

意大利伊莱科有限公司浮子式液位指示器是为了在最大程度上满足流体液位控制领域里各种不同的应用需求而研究、设计的。伊莱科提供的浮子式液位指示器品种范围很广，有标准型的，配备一个或两个浮子；也有按照客户要求的长度来定制的，从而确保了选择时的最大灵活性，保证了客户一定可以找到最适合于自己需求的以及特定的解决方案。伊莱科可以提供特殊配置，也可以提供单个干预点/单个浮子，最多可以提供四个浮子（根据型号来定），长度可以一直到2500毫米。

对于液体接触部分，我们所使用的材料有铝、热塑型塑料、聚氯乙烯、腈基丁二烯橡胶、尼龙、德国Hostaform聚甲醛、黄铜以及不锈钢。

伊莱科提供的浮子式液位指示器可以是与法兰连接与英制管螺纹或者公制螺纹连接，德国标准DIN接插件或者接线盒。根据客户要求，伊莱科还可以提供特别长度的连接电缆，用于高温情况下的硅胶电缆，根据要求提供符合欧洲防爆标准指令ATEX94/9/CE的防爆型（Ex tD）和本安型（Ex ia）。

伊莱科的浮子式液位指示器特别适用于用在液压设备、润滑设备、工业机动车辆、发电设备、液体储存设备、食品和医药工业、水处理以及水清洁设备等领域里。

伊莱科还可以提供适用于船舶设备以及海上用的特别配置的浮子式液位指示器。这些液位指示器都通过了意大利船级社（R.I.N.A.）、英国劳埃德船级社（Lloyd's Register）的认证。

工作原理

伊莱科浮子式液位指示器的工作原理非常简单和直接。密封在管子里的弹簧开关，在受到位于浮子里永久磁铁所产生磁场的的作用下，随着液位沿着管子进行滑动，使得开关的电气触点转换，变为打开或者关闭。

伊莱科的浮子式液位指示器通常垂直安装在容器顶部，但也有些型号适宜于侧面安装。所有型号安装的最大倾斜度一直到15度都能正常工作。有些配备有一个或者两个干预点的型号具有可转换的触点，因此，既可以以常闭也可以以常开的方式进行工作，只需拆下浮子并转换一下，将其触点换成另一种触点即可。然而，大部分型号都没有配备可转换的触点，因此，订货时必须明确指出所需要的触点类型是常开还是常闭触点。

Elettrotec float level switches are designed to meet the most complete range of application requirements in liquid level monitoring. The wide offer both of standard level switches with one or two floats and custom length executions assures greatest choice flexibility and gives the possibility to select the best level control solution for any specific application. Custom length units may be configured with a single station, or as many as four (depending on series), in lengths up to 2500 mm.

Mounting, float and stem materials include aluminium, thermoplastic, PVC, NBR, Nylon, Hostaform, brass and stainless steel.

Different mounting styles are available such as flanges, GAS and metric thread mounting plugs. A variety of wire terminations, custom lead lengths, Silicone cable jacket for high temperature applications, housing and connectors are also available. Explosion-proof executions (Ex tD) and models intrinsically safe approved (Ex ia) according to Directive ATEX 94/9/EC can be supplied on request.

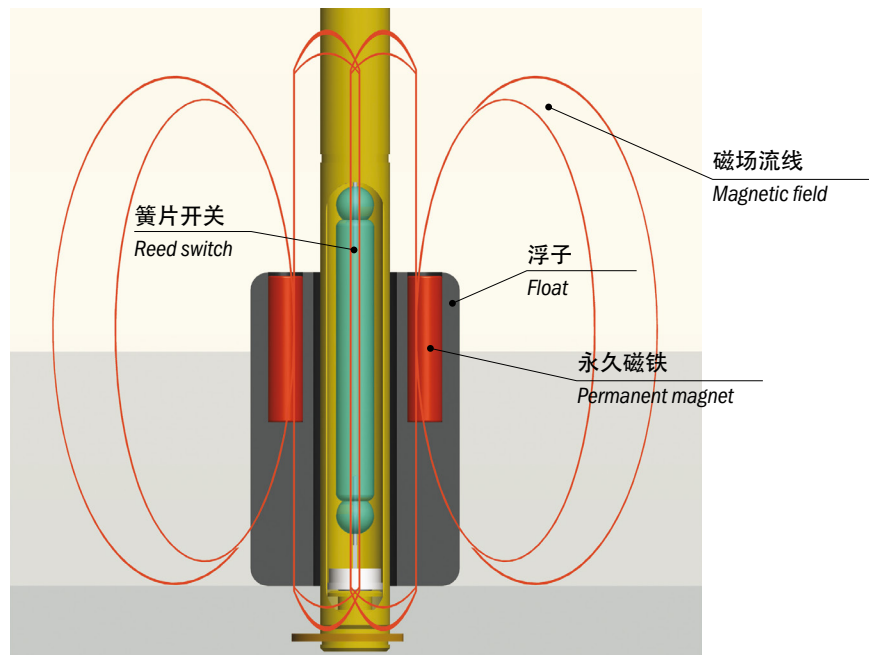
Elettrotec level switches are particularly suitable for hydraulics, lubrication plants, pharmaceuticals, water treatment, industrial vehicles, generating sets, fluid stocking, food and beverage processing, cleaning machines and equipment.

Executions specifically approved R.I.N.A., Lloyd's Register for marine and offshore applications are also available.

OPERATING PRINCIPLE

Elettrotec level switches operate on a direct, simple principle. The hermetically sealed reed switch housed inside the stem is actuated by a magnetic field created by a magnet equipped float. As the float rises and lowers with liquid level, the magnetic field passing the switch in the stem causes the switch to either open or close.

Elettrotec level switches are generally mounted from tank top, but some models have been adapted for side mounting. Switches will operate normally with up to a 15° tilt from vertical. Some single/double point switches operate in either a normally open (NO) or normally closed (NC) mode. Selecting the mode is as easy as removing the retaining clip and reversing the float on the stem. However, the most part is non-reversible and must be clearly ordered as NO or NC.



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Elettrotec reserves the right to technical data of change to the products or halt production without prior notice. It is the responsibility of the user to test the suitability of our products for the particular application, for example, the verification of material compatibility. The use may only be appropriate if proven in field tests. The technical information in this catalogue are based on tests made during product development and based on empirically gathered values. They may not be applicable in all cases.

一般技术数据

最大流体粘度: 150 cSt
 最大压力: 10 巴
 流体比重: ≥ 0.7
 电气连接: DIN 43650 PG09-PG11
 电气防护等级: IP65 – DIN40050 工作温度范围: 从-10°C到+80°C
 使用氟橡胶 (FKM) 密封圈以及硅胶电缆的最大耐受温度: +130°C

电气数据

伊莱科浮子液位指示器里所用的标准簧片开关是密封的, 是电磁启动操作的, 其可靠性是几百万次周期。
 在静止状态下的触点类型是常开/常闭 (单刀单掷SPST) 或转换触点 (单刀双掷SPDT)。触点的额定容量取决于所采用的簧片开关的类型。至于电气数据, 请参阅下面所列的表格。

GENERAL SPECIFICATIONS

Max. fluid viscosity: 150 cSt
 Max. pressure: 10 bar
 Fluid specific gravity: $\geq 0.7 \text{ kg/dm}^3$
 Electrical connection: DIN 43650 PG09-PG11
 Electrical protection: IP65 – DIN40050
 Operating temperature: -10°C to +80°C
 Max. temperature with FKM seal and silicone cable: +130°C

ELECTRICAL DATA

Standard reed switches in Elettrotec level switch units are hermetically-sealed, magnetically actuated, designed for reliability to millions of cycles.
 Switches are normally closed/normally open (SPST) or SPDT. Each Elettrotec level switch varies in rating depending on the type of reed switch used, see the chart below for electrical ratings.

最大电压 / Max. voltage	额定功率 Rating power	最大电流 / Max. current	触点容量 Capacitance	绝缘电阻 Insulation resistance	触点类型 (干式) Switch type (dry)
220伏 - 50赫兹	60 瓦 60伏安	0.8安培	0.6pF微微法	最小 10^{10} Ohm	常闭
220伏 - 50赫兹	60 瓦 60伏安	0.8安培	0.6pF微微法	最小 10^{10} Ohm	常开 / NO 转换型浮子 Reversible float
220伏 - 50赫兹	30瓦	0.5安培	2pF微微法	最小 10^9 Ohm	常开 / NO 非转换型浮子 Non-reversible float
220伏 - 50赫兹	30瓦	0.5安培	2pF微微法	最小 10^9 Ohm	单刀双掷 SPDT

特别提示: 电流以及电压的转换组合决不能超过在表格中所指出的额定转换功率。

有关于触点容量的电气数值指的是电阻性负载。至于电阻性负载或者电容性负载的应用, 需要使用附加的保护线路。为了确保触点的经久耐用以及重复性, 请参阅第4页和第5页上的技术信息。

WARNING: any combination of the switching voltage and current must not exceed the given rated power.

The switch contact ratings, as listed in the switch data chart, are based on use with **resistive type load**. For applications requiring the control of an inductive or capacitance load, additional interface circuitry may be required. To ensure long life and repeatability, see the contact protection information on pages 4 and 5.

型号 / MODEL	干预点 / ACTUATION POINTS	触点类型 / CONTACT TYPE
LM1...	1个干预点 / 1 actuation point	常闭
LM1...NA	1个干预点 / 1 actuation point	常开 / NO
LM2...	1个干预点 / 1 actuation point	单刀双掷 SPDT
LMM1...	2个干预点 - 1个浮子 2 actuation points - 1 float	最低液位, 常闭 最高液位, 常开 Min. NC - Max. NO
LMM1...	2个干预点 - 2个浮子 2 actuation points - 2 floats	最低液位, 常闭 最高液位, 常闭 Min. NC - Max. NC
LM3...	3个干预点 - 3个浮子 3 actuation points - 3 floats	常闭 / NC
LM4...	4个干预点 - 4个浮子 4 actuation points - 4 floats	常闭 / NC

根据客户的要求, 我们可以提供其他种类的触点组合LMM1..., LM3..., LM4...型号。
 On request, LMM1... - LM3... - LM4... models can be supplied with different switch operations.

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簧片触点保护线路

在技术数据中指出的有关额定电流和额定电压的数值，指的是电阻性负载。然而，应该经常检查感性负载或者容量性负载或者应该经常把电灯的线路接通。在这种情况下，必需要考虑防护簧片触点免受到电压或者电流峰值的可能性。

1) 感性负载

在使用直流电供电线路的情况下，触点的防护相对而言是比较容易的。应该如图1（下一页）中所指出的那样，并联连接半导体二极管到负载上。极性应该以下列方式进行连接，这就是与普通的工作电压互锁，在极性相反的情况下总是产生短路。

在使用交流电供电，感性负载相互转换时，不能使用二极管，必需使用一个消弧装置RC。通常指的是一个RC并联连接到转换开关上，因此按照图2（下一页）所指的那样，以串联的方式与负载相连接。消弧的尺寸大小可以由图3（下一页）的曲线图表来决定。

2) 容量性负载和电阻性负载

与感性负载所发生的一切相反，用容量性负载与灯，放电较大，这个电流放电会立即引起故障，甚至会立即引起触点焊接的故障。当充电电容或者电缆电容互换的时候，立即放电。放电的强度是取决于连接电缆的容量和长度。如图4（下一页）所示，放电或者峰值电流是受到与电容器串联电阻的限制。电阻的尺寸是由特定线路的范围内存在的可能性来决定的。在任何的情况下，电阻应该尽可能地大，这是为了把电流放电限制在可接受的范围内。电容器充电也是这样的。

关于电流放电量大的电容器线路，如图5（下一页）所示的那样，应该使用R1或者R2线路。

在前10毫秒的工作时间，钨丝灯泡的额定电流增加5-15倍。电流大量放电可以用增加电阻的方式限制在可接受的数值内，电阻以串联的方式进行连接以限制电流。另外一种可能就是使电阻与转换开关并联，以这种方式，电灯的灯丝进行预热到当灯打开的时候不会成为白炽为止。这两种方式都会引起电流的损耗。

PROTECTIVE CIRCUITS FOR REED CONTACTS The current and voltage switch rating given in the technical data refer to pure resistive loads. However, inductive or capacity loads are often to be checked or lamps are to be switched. In this case it is necessary to protect the reed contacts against peaks in voltage or current.

1) Inductive loads The contact protection is relatively easy with direct current. A semiconductor diode is to be connected in parallel to the load, as indicated in picture 1 (next page). Polarities must be connected in a way the diode would simply jam under normal operating voltage and always short-circuit the opposing voltage that occurs with the opening of the switch. When inductive loads, fed with alternating current, are switched, it is not to be used a diode but an arc-suppression unit. An RC link connected in parallel to the switch, and therefore in series with the load, is usually applied, see picture 2 (next page). The arc-suppression size can be taken from a chart, as from picture 3 (next page).

2) Capacity loads and lamp switching-on Contrary to inductive loads, high current inrushes occur with capacitive loads or switched-on lamps, and that may lead to early switch failure or even to welding of contacts. When charged capacitors or cable capacitors are switched, a sudden discharge occurs, the intensity of which depends on the capacity and length of the connecting cables. A resistor in series with the capacitor limits the current peaks or discharges, as shown in picture 4 (next page).

The size of the resistor depends on the different possibilities offered by a particular circuit. In any case the resistor should be the biggest possible to limit the current discharge within acceptable values. The same applies also to charging of capacitors.

Protection against high current discharges from capacitors should be provided by means of the circuit R1 or R2 or both, as shown in picture 5 (next page).

Tungsten lamps increase from 5 to 15 times the rated current during their first ten milliseconds of working.

These high current inrushes can be limited to an acceptable value connecting in series current-limiting resistance or connecting in parallel to the switch a resistance, so that the lamp filaments would be preheated just to the point they would not become incandescent when turned-on.

Both protecting solutions imply a power loss.

决定感性负载触点消弧的曲线图表

Graph for determining the contact arc suppression for inductive loads

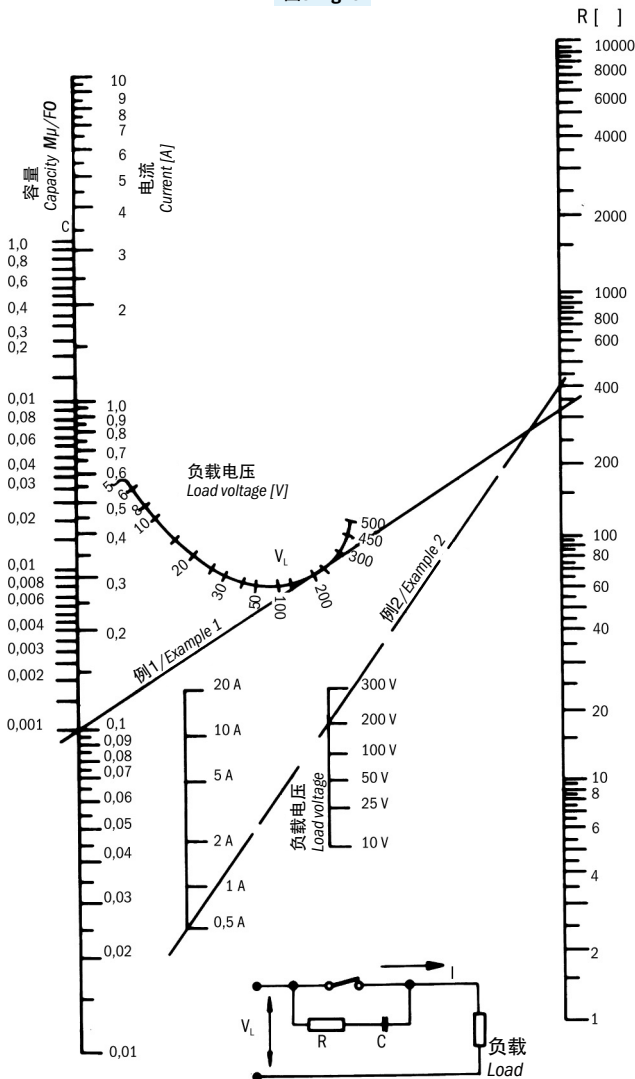
例1: $I = 0.1$ 安
 $V_L = 220$ 伏
 $C = 0.001$ 微法
 $R = 340$ 欧姆

Example 1: $I = 0.1$ A
 $V_L = 220$ V
 $C = 0.001$ μ F
 $R = 340$ Ω

例2: 当电流放电是临界的时候, 电阻应该用下面的曲线图来决定, 例如: 电流放电0.5A $R_{min} = 400$ Ω

Example 2: When the inrush current is critical, the resistance should be determined with the lower graph, for example inrush current 0.5 A $R_{min} = 400$ Ω

图3 Fig. 3



RC连接消弧器

Arc suppressor with RC link

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簧片触点保护线路

Protective circuits for Reed contacts

感性负载

Inductive loads

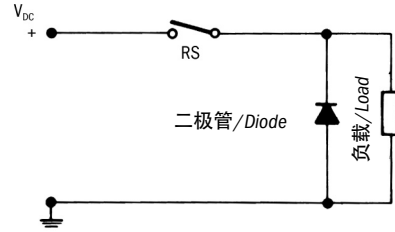


图1 Fig. 1 直流电感性负载用半导体二极管进行保护
 Direct current protection with semiconductor diode for inductive loads.

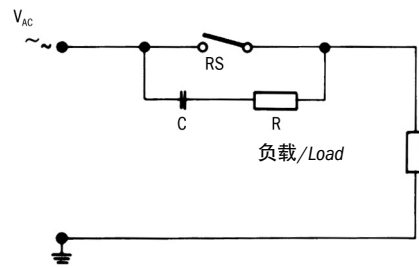


图2 Fig. 2 交流电感性负载用RC连接法保护
 Alternating current protection with RC link for inductive load.

电容性负载与灯泡

Capacitive loads and lamps

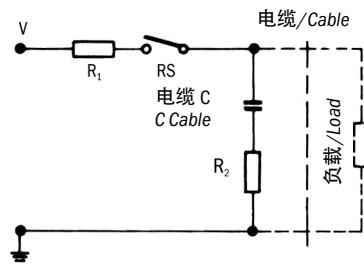


图4 Fig. 4

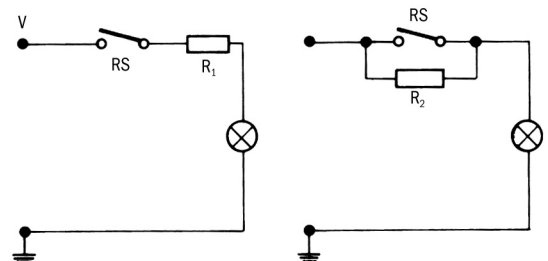


图5 Fig. 5 用并联或者串联的方式将灯、电阻与转换开关连接的线路。
 Lamp load resistance in parallel or in series with switch.

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