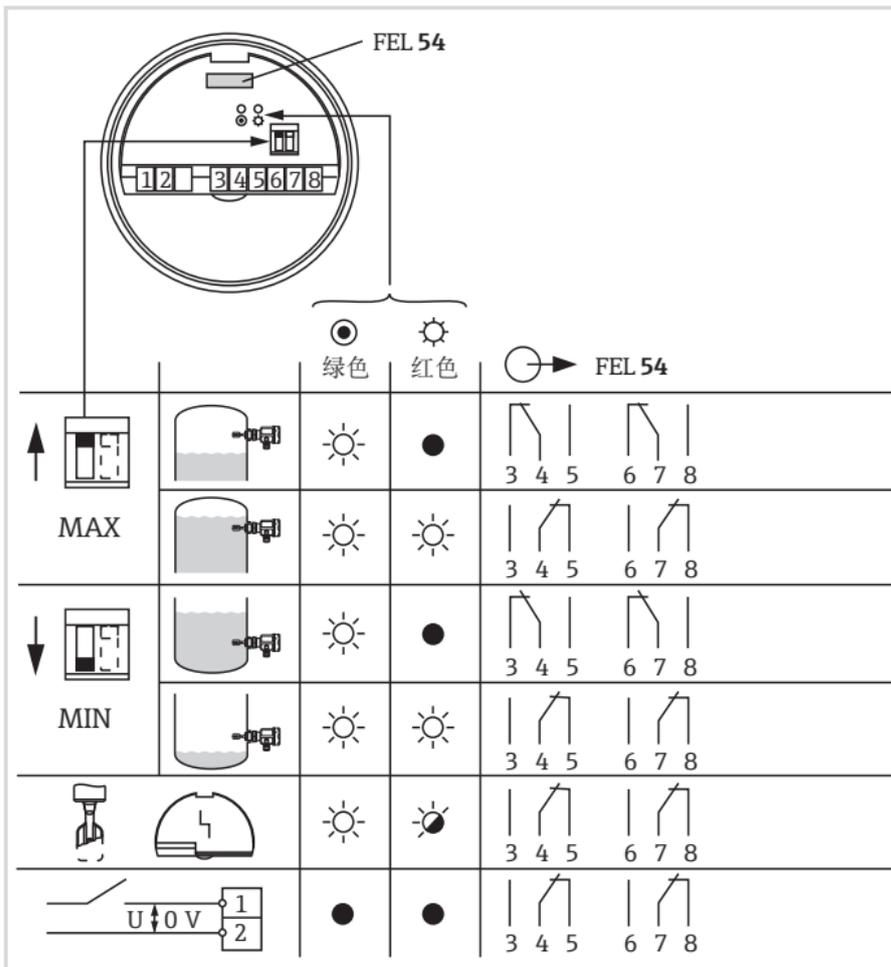
ZH-FEL54 接线图
通用电流连接型
继电器输出



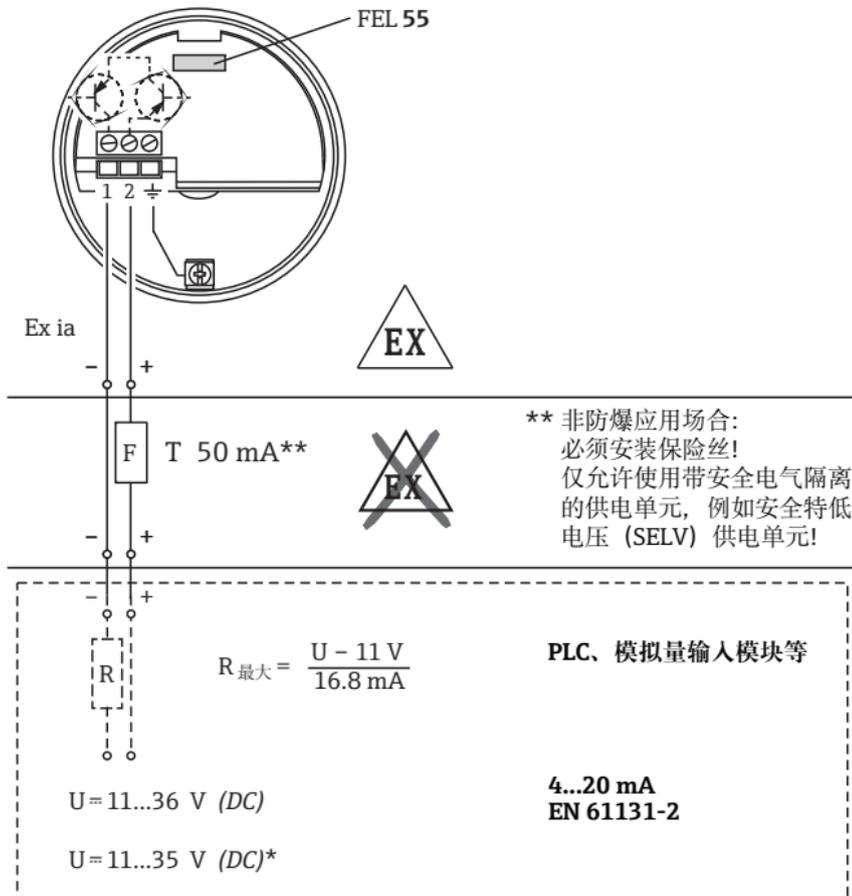
U_{\sim} 19...253 V (AC)

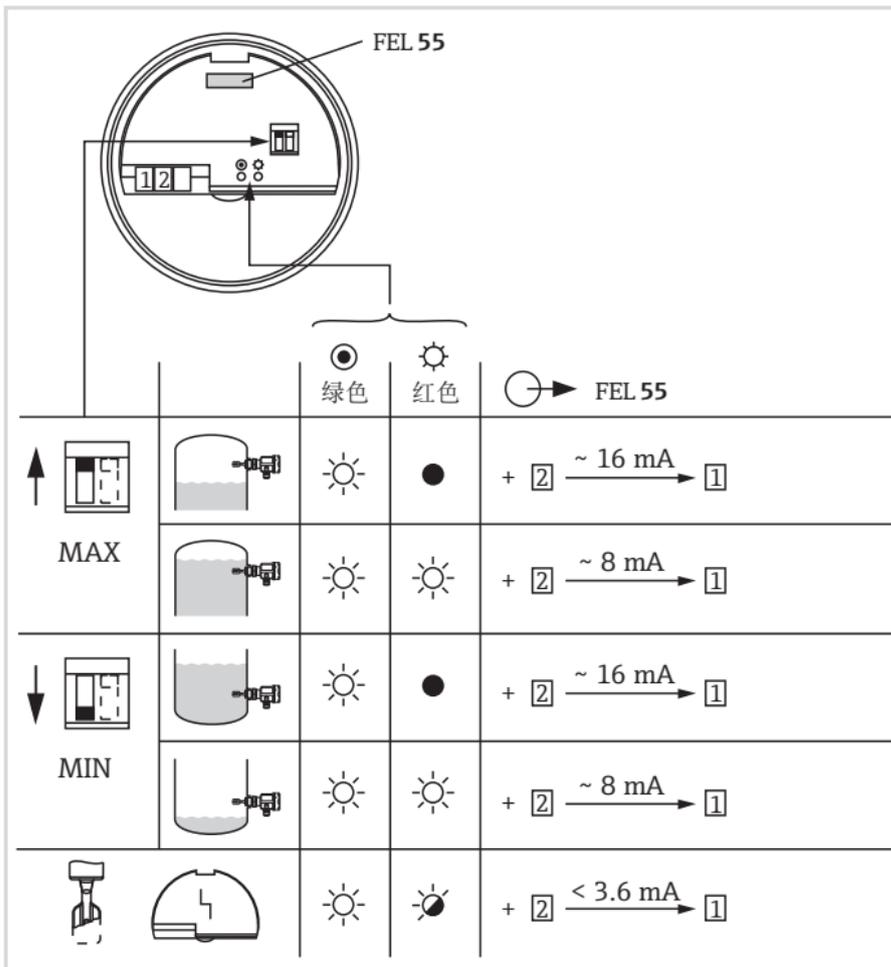
L+ L-
 U_{\dots} 19... 55 V (DC)

$\left\{ \begin{array}{l} U_{\sim} \text{ 最大 } 253 \text{ V, } I_{\sim} \text{ 最大 } 6 \text{ A} \\ P_{\sim} \text{ 最大 } 1500 \text{ VA, } \cos \varphi = 1 \\ * P_{\sim} \text{ 最大 } 750 \text{ VA, } \cos \varphi > 0.7 \\ I_{\dots} \text{ 最大 } 6 \text{ A, } U_{\dots} < 30 \text{ V} \\ I_{\dots} \text{ 最大 } 0.2 \text{ A, } U_{\dots} < 125 \text{ V} \end{array} \right.$



ZH-FEL55 接线图
8/16 mA 输出
 * 适用潮湿地区。

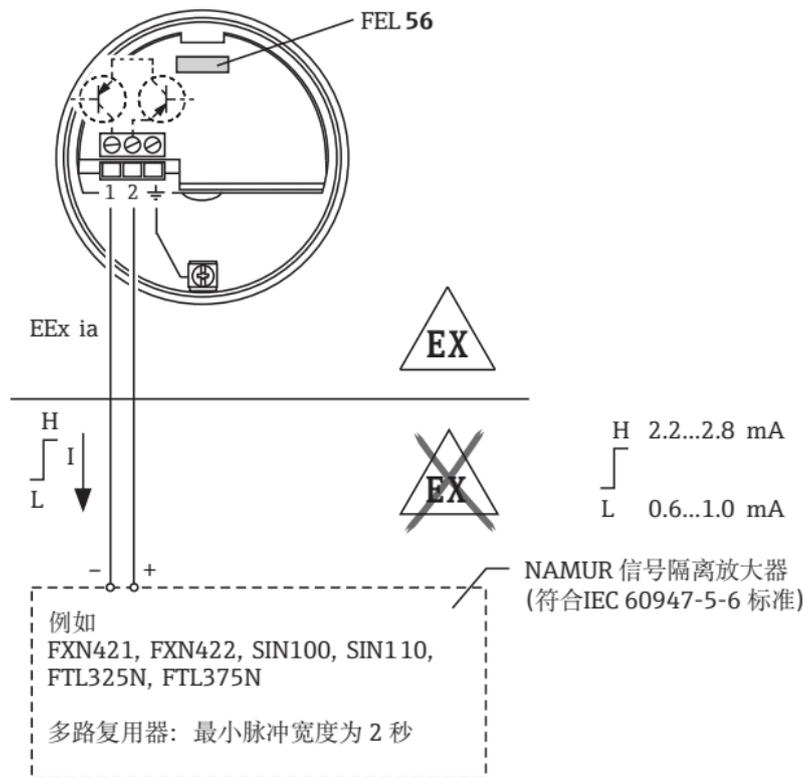




ZH- FEL56 接线图

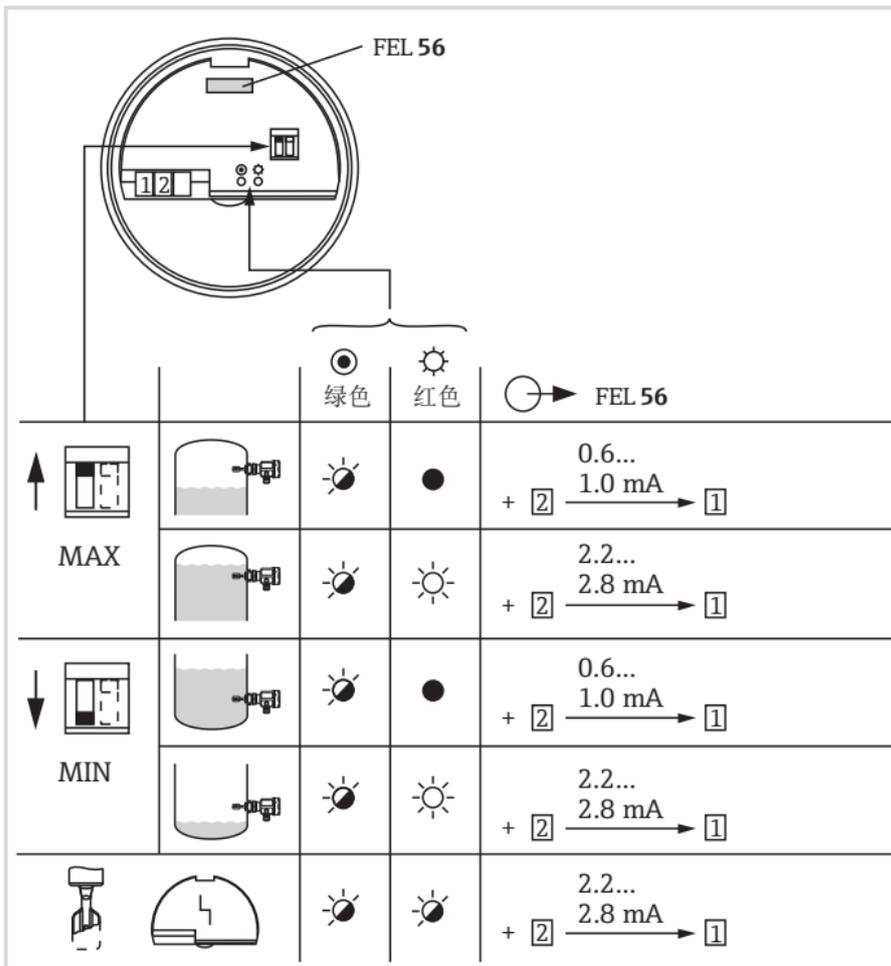
NAMUR 输出, 上升沿
触发 (L-H)

$< 1.0 \text{ mA} / > 2.2 \text{ mA}$

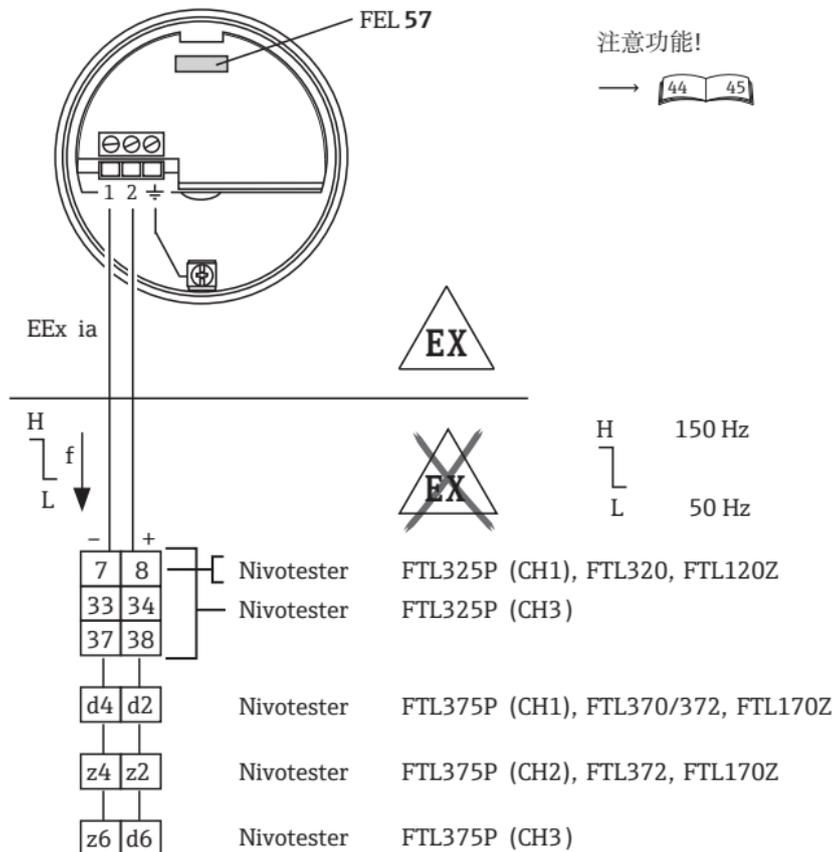


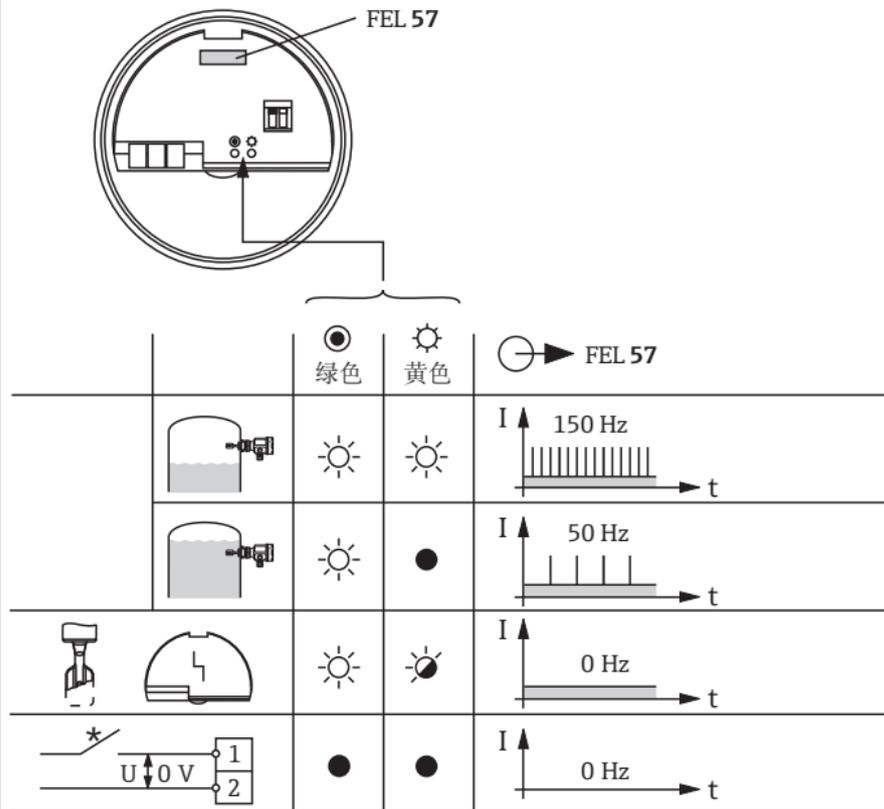
电源

供电电压: $8.2 \text{ VDC} \pm 20\%$



ZH- FEL57 接线图
PFM 输出
150 Hz / 50 Hz

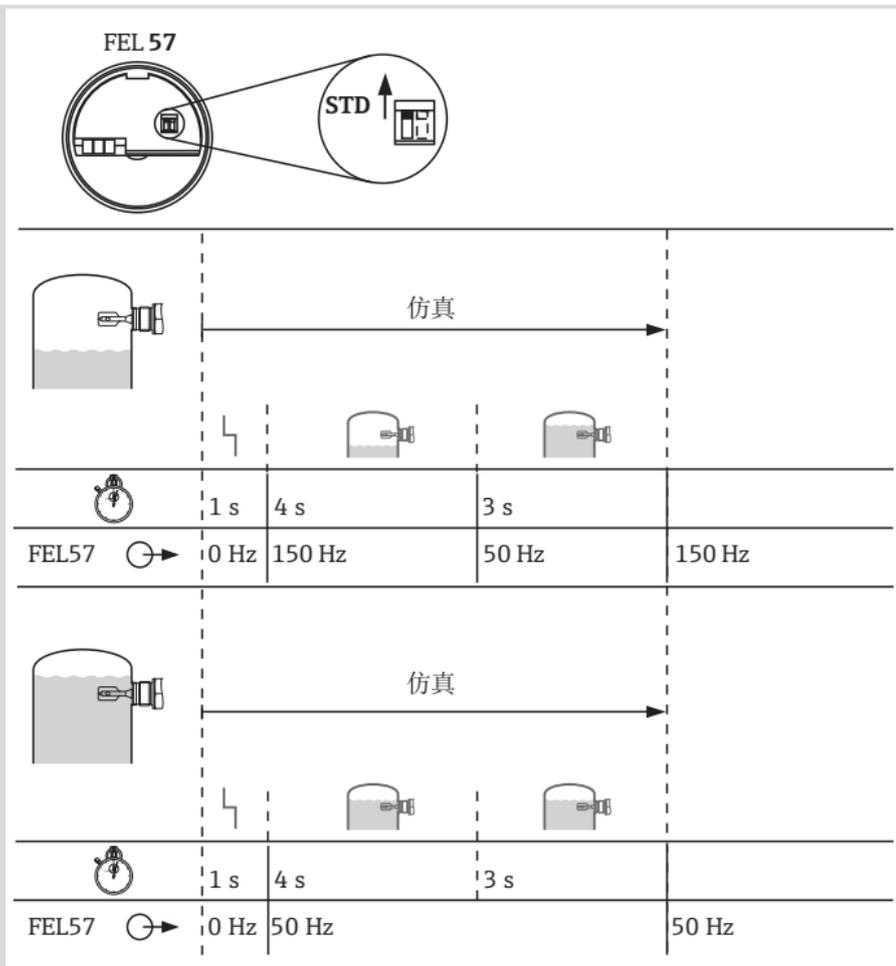




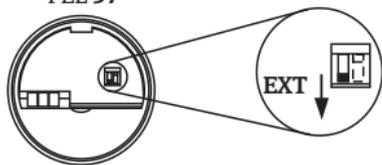
* 上电时的响应状态

→ 44 45

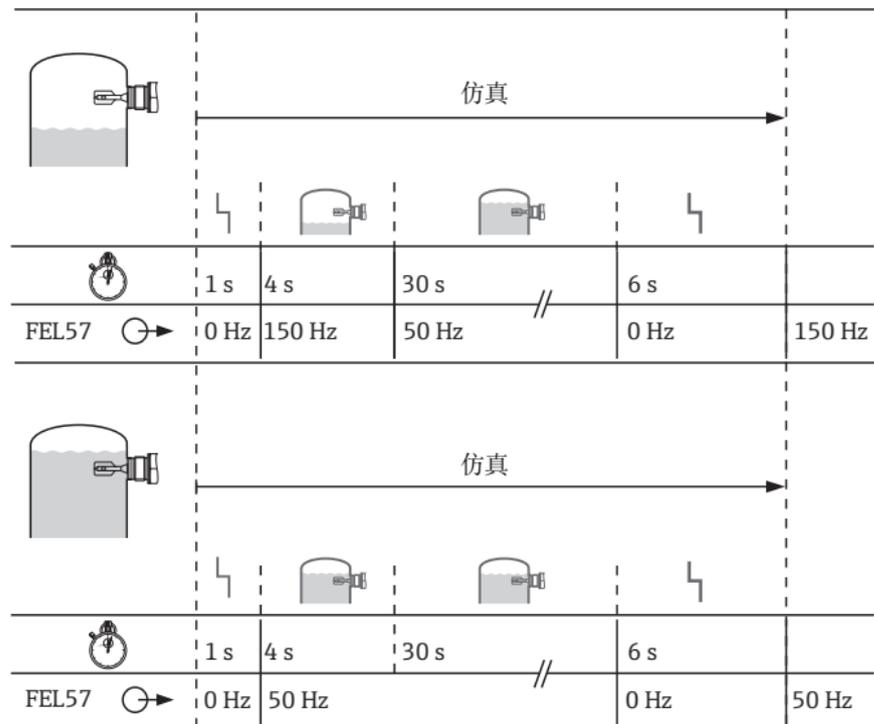
ZH- 上电时的响应状态 自检 (STD)



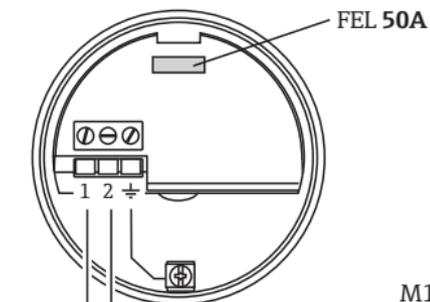
FEL 57



ZH- 上电时的响应状态 自检 (EXT)



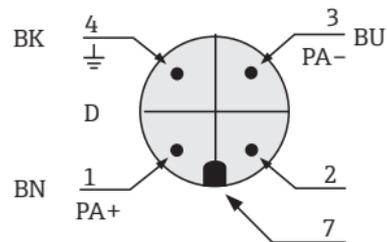
ZH- FEL50A 接线图



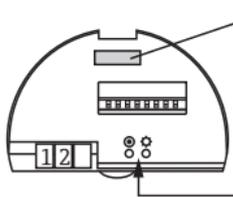
PA- PA+
U: 9...32 V (DC)



M12 插头



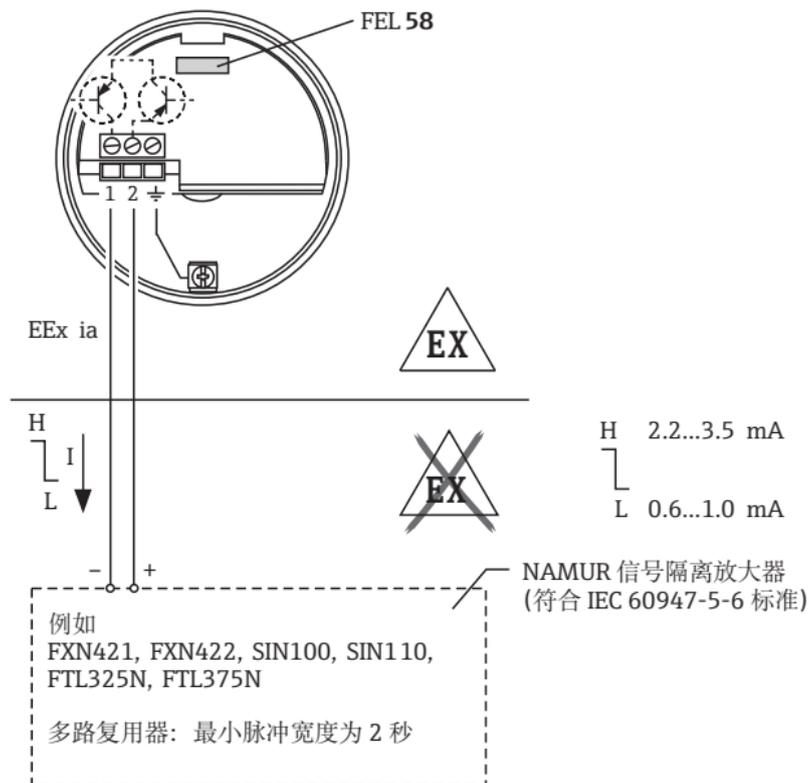
外壳上的设备插头 (公)

				 FEL 50A PA 总线信号
不切换开关状态				OUT_D = 0
				OUT_D = 1
切换开关状态				OUT_D = 0
				OUT_D = 1
 ↔ SPS Commuwin II			-	通信
		-		响应状态参见 BA141F
				../..

ZH-FEL58 接线图

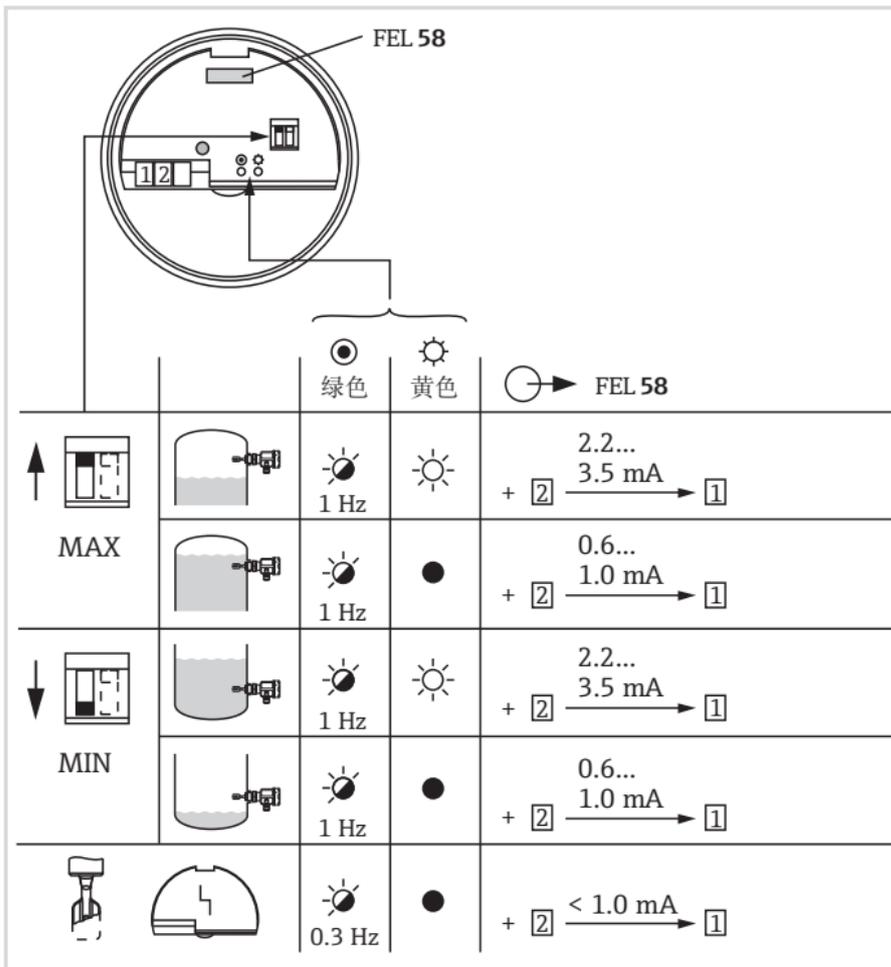
NAMUR 输出, 下降沿
触发 (H-L)

$> 2.2 \text{ mA} / < 1.0 \text{ mA}$



电源

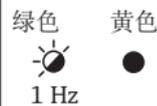
供电电压: $8.2 \text{ VDC} \pm 20\%$



ZH-FEL58 的功能测试按钮
高限 (MAX) 检测模式



1. 正常工作



+ 2.2...
3.5 mA → 1

+ 0.6...
1.0 mA → 1

2. 按下测试按钮



+ 0 mA → 1

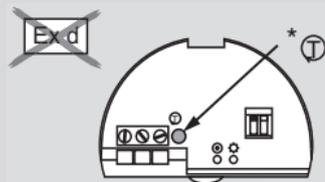
+ 0 mA → 1

3. 进入正常工作状态约 2 秒后
松开测试按钮

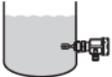
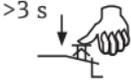


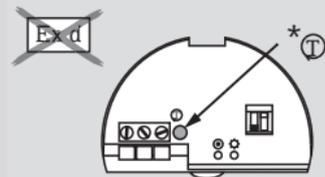
+ 2.2...
3.5 mA → 1

+ 0.6...
1.0 mA → 1

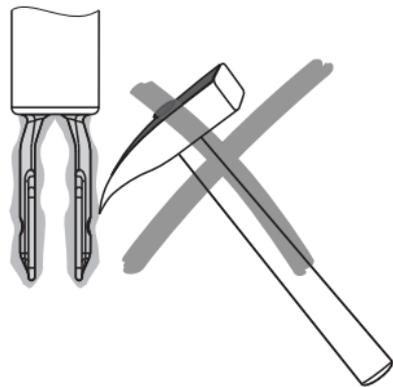
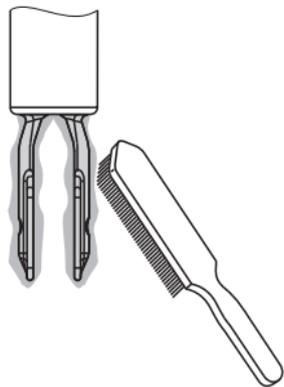


ZH-FEL58 的功能测试按钮 低限 (MIN) 检测模式

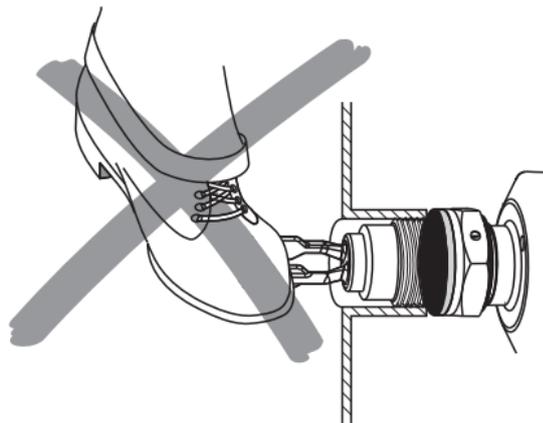
 + 		
1. 正常工作	绿色 黄色   1 Hz + 2.2... + 3.5 mA → 1 2	绿色 黄色   1 Hz + 0.6... + 1.0 mA → 1 2
2. 按下测试按钮 	绿色 黄色   + 0 mA + 2 -----> 1	绿色 黄色   + 0 mA + 2 -----> 1
3. 进入正常工作状态约 2 秒后 松开测试按钮 	绿色 黄色   1 Hz + 2.2... + 3.5 mA → 1 2	绿色 黄色   1 Hz + 0.6... + 1.0 mA → 1 2



ZH- 维护和清洁
清除介质粘附



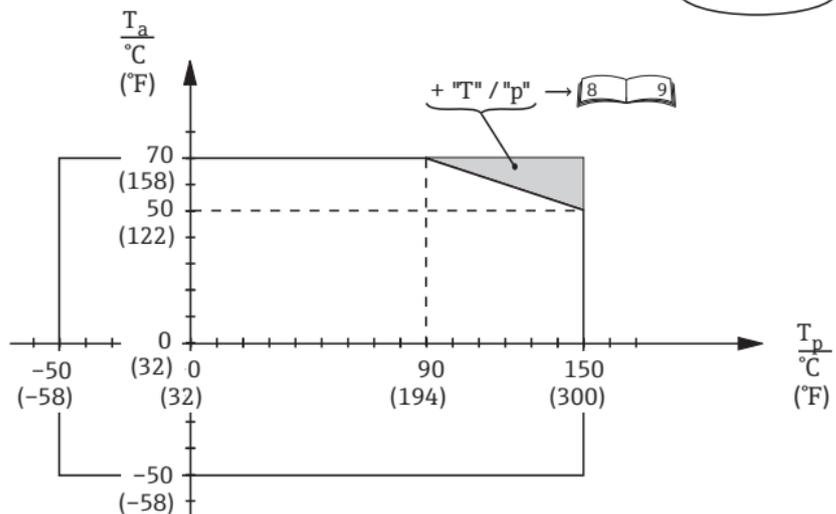
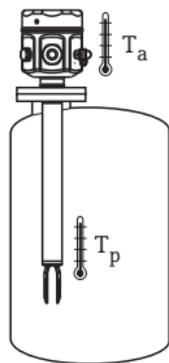
禁止 踩踏叉体!



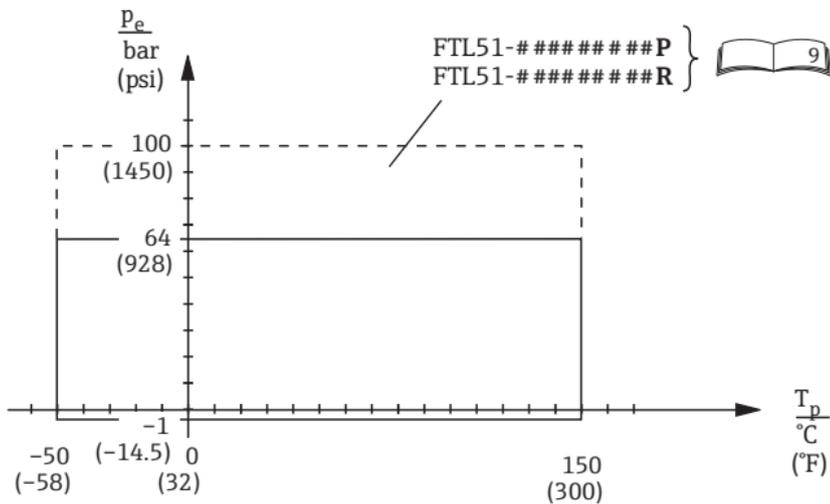
ZH- 技术参数

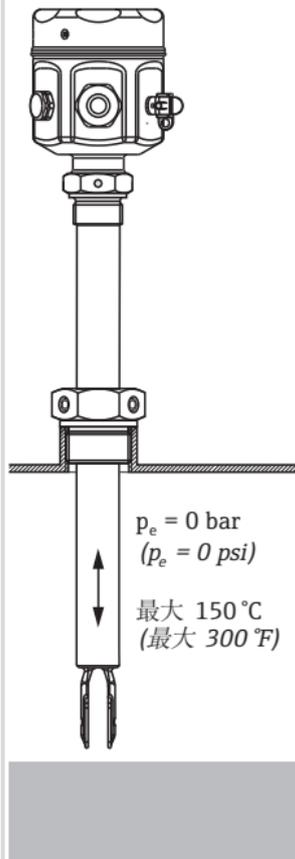
环境温度 T_a

过程温度 T_p

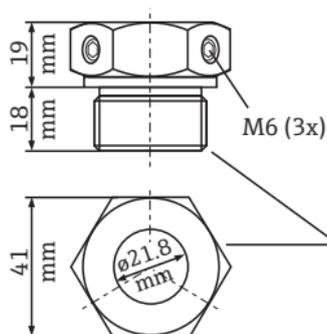


ZH- 过程压力 p_e
过程温度 T_p

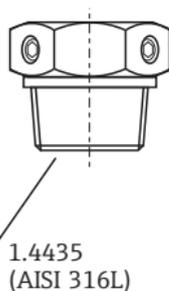




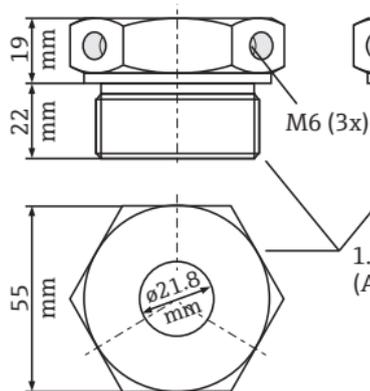
G 1
52003978



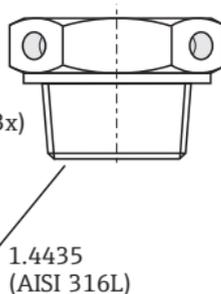
NPT 1 - 1½
52003979



G 1½
52003980



NPT 1½ - 1½
52003981



ZH- 附件 常压滑动套管

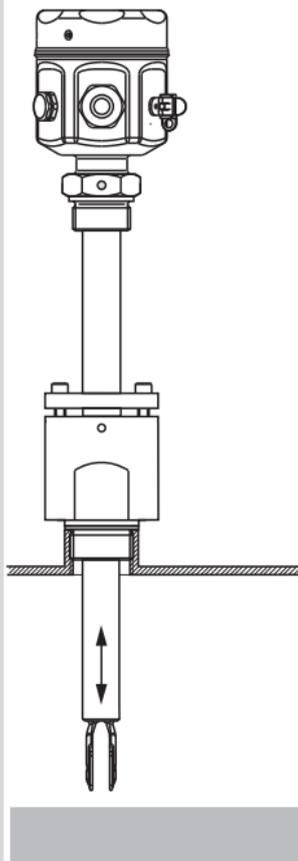
参见:
KA00151F (G 1, NPT 1)
KA00152F (G 1½, NPT 1½)

100 mm = 3.94 in

ZH- 高压滑动套管

参见:
KA00153F (G 1、NPT 1)
KA00154F (G 1½、NPT 1½)

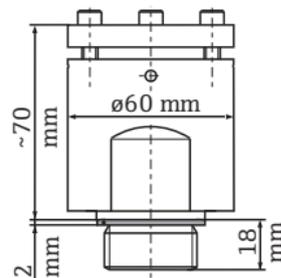
100 mm = 3.94 in



G 1

1.4435 (AISI 316L)
52003663

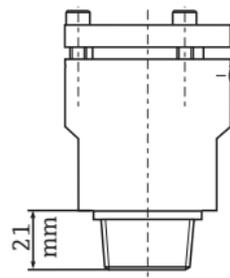
AlloyC4: 52003664
AlloyC22: 71118691



NPT 1 - 1½

1.4435 (AISI 316L)
52003667

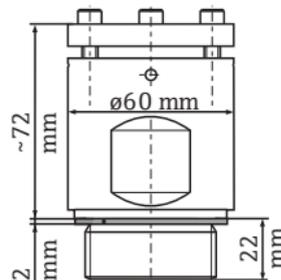
AlloyC4: 52003668
AlloyC22: 71118694



G 1½

1.4435 (AISI 316L)
52003665

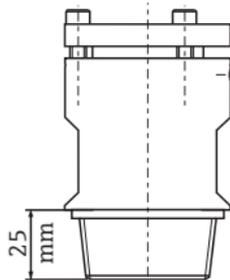
AlloyC4: 52003666
AlloyC22: 71118693



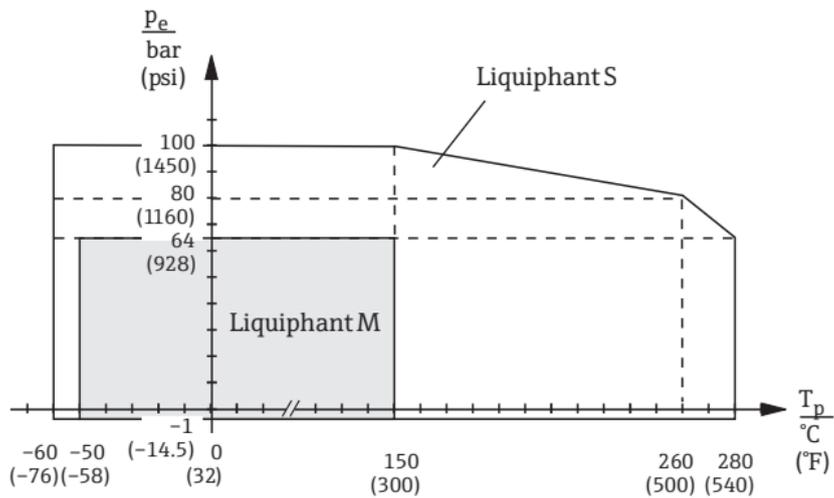
NPT 1½ - 1½

1.4435 (AISI 316L)
52003669

AlloyC4: 52003670
AlloyC22: 71118695



ZH- 高压滑动套管:
过程压力 p_e
过程温度 T_p



ZH- 故障排除

故障	原因	补救措施
开关不动作	未接通电源	检查电源
	信号线故障	检查信号线
	电子插件故障 - FEL51 直接连接至 L1 和 N	更换 - 始终通过外部负载连接 FEL51
	液体密度太低	在电子插件上将密度设置为不低于 0.5
	叉体上存在介质粘附	清洁叉体
	叉体被腐蚀 (FEL 上的指示灯: 红 - 黄交替闪烁, FEL58 上的指示灯: 以 0.3 Hz 频率绿色 闪烁)	更换叉体和过程连接
	FEL51: 连接继电器的内部电阻过大	连接合适的继电器
	FEL51: 连接继电器的保持电流过小	将电阻与继电器并联
	FEL54: 继电器触点烧熔 (短路后)	更换 FEL54; 在触点回路中安装保险丝
错误开关动作	高限 (MAX) / 低限 (MIN) 检测模式 设置错误	在电子插件上设置正确的故障安全模式
偶尔出现开关动作不正确	介质中夹杂大量气泡、 强扰动工况、 测量起泡液体介质	Liquiphant 安装在旁路管道中
	存在强射频干扰	使用屏蔽电缆
	处于强振动环境	拆下设备, 采取减振措施, 并转动 叉体 90°
	外壳进水	拧紧外壳盖和缆塞
	FEL52: 输出过载	降低负载大小和 (电缆) 电容
断电恢复后 开关动作不正确	FEL57 正在进行上电自检 (功能测试)	注意 FEL57 的响应状态; 重新上电后, 系统约需要 45 秒才能正常工作

ZH- 故障排除补充信息

如果叉体的响应状态异常，在诊断插座的针脚 4 处测量叉体振动频率。

安装 FEL51、FEL52、FEL54、FEL55、FEL56、FEL57、

FEL58 电子插件时，音叉进行正弦波振动，可基于振动幅值确定音叉状态。

安装 FEL50A 电子插件时，输出方波信号，此时才可测量叉体振动频率。

ZH- 备件

电子插件



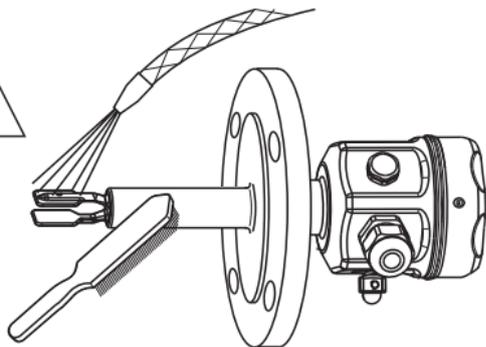
FEL51	52002304
FEL52	52002305
FEL54	52002306
FEL55	52002307
FEL56	52002308
FEL57	52002309
FEL58	52006454
FEL50A	52010527

安装注意事项: 安装过程中, 切记不得将由非本安回路供电的电气部件 (电子插件) 串接至本安回路。

ZH- 维修

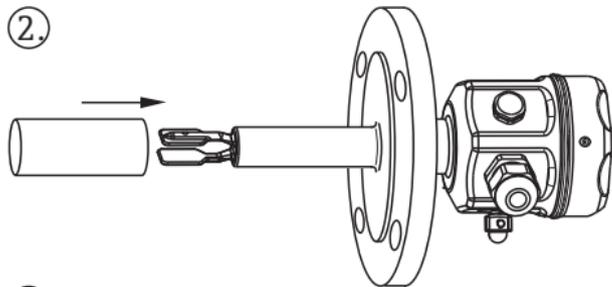
交由 Endress+Hauser 负责

①.



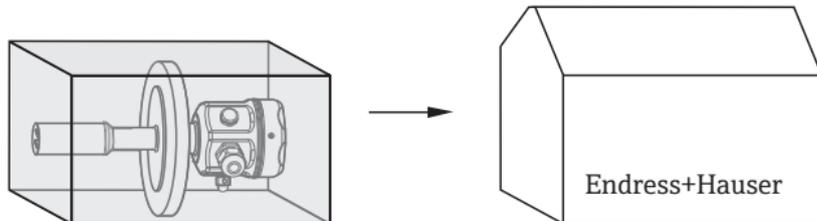
清洁

②.



运输防护

③.



技术资料

TI328F Liquiphant FTL50、FTL50H、FTL51、FTL51H
 TI426F 焊座、过程转接头和法兰

操作手册

BA00141F FEL50A (PROFIBUS PA)

安全指南

XA00031F	CE ^{Ex}	II 1/2 G,	Ex d	IIC/IIB
XA00063F	CE ^{Ex}	II 1/2 G, II 1/2 D,	Ex ia/ib	IIC/IIB
XA00064F	CE ^{Ex}	II 1 G,	Ex ia	IIC/IIB
XA00108F	CE ^{Ex}	II 1/2 G,	Ex de	IIC/IIB
XA00113F	CE ^{Ex}	II 1/2 G,	Ex ia/ib	IIC
XA00114F	CE ^{Ex}	II 1/2 G,	Ex d	IIC
XA00115F	CE ^{Ex}	II 1/2 G,	Ex de	IIC
XA00154F	CE ^{Ex}	II 1/2 G, II 1/2 D,	Ex ia/ib	IIC/IIB
XA00158F	CE ^{Ex}	II 1/2 G,	Ex ia/ib	IIC
XA00159F	CE ^{Ex}	II 1 G,	Ex ia	IIC/IIB
XA00182F	CE ^{Ex}	II 3 G, II 3 D,	Ex nA/nC	IIC/IIIC



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