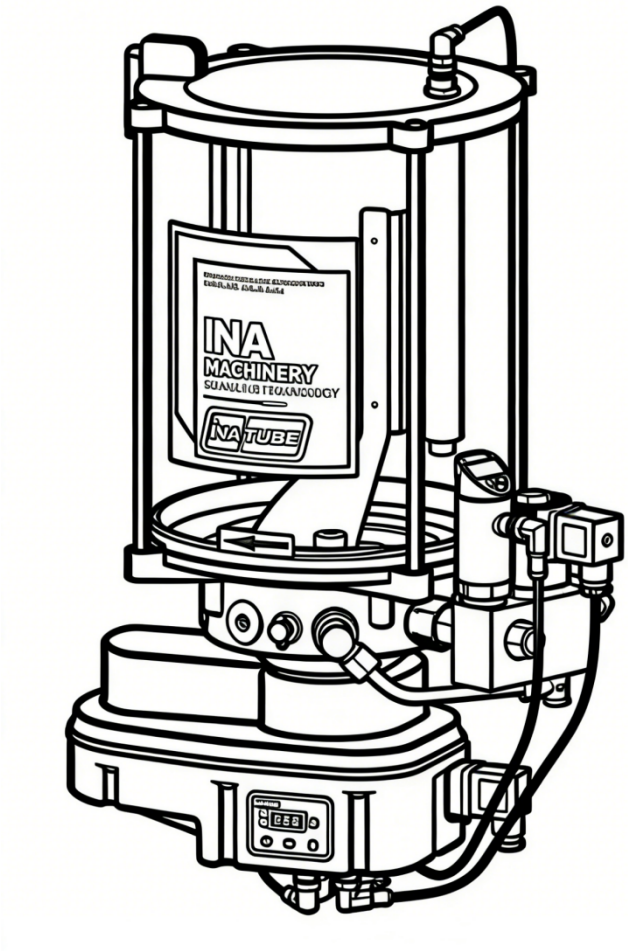
LUBElite™菁英系列单线式
集中润滑系统操作手册



上海毅那机械科技有限公司

目录

安全

本装置仅可由熟悉本使用说明的人员进行安装、维护与维修作业。

设备闲置不用时，务必切断所有动力源（电力、气源或液压源）。

本设备会产生高压。操作设备时须极度谨慎，若零部件松动或破裂发生介质泄漏，高压流体可穿透皮肤进入人体。一旦发现有流体渗入皮肤，必须立即就医，切勿将伤情当作普通割伤处理，并需如实告知接诊医生侵入体内的流体类型。

凡未按本说明书规定进行违规使用，将自动丧失保修及追责索赔权利。

- 严禁违规使用、超压运行、私自改装零部件，禁止使用不相容的化学介质、流体，以及磨损或损坏的零部件。
- 不得超过设备额定最大工作压力，也不得超过系统中最低额定值部件的工作压力。
- 务必阅读并遵循制造商关于流体相容性、防护服装及防护用具使用的相关建议。
- 若未遵守上述要求，可能造成人身伤害和、或设备损坏。
- 必须严格遵守国家法律法规及各项安全防事故管理规定。

安全警示用语释义

须知

本项内容着重提供实用提示与建议，同时说明相关注意事项，用以防止财产损失，并保障设备高效、无故障平稳运行。

注意

表示若忽视防护措施，将可能引发出现轻微人身伤害的危险状况。

警告

表示若忽视防护措施，将可能引发造成严重人身伤害的危险情形。

危险

表示若忽视防护措施，会导致造成死亡或重伤的危险状况。

警告

未阅读并完全理解安全警示及操作说明前，严禁操作本设备。

未遵守安全警示和操作说明，可能导致严重人身伤害。

注意

未佩戴个人防护装备，严禁操作设备。

必须佩戴护目镜。根据工况佩戴防尘口罩、防滑安全鞋、安全帽、听力防护用品等防护装备，可有效降低人身伤害风险。

未按要求执行，可能造成轻微人身伤害。

警告

严禁超过设备标定的最大工作压力，亦不得超过系统中额定等级最低部件的工作压力。

本设备会产生极高油脂压力，操作时务必格外谨慎。

若未遵守本要求，可能造成轻微人身伤害。

警告

严禁使用本设备输送、转运或存放危险物质及混合物。

通用须知

- 在工程机械、道路车辆、通用机械、机床等工业设备上进行安装作业时，必须遵守当地安全防事故规程及相关设备操作与维护说明书。
- 安全防护装置
  - ✧ 严禁因安装润滑系统而擅自改动任何安全防护装置，不得永久拆除设备及设施原有防护装置（如防护栏、防护罩、安全锁等）。
  - ✧ 仅可在安装润滑系统时，按作业要求并获得相关许可后，临时拆除安全防护装置；润滑系统安装完毕后，须立即恢复原有安全防护装置。
- 润滑系统须远离热源，不得在允许工作温度范围以外（高温或低温环境）放置和使用。
- 必须使用原厂配件或授权合规配件。
- 系统可能处于带压状态，进行维护、调节及相关作业前，必须先释放系统压力。
- 务必使用洁净润滑脂。
- 本系统为自动运行，但强烈建议用户每两周定期检查一次，确保润滑脂能够正常输送至各润滑点。

合规润滑剂

- 润滑脂稠度等级为 NLGI 2 及以下。
- 若需选用不符合上述要求的润滑剂，或无法确定所选润滑剂中的特殊添加剂是否会对润滑部件产生影响，请咨询厂家。

运输与储存

- LUBElite 菁英系列润滑泵站按相关国际标准进行销售与包装，符合危险品公路、铁路、航空及海运的国际设计运输要求。
- 包装完好的润滑泵站在搬运、运输过程中须轻拿轻放，避免造成不必要的损坏。
- 润滑泵站可存放于-40 ℃ ～ +70 ℃的干燥环境中。

免责声明

对于因下列情形造成的损坏，我方不承担任何直接、间接及连带责任与相关义务：

- 因润滑脂缺失造成的损坏。
- 因选用不合规润滑脂造成的损坏。
- 因安装、使用非授权配件造成的损坏。
- 因擅自改装润滑系统部件造成的损坏。

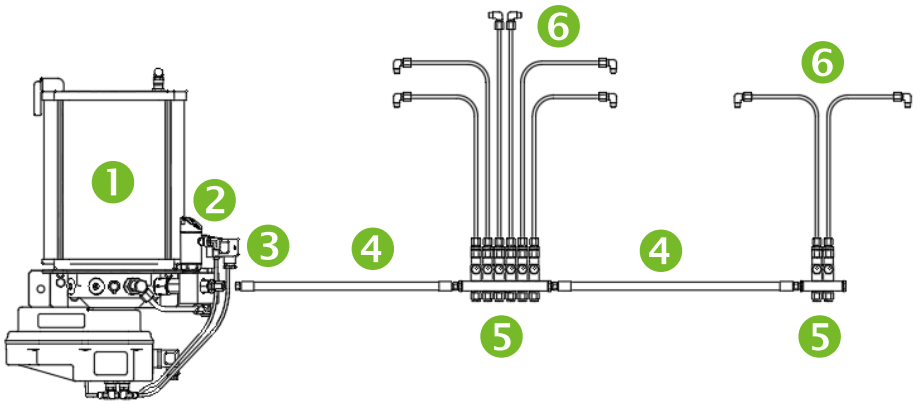
- 因未按规范工况使用设备造成的损坏。
- 因安装错误或管路连接不当造成的损坏。
- 因电气接线错误造成的损坏。
- 因程序设置错误造成的损坏。
- 因故障排查及处理操作失误造成的损坏。

概述

LUBElite 21 系列电动单线润滑泵适用于工程机械、道路车辆、通用机械、机床及其他工业设备。适用润滑脂等级最高可达 NLGI 2 号脂。每台润滑泵配置一个出油口，为一套单线润滑回路供油。

泵站主要由储油筒、无刷电机总成、泵芯组件、安全阀、控制器、压力开关、电磁阀及其他附件组成。

当泵单元①开始工作时，电磁阀③同步关闭。润滑脂经主油路④输送至单线分配器⑤。润滑脂通过润滑点管路⑥送至各润滑点位后，单线分配器⑤关闭内部通道。主油路④内压力持续升高，直至达到压力开关②的设定值。泵单元①接收到压力开关②的信号后停止运转，同时电磁阀③保持开启状态；分配器⑤内部弹簧作用力将分配器及主油路内剩余润滑脂压回储油筒。待间歇时间结束后，泵单元①及整套润滑系统重新启动，进入下一个润滑循环。



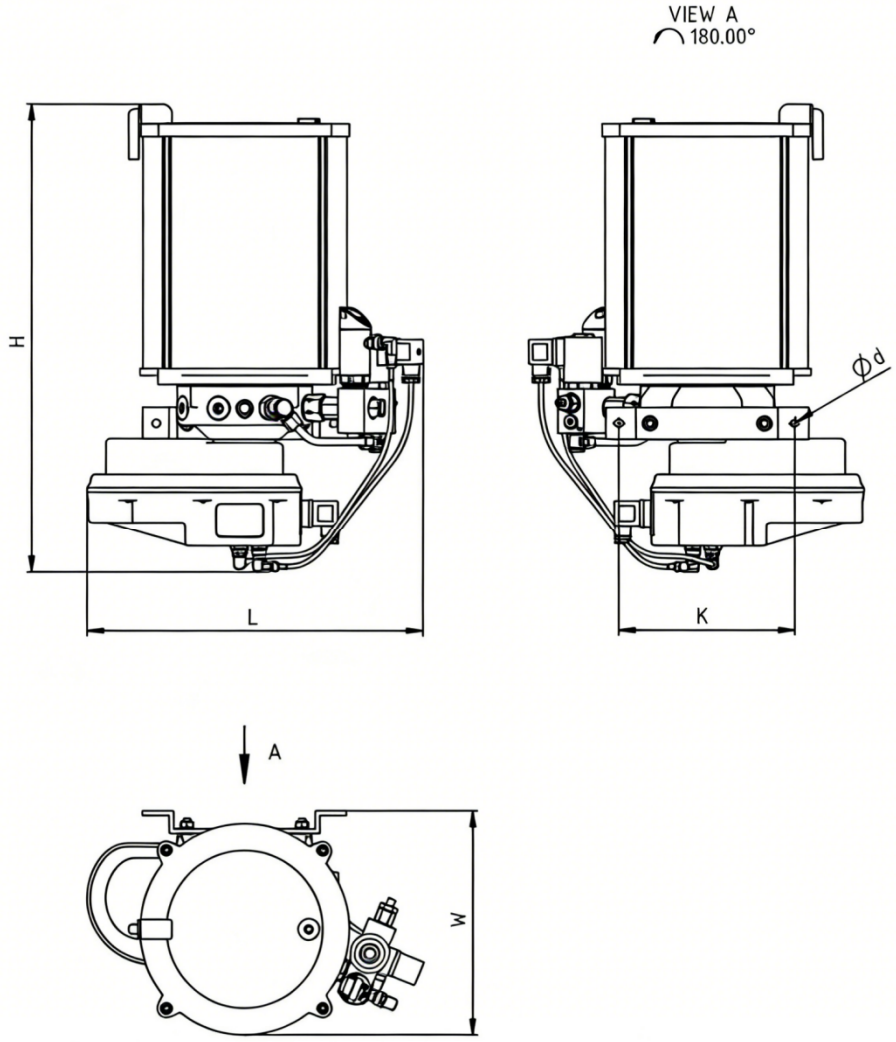
① 润滑泵
② 压力开关
③ 电磁阀
④ 主管路
⑤ 单线注油器
⑥ 润滑点管路

技术参数

工作电压	DC 24 V 或 AC 230V/50 Hz
额定功率	< 100 W
电源连接	DIN 43650 A
防护等级	IP 66
泵出油量	6.0 cm^3/min
出口螺纹	1 x G 1/4
工作压力	210 ~ 345 bar 可调，预设 250 bar
油箱容积	8, 10 L
补油口	DIN 71412 A 和、或顶盖加油
润滑剂	NLGI 0, 1, 2
工作温度	-41 °C ~ +70 °C
安装方式	竖直安装

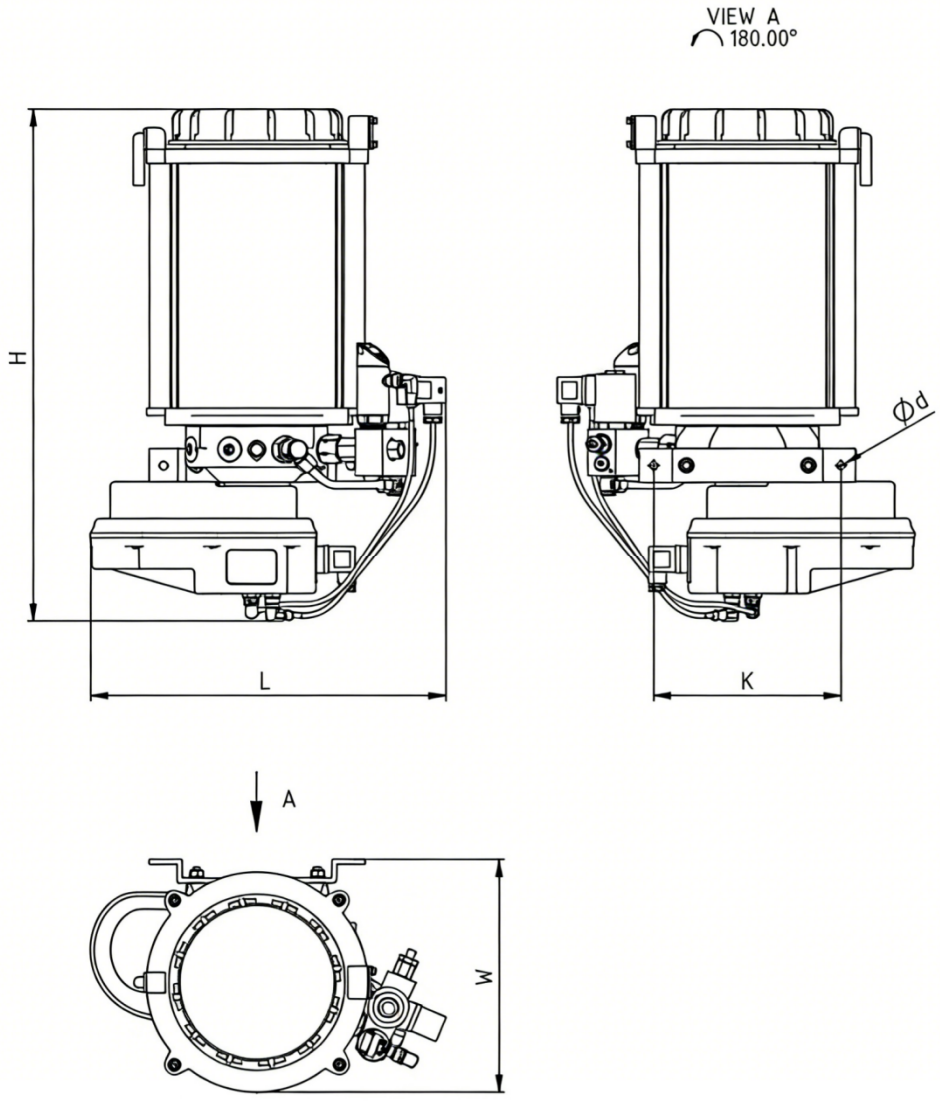
润滑泵外形尺寸

■ *无顶盖加油*



型号	油箱（L）	顶盖加油	工作电压	H (mm)	W (mm)	L (mm)	K (mm)	Ød (mm)
LEP213M...	8	/	DC 24V or AC 230V/50Hz	525	250	380	200	9
LEP2110M...	10	/		555				

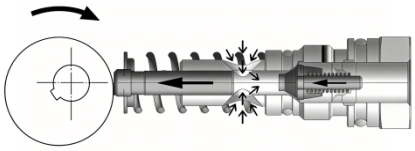
■ *有顶盖加油*



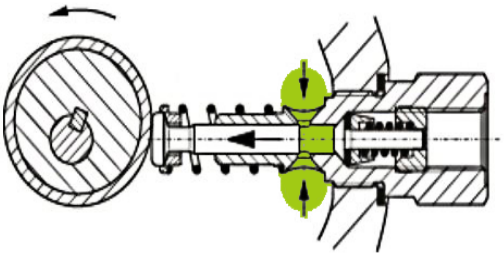
型号	油箱 (L)	顶盖加油	工作电压	H (mm)	W (mm)	L (mm)	K (mm)	Ød (mm)
LEP213MT...	8	有	DC 24V or AC 230V/50Hz	545	250	380	200	9
LEP2110MT...	10	有		575				

泵芯

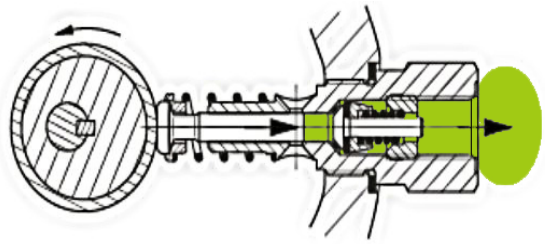
LUBElite 21 系列单线润滑泵配置一个泵芯，输出排量为 6 cm^3/min。泵芯为弹簧复位式结构。泵芯型号规格如下：

泵芯	型号	类型	驱动方式	排量 (cm^3/min)	安装螺纹	出口螺纹
	IBX - 4E	Normal	Spring return	6.0	M20x1.5	G 1/4

■ ***工作原理***



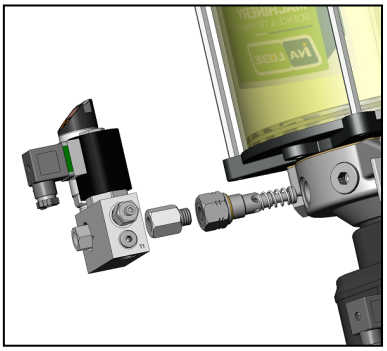
抽油阶段

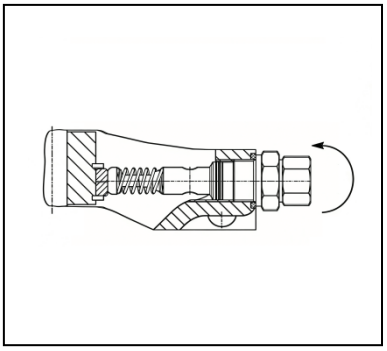


出油阶段

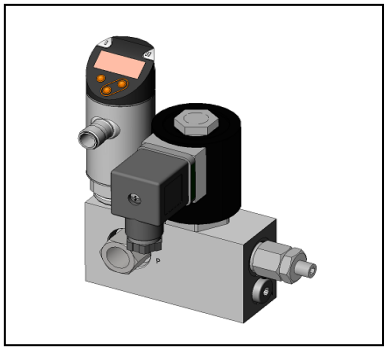
■ ***IBX 泵芯安装步骤***

1. 必须在泵停机非工作状态下，方可进行泵芯的安装与拆卸。
2. 准备配套密封环及扳手工具。
3. 安装时将泵芯水平放置，使泵芯出油口与泵体安装接口保持同心。
4. 将泵芯拧紧固定在泵体接口上，随后开机试运行，观察泵口是否有润滑脂正常排出。
5. 拆卸顺序与安装顺序相反。



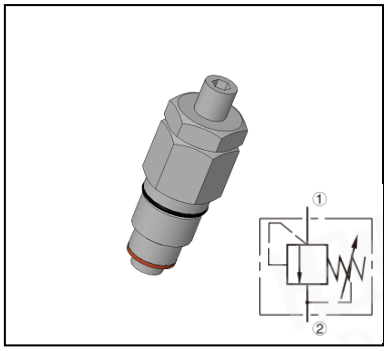


单线阀组



这个阀组件是单线润滑系统中的一个核心功能件。它主要由阀块，安全阀，压力开关和两位两通电磁阀组成。其中压力开关和电磁阀都是 24VDC 电源，且已经和泵的控制器做好了电气连接。

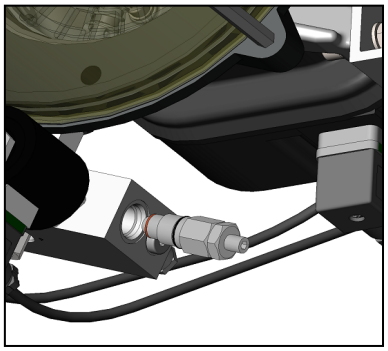
■ *安全阀*



插装式安全阀安装在单线功能阀总成内，用于保护整个润滑系统免受超压损坏。

安全阀开启压力可在 210～345 bar 范围内调节（出厂预设 250 bar）。若油泵运行时压力开关与电磁阀出现故障，导致系统压力异常升高，安全阀将自动开启油脂泄油通路进行泄压，从而保护整套润滑系统。

无特殊原因，请勿更改压力设定值。

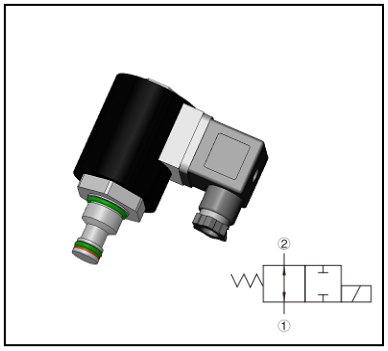


警告

当润滑泵运转但单线分配器不出脂时，说明润滑系统存在管路堵塞故障。请全面检查整套润滑系统并尽快排除故障，否则将造成润滑系统及被润滑机械设备损坏。

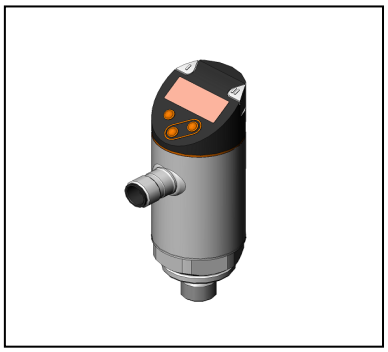
■ ***2 位 2 通电磁阀***

该电磁阀为常开型。它和润滑泵电机做了捆绑联动，当泵工作时，电磁阀关闭，润滑脂顺利输出到润滑点，当泵停止时，电磁阀打开，让主管路中的油脂能顺利泄压回到油箱里



■ ***压力开关***

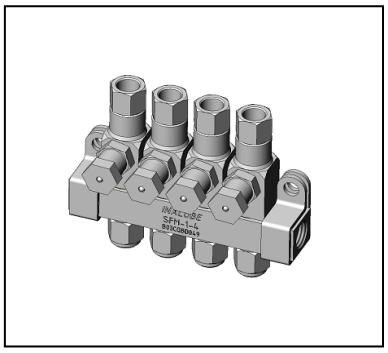
该压力开关为数字量 PNP 型，带有数显屏和按键，方便设置和读取压力值。关于压力开关的参数设置方法，请参考压力开关使用说明书。



SFM-1 单线注油器

SFM-1 系列单线分配器设有 1-6 个出油口。所有规格型号均包含多个计量单元及一个并口块。

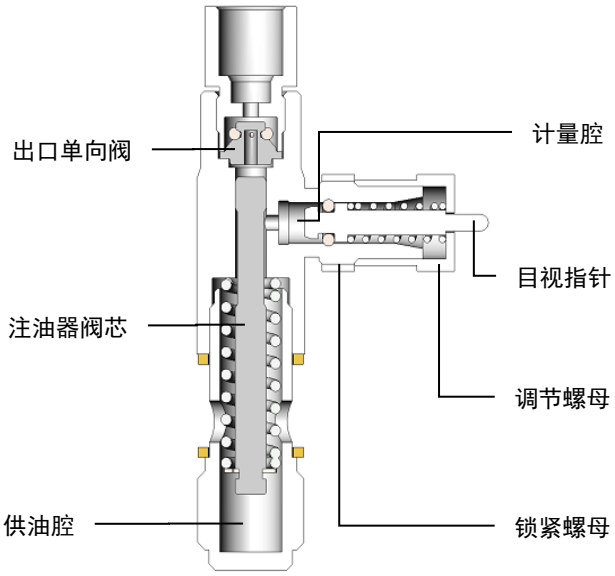
每个出油口单次排量 0.015-0.3 cm³/行程，可调，最高工作压力 240 bar。

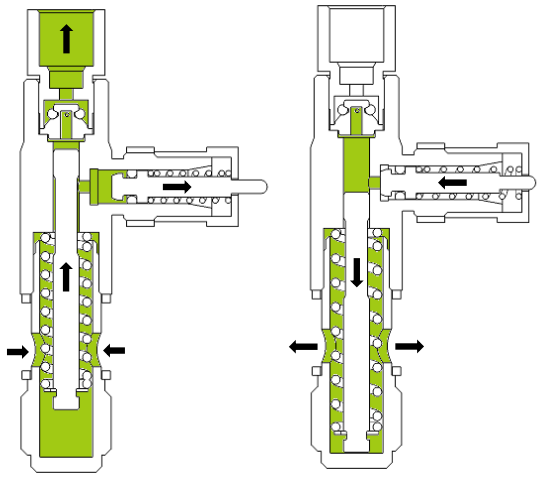


■ ***注油器工作原理和调节方法***

松开锁紧螺母，再旋转调节螺母即可调节油脂排量。顺时针旋转减小出油量，逆时针旋转增大出油量。调节完成后，拧紧锁紧螺母以固定排量。

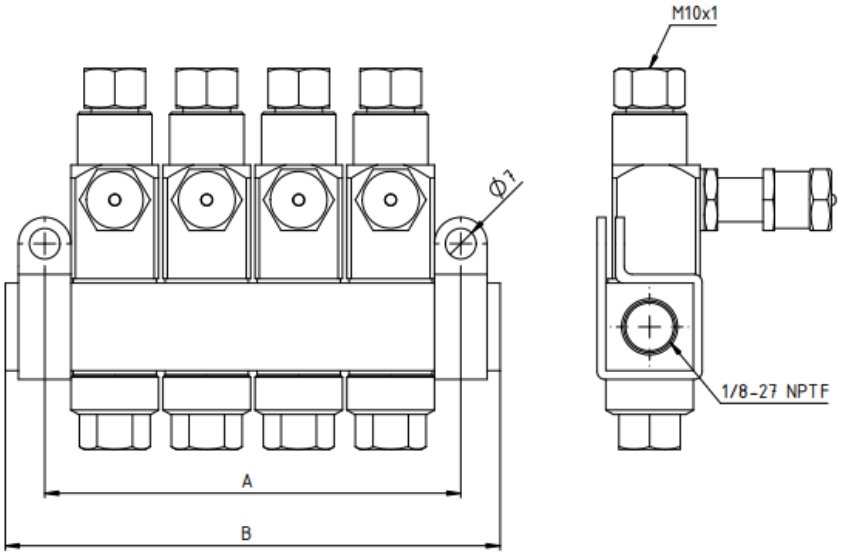
注油器工作时，目视指针会随主管路的加压、卸压过程做前后往复运动。若注油器任意一个出油口发生堵塞，其余注油器及整套润滑系统仍可正常运行。





加压阶段　　泄压阶段

注油器外形尺寸

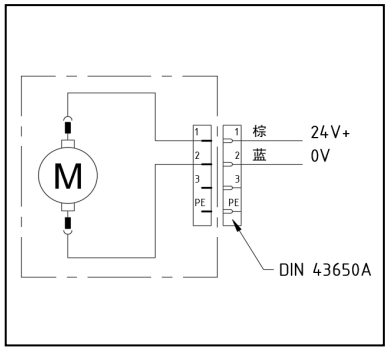


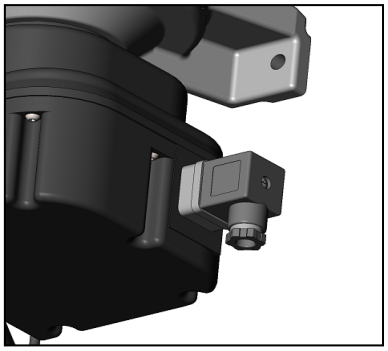
型号	A (mm)	B (mm)
SFM-1-1	32	50
SFM-1-2	53	71
SFM-1-3	74	92
SFM-1-4	95	113
SFM-1-5	116	134
SFM-1-6	137	155

润滑泵电气连接

■ *电源接线*

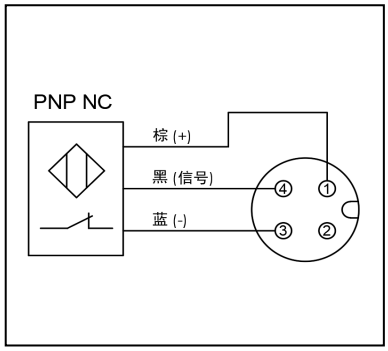
针脚	电线颜色	连接
1	棕	24 V+
2	黑	0V

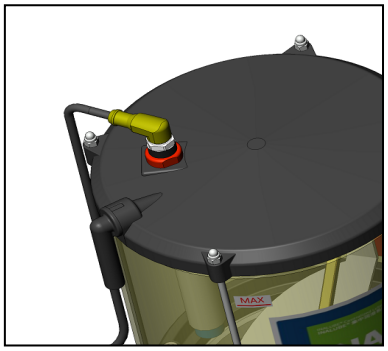




■ *低液位开关接线（红色螺母）*

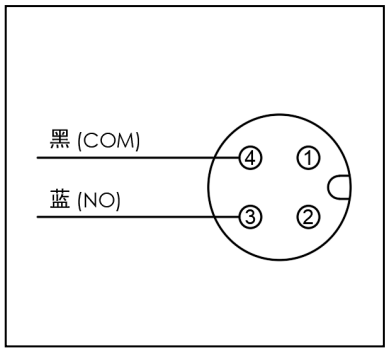
针脚	电线颜色	连接
1	棕	24 V+
3	蓝	0V
4	黑	液位报警 PNP





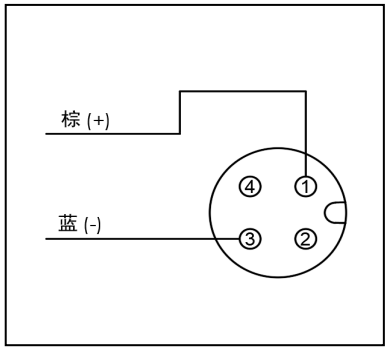
■ *远程报警接线（橙色螺母）*

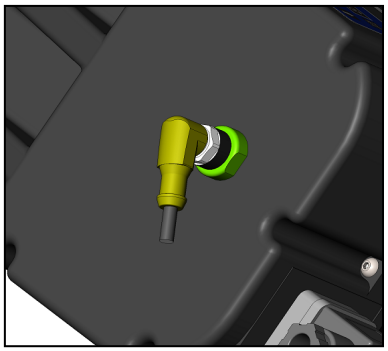
针脚	电线颜色	连接
3	蓝	NO
4	黑	COM



■ *远程启动接线（绿色螺母）*

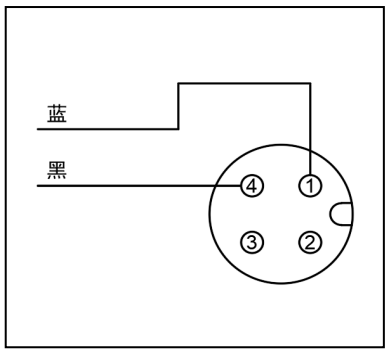
针脚	电线颜色	连接
1	棕	+
3	蓝	-

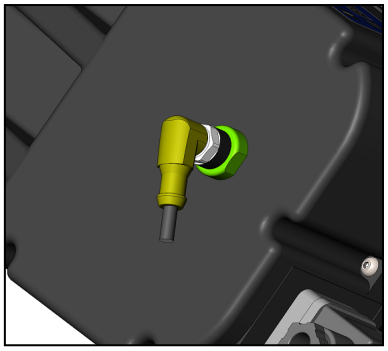




■ ***MODBUS 接线（绿色螺母）***

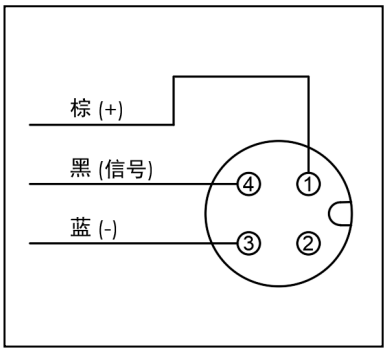
针脚	电线颜色	连接
1	棕	A
4	黑	B

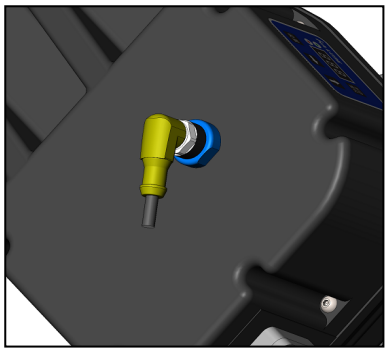




■ ***压力开关接线（蓝色螺母）***

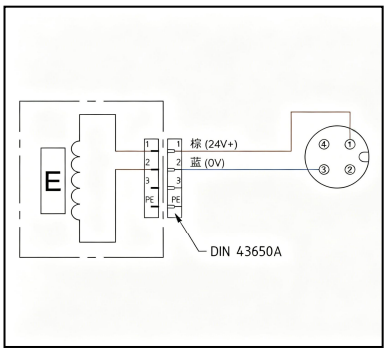
针脚	电线颜色	连接
1	棕	24 V+
3	蓝	0V
4	黑	压力信号 PNP

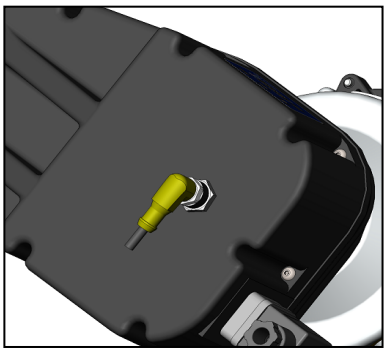




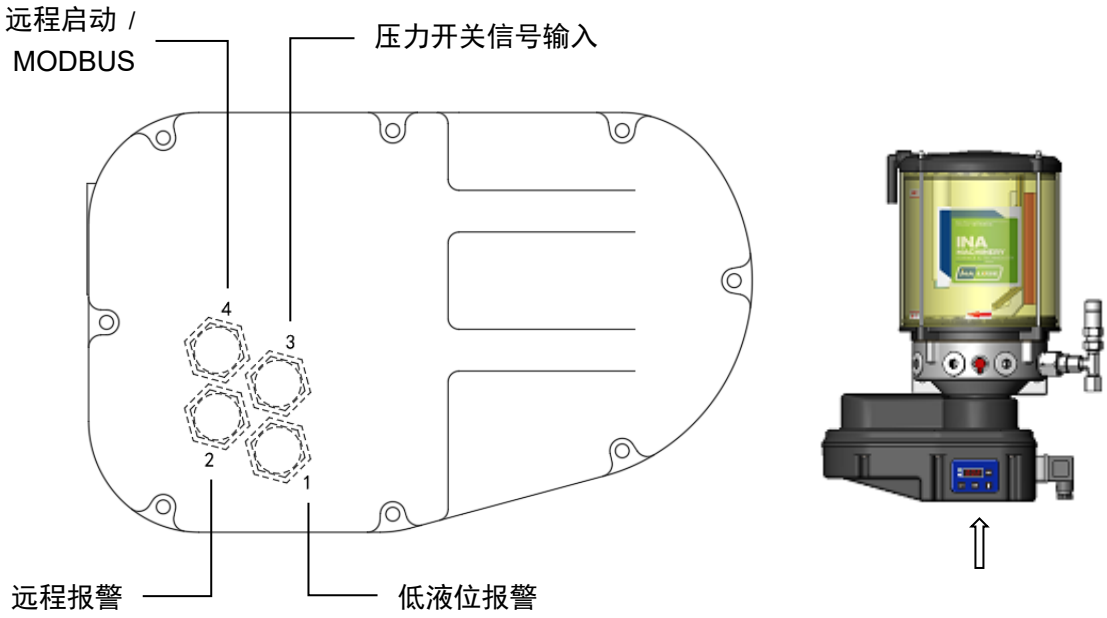
■ ***电磁阀接线（镀锌螺母）***

DIN 标插头		
针脚	电线颜色	连接
1	棕	24 V+
2	蓝	0V
M12 插头		
针脚	电线颜色	连接
1	棕	24 V+
3	蓝	0V





信号端口

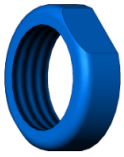


注意！ 电磁阀默认安装接口为 2 号接口。若 2 号接口已占用，可更换至下一接口使用。

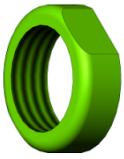
■ ***信号连接端口彩色螺母***

#1 端口：低液位报警连接端

#2 端口：远程报警连接端



#3 端口：压力开关信号输入连接端



#4 端口：远程启动 / MODBUS 连接端

端口：电磁阀连接端

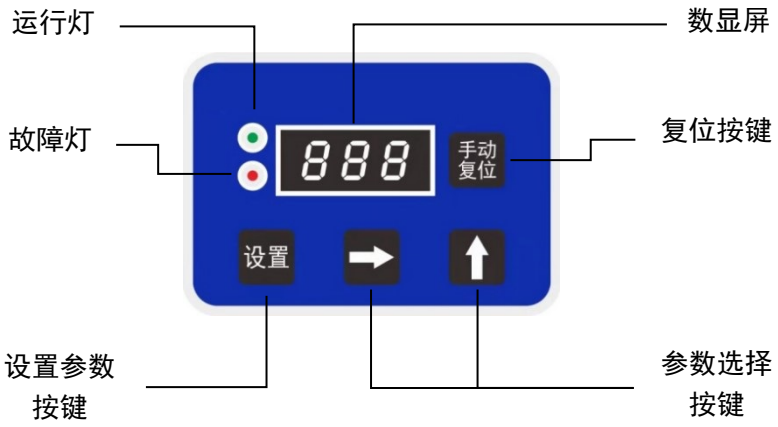
控制系统

■ ***无集成控制器***

无需设置参数，泵接通电源即可启动运行。

■ ***数显按键控制器***

控制器通过面板薄膜实现防潮、防杂质防护。根据控制面板薄膜颜色不同，控制器适配两种程序模式：蓝色面板薄膜代表间隔时间单位为小时；绿色面板薄膜代表间隔时间单位为分钟。



警告

请勿使用有机溶剂擦拭面板薄膜。如需清洁面板，可用软布蘸取中性洗涤剂擦拭。禁止用尖锐物品刮划，以免损坏面板薄膜。

■ ***显示屏***

888 显示运行参数和运行状态。

■ ***指示灯***

指示灯常亮，代表指示灯持续稳定点亮。指示灯闪烁：以点亮 0.5 秒、熄灭 0.5 秒的频率循环闪烁。

■ ***控制器按键***

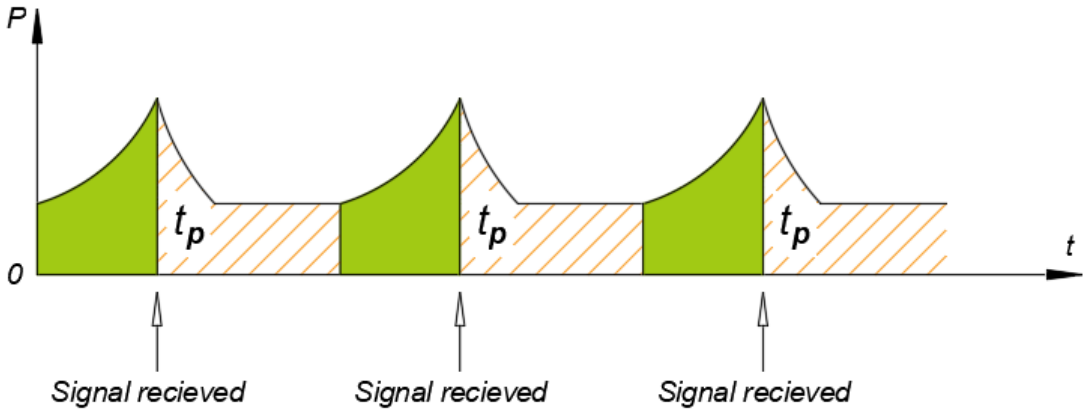
显示屏 888 以数字形式显示时间，单位为分钟或小时。工作时间可调范围：1-999 分钟；间隔时间可调范围：1-999 分钟或小时。当泵运行时，绿灯常亮；当泵停止运行时，红灯常亮；设置参数或报警状态时，红、绿灯同步闪烁。

■ ***工作模式***

控制器包含三种工作模式：d-1、d-2、d-3。LEP 单线润滑泵仅可使用 **d-2** 模式。

润滑泵启动后，管路压力上升，单线注油器向各润滑点输送润滑脂。待所有注油器完成一次往复动作后，系统压力会继续升高，直至达到压力开关的设定压力值。泵接收到压力开关信号后停止运转，系统进入暂停周期（t_p）。暂停周期结束，系统自动进入下一个润滑循环。

若工作周期结束后未检测到压力开关信号，系统将自动报警，显示屏弹出故障代码 **ErP**，红绿指示灯同步闪烁。按下 手动复位 指定按键即可清除报警。



■ ***强制工作***

按下控制面板上的复位键 手动复位 ，润滑泵将按照运行程序设定的工作模式，强制重新执行一次完整润滑流程。

■ ***电源异常保护***

控制器具备断电保护功能。若泵运行过程中断电，再次上电时，泵将从上次工作断点继续运行。若在间歇阶段断电，系统会记录断电时的剩余间歇时长，重新上电后，将接续上次未完成的间歇时间继续计时运行。

参数设置

设置键、移位键、加键用于参数设定。手动复位键用于强制启停控制。指示灯用于显示控制器工作状态，显示时间单位为分钟或小时。

■ ***显示***

泵运行中或设置泵运行时间时，显示屏指示灯为绿色。

泵处于停歇状态或设置泵停歇时间时，显示屏指示灯为红色。

按住 设置，红绿指示灯同时熄灭，显示屏进入工作模式选择状态。仅绿灯亮起时，显示屏为工作时间设置状态；仅红灯亮起时，显示屏为间歇时间设置状态。

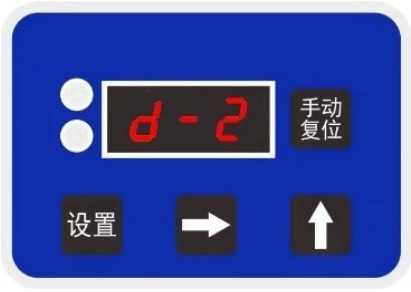
按 →，可选择需要修改的数码管数位。再按 ↑，对应位数数字可在 0-9 之间循环切换。

红绿指示灯同步闪烁时，系统触发故障报警，显示屏将显示报警代码（具体报警代码说明详见故障排查章节）。长按 手动复位 即可解除故障报警。

■ *工作模式设置*

第 1 步：

长按 设置 进入润滑系统工作模式设置（红、绿灯同时熄灭），再按 ↑ 选择 ***d-2*** 定时工作模式。



第 2 步：

长按 设置 键，进入压力开关信号最长接收时间设置模式（此时绿灯闪烁）。按 → 切换数位，按 ↑ 调整当前数位数字。长按 ↑ 可快速滚动数值，在 0-9 之间循环切换。设置取值范围：***001-999*** 分钟。

第 3 步：

长按 设置 进入间歇时间设置（红灯闪烁），按 → 选择调节数位，再按 ↑ 设置该数位数值。长按 ↑，可在 0-9 之间快速循环切换数值。设置范围：***001-999*** 分钟（或小时）。

第 4 步：

长按 设置 确认设置，显示屏将返回显示已设定的压力开关信号最长接收时间，设备开始正常运行。若 ***30*** 秒内无任何按键操作，本次设置将自动失效，系统恢复为原有设定参数。

操作与维护

■ *清洁*

润滑系统的日常必要维护工作：需定期向油箱补充润滑脂，并定期检查润滑脂是否正常输送至各润滑点。同时检查润滑管路有无破损、渗漏，如有损坏请及时更换。

使用集中润滑系统时，应特别保证润滑脂的清洁度。

警告

向油箱加注润滑脂时，须保证作业环境干净整洁，且只能使用专用工具加注洁净润滑脂。否则固体杂质进入系统，将会造成润滑系统堵塞等严重故障！

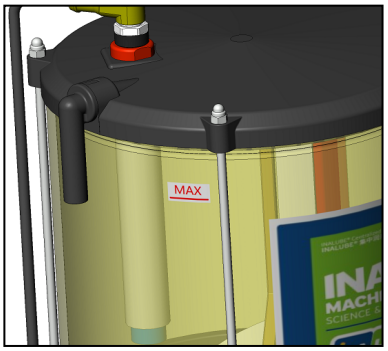
警告

禁止使用全氯乙醚、三氯乙醚及同类溶剂作清洗剂，也不得使用乙醇、甲醇、丙酮等极性有机溶剂及其同类产品。否则将造成油箱开裂。

■ *填充润滑剂*

给泵油箱加注润滑脂时，油位不得超过最高刻度线（MAX 上限刻度线）。所用润滑脂须为 NLGI 2 及以下润滑脂，油品必须洁净无杂质，使用过程中保持粘度稳定。

若油箱完全空了后再补加润滑脂，需静置等待 20 分钟，方能达到设定出油量。



警告

严禁拆卸油箱上盖进行加注！此种方式会导致杂质与气泡混入润滑脂中，造成润滑系统堵塞或供油异常，严重时还会损坏轴承！

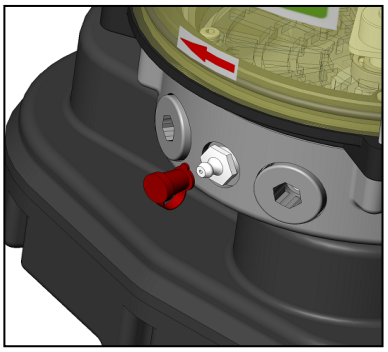
须知

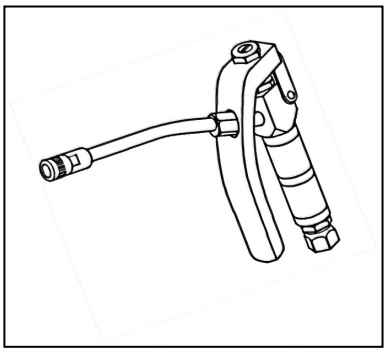
市面上绝大多数润滑脂均不会对润滑系统造成损害。若不确定润滑脂中的特殊添加剂是否会损伤润滑系统，请在加注前联系供应商技术人员进行确认。

■ *补油口*

✧ **DIN 71412 A 锥形黄油嘴**

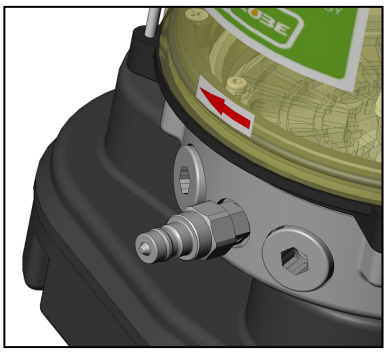
该补油口出厂标准配置，可使用普通黄油枪加注润滑脂。

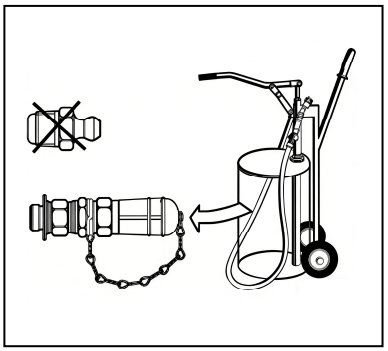




✧ **ISO 7241 A 液压快速接头**

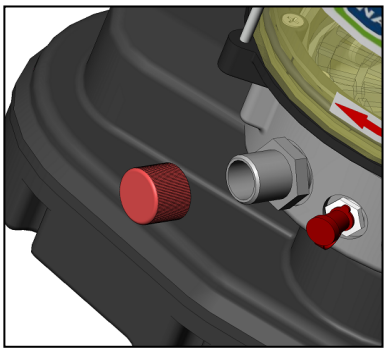
拆下润滑泵上的黄油嘴，换装液压快速接头，通过该液压接头进行润滑脂加注。

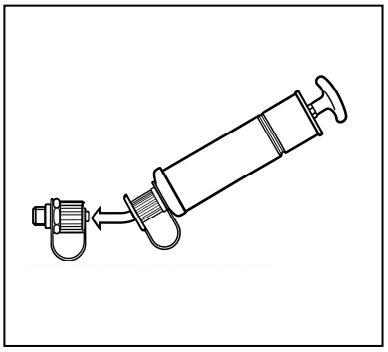




✧ **油脂填充桶**

拆下润滑泵上任意一个泵芯安装口堵头，换装润滑脂加注专用接头。





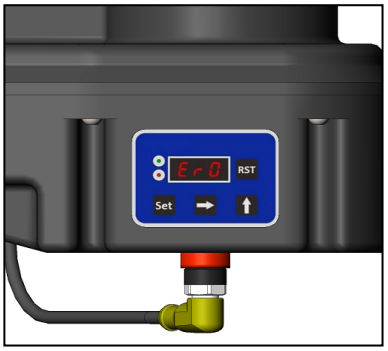
■ ***填充液位确认***

✧ **目视检测**

透明油箱便于进行目视观察。为了润滑系统安全，这种检查需要经常定期进行。

✧ **自动检测**

润滑泵可选配低液位开关。当油箱中润滑剂液位低于 MIN 标记时，润滑泵自动停止工作，数显屏显示  故障信号，红绿灯同时闪烁报警。



警告

当润滑脂油位低于 MIN 最低刻度线时，须立即补加润滑脂；否则空气会混入润滑系统，进而引发系统故障！

须知

当给油箱补充油脂时，不允许超过油桶上标记的最高液位线 MAX。

■ ***系统排气***

1. 拆下润滑泵上的主油管，启动油泵运转，直至排出的润滑脂无气泡后，重新接好主油管。
2. 拆下主分配器入口处的主管道，启动油泵，直至排出的润滑脂无气泡后，重新接好主管道。
3. 拆下主分配器出口处的分支管路，启动油泵，直至排出的润滑脂无气泡后，重新接好分支管路。
4. 按照以上步骤依次对各分支管路、次级分配器以及通往各润滑点的管路进行排气操作。

警告

润滑系统运行前必须进行系统排气，否则将导致润滑系统无法正常工作！

■ ***维修润滑泵***

维修保养必须使用原厂配件。在质保期内或需要大修时，请将润滑泵寄回原厂进行维修。

■ ***更换泵芯***

从泵芯上拆下安全阀。拆卸泵芯时，注意防止零件落入油箱内部，以免妨碍电机运转。若零件不慎落入油箱内，则需先拆下油箱，取出掉落零件，再更换新的泵芯及密封圈。

■ ***系统测试***

通过手动启动附加润滑周期，可检查润滑系统运行是否正常。启动附加润滑周期后，润滑泵将向各润滑点输送润滑脂。

1. 检查各管路有无渗漏。
2. 确认各润滑点是否有润滑脂送达。
3. 核查运行与间隔时间设置是否准确。如有需要，可重新设定润滑周期。

故障排查

■ *电机及泵故障*

故障	可能原因	排除方法
泵不工作	没有供电	检查电源及熔断器，排查故障或更换新熔断器。
		检查从熔断器至润滑泵电源插头之间的线路。
	电机故障	检查电机供电线路，必要时更换电机。
泵工作但不出油	油箱空了	向油箱加注润滑脂，启动油泵，直至润滑点有油脂流出。 *备注：油泵需运行 10-20 分钟才能达到设定排量（与环境温度及润滑脂型号有关）。*
	润滑剂含有气泡	松开溢流阀出油口接头或主油管，启动附加润滑周期，待润滑脂流出无气泡后，重新拧紧接头。 *备注：使用快插接头时，高压软管在带压状态下难以从安全阀上拆卸；需先松开安全阀的堵头或应急油嘴进行泄压。*
	润滑油脂选用不当	更换符合规格要求的润滑脂。
	泵芯吸油口堵塞	拆下泵芯，清除内部杂物污物。
	泵芯磨损	更换泵芯。
	泵芯单向阀损坏或卡滞	更换泵芯。
泵报 "ErP" 故障码	压力开关不发送信号	检查设定压力值是否高于溢流压力。若是，则对其中任意一项进行调节。
		检查压力开关是否因污物堵塞卡滞。若存在卡滞，则对其进行清洁处理。
		检查压力开关是否损坏。如有损坏，更换新件。

■ *故障监控与处理*

当控制器检测到系统故障时，控制面板上的红绿指示灯将同时闪烁，提醒用户润滑系统发生故障。此时润滑系统停止运行，等待用户进行故障处理，具体故障原因可通过显示屏查看。

✧ **故障代码含义**

	润滑泵运行时，未接收到压力开关的信号。
	润滑泵运行时电机电流低于 0.2A。
	润滑泵运行时电机电流大于 5A。
	润滑泵运行时，润滑脂液位低于最低液位。
	输入电源供电不足或控制器存储容量不足。

✧ **清除故障信号**

解决了故障后，按下复位键 手动复位 ，控制器即可清除故障信号，重新进入运行状态。

声明：

未经许可，不得全部或部分引用、复制本说明书中的内容。我们已尽可能确保该说明书中的内容准确无误。对未经我司认可、使用本说明书中提及的任何技术和相关产品，我司不承担由此带来的任何直接、间接和连带责任。

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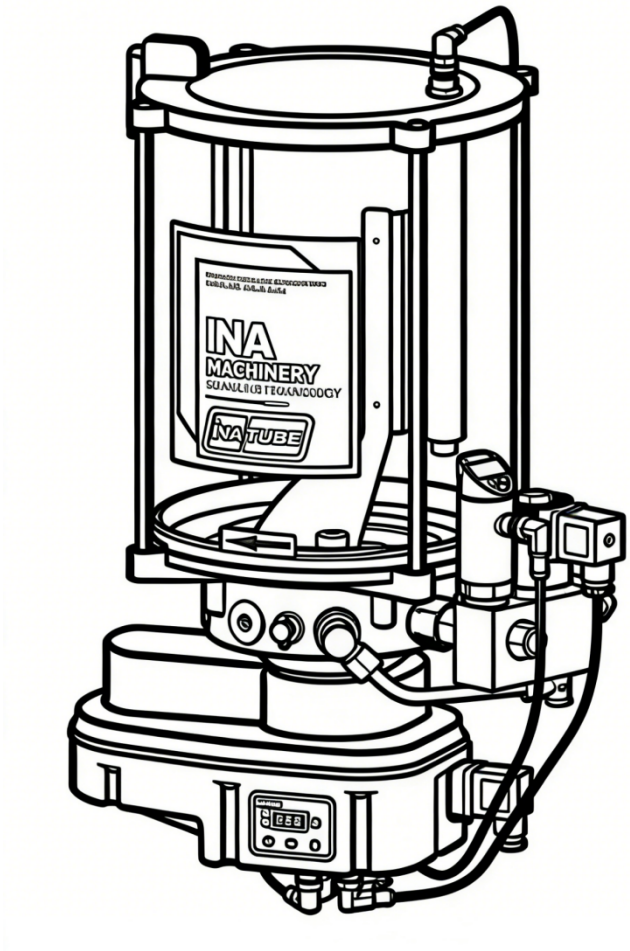
LUBElite™ Single-line
Centralized Lubrication System User Manual



Shanghai INA Machinery Science & Technology Co., Ltd

Content

Safety

The assembly must be installed, maintained and repaired exclusively by persons familiar with the instructions.
Always disconnect power supply (electricity, air or hydraulic) from the equipment when it is not being used.
This equipment generates high pressure. Extreme caution should be used when operating this equipment as material leaks from loose or ruptured components can inject fluid through the skin and into the body. If any fluid appears to penetrate the skin, seek attention from a doctor immediately. Do not treat injury as a simple cut. Tell attending doctor exactly what type of fluid was injected.
Any other use not in accordance with instructions will result in loss of claim for warranty or liability.

- Do not misuse, over-pressurize, modify parts, use incompatible chemicals, fluids, or use worn and/or damaged parts.
- Do not exceed the stated maximum working pressure of the equipment or of the lowest rated component in your system.
- Always read and follow the manufacturer's recommendations regarding fluid compatibility, and the use of protective clothing and equipment.
- Failure to comply may result in personal injury and/or damage to equipment.
- Strictly follow National laws, regulations, and regulations on accident prevention.

Explanation of signal words for safety

NOTE

Emphasizes useful hints and recommendations as well as information to prevent property damage and ensure efficient trouble-free operation.

CAUTION

Indicates a dangerous situation that can lead to light injury if precautionary measures are ignored.

WARNING

Indicates a dangerous situation that can lead to serious injury if precautionary measures are ignored.

DANGER

Indicates a dangerous situation that can lead to death or serious injury if precautionary measures are ignored.

WARNING

Do not operate equipment without reading and fully understanding safety warnings and instructions.

Failure to follow warnings and instructions may result in serious injury.

CAUTION

Do not operate equipment without wearing personal protective gear. Wear eye protection. Protective equipment such as dust mask, non-skid safety shoes, hard hat, or hearing protection used for appropriate conditions will reduce personal injuries.
Failure to comply may result in light personal injury.

WARNING

Do not exceed the stated maximum working pressure

of the equipment or of the lowest rated component in your system. Use extreme caution when operating equipment as equipment generates very high grease pressure.
Failure to comply may result in light personal injury.

WARNING

Do not use this equipment to supply, transport, or store hazardous substances and mixture.

General reminder

- When carrying out installation on industrial equipment such as construction machinery, road vehicles, general machinery, machine tools, etc., the local accident prevention regulations and the relevant operating and maintenance instructions must be observed.
- Safety equipment
  - ✧ Under no circumstances shall any safety equipment be changed due to the installation of lubrication system, and the original safety equipment (such as fence, protective cover, safety lock, etc.) on equipment and facilities shall not be permanently removed.
  - ✧ Safety equipment may only be temporarily removed when lubrication systems are installed, as required and with relevant permission. After the lubrication system is installed, the original safety equipment should be restored immediately.
- Lubrication systems must be kept away from heat sources and must not be placed outside the allowable operating temperature range (e.g. high or low temperature).
- Original parts or licensed parts must be used.
- The system may be under pressure. The pressure must be relieved before starting maintenance, adjustment or related operations.
- Make sure to use clean grease.
- Although the system works automatically, we strongly recommend that users need periodic checks every two weeks to ensure that lubricants are properly distributed to lubrication points.

Approved lubricant

- Lubrication grease viscosity is NLGI 2 or below
- If you need to choose lubricants that do not meet the above conditions or are uncertain about the influence of special additives in the selected lubricants on lubrication parts, please consult factory.

Transportation & storage

- LUBElite series lubrication pump stations are sold and packaged in accordance with relevant international standards, which meet the international design requirements of road transportation,

railway transportation, air transportation and sea transportation of dangerous goods.

- Packed lubrication pump station in the process of transportation and handling, need to be handled with care, to prevent unnecessary damage.
- The lubrication pump station can be stored in a dry space between -40 °C ~ + 70 °C.

Exemption from liability

Do not assume any direct or indirect, joint and several liabilities and obligations for the damage caused by the following circumstances:

- Damage caused by lack of lubrication grease.
- Damage caused by the use of inappropriate lubrication grease.
- Damage caused by installation and use of unauthorized parts.
- Damage caused by unauthorized modifications to lubrication system parts.
- Damage caused by use not in accordance with normal use.
- Damage caused by incorrect installation or piping connections.
- Damage caused by incorrect electrical connections.
- Damage caused by program setup error.
- Damage caused by misoperation of troubleshooting.

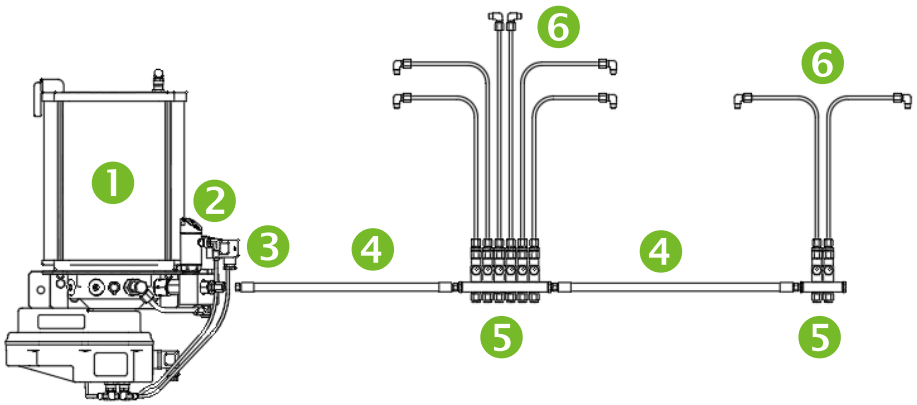
Overview

LUBElite 21 series electric single-line lubrication pumps are suitable for engineering machinery, road vehicles, general machinery, machine tools and other industrial equipment. Applicable lubricant viscosity up to NLGI 2 grease. Each lubrication pump has one outlet to serve one single-line lubrication circuit.

The pump station mainly includes reservoir, BLDC motor assembly, pump element, safety valve, controller, pressure switch, solenoid valve and other accessories.

When pump unit ① begins to operate, the solenoid valve ③ closes simultaneously. Then the grease will be delivering to single-line dividers ⑤ through the main line ④. The single-line dividers ⑤ will close the internal channel after grease is pushed to the lubrication points through lube point pipelines ⑥. Then the pressure in main line ④ continues increasing until reach the set value of pressure switch ②. When the pump unit ① receives the signal from pressure switch ② , it will stop working and solenoid

valve ③ will keep open, then the grease in dividers ⑤ and main line ④ will be pushed back to reservoir by the spring force of dividers ⑤. The pump unit ① and whole lubrication system will restart next cycle until pause time is over.



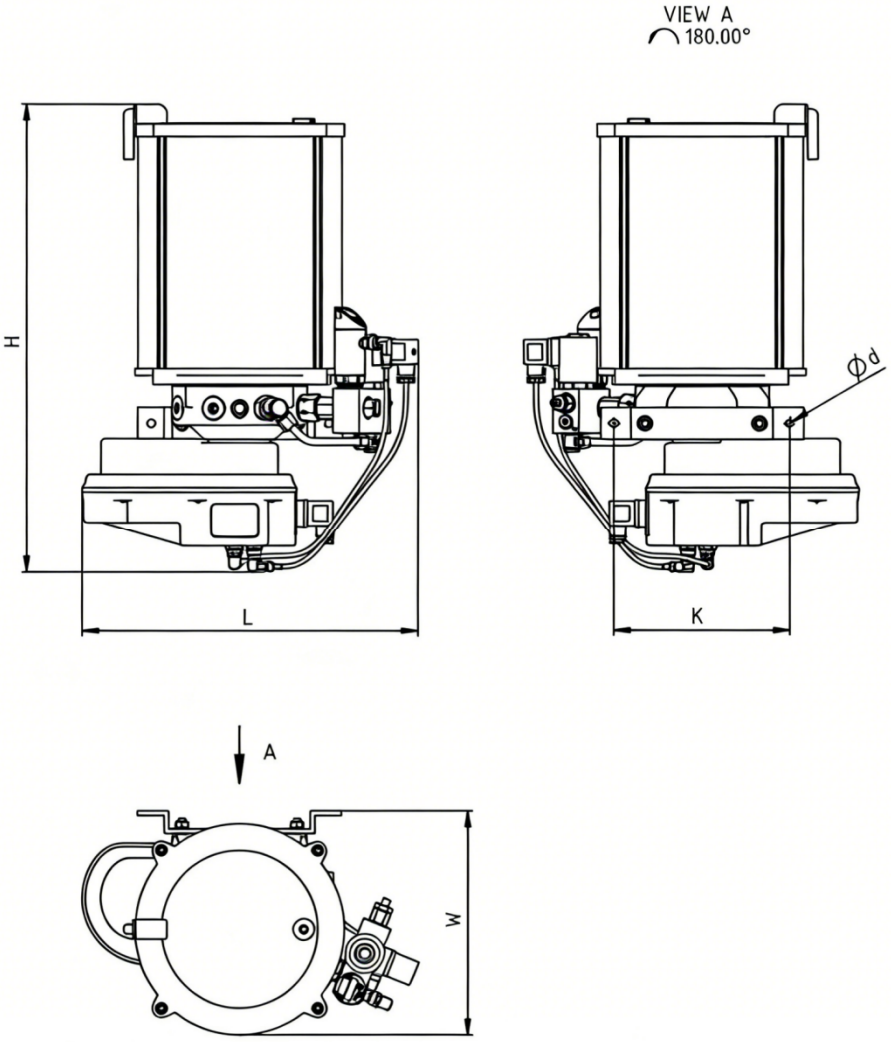
① Pump unit
② Pressure switch
③ Solenoid valve
④ Main line
⑤ Single-line dividers
⑥ Lube point pipeline

Technical data

Power Supply	DC 24 V or AC 230V/50 Hz
Rated Power	< 100 W
Power Socket	DIN 43650 A
IP Class	IP 66
Pump Delivery	6.0 cm^3/min
Outlet Thread	1 x G 1/4
Working Pressure	210 ~ 345 bar adjustable, preset 250 bar
Tank Capacity	8, 10 L
Refilling Port	DIN 71412 A and/or top lid
Lubricant	NLGI 0, 1, 2
Working Temperature	-41 ºC ~ +70 ºC
Mounting	Vertical

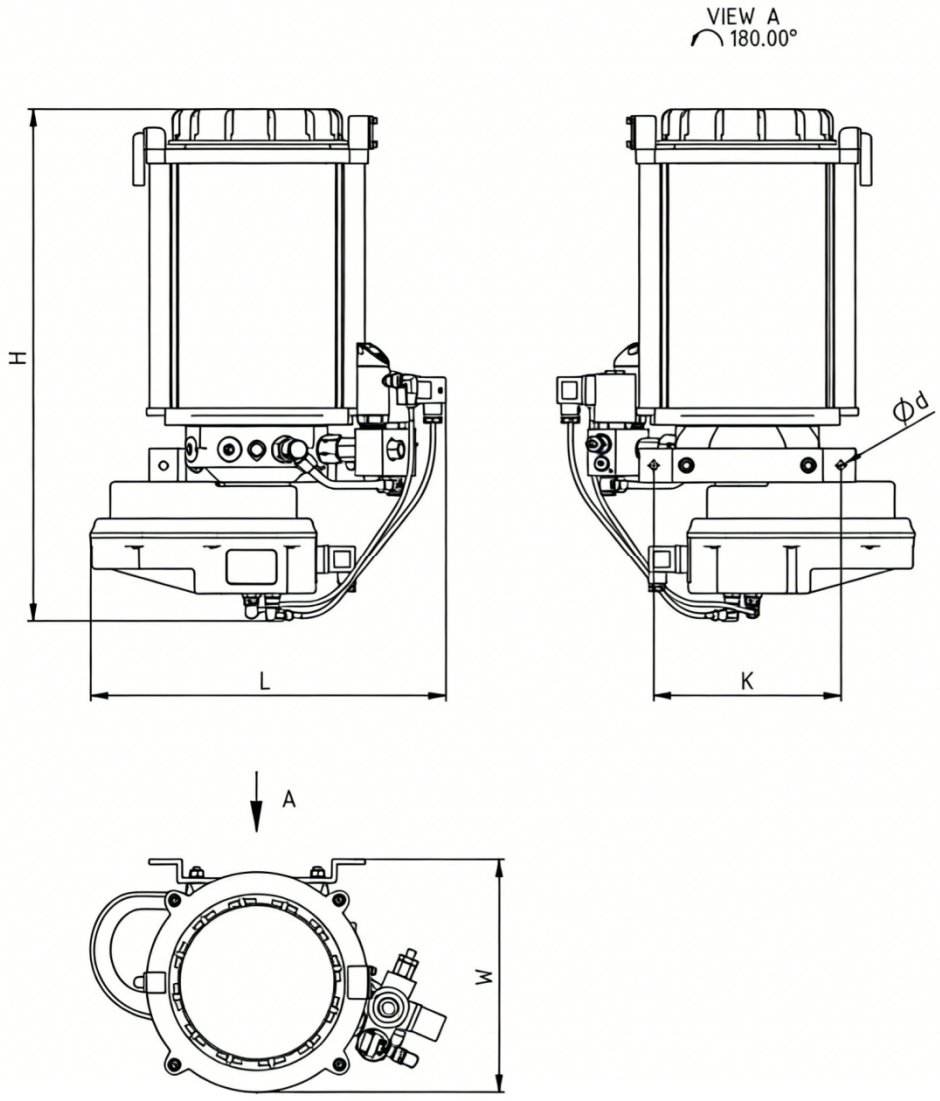
Pump dimension

■ ***No top lid***



Model	Reservoir (L)	Top Lid	Power Supply	H (mm)	W (mm)	L (mm)	K (mm)	Ød (mm)
LEP213M...	8	/	DC 24V or AC 230V/50Hz	525	250	380	200	9
LEP2110M...	10	/		555				

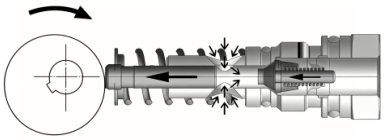
■ ***With top lid***



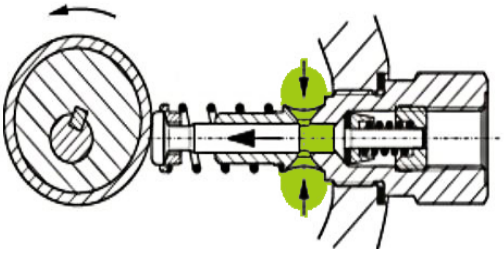
Model	Reservoir (L)	Top Lid	Power Supply	H (mm)	W (mm)	L (mm)	K (mm)	Ød (mm)
LEP213MT...	8	Yes	DC 24V or AC 230V/50Hz	545	250	380	200	9
LEP2110MT...	10	Yes		575				

Pump element

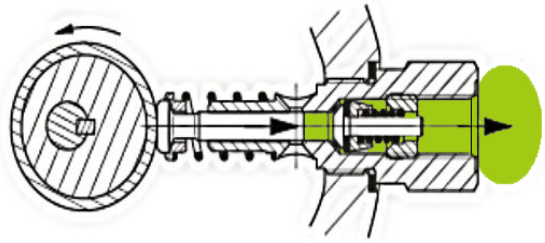
The LUBElite 21 series single-line lubrication pump is equipped with one pump element, with an output displacement of 6 cm³/min. The pump element adopts a spring-return structure. The model and specifications of the pump element are as follows:

Pump Element	Model	Type	Drive Type	Displace-ment (cm^3 / min)	Mounting Thread	Outlet Thread
	IBX - 4E	Normal	Spring return	6.0	M20x1.5	G 1/4

■ ***Work Principle***



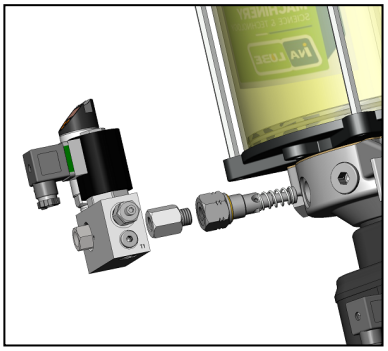
Suction phase

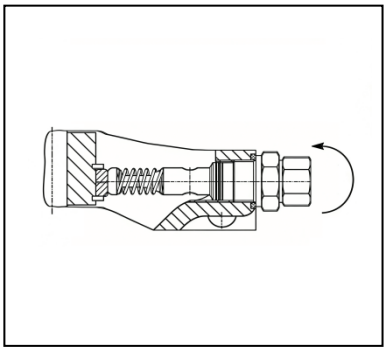


Delivery phase

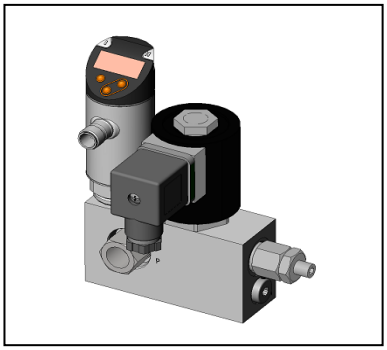
■ ***Installation of IBX pump element***

1. Only when the pump is in a non-working state can the pump element be installed or disassembled.
2. Prepare matching sealing rings and wrench tools
3. When installing, the pump element is placed horizontally, and the outlet of the pump element is kept concentric with the installation port on the pump body.
4. Tighten the pump element to the outlet of the pump body, and start the machine to observe whether lubricant is discharged from the pump outlet.
5. The order of disassembly is reversed.



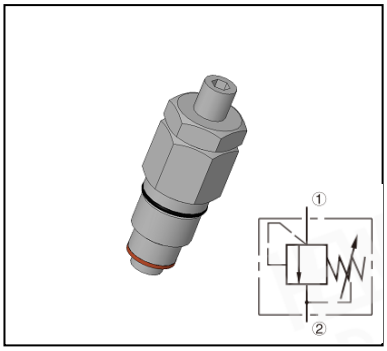


Single-line valve assembly



This valve assembly is a core functional component of the single-line lubrication system. It mainly consists of a valve block, a safety valve, a pressure switch, and a 2/2-way solenoid valve. Both the pressure switch and the solenoid valve adopt 24VDC power supply, and they have been electrically connected to the pump controller in advance.

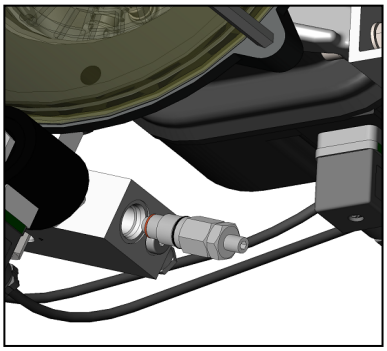
■ *Safety valve*



Cartridge safety valve is installed in the single-line function valve assembly to protect the entire lubrication system from over-pressure.

The opening pressure of the safety valve is 210 ~ 345 bar adjustable (preset 250 bar). If the pressure switch and solenoid valve don't work when pump is running, causing higher pressure in the system, the safety valve automatically opens the grease drain to release the pressure, thus protecting the whole lubrication system.

No specific reason, please do not change the pressure value

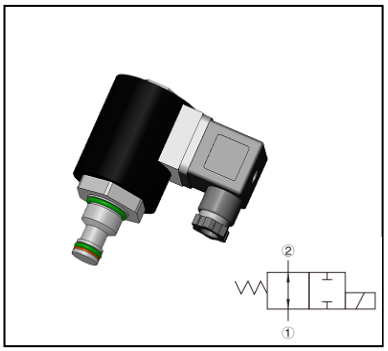


WARNING

When pump is working but single-line injectors don't deliver grease, it means the lubrication system is stuck somewhere. Please check entire lubrication system to solve the problem as soon as possible. Otherwise the lubrication system and lubricated machinery will be damaged.

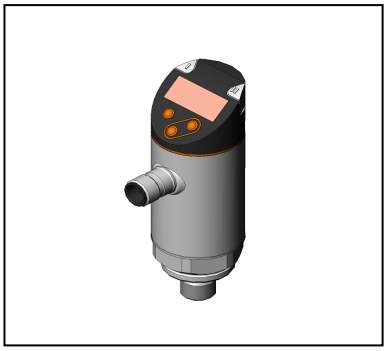
■ ***2/2 - way solenoid valve***

This solenoid valve is normally open type. It is interlocked and linked with the lubrication pump motor. When the pump is running, the solenoid valve closes, allowing grease to be delivered smoothly to each lubrication point. When the pump stops, the solenoid valve opens, enabling the grease in the main pipeline to relieve pressure and flow back to the reservoir smoothly.



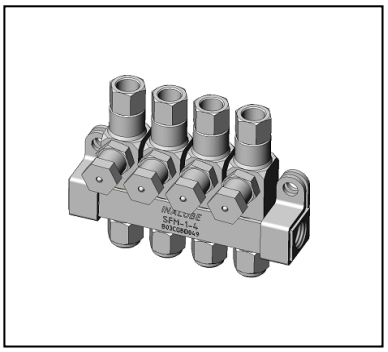
■ ***Pressure switch***

This pressure switch is a digital PNP type, equipped with a digital display and operation buttons, enabling convenient setting and reading of pressure values. For the parameter setting method of the pressure switch, please refer to its dedicated operation manual.



SFM-1 single-line injector

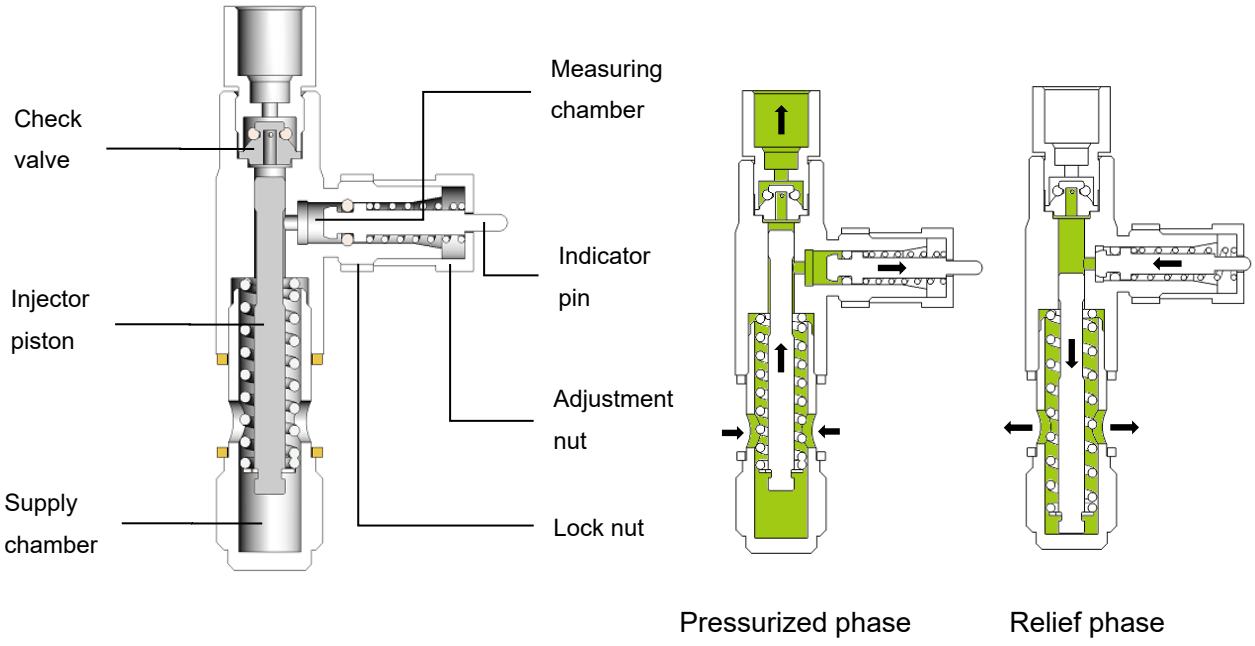
SFM-1 series single-line injectors have 1-6 outlets. All designations include several injectors and one distributor bar. The displacement of each outlet is 0.015-0.3 cm^3 / stroke adjustable. Max. work pressure 240 bar.



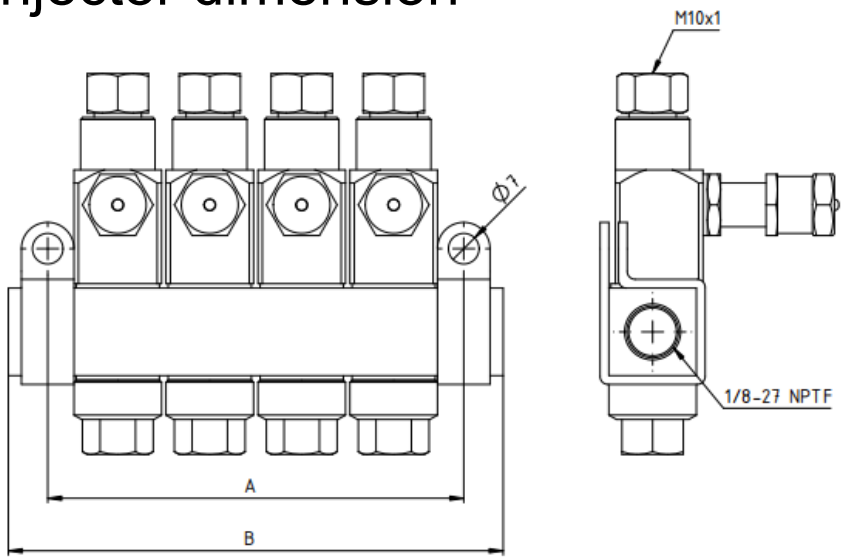
■ ***Injector work principle and adjustment***

Loosen lock nut, and then rotate the adjustment nut to adjust the grease displacement. Clockwise rotation decreases the output volume, counter-clockwise rotation increases the volume. After finished the adjustment, tighten lock nut to fix volume. When injector working, the indicator pin will be moving forward and back accompany with pressurized and relief phases of main line. Anyone of injector's

outlets is blocked, other injector and lubrication system will still work normally.



Injector dimension

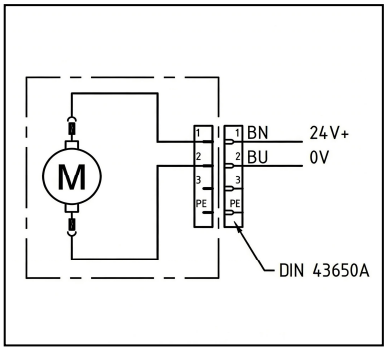


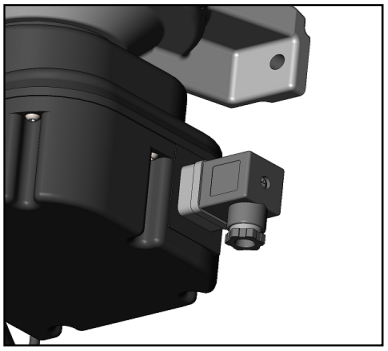
Model	A (mm)	B (mm)
SFM-1-1	32	50
SFM-1-2	53	71
SFM-1-3	74	92
SFM-1-4	95	113
SFM-1-5	116	134
SFM-1-6	137	155

Pump electric connection

■ ***Power wiring diagram***

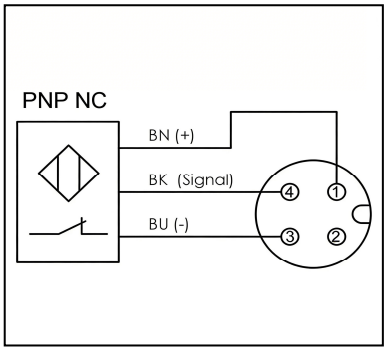
Pin	Wire color	Connection
1	Brown	24 V+
2	Black	0V

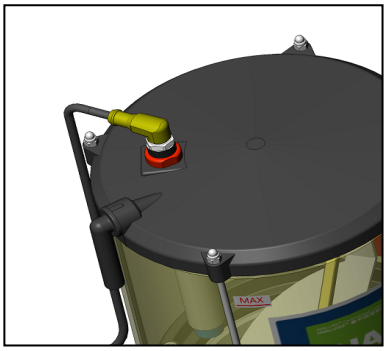




■ ***Low level switch wiring diagram (red nut)***

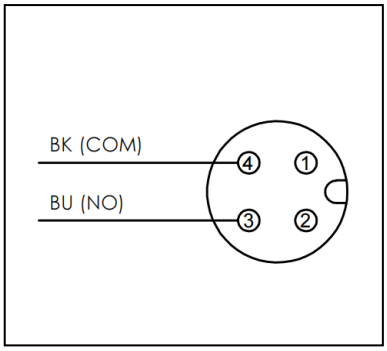
Pin	Wire color	Connection
1	Brown	24 V+
3	Blue	0V
4	Black	Level alarm PNP





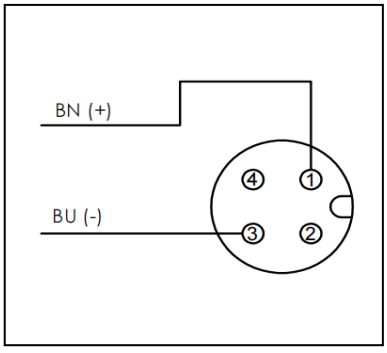
■ ***Remote alarm wiring diagram (orange nut)***

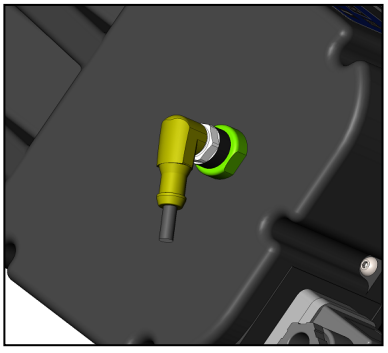
Pin	Wire color	Connection
3	Blue	NO
4	Black	COM



■ ***Remote startup wiring diagram (green nut)***

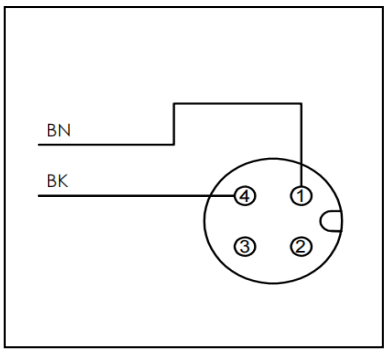
Pin	Wire color	Connection
1	Brown	+
3	Blue	-

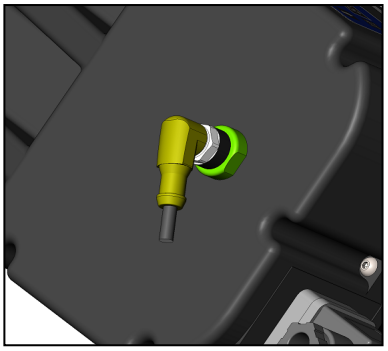




■ ***MODBUS wiring diagram (green nut)***

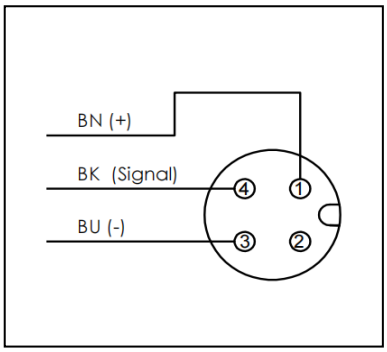
Pin	Wire color	Connection
1	Brown	A
4	Black	B

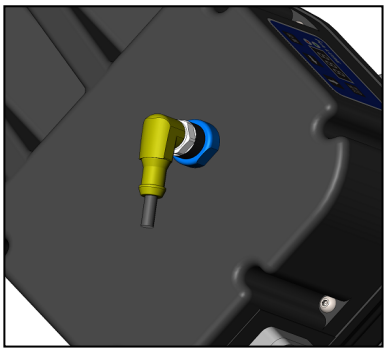




■ ***Pressure switch wiring diagram (blue nut)***

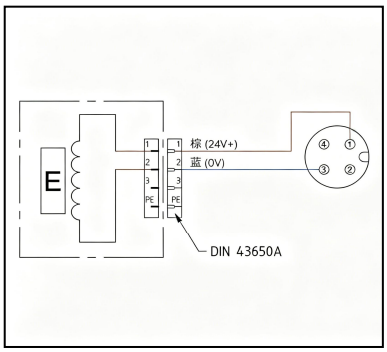
Pin	Wire color	Connection
1	Brown	24 V+
3	Blue	0V
4	Black	Pressure signal PNP

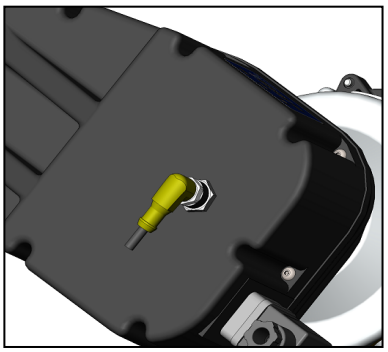




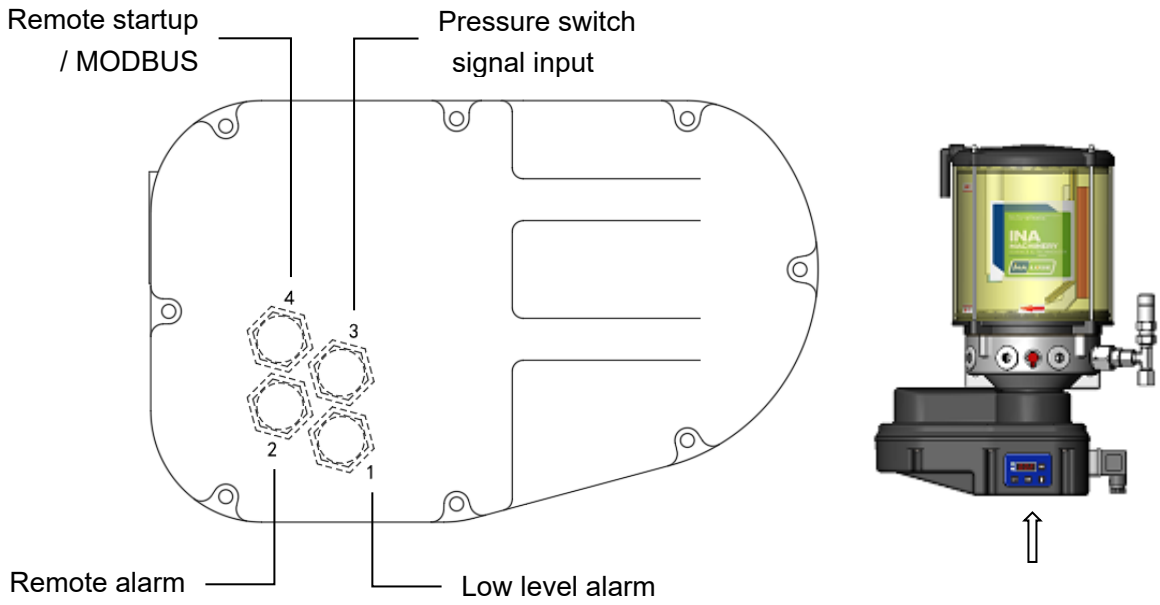
■ ***Solenoid valve wiring diagram (Galvanized nut)***

DIN socket		
Pin	**Wire color**	**Connection**
1	Brown	24 V+
2	Blue	0V
M12 plug		
Pin	**Wire color**	**Connection**
1	Brown	24 V+
3	Blue	0V





Signal connection interface

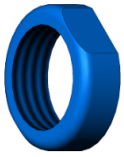


Note! Normally, port for solenoid valve is #2. If #2 part is occupied, then shift to the next port.

■ ***Colorful nut of signal connection port***

#1 port: Low level alarm terminal

#2 port: Remote alarm terminal



#3 port: Pressure switch signal input terminal

#4 port: Remote startup / MODBUS terminal

Port: Solenoid valve terminal

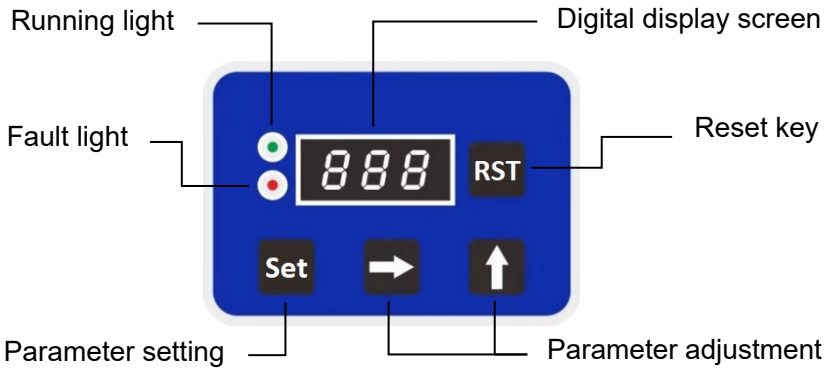
Control system

■ ***No controller integrated***

No need to set parameters, The pump unit can start working by turning on the power supply.

■ ***Digital display key controller***

The controller is protected from moisture and contaminants by a membrane panel. The controller has two options for programmers, depending on the color of the control panel. The blue panel represents the interval time unit is hour. The green panel represents the interval time unit is minute.



WARNING

Do not scrub the film panel with organic solvent. If you want to clean the panel, you can wipe it with a soft cloth dipped in neutral detergent. Do not scratch with sharp objects, so as not to damage the film panel.

■ ***Display screen***

Display working data and working status.

■ ***Indication light***

The indication light is always on, which means that the indication light is on continuously and stably. The indication light flashes, which means that the indication light flashes at the frequency of 0.5 s when it lights up and 0.5 s when it goes out.

■ ***Controller panel keys***

The display 

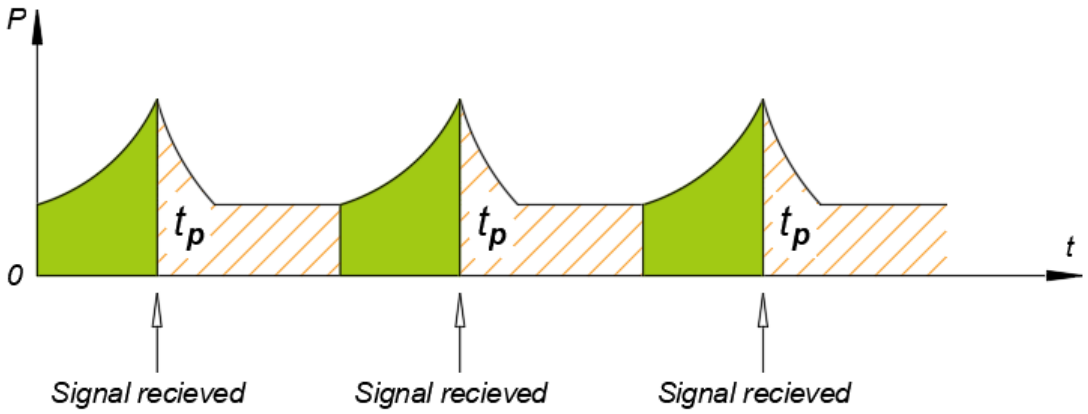
shows the number as time, the unit is minutes or hours, the working time is 1-999 minutes adjustable, intermittent time is 1-999 minutes or hours adjustable. When the pump is running, the green light is on. When the pump is stop running, the red light is on. when setting or alarming, the green and red lights flashes at the same time.

■ ***Working mode***

The controller has three working modes: “d-1”, “d-2”, “d-3”. Only “**d-2**” is right mode for LEP single-line

pump unit. When pump unit starts working, pressure in pipeline is increasing and single-line dividers deliver grease to lubrication point. After all dividers finished movement, then system pressure will continue increasing until reaching the set value of pressure switch. The pump unit received signal from pressure switch and stops working, the system goes into pause time (t_p). When pause time is over, the system starts next lubrication cycle.

When the pressure switch signal is not received at the end of working time, the system will automatically alarm and the screen will display "**ERP**" code. The green and red lights flashes at the same time. Press the RST key to eliminate the alarm.



■ ***Forced operation***

Press the key RST on the control panel, the lubrication pump is forced to re-perform the complete lubrication process in accordance with the working mode set by the operating program.

■ ***System monitoring***

The controller can connect with pressure switch, and the pressure switch is used to monitor the pipe pressure. If the pressure switch does not detect the build-up of pressure in the pipe during lubrication, the fault can be automatically monitored and displayed.

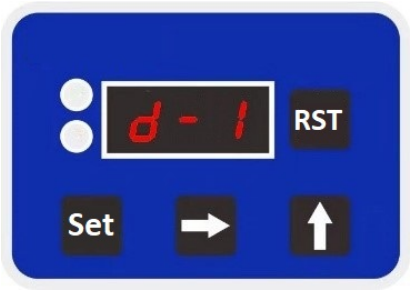
■ ***Power fault protection***

The controller has power-off protection function. If power is off at work, then when power is on again, the pump will start working from the last working time. Record the intermittent time when the power is off during the intermittent time, and continue to the time from the last intermittent time when the power is on again.

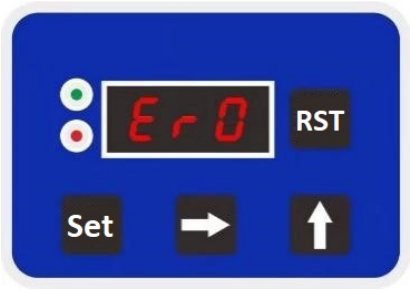
Parameter setting

Setting key, displacement key and adding key are used to set parameters. The manual reset key is used to force start-stop control. The indication light is used to display the status of the controller, and the displayed time unit is minutes or hours.

■ ***Display***

When the pump is running or the pump running time is set, the display signal light is green.	
When the pump is in a suspended state or the pump pause time is set, the display signal light is red.	
Press and hold the **Set** key, the green and red lights are off at the same time, the display screen displays the "working mode" selection status. If only the green light is lit, the display screen displays the "working time" setting status, and if the red light is lit, the display screen displays the "intermittent time" setting status.	
Press the key → , select the digital screen location that you want to change. Press the key ↑ , the corresponding quantile digits jump from 0 to 9.	

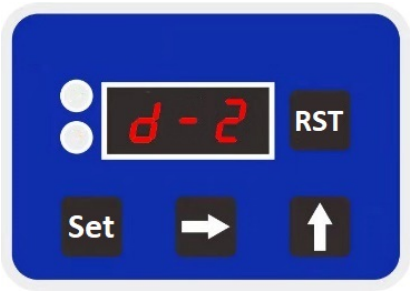
When the red and green light flash at the same time, the system will have a fault alarm, and the alarm code will be displayed on the display screen (for specific alarm code description, please refer to chapter of Troubleshooting), and long press the RST button to cancel the fault alarm.



■ ***Work mode setting***

Step 1:

Press and hold the key Set to enter the lubrication system working mode setting (red and green light are off at the same time), press the key ↑ to select the ***d-2*** pressure working mode.



Step 2:

Press and hold the key Set to enter the max. time setting of pressure signal receiving (the green light flashes), press the key → to select the quantile, and the key ↑ to select the number of the quantile. Press and hold the key ↑ to quickly change the value of 0-9 cycle. The range can be set: ***001-999*** minutes.

Step 3:

Press and hold the key Set to enter the intermittent time setting (the red light flashes), press the key → to select the quantile, and the key ↑ to select the number of the quantile. Press and hold the key ↑ to quickly change the value of 0-9 cycle. The range can be set: ***001-999*** minutes (or hours).

Step 4:

Press and hold the key **Set** to confirm the setting, and the screen will display the previously set working hours and start working normally. If there is no key operation within ***30*** seconds, the current setting will be invalid, and the parameters set before will be automatically restored.

Operation & maintenance

■ ***Cleaning***

The necessary maintenance work of the lubrication system is to replenish the reservoir regularly, and it is required to check regularly whether the lubricant is actually pumped to each lubrication point. In addition, it is also necessary to check whether the lubrication pipeline is damaged or leaked. If damage is found, please replace it in time.

When using centralized lubrication system, the cleanliness of lubricant should be especially ensured.

WARNING

When filling the reservoir with lubricant, make sure that the operating environment is clean and tidy, and only use appropriate tools to fill clean lubricant. Otherwise, solid contaminants will cause serious faults such as blockage of lubrication system!

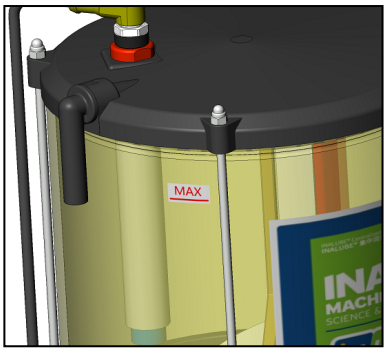
WARNING

Do not use perchloroethyl ether, trichloroethyl ether or similar solvents as cleaning agents, and do not use polar organic solvents such as alcohol, methanol, acetone and similar solvents. Otherwise the pump reservoir will be cracked.

■ *Refilling lubricant*

When refilling the pump reservoir, do not exceed the highest level which is upper mark line (MAX mark line) . The lubricant used shall be grease of NLGI 2 and below. The lubricant used must be clean and free of impurities, and maintain a stable viscosity during usage.

If the pump reservoir is completely empty when refilling the grease, it needs to wait for 20 minutes to reach the set displacement.



WARNING

Strictly prohibited to refill by disassembling the tank top lid! This action can mix contaminants and air bubble into the grease, causing the lubrication system to clog or fail to deliver grease properly, and in severe cases, it can damage the bearings!

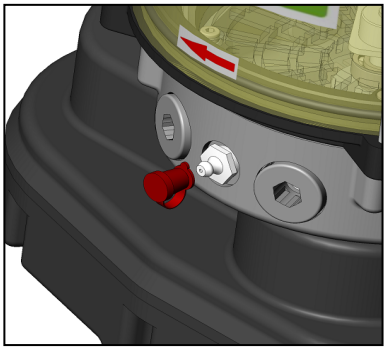
NOTE

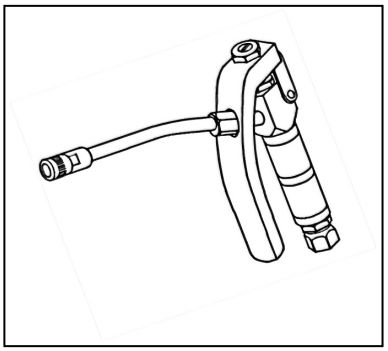
Most lubricants sold on the market will not cause damage to lubrication system. If not sure whether some special additives in grease will damage the lubrication system, please contact the technician of supplier before filling!

■ *Refilling port*

✧ DIN 71412 A grease nipple

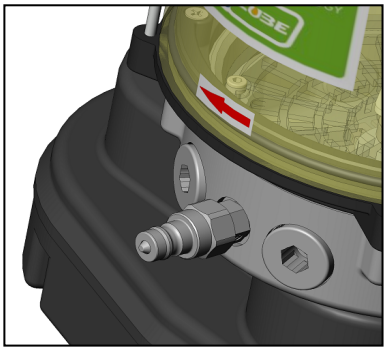
This is the factory configuration. Use a common greasing gun to fill lubricant through a grease nipple on the lubrication pump.

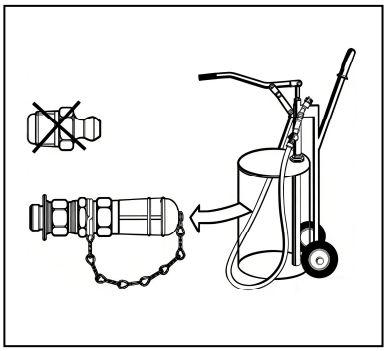




✧ **ISO 7241 A hydraulic coupling**

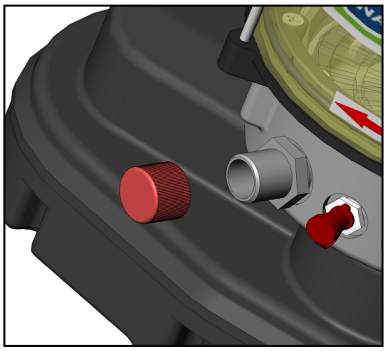
Remove the grease nipple on the lubrication pump and replace it with a hydraulic coupling. Refilling the lubricant through this hydraulic coupling.

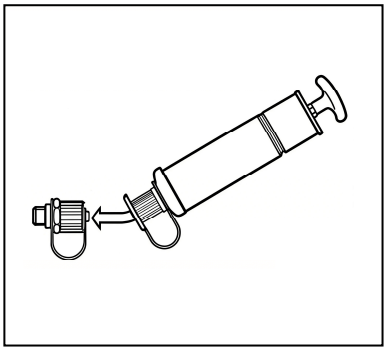




✧ **Grease filling cartridge**

Remove one of pump outlet plugs on the lubrication pump and replace it with a special joint for grease filling cartridge.





■ *Filling level confirmation*

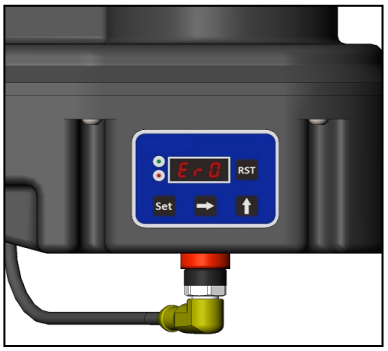
✧ Visual checking

Transparent reservoir is convenient for observation. For the safety of lubrication system, this kind of checking needs to be carried out frequently and regularly.

✧ Automatic detection

The lubrication pump is optional with a low level switch. When the lubricant level is lower than the "MIN" mark, the lubrication pump automatically stops working, the digital display screen 

displays the fault signal, and the green and red lights flash to make an alarm.



WARNING

When the lubricant level is lower than the "MIN" mark, then refill grease immediately, otherwise air will mix into the lubrication system, and cause system failure!

NOTE

When refilling grease into the reservoir, do not fill above the MAX level line.

■ ***Air bleeding***

1. Disassemble the main line on the lubrication pump, start the pump to work until the discharged grease no longer contains air bubbles, and then reconnect the main line.
2. Disassemble the main pipe at the main divider inlet, start the pump until the discharged grease no longer contains air bubbles, and then reconnect the main pipe.
3. Disassemble the branch line at the outlet of the main divider, start the pump until the discharged grease no longer contains air bubbles, and then reconnect the branch line.
4. Follow the above method in sequence to perform air bleeding operations on branch pipes, sub-dividers, and pipelines leading to lubrication points.

WARNING

Before operating the lubrication system, it is necessary to perform air bleeding of the system; otherwise, the lubrication system may fail to work properly!

■ ***Repair lubrication pump***

Original accessories must be used for maintenance. During the warranty period or when overhaul is needed, please return the pump to the original factory for maintenance.

■ ***Replace pump element***

Remove the safety valve from the pump element. When removing the pump element, pay attention to prevent the parts from falling into the reservoir, because they will hinder the operation of the motor. Otherwise, it is necessary to remove the reservoir before taking out these parts and replacing them with new pump element and sealing ring.

■ ***System test***

By manually starting the additional lubrication cycle, you can check whether the system is running normally. Once the additional lubrication cycle is started, the lubrication pump begins to pump lubricant to each lubrication point.

1. Check whether the pipeline is leaking.
2. Check whether the lubrication point has grease.
3. Check whether the running and interval time setting are correct. If necessary, please reset the lubrication time and cycle according to the application needs.

Troubleshooting

■ ***Motor and pump fault***

Condition	Possible cause	Corrective action
Pump does not operate	No power supply	Check the power supply and fuse, troubleshoot or replace the new fuse.
		Check the circuit from the fuse to the pump power plug.
	Motor fault	Check the motor power supply and replace the motor if
Pump does not deliver lubricant	Empty reservoir	Fill the reservoir and start the pump until the grease flow out from the lubrication point. *Note: It takes 10 ~ 20 minutes for the pump to reach the setting displacement. (Relative to ambient temperature and type of grease)*
	Lubricant mixed with air bubbles	Loosen the relief valve outlet connector or main line, start the additional lubrication cycle until no air bubbles emerge from the grease, and then tighten again. *Note: When using quick plug-in connector, the high pressure hose is not easy to be removed from the safety valve under pressurized state, so it is necessary to loosen the plug or emergency nozzle of the safety valve to release the pressure.*
	Not applicable lubricant	Replace grease that meets the requirements.
	Pump element suction port blocked	Remove the pump element and remove contamination.
	Wear of pump element	Replace the pump element.
	Damage or jamming of check valve in pump element	Replace the pump element.

Pump shows "ErP" fault	Pressure switch does not send signal	Check if set pressure value is higher than relief pressure. If yes, then adjust anyone of them.
		Check if pressure switch is stuck due to contamination. If yes, then clean it.
		Check if pressure switch damaged. If yes, then replace with new one.

■ ***Fault monitoring and handling***

When the controller detects the system fault, the red and green indication lights on the control panel will flash at the same time to remind the user that the lubrication system has failed. The lubrication system stops working, waiting for the user to handle the fault. The specific fault cause can be viewed through the display screen.

✧ **Meaning of fault message**

	The pump does not receive signal from the pressure switch during operation
	The motor current is less than 0.2 A during the operation of the pump
	The motor current is greater than 5A during the operation of the pump
	When the pump is running, the grease level is lower than the lowest level
	Insufficient input power supply or controller memory capacity

✧ **Clear the fault signal**

After troubleshooting, press the reset key RST , and the controller will clear the fault signal and return to the operating state.

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