

Wilo-Control EC-L



zh-CHS 安装及操作说明

en Installation and operating instructions



Control EC-L
<https://qr.wilo.com/1401>

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1 概述

1.1 关于本说明书

本说明书是产品的固定组成部分。遵守本说明书中列出的要求和操作步骤，是正确操作和使用产品的前提条件：

- 在执行所有工作前请仔细阅读本说明书。
- 请妥善保管说明书，以备随时使用。
- 遵守所有产品相关参数。
- 注意产品上的标识。

原版操作说明书以德语撰写。其他语种的说明书均为其翻译件。

1.2 版权

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1.4 保修和免责声明

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- 不遵守本说明书的内容
- 未按规定使用
- 不按规范存放或运输
- 错误安装或拆卸
- 缺乏维护
- 无授权维修
- 安装基础有缺陷
- 化学、电气或电化学影响
- 磨损

2 安全

本章节主要介绍各生命阶段适用的基础提示信息。不遵守提示会导致下列危险：

- 电气、电磁或机械作用会给人员带来危害
- 有害物质泄漏会污染环境
- 物资损失
- 重要功能失灵

不遵守提示信息会导致丧失索赔权利。

此外也应遵守其他章节列出的各项指导说明和安全说明！

2.1 安全说明的标识

本安装及操作说明针对物资损失和人身安全问题列举了多项安全说明，其表现形式各有不同：

- 涉及到人身安全问题的安全说明以一个信号词作为开端，而且配套使用相应的符号。



危险

危险类型和危险源！

危险产生的影响以及避免危险说明。

- 涉及到物资损失问题的安全说明也以一个信号词作为开端，但是没有符号。

小心

危险类型和危险源！

影响或信息。

信号词

- **危险！**
如不注意，会导致死亡或重伤！
- **警告！**
如不注意，可能导致人员受（重）伤！
- **小心！**
如不遵守，可能造成物资损失，甚至导致全损。
- **提示！**
操作产品时有用的注意事项

文本说明

- ✓ 前提条件
- 1. 操作步骤/细目列举
 - ⇒ 注意事项/指导
 - ▶ 结果

图标

本说明书使用下图标：



电击危险



爆炸气体导致危险



实用注意事项

2.2 工作人员资格鉴定

- 工作人员必须了解当地现行的事故防范规定。
- 工作人员已阅读安装及操作说明并且理解其中内容。
- 电气作业：受过培训的专业电工
是指接受过相关培训，具备所需知识和经验，能够发现并且规避电力危险的人员。
- 安装/拆卸工作：受过培训的专业电工
对不同设计结构的工具和固定基础有所了解
- 操作/控制：操作人员接受了整个系统功能原理的指导

2.3 电气作业

- 电气作业由专业电工负责执行。
- 在对产品开始任何作业之前，都应先将其断电并采取措施防止重新接通。
- 通电时注意遵守当地相关法规。
- 注意遵守当地供电公司的相关规定。
- 将产品接地。
- 遵守技术说明。
- 接线电缆损坏后立刻进行更换。

2.4 监控设备

断路器

断路器的规格和开关属性取决于所连接电器的额定电流。注意遵守当地相关法规。

2.5 安装/拆卸工作

- 遵从当地有关作业安全和事故防范措施的现行法律法规。
- 将产品断电并采取措施防止重新接通。

- 使用与地基相匹配的固定材料。
 - 产品不防水。注意选择合适的安装地点！
 - 在安装过程中，外壳切勿发生变形。否则可能导致密封件不密封，达不到规定的IP防护等级。
 - 切勿将产品安装在有爆炸危险的区域内。
- 2.6 运行期间**
- 产品不防水。遵守防护等级IP54。
 - 环境温度：-30 ... +50 °C。
 - 最高空气湿度：90 %，不冷凝。
 - 切勿打开控制开关。
 - 一旦发生故障或者出现异常，操作人员必须立即报告主管。
 - 一旦产品或接线电缆损坏，立刻关闭产品。
- 2.7 维护工作**
- 切勿使用腐蚀性或具有磨蚀作用的清洁剂。
 - 产品不防水。切勿浸入液体中。
 - 只执行本安装及操作说明中列出的维护工作。
 - 进行维护和维修时，只能使用生产商提供的原装部件。由于使用非原装部件而造成的任何损失，生产商不承担任何责任。
- 2.8 运营者的责任**
- 为工作人员提供以其母语写成的安装及操作说明。
 - 为工作人员提供必要的培训，确保其能胜任指派的工作。
 - 使产品上安装的安全和提示标牌长期保持清晰可读状态。
 - 使工作人员了解设备的功能原理。
 - 谨防触电危险。
 - 为工作人员指定工作范围，保证安全作业。
- 禁止儿童和16岁以下或身体、感官或精神上能力不足的人员处理该产品！18岁以下人员必须由专业人员监督！
- 3 应用/使用**
- 3.1 规定用途**
- 开关设备用于根据液位情况控制一至三台水泵。
符合规定的使用还包括遵守本说明的规定。任何超出规定范围的应用均视为不合规定。
- 3.2 未按规定使用**
- 潜在爆炸环境内的安装工作
 - 淹没开关设备

4 产品说明

4.1 结构

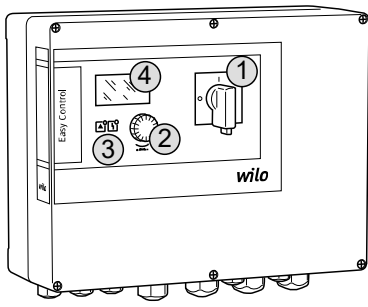


Fig. 1: 控制开关面板

4.2 功能原理

每个水泵的液位监测采用双位控制。根据液位，各台水泵将自动接通和关闭。一旦达到干转运行的水位或高水位，就会发出一个视觉信号。此外，所有水泵都会强制启动。故障存储器中会存储故障记录。

通过液晶显示屏和 LED 显示当前运行数据和运行状态。通过旋钮进行操作和输入运行参数。

注意！ Control EC-L3 ...：如果使用浮子开关来监测液位，最多则可控制 2 台水泵！

4.3 运行模式

开关设备具备两种不同的运行模式：

- 排水 (drain)
- 加水 (fill)

通过菜单进行选择。

“排水”运行模式

为蓄水罐或者集水坑排水。连接的水泵在液位上升时接通，液位降低时关闭。

“加水”运行模式

为蓄水罐加水。连接的水泵在液位降低时接通，液位上升时关闭。

4.4 技术数据

生产日期*	见铭牌
电源连接	1~220/230 V, 3~380/400 V
电源频率	50/60 Hz
每台水泵的最大电耗	12 A
每台水泵的最大额定功率	4 kW
水泵启动方式	直接
环境/运行温度	-30 ... +50 °C
存储温度	-30 ... +60 °C
最大相对空气湿度	90 %, 不冷凝
防护等级	IP54
电气安全	污染程度 II
控制电压	24 V =/~
外壳材料	耐紫外线的聚碳酸酯

可在型号铭牌上找到关于Hardware版本 (HW) 和Software版本的信息！

*生产日期书写格式符合 ISO 8601 标准：JJJJWww

- JJJJ = 年份
- W = 周缩写词
- ww = 日历周数据

4.5 输入和输出

输入端	Hardware版本	输入端数量		
		EC-L1 ...	EC-L2 ...	EC-L3 ...
液位监测				
液位传感器	所有	1	1	1
浮子开关	所有	2	3	3
电极	HW 2以上	2	3	-
动压钟	所有	1	1	1
高水位				
浮子开关	所有	1	1	1
电极	HW 2以上	1	1	-
干转运行水位/缺水水位				
浮子开关	所有	1	1	1
电极	HW 2以上	1	1	-
水泵监控				
热绕组保护监控 (双金属)	所有	1	2	3
热绕组保护监控 (PTC)	所有	-	-	-
密封性监控 (电极)	所有	1	2	3
其他输入端				
Extern OFF : 用于远程关闭所有水泵 “加水”运行模式下通过该输入端来实现干转保护。	所有	1	1	1
输出端				
无源触点				
系统故障信号 (转换接点)	所有	1	1	1
系统运行信号 (转换接点)	所有	1	1	1
单泵故障信号 (常闭触点 (NC))	所有	1	2	3
单泵运行信号 (常开触点 (NO))	所有	1	2	3
其他输出端				
功率输出 (接口数据 : 24 V=, 最大4 VA) 例如可连接一个外部报警器 (指示灯或蜂鸣器)	所有	1	1	1
液位实际值的显示 (0 ... 10 V=)	所有	1	1	1

4.6 型号代码

示例 : Wilo-Control EC-L 2x12A-MT34-DOL-WM-X

EC	用于固定转速水泵的 Easy Control 开关设备
L	水提升应用的“Lift”型
2x	可连接水泵的最大数量
12A	每台水泵的最大额定电流, 单位安培
MT34	电源连接 : <ul style="list-style-type: none"> M = 单相交流电 (1~220/230 V) T34 = 三相交流电 (3~380/400 V)
DOL	水泵的启动方式 : 直接启动
WM	壁挂安装
X	规格 : <ul style="list-style-type: none"> EMS = 无主开关 (由安装方负责设置电源分断装置 !) IPS = 集成了连接液位测量系统的压力传感器

4.7 通过电子起动控制器操作

将开关设备直接连接至水泵和电源。中间不允许接入其他电子启动控制器, 如变频器等 !

4.8 潜在爆炸环境内的安装工作

开关设备没有自己的防爆等级。开关设备不得安装在潜在爆炸环境中 !

4.9 供货范围

- 开关设备
- 安装及操作说明

4.10 附件

- 用于污水和废水的浮子开关
- 液位传感器, 4 ... 20 mA
- 液位控制器
- 动压钟和排气系统
- 信号灯, 24 V=
- 闪光灯, 230 V~
- 蜂鸣器, 230 V~
- 不依赖电源使用的报警器用蓄电池
- 防爆切断继电器
- 齐纳栅

5 运输和存放

5.1 交货

收到货物之后, 立刻检查货物有无缺陷 (有无损坏、是否完整)。如果发现缺陷, 请立刻记在货运单上, 并于到货当天通知运输公司或生产商。之后发现的缺陷不在索赔范围内。

5.2 运输

小心

一旦湿透, 包装可能会裂开!

产品会在没有任何保护的情况下跌落地面, 致使损毁。请小心提起湿透的包装并立刻进行更换!

5.3 存放

- 清洁开关设备。
- 封住外壳开孔, 使其达到防水效果。
- 包装, 注意防水、防撞击。
- 包装开关设备, 注意防尘防水。
- 存储温度: $-30 \dots +60 \text{ }^\circ\text{C}$, 最高空气相对湿度: 90 %, 不冷凝。
- 建议使用温度介于 $10 \dots 25 \text{ }^\circ\text{C}$, 相对空气湿度在 40 ... 50 % 之间的防冻仓库。
- 避免凝露!
- 为了避免外壳进水, 应该封住所有未封闭的电缆螺纹接头。
- 避免安装的电缆发生弯折和损坏, 也避免进入潮气。
- 为了避免部件发生损坏, 需要采取保护措施, 防止控制开关受热和受到阳光直射。
- 结束存储之后, 清洁开关设备。
- 如果出现进水或凝露等现象, 请检查所有电子部件的功能是否正常。请咨询客户服务部!

6 安装

- 检查控制开关在运输途中有无受损。切勿安装损坏的控制开关!
- 规划和运行电子控制器时, 注意遵守当地出台的相关规定。

6.1 工作人员资格鉴定

- 电气作业: 受过培训的专业电工是指接受过相关培训, 具备所需知识和经验, 能够发现并且规避电力危险的人员。
- 安装/拆卸工作: 受过培训的专业电工对不同设计结构的工具和固定基础有所了解

6.2 安装方式

- 壁挂安装

6.3 运营者的责任

- 安装地点必须干净、干燥且不振动。
- 安装地点应该具备防溢流特性。
- 避免阳光直射开关设备。
- 不得安装在潜在爆炸环境中。

6.4 安装



危险

开关设备安装在潜在爆炸环境中存在爆炸风险!

开关设备不具备防爆等级, 切勿安装在潜在爆炸环境中! 必须由专业电工连接。

- 由安装方负责提供液位传感器和接线电缆。
- 电缆铺设期间请注意不要因拉扯、弯折和挤压导致电缆损坏。
- 根据选择的铺设方式，检查电缆横截面和电缆长度是否合适。
- 封住未使用的电缆螺纹接头。
- 遵守下列环境条件：
 - 环境/运行温度：-30 ... +50 °C
 - 空气相对湿度：40 ...50 %
 - 最高空气相对湿度：90 %，不冷凝

6.4.1 固定控制开关的基本说明

可以安装在多种建筑物（水泥墙、安装轨道等）上。为此，安装方应该针对具体的建筑物情况提供相应的固定材料并注意下列说明：

- 为了避免建筑物内出现裂纹和建筑材料剥落等情况，注意与建筑物边缘保持足够大的距离。
- 螺钉长度决定钻孔深度。钻孔深度应超过螺钉长度大约 5 mm。
- 钻孔灰尘会影响夹紧力。必须吹扫或抽吸钻孔。
- 安装过程中切勿损坏外壳。

6.4.2 安装开关设备

使用四颗螺钉和膨胀塞，将开关设备安装在墙上：

- 最大螺钉直径：
 - Control EC-L 1x.../EC-L 2x... : 4 mm
 - Control EC-L 3x... : 6 mm
 - 最大螺钉头直径：
 - Control EC-L 1x.../EC-L 2x... : 7 mm
 - Control EC-L 3x... : 11 mm
 - ✓ 开关设备已断电且无电压。
1. 在安装地点找准并固定钻模。
 2. 根据固定材料的相关说明钻出固定孔并清洁。
 3. 取下钻模。
 4. 拧松盖板上的螺钉并从侧面打开盖板。
 5. 使用固定材料将下部固定在墙上。
检查下部是否变形！为了精确闭合壳体外罩，请重新校准变形的外壳（比如在下面垫垫板）。注意！如果盖板未正确闭合，会影响防护等级！
 6. 闭合盖板并用螺钉固定。
 - ▶ 开关设备安装完毕。现在连接电网、水泵和信号变送器。

6.4.3 液位控制装置

为了自动控制水泵，必须安装一个液位控制装置。为此可连接以下信号变送器：

- 液位传感器
通过菜单设置切换点。
- 动压钟
仅“IPS”型适用！通过菜单设置切换点。
- 浮子开关
- 电极
 - 仅限Control EC-L1 ...和EC-L2 ...
 - Hardware版本2以上
- 液位控制器

安装信号变送器时，注意遵照设备安装图。请注意以下几点：

- 浮子开关：浮子开关必须能够在运行空间（集水坑、蓄水罐）内自由移动！
- 动压钟：为了实现液位测量系统的理想通风，请安装排气系统。
- 不得低于水泵的最低水位！
- 不得超过水泵的开关频率！

6.4.4 干转保护

液位检测可通过下列信号变送器实现：

- 液位传感器
通过菜单设置切换点。
- 动压钟
仅“IPS”型适用！通过菜单设置切换点。
- 独立的浮子开关
- 独立的电极
 - 仅限Control EC-L1 ...和EC-L2 ...

- Hardware版本2以上

在发出报警的情况下，务必强制关闭所有水泵，与所选的信号变送器无关！

安装信号变送器时，注意遵照设备安装图。请注意以下几点：

- 浮子开关：浮子开关必须能够在运行空间（集水坑、蓄水罐）内自由移动！
- 动压钟：为了实现液位测量系统的理想通风，请安装排气系统。

对于“加水”运行模式：

- 通过输入端“Extern OFF”强制实现干转保护！
- 信号变送器安装在供水蓄水罐中（如水井）！

6.4.5 缺水（仅在“加水”模式下）

液位检测可通过下列信号变送器实现：

- 液位传感器
通过菜单设置切换点。
- 动压钟
仅“IPS”型适用！通过菜单设置切换点。
- 独立的浮子开关
- 独立的电极
 - 仅限Control EC-L1 ...和EC-L2 ...
 - Hardware版本2以上

在发出报警的情况下，务必强制启动所有水泵，与所选的信号变送器无关！

安装信号变送器时，注意遵照设备安装图。请注意以下几点：

- 浮子开关：浮子开关必须能够在运行空间（集水坑、蓄水罐）内自由移动！
- 动压钟：为了实现液位测量系统的理想通风，请安装排气系统。

6.4.6 高液位警报

液位检测可通过下列信号变送器实现：

- 液位传感器
通过菜单设置切换点。
- 动压钟
仅“IPS”型适用！通过菜单设置切换点。
- 独立的浮子开关
- 独立的电极
 - 仅限Control EC-L1 ...和EC-L2 ...
 - Hardware版本2以上

安装信号变送器时，注意遵照设备安装图。请注意以下几点：

- 浮子开关：浮子开关必须能够在运行空间（集水坑、蓄水罐）内自由移动！
- 动压钟：为了实现液位测量系统的理想通风，请安装排气系统。

出现报警时的应对措施

- “排水”运行模式：在发出报警的情况下，务必强制启动所有水泵，与所选的信号变送器无关！
- “加水”运行模式：在发出报警的情况下，务必强制关闭所有水泵，与所选的信号变送器无关！

采用强制启动时，水泵必须激活：

- 菜单 3.01：水泵已许可运行。
- Extern OFF：功能非激活状态。

6.5 电气连接



危险

触电导致生命危险！

执行电气作业时不按规定操作，会发生电击致死事故！

- 由专业电工负责执行电气作业！
- 遵守当地相关法规！



注意

- 受系统阻抗和所连接用电器的最大电路数/小时数影响，可能出现电压波动和/或降低等情况。
- 使用屏蔽电缆时，必须在控制开关中的接地母线一侧铺设屏蔽装置！
- 接线工作必须由专业电工执行！
- 注意遵守所连接水泵和信号变送器的安装及操作说明。

- 电源连接的电流和电压必须与铭牌上的说明一致。
- 根据本地相关规定安装电源侧保险丝。
- 如果使用断路器，则根据连接的水泵选择开关属性。
- 如果安装漏电断路器（RCD，A型，正弦电流，对交直流敏感），注意遵守本地相关规定。
- 根据本地相关规定铺设接线电缆。
- 铺设过程中切勿损坏接线电缆。
- 将控制开关和所有用电器接地。

6.5.1 部件概述

Control EC-L 1 ... /EC-L 2 ... 概览

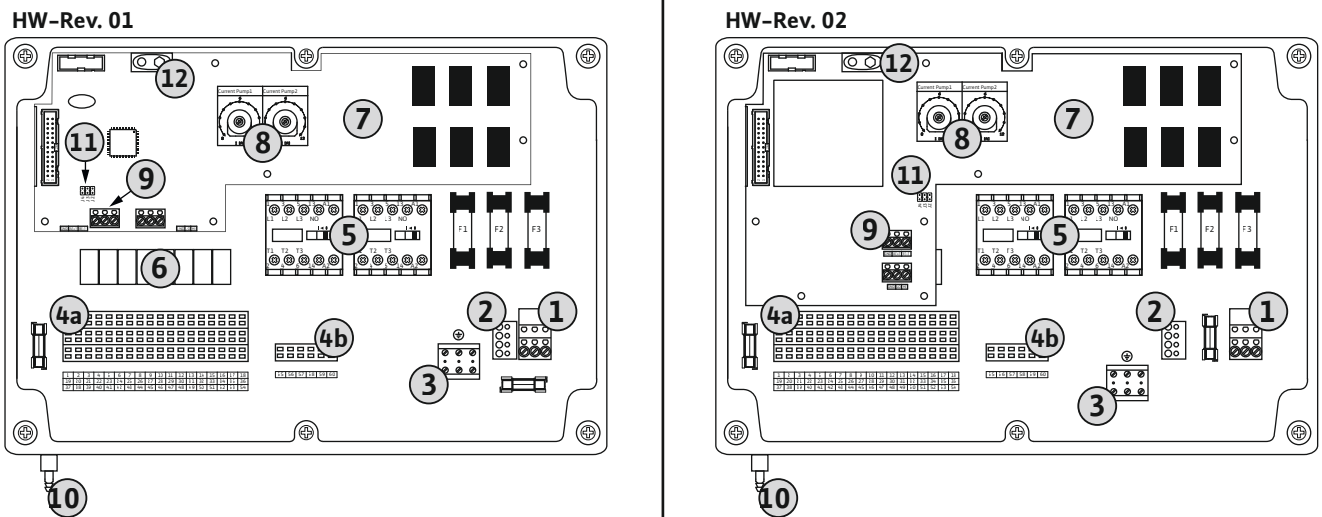


Fig. 2: Control EC-L 1 ... /EC-L 2 ...

1	端子板：电源连接
2	设置供电电压
3	端子板：接地 (PE)
4a	端子板：传感器
4b	端子板：启用防爆模式时的传感器
5	接触器组合
6	输出继电器
7	控制电路板
8	电机电流监控电位计
9	ModBus RTU：RS485 接口
10	动压钟压力连接（仅“IPS”型适用）
11	ModBus RTU：用于终止/极化的跳线
12	9V 蓄电池插槽

Control EC-L 3 ...概览

HW-Rev. 01 & 02

= HW-Rev. 01

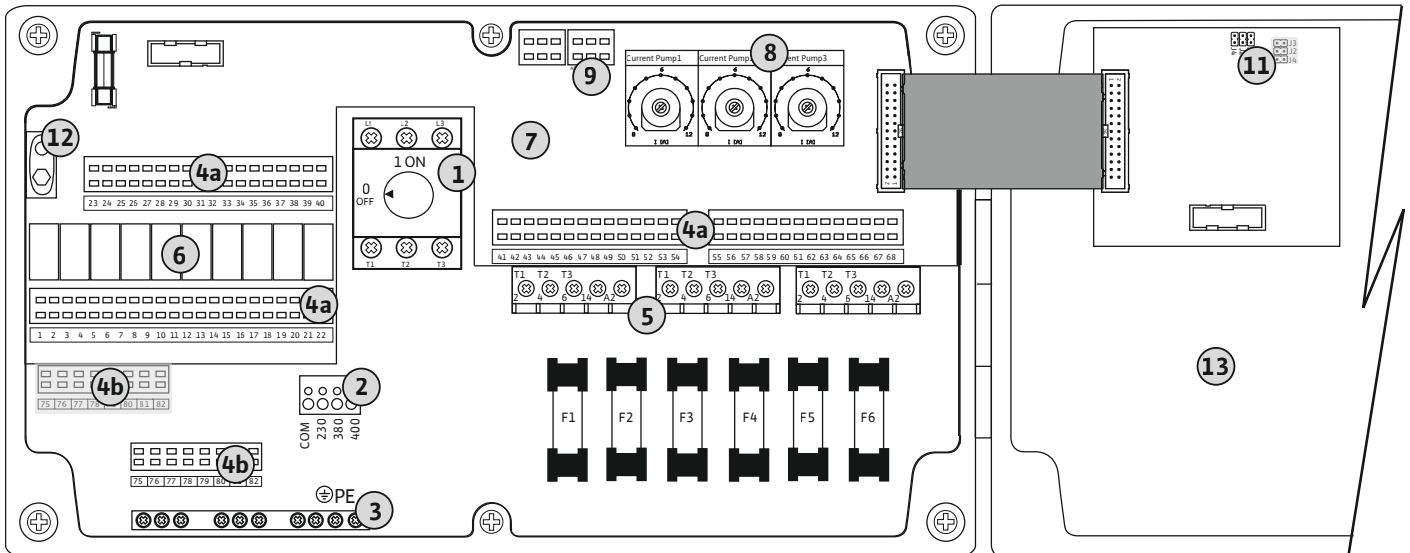


Fig. 3: Control EC-L 3 ...

1	主开关/电源连接
2	设置供电电压
3	端子板：接地 (PE)
4a	端子板：传感器
4b	端子板：启用防爆模式时的传感器
5	接触器组合
6	输出继电器
7	控制电路板
8	电机电流监控电位计
9	ModBus RTU：RS485 接口
11	ModBus RTU：用于终止/极化的跳线
12	9V 蓄电池插槽
13	壳体外罩

6.5.2 开关设备电源连接

小心

供电电压设置错误会造成物资损失！

控制开关可以在不同的供电电压下工作。工厂设定为 400 V 供电电压。如需使用其他供电电压，则开始连接之前，先设置电压跳线。如果供电电压设置错误，会导致开关设备损毁！

Wilo-Control EC-L 1 ... /EC-L 2 ... 电源连接

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。

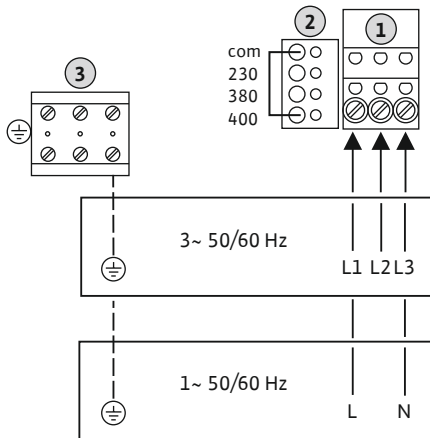


Fig. 4: Wilo-Control EC-L 1 ... /EC-L 2 ... 电源连接

1	端子板：电源连接
2	设置供电电压
3	端子板：接地 (PE)

1~230 V 电源连接：

- 电缆：3 芯
- 芯线：L, N, PE
- 设置供电电压：230/COM 电桥

3~380 V 电源连接：

- 电缆：4 芯
- 芯线：L1, L2, L3, PE
- 设置供电电压：380/COM 电桥

3~400 V 电源连接：

- 电缆：4 芯
- 芯线：L1, L2, L3, PE
- 设置供电电压：400/COM 电桥（工厂设定）

Wilo-Control EC-L 3 ... 电源连接

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在主开关上。

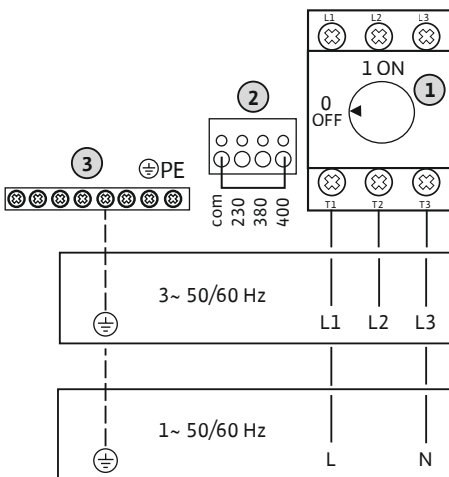


Fig. 5: Wilo-Control EC-L 3 ... 电源连接

1	主开关
2	设置供电电压
3	端子板：接地 (PE)

1~230 V 电源连接：

- 电缆：3 芯
- 芯线：L, N, PE
- 设置供电电压：230/COM 电桥

3~380 V 电源连接：

- 电缆：4 芯
- 芯线：L1, L2, L3, PE
- 设置供电电压：380/COM 电桥

3~400 V 电源连接：

- 电缆：4 芯
- 芯线：L1, L2, L3, PE
- 设置供电电压：400/COM 电桥（工厂设定）

6.5.3 水泵电源连接



注意

电源和水泵连接的相序

电源连接的相序和水泵连接的相序 检查水泵运行的相序（正转或反转）！注意水泵的安装及操作说明。

6.5.3.1 连接水泵 (n)

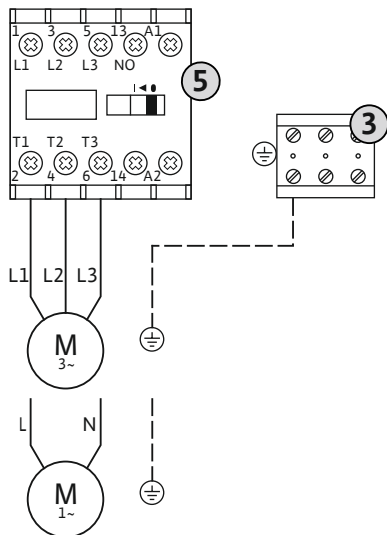


Fig. 6: 水泵接口

6.5.3.2 设置电机电流监控

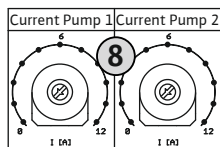


Fig. 7: 设置电机电流监控

6.5.4 电机过热保护连接



危险

接线错误会导致爆炸风险！

如果所连接的水泵安装在爆炸性气体环境（防爆危险区）中，接线错误可能导致爆炸风险：

- 开启防爆模式（菜单5.64）！
- 请注意查看附录中的防爆章节。
- 安装专业电工负责连接工作。

3 端子板：接地 (PE)

5 接触器

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在接触器上。

注意！在连接所有水泵后，请设置电机电流监控！

连接水泵后设置允许的额定电流。

8 电机电流监控电位计

使用螺丝刀在相应的电位计上设置电机电流：

- 满负荷时，按照铭牌上的参数设置额定电流。
- 部分负荷时，将额定电流设为在工况点测得电流的 5 %。

在试运行阶段实现对电机电流监控的精确设置。试运行时可显示当前的电机电流：

- 当前设置的电机监测额定电流（菜单4.25 ... 4.27）
- 当前测得的水泵工作电流（菜单4.29 ... 4.31）



危险

接线错误会导致爆炸风险！

如果所连接的水泵安装在爆炸性气体环境（防爆危险区）中，接线错误可能导致爆炸风险：

- 开启防爆模式（菜单5.64）！
- 请注意查看附录中的防爆章节。
- 安装专业电工负责连接工作。

小心

切勿施加外加电压！

外加电压会导致部件损毁。

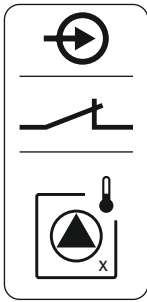


Fig. 8: 接线概览图标

6.5.5 泄露监控连接

每台水泵可以连接一台配备双金属片式传感器的电机过热保护装置。切勿连接 PTC 传感器！

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。图标中的“x”代指各水泵：

- 1 = 水泵 1
- 2 = 水泵 2
- 3 = 水泵 3



危险

接线错误会导致爆炸风险！

如果所连接的水泵安装在爆炸性气体环境（防爆危险区）中，接线错误可能导致爆炸风险：

- 开启防爆模式（菜单5.64）！
- 请注意查看附录中的防爆章节。
- 安装专业电工负责连接工作。

小心

切勿施加外加电压！

外加电压会导致部件损毁。

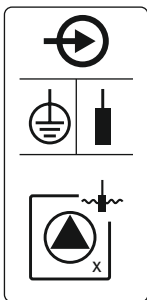


Fig. 9: 接线概览图标

6.5.6 连接用于液位控制装置的信号变送器

每台水泵可以连接一台配备湿度电极的密封性监控装置。水泵的关闭阈值 (<math>< 30 \text{ kOhm}</math>) 已固定保存在开关设备中。切勿连接浮子开关！

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。图标中的“x”代指各水泵：

- 1 = 水泵 1
- 2 = 水泵 2
- 3 = 水泵 3



危险

接线错误会导致爆炸风险！

如果所连接的信号变送器安装在爆炸性气体环境（防爆危险区）中，接线错误可能导致爆炸风险：

- 请勿在爆炸性气体环境（防爆危险区）中安装电极！
- 通过一个防爆切断继电器连接浮子开关！
- 通过齐纳安全栅连接液位传感器！
- 请注意查看附录中的防爆章节。
- 安装专业电工负责连接工作。

小心

切勿施加外加电压！

外加电压会导致部件损毁。

液位检测可通过下列信号变送器实现：

- 液位传感器

- 动压钟
仅“IPS”型适用！
- 浮子开关
- 电极
 - 仅限Control EC-L1 ...和EC-L2 ...
 - Hardware版本2以上
 - 接头具有反电极保护功能！
- 液位控制器

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。

浮子开关或电极

注意！如果使用浮子开关或电极，最多可控制两台水泵。

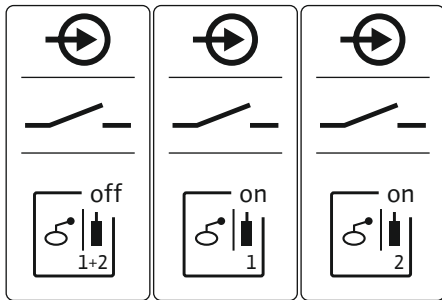


Fig. 10: 接线概览图标

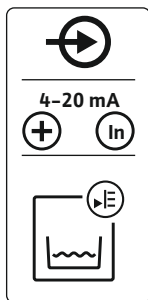


Fig. 11: 接线概览图标

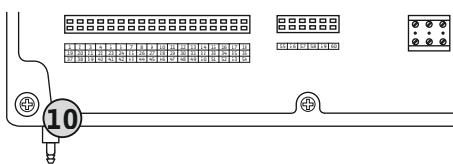


Fig. 12: 压力连接

6.5.7 液位控制器 NW16 连接

	“所有水泵关闭”的液位
	“接通水泵 1”的液位
	“接通水泵 2”的液位

液位传感器

- 连接功率：4...20 mA
- 请勿连接激活的液位传感器。
- 注意！连接时请注意极性！

动压钟

10 动压钟压力连接

- 连接功率：0 ... 250 mbar
 - 每个泵出过程后对液位测量系统进行通风。
如果无法保证液位测量系统的通风，请通过压缩机（排气系统）为其通风。通风可连续或定期进行。
1. 松开并旋出压力连接的接管螺母。
 2. 将接管螺母套在动压钟的压力软管上
 3. 将压力软管套在压力连接上，并推到底。
 4. 重新将接管螺母拧到压力连接上并拧紧固定住压力软管。



危险

液位控制器安装在潜在爆炸环境中时存在爆炸风险！

液位控制器NW16没有自己的防爆防护等级。

- 必须始终在潜在爆炸环境之外安装液位控制器NW16！

小心

切勿施加外加电压！

外加电压会导致部件损毁。

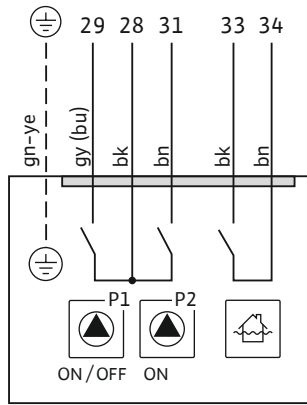


Fig. 13: NW16 连接到 Control EC-L 2x... 的连接图

6.5.8 干转保护/最低水位分别连接单独的浮子开关

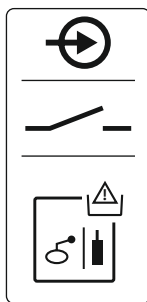


Fig. 14: 接线概览图标

两台水泵的液位监测可通过液位控制器 NW16 来执行。液位控制器具有以下切换点：

- 水泵 1 开/关
- 水泵 2 开/关
- 高水位警报

液位控制与单独浮子开关的操作相对应。液位控制器的内部结构确保了各个水泵接通和关闭液位间存在的磁滞。

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子排上。



危险

接线错误会导致爆炸风险！

如果所连接的信号变送器安装在爆炸性气体环境（防爆危险区）中，接线错误可能导致爆炸风险：

- 请勿在爆炸性气体环境（防爆危险区）中安装电极！
- 通过一个防爆切断继电器连接浮子开关！
- 通过齐纳安全栅连接液位传感器！
- 请注意查看附录中的防爆章节。
- 安装专业电工负责连接工作。

小心

切勿施加外加电压！

外加电压会导致部件损毁。

干转保护（“排水”运行模式）

干转运行水位可额外通过下列信号变送器进行监控：

- 浮子开关
- 电极
 - 仅限Control EC-L1 ...和EC-L2 ...
 - Hardware版本2以上
 - 接头具有反电极保护功能！

输入端作为常开触点（NO）工作：

- 浮子开关开/电极未浸水：干转运行
- 浮子开关关/电极浸水：无干转运行

出厂时端子配备一个换流器桥。

注意！建议务必安装一个单独的干转保护器，为设备提供额外的安全保证。

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。拆除电桥，按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。

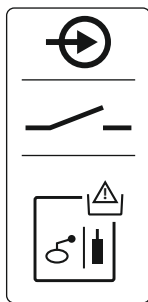


Fig. 15: 接线概览图标

6.5.9 高液位警报连接单独的浮子开关

最低水位 (“加水”运行模式)

最低水位可额外通过下列信号变送器进行监控：

- 浮子开关
- 电极
 - 仅限Control EC-L1 ...和EC-L2 ...
 - Hardware版本2以上
 - 接头具有反电极保护功能！

输入端作为常开触点 (NO) 工作：

- 浮子开关开/电极未浸水：最低水位
- 浮子开关关/电极浸水：水位充盈

出厂时端子配备一个换流器桥。

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。拆除电桥，按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。



危险

接线错误会导致爆炸风险！

如果所连接的信号变送器安装在爆炸性气体环境（防爆危险区）中，接线错误可能导致爆炸风险：

- 请勿在爆炸性气体环境（防爆危险区）中安装电极！
- 通过一个防爆切断继电器连接浮子开关！
- 通过齐纳安全栅连接液位传感器！
- 请注意查看附录中的防爆章节。
- 安装专业电工负责连接工作。

小心

切勿施加外加电压！

外加电压会导致部件损毁。



Fig. 16: 接线概览图标

6.5.10 “Extern OFF”接口：远程关闭

高水位可额外通过下列信号变送器进行监控：

- 浮子开关
- 电极
 - 仅限Control EC-L1 ...和EC-L2 ...
 - Hardware版本2以上
 - 接头具有反电极保护功能！

输入端作为常开触点 (NO) 工作：

- 浮子开关开/电极未浸水：无高水位警报
- 浮子开关关/电极浸水：高水位警报

注意！建议务必安装一个单独的信号变送器来监测高水位，为设备提供额外的安全保证。

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。

小心

切勿施加外加电压！

外加电压会导致部件损毁。

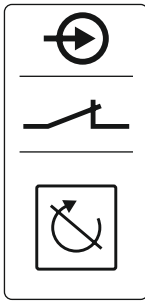


Fig. 17: 接线概览图标

6.5.11 实际液位输出连接

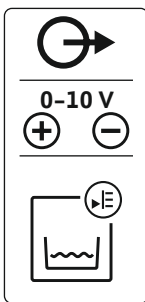


Fig. 18: 接线概览图标

6.5.12 集中运行信号 (SBM) 连接

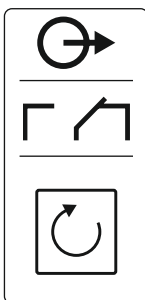


Fig. 19: 接线概览图标

通过一个独立的信号变送器可远程关闭所有水泵：

- 浮子开关
- 电极
 - 仅限Control EC-L1 ...和EC-L2 ...
 - Hardware版本2以上
 - 接头具有反电极保护功能！

输入端作为常闭触点 (NC) 工作：

- 浮子开关关/电极浸水：水泵已释放
- 浮子开关开/电极未浸水：所有水泵关闭 - 显示屏中显示“Extern OFF”图标。
如果菜单 5.39 中的报警已激活，“加水”运行模式中除图标外还将发出声音报警。

出厂时端子被一个电桥占用。

注意！ 远程关闭优先。所有水泵关闭，而不依赖于液位监测。水泵无法实现手动模式和强制启动！

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。拆除电桥，按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。

小心

切勿施加外加电压！

外加电压会导致部件损毁。

液位实际值通过一个单独的输出端发出。输出端的输出电压为 0 ... 10 V =：

- 0 V = 液位传感器值“0”
- 10 V = 液位传感器值-终值

示例：

- 液位传感器测量范围：0 ... 2.5 m
- 显示范围：0 ... 2.5 m
- 设置：1 V = 0.25 m

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。

激活菜单 5.07 中的功能来显示液位实际值。



危险

外部电源的电流导致的生命危险！

即使在主开关关闭的情况下，外部电源的电压依旧存在于端子上！有生命危险！

- 在进行任何作业前，请先断开外部电源！
- 由专业电工负责执行电气作业！
- 遵守当地相关法规！

通过一个单独的输出端输出所有水泵的运行信号 (SBM)：

- 触点类型：无源转换接点
- 触点负载：
 - 最小：12 V_~, 10 mA
 - 最大：250 V_~, 1 A

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。

6.5.13 连接系统故障信号 (SSM)

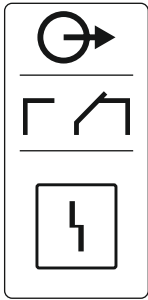


Fig. 20: 接线概览图标

6.5.14 单独运行信号 (EBM) 连接

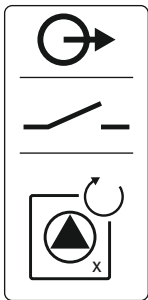


Fig. 21: 接线概览图标

6.5.15 单独故障信号 (ESM) 连接

**危险**

外部电源的电流导致的生命危险！

即使在主开关关闭的情况下，外部电源的电压依旧存在于端子上！有生命危险！

- 在进行任何作业前，请先断开外部电源！
- 由专业电工负责执行电气作业！
- 遵守当地相关法规！

通过一个单独的输出端输出所有水泵的故障信息 (SSM)：

- 触点类型：无源转换接点
- 触点负载：
 - 最小：12 V~, 10 mA
 - 最大：250 V~, 1 A

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子板上。参考盖板内接线概览中的端子编号。

**危险**

外部电源的电流导致的生命危险！

即使在主开关关闭的情况下，外部电源的电压依旧存在于端子上！有生命危险！

- 在进行任何作业前，请先断开外部电源！
- 由专业电工负责执行电气作业！
- 遵守当地相关法规！

通过一个单独的输出端输出每台水泵的运行信号 (EBM)：

- 触点类型：无源常开触点
- 触点负载：
 - 最小：12 V~, 10 mA
 - 最大：250 V~, 1 A

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子板上。参考盖板内接线概览中的端子编号。图标中的“x”代指各水泵：

- 1 = 水泵 1
- 2 = 水泵 2
- 3 = 水泵 3

**危险**

外部电源的电流导致的生命危险！

即使在主开关关闭的情况下，外部电源的电压依旧存在于端子上！有生命危险！

- 在进行任何作业前，请先断开外部电源！
- 由专业电工负责执行电气作业！
- 遵守当地相关法规！

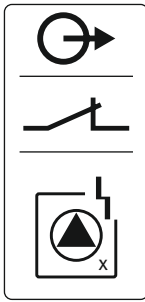


Fig. 22: 接线概览图标

6.5.16 外部报警信号连接

通过一个单独的输出端输出每台水泵的故障信息 (ESM) :

- 触点类型：无源常闭触点
- 触点负载：
 - 最小：12 V₌, 10 mA
 - 最大：250 V_~, 1 A

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。图标中的“x”代指各水泵：

- 1 = 水泵 1
- 2 = 水泵 2
- 3 = 水泵 3

小心

切勿施加外加电压！

外加电压会导致部件损毁。

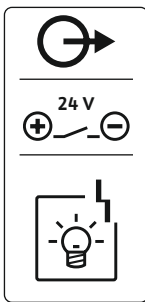


Fig. 23: 接线概览图标

6.5.17 安装蓄电池

可连接一个外部报警器（鸣音器、闪光灯等）。输出信号将与集中故障信号 (SSM) 同时切换。

- 适用于直流电压的报警器。
- 连接功率：24 V₌，最大 4 VA
- 注意！连接时请注意极性！
- 在菜单 5.67 中激活输出端。

将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接线图，将芯线连接在端子上。参考盖板内接线概览中的端子编号。



危险

触电导致的生命危险！

在敞开的控制开关上作业时存在生命危险！部件带电！

- 由专业电工执行作业。
- 避免接触接地的金属部件（管道、基座等）。



注意

与电网无关的警报

插入蓄电池后立即响起警报声。只有拔下蓄电池，或者连接电源，才能关闭警报。

安装一个蓄电池之后，可以在断电时不受电源影响地发出警报信号。警报的表现形式是长鸣。注意下列事项：

- 蓄电池类型：E-Block, 9 V, 镍氢电池
 - 开始使用蓄电池前，为了保证其正常工作，必须先将电池充电，或者在开关设备中充电 24 小时。
 - 环境温度降低时，蓄电池的容量会随之下降。警报的运行时间会缩短。
 - ✓ 电源已连接。
 - ✓ 主开关处于“0/OFF”位置！
注意！开关设备无主开关：通过电源分断装置断开电源！
1. 将蓄电池装入指定的支座中，参见“部件概述”。
警告！不要使用电池！存在爆炸风险！
小心！注意极性是否正确！
 2. 插入接线电缆。

⇒ 响起警报！

3. 将主开关拧到“1/ON”位置。
注意！开关设备无主开关：通过电源分断装置建立电源连接！

⇒ 警报关闭！

▶ 蓄电池已安装完毕。

6.5.18 ModBus RTU 连接

小心

切勿施加外加电压！

外加电压会导致部件损毁。

位置编号参见 部件概述 [▶ 13]

9	ModBus : RS485 接口
11	ModBus : 用于终止/极化的跳线

通过 ModBus 协议连接一台楼宇控制技术设备。将现场铺设的接线电缆穿过电缆螺纹接头并进行固定。按照接口布局，将芯线连接在端子上。

注意下列事项：

- 接口：RS485
- 现场总线协议设置：菜单 2.01 至 2.05。
- 终止开关设备：插入“J2”跳线。
- 如果 ModBus 需要极化，则插接“J3”和“J4”两根跳线。

7 操作



危险

触电导致生命危险！

只在闭合状态下操作控制开关。在敞开的控制开关上作业时存在生命危险！只允许专业电工对内部部件执行作业。

7.1 功能原理

在自动模式下，水泵根据水位开启和关闭。当达到第一个激活点时，水泵 1 接通。当达到第二个激活点时，在经过一段接通延迟后水泵 2 接通。在运行过程中，液晶显示屏会显示相应的数据，同时绿色 LED 亮起。当达到第二个关闭点时，在经过一段关闭延迟后两个水泵关闭。每次关闭后会进行水泵更换，以优化水泵运行时间。

发生故障时，液晶显示屏上将显示一条报警信息。如果连接超过一台水泵，会自动切换到一台功能正常的水泵。通过内部蜂鸣器可额外发出声音报警信号。此外，集中故障信号 (SSM) 和独立故障信号 (ESM) 输出端激活。

达到干转运行水位或高水位时，会根据运行模式：

- 强制关闭所有水泵。
- 强制开启所有水泵。

此外，液晶显示屏上将显示一条报警信息。通过内部蜂鸣器可额外发出声音报警信号。还会激活系统故障信号 (SSM) 的输出端。

7.1.1 同时存在干转保护水位和高水位信号时的优先级

由于设备出错可导致同时存在两个信号。在这种情况下取决于所选运行模式的优先级以及开关设备由此做出的反应：

- “排水”运行模式
 1. 干转保护
 2. 高水位
- “加水”运行模式
 1. 干转保护/缺水（通过输入端“Extern OFF”）
 2. 高水位
 3. 最低水位

7.1.2 轮换运行

为了避免出现各水泵运行时间不均匀的问题，会进行一般的水泵轮换。也就是说，所有水泵交替工作。

7.1.3 在干转保护水位、最低水位或者高水位时强制切换

强制切换取决于所选的运行模式：

- 高水位
“排水”运行模式：务必强制启动*所有水泵，与所选的信号变送器无关。
“加水”运行模式：务必强制关闭所有水泵，与所选的信号变送器无关。
- 干转保护水位
“排水”运行模式：务必强制关闭所有水泵，与所选的信号变送器无关。
“加水”运行模式：通过输入端“Extern OFF”强制实现干转保护。
- 最低水位
“加水”运行模式：务必强制启动*所有水泵，与所选的信号变送器无关。

注意！强制启动

为确保强制启动得以有效实行，须满足下列前提条件：

- 水泵已许可运行（菜单 3.01 至 3.04）！
- 输入端“Extern OFF”未激活！

7.1.4 在液位传感器损坏的情况下运行

如果（由于断线或传感器损坏等原因导致）液位传感器不传输任何测量值，会关闭所有水泵。此外，故障 LED 会亮光，同时激活系统故障信号。

紧急运行

- “排水”运行模式：高水位
如果高水位可通过单独的浮子开关监测，则设备在紧急运行模式下可以继续工作。此处的接通点和关闭点由浮子开关的通断来决定。
- “加水”运行模式：最低水位
如果最低水位可通过单独的浮子开关监测，则设备在紧急运行模式下可以继续工作。此处的接通点和关闭点由浮子开关的通断来决定。

7.2 运行模式



注意

变更运行模式

如需变更运行模式，必须将所有水泵禁用：在菜单 3.01 中设置 „OFF“ 值。



注意

断电后的运行模式

断电后重新启动时，开关设备自动进入断电前最后设置的运行模式！

以下运行模式可行：

- 排水 (drain)
- 加水 (fill)

7.2.1 “排水”运行模式

为蓄水罐或者集水坑排水。水泵在液位上升时接通，液位降低时关闭。这种控制方式主要用于排水处理。

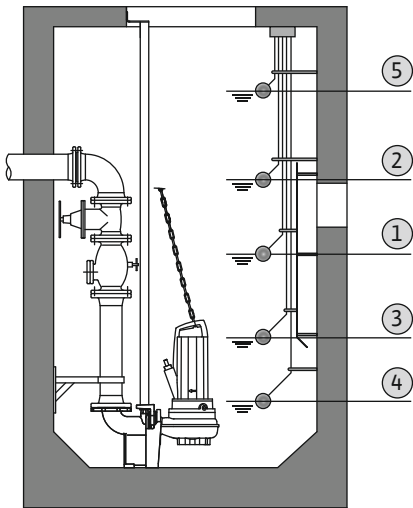


Fig. 24: “排水”运行模式下浮子开关或电极的切换点图示，以两台水泵为例

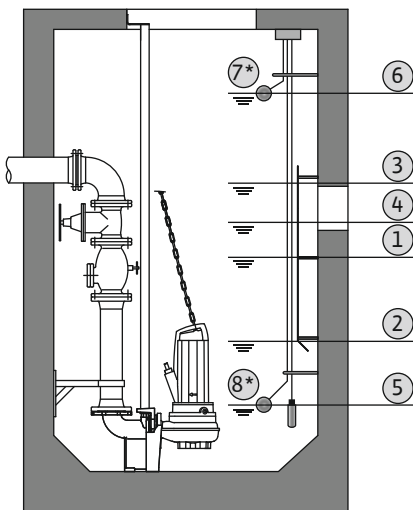


Fig. 25: 介绍“排水”运行模式下液位传感器的切换点，以两台水泵为例

7.2.2 “加水”运行模式

通过浮子开关或电极进行液位监测

1	水泵 1 接通
2	水泵 2 接通
3	水泵 1 和 2 关闭
4	空运行水位
5	高水位

最多可连接五个浮子开关或电极。这样可以控制两台水泵：

- 水泵 1 接通
- 水泵 2 接通
- 水泵 1 和 2 关闭
- 空运行水位
- 高水位

浮子开关需要装配一个常开触点：如果达到了切换点则触点闭合。

通过浮子开关或动压钟进行液位监测

1	水泵 1 接通
2	水泵 1 关闭
3	水泵 2 接通
4	水泵 2 关闭
5	空运行水位
6	高水位
7	高水位*
8	空运行水位*

* 如下提升运行可靠性，需额外增加的单独的浮子开关。

可连接一个液位传感器或一个动压钟。这样可以控制三台水泵：

- 水泵 1 开/关
- 水泵 2 开/关
- 水泵 3 开/关
- 空运行水位
- 高水位

蓄水罐加水，例如向水塔/蓄水池中供水。水泵在液位降低时接通，液位上升时关闭。这种控制方式主要用于供水。

通过浮子开关或电极进行液位监测

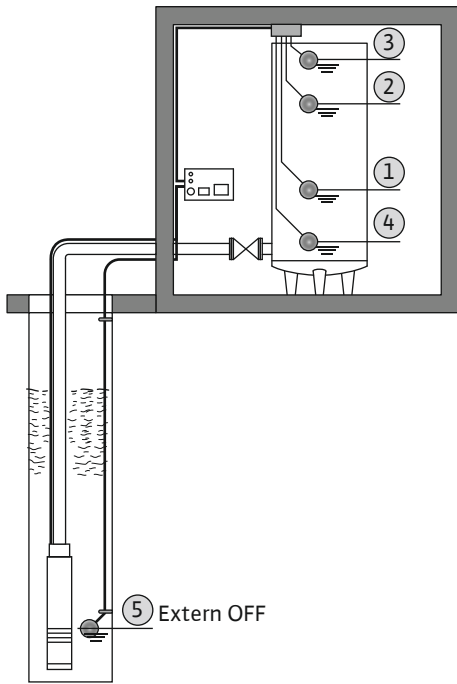


Fig. 26: “加水”运行模式下浮子开关或电极的切换点图示，以一台水泵为例

1	水泵接通
2	水泵关闭
3	高水位
4	最低水位
5	水井中的空运行水位

最多可连接六个浮子开关或电极。这样可以控制两台水泵：

- 水泵 1 接通
- 水泵 2 接通
- 水泵 1 和 2 关闭
- 蓄水罐需要加水的最低水位
- 高水位
- 水井中的空运行水位（输入端“Extern OFF”处单独的浮子开关）

浮子开关需要装配一个常开触点：如果达到了切换点则触点闭合。

通过浮子开关或动压钟进行液位监测

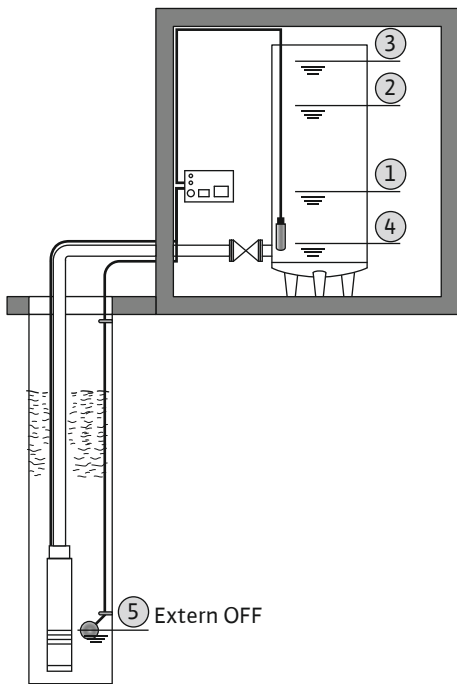


Fig. 27: 介绍“加水”运行模式下液位传感器的切换点，以一台水泵为例

1	水泵接通
2	水泵关闭
3	高水位
4	最低水位
5	水井中的空运行水位

可连接一个液位传感器或一个动压钟。这样可以控制三台水泵：

- 水泵 1 开/关
- 水泵 2 开/关
- 水泵 3 开/关
- 蓄水罐需要加水的最低水位
- 高水位
- 水井中的空运行水位（输入端“Extern OFF”处单独的浮子开关）

7.3 菜单控制

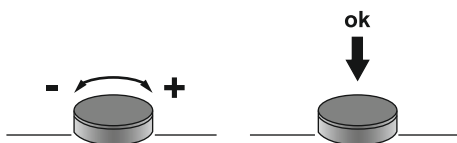


Fig. 28: 操作按钮功能

通过操作按钮控制菜单：

- 转动：选择菜单或设置参数。
- 按压：切换菜单层，确认故障编号或参数。

7.4 菜单类型：主菜单或 Easy Actions 菜单

菜单有两种类型：

- 主菜单：访问所有设置，完成完整的配置。

- Easy Actions 菜单：快捷访问某些功能。
使用 Easy Actions 菜单时注意下列事项：
 - 通过 Easy Actions 菜单只能访问选择的各项功能，无法完成完整的配置。
 - 为了使用 Easy Actions 菜单，需要执行一次首次配置。
 - 出厂时已激活 Easy Actions 菜单。可以在菜单 **7.06** 中禁用 Easy Actions 菜单。

7.5 调用菜单

调用主菜单

1. 按压操作按钮 3 s。
 - ▶ 显示菜单项 1.00。

调用 Easy Actions 菜单

1. 转动操作按钮 180°。
 - ⇒ 显示“重置故障信息”或“水泵 1 手动运行”功能
2. 继续转动操作按钮 180°。
 - ▶ 显示其他功能。最后显示主屏幕。

7.6 “Easy Actions”快捷访问

通过 Easy Actions 菜单可以调用下列各项功能：

	重置当前故障信息 注意！只有存在故障信息时，才会显示这个菜单项！
	水泵 1 手动运行 按压操作按钮后，水泵 1 运转。 松开操作按钮，会关闭水泵。最后设置的运行模式重新激活。
	水泵 2 手动运行 按压操作按钮后，水泵 2 运转。 松开操作按钮，会关闭水泵。最后设置的运行模式重新激活。
	水泵 3 手动运行 按压操作按钮后，水泵 3 运转。 松开操作按钮，会关闭水泵。最后设置的运行模式重新激活。
	关闭水泵 1。 相当于菜单 3.02 中的“off”功能。
	关闭水泵 2。 相当于菜单 3.03 中的“off”功能。
	关闭水泵 3。 相当于菜单 3.04 中的“off”功能。
	水泵 1 自动模式 相当于菜单 3.02 中的“Auto”功能。
	水泵 2 自动模式 相当于菜单 3.03 中的“Auto”功能。
	水泵 3 自动模式 相当于菜单 3.04 中的“Auto”功能。

7.7 工厂设定

如需恢复开关设备的工厂设定，请联系客户服务部。

8 试运行

8.1 运营者的责任

- 将安装及操作说明妥善保存在开关设备上或者放在指定位置。
- 为工作人员提供以其母语编写的安装及操作说明。
- 保证所有工作人员均已阅读安装及操作说明书并且理解其中内容。
- 开关设备的安装地点必须具备防溢流特性。
- 开关设备已经按规定采取安全措施并接地。
- 根据设备资料的说明来安装和设置信号变送器。
- 遵守所连接水泵的最低水浸位。

- 已接通整套设备的安全装置（含急停）并检查功能是否正常。
- 开关设备适合在规定的工作条件下使用。

8.2 爆炸危险环境内的试运行

开关设备不得在爆炸危险环境内投入使用！



危险

开关设备安装在潜在爆炸环境内存在爆炸风险！

开关设备不具备防爆等级，切勿安装在潜在爆炸环境中！必须由专业电工连接。

8.3 潜在爆炸环境内连接信号变送器和水泵



危险

接线错误会导致爆炸风险！

如果所连接的水泵和信号变送器安装在爆炸性气体环境（防爆危险区）中，接线错误可能导致爆炸风险：

- 请勿在爆炸性气体环境（防爆危险区）中安装电极！
- 通过一个防爆切断继电器连接浮子开关！
- 通过齐纳安全栅连接液位传感器！
- 开启防爆模式（菜单5.64）！
- 请注意查看附录中的防爆章节。
- 安装专业电工负责连接工作。

8.4 接通装置

8.4.1 开启时可能的故障信息

根据电源连接和基本设置，开启时可能会出现下列故障信息。所示故障代码及其描述仅限于试运行。完整概览请参见“故障代码 [▶ 47]”章节。

代码*	故障	软件版本	原因	排除方法
E006	旋转磁场	所有	<ul style="list-style-type: none"> • 旋转磁场错误 • 在单相交流电连接时运行。 	<ul style="list-style-type: none"> • 在电源连接处产生顺时针旋转磁场。 • 停用旋转磁场监控（菜单5.68）！
E080.x	水泵故障	至2.01.x	在单相交流电连接时运行。	停用电机电流监控（菜单5.69）！
E080.x	水泵故障	2.02.x以上	<ul style="list-style-type: none"> • 未连接水泵。 • 电机电流监控未设置。 	<ul style="list-style-type: none"> • 连接水泵或停用最小电流监控（菜单5.69）！ • 将电机电流监控设置为水泵的额定电流。

图例说明：

*“x” = 所显示故障涉及到的水泵！

8.4.2 接通装置



注意

注意显示屏上的故障代码

如果红色的故障LED亮起或闪烁，请注意显示屏上的故障代码！确认故障之后，最后一个故障保存在菜单 6.02 中。



注意

断电后的运行模式

断电后重新启动时，开关设备自动进入断电前最后设置的运行模式！

- ✓ 开关设备已锁闭。
- ✓ 已按规定执行安装工作。
- ✓ 已连接所有信号变送器和用电器并已安装在运行空间内。
- ✓ 如果使用浮子开关，则正确设置切换点。
- ✓ 按水泵说明预设电机保护。

1. 将主开关拧到“ON”位置。

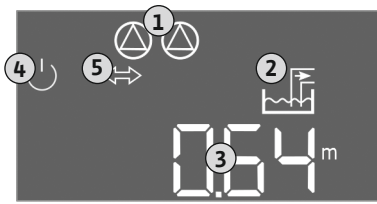


Fig. 29: 开始界面：液位传感器/动压钟

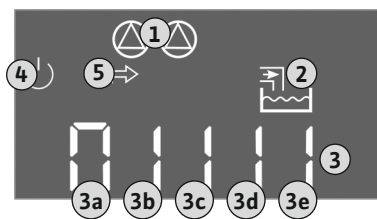


Fig. 30: 开始界面：浮子开关/电极

2. 控制开关启动。
 - 所有 LED 亮光 2 s。
 - 显示屏亮起并显示开始界面。
 - 显示屏显示待机图标。
- 开关设备进入待机状态，开始首次配置或启动自动模式。

屏幕显示液位传感器或动压钟

1	当前水泵状态： - 已登录水泵数量 - 水泵激活/禁用 - 水泵开/关
2	设定的运行模式（如排水）
3	当前水位，单位：m
4	待机模式：开关设备进入运行准备就绪状态。
5	现场总线激活

显示屏显示浮子开关或电极

1	当前水泵状态： - 已登录水泵数量 - 水泵激活/禁用 - 水泵开/关
2	设定的运行模式（如加水）
3	浮子开关/电极的切换状态 • 0 = 浮子开关开/电极未浸水 • 1 = 浮子开关关/电极浸水
4	待机模式：开关设备进入运行准备就绪状态。
5	现场总线激活

取决于运行模式的浮子开关开/电极的标记

编号	排水 (drain)	加水 (fill)
3a	高水位	高水位
3b	水泵 2 接通	水泵 1 和 2 关闭
3c	水泵 1 接通	水泵 1 接通
3d	水泵 1 和 2 关闭	水泵 2 接通
3e	空运行水位	最低液位（缺水）

8.5 开始首次配置

首次配置时请设置下列参数：

- 启用参数输入。
- 菜单 5：基本设置
- 菜单 1：接通/关闭值
- 菜单 2：现场总线连接（如有）
- 菜单 3：启用水泵。
- 设置电机电流监控。
- 检查所连水泵的旋转方向。

在配置过程中注意下面几点内容：

- 如果 6 分钟内无任何输入或操作：
 - 显示屏照明关闭。
 - 显示屏重新显示主屏幕。
 - 参数输入被锁定。
- 某些设置只有当所有水泵均未运行时，才能进行更改。
- 菜单自动根据设置进行调整。示例：菜单 5.41 ... 5.43 仅在功能“泵启动”（菜单 5.40）激活时可见。
- 菜单结构适用于所有 EC 控制开关（比如 HVAC、Booster、Lift、Fire 等）。因此菜单结构可能存在漏洞。

8.5.1 启用参数输入

默认只显示数值。如需更改数值，应在菜单 7.01 中启用参数输入：

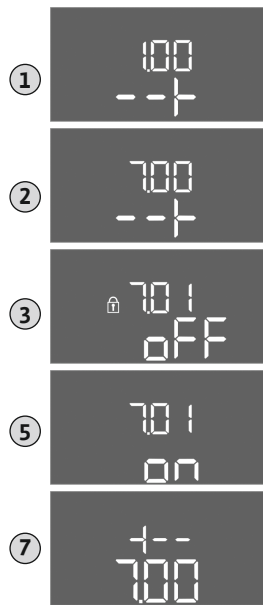


Fig. 31: 启用参数输入

1. 按压操作按钮 3 s。
⇒ 显示菜单 1.00
2. 转动操作按钮，直到显示菜单 7 为止。
3. 按压操作按钮。
⇒ 显示菜单 7.01。
4. 按压操作按钮。
5. 将参数调至“on”：转动操作按钮。
6. 保存数值：按压操作按钮。
⇒ 已启用菜单，可进行更改。
7. 转动操作按钮，直到最后显示菜单 7 为止。
8. 按压操作按钮。
⇒ 返回主菜单层。
▶ 开始首次配置。

8.5.2 菜单 5 : 基本设置



Fig. 32: 菜单 5.01



Fig. 33: 菜单 5.02

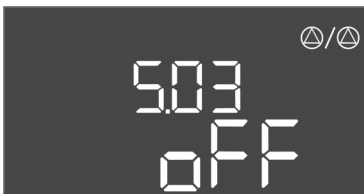


Fig. 34: 菜单 5.03



Fig. 35: 菜单 5.07

菜单编号	5.01
软件版本 : 所有	
说明	运行模式
值域	fill, drain
工厂设定	drain
解释	<ul style="list-style-type: none"> 运行模式“排水 (drain)” : 水泵在液体上升时接通, 液位降低时关闭。 运行模式“加水 (fill)” : 水泵在液位降低时接通, 液位上升时关闭。

菜单编号	5.02
软件版本 : 所有	
说明	已连接水泵数量
值域	1 ... 3
工厂设定	2

菜单编号	5.03
软件版本 : 所有	
说明	备用水泵
值域	on, off
工厂设定	off
声明	<p>可将一台水泵用作备用水泵。正常运行时不会触发这台水泵。只有当有水泵由于发生故障而失灵时, 才会激活备用水泵。备用水泵处于休止状态监控下。因此, 备用水泵会在切换水泵和泵启动时一同响应。</p> <ul style="list-style-type: none"> on = 备用水泵端已激活 off = 备用水泵已停用

菜单编号	5.07
软件版本 : 至2.01.x	
说明	用于液位监测的信号变送器
值域	Float, Level, Bell, Opt01
工厂设定	Level
解释	<p>用于液位监测的信号变送器的定义 :</p> <ul style="list-style-type: none"> Float = 浮子开关 Level = 液位传感器 Bell = 液位测量系统 Opt01 = 液位控制器NW16

软件版本 : 2.02.x以上, 硬件版本 : 2	
说明	用于液位监测的信号变送器
值域	Float, Level, Bell, Opt01
工厂设定	Level
解释	<p>用于液位监测的信号变送器的定义 :</p> <ul style="list-style-type: none"> Float = 浮子开关/电极 Level = 液位传感器 Bell = 液位测量系统 Opt01 = 液位控制器NW16



Fig. 36: 菜单 5.09



Fig. 37: 菜单 5.39



Fig. 38: 菜单 5.40

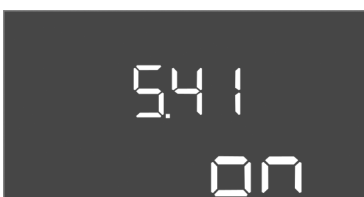


Fig. 39: 菜单 5.41

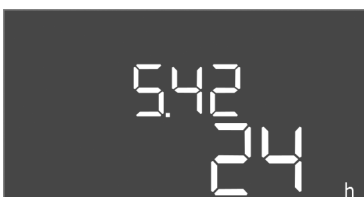


Fig. 40: 菜单 5.42

菜单编号	5.09
软件版本：所有	
说明	传感器测量范围
值域	0.25 ... 12.5 m
工厂设定	1.0 m
解释	传感器的最大测量值

菜单编号	5.39
软件版本：所有	
说明	“Extern OFF”输入端激活时的报警信息
值域	off, on
工厂设定	off
声明	<p>通过输入端“Extern OFF”，水泵可通过一个单独的信号变送器关闭。此功能优先于其他所有功能，所有水泵都将关闭。</p> <ul style="list-style-type: none"> 运行模式“加水”——确定在输入端激活时如何发出报警信息： <ul style="list-style-type: none"> “off”：在液晶显示屏上显示“Extern OFF”图标。 “on”：在液晶显示屏上显示“Extern OFF”图标和故障代码“E068”。 运行模式“排水”——出厂设置无法更改！

菜单编号	5.40
软件版本：所有	
说明	“泵启动”功能开/关
值域	off, on
工厂设定	off
解释	<p>为了避免所连水泵长时间处于休止状态，可以执行周期性试运行（泵启动）：</p> <ul style="list-style-type: none"> off = 泵启动已停用 on = 泵启动已激活 <p>如果泵启动功能已激活，请设置以下菜单项：</p> <ul style="list-style-type: none"> 菜单 5.41：Extern OFF时允许泵启动 菜单 5.42：泵启动时间间隔 菜单 5.43：泵启动运行时间

菜单编号	5.41
软件版本：所有	
说明	Extern OFF 时允许“泵启动”
值域	off, on
工厂设定	on
解释	<p>确定输入端Extern OFF激活时是否允许执行泵启动：</p> <ul style="list-style-type: none"> off = Extern OFF激活时，泵启动停用。 on = Extern OFF激活时，泵启动激活。

菜单编号	5.42
软件版本：所有	
说明	“泵启动时间间隔”
值域	1 ... 336 h
工厂设定	24 h
解释	泵启动实现后的时间。

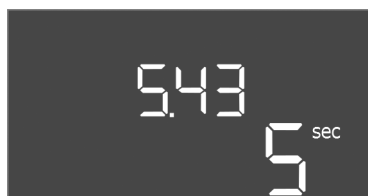


Fig. 41: 菜单 5.43

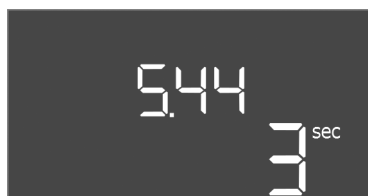


Fig. 42: 菜单 5.44



Fig. 43: 菜单 5.50



Fig. 44: 菜单 5.51



Fig. 45: 菜单 5.57

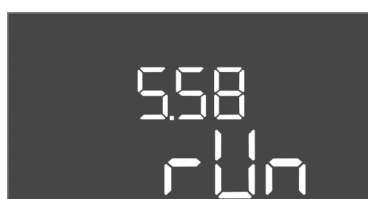


Fig. 46: 菜单 5.58

菜单编号	5.43
软件版本：所有	
说明	“泵启动运行时间”
值域	0 ... 60 s
工厂设定	5 s
解释	水泵在泵启动状态的运行时长。

菜单编号	5.44
软件版本：所有	
说明	断电后的接通延迟
值域	0 ... 180 s
工厂设定	3 s
解释	停电后直到开关设备再次自动开启的时间。

菜单编号	5.50
软件版本：所有	
说明	空运行水位（排水） / 最低水位（加水）
值域	0 ... 12.5 m
工厂设定	0.15 m
解释	输入液位。 如果液位通过单独的浮子开关监测，则禁用液位传感器的液位监测：输入参数“0.00 m”。

菜单编号	5.51
软件版本：所有	
说明	高水位
值域	0 ... 12.5 m
工厂设定	0.46 m
解释	输入液位。

菜单编号	5.57
软件版本：所有	
说明	每个水泵的最大运行时间
值域	0 ... 60 min
工厂设定	0 min
声明	一个水泵最大允许的运行时间。超过时间后将切换至下一个水泵。三次切换循环后激活集中故障信号 (SSM)。 “0 min”的设置关闭运行时间监控。

菜单编号	5.58
软件版本：所有	
说明	集中运行信号 (SBM) 功能
值域	on, run
工厂设定	run
解释	开关设备或所连水泵的运行信号可通过单独的输出端发送： <ul style="list-style-type: none"> “on”：开关设备运行就绪 “run”：至少有一台水泵运转。



Fig. 47: 菜单 5.59

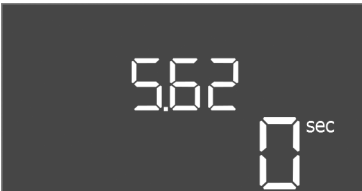


Fig. 48: 菜单 5.62

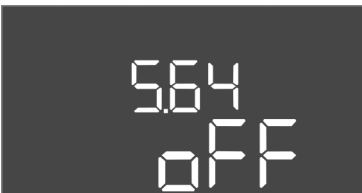


Fig. 49: 菜单 5.64

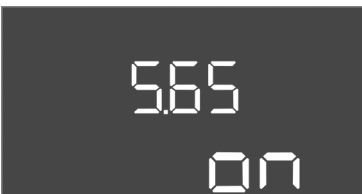


Fig. 50: 菜单 5.65

菜单编号	5.59
软件版本：所有	
说明	集中故障信号 (SSM) 功能
值域	fall, raise
工厂设定	raise
解释	<p>在发生故障的情况下，可通过独立的输出端发送一般故障信息：</p> <ul style="list-style-type: none"> “fall”：继电器释放。 此功能可用于监控供电电压。 “raise”：继电器吸合。

菜单编号	5.62
软件版本：所有	
说明	干转保护延迟
值域	0 ... 180 s
工厂设定	0 s
解释	达到干转运行水位后直到水泵关闭的时间。

菜单编号	5.64
软件版本：所有	
说明	防爆模式开关（仅“排水”运行模式有效！）
值域	on, off
工厂设定	off
解释	<p>在防爆模式（on）激活时会调整下列功能：</p> <ul style="list-style-type: none"> 空转时间 忽略所有的空转时间并立刻关闭水泵！ 空运行水位（通过液位传感器或动压钟） 只有当超过了“所有水泵关闭”的液位时，才可实现下列操作： <ul style="list-style-type: none"> 水泵重新启动 重置故障信息 干转保护（通过浮子开关）报警 手动重置报警（锁定重新接通）！ 电机过热保护报警 手动重置报警（锁定重新接通）！ <p>请遵守附录中防爆章节的额外要求！</p>

菜单编号	5.65
软件版本：所有	
说明	自动重置故障“空运行”
值域	on, off
工厂设定	on
解释	<p>当液位再次超过干转运行水位时，“干转运行”的故障信息会自动恢复。</p> <ul style="list-style-type: none"> on = 功能已激活 off = 功能已停用



Fig. 51: 菜单 5.66



Fig. 52: 菜单 5.67



Fig. 53: 菜单 5.68

菜单编号	5.66
软件版本：所有	
说明	集成的蜂鸣器开/关
值域	off, error
工厂设定	off
解释	<p>打开或关闭集成的蜂鸣器：</p> <ul style="list-style-type: none"> • off = 蜂鸣器关 • error = 蜂鸣器开 <p>注意！供电中断报警：如需关闭装有蓄电池的内置蜂鸣器，请拆卸蓄电池！</p>

菜单编号	5.67
软件版本：所有	
说明	输出端（24 V=，最大4 VA），用于连接外部开/关信号设备
值域	off, error
工厂设定	off
解释	<p>开启或关闭用于控制外部报警器的独立输出端：</p> <ul style="list-style-type: none"> • off = 输出端已停用 • error = 输出端已激活

菜单编号	5.68
软件版本：所有	
说明	电源连接旋转磁场监控开/关
值域	on, off
工厂设定	on
解释	<p>用于电源连接的集成旋转磁场监控。如果没有顺时针旋转的旋转磁场，则会显示故障信息。</p> <ul style="list-style-type: none"> • off = 旋转磁场监控已停用 • on = 旋转磁场监控已激活 <p>注意！在单相交流电连接上运行开关设备时，请关闭该功能！</p>



Fig. 54: 菜单 5.69

菜单编号	5.69
软件版本：至2.01.x	
说明	电机电流监控开/关
值域	on, off
工厂设定	on
解释	<p>如果超过了设定的额定电流，集成的电机电流监控会报告故障。</p> <ul style="list-style-type: none"> • off = 电机电流监控已停用 • on = 电机电流监控已激活 <p>注意！如果开关设备与在单相交流电连接，请关闭功能！</p>

软件版本：2.02.x以上

说明	电机电流监控开/关
值域	on, off
工厂设定	on
解释	<p>集成的电机电流监测可监测水泵的最小和最大额定电流：</p> <ul style="list-style-type: none"> • 最小额定电流监控 如果在水泵开启时未测量到电流，集成的电机电流监控会报告故障。 • 最大额定电流监控 如果超过了设定的额定电流，集成的电机电流监控会报告故障。 <p>该功能可设置如下：</p> <ul style="list-style-type: none"> • on = 最小额定电流监控已启用。 • off = 最小额定电流监控已停用。 • 不可停用最大额定电流监控。



Fig. 55: 菜单 5.70

菜单编号	5.70
软件版本：所有	
说明	每台水泵每小时最大开关频率
值域	0 ... 60
工厂设定	0
声明	如果超过了启动的最大次数，则会激活集中故障信号 (SSM)。要停用该功能，设置为数值“0”。

8.5.3 菜单 1：接通和关闭值



Fig. 56: 菜单 1.09



Fig. 57: 菜单 1.10



Fig. 58: 菜单 1.11



Fig. 59: 菜单 1.12



Fig. 60: 菜单 1.13

菜单编号	1.09
软件版本：所有	
说明	基本负荷水泵关闭延迟
值域	0 ... 60 s
工厂设定	0 s
解释	达到液位后直到基本负荷水泵关闭的时间。

菜单编号	1.10
软件版本：所有	
说明	高峰负荷水泵接通延迟
值域	0 ... 30 s
工厂设定	3 s
解释	达到液位后直到高峰负荷水泵开启的时间。

菜单编号	1.11
软件版本：所有	
说明	高峰负荷水泵关闭延迟
值域	0 ... 30 s
工厂设定	1 s
解释	达到液位后直到高峰负荷水泵关闭的时间。

菜单编号	1.12
软件版本：所有	
说明	基本负荷水泵接通液位
值域	0.06 ... 12.5 m (注意！实际值域取决于菜单5.09的设置。)
工厂设定	0.40 m
声明	运行模式“排水”：值必须比“基本负荷水泵关闭水位”高 0.03 m (菜单 1.13)。 运行模式“加水”：值必须比“基本负荷水泵关闭水位”低 0.03 m (菜单 1.13)。 注意！只有在菜单5.07中设定了值“Level”或“Bell”后，菜单项才可见。

菜单编号	1.13
软件版本：所有	
说明	基本负荷水泵关闭液位
值域	0.06 ... 12.5 m (注意！实际值域取决于菜单5.09的设置。)
工厂设定	0.23 m
声明	运行模式“排水”：值必须比“基本负荷水泵接通水位”低 0.03 m (菜单 1.12)。 运行模式“加水”：值必须比“基本负荷水泵接通水位”高 0.03 m (菜单 1.12)。 注意！只有在菜单5.07中设定了值“Level”或“Bell”后，菜单项才可见。



Fig. 61: 菜单 1.14



Fig. 62: 菜单 1.15



Fig. 63: 菜单 1.16



Fig. 64: 菜单 1.17

菜单编号	1.14
软件版本：所有	
说明	高峰负荷水泵 1 接通液位
值域	0.06 ... 12.5 m (注意！实际值域取决于菜单5.09的设置。)
工厂设定	0.42 m
声明	<p>运行模式“排水”：值必须比“高峰负荷水泵 1 接通水位”高 0.03 m (菜单 1.15)。接通液位必须大于/等于基本负荷水泵的接通液位 (菜单 1.12)。</p> <p>运行模式“加水”：值必须比“高峰负荷水泵 1 关闭水位”低 0.03 m (菜单 1.15)。接通液位必须小于/等于基本负荷水泵的接通液位 (菜单 1.12)。</p> <p>注意！只有在菜单5.07中设定了值“Level”或“Bell”后，菜单项才可见。</p>

菜单编号	1.15
软件版本：所有	
说明	高峰负荷水泵 1 关闭液位
值域	0.06 ... 12.5 m (注意！实际值域取决于菜单5.09的设置。)
工厂设定	0.25 m
声明	<p>运行模式“排水”：值必须比“高峰负荷水泵 1 接通水位”低 0.03 m (菜单 1.14)。关闭液位必须大于/等于基本负荷水泵的关闭液位 (菜单 1.13)。</p> <p>运行模式“加水”：值必须比“高峰负荷水泵 1 接通水位”高 0.03 m (菜单 1.14)。关闭液位必须小于/等于基本负荷水泵的关闭液位 (菜单 1.13)。</p> <p>注意！只有在菜单5.07中设定了值“Level”或“Bell”后，菜单项才可见。</p>

菜单编号	1.16
软件版本：所有	
说明	高峰负荷水泵 2 接通液位
值域	0.06 ... 12.5 m (注意！实际值域取决于菜单5.09的设置。)
工厂设定	0.42 m
声明	<p>运行模式“排水”：值必须比“高峰负荷水泵 2 关闭水位”高 0.03 m (菜单 1.17)。接通液位必须大于/等于高峰负荷水泵的接通液位 (菜单 1.14)。</p> <p>运行模式“加水”：值必须比“高峰负荷水泵 2 关闭水位”低 0.03 m (菜单 1.17)。接通液位必须小于/等于高峰负荷水泵的接通液位 (菜单 1.14)。</p> <p>注意！只有在菜单5.07中设定了值“Level”或“Bell”后，菜单项才可见。</p>

菜单编号	1.17
软件版本：所有	
说明	高峰负荷水泵 2 关闭液位
值域	0.06 ... 12.5 m (注意！实际值域取决于菜单5.09的设置。)
工厂设定	0.25 m
声明	<p>运行模式“排水”：值必须比“高峰负荷水泵 2 接通水位”低 0.03 m (菜单 1.16)。关闭液位必须大于/等于高峰负荷水泵的关闭液位 (菜单 1.15)。</p> <p>运行模式“加水”：值必须比“高峰负荷水泵 2 接通水位”高 0.03 m (菜单 1.16)。关闭液位必须小于/等于高峰负荷水泵的关闭液位 (菜单 1.15)。</p> <p>注意！只有在菜单5.07中设定了值“Level”或“Bell”后，菜单项才可见。</p>

8.5.4 菜单 2 : 现场总线连接ModBus RTU



Fig. 65: 菜单 2.01



Fig. 66: 菜单 2.02



Fig. 67: 菜单 2.03



Fig. 68: 菜单 2.04

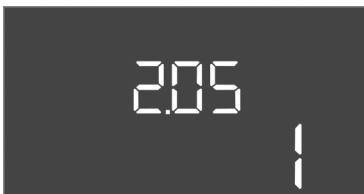


Fig. 69: 菜单 2.05

8.5.5 菜单 3 : 启用水泵



开关设备装有一个 RS485 接口，用于通过 ModBus RTU 进行连接。通过这个接口可以读取不同的参数，部分可更改。这时开关设备作为 Modbus 从站工作。附录概览介绍各参数并对使用的数据类型进行介绍说明。

如要使用 ModBus 接口，需在下列菜单中进行设置：

菜单编号	2.01
说明	ModBus RTU 接口开/关
值域	on, off
工厂设定	off

菜单编号	2.02
说明	波特率
值域	9600; 19200; 38400; 76800
工厂设定	19200

菜单编号	2.03
说明	从站地址
值域	1 ... 254
工厂设定	10

菜单编号	2.04
说明	奇偶校验
值域	none, even, odd
工厂设定	even

菜单编号	2.05
说明	停止位
值域	1; 2
工厂设定	1

运行设备时，需要确定每台水泵的运行模式并启用水泵：

- 出厂时所有水泵均设为“auto”（自动）运行模式。
- 在菜单 3.01 中启用水泵，会启动自动模式。

注意！ 首次配置时需要执行的设置。

首次配置期间，必须执行水泵的旋转方向检查并精确设置电机电流监控。为了执行这项操作，需要进行下列设置：

- 关闭水泵：将菜单3.02至3.04调至“off”。



Fig. 70: 菜单 3.02



Fig. 71: 菜单 3.01

8.5.6 设置电机电流监控

- 启用水泵：将菜单3.01调至“on”。

菜单编号	3.02 ... 3.04
软件版本：所有	
说明	水泵1...水泵3的运行模式
值域	off, Hand, Auto
工厂设定	Auto
解释	<ul style="list-style-type: none"> • off = 水泵已关闭 • Hand = 按住按钮期间，手动运行水泵 • Auto = 根据液位控制装置自动运行水泵 <p>注意！进行首次配置时，将参数调至“off”（关）！</p>

菜单编号	3.01
软件版本：所有	
说明	启用水泵
值域	on, off
工厂设定	off
解释	<ul style="list-style-type: none"> • off = 水泵被锁定，无法启动。 注意！也无法手动运行或强制启动！ • on = 水泵根据设置的运行模式接通/关闭



危险

触电导致的生命危险！

在敞开的控制开关上作业时存在生命危险！部件带电！

- 由专业电工执行作业。
- 避免接触接地的金属部件（管道、基座等）。

显示电机电流监控的当前数值

1. 按压操作按钮 3 s。
⇒ 显示菜单 1.00。
2. 转动操作按钮，直到显示菜单 4.00 为止。
3. 按压操作按钮。
⇒ 显示菜单 4.01。
4. 转动操作按钮，直到显示菜单 4.25 至 4.27。
⇒ 菜单 4.25：显示为水泵 1 设置的电机电流。
⇒ 菜单 4.26：显示为水泵 2 设置的电机电流。
⇒ 菜单 4.27：显示为水泵 3 设置的电机电流。
▶ 已检查电机电流监控装置的当前数值。
对比设定值和铭牌上的规定值。如果设定值与铭牌上的规定值有偏差，则调整数值。

调整电机电流监控数值

- ✓ 已检查电机电流监控设置。

1. 转动操作按钮，直到显示菜单 4.25 至 4.27。
⇒ 菜单 4.25：显示为水泵 1 设置的电机电流。
⇒ 菜单 4.26：显示为水泵 2 设置的电机电流。
⇒ 菜单 4.27：显示为水泵 3 设置的电机电流。
2. 打开控制开关。
危险！触电导致生命危险！在敞开的控制开关上作业时存在生命危险！这类作业只允许由专业电工执行！
3. 使用螺丝刀修正电位计（参见 部件概述 [▶ 13]）上的电机电流。直接在显示屏上读取更改数据。
4. 修正完所有电机电流之后，关闭控制开关。

► 电机电流监控设置完成。执行旋转方向检查。

8.5.7 检查所连接水泵的旋转方向



注意

电源和水泵连接的相序

电源连接的相序和水泵连接的相序 检查水泵运行的相序（正转或反转）！注意水泵的安装及操作说明。

通过一次测试运行，检查水泵的旋转方向。小心！物资损失！在规定的运行条件下执行测试运行。

- ✓ 控制开关已关闭。
 - ✓ 菜单 5 和菜单 1 配置完成。
 - ✓ 已在菜单 3.02 至 3.04 中关闭所有水泵：“off”参数。
 - ✓ 已在菜单 3.01 中启用水泵：“on”参数。
1. 打开 Easy Actions 菜单：转动操作按钮 180°。
 2. 选择手动运行水泵：转动操作按钮，直到显示菜单项：
 - 水泵 1：P1 Hand
 - 水泵 2：P2 Hand
 - 水泵 3：P3 Hand
 3. 开始测试运行：按压操作按钮。水泵一直运转，直到松开操作按钮为止。
 4. 检查旋转方向。
 - ⇒ 旋转方向错误：调换水泵接口的两个相位。
 - 已检查并修正旋转方向。首次配置完成。

8.6 启用自动模式

首次配置后执行自动模式

- ✓ 控制开关已关闭。
 - ✓ 配置完成。
 - ✓ 旋转方向正确。
 - ✓ 已正确设置电机电流监控。
1. 打开 Easy Actions 菜单：转动操作按钮 180°。
 2. 选择采用自动模式的水泵：转动操作按钮，直到显示菜单项：
 - 水泵 1：P1 Auto
 - 水泵 2：P2 Auto
 - 水泵 3：P3 Auto
 3. 按压操作按钮。
 - ⇒ 为选择的水泵设置自动模式。也可在菜单 3.02 至 3.04 中进行设置。
 - 自动模式接通。

停止运行后启动自动模式

- ✓ 控制开关已关闭。
 - ✓ 已检查配置。
 - ✓ 已启用参数输入：菜单 7.01 在 on 位置。
1. 按压操作按钮 3 s。
 - ⇒ 显示菜单 1.00。
 2. 转动操作按钮，直到显示菜单 3.00 为止
 3. 按压操作按钮。
 - ⇒ 显示菜单 3.01。
 4. 按压操作按钮。
 5. 将参数调至“on”。
 6. 按压操作按钮。
 - ⇒ 保存参数，启用水泵。
 - 自动模式接通。

8.7 运行期间

运行期间注意下面几点：

- 已闭合控制开关并采取安全措施防止其被擅自打开。
- 控制开关具有防溢流特性（防护等级 IP54）。
- 无阳光直射。
- 环境温度：-30 ... +50 °C。

主屏幕显示下列信息：

- 水泵状态：
 - 已登录水泵数量
 - 水泵激活/禁用
 - 水泵开/关
- 带备用水泵运行
- 运行模式：加水或排水
- 浮子开关的当前水位或切换状态
- 主动现场总线运行

此外还可通过菜单 4 获取下列信息：

1. 按压操作按钮 3 s。
⇒ 显示菜单 1.00。
2. 转动操作按钮，直到显示菜单 4 为止。
3. 按压操作按钮。
▶ 显示菜单 4.xx。

	当前水位，单位：m
	浮子开关的当前切换状态
	开关设备运行时间 根据规格给定时间*，单位为分钟 (min)、小时 (h) 或天 (d)。
	运行时间：水泵 1 根据规格给定时间，单位为分钟 (min)、小时 (h) 或天 (d)。视具体时间而定，显示方式有所不同： <ul style="list-style-type: none"> • 1 小时：显示为 0 ... 59 分钟，单位：min • 2 至 24 小时：显示小时和分钟，以点作为分隔符，比如 10.59，单位：h • 2 至 999 天：显示天和小时，以点作为分隔符，比如 123.7，单位：d • 1000 天以上：显示天，单位：d
	运行时间：水泵 2 根据规格给定时间，单位为分钟 (min)、小时 (h) 或天 (d)。
	运行时间：水泵 3 根据规格给定时间，单位为分钟 (min)、小时 (h) 或天 (d)。
	开关设备的开关循环
	开关循环：水泵 1
	开关循环：水泵 2
	开关循环：水泵 3

	序列号 交替显示前四位和后四位。
	开关设备型号
	软件版本
	为电机电流监控设置的数值：水泵 1 最大额定电流，单位 A
	为电机电流监控设置的数值：水泵 2 最大额定电流，单位 A
	为电机电流监控设置的数值：水泵 3 最大额定电流，单位 A
	水泵 1 的当前额定电流，单位：A 交替显示 L1、L2 和 L3 按下并按住操作按钮。水泵在 2 s 后启动，进行泵送操作，直到松开操作按钮为止。
	水泵 2 的当前额定电流，单位：A 交替显示 L1、L2 和 L3 按下并按住操作按钮。水泵在 2 s 后启动，进行泵送操作，直到松开操作按钮为止。
	水泵 3 的当前额定电流，单位：A 交替显示 L1、L2 和 L3 按下并按住操作按钮。水泵在 2 s 后启动，进行泵送操作，直到松开操作按钮为止。

9 停止运行

9.1 工作人员资格鉴定

- 电气作业：受过培训的专业电工是指接受过相关培训，具备所需知识和经验，能够发现并且规避电力危险的人员。
- 安装/拆卸工作：受过培训的专业电工对不同设计结构的工具和固定基础有所了解

9.2 运营者的责任

- 遵守本地现行的同业工伤事故保险联合会事故防范规定和安全规定。
- 为工作人员提供必要的培训，确保其能胜任指派的工作。
- 使工作人员了解设备的功能原理。
- 在密闭空间内作业时，为安全起见，必须有第二个人在场。
- 密闭空间保持通风顺畅。
- 如果出现有毒气体或窒息气体汇集的情况，立刻采取对策！

9.3 停止运行

停止运行时，关闭水泵并操作主开关关闭控制开关。设置保存在控制开关中，不会被删除，由此实现零电压安全。因此控制开关随时处于运行准备就绪状态。休止状态下注意以下几点：

- 环境温度：-30 ... +50 °C
 - 最高空气湿度：90%，不冷凝
 - ✓ 已启用参数输入：菜单 7.01 在 on 位置。
1. 按压操作按钮 3 s。
⇒ 显示菜单 1.00。
 2. 转动操作按钮，直到显示菜单 3.00 为止
 3. 按压操作按钮。
⇒ 显示菜单 3.01。
 4. 按压操作按钮。
 5. 将参数调至“off”。
 6. 按压操作按钮。

⇒ 保存参数，关闭水泵。

7. 将主开关转动到“OFF”位置。
8. 对主开关采取安全措施，防止擅自接通（比如锁闭）
 - ▶ 控制开关已关闭。

9.4 拆卸



危险

触电导致生命危险！

执行电气作业时不按规定操作，会发生电击致死事故！

- 由专业电工负责执行电气作业！
- 遵守当地相关法规！

- ✓ 已执行停止运行。
 - ✓ 将电源连接断电并采取安全措施防止擅自接通。
 - ✓ 将故障信号和运行信号的电流连接断电并采取安全措施防止擅自接通。
1. 打开控制开关。
 2. 断开所有接线电缆，拧松电缆螺纹接头，将电缆拔下。
 3. 封住接线电缆的末端，要求达到防水效果。
 4. 封住电缆螺纹接头，要求达到防水效果。
 5. 支撑开关设备（比如由他人支撑）。
 6. 拧松开关设备的紧固螺钉，将开关设备从建筑物上取下。
 - ▶ 控制开关拆卸完成。注意存储提示！

10 维护和维修



危险

触电导致生命危险！

执行电气作业时不按规定操作，会发生电击致死事故！

- 由专业电工负责执行电气作业！
- 遵守当地相关法规！



注意

禁止违规操作，禁止改变产品结构！

只允许实施列举的保养和维修作业。其他任何作业以及改变产品结构的操作，只允许由生产商实施。

10.1 维护间隔

定期

- 清洁控制开关。

一年一次

- 检查电气机械部件有无磨损。

10年后

- 大修

10.2 维护工作

清洁控制开关

- ✓ 关闭控制开关。

1. 使用湿棉布清洁控制开关。
切勿使用腐蚀性或磨蚀性清洁剂和液体！

检查电气机械部件有无磨损

安排一名专业电工检查电气机械部件有无磨损。如果确定发生磨损，请安排专业人员或 Wilo 客户服务部更换相关部件。

大修

大修时检查所有部件、接线和外壳有无磨损。更换损坏或磨损的部件。

10.3 维护周期



Fig. 72: 显示保养间隔

10.3.1 维护周期 - 启动间隔显示



Fig. 73: 启动维护周期

10.3.2 维护周期 - 重置维护周期

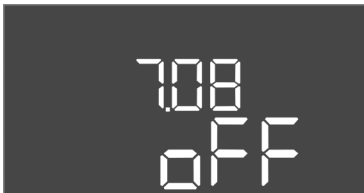


Fig. 74: 重置维护周期

开关设备集成有一个显示保养间隔时间的指示器。完成间隔时间的设定后，主屏幕上的“SER”闪烁。重置最新的间隔时间将自动开始计时下一个间隔时间。此功能出厂时设为关闭状态。

✓ 已启用参数输入：菜单 7.01 在 on 位置。

1. 按压操作按钮 3 s。
⇒ 显示菜单 1.00。
2. 转动操作按钮，直到显示菜单 7 为止
3. 按下操作按钮。
⇒ 显示菜单 7.01。
4. 转动操作按钮，直到显示菜单 7.07 为止。
5. 按下操作按钮。
6. 设置所需的间隔时间：
 - 0 = 间隔提示关闭。
 - 0.25 = 一季度一次
 - 0.5 = 半年一次
 - 1 = 一年一次
 - 2 = 两年一次
7. 按下操作按钮。
⇒ 保存参数。
▶ 间隔提示已开启。

✓ 显示器上“SER”指示灯闪烁。

✓ 已启用参数输入：菜单 7.01 在 on 位置。

1. 按压操作按钮 3 s。
⇒ 显示菜单 1.00。
2. 转动操作按钮，直到显示菜单 7 为止
3. 按下操作按钮。
⇒ 显示菜单 7.01。
4. 转动操作按钮，直到显示菜单 7.08 为止。
5. 按下操作按钮。
6. 将参数调至“on”。
7. 按下操作按钮。
⇒ 重置提示。
▶ 重置当期的保养周期，并开启新的保养周期。

11 故障、原因和排除方法

11.1 运营者的责任



危险

触电导致生命危险！

执行电气作业时不按规定操作，会发生电击致死事故！

- 由专业电工负责执行电气作业！
- 遵守当地相关法规！

- 遵守本地现行的同业工伤事故保险联合会的事事故防范规定和安全规定。
- 为工作人员提供必要的培训，确保其能胜任指派的工作。
- 使工作人员了解设备的功能原理。

- 在密闭空间内作业时，为安全起见，必须有第二个人在场。
- 密闭空间保持通风顺畅。
- 如果出现有毒气体或窒息气体汇集的情况，立刻采取对策！

11.2 故障指示

通过故障 LED 以及显示屏中由字母和数字组成的代码显示可能发生的故障。按照显示的故障检查设备并更换损坏的部件。故障显示方式有多种类型：

- 控制器/控制开关发生故障：
 - 红色故障信号 LED 亮光。
 - 故障代码与主屏幕交替显示并保存在故障存储器中。
 - 系统故障信号激活。
 - 如果激活了内置的蜂鸣器，会发出声音警报信号。
- 一台水泵发生故障
显示屏中闪烁显示各水泵的状态图标。

11.3 故障确认

按压操作按钮可以关闭报警显示。通过主菜单或 Easy Actions 菜单确认故障。

主菜单

- ✓ 已排除所有故障。
1. 按压操作按钮 3 s。
⇒ 显示菜单 1.00。
 2. 转动操作按钮，直到显示菜单 6 为止。
 3. 按压操作按钮。
⇒ 显示菜单 6.01。
 4. 按压操作按钮。
 5. 将参数调至“reset”：转动操作按钮。
 6. 按压操作按钮。
▶ 故障指示重置完成。

Easy Actions 菜单

- ✓ 已排除所有故障。
1. 打开 Easy Actions 菜单：转动操作按钮 180°。
 2. 选择“Err reset”菜单项。
 3. 按压操作按钮。
▶ 故障指示重置完成。

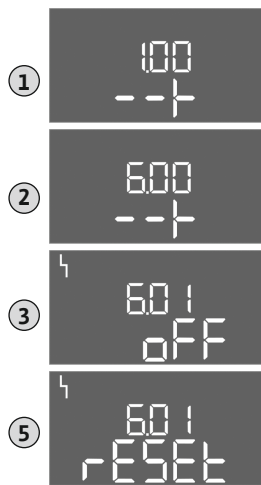


Fig. 75: 确认故障

故障确认失败

如果还存在其他故障，会如下显示故障：

- 故障 LED 亮光。
- 显示屏上显示最后一个故障的故障代码。
可以通过故障存储器调用所有其他故障。

排除完所有故障之后，再次确认故障。

11.4 故障存储器

控制开关配备一个存储有最后十个故障的故障存储器。故障存储器遵循“先进先出”原则。在菜单项 6.02 至 6.11 中，按升序显示各故障：

- 6.02：最后/最近的故障
- 6.11：最早的故障

11.5 故障代码

功能可能会因软件版本不同而有所差异。因此，每个故障代码会同时显示软件版本。所使用软件版本的信息位于型号铭牌上，也可通过菜单 4.24 显示。

代码*	故障	软件版本	原因	排除方法
E006	旋转磁场	所有	<ul style="list-style-type: none"> • 旋转磁场错误 • 在单相交流电连接时运行 	<ul style="list-style-type: none"> • 在电源连接处产生顺时针旋转磁场。 • 停用旋转磁场监控（菜单 5.68）！
E014.x	密封性监控	所有	所连接水泵的湿度电极已触发。	参阅所连接水泵的安装及操作说明
E040	液位传感器故障	所有	未连接传感器	检查接线电缆和传感器，更换损坏的部件。

代码*	故障	软件版本	原因	排除方法
E062	干转保护激活**/最低水位激活**	所有	<ul style="list-style-type: none"> “排水”运行模式：已达到空运行水位 “加水”运行模式：已低于最低水位 	<ul style="list-style-type: none"> 检查入口和设备参数。 检查浮子开关功能是否正常，更换损坏的部件。
E066	高水位警报已激活	所有	高水位已达到	<ul style="list-style-type: none"> 检查入口和设备参数。 检查浮子开关功能是否正常，更换损坏的部件。
E068	Extern OFF 启用	所有	触点“Extern OFF”已启用，有源触点被设定为报警	按照最新的连接图检查“Extern OFF”触点接口。
E080.x	水泵故障**	至2.01.x	<ul style="list-style-type: none"> 在单相交流电连接时运行 没有相应的接触器反馈。 双金属片已触发。 电机电流监控已触发。 	<ul style="list-style-type: none"> 停用电机电流监控（菜单5.69）！ 检查水泵的功能。 检查电机冷却是否足够。 检查设置的额定电流，必要时修正。 联系客户服务。
E080.x	水泵故障**	2.02.x以上	<ul style="list-style-type: none"> 未连接水泵。 电机电流监控未设置（电位计显示为0） 没有相应的接触器反馈。 双金属片已触发。 电机电流监控已触发。 	<ul style="list-style-type: none"> 连接水泵或停用最小电流监控（菜单5.69）！ 将电机电流监控设置为水泵的额定电流。 检查水泵的功能。 检查电机冷却是否足够。 检查设置的额定电流，必要时修正。 联系客户服务。
E085.x	水泵***运行时间监控	至1.xx.x	已超过水泵的最大运行时间	<ul style="list-style-type: none"> 检查运行参数（入口、切换点）。 检查其他水泵的功能。
E090	合理性验证错误	所有	浮子开关顺序错误	检查浮子开关的安装和连接。
E140.x	水泵状态已超过***	所有	已超过水泵最多的启动次数	<ul style="list-style-type: none"> 检查运行参数（入口、切换点）。 检查其他水泵的功能。
E141.x	水泵***运行时间监控	2.xx.x以上	已超过水泵的最大运行时间	<ul style="list-style-type: none"> 检查运行参数（入口、切换点）。 检查其他水泵的功能。

图例说明：

**“x” = 所显示故障涉及到的水泵！

**故障须在防爆模式下手动确认！

*** 故障须通常采用手动确认。

11.6 其他故障排除方法

如果所述方法于故障排除无益，请联系客户服务部。如果需要其他服务，可能会产生费用！具体信息请咨询客户服务部。

12 废弃处置

12.1 蓄电池

蓄电池不属于生活垃圾，必须在对产品废弃处置前将其拆出。最终用户在法律上有责任归还所有用过的蓄电池。为此可以将用过的蓄电池免费交给当地社区的公共垃圾处理场或者专业经销商。



注意

禁止作为生活垃圾废弃处置！

相关的蓄电池标有这个符号。在图片下方标有其中所含的重金属类型：

- Hg（水银）
- Pb（铅）
- Cd（镉）

12.2 关于收集损耗的电气产品和电子产品的相关信息

按规定废弃处置和正确回收这些产品，能避免环境污染、保护人身健康。



注意

禁止作为生活垃圾废弃处置！

在欧盟地区，该标志张贴在产品、包装或随附的资料中。它的意思是，相关的电气和电子产品不得作为生活垃圾废弃处置。

在按规定处理、回收和废弃处置相关旧产品时，要注意以下几点：

- 这些产品只能交给专门为此设立且获得认证的垃圾处理场。
- 注意当地现行的规定！

有关按规定废弃处置的信息，请咨询当地社区、最近的垃圾处理场或您购买产品的经销商。关于回收的详细信息请访问www.wilo-recycling.com。

保留技术变更权利！

13 附录

13.1 潜在爆炸环境：连接信号变送器和水泵



危险

开关设备安装在潜在爆炸环境内存在爆炸风险！

开关设备不具备防爆等级，切勿安装在潜在爆炸环境中！必须由专业电工连接。

13.1.1 防爆危险区

连接的水泵和信号变送器仅允许在防爆危险区 1 和 2 内使用。禁止在防爆危险区 0 内使用！

13.1.2 水泵

- 水泵符合“防火外壳”的耐火结构形式。
- 水泵直连开关设备。禁止使用电子起动控制器！
- 防火外壳外部的监控设备通过一个隔离继电器（Ex-i，本安型电路）连接。

13.1.3 信号变送器



危险

信号变送器错误会导致爆炸风险！

切勿在爆炸性气体环境（防爆危险区）中安装电极！存在爆炸风险！在爆炸性气体环境（防爆危险区）中请始终使用浮子开关或液位传感器。

在易爆区域中通过本安型电路连接信号变送器：

- 通过一个防爆切断继电器连接浮子开关！
- 通过一个齐纳安全栅连接液位传感器！

13.1.4 电机过热保护连接



Fig. 76: 端子图连接概览

连接端子板上的双金属片，以激活防爆模式（参阅 部件概述 [▶ 13]，位置 4b）。参考盖板内接线概览中的端子编号。图标中的“x”代指各水泵。

对此另请参见

- ▶ 部件概述 [▶ 13]

13.1.5 干转保护接口



Fig. 77: 端子图连接概览

13.1.6 开关设备配置：接通防爆模式

危险！ 型号错误存在爆炸风险！监控空运行水位必须通过单独的浮子开关进行！

连接端子板上的浮子开关，以激活防爆模式（参阅 部件概述 [▶ 13]，位置 4b）。参考盖板内接线概览中的端子编号。

对此另请参见

- ▶ 部件概述 [▶ 13]

调整后的功能

防爆模式调整以下功能：

- 空转时间
忽略所有的空转时间并立刻关闭水泵！
- 空运行水位（通过液位传感器或动压钟）
只有当超过了“所有水泵关闭”的液位时，才可实现下列操作：
 - 水泵重新启动
 - 重置故障信息
- 干转保护（通过浮子开关）报警
手动重置报警（锁定重新接通）！
- 电机过热保护报警
手动重置报警（锁定重新接通）！

激活防爆模式

1. 按下操作按钮 3 s。
⇒ 显示菜单 1.00。
2. 转动操作按钮，直到显示菜单 5 为止。
3. 按下操作按钮。
⇒ 显示菜单 5.01。
4. 转动操作按钮，直到显示菜单 5.64 为止。
5. 按下操作按钮。
6. 将参数调至“on”：转动操作按钮。
7. 按下操作按钮。
▶ 防爆模式已接通。

13.2 系统阻抗



注意

每个小时的最大开关频率

每个小时的最大开关频率取决于连接的电机。注意所连接电机的技术数据！不得超过电机的最大开关频率。



注意

- 受系统阻抗和所连接用电器的最大电路数/小时数影响，可能出现电压波动和/或降低等情况。
- 使用屏蔽电缆时，必须在控制开关中的接地母线一侧铺设屏蔽装置！
- 接线工作必须由专业电工执行！
- 注意遵守所连接水泵和信号变送器的安装及操作说明。

3~400 V, 2 极, 直接启动		
功率, 单位 kW	系统阻抗, 单位 Ohm	每小时开关次数
2.2	0.257	12
2.2	0.212	18
2.2	0.186	24
2.2	0.167	30
3.0	0.204	6
3.0	0.148	12
3.0	0.122	18
3.0	0.107	24
4.0	0.130	6
4.0	0.094	12
4.0	0.077	18

13.3 图标概览



待机：
图标亮光：开关设备已接通且进入待机状态。
图标闪烁：水泵 1 的空转时间启用



无法输入参数：
1.输入被锁定
2.调用的菜单只能显示参数。



水泵待机/禁用：
图标亮光：水泵可用且处于待机状态。
图标闪烁：水泵处于禁用状态。



水泵工作/故障：
图标亮光：水泵正在运行。
图标闪烁：水泵发生故障



已将一台水泵指定为备用水泵。



“Extern OFF”输入端激活：所有水泵均已关闭



运行模式：“排水”



运行模式：“加水”



已超过高水位



“排水”运行模式：已低于空运行水位
“加水”运行模式：已低于缺水水位



至少有一条新（未确认）的故障信息。



装置通过一个现场总线系统进行通信。

13.4 线路图概览

EC-L1... 和 EC-L2... 线路图

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	

端子	功能	端子	功能
2/3	输出端：水泵 1 单独运行信号	31/32	输入端：浮子开关或电极“水泵2开启”
4/5	输出端：水泵 1 独立故障信号	33/34	输入端：浮子开关或电极“高水位”
8/9	输出端：水泵 2 独立故障信号	37/38	输入端：水泵 1 热绕组保护
10/11	输出端：水泵 2 单独运行信号	39/40	输入端：水泵 2 热绕组保护
13/14/15	输出端：集中运行信号	41/42	输出端：模拟量输出，用于显示液位实际值
16/17/18	输出端：集中故障信号	45/46	输入端：液位传感器 4-20 mA
19/20	输出端：功率输出	49/50	输入端：水泵 1 密封性监控
21/22	输入端：Extern OFF	51/52	输入端：水泵 2 密封性监控

端子	功能	端子	功能
25/26	输入端：浮子开关或电极“干转保护”	55/56	输入端：浮子开关“干转保护”（防爆模式）
27/28	输入端：浮子开关或电极“所有水泵关闭”	57/58	输入端：水泵 1 热绕组保护（防爆模式）
29/30	输入端：浮子开关或电极“水泵1开启”	59/60	输入端：水泵 2 热绕组保护（防爆模式）

EC-L3... 线路图

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

数据类型	说明
BITMAP*	<p>一种 16 个布尔值 (Bit) 的汇总方式。数值表示为 0 到 15。寄存器中要读取或写入的数字，由所有比特值合计得出：数值 1 乘以以 2 为底数，以比特位为指数的幂。</p> <ul style="list-style-type: none"> • Bit 0: $2^0 = 1$ • Bit 1: $2^1 = 2$ • Bit 2: $2^2 = 4$ • Bit 3: $2^3 = 8$ • Bit 4: $2^4 = 16$ • Bit 5: $2^5 = 32$ • Bit 6: $2^6 = 64$ • Bit 7: $2^7 = 128$ • Bit 8: $2^8 = 256$ • Bit 9: $2^9 = 512$ • Bit 10: $2^{10} = 1024$ • Bit 11: $2^{11} = 2048$ • Bit 12: $2^{12} = 4096$ • Bit 13: $2^{13} = 8192$ • Bit 14: $2^{14} = 16384$ • Bit 15: $2^{15} = 32768$
BITMAP32	一种包含 32 个布尔值 (Bit) 的汇总方式。计算详情请参考 Bitmap。

* 举例解释：

Bit 3、6、8、15 是 1，所有其他都是 0。则总和为 $2^3+2^6+2^8+2^{15} = 8+64+256+32768 = 33096$ 。反之亦然。这时会从指数最大的比特开始，检查读入的数字是否大于或等于 2 的幂。如果是这种情况，则将比特设为 1，从数字中减去 2 的幂。之后使用之前计算得到的剩余数，检查指数次大的比特，如此重复，直至到达 Bit 0 或者剩余数为零为止。
 举例讲解：读取的数字是 1416。Bit 15 是 0，因为 $1416 < 32768$ 。Bits 14 至 11 也是 0。Bit 10 是 1，因为 $1416 > 1024$ 。剩余数是 $1416 - 1024 = 392$ 。Bit 9 是 0，因为 $392 < 512$ 。Bit 8 是 1，因为 $392 > 256$ 。剩余数是 $392 - 256 = 136$ 。Bit 7 是 1，因为 $136 > 128$ 。剩余数是 $136 - 128 = 8$ 。Bit 6 至 4 是 0。Bit 3 是 1，因为 $8 = 8$ 。剩余数是 0。因此，剩余的 Bit 2 至 0 就全部是 0。

13.6 ModBus：参数概览

保持寄存器 (协议)	名称	数据类型	Scale & unit	Elements	Access*	Added
40001 (0)	Version communication profile	UINT16	0.001		R	31.000
40002 (1)	Wink Service	BOOL			RW	31.000
40003 (2)	Switch box type	ENUM		0.SC 1.SC...FC 2.SCe 3.CC 4.CC...FC 5.CCe 6.SCe NWB 7.CCe NWB 8.EC 9.ECe 10.ECe NWB	R	31.000
40014 (13)	总线指令计时器	ENUM		0. - 1.Off 2.Set 3.Active 4.Reset 5.Manual	RW	31.000
40015 (14)	Drives on/off	BOOL			RW	31.000

保持寄存器 (协议)	名称	数据类型	Scale & unit	Elements	Access*	Added
40025 (24)	Control mode	ENUM		0. p-c 1. dp-c 2. dp-v 3. dT-c 4. dT-v 5. n(TV) 6. n(TR) 7. n(TP) 8. n(TA) 9. n-c 10. fill 11. empty/drain 12.FTS 13. cleans/day 14. cleans/ month	R	31.000
40026 (25)	Current value	INT16	0.1 bar 0.1 m 0.1 K 0.1 °C 1 cm 1 min 0.1 h 0.1 每平方英寸 磅数		R	31.000
40041 (40)	Pump 1 mode	ENUM		0.Off 1.手动 2.自动	RW	31.000
40042 (41)	Pump 2 mode	ENUM		0.Off 1.手动 2.自动	RW	31.000
40043 (42)	Pump 3 mode	ENUM		0.Off 1.手动 2.自动	RW	31.000
40062 (61)	Switch box state	BITMAP		0 : SBM 1:S5M	R	31.000
40139 - 40140 (138-139)	Error state	BITMAP32		0 : Sensor error 1:P max 2:P min 3:FC 4:TLS 5:Pump 1 Alarm 6:Pump 2 Alarm 7:Pump 3 Alarm 8:Pump 4 Alarm 9:Pump 5 Alarm 10:Pump 6 Alarm 11: - 12: - 13:Frost 14:Battery Low 15 : High water 16:Priority off 17:Redundancy 18:Plausibility 19:Slave communication 20:Net supply 21:Leakage	R	31.000

保持寄存器 (协议)	名称	数据类型	Scale & unit	Elements	Access*	Added
40141 (140)	Acknowledge	BOOL			W	31.000
40142 (141)	Alarm history index	UINT16			RW	31.000
40143 (142)	Alarm history error code	UINT16	0.1		R	31.000
40198 (197)	State float swiches	BITMAP		0 : DR 1 : Ps off 2:P1 on 3:P2 on 4:HW	R	31.102
40204 (203)	Set points water level 1	UNIT16	1 cm		RW	31.102
40205 (204)	Set points water level 2	UNIT16	1 cm		RW	31.102
40206 (205)	Set points water level 3	UNIT16	1 cm		RW	31.102
40212 (211)	Set points water level 1	UNIT16	1 cm		RW	31.102
40213 (212)	Set points water level 2	UNIT16	1 cm		RW	31.102
40214 (213)	Set points water level 3	UNIT16	1 cm		RW	31.102
40220 (219)	Dry run level	UNIT16	1 cm		RW	31.102
40222 (221)	High water level	UNIT16	1 cm		RW	31.102

图例说明

* R = 仅读取访问, RW = 读取和写入访问

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1 General information

1.1 About these instructions

These instructions form part of the product. Compliance with the instructions is essential for correct handling and use:

- Read the instructions carefully before all activities.
- Keep the instructions in an accessible place at all times.
- Observe all product specifications.
- Observe the markings on the product.

The language of the original operating instructions is German. All other languages of these instructions are translations of the original operating instructions.

1.2 Copyright

WILO SE © 2022

The reproduction, distribution and utilization of this document as well as the communication of its contents to others without express authorization is prohibited. Offenders will be held liable for the payment of damages. All rights reserved.

1.3 Subject to change

Wilo shall reserve the right to change the listed data without notice and shall not be liable for technical inaccuracies and/or omissions. The illustrations used may differ from the original and are intended as an example representation of the device.

1.4 Exclusion from warranty and liability

Wilo shall specifically not assume any warranty or liability in the following cases:

- Inadequate configuration due to inadequate or incorrect instructions by the operator or the client
- Non-compliance with these instructions
- Improper use
- Incorrect storage or transport
- Incorrect installation or dismantling
- Insufficient maintenance
- Unauthorised repairs
- Inadequate construction site
- Chemical, electrical or electrochemical influences
- Wear

2 Safety

This chapter contains basic information for the individual phases of the life cycle. Failure to observe this information carries the following risks:

- Risk of personal injury from electrical, electromagnetic or mechanical influences
- Environmental damage from discharge of hazardous substances
- Damage to property
- Failure of important functions

Failure to observe the information contained herein will result in the loss of claims for damages.

The instructions and safety instructions in the other chapters must also be observed!

2.1 Identification of safety instructions

These installation and operating instructions set out safety instructions for preventing personal injury and damage to property, which are displayed in different ways:

- Safety instructions relating to personal injury start with a signal word and are **preceded by a corresponding symbol**.



DANGER

Type and source of the danger!

Consequences of the danger and instructions for avoidance.

- Safety instructions relating to property damage start with a signal word and are displayed **without** a symbol.

CAUTION

Type and source of the danger!

Consequences or information.

Signal words

- **Danger!**
Failure to observe safety instructions will result in serious injury or death!
- **Warning!**
Failure to follow instructions can lead to (serious) injury!
- **Caution!**
Failure to follow instructions can lead to property damage and possible total loss.
- **Notice!**
Useful information on handling the product

Markups

- ✓ Prerequisite
- 1. Work step/list
 - ⇒ Notice/instructions
 - ▶ Result

Symbols

These instructions use the following symbols:



Danger of electric voltage



Danger – explosive atmosphere



Useful information

2.2 Personnel qualifications

- Personnel have been instructed on locally applicable regulations governing accident prevention.
- Personnel have read and understood the installation and operating instructions.
- Electrical work: qualified electrician
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: qualified electrician
Knowledge regarding tools and fixation material for various structures

- Operation/control: Operating personnel, instructed in the functioning of the complete system
- 2.3 Electrical work**
- Electrical work must be carried out by a qualified electrician.
 - Before commencing work, disconnect the product from the mains and safeguard it from being switched on again.
 - Observe applicable local regulations when connecting to the mains power supply.
 - Adhere to the requirements of the local energy supply company.
 - Earth the product.
 - Observe technical information.
 - Replace a defective connection cable immediately.
- 2.4 Monitoring devices**
- Circuit breaker**
- The size and switching characteristics of the circuit breakers must conform to the rated current of the connected consumer. Observe local regulations.
- 2.5 Installing/dismantling**
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
 - Disconnect the product from the mains and secure it against being switched on again.
 - Suitable fixation material must be used for the existing bearing surface.
 - The product is not watertight. Select an appropriate installation site!
 - Do not deform the housing during installation. Seals could leak and affect the stated IP protection class.
 - The product may **not** be installed in potentially explosive areas.
- 2.6 During operation**
- The product is not watertight. Comply with protection class IP54.
 - Ambient temperature: -30 ... +50 °C.
 - Maximum humidity: 90 %, non-condensing.
 - Do not open the switchgear.
 - The user must notify the person in charge of every fault or irregularity immediately.
 - In case of damage to the product or connection cable, switch off the product immediately.
- 2.7 Maintenance tasks**
- Do not use any aggressive cleaners or scouring agents or fluids.
 - The product is not watertight. Do not submerge the product in fluids.
 - Only carry out maintenance tasks mentioned in these installation and operating instructions.

2.8 Operator responsibilities

- Only original parts from the manufacturer may be used for maintenance and repairs. Use of parts other than the original parts releases the manufacturer from any liability.
- Provide installation and operating instructions in a language which the personnel can understand.
- Make sure that the personnel has had the corresponding training for the specified work.
- Safety and information signs mounted on the device must always be legible.
- Train the personnel on how the system operates.
- Eliminate risk from electrical current.
- To ensure safe working practice, define personnel responsibilities.

Children and persons younger than 16 years or with reduced physical, sensory or mental capacities or limited experience are prohibited from handling the product! A technician must supervise persons younger than 18 years!

3 Application/use

3.1 Intended use

The switchgear is designed for level-dependent control of up to three pumps.

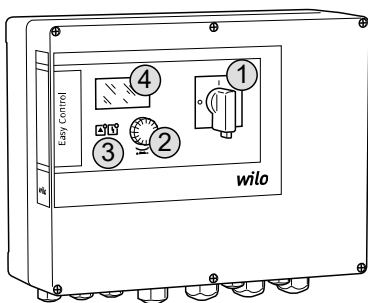
Intended use also includes compliance with this manual. Any other use is regarded as non-compliant with the intended use.

3.2 Improper use

- Installation in potentially explosive atmospheres
- Overflow of the switchgear

4 Product description

4.1 Structure



1	Main switch
2	Operating button
3	LED indicators
4	LCD display

The front of the switchgear comprises the following main components:

- Main switch for switching the switchgear on/off (not the “EMS” version)
- Operating button for menu selection and parameter input
- LEDs for displaying the current operating state
- LCD display for showing the current operating data and individual menu items

Fig. 1: Switchgear front

4.2 How it works

Level measurement is via a two-position control for each pump. The pumps are individually switched on/off automatically, depending on the fill level. An optical signal is given upon reaching the dry run or high water level. All pumps are also switched on or off by force. Faults are stored in the fault memory.

The current operating data and operating conditions are shown on the LCD display and indicated by LEDs. Operation and input of operating parameters is carried out using a rotary knob.

NOTICE! Control EC-L3 ...: A max. of 2 pumps can be actuated with level measurement using a float switch!

4.3 Operating modes

The switchgear has two different operating modes:

- drain (drain)
- fill (fill)

Selection is via the menu.

“Drain” operating mode

The reservoir or pump chamber is drained. The connected pumps are activated when the level rises and switched off when the level falls.

“Fill” operating mode

The reservoir is filled. The connected pumps are activated when the level falls and switched off when the level rises.

4.4 Technical data

Date of manufacture*	See rating plate
Mains connection	1~220/230 V, 3~380/400 V
Mains frequency	50/60 Hz
Max. current consumption per pump	12 A
Max. rated power per pump	4 kW
Pump activation type	Direct on line
Ambient/operating temperature	-30 ... +50 °C
Storage temperature	-30 ... +60 °C
Max. relative humidity	90 %, non-condensing
Protection class	IP54
Electrical safety	Pollution degree II
Control voltage	24 V =/~
Housing material	UV-resistant polycarbonate

Details about the Hardware version (HW) and Software version (SW) can be found on the rating plate!

*The date of manufacture is stated in accordance with ISO 8601: JJJJWww

- JJJJ = year
- W = abbreviation for week
- ww = calendar week

4.5 Inputs and outputs

Inputs	Hardware version	Number of inputs		
		EC-L1 ...	EC-L2 ...	EC-L3 ...
Level measurement				
Level sensor	all	1	1	1
Float switch	all	2	3	3
Electrode	From HW 2	2	3	–
Dynamic pressure bell	all	1	1	1
High water level				
Float switch	all	1	1	1
Electrode	From HW 2	1	1	–
Dry run/low water level				
Float switch	all	1	1	1
Electrode	From HW 2	1	1	–
Pump monitoring				
Thermal winding monitor (bimetal)	all	1	2	3
Thermal winding monitor (PTC)	all	–	–	–
(Electrode) leakage detection	all	1	2	3
Other inputs				
Extern OFF: for remote switch off of all pumps In “fill” operating mode, dry-running protection is realised via this input.	all	1	1	1

Outputs	Hardware version	Number of inputs		
		EC-L1 ...	EC-L2 ...	EC-L3 ...
Potential-free contacts				
Collective fault signal (changeover contact)	all	1	1	1
Collective run signal (changeover contact)	all	1	1	1
Individual fault signal (closed contact (NC))	all	1	2	3
Individual run signal (open contact (NO))	all	1	2	3
Other outputs				
Service output (connection value: 24 V=, max. 4 VA) E.g. output for connecting an external alarm signal (lamp or horn)	all	1	1	1
Display of the current level value (0 ... 10 V=)	all	1	1	1

4.6 Type key

Example: Wilo-Control EC-L 2x12A-MT34-DOL-WM-X	
EC	Easy Control switchgear for fixed-speed pumps
L	"Lift" version for water lifting applications
2x	Max. number of pumps that can be connected
12A	Max. rated current per pump in amperes
MT34	Mains connection: <ul style="list-style-type: none"> M = single-phase current (1~220/230 V) T34 = three-phase current (3~380/400 V)
DOL	Pump activation type: Direct
WM	Wall fixation
X	Versions: <ul style="list-style-type: none"> EMS = without main switch (mains isolator must be provided by the customer!) IPS = with integrated pressure transducer for direct connection of a dynamic pressure bell

4.7 Operation on electronic start-up controllers

Connect the switchgear directly to the pump and the mains. Intermediate switching of additional electronic start-up controllers, e.g. a frequency converter, is not permitted!

4.8 Installation in potentially explosive atmospheres

The switchgear does not have its own explosion protection class. **Do not** install the switchgear in potentially explosive areas!

4.9 Scope of delivery

- Switchgear
- Installation and operating instructions

4.10 Accessories

- Float switch for drainage and sewage
- Level sensor 4 ... 20 mA
- Level monitor
- Dynamic pressure bell and bubbling-through system
- Signal lamp 24 V DC
- Flash light 230 V~
- Horn 230 V~
- Rechargeable battery for mains-independent alarm
- Ex cut-off relay
- Zener barrier

5 Transportation and storage

5.1 Delivery

After receiving the shipment, check it immediately for defects (damage, completeness). The transport company or the manufacturer must be notified of any defects the day the shipment is received, and the damage noted on the freight documentation. Claims cannot be asserted if the notification of defects takes place at a later date.

5.2 Transport

CAUTION

Soaked packaging may tear!

The product may fall on the ground if unprotected and may be damaged. Lift wet packaging carefully and replace it immediately!

5.3 Storage

- Clean switchgear.
- Close housing apertures, ensuring they are sealed watertight.
- Impact-resistant and watertight packaging.
- Pack the switchgear in dustproof and watertight packaging.
- Storage temperature: $-30 \dots +60 \text{ }^\circ\text{C}$, max. relative humidity: 90 %, non-condensing.
- Frost-proof storage at a temperature of $10 \text{ }^\circ\text{C}$ to $25 \text{ }^\circ\text{C}$ with relative humidity of 40 ... 50 % is recommended.
- Avoid the formation of condensation at all times!
- All open threaded cable glands must be sealed to prevent water ingress into the housing.
- Attached cables should be protected against kinking, damage, and ingress of moisture.
- To prevent damage to the components, protect the switchgear from direct sunlight and heat.
- Clean the switchgear after storage.
- If there has been water ingress or condensation has formed, have all the electronic components tested for correct function. Contact customer service!

6 Installation

6.1 Personnel qualifications

- Check the switchgear for damage caused during transport. Do **not** install defective switchgears!
- Observe the local guidelines for the design and operation of electronic controls.
- Electrical work: qualified electrician
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: qualified electrician
Knowledge regarding tools and fixation material for various structures

6.2 Installation types

- Wall fixation

6.3 Operator responsibilities

- The installation location is clean, dry and free of vibration.
- The installation location is overflow-proof.
- The switchgear is not exposed to direct sunlight.
- Installation location outside of potentially explosive atmospheres.

6.4 Installation



DANGER

Risk of explosion if the switchgear is installed in potentially explosive areas!

The switchgear does not have its own explosion protection class and must always be installed outside of potentially explosive areas! The connection must be made by a qualified electrician.

- Level sensor and connection cable provided by the customer.
- While laying the cables, ensure that there is no tension, no kinking and no pinching that could damage the cable.
- Check the cable cross-section and length for the routing type chosen.
- Seal unused threaded cable glands.
- Ensure that the following ambient conditions are adhered to:
 - Ambient/operating temperature: $-30 \dots +50 \text{ }^\circ\text{C}$
 - Relative humidity: 40 ... 50 %
 - Max. relative humidity: 90 %, non-condensing

6.4.1 Basic advice on fixing the switchgear in place

Various structures can be used for installation (concrete wall, mounting rail, etc.). For this reason, the fixation material for the relevant construction must be provided by the customer and the following information must be observed:

- To prevent cracks in the masonry and chipping of the construction material, ensure sufficient clearance to the edge of the structure.
- The depth of the borehole depends on the length of the screws. Drill the borehole approx. 5 mm deeper than the screw length.
- Drilling dust impairs retention force. Always blow the borehole clean or vacuum it out.
- Do not damage the housing during installation.

6.4.2 Installation of switchgear

Attach the switchgear to the wall with the four screws and wall plugs.

- Max. screw diameter:
 - Control EC-L 1x.../EC-L 2x...: 4 mm
 - Control EC-L 3x...: 6 mm
 - Max. screw head diameter:
 - Control EC-L 1x.../EC-L 2x...: 7 mm
 - Control EC-L 3x...: 11 mm
 - ✓ Switchgear is disconnected from the mains and voltage-free.
1. Align the drill template at the installation location and attach.
 2. Drill and clean the mounting holes in accordance with the specifications of the fixation material.
 3. Remove the drill template.
 4. Loosen the screws on the cover and remove the cover to the side.
 5. Attach the lower part to the wall with the fixation material.
Check the lower part for deformations! Realign deformed housing covers (e.g. by placing alignment plates below them) to ensure the housing cover closes precisely.**NO-TICE! If the cover does not close correctly, the protection class is compromised!**
 6. Close the cover and fasten it with the screws.
 - ▶ The switchgear is installed. Now connect the mains, pumps and signal transmitter.

6.4.3 Level control

For automatic control of the pumps, a level control device must be installed. To this end, the following signal transmitters can be connected:

- Level sensor
Change the switching points via the menu.
- Dynamic pressure bell
Only "IPS" version! Change the switching points via the menu.
- Float switch
- Electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**
- Level monitor

The signal transmitters must be installed according to the system's installation plan. Please observe the following points:

- Float switch: Float switches must be able to move freely in the operating space (pump chamber, tank)!
- Dynamic pressure bell: Install a bubbling-through system to optimally vent the dynamic pressure bell.
- Do **not undercut** the minimum water level of the pumps!
- Do **not exceed** the switching frequency of the pumps!

6.4.4 Dry-running protection

The level can be measured via the following signal transmitters:

- Level sensor
Set the switching point in the menu.
- Dynamic pressure bell
Only "IPS" version! Set the switching point in the menu.
- Separate float switch
- Separate electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**

A **forced switch-off** of all pumps always takes place in the event of an alarm, irrespective of the selected signal transmitter!

The signal transmitters must be installed according to the system's installation plan. Please observe the following points:

- Float switch: Float switches must be able to move freely in the operating space (pump chamber, tank)!
- Dynamic pressure bell: Install a bubbling-through system to optimally vent the dynamic pressure bell.

The following applies to the “fill” operating mode:

- Implement dry-running protection in all cases via the “Extern OFF” input!
- Install the signal transmitter in the supplying tank (e.g. well).

6.4.5 Water shortage (for “fill” operating mode only)

The level can be measured via the following signal transmitters:

- Level sensor
Set the switching point in the menu.
- Dynamic pressure bell
Only “IPS” version! Set the switching point in the menu.
- Separate float switch
- Separate electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**

A **forced switch-on** of all pumps always takes place in the event of an alarm, irrespective of the selected signal transmitter!

The signal transmitters must be installed according to the system's installation plan. Please observe the following points:

- Float switch: Float switches must be able to move freely in the operating space (pump chamber, tank)!
- Dynamic pressure bell: Install a bubbling-through system to optimally vent the dynamic pressure bell.

6.4.6 High water alarm

The level can be measured via the following signal transmitters:

- Level sensor
Set the switching point in the menu.
- Dynamic pressure bell
Only “IPS” version! Set the switching point in the menu.
- Separate float switch
- Separate electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**

The signal transmitters must be installed according to the system's installation plan. Please observe the following points:

- Float switch: Float switches must be able to move freely in the operating space (pump chamber, tank)!
- Dynamic pressure bell: Install a bubbling-through system to optimally vent the dynamic pressure bell.

What to do in the event of an alarm

- **Operating mode “drain”:** A **forced switch-on** of all pumps always takes place in the event of an alarm, irrespective of the selected signal transmitter!
- **Operating mode “fill”:** A **forced switch-off** of all pumps always takes place in the event of an alarm, irrespective of the selected signal transmitter!

The pumps must be activated for the **forced switch-on**:

- Menu 3.01: Pumps are enabled.
- Extern OFF: Function is inactive.

**DANGER****Risk of fatal injury due to electrical current!**

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

**NOTICE**

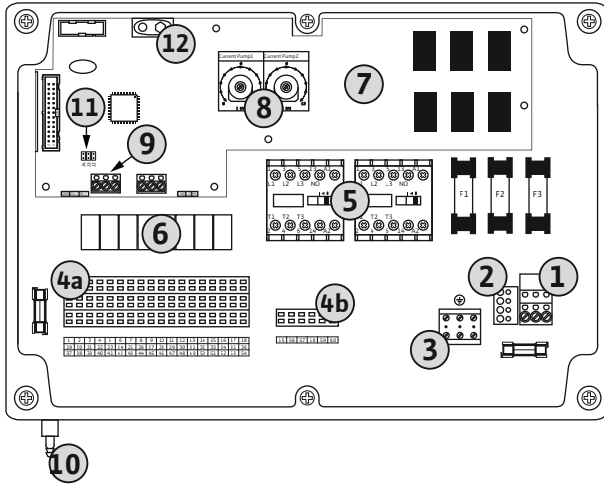
- Depending on the system impedance and the maximum connections/hour of the connected consumers, voltage fluctuations and/or drops may occur.
- When using shielded cables, attach the shielding to the earth rail on one side of the switchgear!
- Always have connection carried out by a qualified electrician!
- Observe the installation and operating instructions for the connected pumps and signal transmitters.

- The mains connection current and voltage must be as stated on the rating plate.
- Execute fuse protection on the mains side in accordance with the local guidelines.
- If circuit breakers are used, the switching characteristics should be selected according to the connected pump.
- Follow local guidelines if residual-current devices (RCD, type A, sinusoidal current, universal-current-sensitive) are installed.
- Route connection cable in accordance with the local guidelines.
- Do not damage the connection cable during routing or installation.
- Earth the switchgear and all electrical consumers.

6.5.1 Overview of components

Overview Control EC-L 1 .../EC-L 2 ...

HW-Rev. 01



HW-Rev. 02

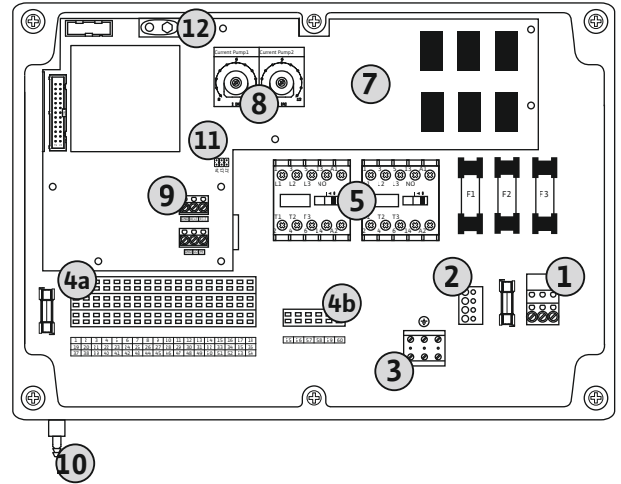


Fig. 2: Control EC-L 1 .../EC-L 2 ...

1	Terminal strip: Mains connection
2	Mains voltage adjustment
3	Terminal strip: Earth (PE)
4a	Terminal strip: Sensors
4b	Terminal strip: Sensors for active ex-mode
5	Contactor combinations
6	Output relay
7	Control board
8	Potentiometer for motor current monitoring
9	ModBus RTU: RS485 interface
10	Dynamic pressure bell pressure connection ("IPS" version only)
11	ModBus RTU: Jumper for termination/polarisation
12	Slot 9 V rechargeable battery

Overview Control /EC-L 3 ...

HW-Rev. 01 & 02

= HW-Rev. 01

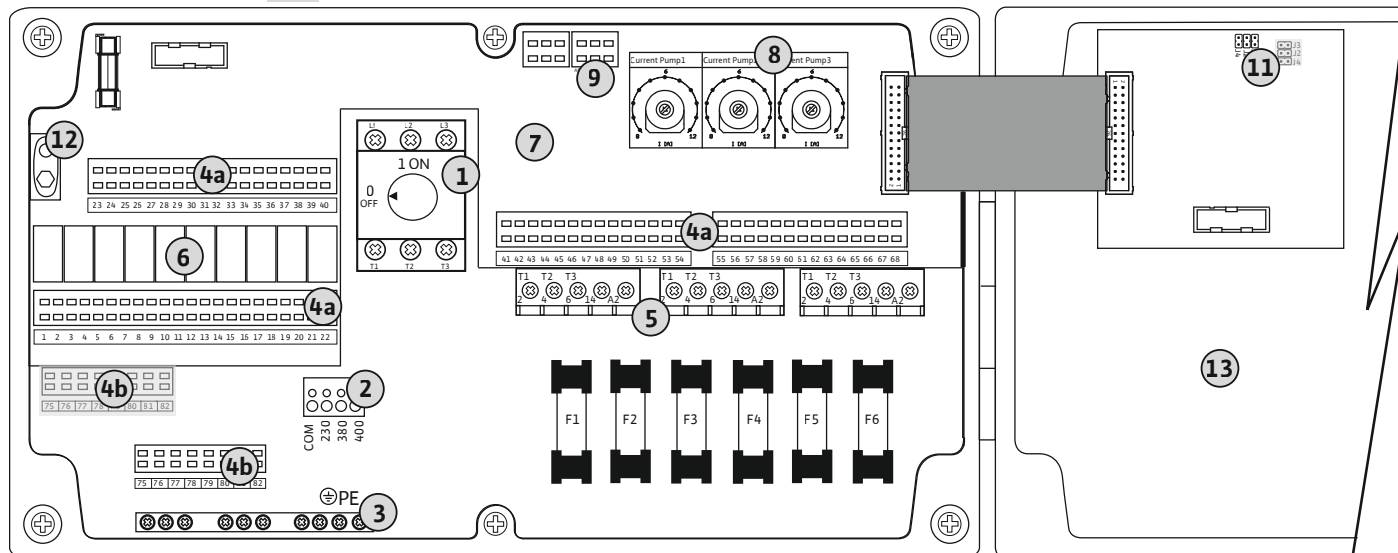


Fig. 3: Control EC-L 3 ...

1	Main switch/mains connection
2	Mains voltage adjustment
3	Terminal strip: Earth (PE)
4a	Terminal strip: Sensors
4b	Terminal strip: Sensors for active ex-mode
5	Contactor combinations
6	Output relay
7	Control board
8	Potentiometer for motor current monitoring
9	ModBus RTU: RS485 interface
11	ModBus RTU: Jumper for termination/polarisation
12	Slot 9 V rechargeable battery
13	Housing cover

6.5.2 Switchgear mains connection

CAUTION**Material damage due to incorrectly set mains voltage!**

The switchgear can be operated at different mains voltages. The mains voltage is set to 400 V at the factory. To use another mains voltage, change the position of the cable jumper before connection. If the wrong mains voltage is set, the switchgear will be destroyed!

Mains connection, Wilo-Control EC-L 1 ... /EC-L 2 ...

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram.

1	Terminal strip: Mains connection
2	Mains voltage adjustment
3	Terminal strip: Earth (PE)

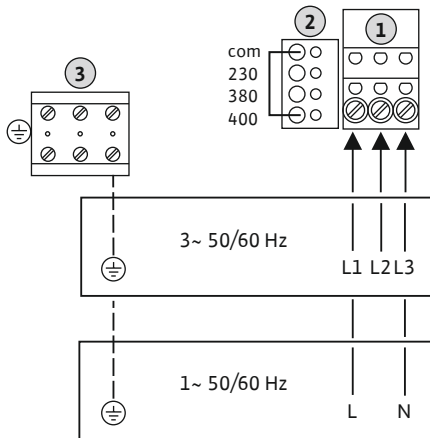


Fig. 4: Mains connection, Wilo-Control EC-L 1 ... /EC-L 2 ...

Mains connection 1~230 V:

- Cable: 3-core
- Wire: L, N, PE
- Mains voltage adjustment: Converter bridge 230/COM

Mains connection 3~380 V:

- Cable: 4-core
- Wire: L1, L2, L3, PE
- Mains voltage adjustment: Converter bridge 380/COM

Mains connection 3~400 V:

- Cable: 4-core
- Wire: L1, L2, L3, PE
- Mains voltage adjustment: Converter bridge 400/COM (**factory setting**)

Mains connection, Wilo-Control EC-L 3 ...

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the main switch as per the connection diagram.

1	Main switch
2	Mains voltage adjustment
3	Terminal strip: Earth (PE)

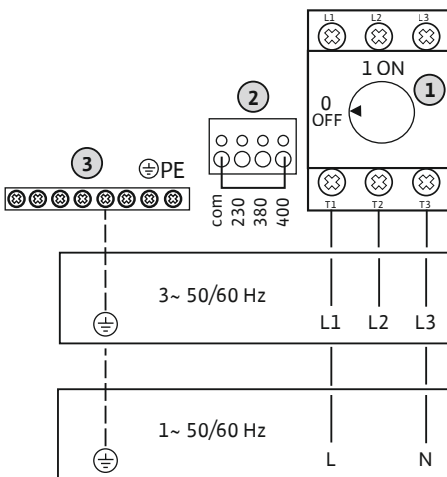


Fig. 5: Mains connection, Wilo-Control EC-L 3 ...

6.5.3 Mains connection, pump



NOTICE

Rotating field, power supply and pump connection

The rotating field is routed from the mains connection directly to the pump connection. Check the required rotating field of the pumps to be connected (clockwise or counter-clockwise)! Observe the installation and operating instructions of the pumps.

6.5.3.1 Connect pump(s)

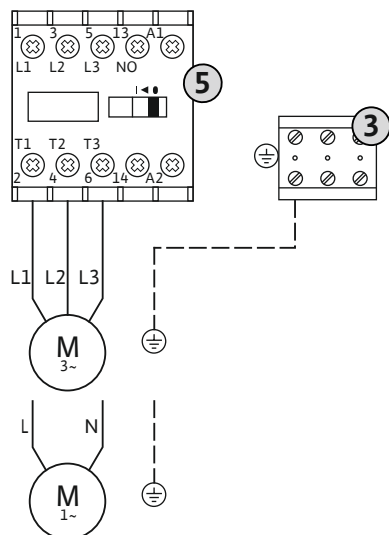


Fig. 6: Pump connection

6.5.3.2 Adjust motor current monitoring

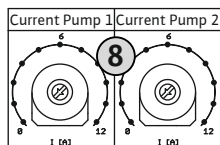


Fig. 7: Adjust motor current monitoring

6.5.4 Connection, thermal motor monitoring



DANGER

Risk of explosion due to incorrect connection!

If the connected pump is installed in an explosive atmosphere, there is a risk of explosion due to incorrect connection:

- Switch on ex-mode (menu 5.64)!
- Observe the section on explosive atmospheres in the appendix.
- Connection must be carried out by a qualified electrician.

3 Terminal strip: Earth (PE)

5 Contactor

Insert the connection cable laid by the customer through the threaded cable glands and secure. Connect the wires to the contactor as per the connection diagram.

NOTICE! After all pumps have been connected, set the motor current monitoring!

Set the permissible rated current after connecting the pump.

8 Potentiometer for motor current monitoring

Set the motor current on the respective potentiometer with a screwdriver:

- At full load, set the rated current in accordance with the rating plate.
- At partial load, set the rated current 5 % above the current measured at the duty point.

The motor current monitoring can be fine tuned during commissioning. The actual motor current can be displayed during commissioning:

- Currently **set** rated current of the motor monitoring (menu 4.25 ... 4.27)
- Currently **measured** operating current of the pump (menu 4.29 ... 4.31)



DANGER

Risk of explosion due to incorrect connection!

If the connected pump is installed in an explosive atmosphere, there is a risk of explosion due to incorrect connection:

- Switch on ex-mode (menu 5.64)!
- Observe the section on explosive atmospheres in the appendix.
- Connection must be carried out by a qualified electrician.

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

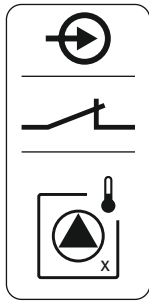


Fig. 8: Connection overview symbol

6.5.5 Leakage detection connection

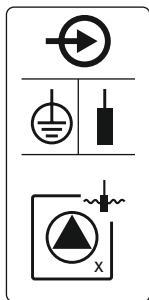


Fig. 9: Connection overview symbol

6.5.6 Connection of signal transmitter for level control device

One thermal motor monitoring device with bimetallic strips can be connected per pump. Do not connect a PTC sensor!

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.** The number shown in location "x" on the symbol indicates which pump it refers to:

- 1 = pump 1
- 2 = pump 2
- 3 = pump 3



DANGER

Risk of explosion due to incorrect connection!

If the connected pump is installed in an explosive atmosphere, there is a risk of explosion due to incorrect connection:

- Switch on ex-mode (menu 5.64)!
- Observe the section on explosive atmospheres in the appendix.
- Connection must be carried out by a qualified electrician.

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

Leakage detection that uses a moisture probe can be connected for each pump. The threshold (< 30 kOhm) for a deactivation is permanently stored in the switchgear. Do not connect a float switch!

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.** The number shown in location "x" on the symbol indicates which pump it refers to:

- 1 = pump 1
- 2 = pump 2
- 3 = pump 3



DANGER

Risk of explosion due to incorrect connection!

If the connected signal transmitter is installed in an explosive atmosphere (Ex zone), there is a risk of explosion due to incorrect connection:

- **Do not** connect electrode in an explosive atmosphere (Ex zone)!
- Connect the float switch using an Ex cut-off relay!
- Connect level sensor via a Zener barrier!
- Observe the section on explosive atmospheres in the appendix.
- Connection must be carried out by a qualified electrician.

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

The level can be measured via the following signal transmitters:

- Level sensor

- Dynamic pressure bell
Only "IPS" version!
- Float switch
- Electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**
 - Connection is protected against reverse polarity!
- Level monitor

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**

Float switch or electrode

NOTICE! A max. of two pumps can be controlled if float switches or electrodes are used.

	Level, "All pumps Off"
	Level, "Pump 1 On"
	Level, "Pump 2 On"

Level sensor

- Connection load: 4 ... 20 mA
- **Do not** connect active level sensors.
- **NOTICE! Observe the correct polarity when connecting!**

Dynamic pressure bell

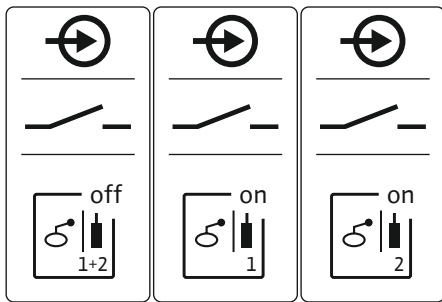


Fig. 10: Connection overview symbol

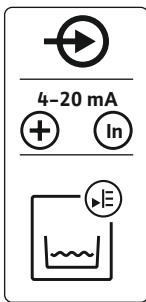


Fig. 11: Connection overview symbol

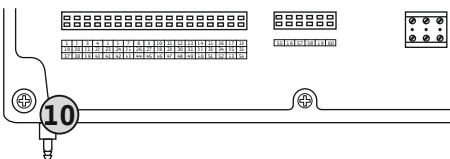


Fig. 12: Discharge connection

10 Dynamic pressure bell, pressure connection

- Connection load: 0 ... 250 mbar
 - Vent the dynamic pressure bell after each drainage process.
If the dynamic pressure bell cannot be readily ventilated, vent the dynamic pressure bell with a compressor (bubbling-through system). Venting can take place continuously or periodically.
1. Loosen and unscrew the union nut from the discharge connection.
 2. Insert a union nut on the pressure hose of the dynamic pressure bell
 3. Push the pressure hose onto the pressure connection as far as it will go.
 4. Screw the union nut back onto the pressure connection and tighten it to fasten the pressure hose.

6.5.7 Connection of the NW16 level monitor

DANGER
Risk of explosion if the level monitor is installed in potentially explosive areas!

The NW16 level monitor does not have its own explosive protection class.

- The NW16 level monitor may only be installed outside potentially explosive atmospheres!

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

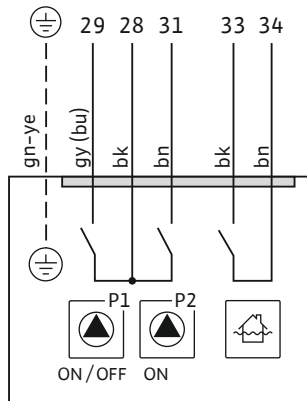


Fig. 13: Connection diagram NW16 at the control EC-L 2x...

6.5.8 Connection dry-running protection/min. Water level with separate float switch

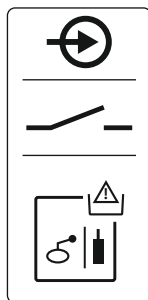


Fig. 14: Connection overview symbol

The level detection for **two** pumps can be performed using the NW16 level monitor. The level monitor has the following switching points:

- Pump 1 On/Off
- Pump 2 On/Off
- High water alarm

The level control corresponds to operation with separate float switches. The internal structure of the level monitor ensures hysteresis between the activation/deactivation level of the relevant pump.

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram.



DANGER

Risk of explosion due to incorrect connection!

If the connected signal transmitter is installed in an explosive atmosphere (Ex zone), there is a risk of explosion due to incorrect connection:

- **Do not** connect electrode in an explosive atmosphere (Ex zone)!
- Connect the float switch using an Ex cut-off relay!
- Connect level sensor via a Zener barrier!
- Observe the section on explosive atmospheres in the appendix.
- Connection must be carried out by a qualified electrician.

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

Dry-running protection ("drain" operating mode)

The dry-running level can also be monitored by the following signal transmitters:

- Float switch
- Electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**
 - Connection is protected against reverse polarity!

The input acts as a normally open contact (NO):

- Float switch open/electrode not immersed: Dry run
- Float switch closed/electrode immersed: No dry run

The terminals are fitted with a converter bridge at the factory.

NOTICE! A separate dry-running protection system is recommended as an additional system safety measure.

Insert the connection cables laid by the customer through the threaded cable glands and secure. Remove the converter bridge and connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**

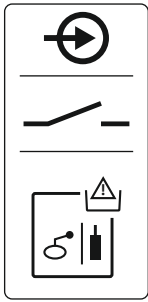


Fig. 15: Connection overview symbol

6.5.9 High water alarm connection with separate float switch

Min. water level (operating mode “fill”)

The min. water level can also be monitored by the following signal transmitters:

- Float switch
- Electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**
 - Connection is protected against reverse polarity!

The input acts as a normally open contact (NO):

- Float switch open/electrode not immersed: Min. water level
- Float switch closed/electrode immersed: water level sufficient

The terminals are fitted with a converter bridge at the factory.

Insert the connection cable laid by the customer through the threaded cable glands and secure. Remove the converter bridge and connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**



DANGER

Risk of explosion due to incorrect connection!

If the connected signal transmitter is installed in an explosive atmosphere (Ex zone), there is a risk of explosion due to incorrect connection:

- **Do not** connect electrode in an explosive atmosphere (Ex zone)!
- Connect the float switch using an Ex cut-off relay!
- Connect level sensor via a Zener barrier!
- Observe the section on explosive atmospheres in the appendix.
- Connection must be carried out by a qualified electrician.

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

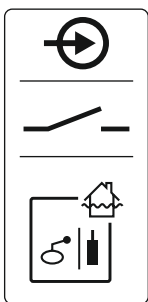


Fig. 16: Connection overview symbol

6.5.10 “Extern OFF” connection: Remote deactivation

The high-water level can also be monitored by the following signal transmitters:

- Float switch
- Electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**
 - Connection is protected against reverse polarity!

The input acts as a normally open contact (NO):

- Float switch open/electrode not immersed: No high water alarm
- Float switch closed/electrode immersed: High water alarm

NOTICE! A separate signal transmitter for the high water level is recommended as an additional system safety measure.

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

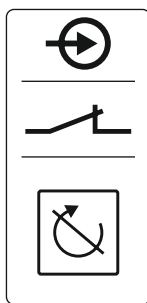


Fig. 17: Connection overview symbol

6.5.11 Connection of a level actual value display

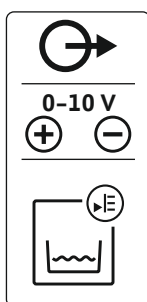


Fig. 18: Connection overview symbol

6.5.12 Collective run signal (SBM) connection

Remote deactivation of all pumps can be performed using a separate signal transmitter:

- Float switch
- Electrode
 - **Only** Control EC-L1 ... and EC-L2 ...
 - Hardware version 2 **or higher**
 - Connection is protected against reverse polarity!

The input acts as a normally closed contact (NC):

- Float switch closed/electrode immersed: Pumps enabled
- Float switch open/electrode not immersed: all pumps deactivated – the display shows the “Extern OFF” symbol.

If the alarm is activated in menu 5.39, in the “fill” operating mode, an audible alarm sounds in addition to the symbol appearing.

The terminals are fitted with a converter bridge at the factory.

NOTICE! Remote deactivation is prioritised. All pumps are deactivated independently of the level measurement. Manual mode and forced switch-on of the pumps is not possible!

Insert the connection cables laid by the customer through the threaded cable glands and secure. Remove the converter bridge and connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

The actual level value is exported via a separate output. A voltage of 0 ... 10 V= is provided for this at the output:

- 0 V = level sensor value “0”
- 10 V = level sensor upper limit

Example:

- Level sensor measurement range: 0 ... 2.5 m
- Display range: 0 ... 2.5 m
- Setting: 1 V = 0.25 m

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**

Activate the function in menu 5.07 to output the actual level value.



DANGER

Risk of fatal injury due to an external electrical power supply!

The external electrical power supply is also present at the terminals when the main switch is switched off! There is a risk of fatal injury!

- Disconnect external power supply before any work!
- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

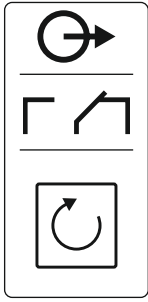


Fig. 19: Connection overview symbol

6.5.13 Collective fault signal connection (SSM)

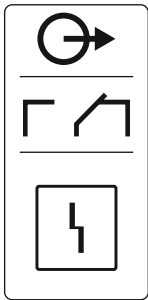


Fig. 20: Connection overview symbol

6.5.14 Individual run signal (EBM) connection

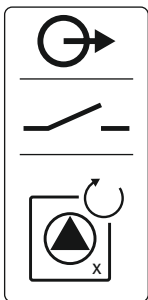


Fig. 21: Connection overview symbol

A run signal is issued for all pumps (SBM) via a separate output:

- Contact type: potential-free changeover contact
- Contact load:
 - Minimum: 12 V₌, 10 mA
 - Maximum: 250 V_~, 1 A

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**



DANGER

Risk of fatal injury due to an external electrical power supply!

The external electrical power supply is also present at the terminals when the main switch is switched off! There is a risk of fatal injury!

- Disconnect external power supply before any work!
- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

A fault message is output for all pumps (SSM) via a separate output:

- Contact type: potential-free changeover contact
- Contact load:
 - Minimum: 12 V₌, 10 mA
 - Maximum: 250 V_~ 1 A

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**



DANGER

Risk of fatal injury due to an external electrical power supply!

The external electrical power supply is also present at the terminals when the main switch is switched off! There is a risk of fatal injury!

- Disconnect external power supply before any work!
- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

A run signal is output for each pump (EBM) via a separate output:

- Contact type: potential-free NO contact
- Contact load:
 - Minimum: 12 V₌, 10 mA
 - Maximum: 250 V_~, 1 A

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.** The number shown in location "x" on the symbol indicates which pump it refers to:

- 1 = pump 1
- 2 = pump 2
- 3 = pump 3

6.5.15 Individual fault signal (ESM) connection

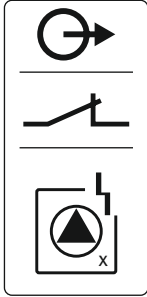


Fig. 22: Connection overview symbol

6.5.16 Connecting an external alarm signal

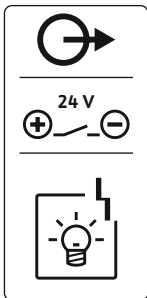


Fig. 23: Connection overview symbol

6.5.17 Installing the rechargeable battery



DANGER

Risk of fatal injury due to an external electrical power supply!

The external electrical power supply is also present at the terminals when the main switch is switched off! There is a risk of fatal injury!

- Disconnect external power supply before any work!
- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

A fault message is output for each pump (ESM) via a separate output:

- Contact type: potential-free NC contact
- Contact load:
 - Minimum: 12 V $\bar{=}$, 10 mA
 - Maximum: 250 V \sim , 1 A

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.** The number shown in location "x" on the symbol indicates which pump it refers to:

- 1 = pump 1
- 2 = pump 2
- 3 = pump 3

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

An external alarm signal (horn, flashing light, etc.) can be connected. The output is switched in parallel to the collective fault signal (SSM).

- Alarm signal suitable for DC voltage.
- Connection load: 24 V $\bar{=}$, max. 4 VA
- **NOTICE! Observe the correct polarity when connecting!**
- Activate output in menu 5.67.

Insert the connection cables laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram. **Use the terminal number shown in the connection overview on the cover.**



DANGER

Risk of fatal injury due to electrical current!

There is a risk of fatal injury when performing work on the open switchgear! The components carry current!

- Have work carried out by a qualified electrician.
- Avoid contact with earthed metal parts (pipes, frames etc.).



NOTICE

Mains-independent alarm

The alarm sounds as soon as the rechargeable battery is inserted. The alarm can only be switched off by removing the rechargeable battery again or by connecting the power supply.

By inserting a rechargeable battery, a mains-independent alarm signal can be issued in the case of a power failure. An audible, constant tone is emitted as an alarm. Observe the following points:

- Rechargeable battery type: E-Block, 9 V, Ni-MH
 - In order to ensure trouble-free operation, charge the rechargeable battery prior to insertion or charge it for 24 h in the switchgear.
 - The capacity of the rechargeable battery will fall if the ambient temperature drops. The alarm running time is reduced.
- ✓ Power supply connected.
- ✓ Main switch in the “0/OFF” position!
- NOTICE! Switchgear without main switch: Disconnect power supply with mains isolator!**
1. Insert the rechargeable battery into the designated holder, see “Overview of components”.
WARNING! Do not insert any batteries! There is a risk of explosion!
CAUTION! Observe the correct polarity!
 2. Plug in the connection cable.
⇒ Alarm sounds!
 3. Turn the main switch to the “1/ON” position.
NOTICE! Switchgear without main switch: Establish power supply by means of mains isolator!
⇒ Alarm off!
▶ Rechargeable battery installed.

6.5.18 Connection ModBus RTU

CAUTION

Do not apply external voltage!

An external voltage which is applied destroys the component.

See Overview of components [▶ 67] for position numbers

9	ModBus: RS485 interface
11	ModBus: Jumper for termination/polarisation

The ModBus protocol is available for connection to a building management system. Insert the connection cable laid by the customer through the threaded cable glands and secure. Connect the wires to the terminal strip according to the connection diagram.

Observe the following points:

- Interface: RS485
- Field bus protocol settings: Menu 2.01 to 2.05.
- Terminate switchgear: Plug in jumper J2.
- If the ModBus requires a polarisation, plug in jumpers “J3” and “J4”.

7 Operation



DANGER

Risk of fatal injury due to electrical current!

Only operate the switchgear when closed. There is a risk of fatal injury from open switchgear! Electrical work on the internal components must be carried out by a qualified electrician.

7.1 How it works

In automatic mode, the pumps are switched on and off depending on the water level. Once the first activation point has been reached, pump 1 switches on. Once the second activation point has been reached, pump 2 switches on after the activation delay has elapsed. During operation, a visual indicator appears on the LCD display and the green LED lights up. Once the deactivation point has been reached, both pumps are switched off after the deactivation delay has elapsed. To optimise pump running times, pump cycling is carried out every time the pump is switched off.

An alarm signal is shown on the LCD display in case of a fault. If more than one pump is connected, automatic changeover to a fully-functional pump occurs. Additionally, the internal buzzer can emit an audible alarm signal. Furthermore, the outputs for the collective fault signal (SSM) and individual fault signal (ESM) are activated.

Upon reaching the dry run or high water level, the following occurs depending on the operating mode:

- Forced **shutdown** of all pumps.
- Forced **activation** of all pumps.

An alarm signal is also shown on the LCD display. Additionally, the internal buzzer can emit an audible alarm signal. Furthermore, the output for the collective fault signal (SSM) is activated.

7.1.1 Priority when dry run and high water signals are present simultaneously

If the system malfunctions, it may happen that both signals are present at the same time. In this case, the priority is dependent upon the selected operating mode and thus the reaction of the switchgear:

- Operating mode “drain”
 1. Dry-running protection
 2. High water
- “Fill” operating mode
 1. Dry-running protection/low water (via “Extern OFF” input)
 2. High water
 3. Min. water level

7.1.2 Pump cycling

To prevent irregular running times of the individual pumps, general pump cycling takes place. This means that all pumps work alternately.

7.1.3 Forced switching of the pumps in case of dry run, min. water level or high water

Forced switching depends on the selected operating mode:

- High water level

Operating mode “drain”: A **forced switch-on*** of all pumps always occurs, irrespective of the signal transmitter used.

Operating mode “fill”: A **forced switch-off** of all pumps always occurs, irrespective of the signal transmitter used.
- Dry-running level

Operating mode “drain”: A forced switch-off of all pumps always occurs, irrespective of the signal transmitter used.

Operating mode “fill”: Realise dry-running protection via the “Extern OFF” input.
- Min. water level

Operating mode “fill”: A **forced switch-on*** of all pumps always occurs, irrespective of the signal transmitter used.

NOTICE! Forced switch-on

The following preconditions must be fulfilled so that a forced switch-on can be performed:

- Pumps are enabled (menu 3.01 to 3.04).
- The “Extern OFF” input is not active.

7.1.4 Operation with a defective level sensor

If the level sensor does not transfer a measured value (e.g. due to wire break, defective sensor), all pumps are switched off. Furthermore, the fault signal LED lights up and the collective fault signal is activated.

Emergency operation

- Operating mode “drain”: High water level

If the high water level is performed by a separate float switch, the system can continue running in emergency operation. The activation and deactivation points are defined by the hysteresis of the float switch.
- Operating mode “fill”: Min. water level

If the min. water level is monitored by a separate float switch, the system can continue running in emergency operation. The activation and deactivation points are defined by the hysteresis of the float switch.

7.2 Operating modes



NOTICE

Changing the operating mode

To change the operating mode, deactivate all pumps: in Menu 3.01, select the value „OFF“.



NOTICE

Operating mode after power failure

Following a power failure, the switchgear will automatically start up in the last operating mode set.

The following operating modes are possible:

- drain
- fill

7.2.1 “Drain” operating mode

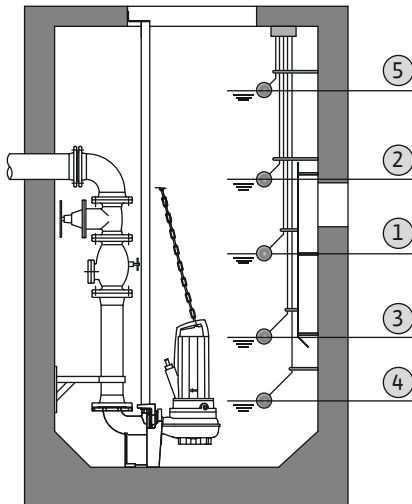


Fig. 24: Illustration of the switching points with a float switch or electrode in the “drain” operating mode using the example of two pumps

The reservoir or pump chamber is drained. The pumps are activated when the level rises and switched off when the level falls. This control is mainly used for **water drainage**.

Level control for float switch or electrodes

1	Pump 1 On
2	Pump 2 On
3	Pump 1 and 2 Off
4	Dry-running level
5	High water level

Up to a maximum of five float switches or electrodes can be connected. This can be used to control two pumps:

- Pump 1 On
- Pump 2 On
- Pump 1 and 2 Off
- Dry-running level
- High water level

The float switch should be equipped with a NO contact: Once the switching point has been reached, the contact is closed.

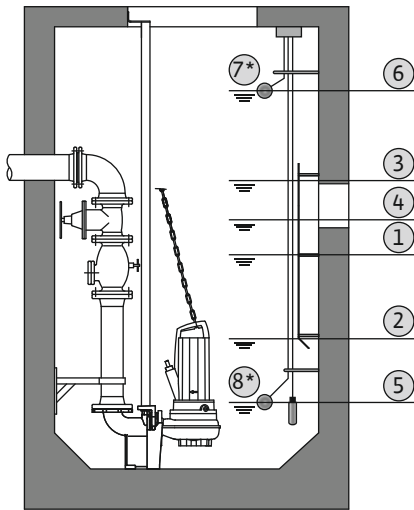


Fig. 25: Illustration of the switching points with a level sensor in the "drain" operating mode using the example of two pumps

7.2.2 "Fill" operating mode

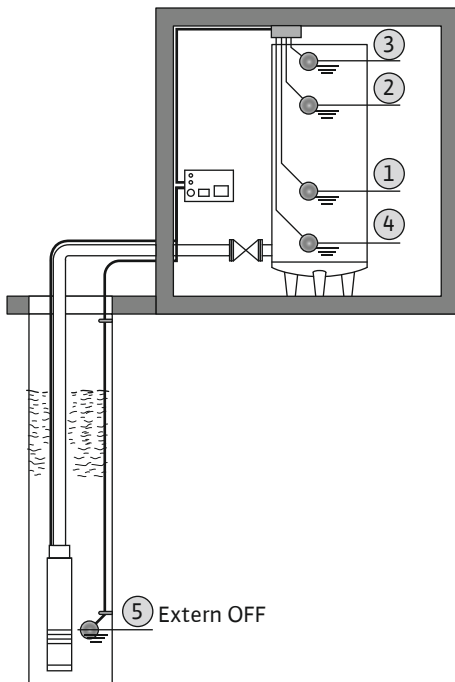


Fig. 26: Illustration of the switching points with a float switch or electrodes in the "fill" operating mode using the example of one pump

Level measurement with level sensor or dynamic pressure bell

1	Pump 1 On
2	Pump 1 Off
3	Pump 2 On
4	Pump 2 Off
5	Dry-running level
6	High water level
7	High water level*
8	Dry-running level*

* Also implemented via a separate float switch for increased operational reliability.

A level sensor or dynamic pressure bell can be connected. This can be used to control three pumps:

- Pump 1 On/Off
- Pump 2 On/Off
- Pump 3 On/Off
- Dry-running level
- High water level

The reservoir is filled up, for instance, to pump water into a rainwater storage tank. The pumps are activated when the level falls and switched off when the level rises. This control is mainly used for **water supply**.

Level control for float switch or electrodes

1	Pump On
2	Pump OFF
3	High water level
4	Min. water level
5	Dry-running level in the well

Up to a maximum of six float switches or electrodes can be connected. This can be used to control two pumps:

- Pump 1 On
- Pump 2 On
- Pump 1 and 2 Off
- Min. water level in the tank to be filled
- High water level
- Dry-running level in the well (separate float switch at the "Extern OFF" input)

The float switch should be equipped with a NO contact: Once the switching point has been reached, the contact is closed.

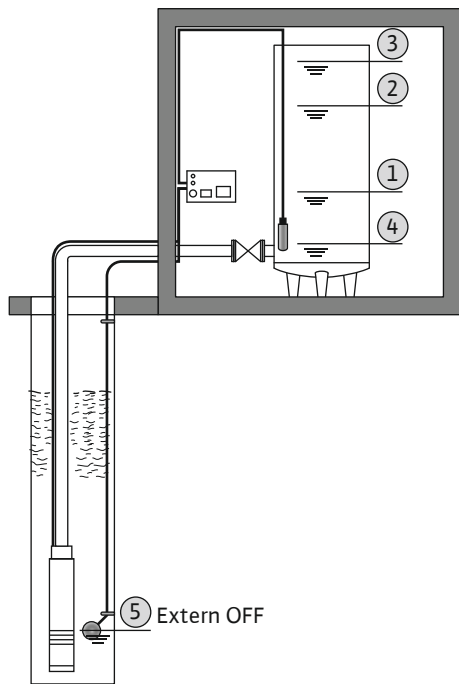


Fig. 27: Illustration of the switching points with a level sensor in the “fill” operating mode using the example of one pump

7.3 Menu control

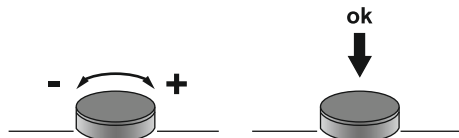


Fig. 28: Operating button function

7.4 Menu type: Main menu or Easy Actions menu

The menu is controlled via the operating button:

- **Turn:** Menu selection or settings values.
- **Press:** Change menu level, confirm error number or value.

There are two different menus.

- Main menu: Access to all settings for a complete configuration.
 - Easy Actions menu: Quick access to certain functions.
- Observe the following points when using the Easy Actions menu:

- The Easy Actions menu only offers access to the selected functions. It is not possible to perform a complete configuration with this.
- Perform an initial configuration to use the Easy Actions menu.
- The Easy Actions menu is enabled at the factory. Note, the Easy Actions menu can be **disabled in menu 7.06**.

7.5 Call up the menu

Call up the main menu

1. Press operating button for 3 seconds.
 - ▶ Menu item 1.00 appears.

Call up the Easy Actions menu

1. Turn operating button 180°.
 - ⇒ The “Resetting error messages” or “Manual operation pump 1” function appears
2. Turn operating button an additional 180°.
 - ▶ The other functions are shown. The main screen appears at the end.

7.6 Quick access to “Easy Actions”

The following functions can be called up using the Easy Actions menu:



Reset the current error message






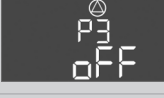



NOTICE! Menu point is only shown when an error is present!

Level measurement with level sensor or dynamic pressure bell

1	Pump On
2	Pump OFF
3	High water level
4	Min. water level
5	Dry-running level in the well

A level sensor or dynamic pressure bell can be connected. This can be used to control three pumps:

- Pump 1 On/Off
- Pump 2 On/Off
- Pump 3 On/Off
- Min. water level in the tank to be filled
- High water level
- Dry-running level in the well (separate float switch at the “Extern OFF” input)

	Manual operation pump 1 If the operating button is pressed, pump 1 runs. If the operating button is released, the pump switches off. The last set operating mode is active again.
	Manual operation pump 2 If the operating button is pressed, pump 2 runs. If the operating button is released, the pump switches off. The last set operating mode is active again.
	Manual operation pump 3 If the operating button is pressed, pump 3 runs. If the operating button is released, the pump switches off. The last set operating mode is active again.
	Pump 1 switch off. Corresponds to the “off” value in menu 3.02.
	Pump 2 switch off. Corresponds to the “off” value in menu 3.03.
	Pump 3 switch off. Corresponds to the “off” value in menu 3.04.
	Automatic mode, pump 1 Corresponds to the “Auto” value in menu 3.02.
	Automatic mode, pump 2 Corresponds to the “Auto” value in menu 3.03.
	Automatic mode, pump 3 Corresponds to the “Auto” value in menu 3.04.

7.7 Factory settings

To reset the switchgear to the factory settings, contact customer service.

8 Commissioning

8.1 Operator responsibilities

- Provide installation and operating instructions at the switchgear or at a place specially reserved for it.
- Make the installation and operating instructions available in a language the personnel can understand.
- Make sure that the installation and operating instructions are read and understood by all personnel.
- The installation site of the switchgear is overflow-proof.
- The switchgear must be properly fused and earthed.
- The signal transmitter must be installed and set in accordance with the system documentation.
- Observe the minimum water submersion of the connected pumps.
- Safety devices (incl. emergency off) of the entire system are switched on and checked for trouble-free operation.
- The switchgear is suitable for use under the specified operating conditions.

8.2 Commissioning in explosive atmospheres

The switchgear may **not** be put into operation in potentially explosive atmospheres!



DANGER

Risk of explosion if the switchgear is installed in potentially explosive areas!

The switchgear does not have its own explosion protection class and must always be installed outside of potentially explosive areas! The connection must be made by a qualified electrician.

8.3 Connection of signal transmitters and pumps within potentially explosive atmospheres



DANGER

Risk of explosion due to incorrect connection!

If the connected pump and signal transmitter is installed in an explosive atmosphere (Ex zone), there is a risk of explosion due to incorrect connection:

- **Do not** connect electrode in an explosive atmosphere (Ex zone)!
- Connect the float switch using an Ex cut-off relay!
- Connect level sensor via a Zener barrier!
- Switch on ex-mode (menu 5.64)!
- Observe the section on explosive atmospheres in the appendix.
- Connection must be carried out by a qualified electrician.

8.4 Activating the device

8.4.1 Possible error message during activation

Depending on the mains connection and the basic settings, the following error message may occur during activation. The error codes listed and their description apply to commissioning. A complete overview can be found in Chapter "Error codes [► 104]".

Code*	Fault	Software version	Cause	Remedies
E006	Rotating field error	all	<ul style="list-style-type: none"> • Incorrect rotating field • Operation with single-phase AC current connection. 	<ul style="list-style-type: none"> • Establish a clockwise rotating field at the mains connection. • Deactivate rotating field monitoring (menu 5.68)!
E080.x	Pump fault	Up to 2.01.x	Operation with single-phase AC current connection.	Deactivate motor current monitoring (menu 5.69)!
E080.x	Pump fault	From 2.02.x	<ul style="list-style-type: none"> • No pump connected. • Motor current monitoring not set. 	<ul style="list-style-type: none"> • Connect pump or deactivate minimum current monitoring (menu 5.69)! • Set the motor current monitoring to the pump's rated current.

Key:

**"x" = represents the pump to which the fault shown applies!

8.4.2 Activating the device



NOTICE

Observe the error code on the display

If the red fault LED lights up or flashes, observe the error code on the display! If the error has been confirmed, the previous error will be stored in menu 6.02.



NOTICE

Operating mode after power failure

Following a power failure, the switchgear will automatically start up in the last operating mode set.

- ✓ Switchgear is closed.
 - ✓ Installation has been performed correctly.
 - ✓ All signal transmitters and consumers are connected and installed in the operating space.
 - ✓ If float switches are used, set the switching points correctly.
 - ✓ Motor protection is preset according to the pump data.
1. Turn the main switch to the "ON" position.
 2. Switchgear starts.
All LEDs light up for 2 s.

- The display illuminates and the start screen appears.
- The standby symbol appears in the display.
- ▶ The switchgear is ready for operation. Start the initial configuration or automatic mode.

Display with level sensor or dynamic pressure bell

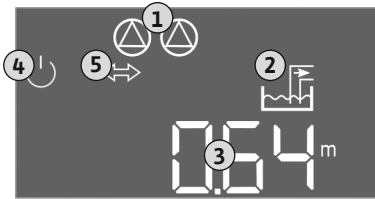


Fig. 29: Start screen: Level sensor/dynamic pressure bell

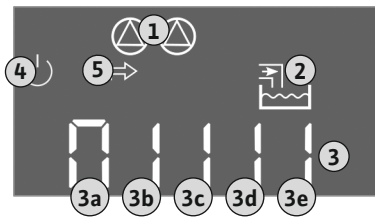


Fig. 30: Start screen: Float switch/electrode

1	Current pump status: – Number of registered pumps – Pump activated/deactivated – Pumps On/Off
2	Set operating mode (e.g. drain)
3	Current water level in m
4	Standby: Switchgear is ready for operation.
5	Field bus active

Display with float switch or electrodes

1	Current pump status: – Number of registered pumps – Pump activated/deactivated – Pumps On/Off
2	Set operating mode (e.g. fill)
3	Switching status of the float switch/electrode <ul style="list-style-type: none"> • 0 = Float switch open/electrode not immersed • 1 = Float switch closed/electrode immersed
4	Standby: Switchgear is ready for operation.
5	Field bus active

Designation of the float switch/electrode depending on the operating mode

No.	drain	fill
3a	High water level	High water level
3b	Pump 2 On	Pump 1 and 2 Off
3c	Pump 1 On	Pump 1 On
3d	Pump 1 and 2 Off	Pump 2 On
3e	Dry-running level	Min. level (low water)

8.5 Start initial configuration

Set the following parameters during initial configuration:

- Enable parameter input.
- Menu 5: Basic settings
- Menu 1: Activation/deactivation values
- Menu 2: Fieldbus connection (if available)
- Menu 3: Enable pumps.
- Set motor current monitoring.
- Check the direction of rotation of the connected pumps.

Observe the following points during the configuration:

- If there is no input or operation for 6 minutes:
 - the display illumination is switched off.
 - the display returns to the main screen.
 - parameter input is locked.
- Some settings can only be adjusted when there is no pump in operation.
- The menu is automatically adapted based on the settings. Example: The Menus 5.41 ... 5.43 are only visible when the “pump kick” function (Menu 5.40) is activated.
- The menu structure is valid for all EC switchgears (e.g. HVAC, Booster, Lift, Fire, etc.). This may lead to gaps in the menu structure.

8.5.1 Enable parameter input

As standard, the values are only displayed. To change the values, the parameter input in Menu 7.01 must be enabled:

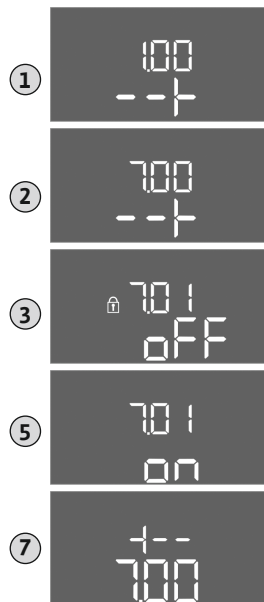


Fig. 31: Enable parameter input

1. Press the operating button for 3 s.
⇒ Menu item 1.00 appears
2. Turn the operating button until menu 7 appears.
3. Press the operating button.
⇒ Menu 7.01 appears.
4. Press the operating button.
5. Change the value to “on”: Turn the operating button.
6. Save value: Press the operating button.
⇒ The menu is enabled and can be changed.
7. Turn the operating button until the end of menu 7 appears.
8. Press the operating button.
⇒ Back to the main menu level.
▶ Start initial configuration.

8.5.2 Menu 5: Basic settings



Fig. 32: Menu 5.01



Fig. 33: Menu 5.02

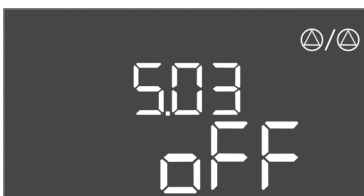


Fig. 34: Menu 5.03



Fig. 35: Menu 5.07

Menu no.	5.01
Software version: All	
Description	Operating mode
Value range	fill, drain
Factory setting	drain
Explanation	<ul style="list-style-type: none"> Operating mode “drain”: The pumps are activated when the level rises and switched off when the level falls. Operating mode fill: The pumps are activated when the level falls and deactivated when the level rises

Menu no.	5.02
Software version: All	
Description	Number of connected pumps
Value range	1 ... 3
Factory setting	2

Menu no.	5.03
Software version: All	
Description	Standby pump
Value range	on, off
Factory setting	off
Explanation	<p>One pump can be used as a standby pump. This pump is not activated during normal operation. The standby pump is only activated in the event of pump failure due to a fault. The standby pump is subject to standstill monitoring. The standby pump is therefore activated during pump cycling and pump kick.</p> <ul style="list-style-type: none"> on = Standby pump activated off = Standby pump deactivated

Menu no.	5.07
Software version: Up to 2.01.x	
Description	Signal transmitter for level measurement
Value range	Float, Level, Bell, Opt01
Factory setting	Level
Explanation	<p>Definition of the signal transmitters for level measurement:</p> <ul style="list-style-type: none"> Float = float switch Level = level sensor Bell = dynamic pressure bell Opt01 = NW16 level monitor

Software version: from 2.02.x and hardware version: 2	
Description	Signal transmitter for level measurement
Value range	Float, Level, Bell, Opt01
Factory setting	Level
Explanation	<p>Definition of the signal transmitters for level measurement:</p> <ul style="list-style-type: none"> Float = float switch/electrode Level = level sensor Bell = dynamic pressure bell Opt01 = NW16 level monitor



Fig. 36: Menu 5.09



Fig. 37: Menu 5.39



Fig. 38: Menu 5.40

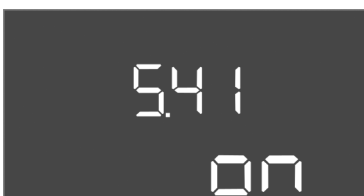


Fig. 39: Menu 5.41

Menu no.	5.09
Software version: All	
Description	Sensor measurement range
Value range	0.25 ... 12.5 m
Factory setting	1.0 m
Explanation	Maximum measured values of the sensor

Menu no.	5.39
Software version: All	
Description	Alarm signal with active "Extern OFF" input
Value range	off, on
Factory setting	off
Explanation	<p>The pumps can be switched off using a separate signal transmitter via the "Extern OFF" input. This function overrides all other switching points and all pumps are switched off.</p> <ul style="list-style-type: none"> In the "fill" operating mode – select how the alarm signal occurs in the event of an active input: <ul style="list-style-type: none"> "off": the "Extern OFF" symbol appears on the LCD display "on": the "Extern OFF" symbol and the error code "E068" appear on the LCD display. "Drain" operating mode – factory setting cannot be changed!

Menu no.	5.40
Software version: All	
Description	Switch "pump kick" function On/Off
Value range	off, on
Factory setting	off
Explanation	<p>To prevent longer standstill times for the connected pumps, a periodical test run can be performed (pump kick function):</p> <ul style="list-style-type: none"> off = pump kick deactivated on = pump kick activated <p>If the pump kick function is activated, the following menu items can be set:</p> <ul style="list-style-type: none"> Menu 5.41: Allows "pump kick" when status is Extern OFF Menu 5.42: Pump kick interval Menu 5.43: Pump kick duration

Menu no.	5.41
Software version: All	
Description	Allows "pump kick" when status is Extern OFF
Value range	off, on
Factory setting	on
Explanation	<p>Select whether a pump kick may take place or not if the Extern OFF input is active:</p> <ul style="list-style-type: none"> off = pump kick deactivated if Extern OFF is active. on = pump kick activated if Extern OFF is active.



Fig. 40: Menu 5.42



Fig. 41: Menu 5.43

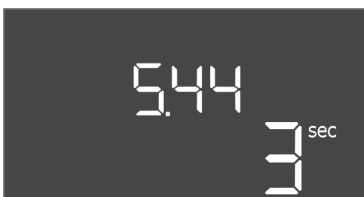


Fig. 42: Menu 5.44



Fig. 43: Menu 5.50



Fig. 44: Menu 5.51



Fig. 45: Menu 5.57

Menu no.	5.42
Software version: All	
Description	"Pump kick interval"
Value range	1 ... 336 h
Factory setting	24 h
Explanation	Time after which a pump kick takes place.

Menu no.	5.43
Software version: All	
Description	"Pump kick duration"
Value range	0 ... 60 s
Factory setting	5 s
Explanation	How long a pump kick runs for a pump.

Menu no.	5.44
Software version: All	
Description	Activation delay after power failure
Value range	0 ... 180 s
Factory setting	3 s
Explanation	Time until the switchgear automatically restarts after a power outage.

Menu no.	5.50
Software version: All	
Description	Dry-running level (drain)/min. water level (fill)
Value range	0 ... 12.5 m
Factory setting	0.15 m
Explanation	Enter fill level. If the level is monitored with a separate float switch, deactivate the level sensor: Enter the value "0.00 m" .

Menu no.	5.51
Software version: All	
Description	High water level
Value range	0 ... 12.5 m
Factory setting	0.46 m
Explanation	Enter fill level.

Menu no.	5.57
Software version: All	
Description	Max. running time per pump
Value range	0 ... 60 min
Factory setting	0 min
Explanation	Maximum permissible running time of a pump. Once the time has been exceeded, the system switches to the next pump. After three change cycles, the collective fault signal (SSM) is activated. The setting "0 min" switches the running time monitoring off.



Fig. 46: Menu 5.58



Fig. 47: Menu 5.59

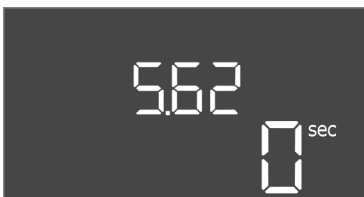


Fig. 48: Menu 5.62

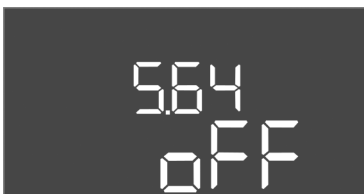


Fig. 49: Menu 5.64

Menu no.	5.58
Software version: All	
Description	Collective run signal (SBM) function
Value range	on, run
Factory setting	run
Explanation	A run signal for the switchgear or attached pump can sent via a separate output: <ul style="list-style-type: none"> • “on”: Switchgear ready for operation • “run”: At least one pump is running.

Menu no.	5.59
Software version: All	
Description	Collective fault signal (SSM) function
Value range	fall, raise
Factory setting	raise
Explanation	In case of an error, a general fault message can be sent via a separate output: <ul style="list-style-type: none"> • “fall”: The relay drops out. Optionally, this function can be used for controlling the mains voltage supply. • “raise”: The relay picks up.

Menu no.	5.62
Software version: All	
Description	Dry-running protection delay
Value range	0 ... 180 s
Factory setting	0 s
Explanation	Time until the pump are deactivated after reaching the dry run level.

Menu no.	5.64
Software version: All	
Description	Ex-mode On/Off (only available in the “drain” operating mode!)
Value range	on, off
Factory setting	off
Explanation	The following functions are adjusted when the Ex-mode is activated (on): <ul style="list-style-type: none"> • Follow-up times All follow-up times are ignored and the pumps switched off immediately! • Dry-running level (by level sensor or dynamic pressure bell) The following actions are only possible once the “All pumps off” fill level has been exceeded: <ul style="list-style-type: none"> – Reactivation of the pumps – Resetting the error message • Alarm dry-running protection (via float switch) Alarm manual reset (anti-reactivation lock)! • Alarm thermal motor monitoring Alarm manual reset (anti-reactivation lock)! <p>Observe the additional requirements in the chapter on explosive atmospheres in the appendix!</p>



Fig. 50: Menu 5.65



Fig. 51: Menu 5.66



Fig. 52: Menu 5.67



Fig. 53: Menu 5.68

Menu no.	5.65
Software version: All	
Description	Automatic resetting of error “Dry run”
Value range	on, off
Factory setting	on
Explanation	If the fill level is over the dry run level again, the error message “dry run” is automatically reset. <ul style="list-style-type: none"> • on = function activated • off = function deactivated

Menu no.	5.66
Software version: All	
Description	Integrated buzzer On/Off
Value range	off, error
Factory setting	off
Explanation	Switching the buzzer on or off: <ul style="list-style-type: none"> • off = buzzer off • error = buzzer on <p>NOTICE! Alarm in the event of interrupted power supply: To switch off the internal buzzer if there is a built-in rechargeable battery, remove the battery!</p>

Menu no.	5.67
Software version: All	
Description	Output (24 V=, max. 4 VA) On/Off for an external signalling unit
Value range	off, error
Factory setting	off
Explanation	Separate output to switch an external alarm signal on or off: <ul style="list-style-type: none"> • off = output deactivated • error = output activated

Menu no.	5.68
Software version: All	
Description	Mains connection rotating field monitoring On/Off
Value range	on, off
Factory setting	on
Explanation	Integrated rotating field monitoring for the mains connection. If no clockwise rotating field is present, an error message occurs. <ul style="list-style-type: none"> • off = rotating field monitoring deactivated • on = rotating field monitoring activated <p>NOTICE! When operating the switchgear via a single-phase current connection, switch off this function!</p>



Fig. 54: Menu 5.69

Menu no.	5.69
Software version: Up to 2.01.x	
Description	Motor current monitoring On/Off
Value range	on, off
Factory setting	on
Explanation	<p>The integrated motor current monitoring outputs an error if the set rated current is exceeded.</p> <ul style="list-style-type: none"> off = motor current monitoring deactivated on = motor current monitoring activated <p>NOTICE! If the switchgear is connected to a single-phase current, switch off this function!</p>

Software version: From 2.02.x	
Description	Motor current monitoring On/Off
Value range	on, off
Factory setting	on
Explanation	<p>The integrated motor current monitoring keeps tab on the minimum and maximum rated current of the pump:</p> <ul style="list-style-type: none"> Monitoring the minimum rated current If no current is measured when the pump is switched on, the integrated motor current monitoring outputs an error. Monitoring the maximum rated current The integrated motor current monitoring outputs an error if the set rated current is exceeded. <p>This function can be set as follows:</p> <ul style="list-style-type: none"> on = activate monitoring the minimum rated current. off = deactivate monitoring the minimum rated current. Monitoring the maximum rated current cannot be deactivated.



Fig. 55: Menu 5.70

Menu no.	5.70
Software version: All	
Description	Max. switching frequency per hour, per pump
Value range	0 ... 60
Factory setting	0
Explanation	<p>If the max. number of starts has been exceeded, the collective fault signal (SSM) is activated. To deactivate the function, set the value "0".</p>

8.5.3 Menu 1: Values for switching on and off



Fig. 56: Menu 1.09



Fig. 57: Menu 1.10



Fig. 58: Menu 1.11



Fig. 59: Menu 1.12



Fig. 60: Menu 1.13

Menu no.	1.09
Software version: All	
Description	Base-load pump switch-off delay
Value range	0 ... 60 s
Factory setting	0 s
Explanation	Time until the base-load pump is switched off after the fill levels are reached.

Menu no.	1.10
Software version: All	
Description	Peak-load pump activation delay
Value range	0 ... 30 s
Factory setting	3 s
Explanation	Time until the peak-load pump is switched on after the fill levels are reached.

Menu no.	1.11
Software version: All	
Description	Peak-load pump switch-off delay
Value range	0 ... 30 s
Factory setting	1 s
Explanation	Time until the peak-load pump is switched off after the fill levels are reached.

Menu no.	1.12
Software version: All	
Description	Base-load pump On level
Value range	0.06 ... 12.5 m (NOTICE! The actual value range is dependent on the setting in menu 5.09.)
Factory setting	0.40 m
Explanation	<p>“Drain” operating mode: Value must be 0.03 m higher than the “Base-load pump Off level” (menu 1.13).</p> <p>“Fill” operating mode: Value must be 0.03 m lower than the “Base-load pump Off level” (menu 1.13).</p> <p>NOTICE! The menu item is only visible if the value “Level” or “Bell” have been set in menu 5.07.</p>

Menu no.	1.13
Software version: All	
Description	Base-load pump Off level
Value range	0.06 ... 12.5 m (NOTICE! The actual value range is dependent on the setting in menu 5.09.)
Factory setting	0.23 m
Explanation	<p>“Drain” operating mode: Value must be 0.03 m lower than the “Base-load pump On” level (menu 1.12).</p> <p>“Fill” operating mode: Value must be 0.03 m higher than the “Base-load pump On level” (menu 1.12).</p> <p>NOTICE! The menu item is only visible if the value “Level” or “Bell” have been set in menu 5.07.</p>



Fig. 61: Menu 1.14



Fig. 62: Menu 1.15



Fig. 63: Menu 1.16

Menu no.	1.14
Software version: All	
Description	Level peak-load pump 1 on
Value range	0.06 ... 12.5 m (NOTICE! The actual value range is dependent on the setting in menu 5.09.)
Factory setting	0.42 m
Explanation	<p>“Drain” operating mode: The value must be 0.03 m higher than the “Peak-load pump 1 On” level (menu 1.15). The switch-on level must be greater than/equal to the switch-on level of the base-load pump (menu 1.12).</p> <p>“Fill” operating mode: The value must be 0.03 m lower than the “Peak-load pump 1 Off” level (menu 1.15). The switch-on level must be lower than/equal to the switch-on level of the base-load pump (menu 1.12).</p> <p>NOTICE! The menu item is only visible if the value “Level” or “Bell” have been set in menu 5.07.</p>

Menu no.	1.15
Software version: All	
Description	Peak-load pump 1 Off level
Value range	0.06 ... 12.5 m (NOTICE! The actual value range is dependent on the setting in menu 5.09.)
Factory setting	0.25 m
Explanation	<p>“Drain” operating mode: The value must be 0.03 m lower than the “Peak-load pump 1 On” level (menu 1.14). The switch-off level must be greater than/equal to the switch-on level of the base-load pump (menu 1.13).</p> <p>“Fill” operating mode: The value must be 0.03 m higher than the “Peak-load pump 1 On” level (menu 1.14). The switch-off level must be lower than/equal to the switch-off level of the base-load pump (menu 1.13).</p> <p>NOTICE! The menu item is only visible if the value “Level” or “Bell” have been set in menu 5.07.</p>

Menu no.	1.16
Software version: All	
Description	Peak-load pump 2 On level
Value range	0.06 ... 12.5 m (NOTICE! The actual value range is dependent on the setting in menu 5.09.)
Factory setting	0.42 m
Explanation	<p>“Drain” operating mode: The value must be 0.03 m higher than the “Peak-load pump 2 Off” level (menu 1.17). The switch-on level must be greater than/equal to the switch-on level of the peak-load pump (menu 1.14).</p> <p>“Fill” operating mode: The value must be 0.03 m lower than the “Peak-load pump 2 Off” level (menu 1.17). The switch-on level must be lower than/equal to the switch-on level of the peak-load pump (menu 1.14).</p> <p>NOTICE! The menu item is only visible if the value “Level” or “Bell” have been set in menu 5.07.</p>



Fig. 64: Menu 1.17

Menu no.	1.17
Software version: All	
Description	Peak-load pump 2 Off level
Value range	0.06 ... 12.5 m (NOTICE! The actual value range is dependent on the setting in menu 5.09.)
Factory setting	0.25 m
Explanation	<p>“Drain” operating mode: The value must be 0.03 m lower than the “Peak-load pump 2 On” level (menu 1.16). The switch-off level must be greater than/equal to the switch-off level of the peak-load pump (menu 1.15).</p> <p>“Fill” operating mode: The value must be 0.03 m higher than the “Peak-load pump 2 On” level (menu 1.16). The switch-off level must be lower than/equal to the switch-off level of the peak-load pump (menu 1.15).</p> <p>NOTICE! The menu item is only visible if the value “Level” or “Bell” have been set in menu 5.07.</p>

8.5.4 Menu 2: ModBus RTU connection

The switchgear is equipped with an RS485 interface for connection via ModBus RTU. Different parameters can be read and also changed to some extent via the interface. In this case, the switchgear works as a Modbus slave. An overview of individual parameters and a description of the data types used are shown in the appendix.



Fig. 65: Menu 2.01



Fig. 66: Menu 2.02



Fig. 67: Menu 2.03



Fig. 68: Menu 2.04

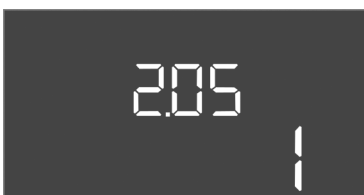


Fig. 69: Menu 2.05

8.5.5 Menu 3: Enable pumps



To use the ModBus interface, the settings must be changed in the following menus:

Menu no.	2.01
Description	ModBus RTU interface On/Off
Value range	on, off
Factory setting	off

Menu no.	2.02
Description	Baud rate
Value range	9600; 19200; 38400; 76800
Factory setting	19200

Menu no.	2.03
Description	Slave address
Value range	1 ... 254
Factory setting	10

Menu no.	2.04
Description	Parity
Value range	none, even, odd
Factory setting	even

Menu no.	2.05
Description	Number of stop bits
Value range	1; 2
Factory setting	1

To operate the system, the operating mode must be set for each pump and the pumps enabled:

- Every pump is set to the “auto” operating mode as the factory setting.
- Automatic mode starts after the pumps have been enabled in menu 3.01.

NOTICE! Required settings for the initial configuration.

During the initial configuration, a direction of rotation check must be performed on the pumps and the motor current monitoring set exactly. Use the following settings to perform the initial configuration:

- Switch off the pumps: Set menu 3.02 to 3.04 to “off”.



Fig. 70: Menu 3.02

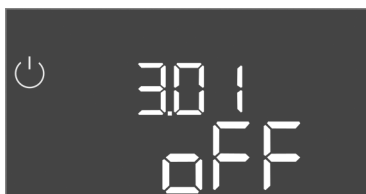


Fig. 71: Menu 3.01

8.5.6 Adjust motor current monitoring

- Enable pumps: Set menu 3.01 to “on”.

Menu no.	3.02 ... 3.04
Software version: All	
Description	Pump 1 ... Pump 3 operating mode
Value range	off, Hand, Auto
Factory setting	Auto
Explanation	<ul style="list-style-type: none"> • off = pump switched off • Hand = manual operation pump, as long as the button is pressed. • Auto = level-control-dependent automatic operation of the pump <p>NOTICE! Change the value to “off” for the initial configuration!</p>

Menu no.	3.01
Software version: All	
Description	Enable pumps
Value range	on, off
Factory setting	off
Explanation	<ul style="list-style-type: none"> • off = pumps are locked and cannot be started. <p>NOTICE! Manual operation or forced switch-on are also not possible!</p> <ul style="list-style-type: none"> • on = pumps are switched on/off, depending on the operating mode set



DANGER

Risk of fatal injury due to electrical current!

There is a risk of fatal injury when performing work on the open switchgear! The components carry current!

- Have work carried out by a qualified electrician.
- Avoid contact with earthed metal parts (pipes, frames etc.).

Indicate the actual value of the motor current monitoring

1. Press the operating button for 3 s.
⇒ Menu 1.00 appears.
2. Turn the operating button until menu 4.00 appears.
3. Press the operating button.
⇒ Menu 4.01 appears.
4. Turn the operating button until menu 4.25 to 4.27 appears.
⇒ Menu 4.25: Shows the set motor current for pump 1.
⇒ Menu 4.26: Shows the set motor current for pump 2.
⇒ Menu 4.27: Shows the set motor current for pump 3.
▶ Actual value of the motor current monitoring checked.
Compare the set value with the specification on the rating plate. If the set value differs from the specification on the rating plate, adjust the value.

Adjust the motor current monitoring value

- ✓ Motor current monitoring settings checked.
1. Turn the operating button until menu 4.25 to 4.27 appears.
⇒ Menu 4.25: Shows the set motor current for pump 1.
⇒ Menu 4.26: Shows the set motor current for pump 2.
⇒ Menu 4.27: Shows the set motor current for pump 3.

2. Open the switchgear.
DANGER! Risk of fatal injury due to electric current! There is a risk of fatal injury when performing work on the open switchgear! This work must be carried out by a qualified electrician!
3. Correct the motor current on the potentiometer with a screwdriver (see Overview of components [▶ 67]). Read changes directly off the display.
4. Once all of the motor currents have been corrected, close the switchgear.
 - ▶ Motor current monitoring set. Perform direction of rotation check.

8.5.7 Check the direction of rotation of the connected pumps



NOTICE

Rotating field, power supply and pump connection

The rotating field is routed from the mains connection directly to the pump connection. Check the required rotating field of the pumps to be connected (clockwise or counter-clockwise)! Observe the installation and operating instructions of the pumps.

Perform a test run to check the direction of rotation of the pumps. **CAUTION! Damage to property! Perform the test run under the prescribed operating conditions.**

- ✓ The switchgear is closed.
 - ✓ Configuration of menu 5 and menu 1 complete.
 - ✓ All pumps are switched off in menu 3.02 to 3.04: Value is "off".
 - ✓ The pumps are enabled in menu 3.01: Value is "on".
1. Start Easy Actions menu: Turn the operating button 180°.
 2. Select the pump's manual operation mode: turn the operating button until the menu item is displayed:
 - Pump 1: P1 Hand
 - Pump 2: P2 Hand
 - Pump 3: P3 Hand
 3. Start test run: Press the operating button. The pump runs until the operating button is released.
 4. Check direction of rotation.
 - ⇒ **Incorrect direction of rotation:** Exchange the two phases on the pump connection.
 - ▶ Direction of rotation checked and corrected as necessary. The initial configuration is complete.

8.6 Start automatic mode

Automatic mode after initial configuration

- ✓ The switchgear is closed.
 - ✓ Configuration complete.
 - ✓ Direction of rotation correct.
 - ✓ Motor current monitoring set correctly.
1. Start Easy Actions menu: Turn the operating button 180°.
 2. Select the pump for automatic mode: Turn the operating button until the menu item is displayed:
 - Pump 1: P1 Auto
 - Pump 2: P2 Auto
 - Pump 3: P3 Auto
 3. Press the operating button.
 - ⇒ Automatic mode is set for the selected pump. Alternatively, setting can be performed in Menu 3.02 to 3.04.
 - ▶ Automatic mode switched on.

Automatic mode after shutdown

- ✓ The switchgear is closed.
- ✓ Checked configuration.

- ✓ Parameter input enabled: Menu 7.01 shows on.
- 1. Press the operating button for 3 s.
 - ⇒ Menu 1.00 appears.
- 2. Turn the operating button until menu 3.00 appears
- 3. Press the operating button.
 - ⇒ Menu 3.01 appears.
- 4. Press the operating button.
- 5. Change value to “on”.
- 6. Press the operating button.
 - ⇒ Value saved, pump enabled.
 - ▶ Automatic mode switched on.

8.7 During operation

Make sure the following points are observed during operation:



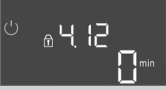


- Keep the switchgear closed and secure it against unauthorised opening.
- Switchgear attached in an overflow-proof manner (protection class IP54).
- Not exposed to direct sunlight.
- Ambient temperature: -30 ... +50 °C.


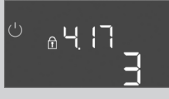


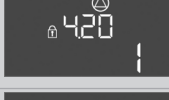









The following items of information are shown on the main screen:

- Pump status:
 - Number of registered pumps
 - Pump activated/deactivated
 - Pump On/Off
- Operation with standby pump
- Operating mode: fill or drain
- Current water level or switching state of the float switch
- Active field bus operation

Furthermore, the following information is available via menu 4:

1. Press the operating button for 3 s.
 - ⇒ Menu 1.00 appears.
2. Turn the operating button until menu 4 appears.
3. Press the operating button.
 - ▶ Menu 4.xx appears.

	Current water level in m
	Current switching state of the float switch
	Switchgear running time The time* is stated depending on the unit, in minutes (min), hours (h) or days (d).
	Running time: Pump 1 The time is stated in minutes (min), hours (h) or days (d) depending on the unit. The display varies depending on the timespan: <ul style="list-style-type: none"> • 1 hour: Display in 0 ... 59, unit: min • 2 hours to 24 hours: Display in hours and minutes separated by a decimal point, e.g. 10.59, unit: h • 2 days to 999 days: Display in days and hours separated by a decimal point, e.g. 123.7, unit: d • From 1000 days: Display in days, unit: d
	Running time: Pump 2 The time is stated in minutes (min), hours (h) or days (d) depending on the unit.

	Running time: Pump 3 The time is stated in minutes (min), hours (h) or days (d) depending on the unit.
	Switchgear switching cycles
	Switching cycles: Pump 1
	Switching cycles: Pump 2
	Switching cycles: Pump 3
	Serial number Display switches between the 1st and 2nd four digits.
	Switchgear type
	Software version
	Set value for the motor current monitoring: Pump 1 Max. Rated current in A
	Set value for the motor current monitoring: Pump 2 Max. Rated current in A
	Set value for the motor current monitoring: Pump 3 Max. Rated current in A
	Current rated current of pump 1 in A display changes between L1, L2 and L3 press and hold the operating button. The pump starts after 2 s of pumping operation until the operating button is released.
	Current rated current in A for pump 2 display changes between L1, L2 and L3 press and hold the operating button. The pump starts after 2 s of pumping operation until the operating button is released.
	Current rated current in A for pump 3 display changes between L1, L2 and L3 press and hold the operating button. The pump starts after 2 s of pumping operation until the operating button is released.

9 Shut-down

9.1 Personnel qualifications

- Electrical work: qualified electrician
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: qualified electrician
Knowledge regarding tools and fixation material for various structures

9.2 Operator responsibilities

- Observe locally applicable accident prevention and safety regulations of trade associations.
- Make sure that the personnel has had the corresponding training for the specified work.
- Train the personnel on how the system operates.
- When working in enclosed spaces, a second person must be present for safety reasons.
- Ensure enclosed spaces have sufficient ventilation.

9.3 Shut-down

- Take immediate countermeasures if there is a build-up of toxic or suffocating gases!

To decommission the pumps, switch off the pumps and switchgear at the main switch. The settings are stored in non-volatile memory in the switchgear and are not deleted. This ensures that the switchgear is always ready for operation. Adhere to the following points during the standstill period:

- Ambient temperature: -30 ... +50 °C
 - Max. humidity: 90 %, non-condensing
 - ✓ Parameter input enabled: Menu 7.01 shows on.
1. Press the operating button for 3 s.
⇒ Menu 1.00 appears.
 2. Turn the operating button until menu 3.00 appears
 3. Press the operating button.
⇒ Menu 3.01 appears.
 4. Press the operating button.
 5. Change value to "off".
 6. Press the operating button.
⇒ Value saved, pump switched off.
 7. Turn main switch to the "OFF" position.
 8. Secure the main switch against being activated by unauthorised persons (e.g. lock main switch)
 - ▶ Switchgear switched off.

9.4 Removal



DANGER

Risk of fatal injury due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

- ✓ Decommissioning performed.
 - ✓ Mains connection is switched so that it is voltage-free and safeguarded against being activated by unauthorised persons.
 - ✓ The power connection for fault and run signals is switched so that it is voltage-free and safeguarded against being activated by unauthorised persons.
1. Open the switchgear.
 2. Disconnect all connection cables and pull them out through the threaded cable connection.
 3. Close off the ends of the connection cables watertight.
 4. Seal threaded cable connections watertight.
 5. Support the switchgear (e.g. get a second person to help).
 6. Loosen the switchgear fastening screws and remove the switchgear from the structure.
 - ▶ Switchgear removed. Observe the following for storage!

10 Maintenance and repair



DANGER

Risk of fatal injury due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!



NOTICE

Unauthorised work or structural changes are prohibited!

Only maintenance and repair work described in this manual may be carried out. All other works and any alterations to the construction may only be carried out by the manufacturer.

10.1 Maintenance intervals

10.2 Maintenance tasks

10.3 Maintenance interval display



Fig. 72: Maintenance interval display

10.3.1 Maintenance interval – Activate the interval indicator



Fig. 73: Activating the maintenance interval

Regular

- Clean switchgear.

Annually

- Check electro-mechanical components for wear.

After 10 years

- General overhaul

Cleaning switchgear

- ✓ Switch off switchgear.

1. Clean switchgear with a damp cotton cloth.

Do not use any aggressive or scouring cleaners or fluids!

Check electrical-mechanical components for wear

Have electrical-mechanical components checked for wear by an electrician. If wear is ascertained, have the affected components replaced by an electrician or by the Wilo Customer Service.

General overhaul

During a general overhaul, all of the components, wiring and the housing are checked for wear. Defective or worn components are replaced.

The switchgear has an integrated maintenance interval indicator. Once the set interval has expired, "SER" on the main screen blinks. The next interval starts automatically by resetting the current interval. The function is disabled at the factory.

- ✓ Parameter input enabled: Menu 7.01 shows on.

1. Press the operating button for 3 s.
⇒ Menu 1.00 appears.
2. Turn the operating button until menu 7 appears
3. Press operating button.
⇒ Menu 7.01 appears.
4. Turn the operating button until menu 7.07 appears.
5. Press the operating button.
6. Set desired interval:
 - 0 = interval display off.
 - 0.25 = quarterly
 - 0.5 = six-monthly
 - 1 = annually
 - 2 = every two years
7. Press the operating button.
⇒ Value is saved.
▶ Interval display is activated.

10.3.2 Maintenance interval – reset the maintenance interval

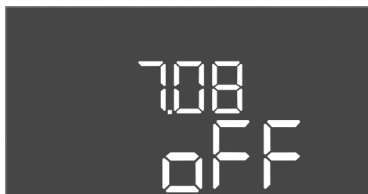


Fig. 74: Reset the maintenance interval

- ✓ The “SER” message flashes on the display.
 - ✓ Parameter input enabled: Menu 7.01 shows on.
1. Press the operating button for 3 s.
⇒ Menu 1.00 appears.
 2. Turn the operating button until menu 7 appears
 3. Press operating button.
⇒ Menu 7.01 appears.
 4. Turn the operating button until menu 7.08 appears.
 5. Press the operating button.
 6. Change value to “on”.
 7. Press the operating button.
⇒ Display reset.
- ▶ Current maintenance interval reset, new maintenance interval started.

11 Faults, causes and remedies



DANGER

Risk of fatal injury due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

11.1 Operator responsibilities

- Observe locally applicable accident prevention and safety regulations of trade associations.
- Make sure that the personnel has had the corresponding training for the specified work.
- Train the personnel on how the system operates.
- When working in enclosed spaces, a second person must be present for safety reasons.
- Ensure enclosed spaces have sufficient ventilation.
- Take immediate countermeasures if there is a build-up of toxic or suffocating gases!

11.2 Fault indication

Possible faults are shown by the fault LEDs and alphanumeric codes on the display. Have system checked according to the displayed fault and have defective components replaced. Faults are displayed in various ways:

- Fault in the control/on the switchgear:
 - The red fault signal LED **lights up**.
 - Display of the error code alternates with the main screen. The error code is stored in the fault memory.
 - The collective fault signal is activated.
 - If the internal buzzer is activated, there is an audible alarm signal.
- Pump fault
Status icon of the respective pump **flashes** on the display.

11.3 Fault acknowledgement

Switch off the alarm display by pressing the operating button. Acknowledge the fault via the main menu or Easy Actions menu.

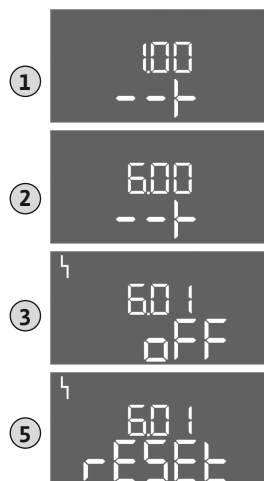


Fig. 75: Acknowledge fault

Main menu

- ✓ All faults rectified.
- 1. Press the operating button for 3 s.
⇒ Menu 1.00 appears.
- 2. Turn the operating button until menu 6 appears.
- 3. Press the operating button.
⇒ Menu 6.01 appears.
- 4. Press the operating button.
- 5. Change the value to “reset”: Turn the operating button.
- 6. Press the operating button.
▶ The fault indication is reset.

Easy Actions menu

- ✓ All faults rectified.
- 1. Starting the Easy Actions menu: Turn the operating button 180°.
- 2. Select menu item “Err reset”.
- 3. Press the operating button.
▶ The fault indication is reset.

Fault acknowledgement failed

If there are further faults, the faults are displayed as follows:

- The fault LED lights up.
- The error code of the last fault is shown in the display.
All other faults can be called up from the fault memory.

If all faults have been rectified, acknowledge the faults again.

11.4 Fault memory

The switchgear stores the last ten faults in the fault memory. The fault memory works according to the first in/first out principle. The faults are displayed in descending order in the menu items 6.02 to 6.11:

- 6.02: the last/latest fault
- 6.11: the oldest fault

11.5 Error codes

The functions may operate differently depending on the software version. That is why a software version is included with every error code.

The details regarding the software version used can be read on the rating plate or displayed via menu 4.24.

Code*	Fault	Software version	Cause	Remedies
E006	Rotating field error	all	<ul style="list-style-type: none"> • Incorrect rotating field • Operation via single-phase current connection 	<ul style="list-style-type: none"> • Establish a clockwise rotating field at the mains connection. • Deactivate rotating field monitoring (menu 5.68)!
E014.x	Leakage detection	all	The moisture probe of the connected pump was tripped.	See the installation and operating instructions of the connected pump
E040	Fault, level sensor	all	No connection to the sensor	Check the connection cable and sensor. Replace the defective component.
E062	Dry-running protection active** / min. water level active**	all	<ul style="list-style-type: none"> • Operating mode “drain”: Dry-running level reached • Operating mode “fill”: Min. water level, below minimum value 	<ul style="list-style-type: none"> • Check inlet and system parameters. • Check that the float switch is working correctly, replace the defective component.
E066	High water alarm active	all	High water level reached	<ul style="list-style-type: none"> • Check inlet and system parameters. • Check that the float switch is working correctly, replace the defective component.

Code*	Fault	Software version	Cause	Remedies
E068	Extern OFF active	all	The "Extern OFF" contact is active; the active contact is defined as alarm	Check the connection of the "Extern OFF" contact as per the current connection diagram.
E080.x	Pump fault**	Up to 2.01.x	<ul style="list-style-type: none"> • Operation via single-phase current connection • No feedback from the corresponding contactor. • Bimetallic strip has been tripped. • Motor current monitoring has been tripped. 	<ul style="list-style-type: none"> • Deactivate motor current monitoring (menu 5.69)! • Check functionality of pump. • Check that the motor has sufficient cooling. • Check the set rated current and correct if necessary. • Contact customer service.
E080.x	Pump fault**	From 2.02.x	<ul style="list-style-type: none"> • No pump connected. • Motor current monitoring not set (potentiometer is at 0) • No feedback from the corresponding contactor. • Bimetallic strip has been tripped. • Motor current monitoring has been tripped. 	<ul style="list-style-type: none"> • Connect pump or deactivate minimum current monitoring (menu 5.69)! • Set the motor current monitoring to the pump's rated current. • Check functionality of pump. • Check that the motor has sufficient cooling. • Check the set rated current and correct if necessary. • Contact customer service.
E085.x	Pump running time monitoring***	Up to 1.xx.x	Maximum running time of the pump exceeded	<ul style="list-style-type: none"> • Check the operating parameters (inlet, switching points). • Check that other pumps function.
E090	Plausibility error	all	Float switches are in incorrect sequence	Check the installation and connections of the float switch.
E140.x	Pump starts exceeded***	all	The max. number of pump starts has been exceeded	<ul style="list-style-type: none"> • Check the operating parameters (inlet, switching points). • Check that other pumps function.
E141.x	Pump running time monitoring***	From 2.xx.x	Maximum running time of the pump exceeded	<ul style="list-style-type: none"> • Check the operating parameters (inlet, switching points). • Check that other pumps function.

Key:

**"x" = represents the pump to which the fault shown applies!

** Fault must be **manually** acknowledged in ex-mode!

*** Fault must **generally be manually** acknowledged.

11.6 Further steps for troubleshooting

If the points listed here do not rectify the fault, please contact customer service. Costs may be incurred if other services are used. For more details, please contact customer service.

12 Disposal**12.1 Rechargeable battery**

Do not dispose of rechargeable batteries in domestic waste and remove them before product disposal. End consumers are legally obliged to return all used rechargeable batteries. For this purpose, you can return used rechargeable batteries free of charge at municipal collection points or specialist retailers.

**NOTICE****Disposal in domestic waste is prohibited!**

Affected rechargeable batteries are marked with this symbol. The identifier for the heavy metal they contain is displayed beneath the graphic:

- **Hg** (mercury)
- **Pb** (lead)
- **Cd** (cadmium)

12.2 Information on the collection of used electrical and electronic products

Proper disposal and appropriate recycling of this product prevents damage to the environment and putting your personal health at risk.



NOTICE

Disposal in domestic waste is prohibited!

In the European Union this symbol may be included on the product, the packaging or the accompanying documentation. It means that the electrical and electronic products in question must not be disposed of along with domestic waste.

Please note the following points to ensure proper handling, recycling and disposal of the used products in question:

- Hand over these products at designated, certified collection points only.
- Observe the locally applicable regulations!

Please consult your local municipality, the nearest waste disposal site, or the dealer who sold the product to you for information on proper disposal. See www.wilo-recycling.com for more information about recycling.

Subject to change without prior notice!

13 Appendix

13.1 Potentially explosive atmospheres: Connection of signal transmitters and pumps



DANGER

Risk of explosion if the switchgear is installed in potentially explosive areas!

The switchgear does not have its own explosion protection class and must always be installed outside of potentially explosive areas! The connection must be made by a qualified electrician.

13.1.1 Ex-zones

The connected pumps and signal transmitters may only be used in the ex-zones 1 and 2.
Use in ex-zone 0 is prohibited!

13.1.2 Pumps

- Pumps comply with the ignition protection class “flameproof enclosure”.
- Connect pumps directly to the switchgear. The use of electronic start-up controllers is prohibited!
- Connect monitoring devices outside of the flameproof enclosure via a cut-off relay (Ex-i, intrinsically safe circuit).

13.1.3 Signal transmitter



DANGER

Risk of explosion due to incorrect signal transmitter!

Do not connect electrode in an explosive atmosphere (Ex zone)! There is a risk of explosion!
Always use float switch or level sensor in explosive atmospheres (ex zone).

Connect signal transmitters in explosive atmospheres via an intrinsically safe circuit:

- Connect the float switch using an Ex cut-off relay!
- Connect level sensor via a Zener barrier!

13.1.4 Connection, thermal motor monitoring



Fig. 76: Overview of connections, terminal layout

13.1.5 Dry-running protection connection

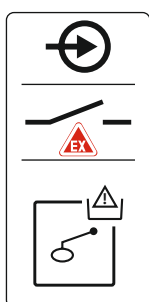


Fig. 77: Overview of connections, terminal layout

13.1.6 Switchgear configuration: Switching on ex-mode

Connect the bimetallic strip to the terminal strip for active ex-mode (see Overview of components [▶ 67], item 4b). **Use the terminal number shown in the connection overview on the cover.** The “x” in the symbol states the respective pump.

See also

- ▶ Overview of components [▶ 67]

DANGER! Risk of explosion due to incorrect execution! Monitoring of the dry-running level must be performed with a separate float switch!

Connect the float switch to the terminal strip for active ex-mode (see Overview of components [▶ 67], item 4b). **Use the terminal number shown in the connection overview on the cover.**

See also

- ▶ Overview of components [▶ 67]

Adapted functions

Ex-mode adapts the following functions:

- Follow-up times
All follow-up times are ignored and the pumps switched off immediately!
- Dry-running level (by level sensor or dynamic pressure bell)
The following actions are only possible once the “All pumps off” fill level has been exceeded:
 - Reactivation of the pumps
 - Resetting the error message
- Alarm dry-running protection (via float switch)
Alarm manual reset (anti-reactivation lock)!
- Alarm thermal motor monitoring
Alarm manual reset (anti-reactivation lock)!

Activating ex-mode

1. Press the operating button for 3 s.
⇒ Menu 1.00 appears.
2. Turn the operating button until menu 5 appears.
3. Press the operating button.
⇒ Menu 5.01 appears.
4. Turn the operating button until menu 5.64 appears.
5. Press the operating button.
6. Change the value to “on”: Turn the operating button.
7. Press the operating button.
 - ▶ Ex-mode switched on.

13.2 System impedances



NOTICE

Maximum switching frequency per hour

The connected motor determines the maximum switching frequency per hour. Note the technical data of the connected motor! The maximum switching frequency of the motor must not be exceeded.



NOTICE

- Depending on the system impedance and the maximum connections/hour of the connected consumers, voltage fluctuations and/or drops may occur.
- When using shielded cables, attach the shielding to the earth rail on one side of the switchgear!
- Always have connection carried out by a qualified electrician!
- Observe the installation and operating instructions for the connected pumps and signal transmitters.

3~400 V, 2-pole, direct starting		
Power in kW	System impedance in ohm	Connections/h
2.2	0.257	12
2.2	0.212	18
2.2	0.186	24
2.2	0.167	30
3.0	0.204	6
3.0	0.148	12
3.0	0.122	18
3.0	0.107	24
4.0	0.130	6
4.0	0.094	12
4.0	0.077	18

13.3 Overview of the symbols



Standby:
Symbol lights up: The switchgear is switched on and ready for operation.
Symbol flashing: Follow-up time of pump 1 active



Value input not possible:
1. Input disabled
2. The accessed menu only displays values.



Pumps ready for operation/deactivated:
Symbol lights up: Pump is available and ready for operation.
Symbol flashing: Pump is deactivated.



Pumps working/fault:
Symbol lights up: Pump is in operation.
Symbol flashing: Pump fault



A pump has been set as the standby pump.



“Extern OFF” input active: All pumps switched off



Operating mode: “drain”



Operating mode: “fill”



High water level reached



Operating mode “drain”: Dry-running level too low

Operating mode “fill”: Level for low water too low



There is at least one current (unacknowledged) error message.



The device communicates using a field bus system.

13.4 Terminal diagram overview

Wiring diagram EC-L1... and EC-L2...

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	

Terminal	Function	Terminal	Function
2/3	Output: Individual run signal pump 1	31/32	Input: Float switch or electrode "pump 2 in"
4/5	Output: Individual fault signal pump 1	33/34	Input: "High water" float switch or electrode
8/9	Output: Individual fault signal pump 2	37/38	Input: Pump 1 thermal winding monitor
10/11	Output: Individual run signal pump 2	39/40	Input: Pump 2 thermal winding monitor
13/14/15	Output: Collective run signal	41/42	Output: Analogue output for displaying the actual level value
16/17/18	Output: Collective fault signal	45/46	Input: Level sensor 4 – 20 mA
19/20	Output: Power output	49/50	Input: Leakage detection pump 1
21/22	Input: Extern OFF	51/52	Input: Leakage detection pump 2
25/26	Input: "Dry-running protection" float switch or electrode	55/56	Input: "Dry-running protection" float switch (ex-mode)
27/28	Input: "All pumps off" float switch or electrode	57/58	Input: Thermal winding monitor pump 1 (ex-mode)
29/30	Input: Float switch or electrode "pump 1 in"	59/60	Input: Thermal winding monitor pump 2 (ex-mode)

Terminal diagram EC-L3...

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90

Terminal	Function	Terminal	Function
1/2	Output: Power output	33/34	Input: "All pumps off" float switch
3/4	Output: Individual run signal pump 1	35/36	Input: "Pump 1 on" float switch
5/6	Output: Individual run signal pump 2	37/38	Input: "Pump 2 on" float switch
7/8	Output: Individual run signal pump 3	39/40	Input: "High water" float switch
11/12	Output: Individual fault signal pump 1	41/42	Input: Level sensor 4 – 20 mA
13/14	Output: Individual fault signal pump 2	47/48	Output: Analogue output for displaying the actual level value
15/16	Output: Individual fault signal pump 3	63/64	Input: Leakage detection pump 1
17/18/19	Output: Collective run signal	65/66	Input: Leakage detection pump 2

Terminal	Function	Terminal	Function
20/21/22	Output: Collective fault signal	67/68	Input: Leakage detection pump 3
23/24	Input: Pump 1 thermal winding monitor	75/76	Input: "Dry-running protection" float switch (ex-mode)
25/26	Input: Pump 2 thermal winding monitor	77/78	Input: Thermal winding monitor pump 1 (ex-mode)
27/28	Input: Pump 3 thermal winding monitor	79/80	Input: Thermal winding monitor pump 2 (ex-mode)
29/30	Input: Extern OFF	81/82	Input: Thermal winding monitor pump 3 (ex-mode)
31/32	Input: "Dry-running protection" float switch		

13.5 ModBus: Data types

Data type	Description
INT16	Integer in the range from -32768 to 32767. The number range actually used for a data point may vary.
UINT16	Unsigned integers in the range from 0 to 65535. The number range actually used for a data point may vary.
ENUM	Is a list. Only one of the values listed in the parameters can be set.
BOOL	A Boolean value is a parameter with exactly two states (0 – false and 1 – true). Generally, all values greater than zero are classified as true.
BITMAP*	Is an array of 16 Boolean values (bits). Values are indexed from 0 to 15. The number read from or written to the register is the sum of all bits with the value 1 multiplied by 2 to the power of its index. <ul style="list-style-type: none"> • Bit 0: $2^0 = 1$ • Bit 1: $2^1 = 2$ • Bit 2: $2^2 = 4$ • Bit 3: $2^3 = 8$ • Bit 4: $2^4 = 16$ • Bit 5: $2^5 = 32$ • Bit 6: $2^6 = 64$ • Bit 7: $2^7 = 128$ • Bit 8: $2^8 = 256$ • Bit 9: $2^9 = 512$ • Bit 10: $2^{10} = 1024$ • Bit 11: $2^{11} = 2048$ • Bit 12: $2^{12} = 4096$ • Bit 13: $2^{13} = 8192$ • Bit 14: $2^{14} = 16384$ • Bit 15: $2^{15} = 32768$
BITMAP32	Is an array of 32 Boolean values (bits). Please check Bitmap for the calculation details.

* Example for clarification:

Bit 3, 6, 8, and 15 are 1. All others are 0. The sum is then $2^3+2^6+2^8+2^{15} = 8+64+256+32768 = 33096$. It is also possible to do the calculation the other way round. Based on the bit with the highest index, check whether the read number is greater than/equal to the power of two. If this is the case, bit 1 is set and the power of two is deducted from the number. Then the check with the bit with the next lower index and the recently calculated residual number is repeated until bit 0 is obtained or the residual number is zero. Example for clarification: The read number is 1416. Bit 15 will be 0, since $1416 < 32768$. Bits 14 to 11 will also be 0. Bit 10 will be 1, since $1416 > 1024$. The remainder will be $1416-1024=392$. Bit 9 will be 0, since $392 < 512$. Bit 8 will be 1, since $392 > 256$. The remainder will be $392-256=136$. Bit 7 will be 1, since $136 > 128$. The remainder will be $136-128=8$. Bits 6 to 4 will be 0. Bit 3 will be 1, since $8 = 8$. The remainder will be 0. The remaining bits 2 to 0 will thus all be 0.

13.6 ModBus: Parameter overview

Holding register (Protocol)	Name	Data type	Scale & unit	Elements	Access*	Added
40001 (0)	Version communication profile	UINT16	0.001		R	31,000
40002 (1)	Wink service	BOOL			RW	31,000

Holding register (Protocol)	Name	Data type	Scale & unit	Elements	Access*	Added
40003 (2)	Switch box type	ENUM		0. SC 1. SC...FC 2. SCe 3. CC 4. CC...FC 5. CCe 6. SCe NWB 7. CCe NWB 8. EC 9. ECe 10. ECe NWB	R	31,000
40014 (13)	Bus command timer	ENUM		0. - 1. Off 2. Set 3. Active 4. Reset 5. Manual	RW	31,000
40015 (14)	Drives on/off	BOOL			RW	31,000
40025 (24)	Control mode	ENUM		0. p-c 1. dp-c 2. dp-v 3. dT-c 4. dT-v 5. n(TV) 6. n(TR) 7. n(TP) 8. n(TA) 9. n-c 10. fill 11. empty/drain 12. FTS 13. cleans/day 14. cleans/ month	R	31,000
40026 (25)	Current value	INT16	0.1 bar 0.1 m 0.1 K 0.1 °C 1 cm 1 min 0.1 h 0.1 psi		R	31,000
40041 (40)	Pump 1 mode	ENUM		0. Off 1. Hand 2. Auto	RW	31,000
40042 (41)	Pump 2 mode	ENUM		0. Off 1. Hand 2. Auto	RW	31,000
40043 (42)	Pump 3 mode	ENUM		0. Off 1. Hand 2. Auto	RW	31,000
40062 (61)	Switch box state	BITMAP		0: SBM 1: SSM	R	31,000

Holding register (Protocol)	Name	Data type	Scale & unit	Elements	Access*	Added
40139 - 40140 (138-139)	Error state	BITMAP32		0: Sensor error 1: P max 2: P min 3: FC 4: TLS 5: Pump 1 Alarm 6: Pump 2 Alarm 7: Pump 3 Alarm 8: Pump 4 Alarm 9: Pump 5 Alarm 10: Pump 6 Alarm 11: - 12: - 13: Frost 14: Battery Low 15: High water 16: Priority off 17: Redundancy 18: Plausibility 19: Slave communication 20: Net supply 21: Leakage	R	31,000
40141 (140)	Acknowledge	BOOL			W	31,000
40142 (141)	Alarm history index	UINT16			RW	31,000
40143 (142)	Alarm history error code	UINT16	0.1		R	31,000
40198 (197)	State float swiches	BITMAP		0: DR 1: Ps off 2: P1 on 3: P2 on 4: HW	R	31.102
40204 (203)	Set points water level 1	UNIT16	1 cm		RW	31.102
40205 (204)	Set points water level 2	UNIT16	1 cm		RW	31.102
40206 (205)	Set points water level 3	UNIT16	1 cm		RW	31.102
40212 (211)	Set points water level 1	UNIT16	1 cm		RW	31.102
40213 (212)	Set points water level 2	UNIT16	1 cm		RW	31.102
40214 (213)	Set points water level 3	UNIT16	1 cm		RW	31.102
40220 (219)	Dry run level	UNIT16	1 cm		RW	31.102
40222 (221)	High water level	UNIT16	1 cm		RW	31.102

Key

* R = read-only, RW = read- and write-accessible







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