

Altistart 48

软起动-软停止单元

用户手册
User's Manual





按照规定，对设备或机器的任何电气或机械部件进行操作之前，Altistart 48 的控制 (CL1-CL2) 和电源 (1/L1-3/L2-5/L3) 必须断开。

在运行过程中可以通过取消运行命令使电机停机。起动器保持通电。如果为了人员安全需要禁止突然重起动，则此电气锁定系统是不够的：必须在动力电路上安装一个断路器。

本起动器装有安全设备，当出现故障时，可以停止起动器工作继而使电机停机。电机自身可以通过机械锁定停机。另外，电压变化或电源故障也会导致停机。

如果导致停机的原因消失，则存在重新启动的可能，这将危及某些机器或设备的安全，特别是那些必须符合安全规范的机器或设备。在这种情况下用户必须采取措施预防自动重起动的发生，特别是在电机出现不合程序要求的停机时，要使用低速检测器切断起动器的电源。

本档中介绍的产品和设备可能会因技术原因随时变更或修改。我们保留更改的权力。

起动器安装和设置必须符合国际和国内标准的要求。系统集成商有责任确保设备的合格性，必须遵守欧盟范围内其他国家的 EMC 规范。

本文档中的技术规范必须遵守，以符合 EMC 条款的基本要求。

Altistart 48 必须被视为一个组件，它不是一部已经能够符合欧洲规范的机器或设备（机械规范和电磁兼容性规范）。最终的集成商有责任确保其符合相关的标准。

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起动机设置步骤

1、Altistart 48 的交货

- 检查印在标签上的起动机型号与定单相对应的提货单上标注的型号是否一致。
- 打开 Altistart 48 的包装，确认在运输过程中没有发生损坏。

2、根据 20 页和 21 页上的指导安装 Altistart 48

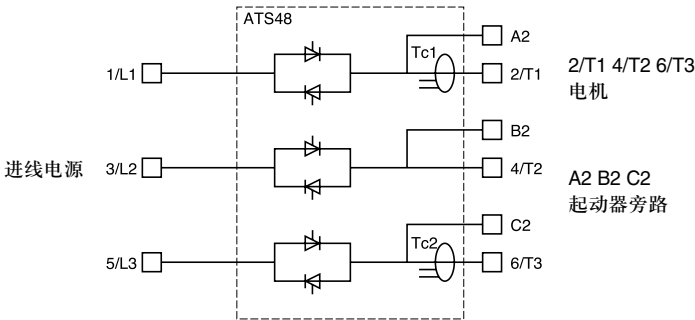
3、按如下步骤连接 Altistart 48:

- 控制线路电源 (CL1 - CL2)，确保电源断开
- 主电源 (1/L1 - 3/L2 - 5/L3)，确保电源断开
- 电机 (2/T1 - 4/T2 - 6/T3)，确保电机电压与电源电压匹配

注意：如果使用旁路接触器，应将其连接到电源端的 L1, L2, L3 和 Altistart 48 上的端子 A2, B2, C2 上。见 30 页图。

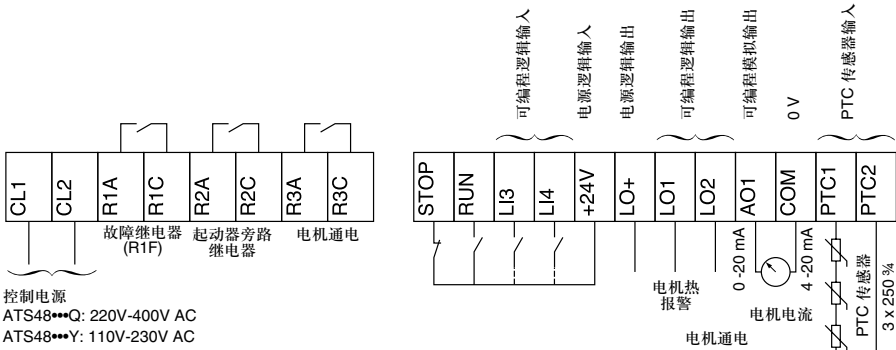
如果在电机三角形绕组中使用 ATS48***Q，应遵循 10、11 页的说明以及 31 页的图示。

ATS48 电力部件框图



起动机设置步骤

控制端子的出厂配置：



 将故障继电器接点连至电源侧接触器，以便在出现故障时断开电气回路。
详见应用接线图。

连接 RUN（运行）和 STOP（停止）命令，如有必要还应连接其他输入/输出端子。

Stop 为 1（通）且 RUN 为 1（通）：起动命令。
Stop 为 0（断）且 RUN 为 1 或 0：停机命令。

4、 起动 Altistart 48 前：

阅读电机铭牌上的信息，以便在 SET 菜单中设定参数 (In)。

5、 控制部分 (CL1-CL2) 通电，主电源部分不通电，且不给运行命令

起动机显示：nLP（指示电源断开）。

ATS 48 起动机出厂配置用于不需特殊功能的标准应用场合。它具备 10 级的电机保护。

通过改变参数改变设定值，详见第 44 页。

在任何情况下 In 参数都必须设置为电机铭牌上指示的当前值。

6、 主电源部分通电 (1/L1 - 3/L2 - 5/L3)

起动机显示：rdY（指示起动机已通电并待机）。
发送一个“RUN”命令起动系统。

出厂配置

出厂设定值

Altistart 48 出厂时已设定为普通的运行情况：

- ATS 48 在电机电源上使用（在电机绕组中未将其串入三角形绕组中）
- 电机额定电流 In:
 - ATS 48***Q: 为标准 400V 4 极电机预置
 - ATS 48***Y: 为 NEC 电流、460V 电机预置
- 限制电流 (ILt): 电机额定电流的 400%
- 加速斜坡 (ACC): 15 秒
- 起动力矩 (tq0): 额定力矩的 20%
- 停机 (StY): 自由停车 (-F-)
- 电机热保护 (tHP): 10 级保护曲线
- 显示 : rdY (起动机待机), 有电源电压和控制电压, 电机电流运行
- 逻辑输入 :
 - LI1: STOP (停机)
 - LI2: RUN (运行)
 - LI3: 强制自由停车 (LIA)
 - LI4: 强制本地模式 (LIL)
- 逻辑输出 :
 - LO1: 电机热报警 (tA1)
 - LO1: 电机已通电 (ml)
- 继电器输出 :
 - R1: 故障继电器 (rll)
 - R2: 起动结束旁路继电器
 - R3: 电机已通电 (ml)
- 模拟输出 :
 - AO 电机电流 (Ocr, 0-20mA)
- 通讯参数 :
 - 通过串口连接, 起动机逻辑地址 (Add) 为 “0”
 - 传输速度 (tbr): 19200 比特每秒
 - 传输格式 (For): 8 位, 无奇偶校验, 1 个停止位 (8nl)

如果上述值均符合实际应用, 则起动机无须改变设定值即可使用。

搬运和存放

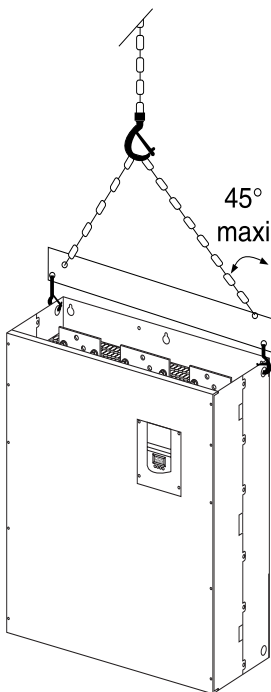
在安装前为保护起动器，应带着包装进行搬运和存放。

安装搬运

Altistart 48 系列有 6 种大小的设备，其重量和尺寸各不相同。

小型起动器可以去除包装，无需吊装设备即可安装。

对于大型起动器必须使用吊装设备；为此其上均带有“吊环”。必须遵守如下吊装方式：



不要用电源轨道搬运起动器

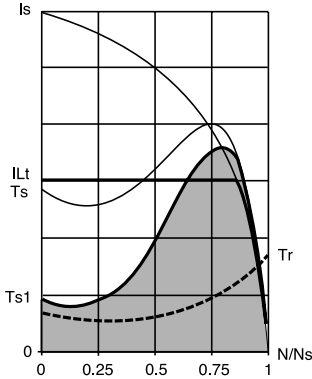
环境

防护等级	• ATS 48D17 • 至 C11 • 为 IP20 • ATS 48C14 • 至 M12 • 为 IP00 (1)
耐振性	符合 IEC 68-2-6: • 2 至 13Hz 为 1.5mm 峰值 • 13 至 200Hz 为 1gn
抗冲击性	符合 IEC 68-2-27: 15g, 11ms
最大环境污染等级	3 级, 符合 IEC 947-4-2
最大相对湿度	93% 无冷凝或滴水, 符合 IEC 68-2-3
环境温度	贮存 : -25°C 至 +70°C 运行 : • 10°C 至 +40°C 不降容 • 最高 +60°C, 40°C 以上每升高 1°C 电流降低 2%
最大运行高度	1000 米不降容 (1000 米以上, 每增加 100 米, 电流降低 0.5%)
运行位置	垂直位置, ±10° 以内



(1) 防护等级为 IP00 的 ATS 48 起动器必须安装保护排以防止人员接触到带电部分。

有效力矩



曲线 Ts 和 Is 表示异步电机直接起动。

曲线 Ts1 表示使用 ATS 48 可获得的总的力矩范围，它取决于限制电流 ILt。起动器的逐级起动由此范围内的电动力矩控制。

Tr: 阻力矩，它必须低于 Ts1 力矩。

选择软起动 - 软停止单元

S1 电机负载对应于恒载运行，允许获得热平衡。

S4 电机负载对应于周期运行，运行周期由起动、恒载运行和停止过程组成，该周期由负载系数表示。

必须根据应用类型（“标准”或“重载”）和电机额定功率对 Altistart 48 进行选择。“标准”或“重载”应用定义了电流限定值和电机负载 S1 和 S4 周期。



注意：Altistart 48 不要使用电机之外的其他负载（例如禁止使用变压器和电阻器）。不要将功率因数校正电容连接在由 Altistart 48 控制的电机的端子上。

标准应用

例如：离心泵

在标准应用中，Altistart 48 设计能够提供如下功能：

- 在 S1 负荷中：冷态以 4In 电流持续 23 秒或 3In 电流持续 46 秒起动。
- 在 S4 负荷中：负载系数 50%，每小时起动 10 次，以 3In 持续 23 秒或 4In 电流起动 12 秒，或与此相当的热循环。

在此情况下，电机热保护必须符合 10 级保护等级。

重载应用

例如：研磨机

在重载应用中，Altistart 48 设计用于 S4 负荷，负载系数为 50%，每小时起动 5 次，电流 4In 持续 23 秒或与此相当的热循环。

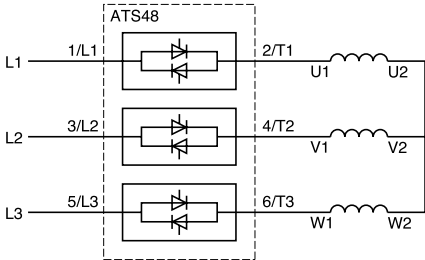
在此情况下，电机热保护必须符合 20 级保护等级。电流 In 决不能保持在出厂设定值，而必须设定为电机铭牌上所示的值。

注：起动器选型可以选大一级，例如对 11kW-400V、以电机负荷 S4 运行的电机可选用 ATS 48D17Q。

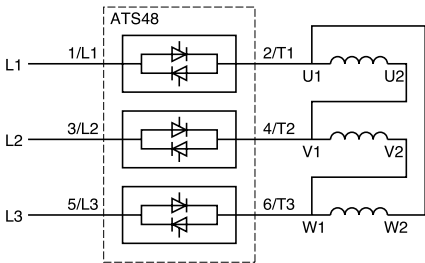
为此，应在起动过程结束时将 Altistart 48 短路。允许每小时起动 10 次，3 倍 In 电流最长持续 23 秒或相当的热循环，电机热保护必须符合 10 级要求。

Altistart 48Q 系列 (230-400V) 与电机直接连接或连接到电机三角形绕组

Altistart 48 连接在电机电源线中



电机连接取决于电源电压，在本例中为星形连接。



电机连接取决于电源电压，在本例中为三角形连接。

Altistart 48Q 系列 (230-400V) 连接到电机三角形绕组，与每一绕组串联

ATS48...Q 起动器可以串联接入电机三角形绕组中。它们由 $1/\sqrt{3}$ 线电流的电流驱动，这样可以使用低额定值的起动器。

此选项可以在高级设定菜单 (Advanced settings menu) 中进行配置 (dLt=On)。

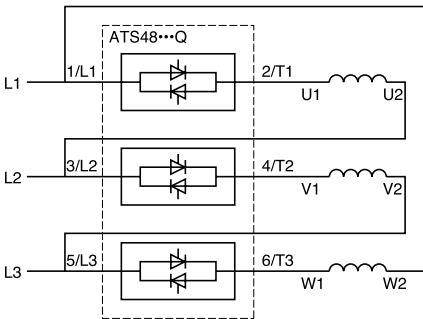
额定电流和限制电流设定值以及运行过程中显示的电流均为在线值，因此不需要由用户自己计算。



对于 ATS48...Q 起动器，只有 Altistart 48Q 可串联连接在电机三角形绕组中。这样：

- 只能自由停车
- 不能使用级联功能
- 不能使用预热功能

关于起动器 - 电机组合的更多信息可参见第 12 页表格。



连接在电机三角形绕组中

例如：

1 台 400V-110kW 电机，线电流 195A (三角形连接的额定电流)。

每一绕组中的电流等于 $195/1.7$ ，即 114A。

选择最大允许额定电流稍大于此电流的额定值，即 140A 作为额定值 (ATS48C14Q 用于标准应用)。

为避免计算额定值，可以使用 14 和 15 页的表，表中给出对应于每种应用类型电机功率的起动器额定值。



标准应用，230V/400V 电源，起
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电机		起 动 器 230/400V (+10%-15%) -50/60Hz		
电机额定功率		10 级最大	ICL	起 动 器 型 号
230V	400V	允许电流	额定值	
kW	kW	A	A	
4	7.5	17	17	ATS 48D17Q
5.5	11	22	22	ATS 48D22Q
7.5	15	32	32	ATS 48D32Q
9	18.5	38	38	ATS 48D38Q
11	22	47	47	ATS 48D47Q
15	30	62	62	ATS 48D62Q
18.5	37	75	75	ATS 48D75Q
22	45	88	88	ATS 48D88Q
30	55	110	110	ATS 48C11Q
37	75	140	140	ATS 48C14Q
45	90	170	170	ATS 48C17Q
55	110	210	210	ATS 48C21Q
75	132	250	250	ATS 48C25Q
90	160	320	320	ATS 48C32Q
110	220	410	410	ATS 48C41Q
132	250	480	480	ATS 48C48Q
160	315	590	590	ATS 48C59Q
(1)	355	660	660	ATS 48C66Q
220	400	790	790	ATS 48C79Q
250	500	1000	1000	ATS 48M10Q
355	630	1200	1200	ATS 48M12Q

电机额定电流 In 不能超过 10 级的最大允许电流。

(1) 没有对应的标准化电机时未给出功率值。

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上表中的值是根据最高环境温度 40°C 时的运行情况给出的。

ATS 48 最高可以在 60°C 环境温度下使用，在 40°C 以上每升高 1°C，10 级最大允许电流降低 2% 即可。

例: ATS 48D32Q 在 50°C 下运行，则应降容 $10 \times 2\% = 20\%$ ，32A 变为 $32 \times 0.8 = 25.6A$ (最大电机额定电流)



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电机		起 动 器 230/400V (+10%-15%) -50/60Hz		
电机额定功率		20 级 中 的 最 大 允 许 电 流	ICL 额 定 值	起 动 器 型 号
230V	400V			
kW	kW	A	A	
3	5.5	12	17	ATS 48D17Q
4	7.5	17	22	ATS 48D22Q
5.5	11	22	32	ATS 48D32Q
7.5	15	32	38	ATS 48D38Q
9	18.5	38	47	ATS 48D47Q
11	22	47	62	ATS 48D62Q
15	30	62	75	ATS 48D75Q
18.5	37	75	88	ATS 48D88Q
22	45	88	110	ATS 48C11Q
30	55	110	140	ATS 48C14Q
37	75	140	170	ATS 48C17Q
45	90	170	210	ATS 48C21Q
55	110	210	250	ATS 48C25Q
75	132	250	320	ATS 48C32Q
90	160	320	410	ATS 48C41Q
110	220	410	480	ATS 48C48Q
132	250	480	590	ATS 48C59Q
160	315	590	660	ATS 48C66Q
(1)	355	660	790	ATS 48C79Q
220	400	790	1000	ATS 48M10Q
250	500	1000	1200	ATS 48M12Q

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标准应用，230V/400V 电源，起
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电机		起 动 器 230/400V (+10%-15%) -50/60Hz		
电机额定功率		10 级中的最大	ICL	起 动 器 型 号
230V	400V	允许电流	额定值	
kW	kW	A	A	
7.5	15	29	29	ATS 48D17Q
9	18.5	38	38	ATS 48D22Q
15	22	55	55	ATS 48D32Q
18.5	30	66	66	ATS 48D38Q
22	45	81	81	ATS 48D47Q
30	55	107	107	ATS 48D62Q
37	55	130	130	ATS 48D75Q
45	75	152	152	ATS 48D88Q
55	90	191	191	ATS 48C11Q
75	110	242	242	ATS 48C14Q
90	132	294	294	ATS 48C17Q
110	160	364	364	ATS 48C21Q
132	220	433	433	ATS 48C25Q
160	250	554	554	ATS 48C32Q
220	315	710	710	ATS 48C41Q
250	355	831	831	ATS 48C48Q
(1)	400	1022	1022	ATS 48C59Q
315	500	1143	1143	ATS 48C66Q
355	630	1368	1368	ATS 48C79Q
(1)	710	1732	1732	ATS 48M10Q
500	(1)	2078	2078	ATS 48M12Q

电机额定电流 In 不能超过 10 级的最大允许电流。

(1) 当没有对应的标准化电机时未给出功率值。

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上表中的值是根据最高环境温度 40°C 时的运行情况给出的。

ATS 48 最高可以在 60°C 环境温度下使用，40°C 以上每升高 1°C，10 级最大允许电流降低 2% 即可。

例如: ATS 48D32Q 在 50°C 下运行，则应降容 $10 \times 2\% = 20\%$ ，55A 变为 $55 \times 0.8 = 44\text{A}$ (最大电机额定电流)



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电机		起 动 器 230/400V (+10%-15%) -50/60Hz		
电机额定功率		20 级 中 的 最 大 允 许 电 流	ICL 额 定 值	起 动 器 型 号
230V	400V			
kW	kW	A	A	
5.5	11	22	29	ATS 48D17Q
7.5	15	29	38	ATS 48D22Q
9	18.5	38	55	ATS 48D32Q
15	22	55	66	ATS 48D38Q
18.5	30	66	81	ATS 48D47Q
22	45	81	107	ATS 48D62Q
30	55	107	130	ATS 48D75Q
37	55	130	152	ATS 48D88Q
45	75	152	191	ATS 48C11Q
55	90	191	242	ATS 48C14Q
75	110	242	294	ATS 48C17Q
90	132	294	364	ATS 48C21Q
110	160	364	433	ATS 48C25Q
132	220	433	554	ATS 48C32Q
160	250	554	710	ATS 48C41Q
220	315	710	831	ATS 48C48Q
250	355	831	1022	ATS 48C59Q
(1)	400	1022	1143	ATS 48C66Q
315	500	1143	1368	ATS 48C79Q
355	630	1368	1732	ATS 48M10Q
(1)	710	1732	2078	ATS 48M12Q

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标准应用， 208V/690V 电源， 起动器直接连接

电机							起动器 208/690V (+10%-15%) -50/60Hz		
电机额定功率							10 级中的最大允许电流	ICL 额定值	起动器型号
208V	230V	440V	460V	500V	575V	690V			
HP	HP	kW	HP	kW	HP	kW	A	A	
3	5	7.5	10	9	15	15	17	17	ATS 48D17Y
5	7.5	11	15	11	20	18.5	22	22	ATS 48D22Y
7,5	10	15	20	18.5	25	22	32	32	ATS 48D32Y
10	(1)	18.5	25	22	30	30	38	38	ATS 48D38Y
(1)	15	22	30	30	40	37	47	47	ATS 48D47Y
15	20	30	40	37	50	45	62	62	ATS 48D62Y
20	25	37	50	45	60	55	75	75	ATS 48D75Y
25	30	45	60	55	75	75	88	88	ATS 48D88Y
30	40	55	75	75	100	90	110	110	ATS 48C11Y
40	50	75	100	90	125	110	140	140	ATS 48C14Y
50	60	90	125	110	150	160	170	170	ATS 48C17Y
60	75	110	150	132	200	200	210	210	ATS 48C21Y
75	100	132	200	160	250	250	250	250	ATS 48C25Y
100	125	160	250	220	300	315	320	320	ATS 48C32Y
125	150	220	300	250	350	400	410	410	ATS 48C41Y
150	(1)	250	350	315	400	500	480	480	ATS 48C48Y
(1)	200	355	400	400	500	560	590	590	ATS 48C59Y
200	250	400	500	(1)	600	630	660	660	ATS 48C66Y
250	300	500	600	500	800	710	790	790	ATS 48C79Y
350	350	630	800	630	1000	900	1000	1000	ATS 48M10Y
400	450	710	1000	800	1200	(1)	1200	1200	ATS 48M12Y

电机额定电流 In 不能超过 10 级的最大允许电流。

(1) 当没有对应的标准化电机时未给出功率值。

温度降容

上表中的值是根据最高环境温度 40°C 时的运行情况给出的。

ATS 48 最高可以在 60°C 环境温度下使用， 40°C 以上每升高 1°C， 10 级最大允许电流降低 2% 即可。

例如：ATS 48D32Y 在 50°C 下运行，则应降容 $10 \times 2\%=20\%$ ，32A 变为 $32 \times 0.8=25.6A$ (最大电机额定电流)



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电机							起 动 器 208/690V (+10%-15%) -50/60Hz		
电机额定功率							20 级 中 的 最 大 允 许 电 流	ICL 额 定 值	起 动 器 型 号
208V	230V	440V	460V	500V	575V	690V			
HP	HP	kW	HP	kW	HP	kW	A	A	
2	3	5.5	7.5	7.5	10	11	12	17	ATS 48D17Y
3	5	7.5	10	9	15	15	17	22	ATS 48D22Y
5	7.5	11	15	11	20	18.5	22	32	ATS 48D32Y
7,5	10	15	20	18.5	25	22	32	38	ATS 48D38Y
10	(1)	18.5	25	22	30	30	38	47	ATS 48D47Y
(1)	15	22	30	30	40	37	47	62	ATS 48D62Y
15	20	30	40	37	50	45	62	75	ATS 48D75Y
20	25	37	50	45	60	55	75	88	ATS 48D88Y
25	30	45	60	55	75	75	88	110	ATS 48C11Y
30	40	55	75	75	100	90	110	140	ATS 48C14Y
40	50	75	100	90	125	110	140	170	ATS 48C17Y
50	60	90	125	110	150	160	170	210	ATS 48C21Y
60	75	110	150	132	200	200	210	250	ATS 48C25Y
75	100	132	200	160	250	250	250	320	ATS 48C32Y
100	125	160	250	220	300	315	320	410	ATS 48C41Y
125	150	220	300	250	350	400	410	480	ATS 48C48Y
150	(1)	250	350	315	400	500	480	590	ATS 48C59Y
(1)	200	355	400	400	500	560	590	660	ATS 48C66Y
200	250	400	500	(1)	600	630	660	790	ATS 48C79Y
250	300	500	600	500	800	710	790	1000	ATS 48M10Y
350	350	630	800	630	1000	900	1000	1200	ATS 48M12Y

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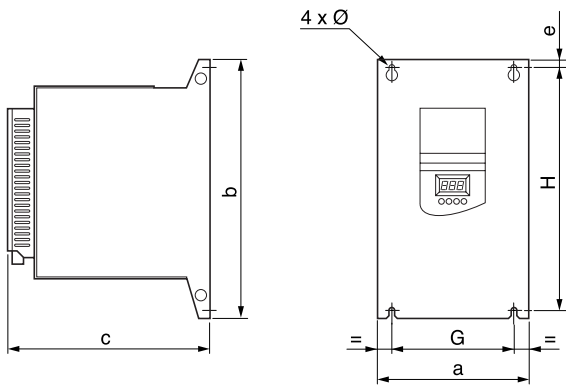
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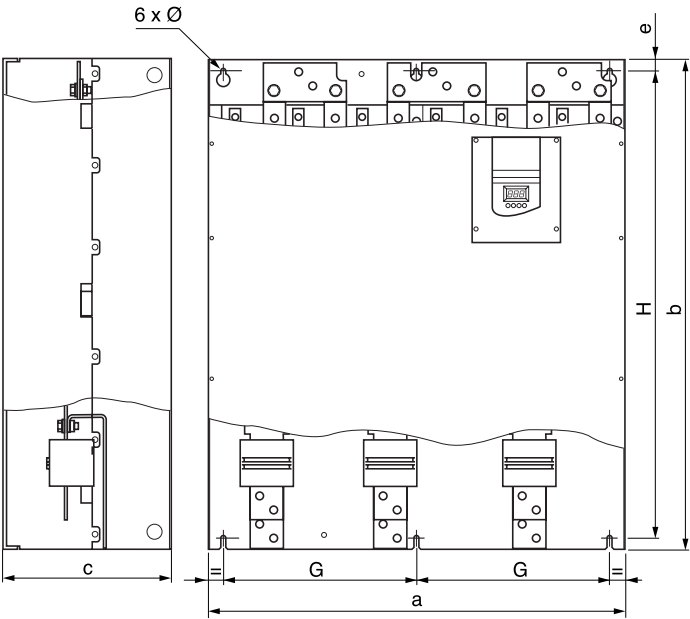
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ATS 48D17 • ... C66 •



ATS 48	a mm	b mm	c mm	e mm	G mm	H mm	Ø mm	重量 kg
D17Q, D17Y D22Q, D22Y D32Q, D32Y D38Q, D38Y D47Q, D47Y	160	275	190	6.6	100	260	7	4.9
D62Q, D62Y D75Q, D75Y D88Q, D88Y C11Q, C11Y	190	290	235	10	150	270	7	8.3
C14Q, C14Y C17Q, C17Y	200	340	265	10	160	320	7	12.4
C21Q, C21Y C25Q, C25Y C32Q, C32Y	320	380	265	15	250	350	9	18.2
C41Q, C41Y C48Q, C48Y C59Q, C59Y C66Q, C66Y	400	670	300	20	300	610	9	51.4

ATS 48C79 • ... M12 •



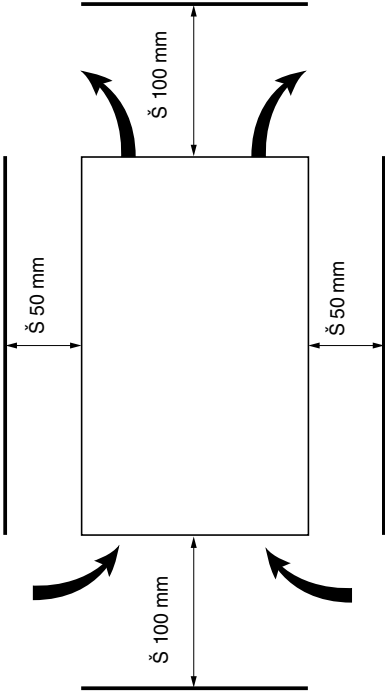
ATS 48	a mm	b mm	c mm	e mm	G mm	H mm	Ø mm	重量 kg
C79Q, C79Y M10Q, M10Y M12Q, M12Y	770	890	315	20	350	850	9	115

安装建议

垂直安装，倾斜角范围在 $\pm 10^\circ$ 以内。

不要靠近发热元件安装，特别是不要在发热元件上方安装。

应留出足够的空间以确保冷却空气能够从软起动器底部到顶部进行循环。



确认不会有液体、灰尘或导电物体落入起动器中
(上方 IP00 防护等级)

起动器通风

起动器上安装有一个冷却风扇，当散热器温度达到 50°C 时风扇即自动起动。温度降至 40°C 以下时风扇将停止工作。

风扇流量：

- ATS 48 D32 • 和 D38 • : $14\text{m}^3/\text{h}$
- ATS 48 D47 • : $28\text{m}^3/\text{h}$
- ATS 48 D62 • 至 C11 • : $86\text{m}^3/\text{h}$
- ATS 48 C14 • 和 C17 • : $138\text{m}^3/\text{h}$
- ATS 48 C21 • 至 C32 • : $280\text{m}^3/\text{h}$
- ATS 48 C41 • 至 C66 • : $600\text{m}^3/\text{h}$
- ATS 48 C79 • 至 M12 • : $1,200\text{m}^3/\text{h}$

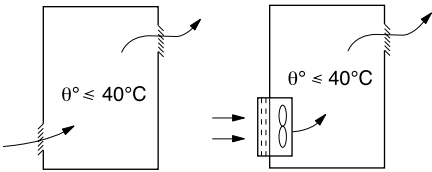
壁挂式或落地式安装的壳体

壁挂式或落地式金属壳体，防护等级为 IP 23

应遵守上页的安装指导。

确保起动器通风充分：

- 安装通风格栅
- 检查通风是否充分。如不充分，安装一个带滤网的强迫通风装置。



起动器耗散的功率，无旁路，额定电流时

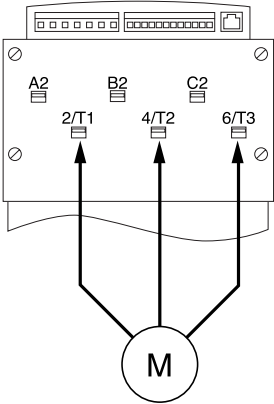
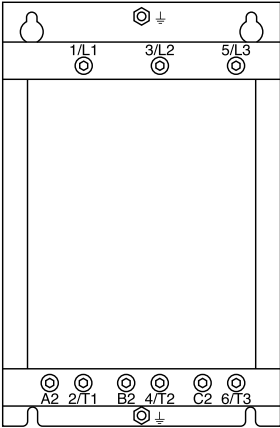
起动器型号 ATS 48	功率 单位 W	起动器型号 ATS 48	功率 单位 W
D17Q, D17Y	59	C21Q, C21Y	580
D22Q, D22Y	74	C25Q, C25Y	695
D32Q, D32Y	104	C32Q, C32Y	902
D38Q, D38Y	116	C41Q, C41Y	1339
D47Q, D47Y	142	C48Q, C48Y	1386
D62Q, D62Y	201	C59Q, C59Y	1731
D75Q, D75Y	245	C66Q, C66Y	1958
D88Q, D88Y	290	C79Q, C79Y	2537
C11Q, C11Y	322	M10Q, M10Y	2865
C14Q, C14Y	391	M12Q, M12Y	3497
C17Q, C17Y	479		

注：起动器带旁路时其耗散功率极小（在 15 到 30W 之间）

控制回路功率损耗（所有额定值）：25W 无通风
ATS48D32 至 C17 Q/Y：30W 带通风
ATS48C21 至 D32 Q/Y：50W 带通风
ATS48C41 至 M12 Q/Y：80W 带通风

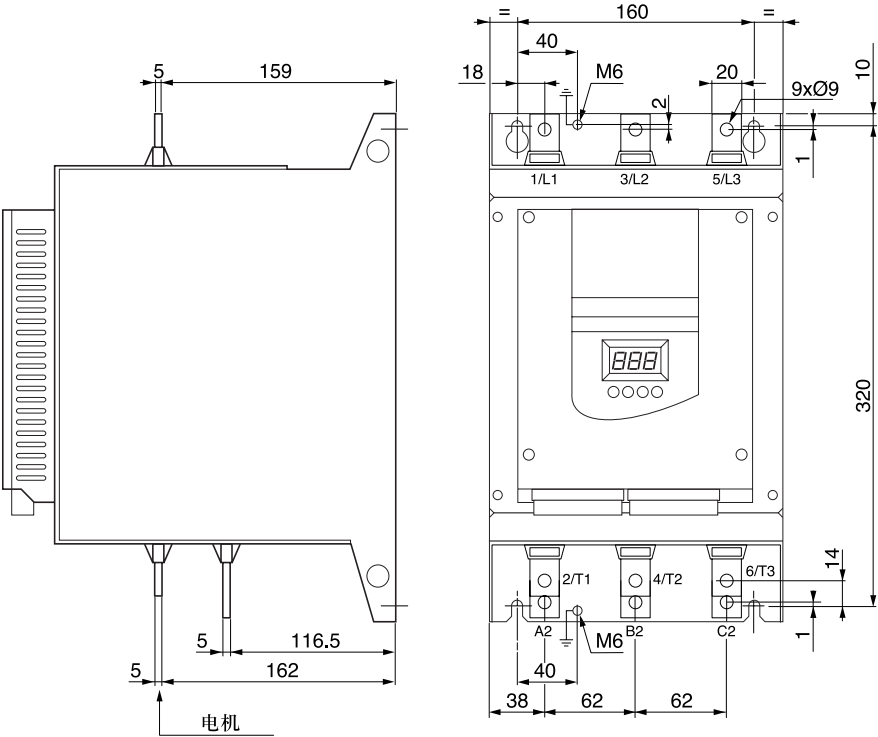
端子	功能	最大接线能力 端子紧固力矩					
		ATS 48 D17 • D22 • D32 • D38 • D47 •	ATS 48 D62 • D75 • D88 • C11 •	ATS 48 C14 • C17 •	ATS 48 C21 • C25 • C32 •	ATS 48 C41 • C48 • C59 • C66 •	ATS 48 C79 • M10 • M12 •
⏏	地线接头 接地	10mm ² 1.7 N.m	16mm ² 3 N.m	120mm ² 27 N.m	120mm ² 27 N.m	240mm ² 27 N.m	2x240mm ² 27 N.m
		8 AWG 15 lb.in	4 AWG 26 lb.in	母线 238 lb.in	母线 238 lb.in	母线 238 lb.in	母线 238 lb.in
1/L1 3/L2 5/L3	电源	16mm ² 3 N.m	50mm ² 10 N.m	95mm ² 34 N.m	240mm ² 34 N.m	2x240mm ² 57 N.m	4x240mm ² 57 N.m
		8 AWG 26 lb.in	2/0 AWG 88 lb.in	2/0 AWG 300 lb.in	母线 300 lb.in	母线 500 lb.in	母线 500 lb.in
2/T1 4/T2 6/T3	至电机输出	16mm ² 3 N.m	50mm ² 10 N.m	95mm ² 34 N.m	240mm ² 34 N.m	2x240mm ² 57 N.m	4x240mm ² 57 N.m
		8 AWG 26 lb.in	2/0 AWG 88 lb.in	2/0 AWG 300 lb.in	母线 300 lb.in	母线 500 lb.in	母线 500 lb.in
A2 B2 C2	起动器旁路	16mm ² 3 N.m	50mm ² 10 N.m	95mm ² 34 N.m	240mm ² 34 N.m	2x240mm ² 57 N.m	4x240mm ² 57 N.m
		8 AWG 26 lb.in	2/0 AWG 88 lb.in	2/0 AWG 300 lb.in	母线 300 lb.in	母线 500 lb.in	母线 500 lb.in

电源端子布置图， **ATS 48D17 • 至 C11 •**



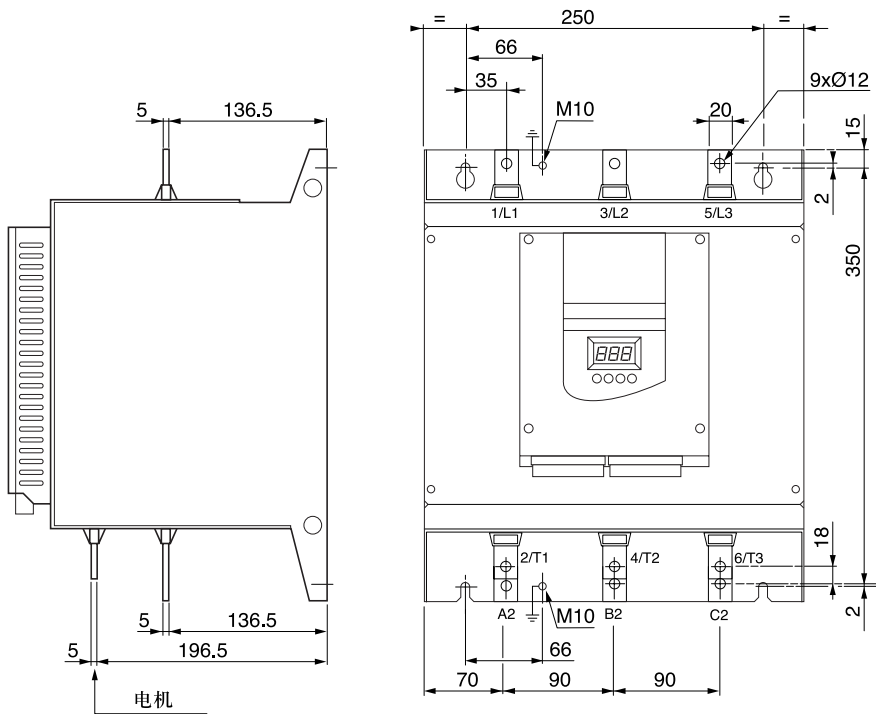
电机连接至 **2/T1、4/T2、6/T3**

电源端子布置图，ATS 48C14 • 和 C17 •



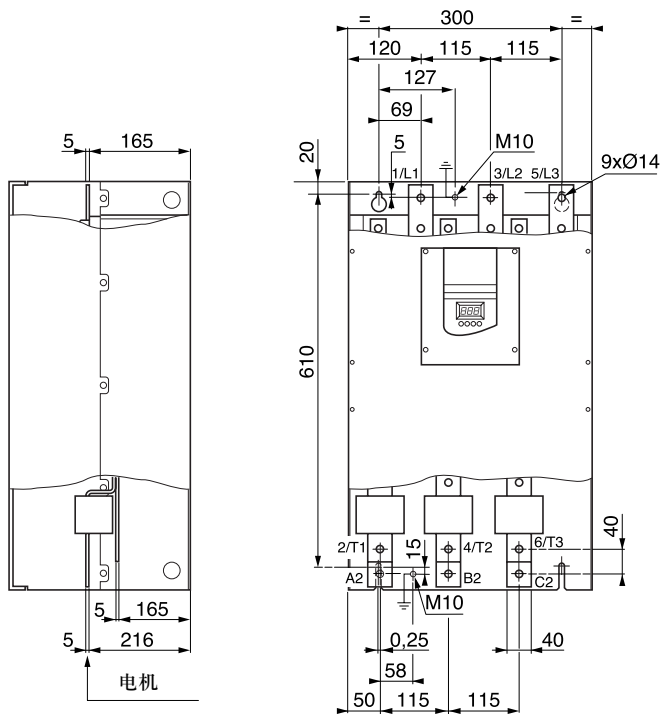
中文

电源端子布置图, ATS 48C21 • 和 C32 •

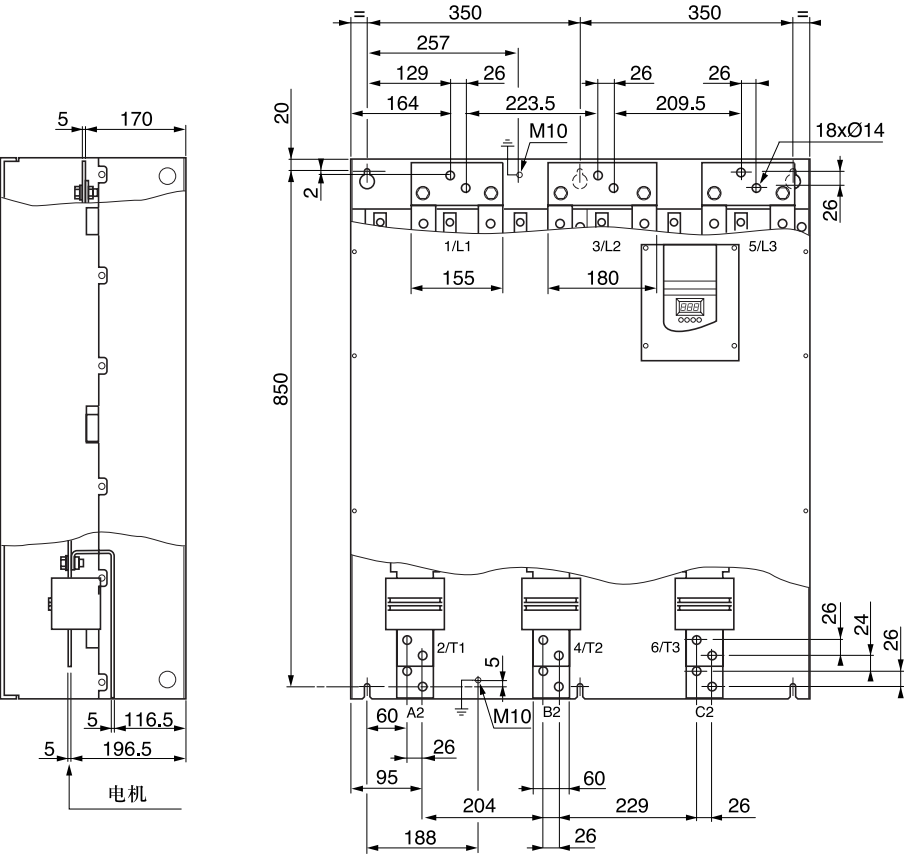


电源端子

电源端子布置图, ATS 48C41 • 和 C66 •



电源端子布置图，ATS 48C79 • 和 M12 •



控制端子

控制端子使用单向插入式接头连接。

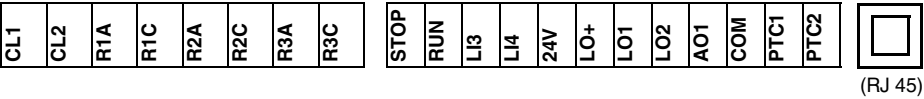
最大接线能力 : 2.5mm² (12 AWG)
最大紧固力矩 : 0.4N.m (3.5 lb.in)

要接近 ATS 48C17 • 至 M12 • 起动器的控制端子，必须将保护罩拆下。

电气特性

端子	功能	特性
CL1 CL2	Altistart 控制电源	ATS 48***Q: 220 至 415V + 10% - 15%, 50/60Hz ATS 48***Y: 110 至 230V + 10% - 15%, 50/60Hz 能耗见 21 页
R1A R1C	可编程继电器 r1 的常开 (N/O) 触点	最小开关能力 • 直流 6V 时为 10mA 对感性负载的最大开关能力 (cos ϕ =0.5, L/R=20ms): • 对交流 230V 和直流 30V 为 1.8A 最大电压 400V
R2A R2C	起动结束继电器 r2 的常开 (N/O) 触点	
R3A R3C	可编程继电器 r3 的常开 (N/O) 触点	
STOP RUN LI3 LI4	起动器停机 (状态 0 为停机) 起动器运行 (如果 STOP 为 1, 则状态 1 为运行) 可编程输入 可编程输入	4 x 24V 逻辑输入, 阻抗为 4.3k Ω U _{max} = 30V, I _{max} = 8mA 状态 1: U > 11V - I > 5mA 状态 0: U < 5V - I < 2mA
24V	电源逻辑输入	+24V $\pm$ 25% 隔离并保护以防短路和过载, 最大电流 : 200mA
LO+	电源逻辑输出	连接至 24V 或外部电源
LO1 LO2	可编程逻辑输出	2 个集电极开路输出端, 与 1 级 PLC 兼容, 符合 IEC 65A-68 标准。 • 电源 +24V (最低 12V, 最高 30V) • 带有外接电源的每个输出端最大电流 200mA
AO1	可编程模拟输出	输出可配置为 0-20mA 或 4-20mA • 精度为最大值的 $\pm$ 5%, 最大阻抗 500 Ω
COM	I/O 公共端	0V
PTC1 PTC2	PTC 传感器输入	25°C 时传感器回路的总电阻为 750 Ω (例如, 3 x 250 Ω 传感器串联)
(RJ 45)	接头用于 • 远程操作盘 • PowerSuite • 通讯总线	RS 485 Modbus

控制端子布置图



接线 /RUN-STOP (运行 - 停机) 命令

接线指导

电源接线

按照标准中推荐的电缆截面选用电缆。

起动器必须接地以符合有关漏电流的规范。当安装标准要求使用进线“残余电流设备”用于保护时，必须使用一个 A-Si 类型设备（避免上电过程中出现意外脱扣）。检查它与其他保护设备的兼容性。如果安装中有若干起动器连接在同一条线上的情况，则每个起动器必须单独接地。如有必要，应安装一个进线电抗器（参见产品目录）。

动力电缆应与弱电信号（检测器、PLC、测量仪表、视频、电话）电路保持隔离。

控制接线

控制线与动力电缆应保持隔离。

RUN (运行) 和 STOP (停机) 逻辑输入端的功能 (见 30 页应用接线图)

2 线控制

运行和停机是由状态 1 (运行) 和 0 (停机) 进行控制，RUN 和 STOP 输入状态同时考虑。

在上电或故障手动复位时如果有 RUN 命令则电机重新起动。

3 线控制

运行和停机由 2 个不同的逻辑输入端控制。

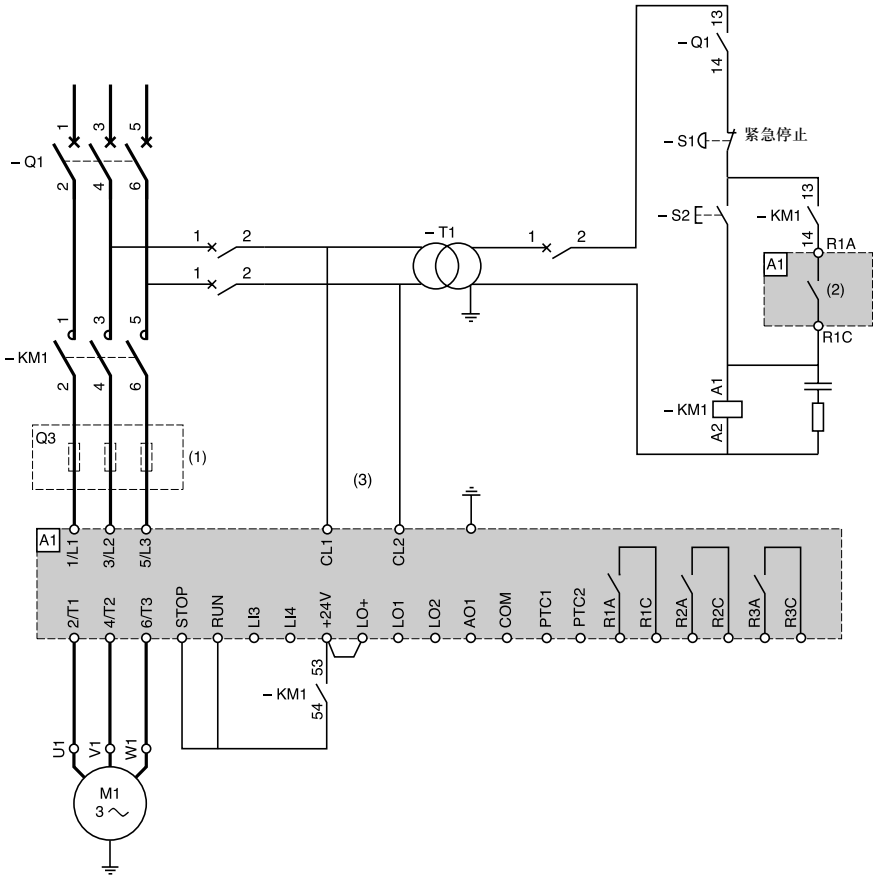
断开 (状态 0) STOP 输入可获得停机。

在 RUN 输入端的脉冲一直存储到停机输入断开为止。

在上电或故障手动复位时或在一个停机命令之后，电机只能在 RUN 输入端已断开 (状态 0) 之后跟着一个新脉冲 (状态 1) 时才能上电。



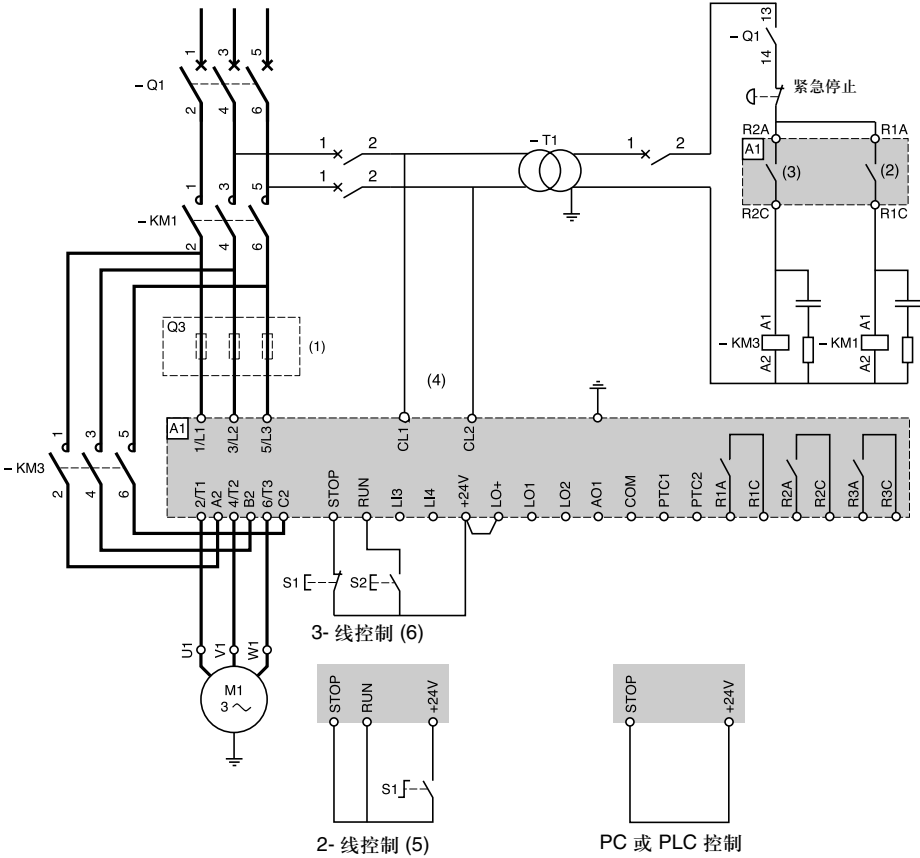
ATS 48: 不可逆，带有进线接触器，自由停车，协调 1 型



- (1) 安装用于协调 2 型的快速熔断器 (符合 IEC 60 947-4-2 标准)
- (2) 继电器 R1 定义: 隔离继电器 (ril)。见 27 页 “电气特性”。要了解触点的容量限制, 例如当与高额定值接触器连接时。
- (3) 如果电源电压与 ATS 48 所允许的控制电压不同, 则应添加一个变压器。见 27 页 “电气特性”。



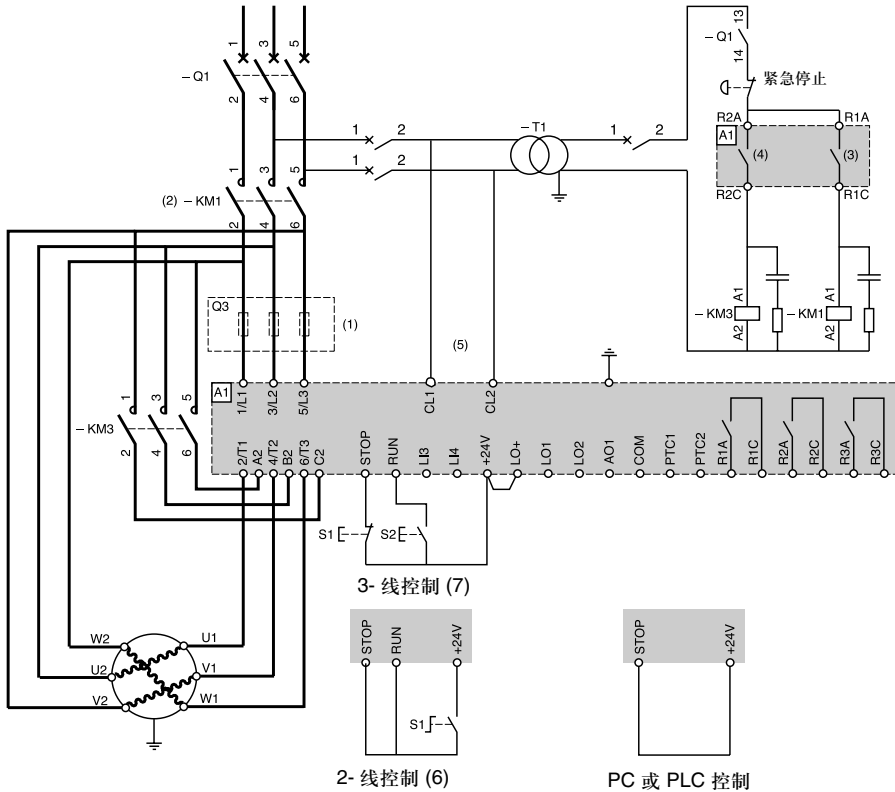
ATS 48: 不可逆，带有进线接触器，旁路，自由停车或可控停车，协调 1 型



- (1) 安装用于协调 2 型的快速熔断器 (符合 IEC 60 947-4-2 标准)
- (2) 继电器 R1 定义: 隔离继电器 (rl)。要了解触点的容量限制, 例如当与高额定值接触器连接时。见 27 页 “电气特性”。
- (3) 要了解触点的容量限制, 例如当与高额定值接触器连接时。见 27 页 “电气特性”。
- (4) 如果电源电压与 ATS 48 控制所允许的电压不同, 则应添加一个变压器。见 27 页 “电气特性”。
- (5) 见 28 页 “2- 线控制”。
- (6) 见 28 页 “3- 线控制”。



ATS 48: 不可逆, 自由停车或可控停车, 协调 1 型, 带有进线接触器, 旁路, 连接至电机中的三角形绕组, 仅适用于 ATS 48...Q



- (1) 安装用于协调 2 型的快速熔断器 (符合 IEC 60 947-4-2 标准)
- (2) 必须使用 KM1, 需要添加外部微分热保护装置。
- (3) 继电器 R1 定义: 隔离继电器 (ril)。要了解触点的容量限制, 例如当与高额定值接触器连接时。见 27 页 “电气特性”。
- (4) 要了解触点的容量限制, 例如当与高额定值接触器连接时。见 27 页 “电气特性”。
- (5) 如果电源电压与 ATS 48 控制所允许的电压不同, 则应添加一个变压器。见 27 页 “电气特性”。
- (6) 见 28 页 “2- 线控制”。
- (7) 见 28 页 “3- 线控制”。

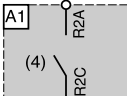


如果使用了旁路接触器, 则 “PHF” 故障检测仍然有效。

中文



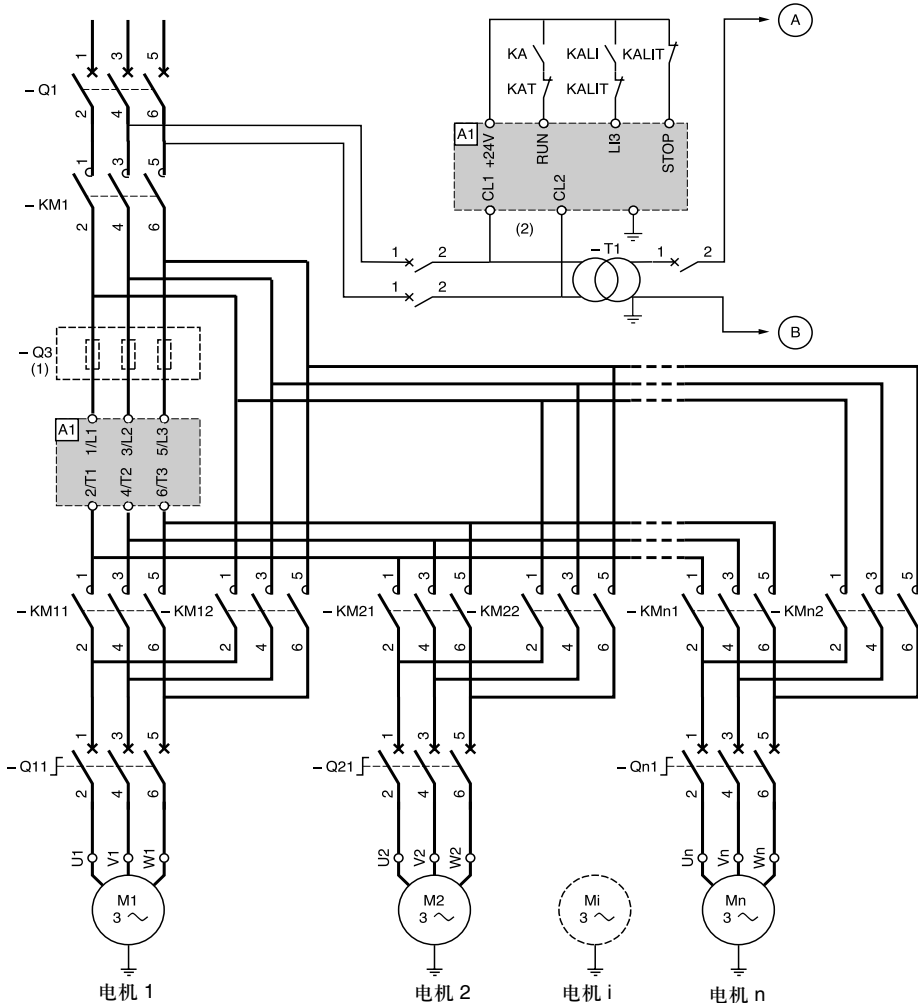
- (1) 在协调 2 型情况下安装快速熔断器 (符合 IEC 60 947-4-2 标准)
- (2) 如果电源电压与 ATS 48 控制所允许的电压不同, 则应添加一个变压器。见 27 页“电气特性”。
- (3) 应确保电机转动方向与两种速度均能对应。



- 32



ATS 48: 不可逆，带有进线接触器，用单个 Altistart 对级联的多个电机进行启动或减速

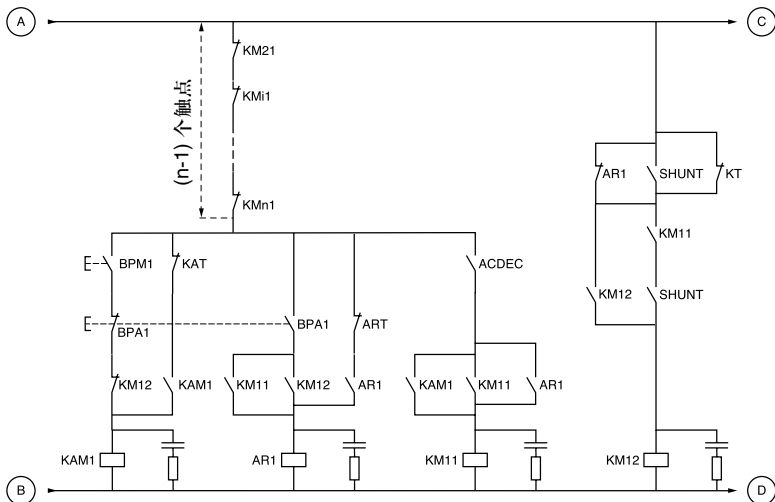


- (1) 协调 2 型情况下熔断器安装 (符合 IEC 60 947-4-2 标准)
- (2) 如果电源电压与 ATS 48 控制所允许的电压不同，则应添加一个变压器。见 27 页“电气特性”。

- 注：
- 在 ATS48 上必须配置一个“级联”逻辑输入 (LI3=LIC)。见 58 页“级联功能激活”。
 - 在出现故障时将不能够对当时正在运行的任何电机进行减速或制动。
 - 根据电机额定电流调整每个断路器 QN1 的热保护。

中文

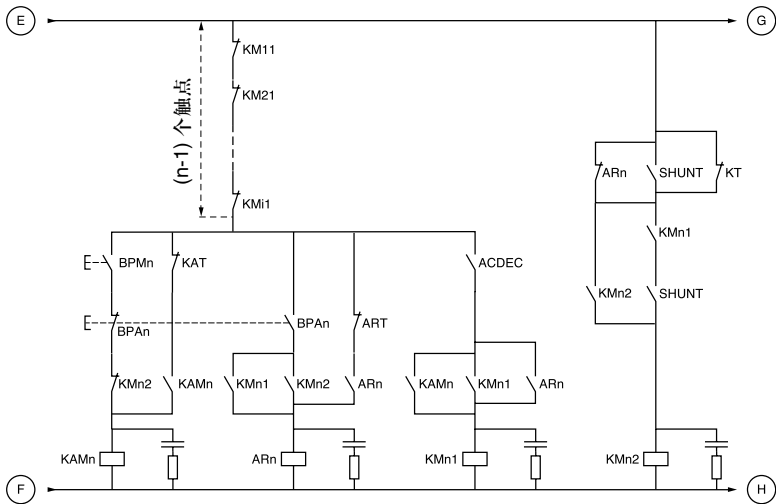
电机 1 控制

[illegible]

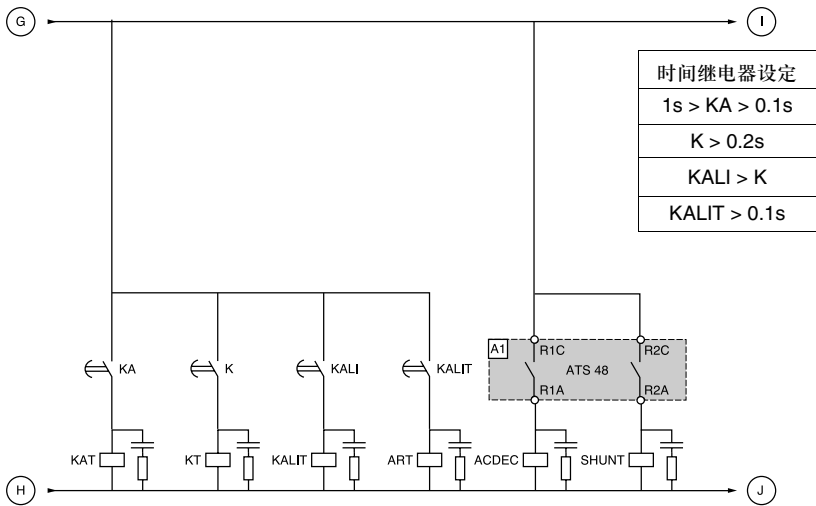
BPA1: 电机 1 “停止” 按钮
BPA2: 电机 2 “停止” 按钮

ATS 48: 不可逆，带有进线接触器，用单个 Altistart 对级联的多个电机进行启动或减速

电机 n 控制



级联控制



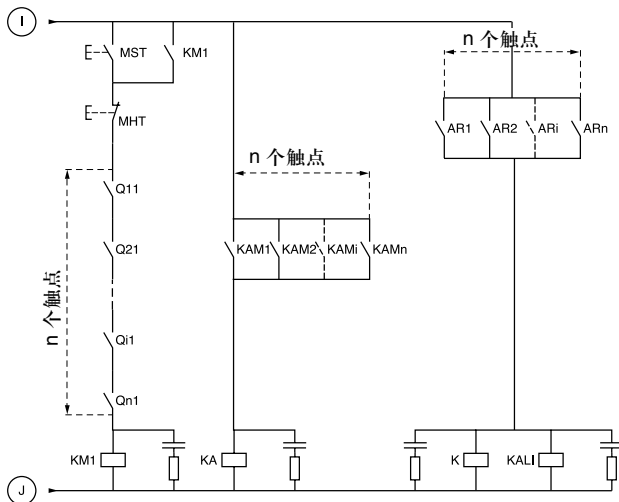
BPMn: 电机 n 的“启动”按钮
BPAn: 电机 n 的“停止”按钮

R1 必须配置为隔离继电器 (r1=rll)



连续 2 个停机命令需等待时间继电器 KALIT 延时的结束。

级联控制



MST: 总“起动”按钮
MHT: 总“停止”按钮

ATS 48: 不可逆, 带有进线接触器, 用单个 Altistart 对级联的多个电机进行启动或减速

完整操作顺序说明

按下 **MST** 启动按钮, **KM1** 线圈得电 (进线接触器), 主触头闭合

1 - 2 - 3

按 BPM1 启动电机 1。按 BPM2 启动电机 2, 按 BPMn 启动电机 n。

当按下 BPM1 时, KAM1 得电, 如 KM11 一样, 因为 ACDEC 被激活 (ATS48 由 MST 和 KM1 供电)。因为 KAM1 闭合, KA 得电。在一段可调的延时后 KAT 也会得电。

4 - 5

ATS48 在有 KA 和 KAT 吸合后, RUN 端子施加运行命令后将会启动电机。

KAM1 由于 KAT 常闭触点打开失电。

KM11 保持闭合。

6 - 7

在启动结束时, R2 在 ATS48 得电, SHUNT 闭合, KM12 被 SHUNT 闭合, 而 KM11 保持闭合。

8 - 9

在较短的一段时间之后, R2 在 R1 之后失电 (启动器旁路功能)。

由于 ACDEC 断开, KM11 断开。

电机继续由 KM12 供电。

ATS48 显示一个故障代码。

用同样的步骤启动下一个电机。启动电机 n 按下 BPMn, 按下 BPA_n 让电机 n 停机。各个电机可以以任何顺序启动和停止。

要使电机 1 停机, 按 **BPA1**, **AR1** 闭合

a - b - c - d

K 和 KALI 闭合。

ATS48 上的 LI 从 KALI 和 KALIT 上接收一个命令 (LI 必须调整至 LIC 值)。

ATS48 上 R1 和 R2 得电动作 (R2 为脉冲信号, R1 保持闭合直到电机完全停下来)。

e

KM11 闭合。

在一段可调的时延之后, KT 和 KALIT 得电。

f

ATS48 从 KALIT 接受一个停机指令。

g

KM12 失电。

ATS48 使电机减速。

h

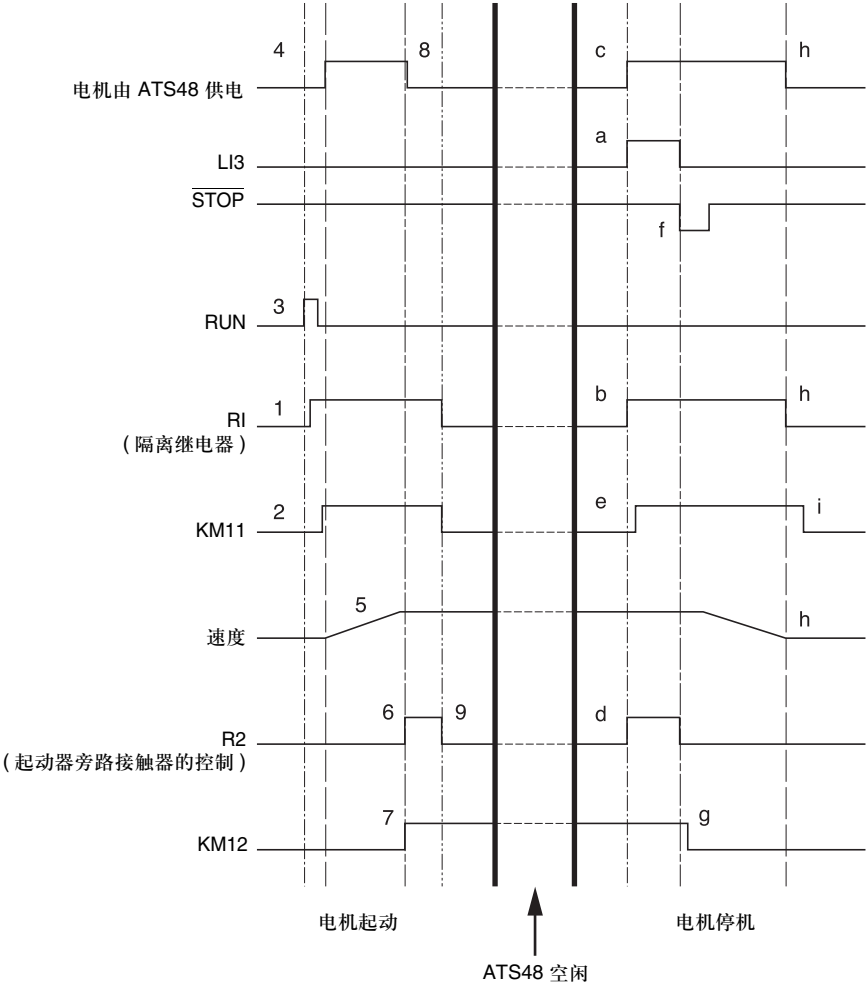
当电机完全停下来后 ATS48 上 R1 断开。

i

KM11 断开。

ATS48 可以对其他电机进行启动或停机。

ATS 48: 不可逆，带有进线接触器，用单个 **Altistart** 对级联的多个电机进行启动或减速
动作时序图



起动机热保护

通过安装在散热器上的 PTC 传感器和计算晶闸管的温升提供热保护。

电机热保护

起动机将根据受控制的额定电流 I_n 和实际吸收的电流持续地计算电机的温升。

温升可能由长时间或短时间的欠载或过载引起。下面几页上的脱扣曲线是基于起动电流 I_s 和电机电流 I_n (可调整的) 做出的。

IEC60947-4-2 标准定义了保护等级, 它给出了电机的无热故障起动能力 (热起动或冷起动)。对 COLD (冷) 状态 (对应于稳定的电机热状态, 断电) 和 WARM (热) 状态 (对应于一个稳定的电机热状态, 在额定功率下) 给出了不同的保护等级。

起动机出厂设置为 10 级保护。
可以使用 PrO 菜单修改保护等级。

起动机显示的热保护对应于加热时间常数 (iron time constant)。

- 如果电机超过了其额定温升阈值 (电机热状态 =110%) 则激活过载报警。
- 如果超过了临界温升阈值 (电机热状态 =125%) 热故障将使电机停机。

在出现起动延长时, 即使显示的值低于脱扣值起动机也能由故障或热报警脱扣。

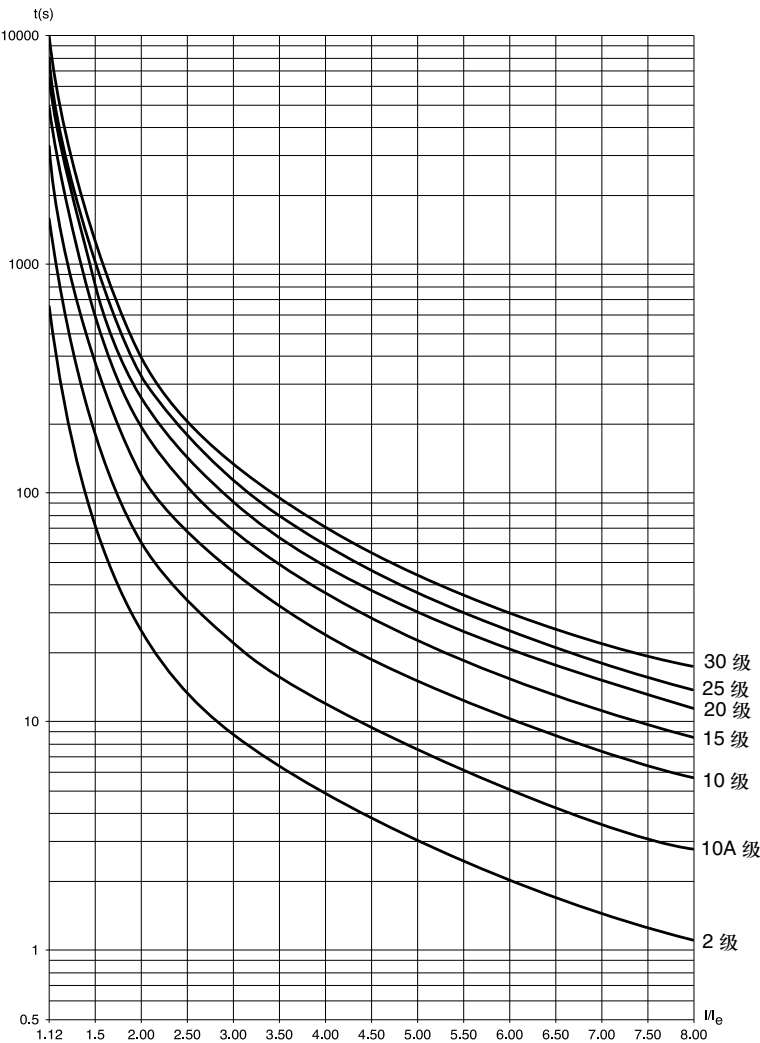
如果没有禁止热保护, 则热故障可以由继电器 R1 指示。

在电机已经停机或起动机已被断电后, 即使控制电路断电也仍然会计算热状态。Altistart 热控制系统可以防止在电机温升过高的情况下重新启动电机。

如果使用特殊的电机 (防火、水下的等等), 则应由 PTC 传感器提供热保护。

电机热保护

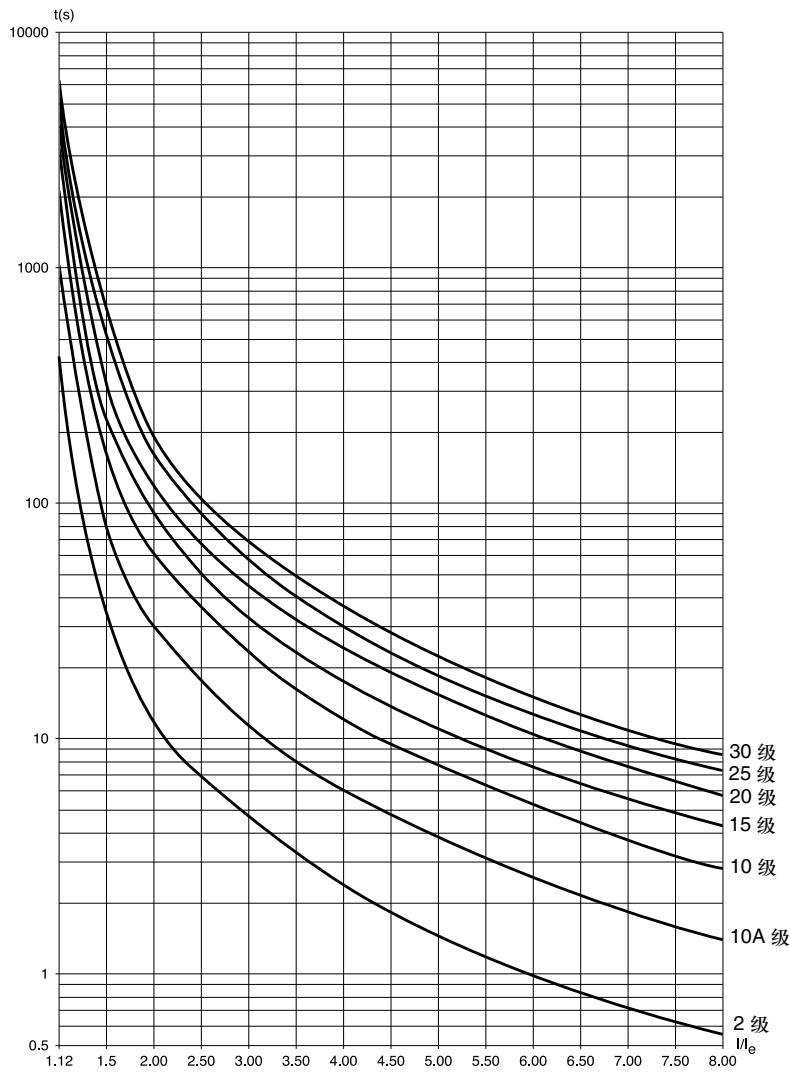
冷态曲线



标准应用 (10 级) 的脱扣时间		重载应用 (20 级) 的脱扣时间	
3In	5In	3.5In	5In
46s	15s	63s	29s

电机热保护

热态曲线



标准应用 (10 级) 的脱扣时间		重载应用 (20 级) 的脱扣时间	
3In	5In	3.5In	5In
23s	7.5s	32s	15s

使用 PTC 传感器的电机热保护

集成在电机中用以测量其温度的 PTC 传感器可以连接到控制卡端口上，这个模拟值由起动器进行管理。

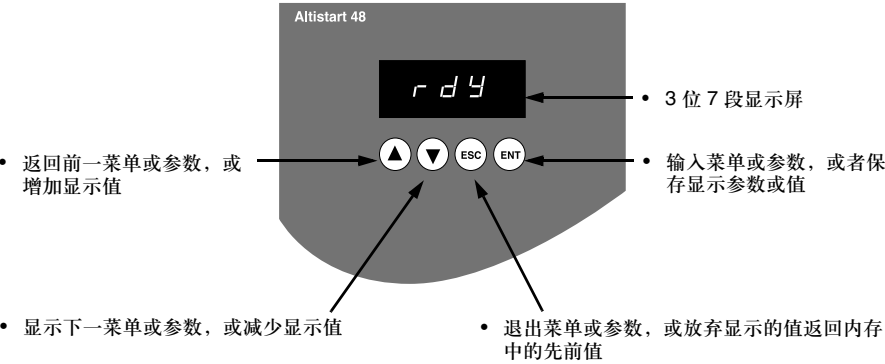
“PTC probe thermal overshoot” (PTC 传感器热过冲) 参数值可通过两种方式进行处理和使用：

- 如果该信号有效，出现故障时停机
- 如果该信号有效，给出报警。该报警可以显示在起动器状态字 (串口) 中或可配置逻辑输出

注意：

PTC 传感器保护不会禁止通过计算给出的电机热保护。两种类型的保护可以并行工作。

按键及显示屏的功能



按  或  不会存储所作的选择。

存储，保存显示的选项：

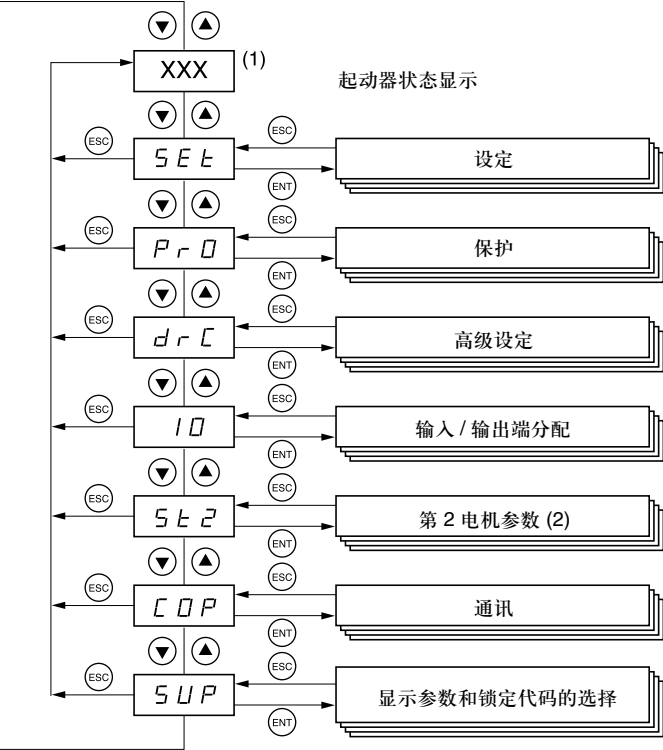
存储某一值时显示屏将会闪烁。

显示规则

根据参数的最大范围及其值，数字的显示原则有所不同。

- 最大范围 9990:
 - 0.1 至 99.9 的值 (如 : 05.5 = 5.5; 55.0 = 55; 55.5 = 55.5)
 - 100 至 999 的值 (如 : 555 = 555)
 - 1000 至 9990 的值 (如 : 5.55 = 5550)
- 最大范围 99900:
 - 1 至 999 的值 (如 : 005 = 5; 055 = 55; 550 = 550)
 - 1000 至 9990 的值 (如 : 5.55 = 5550)
 - 10000 至 99900 的值 (如 : 55.5 = 55500)

访问菜单



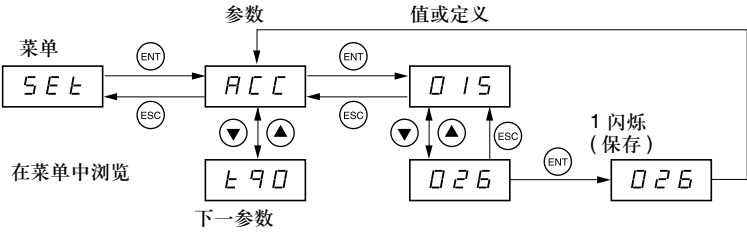
- (1) 对显示值 “XXX” 的处理在下页表中给出。
- (2) 菜单 St2 仅当配置了 “second set of motor parameters” (第 2 组电机参数) 功能时才可见。

访问参数

存储，保存显示的选项：(ENT)

存储某一值时显示屏将会闪烁。

例：



起动器状态显示

显示器 “XXX” 遵循以下规则：

显示值	状态
故障代码	起动器故障
nLP rdY	起动器没有运行命令且： • 未通电 • 通电
tbS	未经过起动延时
HEA	电机正在加热
用户选择的检测参数 (SUP 菜单)。出厂设定：电机 电流	起动器有运行命令
brL	起动器制动
Stb	在级联模式下等待命令 (RUN 或 STOP)

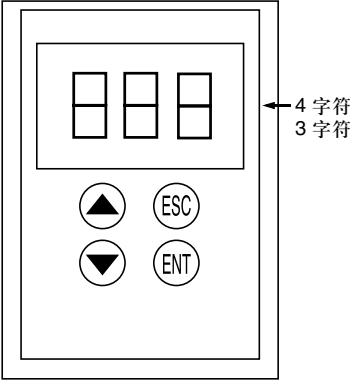
当电流限制用于起动器时，显示的值 “XXX” 将闪烁。

即使起动器上出现故障时仍然可以对参数进行修改。

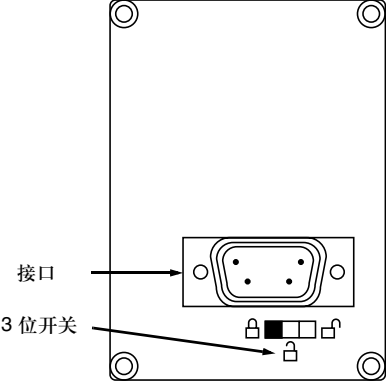
远程操作盘选件

VW3 G48101 远程操作盘可以安装在壁挂式或落地式安装的封装门上，带有密封条能够提供 IP 65 防护。它有一条 3m 长的带接头的电缆，通过起动器上的 RJ45/Modbus 接口进行通讯 (见端子附带的手册)。它具有与 Altistart 48 相同的显示屏和编程按钮，另外还添加了一个菜单访问锁定开关。

前面板视图：



后面板视图：

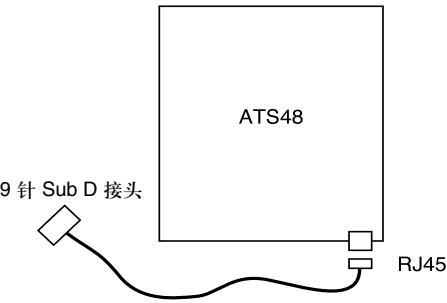


远程操作盘开关的控制

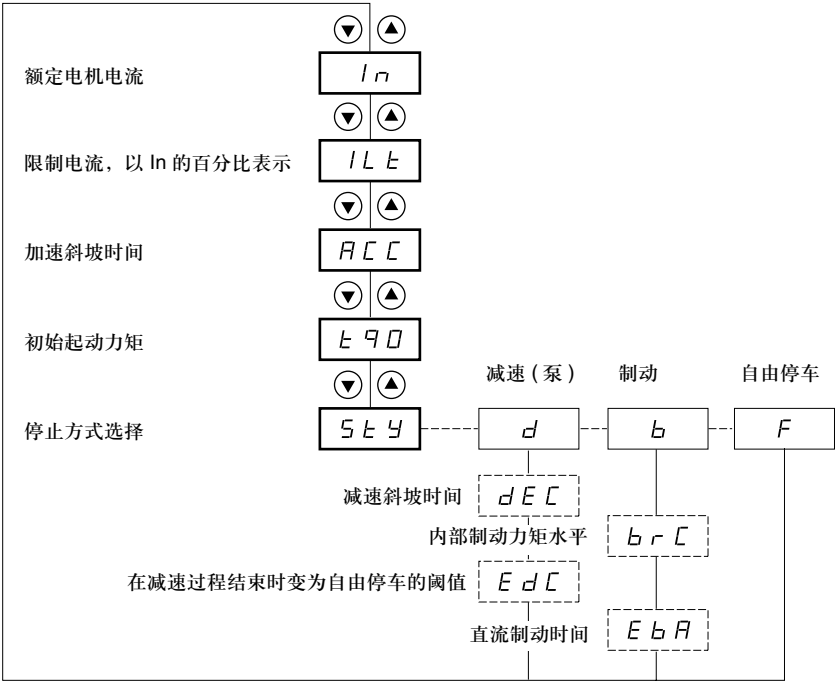
操作盘上的 3 位置开关应按如下原则使用：

- 锁定位置 ：只有检测参数可以访问。当起动器正在运行时，不能选择显示不同的参数。
- 部分锁定位置 ：对 SEt, PrO 和 SUP 菜单参数进行有限的访问。
- 解锁位置 ：所有参数均可访问。

任何有远程操作盘开关施加给起动器的显示限制在起动器已断开连接甚至以关机后仍然起作用。



设定菜单 (Set)

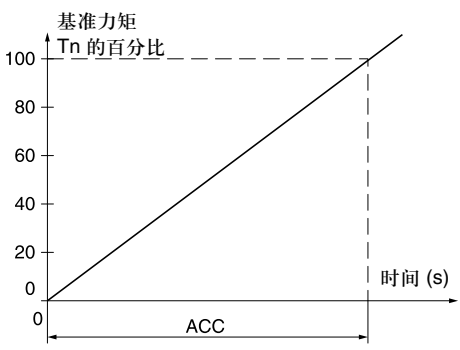


- 菜单中的参数
- 可选择
- 根据选择的参数出现

要访问参数，参见 44 页。

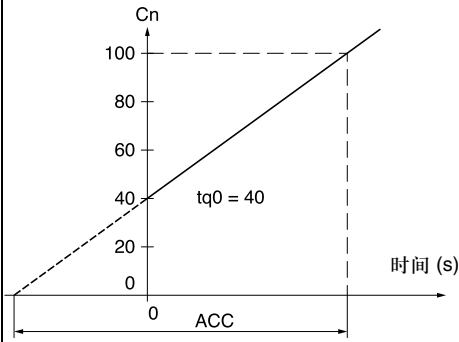
设定菜单 (Set)

这些设定参数只能在电机停机后进行修改。

代码	说明	设定范围	出厂设定
I_n	电机额定电流	0.4 至 1.3ICL	(1)
	调整铭牌上指示的电机额定电流值，即使起动器已与电机按三角形接法连接 (PrO 菜单中的 dLt)。确认该电流在 0.4 到 1.3ICL 之间 (ICL: 起动器额定值)。		
ILt	限制电流	I_n 的 150 至 700%，限定在 ICL 的 500%	I_n 的 400%
	限制电流 ILt 以 ICL 的百分比表示。 限制在 ICL (起动器额定值，见 12 页 “起动器 - 电机组合”) 的 500% 以内。 限制电流 = $ILt \times I_n$ 。 例 1: $I_n=22A$ ， $ILt=300\%$ ，则限制电流 = $300\% \times 22A=66A$ 例 2: ATS 48C21Q，其 ICL=210A $I_n=195A$ ， $ILt=700\%$ ，限制电流 = $700\% \times 195=1365$ ， 最高限制为 $500\% \times 210=1050A$		
ACC	加速斜坡时间	1 至 60s	15s
	下图为起动器力矩在 0 到额定力矩 T_n 之间的上升时间，即加速过程中力矩斜坡的梯度。 		

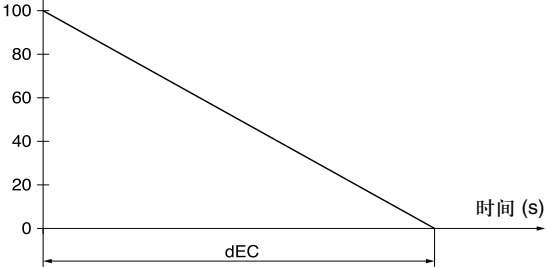
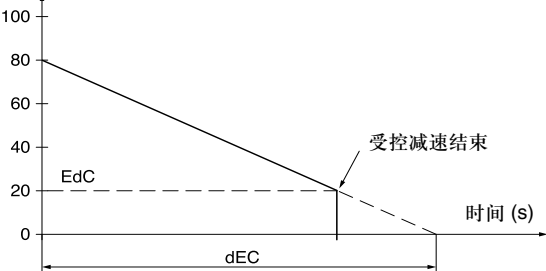
(1) I_n 的出厂设定对应于一个带 10 级保护的 4 极 400V 标准化电机的通常值 (对于 ATS 48***Q)。
 I_n 的出厂设定对应于一个符合 NEC 标准、带 10 级保护的 4 极 460V 标准化电机的通常值 (对于 ATS 48***Y)。

设定菜单 (Set)

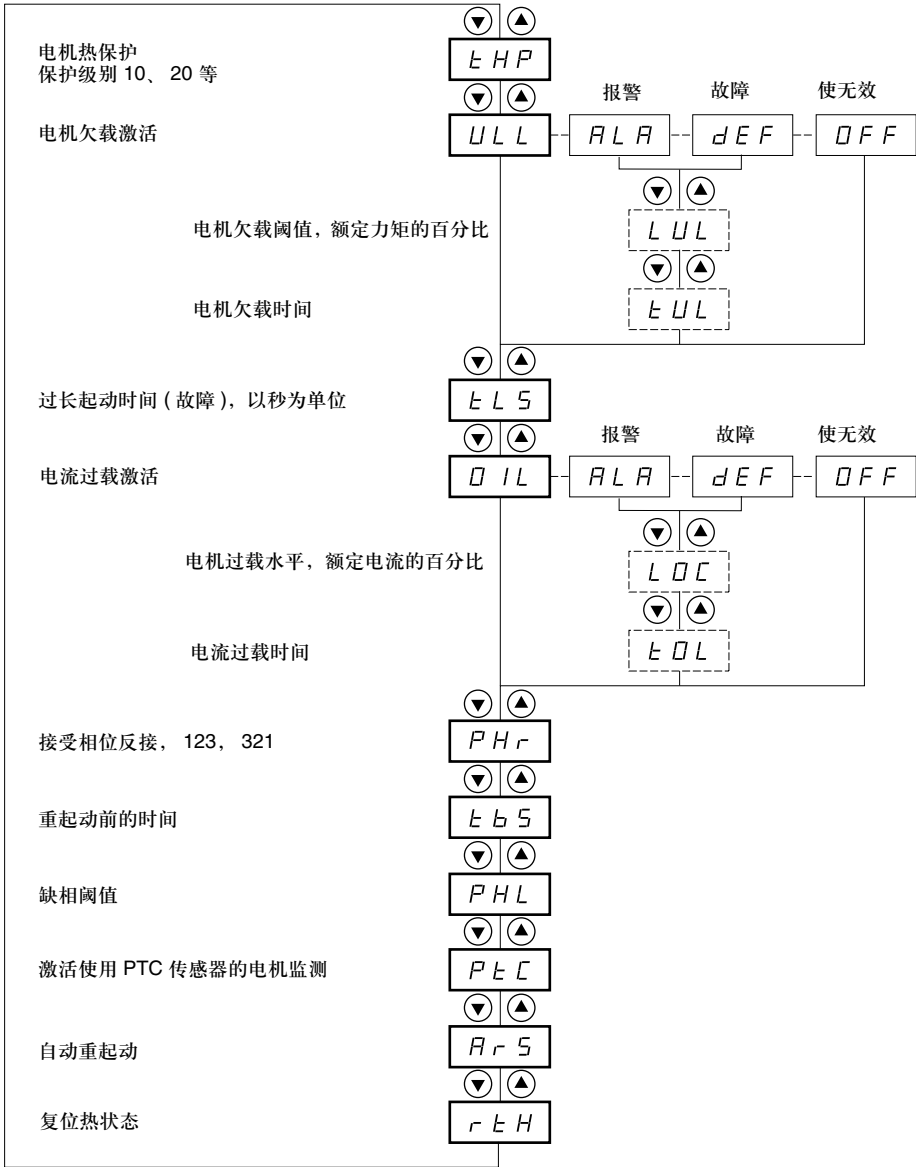
代码	说明	设定范围	出厂设定
t q 0	初始起动力矩	Tn 的 0 至 100%	20%
	起动过程中的初始力矩设定，在额定力矩的 0 到 100% 之间变动。 		
St y	停机类型选择	d-b-F	-F-
	可以使用 3 种类型的停机方式： - d -: 通过控制力矩的软停机。起动器对电机施加一个力矩以使其按斜坡逐渐减速，避免快速停止。这类停止方式能够降低水锤效应的作用。 - b -: 动态制动停机：如果存在相当大的惯性，则起动器在电机中产生一个制动力矩，以此使电机减速。 - F -: 自由停车：起动器不向电机施加力矩。 如果起动器连接至“电机三角形绕组”，则只允许 F 型停机。		

设定菜单 (Set)

中文

代码	说明	设定范围	出厂设定
dEC	减速斜坡时间 此参数只在 StY=-d- 才能被访问。 可用于设定一段 1 至 60s 的时间，以便从估算的力矩转换为零力矩 (= 当使用 -d- 类停机时，减速过程中力矩斜坡的梯度) 它通过改变力矩基准的梯度改变了减速过程，避免了泵应用中的液体冲击。 估计力矩，额定力矩的百分比  The graph shows a coordinate system with '时间 (s)' (Time (s)) on the x-axis and '估计力矩，额定力矩的百分比' (Estimated torque, percentage of rated torque) on the y-axis. The y-axis has markings at 0, 20, 40, 60, 80, and 100. A solid line starts at (0, 100) and decreases linearly to (dEC, 0). A horizontal dimension line below the x-axis indicates the duration dEC.	1 至 60s	15s
EdC	在减速过程未变为自由停车模式的阈值 此参数只在 StY=-d- 且高级设定菜单 (drC) 中的 CLP 参数仍设置为出厂设定 (On) 时才能被访问。 可用于在减速过程开始时估算力矩的 0 到 100% 之间设定最终的力矩水平。 在泵的应用中，减速控制不一定低于由 Edc 设置的负载水平。 如果在减速开始时估算的力矩低于 20，即额定力矩的 20%，则不会激活受控减速，电机将会转为自由停车模式。 估算的力矩，为额定力矩的百分比  The graph shows a coordinate system with '时间 (s)' (Time (s)) on the x-axis and '估算的力矩，为额定力矩的百分比' (Estimated torque, percentage of rated torque) on the y-axis. The y-axis has markings at 0, 20, 40, 60, 80, and 100. A solid line starts at (0, 80) and decreases linearly. A horizontal dashed line is drawn at y=20, labeled 'EdC'. The solid line crosses this dashed line at a point labeled '受控减速结束' (Controlled deceleration ends). A vertical line drops from this intersection point to the x-axis. A horizontal dimension line below the x-axis indicates the duration dEC from t=0 to this point.	0 至 100%	20%

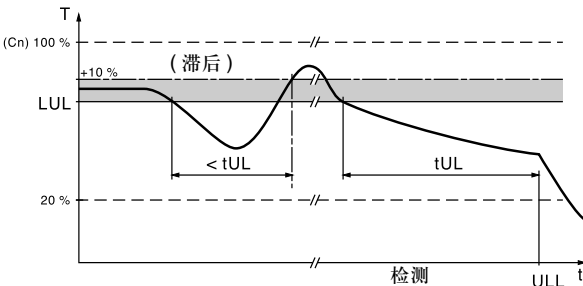
代码	说明	设定范围	出厂设定
brC	内部制动力矩水平 此参数只在 StY=-b- 时才能被访问。 对于 -b- 类停机，用于调整制动强度。 制动在额定速度的 20% 以下有效。通过调整电机中直流电流的注入时间（在两相之间）对电机的停机进行配置。参见下一参数 EbA。 直流电流注入时间：$T2 = T1 \times EbA$ 注意：时间 T1 不由 brC 决定。T1 是电机速度从额定值的 100% 降至 20% 所需的时间，以秒为单位（取决于电机和应用场合的特性）。	0 至 100%	50%
EbA	直流制动时间 此参数只在 StY=-b- 时才能被访问。 对于 -b- 类停机，调整制动过程末的电流注入时间。 可用于调整电流注入时间。 可设置为动态制动时间 (T1) 的 20 至 100%。 例如： 动态制动 = 10s (T1) 停机时间可从 2 到 10 秒变化 (T2) EbA=20 对应于 2s 的注入时间 EbA=100 对应于 10s 的注入时间 出厂设定：20	20 至 100%	20%



- 菜单中的参数
- 可选择
- 根据选择出现的参数

要访问这些参数，参见 44 页。

这些设定参数只能在电机停机后进行修改。

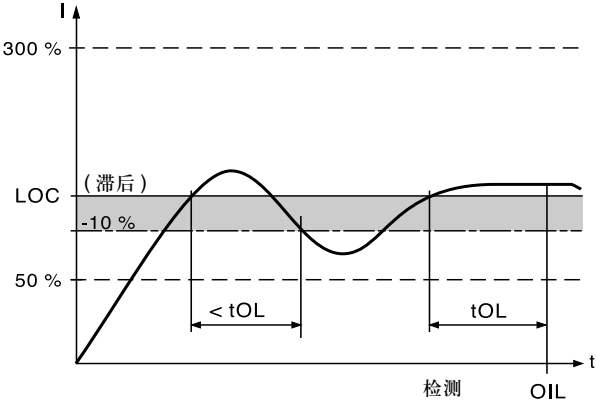
代码	说明	设定范围	出厂设定
<i>tHP</i>	电机热保护		10
	见 39 页 “热保护”。 30: 30 级 25: 25 级 20: 20 级 (重载应用) 15: 15 级 10: 10 级 (标准应用) 10A: 10A 级 2: 2 子级 OFF: 无保护		
<i>ULL</i>	电机欠载激活		OFF
	如果电机电矩低于一个可调的阈值 LUL 且持续时间超过可调整的值 tUL: - ALA: 报警激活 (内部和可配置逻辑输出) - dEF: 起动器被锁定, 显示 ULF 故障 - OFF: 无保护		
			
<i>LUL</i>	电机欠载阈值	Tn 的 20% 至 100%	60%
	如果 ULL=OFF 则此参数不可用。 LUL 可以设置为电机额定力矩 20% 到 100% 之间的值。		
<i>tUL</i>	电机欠载时间	1 至 60s	60s
	如果 ULL=OFF 则此参数不可用。 一旦电机电矩降至阈值 LUL 以下时间继电器 tUL 会立即激活。当力矩升高到比此阈值 LUL 高 +10% (滞后作用) 时它将被重置为 0。		
<i>tLS</i>	超长起动时间	10 至 999s 或 OFF	OFF
	如果起动时间超过了 tLS 的值, 则起动器会被锁定并显示故障 StF。起动结束的条件为: 施加在电机上的线电压 (最小触发角) 和电机电流低于 1.3In。 - OFF: 无保护		



检测报警 (ALA) 配置只能提示存在故障但不能直接对设备进行保护。

保护菜单 (PrO)

中文

代码	说明	设定范围	出厂设定
Oil	电流过载激活 功能仅在稳定状态下有效。 如果电机电流超过一个可调的阈值 LOC 且持续时间超过可调整的时间值 tOL: - ALA: 报警激活 (内部和可配置逻辑输出端) - dEF: 起动器被锁定, 显示 OLC 故障 - OFF: 无保护		OFF
			
LOC	电流过载阈值	In 的 50% 至 300%	80%
	如果 OIL=OFF, 则此参数不可用。 LOC 可以在电机额定电流的 50% 到 300% 之间进行设定。		
tOL	电流过载时间	0.1 至 60s	10s
	如果 OIL=OFF, 则此参数不可用。 一旦电机电流升至阈值 LOC 以上时间继电器 tOL 会立即激活。当电流降低到比此阈值 LOC 至少低 10% (滞后作用) 时它将被重置为 0。		



检测报警 (ALA) 的出厂配置只能提示存在故障但不能直接对设备进行保护。

保护菜单 (PrO)

代码	说明	设定范围	出厂设定
PHr	防止线路相序颠倒	321 或 123 或无	无
	如果相线顺序与配置不同，起动器将锁定并显示故障 PIF。 - 321: 反转 (L3-L2-L1) - 123: 正转 (L1-L2-L3) - no: 无检测		
tbS	起动前的时间	0 至 999 s	2s
	避免电机过热的快速连续起动。当电机转为自由停机模式时时间继电器起动。 在 2 线控制中，如果 RUN 命令输入仍然有效则电机在延时之后重新起动。 在 3 线控制中，如果发送了一个新的 RUN 命令（上升沿）则电机在延时之后会重新起动。 在延时过程中起动器显示“tbS”。		
PHL	缺相阈值	5 至 10%	10%
	如果电机某一相中的电流降至此阈值以下并持续 0.5s 或全部三相中电流全部降至此阈值以下持续 0.2s，则起动器将锁定，并显示故障 PHF。 可以被设置为起动器额定值 ICL 的 5% 到 10% 之间的值。		
PtC	激活使用 PTC 传感器的电机监测		OFF
	电机上的 PTC 传感器必须连接到正确的逻辑输入端上。此保护与计算所得热保护 (tHP 参数) 独立。两种保护可以同时使用。 - ALA: 报警激活（内部位和可配置逻辑输出端） - dEF: 起动器被锁定，显示 OtF 故障 - OFF: 无保护		
RrS	自动重起动	On - OFF	OFF
	在由于故障锁定之后，如果故障已消失且其他的运行条件允许重新启动，则将进行一系列起动器重起动尝试，每次间隔为 60s。如果在 6 次尝试之后还没有成功，则此过程将被放弃，起动器保持在锁定状态，直至关机后重新开机或手动复位（见“故障 - 原因 - 处理方法”）。下列故障时此功能有效：PHF、FrF、CLF、USF。如果此功能有效则起动器故障继电器将保持激活。运行命令必须保持。 此功能只能用于 2 线控制中。 - OFF: 功能无效 - On: 功能有效  确认偶然起动不会对人员或设备造成任何危险。		
r t H	复位由起动器计算的电机热状态	no - YES	no
	- no: 功能无效 - YES: 功能有效		



检测报警 (ALA) 的出厂配置只能提示存在故障但不能直接对设备进行保护。

高级设定菜单 (drC)

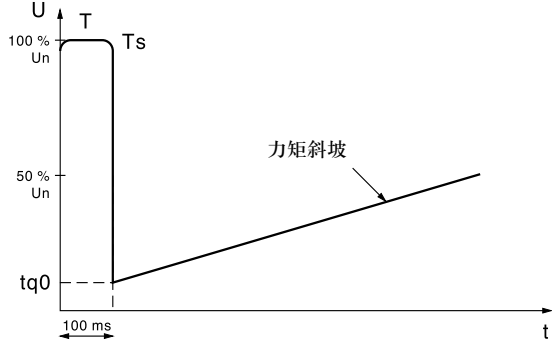
中文

力矩限制，为额定值的百分比	▼▲ ELI
电压升高水平	▼▲ bSt
起动机三角形连接	▼▲ dLt
小型电机测试	▼▲ SSt
力矩控制	▼▲ CLP
定子损耗补偿	▼▲ LSL
减速增益	▼▲ tIG
激活级联功能	▼▲ CSL
线电压 (以 kW 计算 P)	▼▲ ULLn
线路频率	▼▲ FrL
清零 kWh 或运行时间	▼▲ rPr
返回出厂设定	▼▲ FLS

菜单中的参数

高级设定菜单 (drC)

高级设定参数 (Advanced setting parameters) 只能在电机停机时进行修改。

代码	说明	设定范围	出厂设定
tLl	力矩限制	10 至 200% 或 OFF	OFF
	可用于限制力矩给定以避免在高惯性应用场合中的再生能量现象。如果 $tq0=tLl$ 则可用于恒力矩启动。 - OFF: 无限制 - 10 至 200: 按额定力矩百分比设定的限定值		
bSt	电压升高水平	50 至 100% 或 OFF	OFF
	当一个运行命令存在达到 100ms 时即可以施加一个可调整的电压。当这段时间结束后，起动器将按照一个标准的加速斜坡启动，以初始力矩设定值 ($tq0$) 开始。 此功能可用于避免任何“启动”力矩（由于停止时的摩擦或机械间隙造成的现象）。 - OFF: 功能无效 - 50 至 100: 为电机额定电压的一个百分比   在超过起动器额定值的情况下 (电机 $Im > ATS48 Im$)，参数 bSt 的过高值将会导致起动器出现 OCF 脱扣。		
dLt	起动器按三角形接法连接	on - OFF	OFF
	此配置允许起动器额定功率值增加至 1.7 倍，但不允许制动或减速。 - OFF: 额定线力矩 - On: 电机按三角形接法连接 电机额定电流 ln 与电机铭牌上标注的一样，且显示的电流值对应于电源的线电流。 额定电流值 ln (Set 菜单) 与电机铭牌上三角形连接的标注值相同。起动器将自行进行转换以控制绕组中的电流。 该参数只能用于 ATS 48...Q 起动器。  • 使用此功能时，只能进行自由停车 • 不能使用级联功能 • 不能进行预热		

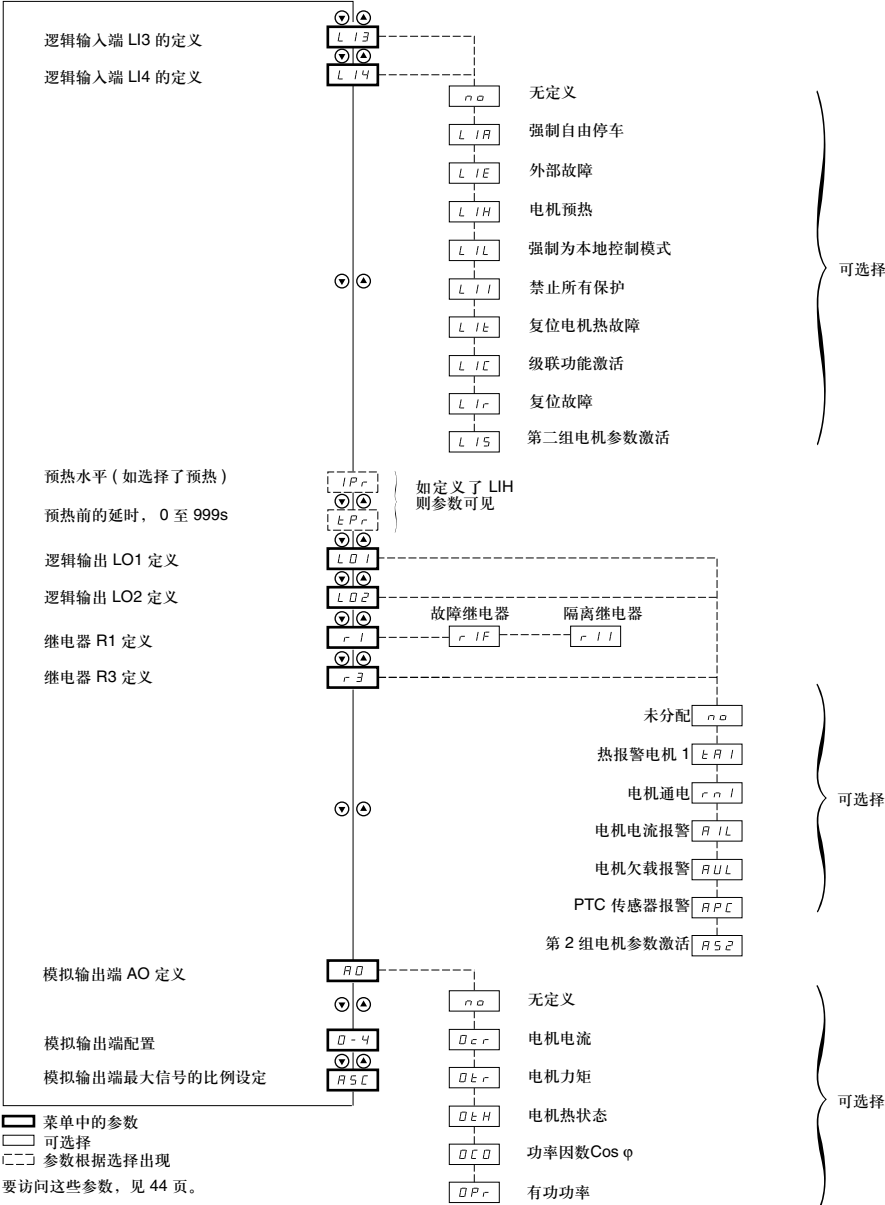
高级设定菜单 (drC)

中文

代码	说明	设定范围	出厂设定
55E	小型电机测试	On - OFF	OFF
	要在测试或维护环境中对起动器进行检查，使用功率远小于起动器额定值的电机（特别是对于大功率的起动器）。 力矩控制参数 CLP 自动无效。 - OFF: 功能无效 - On: 功能有效 控制电压一断开 SS1 即返回 OFF 状态。在下次一次起动时，PHF 故障和 CLP 参数将会返回其初始配置。		
CLP	力矩控制（控制类型）	On - OFF	On
	- OFF: 功能无效 - On: 功能有效 在 On 位置，起动和减速按照力矩斜坡进行。 在 OFF 位置，起动和减速由电压的变化进行控制。 对于多个电机并接在一个起动器上，或电机功率相对于起动器额定值非常小（用小型号电机测试起动器）的情况，建议使用电压控制（CLP=OFF）。		
L5C	定子损耗补偿	0 至 90%	50%
	参数在加速阶段（或当 StY=-d- 时的减速阶段）有效。 在出现力矩振荡的情况下，应逐步降低这个参数的值，直至设备正常运行为止。 在起动器与电机按三角形接法连接或滑差率大的电机中振荡是最常见的现象。		
tIG	减速增益（用于力矩控制）	10 至 50%	40%
	此参数仅在 CLP=On 或 StY 参数 (Set 设定菜单) =-d- 时才访问。 可用于消除减速过程中的不稳定性。 应根据振荡情况调整这一参数。		
C5C	级联功能激活	On - OFF	OFF
	见 38 页 - On: 功能有效 - OFF: 功能无效 仅当继电器 R1 已事先定义为“隔离继电器”功能，或未配置“强制自由停车”、“起动器三角形接法”以及“预热”功能时可以访问此参数。 定义一个输入端 LI=LIC。 最多 255 个电机。		
ULn	线电压	170 至 460V (ATS48***Q) 180 至 790V (ATS48***Y)	400V (ATS48***Q) 690V (ATS48***Y)
	此参数用于计算显示的功率 (SUP 菜单中的 LPr 和 LAP 参数)。此显示仅当该参数已被正确设置时才准确。		

高级设定菜单 (drC)

代码	说明	调整范围	出厂设定
FrC	线路频率	50-60-AUt	AUt
	- 50: 50Hz (频率故障 FrF 检测容许偏差 = ± 20%)。 - 60: 60Hz (频率故障 FrF 检测容许偏差 = ± 20%)。 - AUt: 由起动机自动识别线路频率，频率故障检测容许偏差 FrF= ± 5%。 如果由发电机组提供电源，因其具有较高的频率检测允许偏差，建议选择 50Hz 或 60Hz。		
rPr	清零 kWh 或运行时间	no-APH-trE	no
	- no: 功能无效 - APH: kWh 复位为零 - trE: 运行时间复位为零 清零命令必须使用 ENT 进行确认。APH 和 trE 立即有效。之后此参数自动返回 no 值。		
FL5	返回出厂设定	no-YES	no
	用于将所有的参数返回其出厂设定。 - no: 功能无效 - YES: 功能有效，必须被按下并保持一段时间 (大约 2s) 以便有效。显示屏会闪烁以示确认。之后按下 ESC 键可自动将 FCS 参数重置为 no。 此参数不能通过远程操作盘进行修改。		



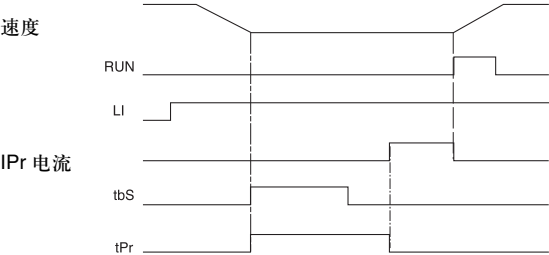
注意:

逻辑输入 RUN: 不能分配

逻辑输入 STOP: 不能分配

起动机旁路接触器控制: 不能分配 (R2)

I/O 参数只能在电机停机时进行修改。

代码	说明	设定范围	出厂设定
L 13 L 14	逻辑输入		LIA LIL
如果输入端已通电，则所选功能有效。 - no: 未定义 - LIA: 一旦接收到一个 STOP 命令即进行强制自由停车。如果 drC 菜单中的 CSC 参数设为“ON”则此选项不会出现。它将强制使用自由停车，但不会对停车进行控制。 - LIE: 外部故障。允许起动器检测外部用户故障（水位、压力等）。电机进行自动停车且起动器显示 EtF。 - LIH: (1) 电机预热。如果 drC 菜单中的 CSC 参数设为“ON”则此选项不会出现。用于防止电机结冰或可能导致冷凝的温度漂移。如果此输入有效，则当电机停机并经过一段可调整的延时之后，将会有有一个可调整的电流 IPr 通入电机。该电流对电机进行加热但不会使其转动。IPr 和 tbr 必须进行调整（见下图）。  速度 RUN LI IPr 电流 tbS tPr 当该输入端激活且电机已停机、且已经过延时 tPr 和 tbS 后，预热开始。如果该输入被禁止、发送了运行命令或激活了 STOP 输入端，则预热停止。 - LIL: 强制为本地控制模式。如果使用了串口，则从线路模式（通过串口控制）转为本地模式（通过终端控制）。 - LII: (1) 禁止所有保护。警告：这类应用将使起动器质保失效。用于在紧急情况下对起动器进行控制（例如烟雾抽取系统）。 - LIi: 重置电机热故障 - LIC: 级联功能激活。在这种情况下电机热保护被禁止且继电器 R1 必须配置为隔离继电器。可用于单个起动器对若干相同电机的顺次起动和减速（见应用接线图）。 - LIr: 复位可以被复位的故障 - LIS: 第 2 组电机参数激活。用于对两台不同的电机逐个进行起动和减速，或用单个起动器对一台电机进行两种不同配置的起动或减速。			

(1) 为使此定义生效，ENT 必须按下 10s（显示屏闪烁以示确认）。
此参数不能通过远程操作盘进行修改。

I/O 菜单 (IO)

代码	说明	设定范围	出厂设定
IPr	预热水平	0 至 100%	0%
	此参数在 LI3 或 LI4 已被定义为 LIH 功能：电机预热之后出现。它可用于设置预热电流。使用真值电流表来设定电流水平。 参数 In 对电流 IPr 没有影响。		
	EPPr 预热前延时	0 至 999s	5s
LO1 LO2	此参数在 LI3 或 LI4 已被定义为 LIH 功能：电机预热之后出现。当该输入端激活且已经历延时 tPr 和 tbS (PrO 菜单) 后预热开始。		
	逻辑输出		tAl rnl
	- no: 无定义。 - tAl: 电机热报警。见 39 页。 - rnl: 电机上电 (提示电机中可能有电流)。 - AIL: 电机电流报警 (超出 PrO 菜单中的阈值 OIL 和时间 tOL)。见 “仅在稳定状态下有效的功能”，54 页。 - AUL: 电机欠载报警 (超出了 PrO 菜单中的阈值 LUL 和时间 tUL)。见 53 页。 - APC: 电机 PTC 传感器报警。见 “激活使用 PTC 传感器的电机检测”，55 页。 - AS2: 第 2 组电机参数已激活。见 LIS “逻辑输入”，61 页。		
r1	继电器 R1		rIF
	- r1F: 故障继电器。起动机通电时继电器 R1 被激活 (最小 CL1/CL2 控制)。当出现故障及电机转为自由停车模式时继电器 R1 被置为无效。参见当自动重起动机功能被激活时的特殊情况以及 “故障 - 原因 - 处理方法”。 - r1I: 隔离继电器。继电器 R1 设计用来以 RUN 和 STOP 命令为基础控制线接触器并提示故障。继电器 R1 由 RUN 命令激活 (或一个预热命令)。在制动或减速结束或当电机在 STOP 命令之后转为自由停车模式时被置为无效。当出现故障时同样无效。电机在此时转换为自由停车模式。		
	r3 继电器 R3		rnl
	- no: 未定义。 - tAl: 电机热报警。见 39 页。 - rnl: 电机通电 (指示电机中可能有电流)。 - AIL: 电机电流报警 (超出了 PrO 菜单中的阈值 OIL 和时间 tOL)。见 “仅在稳定状态下有效的功能”，54 页。 - AUL: 电机欠载报警 (超出了 PrO 菜单中的阈值 LUL 和时间 tUL)。见 53 页。 - APC: 电机 PTC 传感器报警。见 “激活使用 PTC 传感器的电机检测”，55 页。 - AS2: 第 2 组电机参数已激活。见 LIS “逻辑输入”，61 页。		

起动结束继电器 R2 (不能被定义)

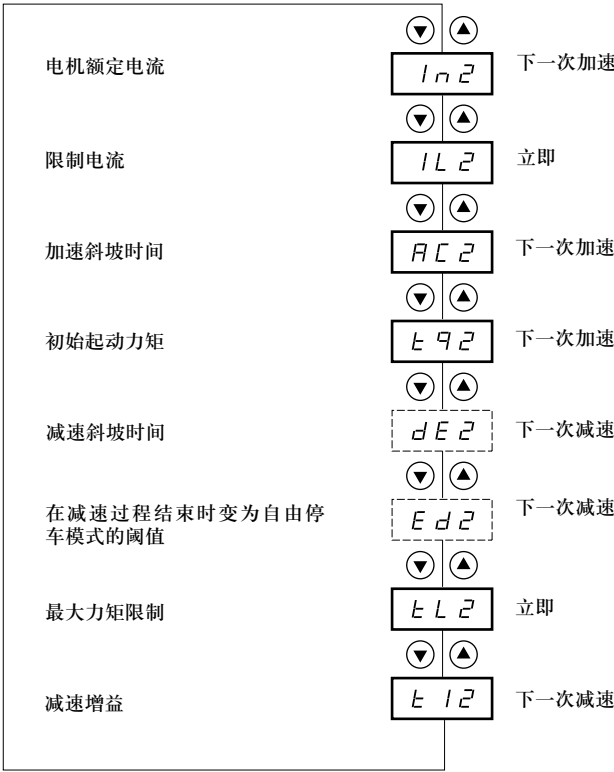
当起动器通电、没有故障且电机已经完成起动阶段时激活起动结束继电器 R2。当出现停止请求或故障时被置为无效。它有一个常开触点 (N/O)。

它可以用于在起动阶段结束时对 ATS 48 进行旁路。

代码	说明	设定范围	出厂设定
R2	模拟输出		OCr
	- no: 无定义 - OCr: 电机电流 - Otr: 电机力矩 - OtH: 电机热状态 - OCO: cos φ - OPr: 有功功率		
	输出端 AO 给出的信号类型的配置	020 - 420	020
	- 020: 0-20mA 信号 - 420: 4-20mA 信号		
	模拟输出最大信号的比例设定	50 至 500%	200
	为已配置参数额定值的百分比，对于 cos φ 单位为 1。		

第 2 电机参数菜单 (St2)

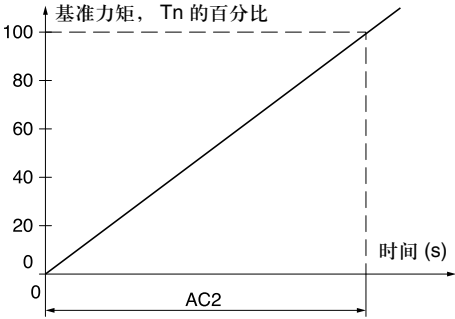
用于第 1 或第 2 电机的参数由逻辑输入端 (LIS) 选择。选择的电机参数：



-  菜单中的参数
-  参数根据选择和 SET 菜单中 StY 的定义出现

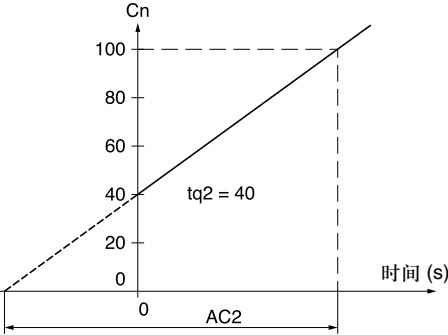
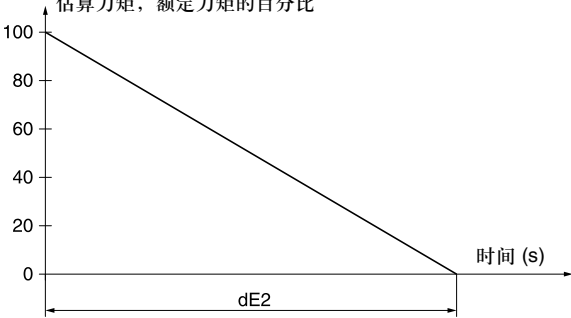
第 2 电机参数菜单 (St2)

仅当一个逻辑输入端分配给激活 I/O 菜单中的第 2 组电机参数 (LIS) 的功能时此菜单才可见。

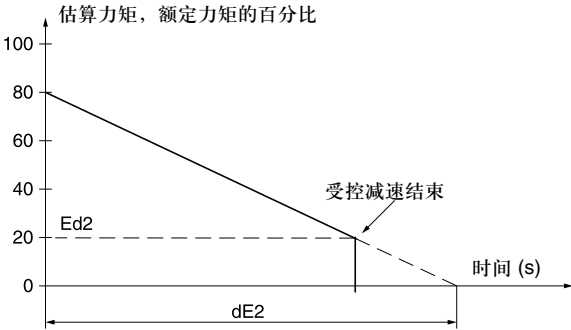
代码	说明	设定范围	出厂设定
In2	电机额定电流	0.4 至 1.3 倍 ICL	(1)
	调整铭牌上指示的电机额定电流值，即使起动机已连接于电机三角形绕组中 (PrO)。检查确认电流在 0.4 到 1.3ICL 之间 (ICL: 起动机额定值)。见“起动机 - 电机组合”，12 页。		
IL2	限制电流	In 的 150 至 700%，限制为 ICL 的 500%	In 的 400%
	限制电流 IL2 以 In2 的百分比表示。 它被限制在 ICL (起动机额定值，见“起动机 - 电机组合”，12 页) 的 500%。 限制电流 =IL2 × In2 例 1: In2=21A，IL2=300%，限制电流 =300% × 22A=66A 例 2: ATS 48C21Q，ICL=210A In2=195A，IL2=700%，限制电流 =700% × 195=1365， 限制为 500% × 210=1050A		
AC2	加速斜坡时间	1 至 60s	15s
	它是起动机力矩由 0 到额定力矩 Tn 的上升时间，即加速中力矩斜坡的梯度。 		

(1) In2 的出厂设定对应于一个带 10 级保护的 4 极 400V 标准化电机的通常值 (对于 ATS 48***Q)。
In2 的出厂设定对应于一个符合 NEC 并带有 10 级保护的 460V 标准化电机的通常值 (对于 ATS 48***Y)。

第 2 电机参数菜单 (St2)

代码	说明	设定范围	出厂设定
L 92	初始起动力矩 起动阶段的初始力矩，从额定力矩的 0 变化到 100%。 	Tn 的 0 至 100%	20%
dE2	减速斜坡时间 此参数仅当 StY=-d- 时才能访问。 用于设定 1 至 60s 的时间从估算力矩到零力矩转换 (=采用 -d- 类停机时减速中力矩斜坡的梯度)。 它可以通过修改力矩基准的梯度，改变减速进程，避免泵应用中的液体冲击。 	1 至 60s	15s

第 2 电机参数菜单 (St2)

代码	说明	设定范围	出厂设定
Ed2	在减速过程结束时变为自由停车模式的阈值	0 至 100%	20%
此参数仅当 StY=-d- 或高级设定菜单 (drC) 中的 CLP 参数仍设为出厂设定 (On) 时才可以访问。 用于在减速开始时估算力矩的 0 至 100% 之间设定最终力矩水平。 在泵应用中，减速控制不一定低于由 Edc 设置的负载水平。 如果减速开始时估算的力矩低于 20，即额定力矩的 20%，则不会激活受控减速，电机将转为自由停车模式。 			
tL2	最大力矩限制	10 至 200% 或 OFF	OFF
用于限制力矩给定以避免在高惯性应用场合中的再生能量效应。 如果 tq2=tLl 则可用于恒力矩起动。 - OFF: 无限制 - 10 至 200: 限制设定为额定力矩的百分比			
tI2	减速增益 (用于力矩控制)	10 至 50%	40%
此参数仅当 CLP=On 或 StY 参数 (Set 设定菜单) =-d- 才能访问。 用于消除减速过程中的不稳定性。 根据振动情况调整参数。			

通讯菜单 (COP)

中
文

起动机地址	▼▲ Addr
通讯速度	▼▲ tlbr
通讯格式	▼▲ FOr
串口超时设定	▼▲ tlP
与远程操作盘或软件包通讯的端口配置	▼▲ PCE

菜单中的参数

通讯菜单 (COP)

通讯菜单参数只能在电机停机时进行修改。
使用的内部协议为 Modbus。

代码	说明	设定范围	出厂设定
<i>Rdd</i>	起动器地址，RS485 串口	0 至 31	0
<i>tbr</i>	通讯速度， kbps	4.8 - 9.6 - 19.2	19.2
<i>For</i>	通讯格式 8o1: 8 个数据位，奇校验， 1 个停止位 8E1: 8 个数据位，偶校验， 1 个停止位 8n1: 8 个数据位，无校验， 1 个停止位 8n2: 8 个数据位，无校验， 2 个停止位		8n1
<i>tLP</i>	串口超时设定 (1)	0.1 至 60s	5s
<i>Pct</i>	用于与远程操作盘通讯的串口配置 On: 功能有效。临时配置起动器 (tbr 和 For) 用于与远程操作盘的通讯。 OFF: 功能无效 控制电压一断开 PCT 即返回 OFF 状态。下一次通电时， tbr 和 For 参数将返回其初始配置。		OFF

 (1) 确认此时间设定不会干扰机器的安全运行

显示参数菜单 (SUP)

中文

Cos φ	▼▲ COS	
电机热状态，以百分比表示	▼▲ thr	
电机电流	▼▲ Lcr	
上次复位以来的运行时间	▼▲ rne	
有功功率，以百分比表示	▼▲ LPr	
电机力矩，以百分比表示	▼▲ Ltr	
有功功率，以 kW 表示	▼▲ LPP	在 drC 菜单中设置 UIn
当前状态显示 (ACC、rUn、dEC 等)	▼▲ EEA	
前次检测到的故障	▼▲ LFt	
相位旋转方向，1-2-3 或 3-2-1	▼▲ PHE	
操作盘锁定代码	▼▲ CDD	

菜单中显示的参数

显示参数菜单 (SUP)

要显示的参数可以在电机停机或运行时进行修改。

出厂设定为显示电机电流 (参数 LCr)。

选择显示项保存：

- 按 ENT 键一次：该选择为临时性的，在下次上电时将被清除。
- 再次按下 ENT 键 2 秒钟：显示屏闪烁，此选择为永久性的，不能再修改。

代码	参数	单位
CO5	Cos φ	0.01
tHr	电机热状态 从 0 变化到 125% 100% 对应于电流 In 设定的额定热状态。	%
LCr	电机电流 以安培为单位，最高 999A (例：01.5=1.5A；15.0=15A；150=150A) 从 1000A 开始以千安为单位 (例：1.50=1500；1.15=1150A)	A 或 kA
rne	运行时间，自上次复位起，以小时为单位。 以小时为单位，最大 999 小时 (例：001=1hr；111=111hr) 从 1000 到 65535 以千小时为单位 (例：1.11=1110hr；11.1=11100hr) 超过 65535 小时 (65.5) 显示将被复位为 0。 当电机不停机，即晶闸管被触发 (加热、加速、稳定状态、减速、制动) 及连续旁路运行时对运行时间进行计数。 可以在线控模式中使用控制字或在电机停机时通过操作盘对小时计数器进行清零。 当控制部分断电时小时计数器的值被存入 EEPROM 中。	h 或 kh
LPr	有功功率 从 0 至 255% 变化。 100% 对应于在额定电流和满电压时的功率。	%
Ltr	电机力矩 从 0 至 255% 变化。 100% 对应于在额定力矩。	%
LAP	有功功率，单位为 kW 此参数要求在 drC 菜单中配置线电压 Uln 的准确值。	kW
EeA	当前状态显示 - nLP: 起动机无运行命令且未通电 - rdY: 起动机无运行命令且已通电 - tbS: 未经历启动延时 - ACC: 正在加速 - dEC: 正在减速 - rUn: 稳定状态运行 - brL: 正在制动 - CLl: 起动机处于电流限制模式 - nSt: 由串口强制为自由停车模式	
LFe	前次检测到的故障 (见 75 页)。 如果没有保存任何故障，则显示 nDF 。	
PHE	相位旋转方向，从起动机方向看 - 123: 正转 (L1-L2-L3) - 321: 反转 (L3-L2-L1)	

显示参数菜单 (SUP)

中文

代码	参数
C0d	操作盘锁定代码 允许使用访问密码对起动机配置进行保护。  注意：在输入密码之前，切勿忘记将密码记下。 • OFF: 无访问锁定密码 - 要对访问进行锁定，输入一个密码 (2 至 999)。显示项可使用 ▲ 键递增。现在按 ENT。画面上出现 “On” 提示参数已被锁定。 • On: 访问已被密码锁定 (2 至 999) - 要对访问进行解锁，应输入密码 (使用 ▲ 键递增显示项) 并按 ENT。该密码将一直保留在显示屏上，访问本解锁，直至下一次断电为止。下一次在上电时参数访问会被重新锁定。 - 如果输入了一个错误的密码，显示将会变为 “On” 且参数保持锁定。 • XXX: 参数访问被解锁 (密码保留在画面上)。 - 在参数已被解锁后要使用相同的密码重新激活锁定，可使用 ▼ 键返回 “On” 并按 ENT。画面上出现 “On” 提示参数已被锁定。 - 在参数已被解锁后要使用新密码对访问进行锁定，可输入一个新密码 (使用 ▲ 或 ▼ 键改变显示项) 并按 ENT。画面上出现 “On” 提示参数已被锁定。 - 在参数已被解锁后要清除锁定，可使用 ▼ 键返回 “OFF” 并按 ENT。“OFF” 将保留在画面上。参数被解锁并保持至下一次重启动为止。

当使用密码对访问进行锁定时，只有监测参数可以访问，且仅显示参数的临时选项。

兼容性表

应用功能的选择会受到某些功能不兼容的限制。在下表中未列出的功能均可与其他任何功能兼容。

功能	软停止	动态制动停车	强制自由停车	热保护	电机缺相	与电机按三角形连接	小型电机测试	级联	预热
软停止									
动态制动停车									
强制自由停车									
热保护									(2)
电机缺相						(1)			(1)
与电机按三角形连接					(1)				
小型电机测试									
级联									
预热				(2)	(1)				

	兼容功能
	不兼容功能
	无意义

- (1) 不检测电机缺相
- (2) 当电机正在预热时，不进行热保护。应设置预热电流 IPr。

维护

Altistart 48 不需要任何预防性维护。建议定期进行以下维护工作：

- 检查连接的状态和紧固程度
- 确保部件周围的温度保持在可接受的水平而且通风有效（风扇平均寿命：3 至 5 年，取决于运行条件）
- 如有必要应清除散热器上的所有灰尘

维护指南

如果在设置或运行过程中出现问题，应确保遵守与环境、安装和连接相关的规定。

检测到的第一个故障被记忆下来并在屏幕上显示：起动机锁定，继电器 R1 和 R2 根据其定义改变状态。

清除故障

出现不能被复位的故障时应关闭起动机电源。

等待显示屏内容完全消失。

查找故障原因以便排除。

恢复电源：如果故障已消除，则此操作可以清除故障状态。

如果已定制了自动重启动功能，则在某些情况下当故障消失后可能会自动重启动。

监测菜单

通过显示起动机状态及其当前参数值来防止和查找故障原因。

备件及修理

请咨询施耐德电气的产品支持部门。

按照常规，如果起动机启动时出现故障，则建议返回出厂设定值并重新按步骤进行设置。

起动机不起动，无故障显示

- 无显示：检查控制电源 CL1/CL2 上是否有电源（见 27 页）。
- 检查显示的代码是否与起动机正常状态对应（见 45 页）。
- 检查是否有 RUN/STOP 命令（见 28 页）。

不能被复位的故障

当此类故障出现时，起动机锁定，电机转为自由停车模式。

故障迹象：

- 起动结束继电器 R2 断开
- 继电器 R1 断开（在起动机锁定之后）
- 显示屏上故障代码闪烁
- 存储最近的 5 次故障，使用 PowerSuite 软件包可以查看

重新启动条件：

- 故障原因消失
- 控制电源断开及重新连接

故障显示	可能原因	规程，解决办法
<i>Inf</i>	内部故障	断开控制电源后再重新连上。如果故障仍然存在，应联系施耐德电气产品支持部门。
<i>OCF</i>	过电流： • 起动机输出短路 • 内部短路 • 旁路接触器粘连 • 超过起动机额定值	关闭起动机电源。 • 检查连接电缆和电机隔离。 • 检查晶闸管 • 检查旁路接触器（触点粘连） • 检查菜单 drC 中参数 bSt 的值见 57 页
<i>PfF</i>	相序颠倒 电源倒相不符合 Protection（保护）菜单中 PHr 参数的选择。	倒换两条相线或设置 PHr=no
<i>EEF</i>	内部存储故障	断开控制电源后再重新连上。如果故障仍然存在，应联系施耐德电气产品支持部门。

故障原因一消失即可被复位的故障

当此类故障出现时，起动器锁定，电机转为自由停车模式。

故障现象：

- 起动结束继电器 R2 断开。
- 仅当作为隔离继电器时继电器 R1 断开。
- 只要故障存在，显示屏上就一直有故障代码闪烁。
- 存储最近的 5 次故障，使用 PowerSuite 软件可以查看。

重起动条件：

- 故障原因消失
- 在 2 线控制中运行命令必须保留在 RUN 输入端。
- 在 3 线控制中 RUN 输入端需要有新的运行命令 (上升沿)。

故障显示	可能原因	规程，处理办法
<i>CFF</i>	通电时无效配置	• 在高级设定菜单 drC 中返回出厂设定值 • 重新配置起动器。
<i>CFI</i>	无效配置 通过串口载入起动器的配置与之不兼容。	• 检查前一次载入的配置。 • 载入兼容的配置。

可以被复位并能使起动器自动重新启动的故障 (1)

当此类故障出现时，起动器锁定，电机转为自由停车模式。

伴随自动重起动的故障迹象：

- 起动结束继电器 R2 断开
- 仅当作为隔离继电器时继电器 R1 断开。如果配置为故障继电器则 R1 保持闭合，见 62 页
- 只要故障存在，显示屏上就一直有故障代码闪烁
- 存储最近的 5 次故障，使用 PowerSuite 软件包可以查看

重起动条件，对于下表中伴随自动重起动的故障（仅在 2 线控制中）：

- 故障原因消失
- 在 RUN 输入端保留有运行命令
- 进行 5 次重起动尝试，每次间隔 60 秒。如果在第 6 次尝试时故障仍然存在，则将成为不可复位的故障。
- 进行 6 次重起动尝试，每次间隔 60 秒。如果在第 6 次尝试时故障仍然存在，则它将脱扣，需要手动复位（见下页），且如果被配置为故障继电器则 R1 断开。

故障显示	可能原因	处理方法
<i>PHF</i>	电源缺相 电机缺相 如果电机某一相电流降至可调整的阈值 PHL 以下超过 0.5s 或三相均降至该阈值以下超过 0.2s。此故障状态可在保护菜单 Pro 中的 PHL 参数进行配置。	• 检查电源、起动器连接以及所有处于电源和起动器之间的隔离设备（接触器、熔断器、断路器等等）。 • 检查电机连接以及所有处于起动器和电机之间的隔离设备（接触器、熔断器、断路器等）。 • 检查电机状态。 • 检查 PHL 参数的配置是否与所使用的电机匹配。
<i>FrF</i>	电源频率，超出允许范围 此故障状态可在 Advanced settings（高级设定）菜单 drC 中的 FrC 参数进行配置。	• 检查电源。 • 检查 FrC 参数的配置是否与所使用的电源匹配（例如发电机组）。

下列故障的重起动情况：

- t 故障原因消失
- t 运行命令保持（仅对 2 线控制）

故障显示	可能原因	处理方法
<i>USF</i>	有运行命令时动力电源故障	• 检查动力电源电路和电压。
<i>CLF</i>	控制线路故障	• CL1/CL2 缺失超过 200ms

(1) 如果没有选择自动重起动功能，则应参见 78 页这些故障的现象和重起动条件。

可以被手动复位的故障

当此类故障出现时，起动机锁定，电机转为自由停车模式。

故障现象：

- 启动结束继电器 R2 断开
- 继电器 R1 断开
- 只要故障存在，显示屏上就一直有故障代码闪烁
- 存储最近的 5 次故障，使用 PowerSuite 软件包可以查看

重启动条件：

- 故障原因消失
- 用一个运行命令 (2 线或 3 线控制，需要 RUN 输入端的上升沿) 复位故障 (1)
- 另一个运行命令 (2 线或 3 线控制，需要 RUN 输入端的上升沿) 重启动电机

故障显示	可能原因	规程，解决办法
5 L F	串口故障	• 检查 RS485 连接。
E t F	外部故障	• 检查已被考虑的故障。
5 t F	启动时间过长	• 检查机械（磨损情况、机械间隙、润滑、阻塞等）。 • 检查 PrO 菜单中的 tLs 参数设定值，53 页。 • 检查与机械要求相关的起动机 - 电机选型。
OL C	电流过载	• 检查机械（磨损情况、机械间隙、润滑、阻塞等）。 • 检查 PrO 菜单中的 LOC 和 tOL 参数设定值，54 页。
OL F	电机热故障	• 检查机械（磨损情况、机械间隙、润滑、阻塞等）。 • 检查与机械要求相关的起动机 - 电机选型。 • 检查 PrO 菜单中的 tHP 参数设定值 (53 页) 和 SEt 菜单 (53 页) 中的 In 参数设定值。 • 检查电机的电气隔离。 • 等待电机冷却下来后再重新启动。
DHF	起动机热故障	• 检查机械（磨损情况、机械间隙、润滑、阻塞等）。 • 检查与电机和机械要求相关的起动机选型。 • 检查风扇 (如果所用的 ATS48 有的话) 的运行情况，保证空气通路不会受到任何阻断，且散热器清洁。确保遵守安装建议。 • 等待 ATS48 冷却下来后再重新启动。

(1) 如果 LI 被定义为“故障复位 (Llr)”功能，则有运行命令时不会产生复位。

可以被手动复位的故障

故障显示	可能原因	处理方法
<i>O t F</i>	由 PTC 传感器检测到的电机热故障	• 检查机械（磨损情况、机械间隙、润滑、阻塞等）。 • 检查与机械要求相关的起动器 - 电机选型。 • 检查 Pro 菜单中的 PtC 参数设定值，55 页。 • 等待电机冷却下来后再重新启动。
<i>U L F</i>	电机欠载	• 检查液压回路。 • 检查 Pro 菜单中的 LUL 和 tUL 参数设定值，53 页。
<i>L r F</i>	稳定状态下转子锁定 此故障仅在有起动器旁路接触器的稳定状态下有效。如果某一相电流大于或等于 5In 并超过 0.2s 就将检测到这一故障。	• 检查机械（磨损情况、机械间隙、润滑、阻塞等）。

使用逻辑输入复位故障

如果一个逻辑输入 LI 被配置为 “reset motor thermal fault (复位电机热故障)” 或 “reset faults which can be reset (复位可被复位的故障)”，则必须满足下列条件：

- 逻辑输入端有一个脉冲
- 在 2 线控制中如果在 RUN 输入端保持有运行命令，则电机会展重起动。
- 在 3 线控制中如果在 RUN 输入端有新的运行命令 (上升沿)，则电机会展重起动。

配置 / 设定表

ATS 48 起动器
客户识别号码 (如果有).....
访问密码 (如果有).....

设定菜单 *SEt*

代码	出厂设定	用户设定	代码	出厂设定	用户设定
<i>In</i>	(1)		<i>dEL</i>	15s	
<i>ILt</i>	400%		<i>EdC</i>	20%	
<i>ACC</i>	15s		<i>brC</i>	50%	
<i>t90</i>	20%		<i>EbR</i>	20%	
<i>StY</i>	-F-				

 如果配置了相应的功能，则阴影框中的参数出现。

保护菜单 *PrO*

代码	出厂设定	用户设定	代码	出厂设定	用户设定
<i>tHP</i>	10		<i>tDL</i>	10.0	
<i>ULL</i>	OFF		<i>PHr</i>	no	
<i>LUL</i>	60%		<i>tbs</i>	2s	
<i>tUL</i>	60%		<i>PHL</i>	10%	
<i>tL5</i>	OFF		<i>PtC</i>	OFF	
<i>Oil</i>	OFF		<i>Rr5</i>	OFF	
<i>LDC</i>	80%		<i>rtH</i>	no	

 如果配置了相应的功能，则阴影框中的参数出现。

(1) 取决于起动器额定值。

高级设定菜单 *drC*

代码	出厂设定	用户设定	代码	出厂设定	用户设定
<i>ELI</i>	OFF		<i>LSL</i>	50%	
<i>bSt</i>	OFF		<i>tIG</i>	40%	
<i>dLt</i>	OFF		<i>CSL</i>	OFF	
<i>SSL</i>	OFF		<i>ULn</i>	(1)	
<i>CLP</i>	On		<i>Frc</i>	AUt	

 如果配置了相应的功能，则阴影框中的参数出现。

I/O 菜单 *ID*

代码	出厂设定	用户设定	代码	出厂设定	用户设定
<i>L13</i>	LIA		<i>rI</i>	rll	
<i>L14</i>	LIL		<i>r3</i>	rn1	
<i>IPr</i>	0%		<i>RO</i>	OCr	
<i>tPr</i>	5s		<i>D4</i>	020	
<i>LD1</i>	tA1		<i>RSL</i>	200	
<i>LD2</i>	rn1				

 如果配置了相应的功能，则阴影框中的参数出现。

- (1) -ATS 48...Q: 400V
-ATS 48...Y: 460V

第 2 电机参数菜单 *5 L 2*

仅当有一个逻辑输入端在 I/O 菜单中被定义为激活第 2 组电机参数的功能时，此菜单才有效。

代码	出厂设定	用户设定	代码	出厂设定	用户设定
<i>ln 2</i>	(1)		<i>de 2</i>	15s	
<i>il 2</i>	400%		<i>ed 2</i>	20%	
<i>rl 2</i>	15s		<i>el 2</i>	OFF	
<i>lr 2</i>	20%		<i>li 2</i>	40%	

通讯菜单 *C O P*

代码	出厂设定	用户设定	代码	出厂设定	用户设定
<i>add</i>	0		<i>elp</i>	5s	
<i>lbr</i>	19.2kbps		<i>pct</i>	OFF	
<i>for</i>	8n1				

(1) 取决于起动器额定值。

As a rule, the Altistart 48 control (CL1 - CL2) and power (1/L1 - 3/L2 - 5/L3) supplies must be disconnected before any operation on either the electrical or mechanical parts of the installation or machine.

During operation the motor can be stopped by cancelling the run command. The starter remains powered up. If personnel safety requires prevention of sudden restarts, this electronic locking system is not sufficient: fit a breaker on the power circuit.

The starter is fitted with safety devices which, in the event of a fault, can stop the starter and consequently the motor. The motor itself may be stopped by a mechanical blockage. Finally, voltage variations or line supply failures can also cause shutdowns.

If the cause of the shutdown disappears, there is a risk of restarting which may endanger certain machines or installations, especially those which must conform to safety regulations. In this case the user must take precautions against the possibility of restarts, in particular by using a low speed detector to cut off power to the starter if the motor performs an unprogrammed shutdown.

The products and equipment described in this document may be changed or modified at any time, either from a technical point of view or in the way they are operated. Their description can in no way be considered contractual.

This starter must be installed and set up in accordance with both international and national standards. Bringing the device into conformity is the responsibility of the systems integrator who must observe the EMC directive among others within the European Union.

The specifications contained in this document must be applied in order to comply with the essential requirements of the EMC directive.

The Altistart 48 must be considered as a component: it is neither a machine nor a device ready for use in accordance with European directives (machinery directive and electromagnetic compatibility directive). It is the responsibility of the final integrator to guarantee conformity to the relevant standards.

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Steps for setting up the starter

1 – Delivery of the Altistart 48

- Check that the starter reference printed on the label is the same as that on the delivery note corresponding to the purchase order.
- Remove the Altistart 48 from its packaging and check that it has not been damaged in transit.

2 - Fit the Altistart 48 in accordance with the recommendations on page 102 and page 103

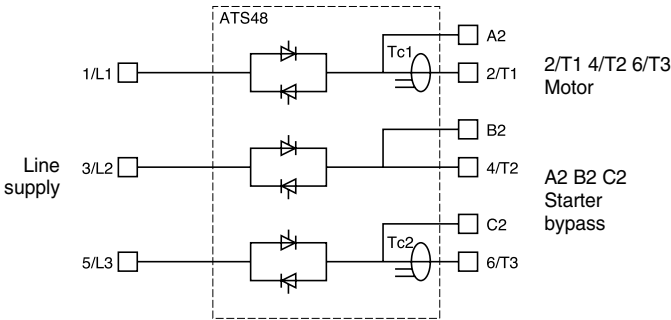
3 - Connect the following to the Altistart 48:

- The control line supply (CL1 – CL2), ensuring that it is off
- The power line supply (1/L1 - 3/L2 - 5/L3), ensuring that it is off
- The motor (2/T1 - 4/T2 - 6/T3), ensuring that its coupling corresponds to the supply voltage

Note: If a bypass contactor is used, connect it to L1 L2 L3 on the line supply side and to terminals A2 B2 C2 provided for this purpose on the Altistart 48. See the diagrams on page 112.

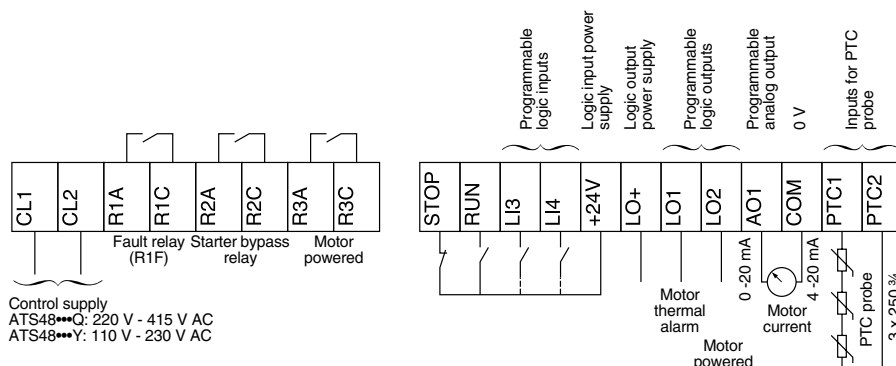
If the ATS48***Q is used in the motor delta windings, follow the recommendations on page 92, page 93 and the diagrams on page 113.

Block diagram of the power part of the ATS48:



Steps for setting up the starter

Factory configuration of the control terminals:



Connect the RUN and STOP commands and if necessary the other terminal inputs/outputs.

Stop at 1 (on) and RUN at 1 (on): start command.
Stop at 0 (off) and RUN at 1 or at 0: stop command.

4 - Essential information before starting up the Altistart 48:

Read the information on the motor rating plate. The values will be used to set parameter (In) in the SEt menu.

5 - Powering up the control part (CL1-CL2) without the power part and without giving the run command

The starter displays: nLP (to indicate that the power is switched off).

The ATS 48 starter is factory-configured for a standard application which does not require specific functions. It has motor protection class 10.

The settings can be changed by accessing the parameters as described on page 126.

In all cases the In parameter must be set to the current value indicated on the motor rating plate.

6 - Powering up the power part (1/L1 - 3/L2 - 5/L3)

The starter displays: rdY (to indicate that the starter is powered up and ready).
Send a "RUN" command to start the system.

Factory settings

The Altistart 48 is factory-set for the most common operating conditions:

- The ATS 48 is used on the motor line supply (it is not inserted as a delta connection in the motor windings)
- Nominal motor current I_n :
 - ATS 48 ***Q: preset for a standard 400 V 4-pole motor
 - ATS 48 ***Y: preset for NEC current, 460 V motor
- Limiting current (ILt): 400% of the motor current I_n
- Acceleration ramp (ACC): 15 seconds
- Initial torque on starting (tq0): 20% of the nominal torque
- Stop (StY): Freewheel stop (-F-)
- Motor thermal protection (tHP): class 10 protection curve
- Display: rdY (starter ready) with power and control voltage present, motor current operating
- Logic inputs:
 - LI1: STOP
 - LI2: RUN
 - LI3: Forced freewheel stop (LIA)
 - LI4: Forced local mode (LIL)
- Logic outputs:
 - LO1: Motor thermal alarm (tA1)
 - LO2: Motor powered (ml)
- Relay outputs:
 - R1: Fault relay (r1l)
 - R2: Bypass relay at the end of starting
 - R3: Motor powered (ml)
- Analog output:
 - AO: Motor current (OCr, 0 - 20 mA)
- Communication parameters:
 - Connected via the serial link, the starter has the logic address (Add) = "0"
 - Transmission speed (tbr): 19200 bits per second
 - Communication format (FOr): 8 bits, no parity, 1 stop bit (8nl)

If the above values are compatible with the application, the starter can be used without changing the settings.

Preliminary recommendations

Handling and storage

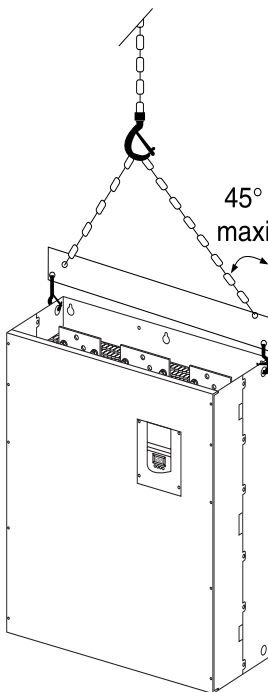
To ensure the starter is protected before installation, handle and store the device in its packaging.

Handling on installation

The Altistart 48 range comprises 6 sizes of device, with various weights and dimensions.

Small starters can be removed from their packaging and installed without a handling device.

A handling device must be used with large starters; for this reason they are supplied with handling "lugs". The precautions described below must be observed:



Do not handle the starter by the power rails

Technical specifications

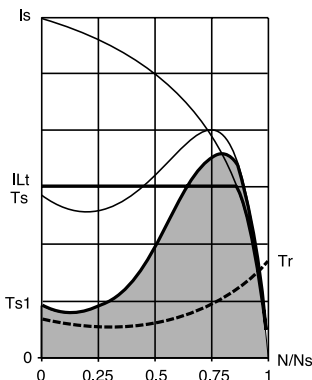
Environment

Degree of protection	• IP 20 for ATS 48D17• to C11• • IP00 for ATS 48C14• to M12• (1)
Vibration resistance	Conforming to IEC 68-2-6: • 1.5 mm peak from 2 to 13 Hz • 1 gn from 13 to 200 Hz
Shock resistance	Conforming to IEC 68-2-27: • 15 g, 11 ms
Maximum ambient pollution	Degree 3 conforming to IEC 947-4-2
Maximum relative humidity	93% without condensation or dripping water conforming to IEC 68-2-3
Ambient temperature around the unit	Storage: -25°C to +70°C Operation: • -10°C to +40°C without derating • up to +60°C, derating the current by 2% for each °C above 40°C
Maximum operating altitude	1000 m without derating (above this, derate the current by 0.5% for each additional 100 m)
Operating position	Vertical at ± 10°



(1) ATS 48 starters with degree of protection IP00 must be fitted with a protective bar to protect personnel against electrical contact

Available torque



Curves T_s and I_s represent the direct line starting of an asynchronous motor.

Curve T_{a1} indicates the total torque range available with an ATS 48, which is dependent on the limiting current I_{Lt} . The progression of the starter is controlled by the motor torque within this range.

T_r : Resistive torque, which must always be less than the T_{s1} torque.

Selecting the soft start - soft stop unit

S1 motor duty corresponds to starting followed by operation at constant load enabling the thermal equilibrium to be reached.

S4 motor duty corresponds to a cycle comprising starting, operation at constant load and an idle period. This cycle is characterised by a load factor.

The Altistart 48 must be selected depending on the type of application ("standard" or "severe") and the nominal power of the motor. "Standard" or "severe" applications define the limiting values of the current and the cycle for motor duties S1 and S4.



Caution: Do not use the Altistart 48 upstream of loads other than motors (for example transformers and resistors are forbidden). Do not connect power factor correction capacitors to the terminals of a motor controlled by an Altistart 48

Standard application

Example: centrifugal pump

In standard applications, the Altistart 48 is designed to provide:

- in S1 duty: starting at 4 In for 23 seconds or starting at 3 In for 46 seconds from a cold state.
- in S4 duty: a load factor of 50% and 10 starts per hour, with 3 In for 23 seconds or 4 In for 12 seconds or an equivalent thermal cycle.

In this case, the motor thermal protection must conform to protection class 10.

Severe application

Example: grinder

In severe applications, the Altistart 48 is designed for S4 duty with a load factor of 50% and 5 starts per hour at 4 In for 23 seconds or an equivalent thermal cycle.

In this case, the motor thermal protection must conform to protection class 20. Current **In must not remain at its factory setting** but must be set to the value indicated on the motor rating plate.

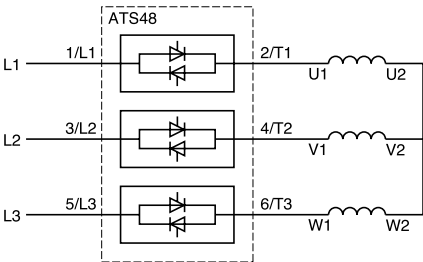
Note: The starter can be oversized by one rating, for example by selecting an ATS 48D17Q for an 11 kW - 400 V motor in motor duty S4.

To do this, short-circuit the Altistart at the end of starting. This permits 10 starts per hour at 3 times In for 23 seconds maximum or equivalent and the thermal motor protection must conform to class 10.

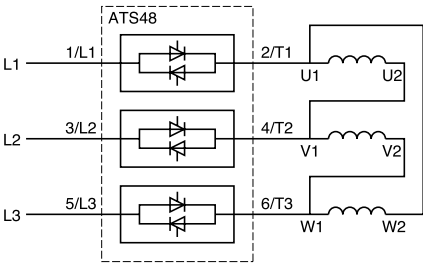
Operating recommendations

The Altistart 48 Q range (230-415 V) connected in line with the motor or in the motor delta winding

The Altistart 48 connected in the motor supply line



The motor connection depends on the supply voltage, **which in this example is a star connection.**



The motor connection depends on the supply voltage, **which in this example is a delta connection.**

The Altistart 48 connected in the motor delta winding in series with each winding

ATS48...Q starters connected to motors with delta connections can be inserted in series in the motor windings. They are powered by a current which is less than the line current by a factor of $\sqrt{3}$, which enables a starter with a lower rating to be used.

This option can be configured in the Advanced settings menu (dLt = On).

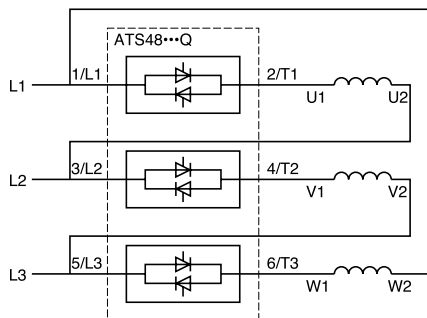
The nominal current and limiting current settings as well as the current displayed during operation are on-line values and so do not have to be calculated by the user.



The Altistart 48 can only be connected in the motor delta winding for ATS48...Q starters. This means that:

- only freewheel stopping is possible
- cascading is not possible
- preheating is not possible

See the tables on page 94 for more information about starter-motor combinations.



Connection in the motor delta winding

Example:

A 400 V - 110 kW motor with a line current of 195 A (nominal current for the delta connection).

The current in each winding is equal to $195/\sqrt{3}$ or 114 A.

The rating is determined by selecting the starter with a maximum permanent nominal current just above this current, i.e. 140 A (ATS48C14Q for a standard application).

To avoid having to calculate the rating in this way, use the tables on page 96 and 97 which indicate the rating of the starter corresponding to the motor power for each application type.



Standard application, 230/415 V supply, starter with line connection

Motor		Starter 230/415 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power		Max. permanent current in class 10	ICL rating	Starter reference
230 V	400 V			
kW	kW	A	A	
4	7.5	17	17	ATS 48D17Q
5.5	11	22	22	ATS 48D22Q
7.5	15	32	32	ATS 48D32Q
9	18.5	38	38	ATS 48D38Q
11	22	47	47	ATS 48D47Q
15	30	62	62	ATS 48D62Q
18.5	37	75	75	ATS 48D75Q
22	45	88	88	ATS 48D88Q
30	55	110	110	ATS 48C11Q
37	75	140	140	ATS 48C14Q
45	90	170	170	ATS 48C17Q
55	110	210	210	ATS 48C21Q
75	132	250	250	ATS 48C25Q
90	160	320	320	ATS 48C32Q
110	220	410	410	ATS 48C41Q
132	250	480	480	ATS 48C48Q
160	315	590	590	ATS 48C59Q
(1)	355	660	660	ATS 48C66Q
220	400	790	790	ATS 48C79Q
250	500	1000	1000	ATS 48M10Q
355	630	1200	1200	ATS 48M12Q

The nominal motor current I_n must not exceed the max. permanent current in class 10.

(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

The information in the table above is based on operation at a maximum ambient temperature of 40°C.

The ATS 48 can be used up to an ambient temperature of 60°C as long as the max. permanent current in class 10 is derated by 2% for each degree above 40°C.

Example: ATS 48D32Q at 50°C derated by $10 \times 2\% = 20\%$, 32 A becomes $32 \times 0.8 = 25.6$ A (max. nominal motor current).



Severe application, 230/415 V supply, starter with line connection

Motor		Starter 230/415 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power		Max. permanent current in class 20	ICL rating	Starter reference
230 V	400 V			
kW	kW	A	A	
3	5.5	12	17	ATS 48D17Q
4	7.5	17	22	ATS 48D22Q
5.5	11	22	32	ATS 48D32Q
7.5	15	32	38	ATS 48D38Q
9	18.5	38	47	ATS 48D47Q
11	22	47	62	ATS 48D62Q
15	30	62	75	ATS 48D75Q
18.5	37	75	88	ATS 48D88Q
22	45	88	110	ATS 48C11Q
30	55	110	140	ATS 48C14Q
37	75	140	170	ATS 48C17Q
45	90	170	210	ATS 48C21Q
55	110	210	250	ATS 48C25Q
75	132	250	320	ATS 48C32Q
90	160	320	410	ATS 48C41Q
110	220	410	480	ATS 48C48Q
132	250	480	590	ATS 48C59Q
160	315	590	660	ATS 48C66Q
(1)	355	660	790	ATS 48C79Q
220	400	790	1000	ATS 48M10Q
250	500	1000	1200	ATS 48M12Q

The nominal motor current I_n must not exceed the max. permanent current in class 20.

(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

The information in the table above is based on operation at a maximum ambient temperature of 40°C.

The ATS 48 can be used up to an ambient temperature of 60°C as long as the max. permanent current in class 20 is derated by 2% for each degree above 40°C.

Example: ATS 48D32Q at 50°C derated by $10 \times 2\% = 20\%$, 22 A becomes $22 \times 0.8 = 17.6$ A (max. nominal motor current).



Standard application, 230/415 V supply, starter with delta connection

Motor		Starter 230/415 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power		Max. permanent current in class 10	ICL rating	Starter reference
230 V	400 V			
kW	kW	A	A	
7.5	15	29	29	ATS 48D17Q
9	18.5	38	38	ATS 48D22Q
15	22	55	55	ATS 48D32Q
18.5	30	66	66	ATS 48D38Q
22	45	81	81	ATS 48D47Q
30	55	107	107	ATS 48D62Q
37	55	130	130	ATS 48D75Q
45	75	152	152	ATS 48D88Q
55	90	191	191	ATS 48C11Q
75	110	242	242	ATS 48C14Q
90	132	294	294	ATS 48C17Q
110	160	364	364	ATS 48C21Q
132	220	433	433	ATS 48C25Q
160	250	554	554	ATS 48C32Q
220	315	710	710	ATS 48C41Q
250	355	831	831	ATS 48C48Q
(1)	400	1022	1022	ATS 48C59Q
315	500	1143	1143	ATS 48C66Q
355	630	1368	1368	ATS 48C79Q
(1)	710	1732	1732	ATS 48M10Q
500	(1)	2078	2078	ATS 48M12Q

The nominal motor current I_n must not exceed the max. permanent current in class 10.

(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

The information in the table above is based on operation at a maximum ambient temperature of 40°C.

The ATS 48 can be used up to an ambient temperature of 60°C as long as the max. permanent current in class 10 is derated by 2% for each degree above 40°C.

Example: ATS 48D32Q at 50°C derated by $10 \times 2\% = 20\%$, 55 A becomes $55 \times 0.8 = 44$ A (max. nominal motor current).



Severe application, 230/415 V supply, starter with delta connection

Motor		Starter 230/415 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power		Max. permanent current in class 20	ICL rating	Starter reference
230 V	400 V			
kW	kW	A	A	
5.5	11	22	29	ATS 48D17Q
7.5	15	29	38	ATS 48D22Q
9	18.5	38	55	ATS 48D32Q
15	22	55	66	ATS 48D38Q
18.5	30	66	81	ATS 48D47Q
22	45	81	107	ATS 48D62Q
30	55	107	130	ATS 48D75Q
37	55	130	152	ATS 48D88Q
45	75	152	191	ATS 48C11Q
55	90	191	242	ATS 48C14Q
75	110	242	294	ATS 48C17Q
90	132	294	364	ATS 48C21Q
110	160	364	433	ATS 48C25Q
132	220	433	554	ATS 48C32Q
160	250	554	710	ATS 48C41Q
220	315	710	831	ATS 48C48Q
250	355	831	1022	ATS 48C59Q
(1)	400	1022	1143	ATS 48C66Q
315	500	1143	1368	ATS 48C79Q
355	630	1368	1732	ATS 48M10Q
(1)	710	1732	2078	ATS 48M12Q

The nominal motor current I_n must not exceed the max. permanent current in class 20.

(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

The information in the table above is based on operation at a maximum ambient temperature of 40°C.

The ATS 48 can be used up to an ambient temperature of 60°C as long as the max. permanent current in class 20 is derated by 2% for each degree above 40°C.

Example: ATS 48D32Q at 50°C derated by $10 \times 2\% = 20\%$, 38 A becomes $38 \times 0.8 = 30.4$ A (max. nominal motor current).



Standard application, 208/690 V supply, starter with line connection

Motor							Starter 208/690 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power							Max. permanent current in class 10	ICL rating	Starter reference
208 V	230 V	440 V	460 V	500 V	575 V	690 V			
HP	HP	kW	HP	kW	HP	kW	A	A	
3	5	7.5	10	9	15	15	17	17	ATS 48D17Y
5	7.5	11	15	11	20	18.5	22	22	ATS 48D22Y
7,5	10	15	20	18.5	25	22	32	32	ATS 48D32Y
10	(1)	18.5	25	22	30	30	38	38	ATS 48D38Y
(1)	15	22	30	30	40	37	47	47	ATS 48D47Y
15	20	30	40	37	50	45	62	62	ATS 48D62Y
20	25	37	50	45	60	55	75	75	ATS 48D75Y
25	30	45	60	55	75	75	88	88	ATS 48D88Y
30	40	55	75	75	100	90	110	110	ATS 48C11Y
40	50	75	100	90	125	110	140	140	ATS 48C14Y
50	60	90	125	110	150	160	170	170	ATS 48C17Y
60	75	110	150	132	200	200	210	210	ATS 48C21Y
75	100	132	200	160	250	250	250	250	ATS 48C25Y
100	125	160	250	220	300	315	320	320	ATS 48C32Y
125	150	220	300	250	350	400	410	410	ATS 48C41Y
150	(1)	250	350	315	400	500	480	480	ATS 48C48Y
(1)	200	355	400	400	500	560	590	590	ATS 48C59Y
200	250	400	500	(1)	600	630	660	660	ATS 48C66Y
250	300	500	600	500	800	710	790	790	ATS 48C79Y
350	350	630	800	630	1000	900	1000	1000	ATS 48M10Y
400	450	710	1000	800	1200	(1)	1200	1200	ATS 48M12Y

The nominal motor current I_n must not exceed the max. permanent current in class 10.

(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

The information in the table above is based on operation at a maximum ambient temperature of 40°C.

The ATS 48 can be used up to an ambient temperature of 60°C as long as the max. permanent current in class 10 is derated by 2% for each degree above 40°C.

Example: ATS 48D32Y at 50°C derated by $10 \times 2\% = 20\%$, 32 A becomes $32 \times 0.8 = 25.6$ A (max. nominal motor current).



Severe application, 208/690 V supply, starter with line connection

Motor							Starter 208/690 V (+ 10% - 15%) - 50/60 Hz		
Nominal motor power							Max. permanent current in class 20	ICL rating	Starter reference
208 V	230 V	440 V	460 V	500 V	575 V	690 V			
HP	HP	kW	HP	kW	HP	kW	A	A	
2	3	5.5	7.5	7.5	10	11	12	17	ATS 48D17Y
3	5	7.5	10	9	15	15	17	22	ATS 48D22Y
5	7.5	11	15	11	20	18.5	22	32	ATS 48D32Y
7,5	10	15	20	18.5	25	22	32	38	ATS 48D38Y
10	(1)	18.5	25	22	30	30	38	47	ATS 48D47Y
(1)	15	22	30	30	40	37	47	62	ATS 48D62Y
15	20	30	40	37	50	45	62	75	ATS 48D75Y
20	25	37	50	45	60	55	75	88	ATS 48D88Y
25	30	45	60	55	75	75	88	110	ATS 48C11Y
30	40	55	75	75	100	90	110	140	ATS 48C14Y
40	50	75	100	90	125	110	140	170	ATS 48C17Y
50	60	90	125	110	150	160	170	210	ATS 48C21Y
60	75	110	150	132	200	200	210	250	ATS 48C25Y
75	100	132	200	160	250	250	250	320	ATS 48C32Y
100	125	160	250	220	300	315	320	410	ATS 48C41Y
125	150	220	300	250	350	400	410	480	ATS 48C48Y
150	(1)	250	350	315	400	500	480	590	ATS 48C59Y
(1)	200	355	400	400	500	560	590	660	ATS 48C66Y
200	250	400	500	(1)	600	630	660	790	ATS 48C79Y
250	300	500	600	500	800	710	790	1000	ATS 48M10Y
350	350	630	800	630	1000	900	1000	1200	ATS 48M12Y

The nominal motor current I_n must not exceed the max. permanent current in class 20.

(1) Value not indicated when there is no corresponding standardised motor.

Temperature derating

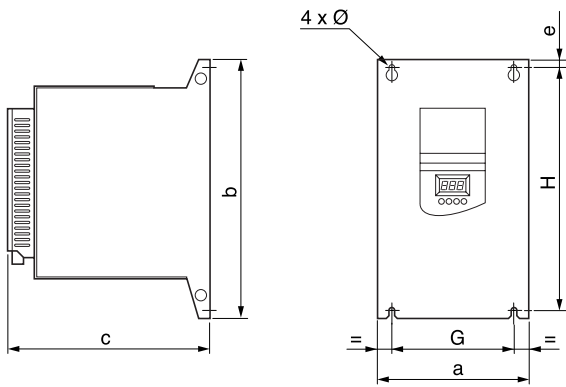
The information in the table above is based on operation at a maximum ambient temperature of 40°C.

The ATS 48 can be used up to an ambient temperature of 60°C as long as the max. permanent current in class 20 is derated by 2% for each degree above 40°C.

Example: ATS 48D32Y at 50°C derated by $10 \times 2\% = 20\%$, 22 A becomes $22 \times 0.8 = 17.6$ A (max. nominal motor current).

Dimensions

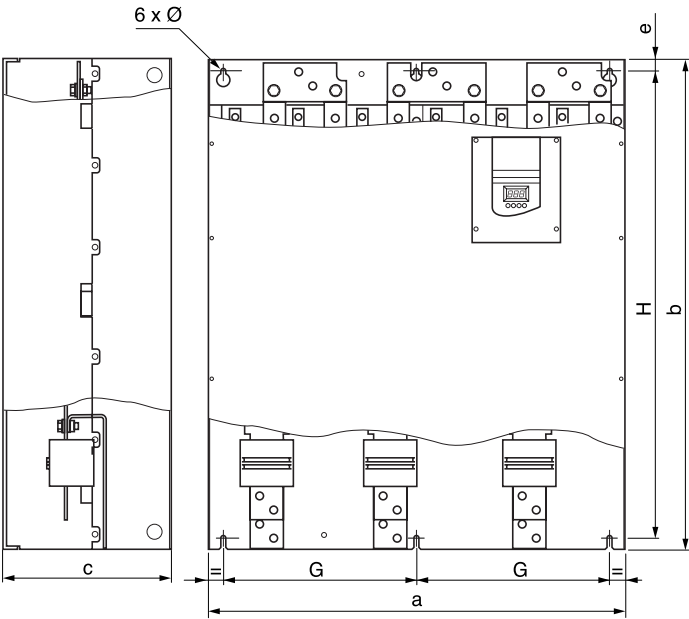
ATS 48D17 • ...C66 •



ATS 48	a mm	b mm	c mm	e mm	G mm	H mm	Ø mm	Weight kg
D17Q, D17Y D22Q, D22Y D32Q, D32Y D38Q, D38Y D47Q, D47Y	160	275	190	6.6	100	260	7	4.9
D62Q, D62Y D75Q, D75Y D88Q, D88Y C11Q, C11Y	190	290	235	10	150	270	7	8.3
C14Q, C14Y C17Q, C17Y	200	340	265	10	160	320	7	12.4
C21Q, C21Y C25Q, C25Y C32Q, C32Y	320	380	265	15	250	350	9	18.2
C41Q, C41Y C48Q, C48Y C59Q, C59Y C66Q, C66Y	400	670	300	20	300	610	9	51.4

Dimensions

ATS 48C79 • ...M12 •



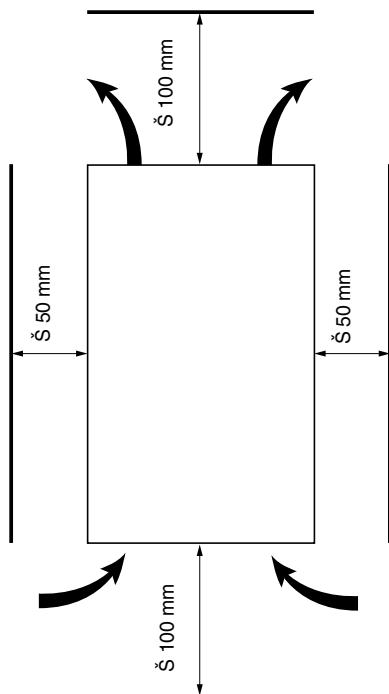
ATS 48	a mm	b mm	c mm	e mm	G mm	H mm	Ø mm	Weight kg
C79Q, C79Y M10Q, M10Y M12Q, M12Y	770	890	315	20	350	850	9	115

Mounting recommendations

Install the unit vertically, at $\pm 10^\circ$.

Do not install the unit close to, especially above, heating elements.

Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.



Check that no liquids, dust or conductive objects can fall into the starter (degree of protection IP00 from above)

Starter ventilation

On starters fitted with a cooling fan, the fan is switched on automatically as soon as the heatsink temperature reaches 50°C . It is switched off when the temperature falls back to 40°C .

Fan flow rate:

ATS 48 D32 • and D38 •	: 14 m ³ /hour
ATS 48 D47 •	: 28 m ³ /hour
ATS 48 D62 • to C11 •	: 86 m ³ /hour
ATS 48 C14 • and C17 •	: 138 m ³ /hour
ATS 48 C21 • to C32 •	: 280 m ³ /hour
ATS 48 C41 • to C66 •	: 600 m ³ /hour
ATS 48 C79 • to M12 •	: 1,200 m ³ /hour

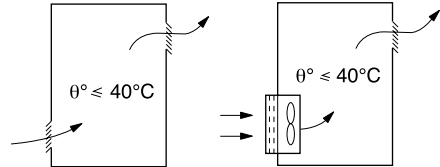
Mounting in a wall-fixing or floor-standing enclosure

Metal wall-fixing or floor-standing enclosure with IP 23 degree of protection

Observe the mounting recommendations on the previous page.

To ensure proper air circulation in the drive:

- Fit ventilation grilles.
- Ensure that ventilation is adequate: if not install a forced ventilation unit, with a filter if necessary.



Power dissipated by the starters, not bypassed, at their nominal current

Starter reference ATS 48	Power in W	Starter reference ATS 48	Power in W
D17Q, D17Y	59	C21Q, C21Y	580
D22Q, D22Y	74	C25Q, C25Y	695
D32Q, D32Y	104	C32Q, C32Y	902
D38Q, D38Y	116	C41Q, C41Y	1339
D47Q, D47Y	142	C48Q, C48Y	1386
D62Q, D62Y	201	C59Q, C59Y	1731
D75Q, D75Y	245	C66Q, C66Y	1958
D88Q, D88Y	290	C79Q, C79Y	2537
C11Q, C11Y	322	M10Q, M10Y	2865
C14Q, C14Y	391	M12Q, M12Y	3497
C17Q, C17Y	479		

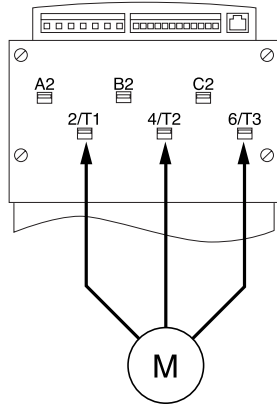
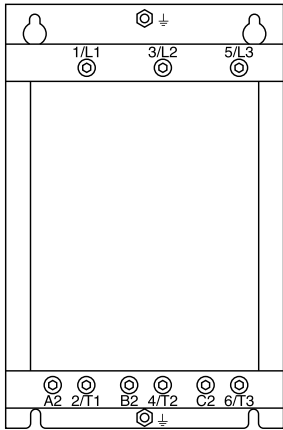
Note: When the starters are bypassed the amount of power dissipated is extremely small (between 15 and 30 W)

Control consumption (all ratings)	: 25 W non-ventilated
ATS48D32 to C17 Q/Y	: 30 W ventilated
ATS48C21 to D32 Q/Y	: 50 W ventilated
ATS48C41 to M12 Q/Y	: 80 W ventilated

Power terminals

Terminals	Functions	Maximum connection capacity					
		Terminal tightening torque					
		ATS 48 D17 • D22 • D32 • D38 • D47 •	ATS 48 D62 • D75 • D88 • C11 •	ATS 48 C14 • C17 •	ATS 48 C21 • C25 • C32 •	ATS 48 C41 • C48 • C59 • C66 •	ATS 48 C79 • M10 • M12 •
⏚	Earth connections connected to earth	10 mm ² 1.7 N.m	16 mm ² 3 N.m	120 mm ² 27 N.m	120 mm ² 27 N.m	240 mm ² 27 N.m	2x240 mm ² 27 N.m
		8 AWG 15 lb.in	4 AWG 26 lb.in	Busbar 238 lb.in	Busbar 238 lb.in	Busbar 238 lb.in	Busbar 238 lb.in
1/L1 3/L2 5/L3	Power supply	16 mm ² 3 N.m	50 mm ² 10 N.m	95 mm ² 34 N.m	240 mm ² 34 N.m	2x240 mm ² 57 N.m	4x240 mm ² 57 N.m
		8 AWG 26 lb.in	2/0 AWG 88 lb.in	2/0 AWG 300 lb.in	Busbar 300 lb.in	Busbar 500 lb.in	Busbar 500 lb.in
2/T1 4/T2 6/T3	Outputs to motor	16 mm ² 3 N.m	50 mm ² 10 N.m	95 mm ² 34 N.m	240 mm ² 34 N.m	2x240 mm ² 57 N.m	4x240 mm ² 57 N.m
		8 AWG 26 lb.in	2/0 AWG 88 lb.in	2/0 AWG 300 lb.in	Busbar 300 lb.in	Busbar 500 lb.in	Busbar 500 lb.in
A2 B2 C2	Starter bypass	16 mm ² 3 N.m	50 mm ² 10 N.m	95 mm ² 34 N.m	240 mm ² 34 N.m	2x240 mm ² 57 N.m	4x240 mm ² 57 N.m
		8 AWG 26 lb.in	2/0 AWG 88 lb.in	2/0 AWG 300 lb.in	Busbar 300 lb.in	Busbar 500 lb.in	Busbar 500 lb.in

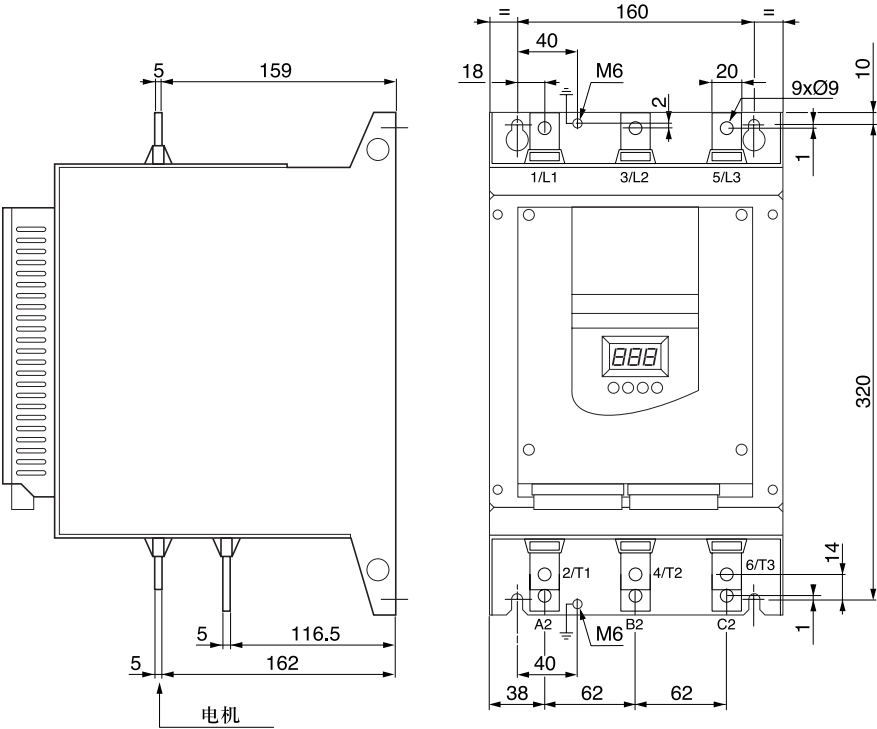
Layout of the power terminals, ATS 48D17 • to C11 •



Motor to be connected to 2/T1, 4/T2, 6/T3

Power terminals

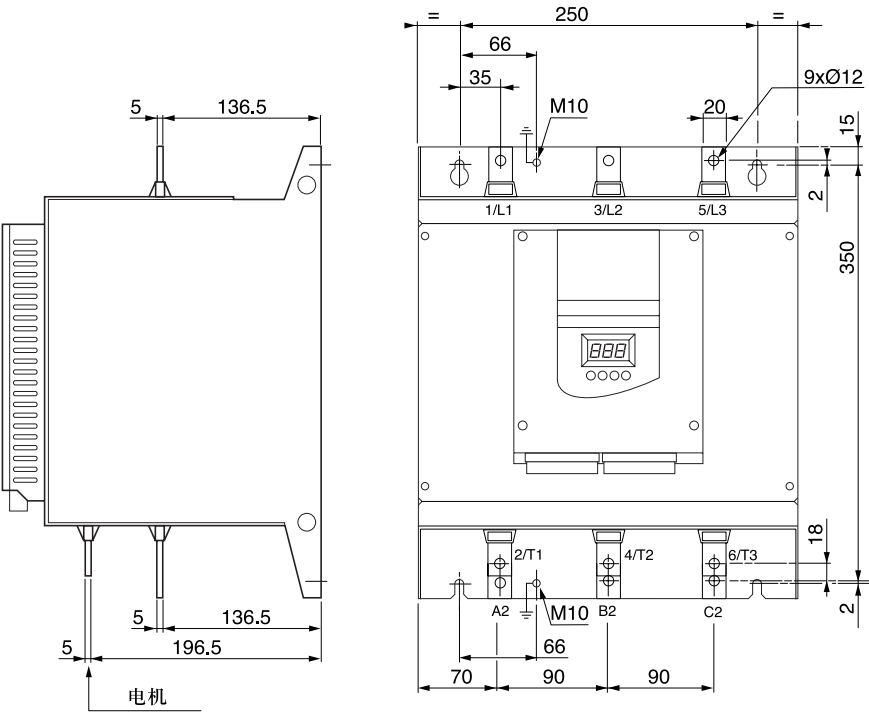
Layout of the power terminals, ATS 48C14 • and C17 •



Power terminals

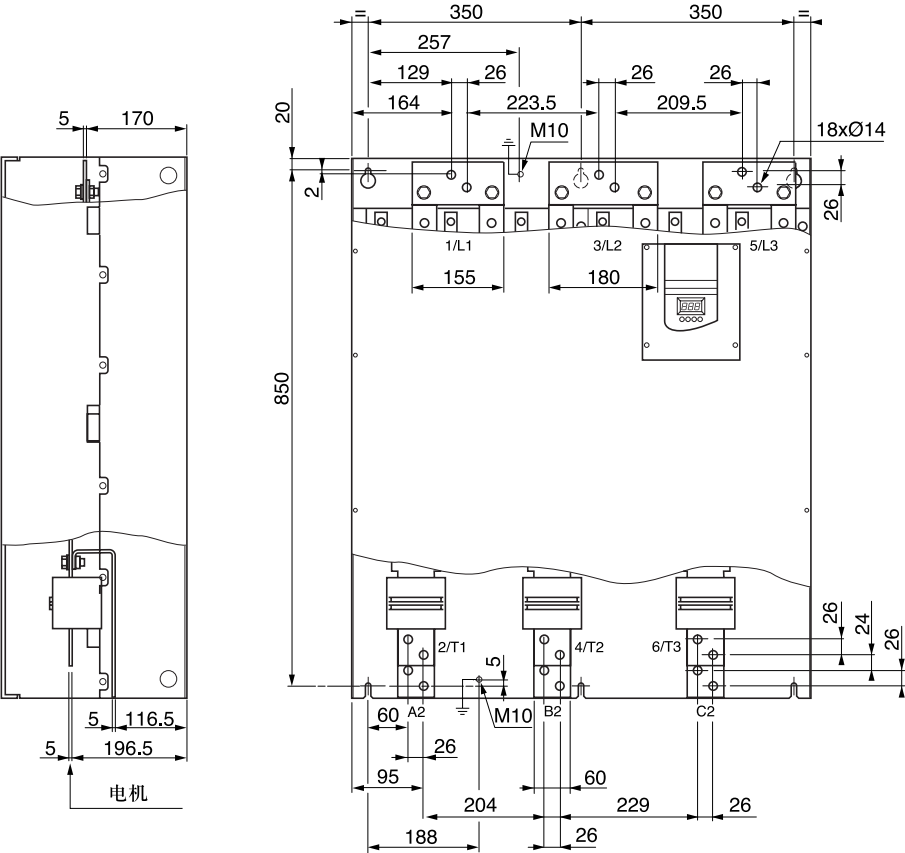
Layout of the power terminals, ATS 48C21 • to C32 •

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Layout of the power terminals, ATS 48C79 • to M12 •



Control terminals

The control terminals are fitted with one way plug-in connectors.

Maximum connection capacity : 2.5 mm² (12 AWG)
Maximum tightening torque : 0.4 N.m (3.5 lb.in)

In order to access the control terminals on ATS 48C17 • to M12 • starters, the protective cover must be removed.

Electrical characteristics

Terminals	Function	Characteristics
CL1 CL2	Altistart control power supply	ATS 48 •••Q: 220 to 415 V + 10% - 15%, 50/60 Hz ATS 48 •••Y: 110 to 230 V + 10% - 15%, 50/60 Hz Consumption see page 103.
R1A R1C	Normally open (N/O) contact of programmable relay r1	Min. switching capacity • 10 mA for 6 V --- Max. switching capacity on inductive load (cos φ = 0.5 and L/R = 20 ms): • 1.8 A for 230 V ~ and 30 V --- Max. voltage 400 V
R2A R2C	Normally open (N/O) contact of end of starting relay r2	
R3A R3C	Normally open (N/O) contact of programmable relay r3	
STOP RUN LI3 LI4	Stop starter (state 0 = stop) Run starter (state 1 = run if STOP is at 1) Programmable input Programmable input	4 x 24 V logic inputs with 4.3 kΩ impedance U _{max} = 30 V, I _{max} = 8 mA state 1: U > 11 V - I > 5 mA state 0: U < 5 V - I < 2 mA
24V	Logic input power supply	+24 V ± 25% isolated and protected against short-circuits and overloads, maximum current: 200 mA
LO+	Logic output power supply	To be connected to 24 V or an external source
LO1 LO2	Programmable logic outputs	2 open collector outputs, compatible with level 1 PLC, IEC 65A-68 standard. • Power supply +24 V (min. 12 V, max. 30 V) • Max. current 200 mA per output with an external source
AO1	Programmable analog output	Output can be configured as 0 - 20 mA or 4 - 20 mA • accuracy ± 5% of the max. value, max. load impedance 500 Ω
COM	I/O common	0 V
PTC1 PTC2	Input for PTC probes	Total resistance of probe circuit 750 Ω at 25°C (3 x 250 Ω probes in series, for example)
(RJ 45)	Connector for • remote terminal • PowerSuite • communication bus	RS 485 Modbus

Layout of control terminals

CL1	CL2	R1A	R1C	R2A	R2C	R3A	R3C
-----	-----	-----	-----	-----	-----	-----	-----

STOP	RUN	LI3	LI4	24V	LO+	LO1	LO2	AO1	COM	PTC1	PTC2
------	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------



(RJ 45)

Wiring recommendations

Power

Observe the cable cross-sectional areas recommended in the standards.

The starter must be earthed to conform to the regulations concerning leakage currents. When the use of an upstream "residual current device" for protection is required by the installation standards, an A-Si type device must be used (to avoid accidental tripping during power up). Check its compatibility with the other protective devices. If the installation involves several starters on the same line, each starter must be earthed separately. If necessary, fit a line choke (consult the catalogue).

Keep the power cables separate from circuits in the installation with low-level signals (detectors, PLCs, measuring apparatus, video, telephone).

Control

Keep the control circuits away from the power cables.

Functions of the RUN and STOP logic inputs (See application diagram see page 112)

2-wire control

Run and stop are controlled by state 1 (run) or 0 (stop), which is taken into account at the same time on the RUN and STOP inputs.

On power-up or a manual fault reset the motor will restart if the RUN command is present.

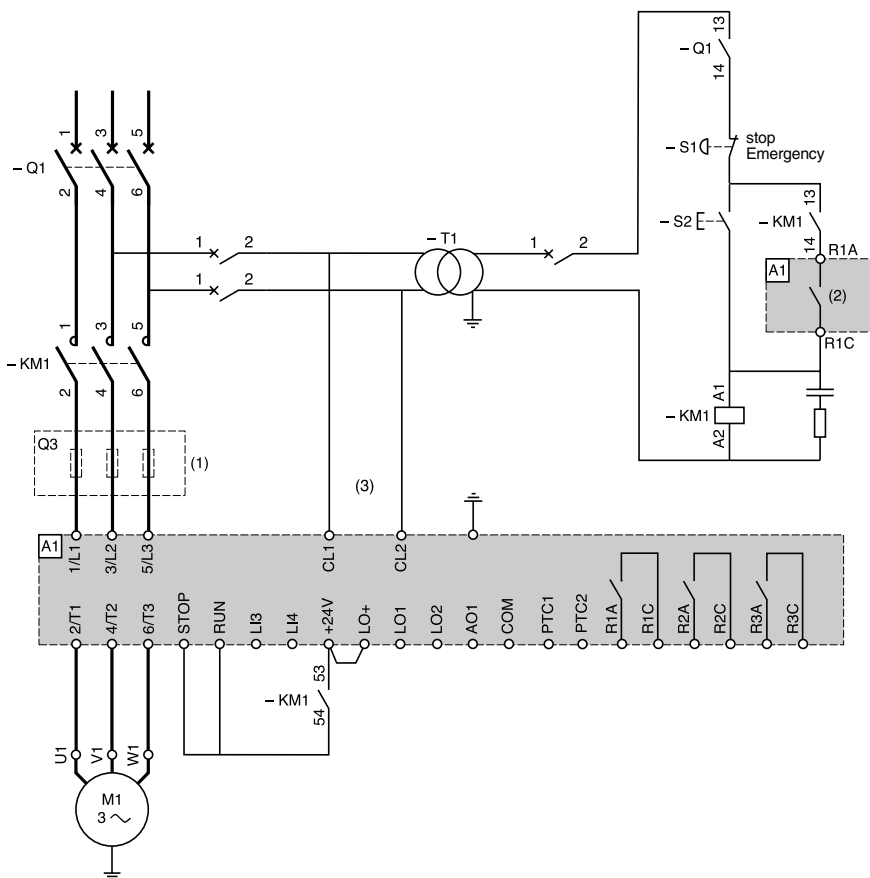
3-wire control

Run and stop are controlled by 2 different logic inputs.
A stop is obtained on opening (state 0) the STOP input.
The pulse on the RUN input is stored until the stop input opens.

On power-up or a manual fault reset or after a stop command, the motor can only be powered once the RUN input has been opened (state 0) followed by a new pulse (state 1).



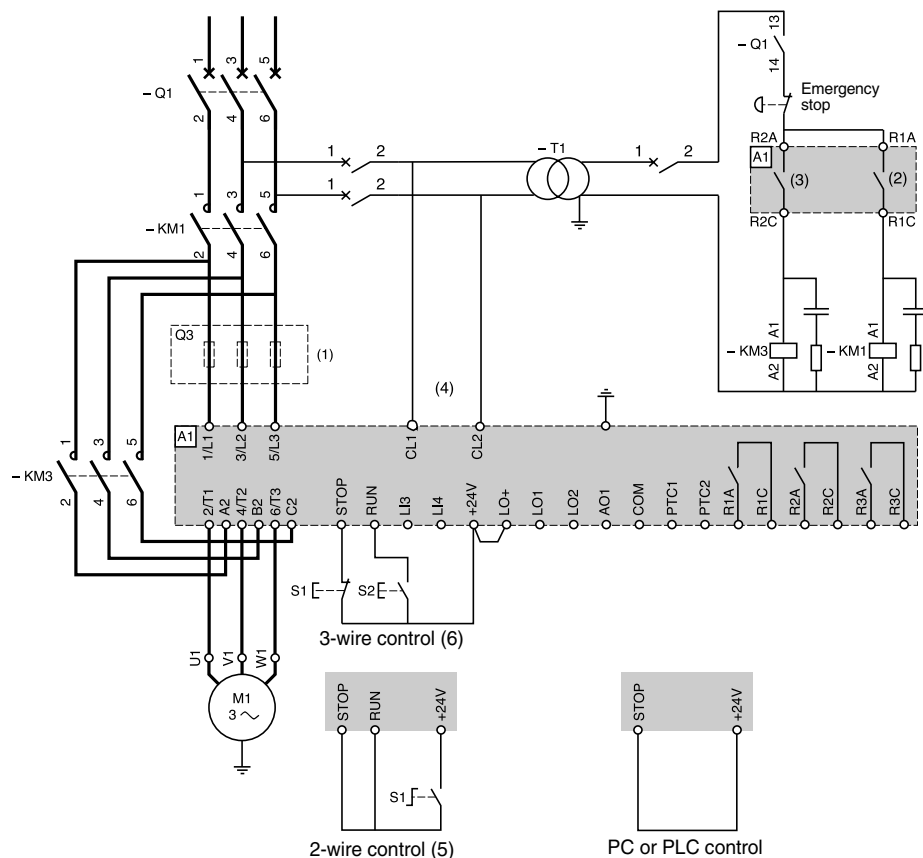
ATS 48: Non-reversing, with line contactor, freewheel stop, type 1 coordination



- (1) Installation of fast-acting fuses for type 2 coordination (conforming to IEC 60 947-4-2)
- (2) Assignment of relay R1: isolating relay (r1l). See "Electrical characteristics", page 109. Beware of the operating limits of the contact, for example when connecting to high rating contactors.
- (3) Insert a transformer if the supply voltage is different to that permitted by the ATS 48 control. See "Electrical characteristics", page 109.



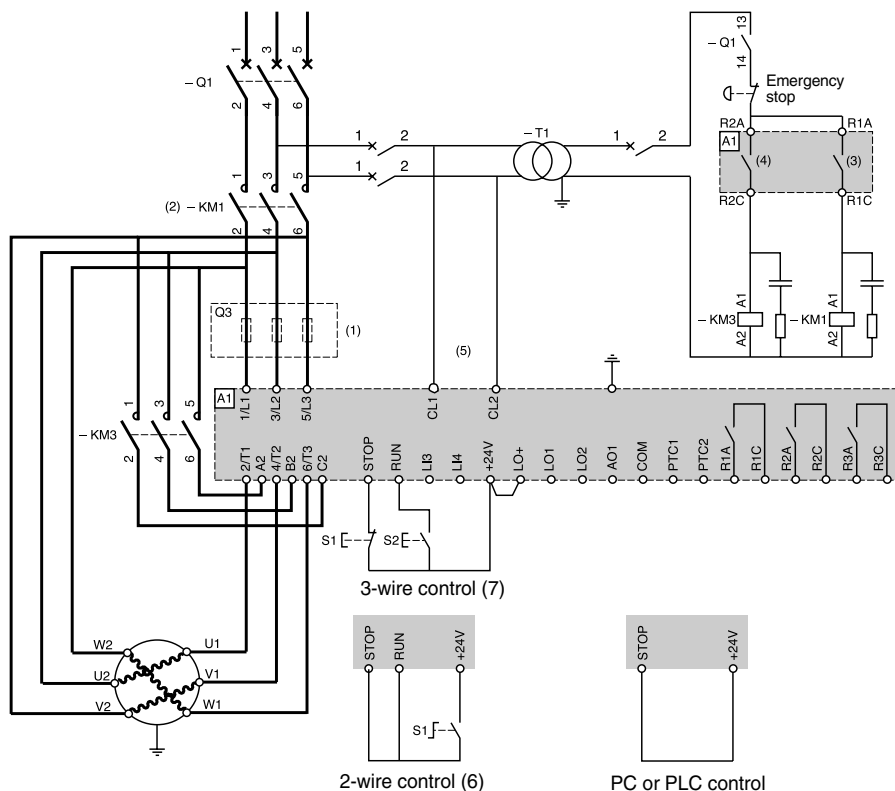
ATS 48: Non-reversing with line contactor, bypass, freewheel or controlled stop, type 1 coordination



- (1) Installation of fast-acting fuses for type 2 coordination (conforming to IEC 60 947-4-2)
- (2) Assignment of relay R1: Isolating relay (r1l). Beware of the operating limits of the contact, for example when connecting to high rating contactors. See "Electrical characteristics", page 109.
- (3) Beware of the operating limits of the contact, for example when connecting to high rating contactors. See "Electrical characteristics", page 109.
- (4) Insert a transformer if the supply voltage is different to that permitted by the ATS 48 control. See "Electrical characteristics", page 109.
- (5) See "2-wire control", page 110.
- (6) See "3-wire control", page 110.



ATS 48: Non-reversing, freewheel stop, type 1 coordination, with line contactor, bypass, connection to delta in the motor, ATS 48...Q only



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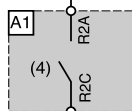


- (1) Installation of fast-acting fuses for type 2 coordination (conforming to IEC 60 947-4-2).
- (2) It is mandatory to use KM1. External differential thermal protection will need to be added.
- (3) Assignment of relay R1: isolating relay (r11). Beware of the operating limits of the contact, for example when connecting to high rating contactors. See "Electrical characteristics", page 109.
- (4) Beware of the operating limits of the contact, for example when connecting to high rating contactors. See "Electrical characteristics", page 109.
- (5) Insert a transformer if the supply voltage is different to that permissible by the ATS 48 control. See "Electrical characteristics", page 109.
- (6) See "2-wire control", page 110.
- (7) See "3-wire control", page 110.



If the bypass contactor is used, "PHF" fault detection can be extended.

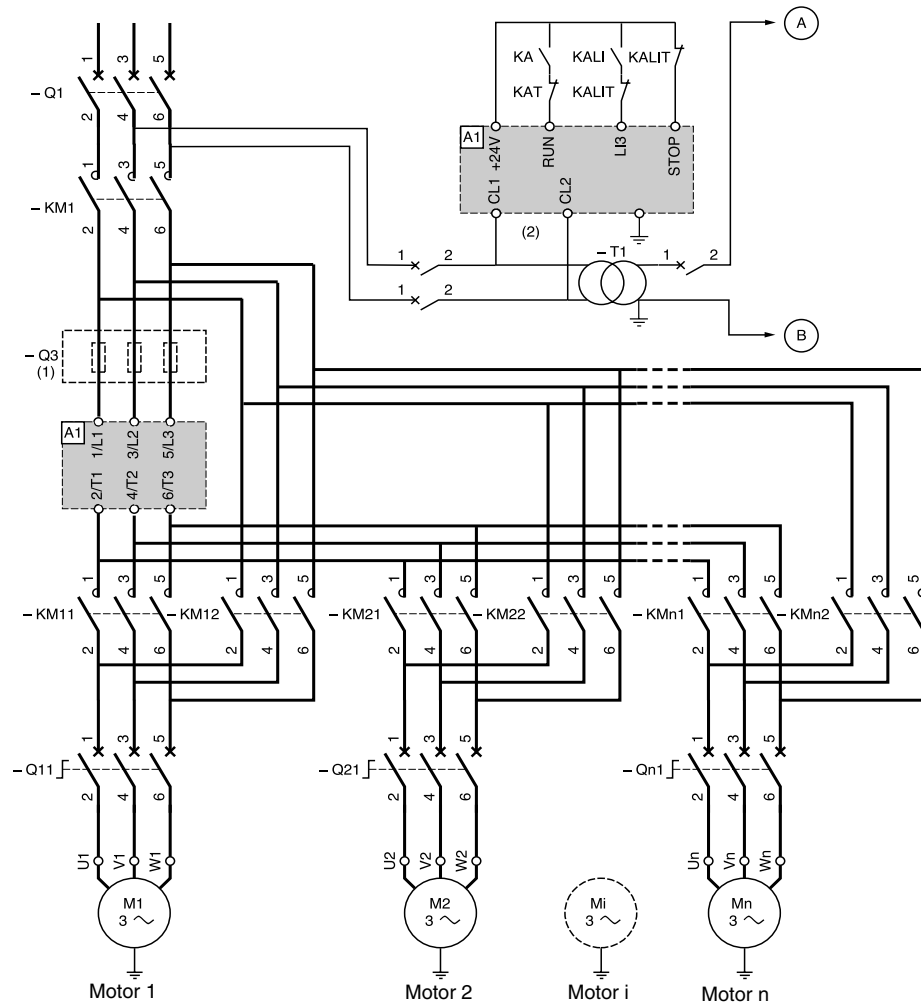
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ATS 48: Non-reversing with line contactor, starting and deceleration of several cascaded motors with a single Altistart



(1) Installation of fuses for type 2 coordination (conforming to IEC 60 947-4-2)

(2) Insert a transformer if the supply voltage is different to that permitted by the ATS 48 control. See "Electrical characteristics", page 109.

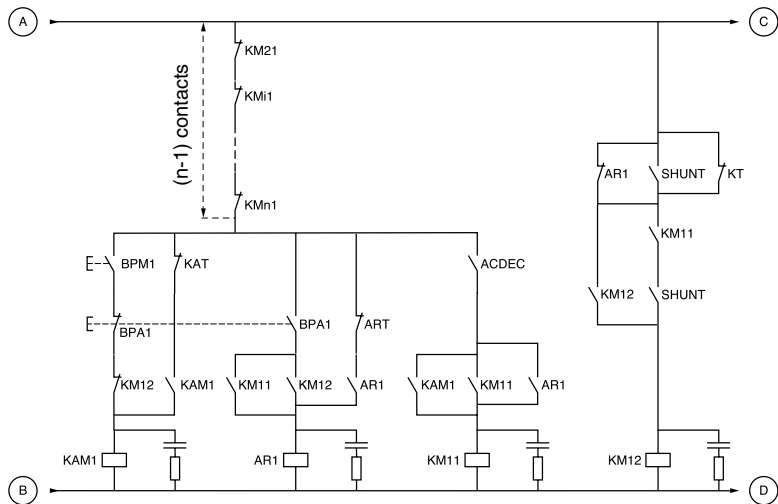
Important:

- A "cascading" logic input must be configured on the ATS48 (LI3 = LIC). See "Activation of the cascade function", page 140.
- In the event of a fault it will not be possible to decelerate or brake any motors that may be running at that time.
- Adjust the thermal protection of each circuit breaker Qn1 to the nominal motor current.

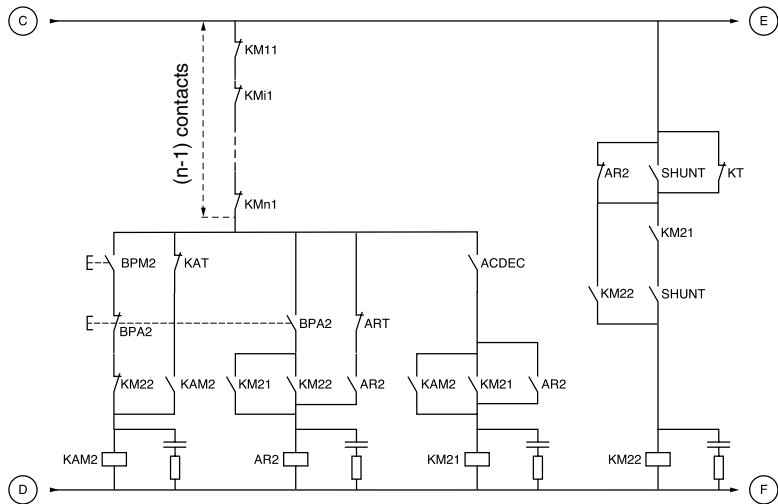
Application diagram

ATS 48: Non-reversing with line contactor, starting and deceleration of several cascaded motors with a single Altistart

Motor 1 control



Motor 2 control



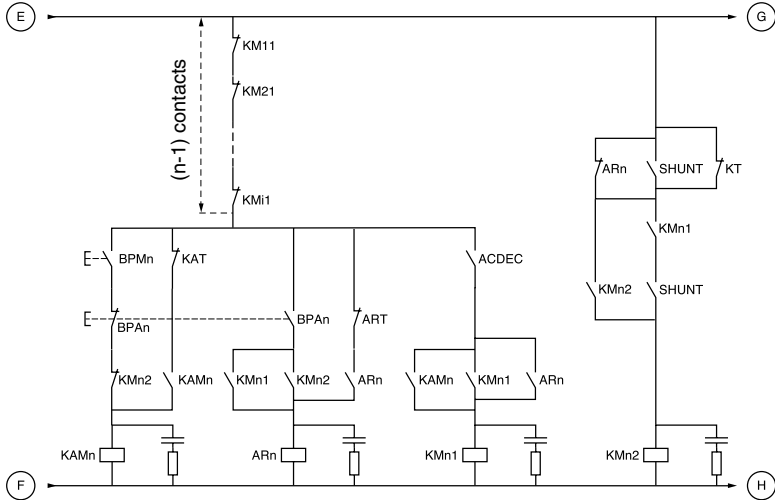
BPM1: "Run" button motor 1
BPM2: "Run" button motor 2

BPA1: "Stop" button motor 1
BPA2: "Stop" button motor 2

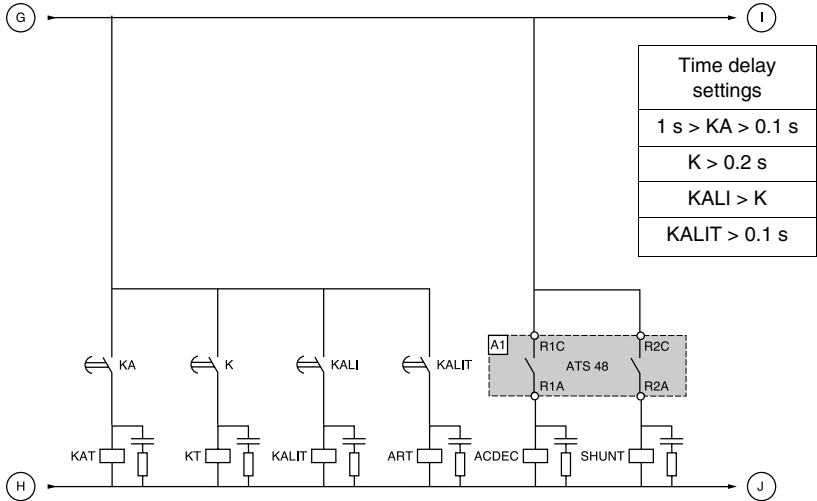
Application diagram

ATS 48: Non-reversing with line contactor, starting and deceleration of several cascaded motors with a single Altistart

Motor n control



Cascade control



BPMn: "Run" button motor n
BPA n: "Stop" button motor n

R1 must be configured as an isolating relay ($r1 = r1l$)

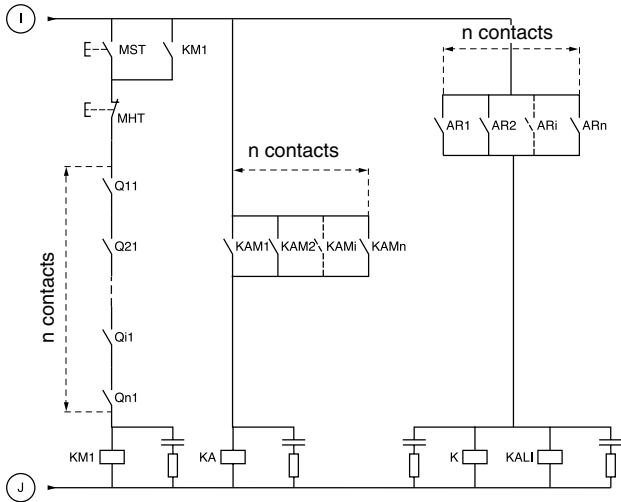


Wait for the end of the timer KALIT between 2 consecutive stop requests

Application diagram

ATS 48: Non-reversing with line contactor, starting and deceleration of several cascaded motors with a single Altistart

Cascade control



MST: General "Run" button
MHT: General "Stop" button

ATS 48: Non-reversing with line contactor, starting and deceleration of several cascaded motors with a single Altistart

Description of the complete sequence

Start with MST so that KM1 rises (line contactor)

1 - 2 - 3

Press BPM1 to start motor 1. Press BPM2 to start motor 2, press BPMn to start motor n.

When BPM1 is pressed, KAM1 rises, as does KM11 because ACDEC is activated (the ATS48 is powered by MST and KM1).

KA rises because KAM1 is closed. KAT also rises after an adjustable time delay.

4 - 5

The ATS48 starts the motor following a run command on RUN with KA and KAT.

KAM1 drops out due to KAT.

KM11 remains closed.

6 - 7

At the end of starting, R2 on the ATS48 rises, SHUNT is closed, KM12 is closed by SHUNT and KM11 remains closed.

8 - 9

After a short time R2 drops out followed by R1 (starter bypass function).

KM11 opens because ACDEC is open.

The motor continues to be powered by KM12.

The ATS48 displays a fault code.

Follow the same procedure to start the next motor. To start motor n use BPMn and to stop motor n use BPA_n. The motors can be started and stopped in any order.

To stop motor 1 press BPA1. AR1 closes

a - b - c - d

K and KAL1 are closed.

LI on the ATS48 receives a command from KAL1 and KALIT (LI must be adjusted to value LIC).

R1 and R2 on the ATS48 rise (a pulse on R2 and R1 remains closed until the motor has come to a complete stop).

e

KM11 closes.

After an adjustable time delay, KT and KALIT rise.

f

The ATS48 receives a stop command from KALIT.

g

KM12 drops out.

The ATS48 decelerates the motor.

h

R1 on the ATS48 opens when the motor has come to a complete stop.

i

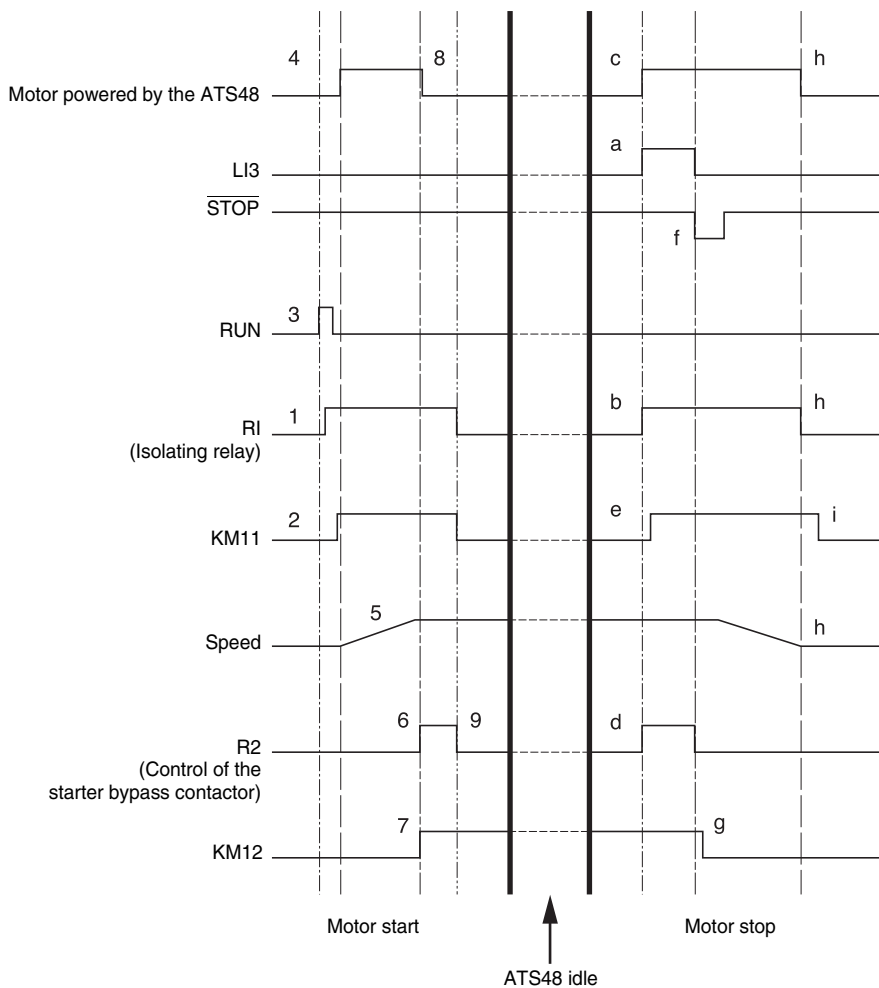
KM11 opens.

The ATS48 is ready to start or stop another motor.

Application diagram

ATS 48: Non-reversing with line contactor, starting and deceleration of several cascaded motors with a single Altistart

Trend diagram



Starter thermal protection

Thermal protection is provided by the PTC probe fitted on the heatsink and by calculating the temperature rise of the thyristors.

Motor thermal protection

The starter continuously calculates the temperature rise of the motor based on the controlled nominal current I_n and the actual current absorbed.

Temperature rises can be caused by a low or high overload with a long or short duration. The tripping curves on the following pages are based on the relationship between the starting current I_s and the (adjustable) motor current I_n .

Standard IEC60947-4-2 defines the protection classes giving the starting capacities of the motor (warm or cold start) without thermal faults. Different protection classes are given for a COLD state (corresponding to a stabilised motor thermal state, switched off) and for a WARM state (corresponding to a stabilised motor thermal state, at nominal power).

The starter is factory-set to protection class 10.

This protection class can be modified using the PrO menu.

The thermal protection displayed by the starter corresponds to the iron time constant.

- An overload alarm is activated if the motor exceeds its nominal temperature rise threshold (motor thermal state = 110%).
- A thermal fault stops the motor if it exceeds the critical temperature rise threshold (motor thermal state = 125%).

In the event of a prolonged start, the starter can trip on a fault or thermal alarm even if the value displayed is less than the trip value.

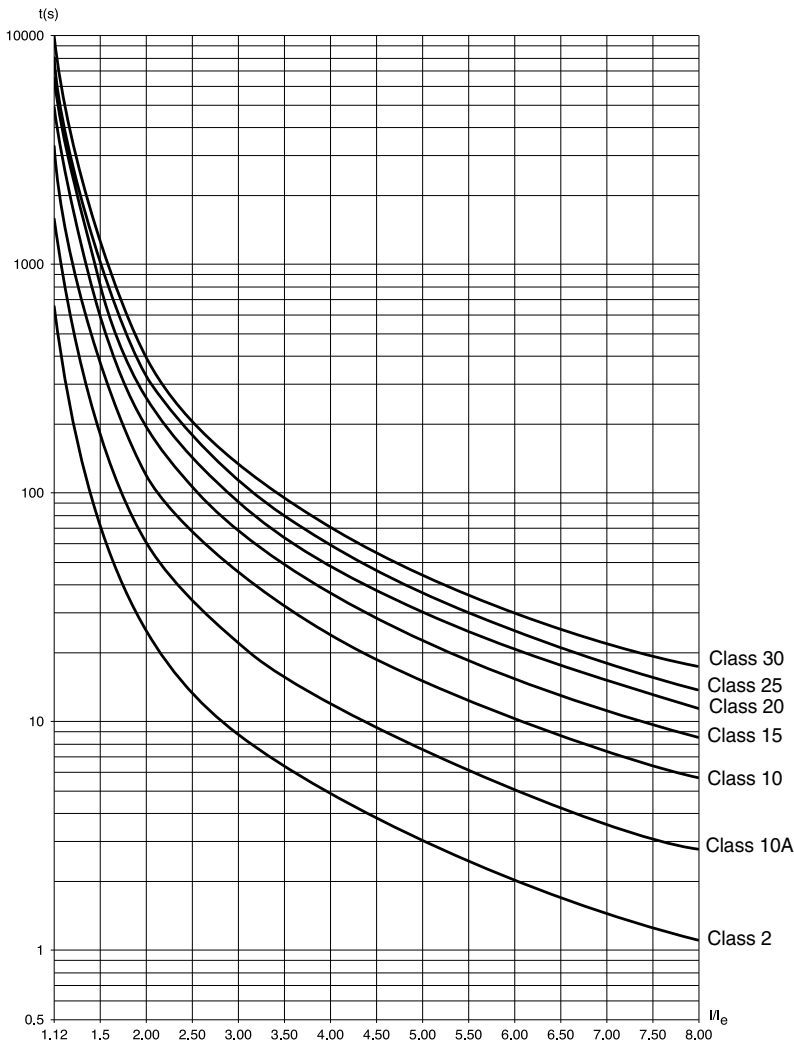
The thermal fault can be indicated by relay R1 if thermal protection has not been disabled.

After the motor has stopped or the starter has been switched off, the thermal state is calculated even if the control circuit is not powered. The Altistart thermal control prevents the motor from restarting if the temperature rise is too high.

If a special motor is used (flameproof, submersible, etc.) thermal protection should be provided by PTC probes.

Motor thermal protection

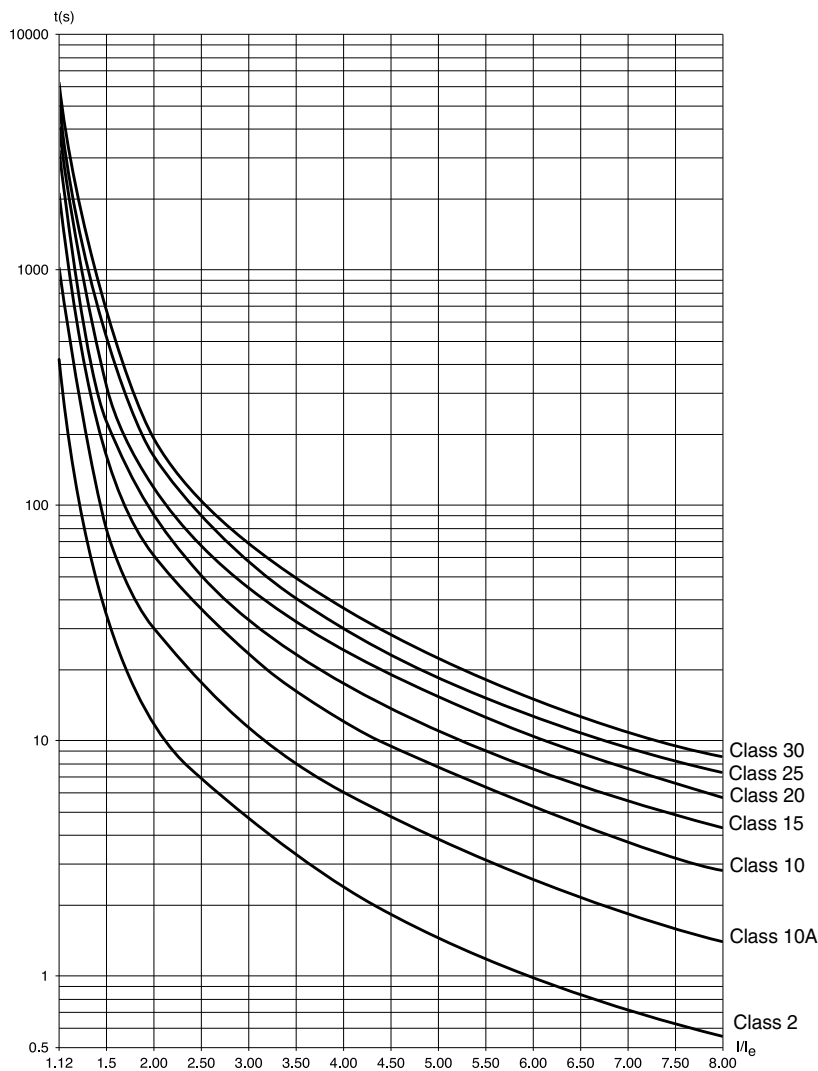
Cold curves



Trip time for a standard application (class 10)		Trip time for a severe application (class 20)	
3 In	5 In	3.5 In	5 In
46 s	15 s	63 s	29 s

Motor thermal protection

Warm curves



Trip time for a standard application (class 10)		Trip time for a severe application (class 20)	
3 In	5 In	3.5 In	5 In
23 s	7.5 s	32 s	15 s

Motor thermal protection with PTC probes

PTC probes integrated in the motor to measure its temperature can be connected to the control card terminals. This analog value is managed by the starter.

The "PTC probe thermal overshoot" value can be processed and used in two ways:

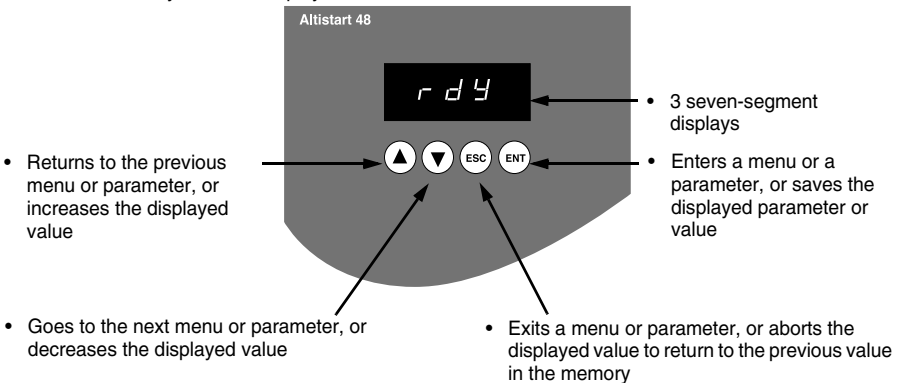
- stop in the event of a fault if the signal is active
- activate an alarm if the signal is active. This alarm can be displayed in a starter status word (serial link) or on a configurable logic output.

Note:

PTC probe protection does not deactivate the motor thermal protection provided by the calculation. Both types of protection can operate in parallel.

Display unit and programming

Functions of the keys and the display



Pressing  or  does not store the choices.

Store, save the displayed choice: 

The display flashes when a value is stored.

Display principle

The display principle for numbers differs depending on the maximum scale of the parameter and its value.

- Max. scale 9990:
 - values 0.1 to 99.9 (examples: 05.5 = 5.5; 55.0 = 55; 55.5 = 55.5)
 - values 100 to 999 (example: 555 = 555)
 - values 1000 to 9990 (example: 5.55 = 5550)
- Max. scale 99900:
 - values 1 to 999 (examples: 005 = 5; 055 = 55; 550 = 550)
 - values 1000 to 9990 (example: 5.55 = 5550)
 - values 10000 to 99900 (example: 55.5 = 55500)

Display unit and programming

Accessing menus



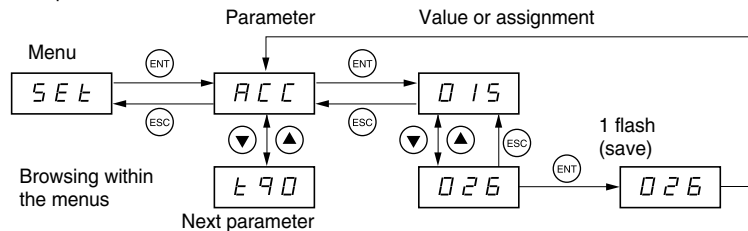
- (1) Management of the displayed value "XXX" is given in the table on the next page.
(2) Menu St2. is only visible if the "second set of motor parameters" function is configured.

Accessing parameters

Store, save the displayed choice: (ENT)

The display flashes when a value is stored.

Example:



Display of starter status

The displayed value "XXX" follows the following rules:

Value displayed	Condition
Fault code	Faulty starter
nLP rdY	Starter without run command and: • Power not supplied • Power supplied
tbS	Starting time delay not elapsed
HEA	Motor heating in progress
Monitoring parameter selected by the user (SUP menu). Factory setting: motor current	Starter with run command
brL	Starter braking
Stb	Waiting for a command (RUN or STOP) in cascade mode

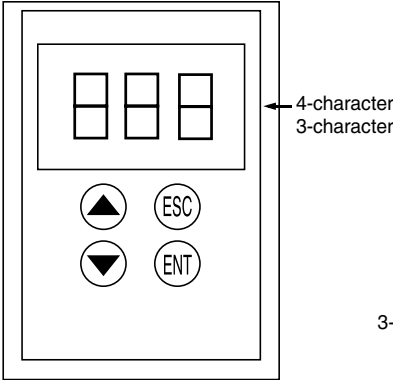
When current limiting is applied to the starter, the displayed value "XXX" flashes.

It is still possible to modify the parameters even if a fault occurs on the starter.

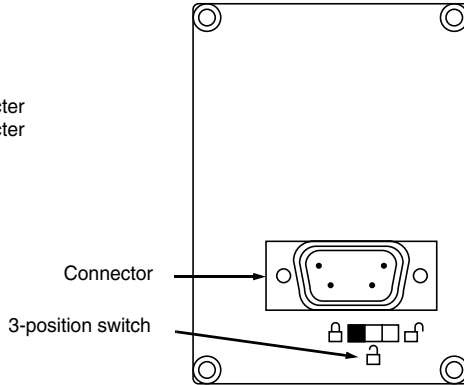
Remote terminal option

The **VW3 G48101** remote terminal can be mounted on the door of the wall-mounted or floor-standing enclosure with a seal which offers IP 65 protection. It has a 3 m cable with connectors and communication is via the RJ45/Modbus connection on the starter (**see the manual supplied with the terminal**). It has the same display and the same programming buttons as the Altistart 48 with the addition of a menu access locking switch.

View of the front panel:



View of the rear panel:

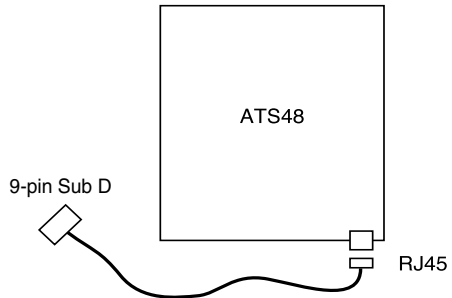


Control of the remote terminal switch

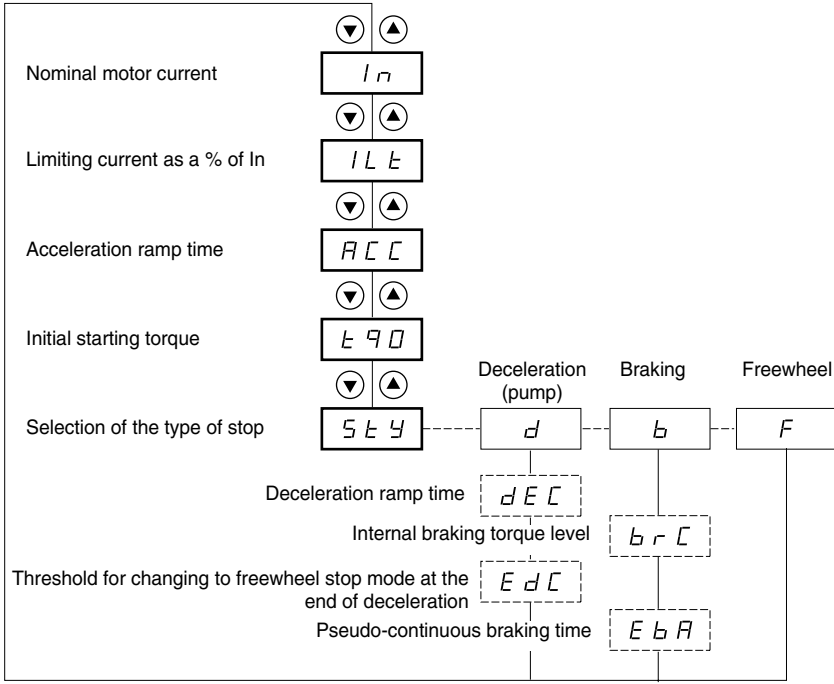
The 3-position switch on the terminal is used as follows:

- locked position  : only the monitoring parameters can be accessed. When the starter is running, it is not possible to select a different parameter to be displayed.
- partly locked position  : limited access to the SEt, PrO and SUP menu parameters.
- unlocked position  : all parameters can be accessed.

Any display restrictions applied to the starter by the remote terminal switch will still be in force once the starter has been disconnected and even after it has been switched off.



Settings menu (Set)

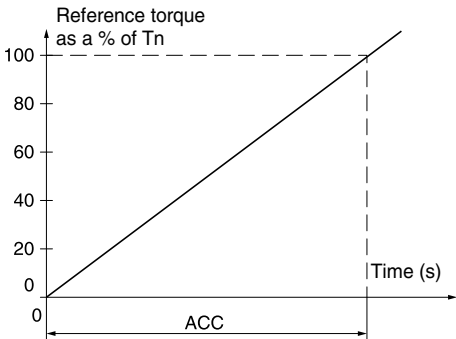


- Parameters in menu
- Can be selected
- Parameter appears according to selection

To access the parameters, see page 126.

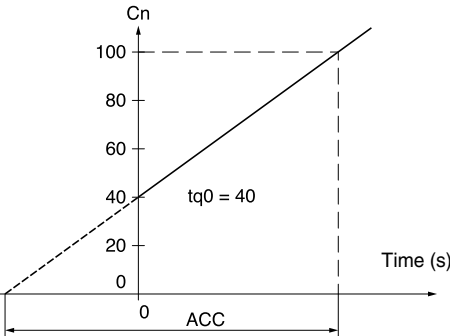
Settings menu (Set)

The settings parameters can only be modified when the motor is stopped.

Code	Description	Setting range	Factory setting
<i>I_n</i>	Nominal motor current Adjust the value of the nominal motor current indicated on the rating plate, even if the starter is connected in the motor delta winding (dLt in the PrO menu). Check that the current is between 0.4 and 1.3 ICL (ICL: starter rating).	0.4 to 1.3 ICL	(1)
<i>I_{Lt}</i>	Limiting current The limiting current ILt is expressed as a % of In. It is limited to 500% of ICL (starter rating, see "Starter-motor combinations", page 94). Limiting current = ILt x In. Example 1: In = 22 A, ILt = 300%, limiting current = 300% x 22 A = 66 A Example 2: ATS 48C21Q, with ICL = 210 A In = 195 A, ILt = 700%, limiting current = 700% x 195 = 1365, limited to 500% x 210 = 1050 A	150 to 700% of In, limited to 500% of ICL	400% of In
<i>ACC</i>	Acceleration ramp time This is the rise time of the starter torque between 0 and the nominal torque Tn, i.e. the gradient of the torque ramp on acceleration. 	1 to 60 s	15 s

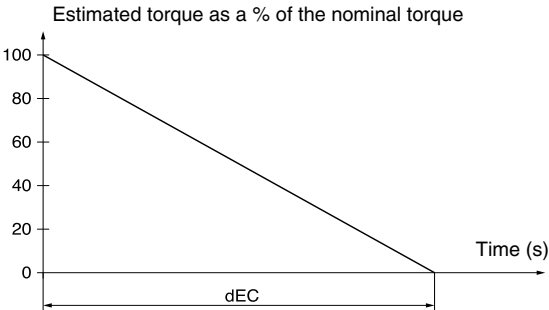
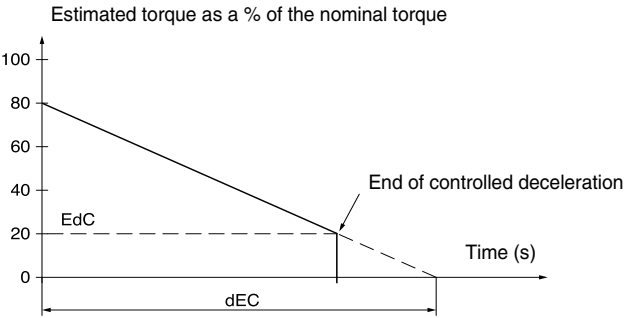
- (1) Factory setting of In corresponding to the usual value of a 4-pole 400 V standardised motor with class 10 protection (for ATS 48***Q).
Factory setting of In corresponding to the usual value of a 460 V standardised motor in accordance with NEC and with class 10 protection (for ATS 48***Y).

Settings menu (Set)

Code	Description	Setting range	Factory setting
4 9 0	Initial starting torque Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque. 	0 to 100% of Tn	20%
5 4 4	Selection of the type of stop Three types of stop are possible: - d - : Soft stopping by control of torque. The starter applies a motor torque in order to decelerate progressively on the ramp, avoiding a rapid stop. This type of stop reduces the risk of water hammer on a pump. - b - : Dynamic braking stop: The starter generates a braking torque in the motor which will slow the motor down if there is considerable inertia. - F - : Freewheel stop: No torque is applied to the motor by the starter. If the starter is connected to "delta in the motor", only stop type F is permitted.	d-b-F	-F-

Settings menu (Set)

ENGLISH

Code	Description	Setting range	Factory setting
dEC	Deceleration ramp time This parameter can only be accessed if StY = -d-. Can be used to set a time between 1 to 60 s to switch from the estimated torque to zero torque (= gradient of the torque ramp on deceleration when a -d- stop is applied). This modifies the progression of the deceleration and avoids hydraulic shocks in pump applications by modifying the gradient of the torque reference. 	1 to 60 s	15 s
EdC	Threshold for changing to freewheel stop mode at the end of deceleration This parameter can only be accessed if StY = -d- and if the CLP parameter in the drive menu (drC) is still set to the factory setting (On). Can be used to set the final torque level between 0 and 100% of the estimated torque at the start of deceleration. In pump applications, deceleration control is not necessarily below a load level set by Edc. If the estimated torque at the start of deceleration is below 20, i.e. 20% of the nominal torque, controlled deceleration is not activated, and the motor changes to freewheel mode. 	0 to 100%	20%

Settings menu (Set)

Code	Description	Setting range	Factory setting
b r C	Internal braking torque level This parameter can only be accessed if StY = -b-. For stop type -b-, used to adjust the braking intensity. Braking is active up to 20% of the nominal speed. The total stop of the motor is configured by adjusting the injection time of the pseudo-continuous current in the motor (on two phases). See the next parameter EbA. Pseudo-continuous injection time: $T2 = T1 \times EbA$ Note: Time T1 is not determined by brC. T1 is the time required in seconds for the motor to fall from 100% of the nominal speed to 20% (depends on the motor and application characteristics).	0 to 100%	50%
E b A	Pseudo-continuous braking time This parameter can only be accessed if StY = -b-. For stop type -b-, adjustment of the current injection time at the end of braking. Can be used to adjust the current injection time. Can be set at 20 to 100% of the dynamic braking time (T1). Example: Dynamic braking = 10 s (T1) The stopping time can vary from 2 to 10 s (T2) EbA = 20 Corresponds to an injection time of 2 s EbA = 100 Corresponds to an injection time of 10 s Factory setting: 20	20 to 100%	20%

Protection menu (PrO)

Motor thermal protection
Protection classes 10, 20, etc.



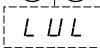
Activation of motor underload



Alarm Fault Deactivation



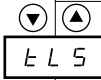
Motor underload threshold as a %
of the nominal torque



Motor underload time



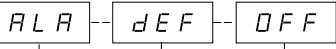
Excessive starting time (fault)
in seconds



Activation of current overload



Alarm Fault Deactivation



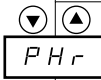
Current overload level as a %
of the nominal current



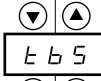
Current overload time



Acceptance of phase rotation, 123, 321



Time before restarting



Phase loss threshold



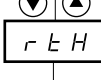
Activation of motor monitoring by PTC probes



Automatic restart



Reset thermal state



-  Parameters in menu
-  Can be selected
-  Parameter appears according to selection

To access the parameters, see page 126.

Protection menu (PrO)

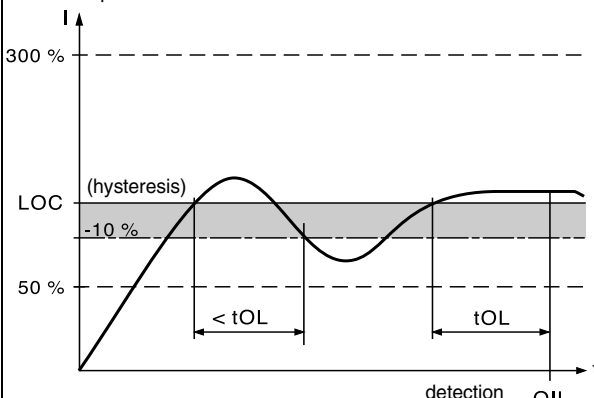
The protection parameters can only be modified when the motor is stopped.

Code	Description	Setting range	Factory setting
<i>tHP</i>	Motor thermal protection		10
	See "Thermal protection", page 121. 30: class 30 25: class 25 20: class 20 (severe application) 15: class 15 10: class 10 (standard application) 10A: class 10A 2: sub-class 2 OFF: no protection		
<i>ULL</i>	Activation of motor underload		OFF
	If the motor torque is less than an adjustable threshold LUL for a period of time longer than an adjustable value tUL: - ALA: an alarm is activated (internal bit and configurable logic output) - dEF: the starter is locked and the ULF fault is displayed - OFF: no protection		
	The graph plots torque T (in C_n) against time t. The nominal torque is 100%. A horizontal line at LUL (ranging from 20% to 100% of T_n) represents the underload threshold. A hysteresis band is shown around LUL. The graph illustrates the detection of underload when torque falls below LUL for a duration t_{UL}, leading to a fault state ULL.		
<i>LUL</i>	Motor underload threshold	20% to 100% of T_n	60%
	This parameter is not available if $ULL = OFF$. LUL can be set at between 20% and 100% of the nominal motor torque.		
<i>tUL</i>	Motor underload time	1 to 60 s	60 s
	This parameter is not available if $ULL = OFF$. Time delay tUL is activated as soon as the motor torque falls below threshold LUL . It is reset to zero if the torque rises above this threshold LUL by + 10% (hysteresis).		
<i>tLS</i>	Excessive starting time	10 to 999 s or OFF	OFF
	If the starting time exceeds the value of tLS , the starter is locked and displays the fault StF. The conditions for the end of starting are: line voltage applied to the motor (min. firing angle) and motor current less than 1.3 I_n . - OFF: no protection		



The configuration of a monitoring alarm (ALA) indicates the presence of a fault but will not directly protect the installation

Protection menu (PrO)

Code	Description	Setting range	Factory setting
0 IL	Activation of current overload		OFF
Function active only in steady state If the motor current exceeds an adjustable threshold LOC for a period of time longer than an adjustable value tOL: - ALA: an alarm is activated (internal bit and configurable logic output) - dEF: the starter is locked and the OLC fault is displayed - OFF: no protection 			
L OL	Current overload threshold	50% to 300% of In	80%
This parameter is not available if OIL = OFF. LOC can be set at between 50% and 300% of the nominal motor current.			
t OL	Current overload time	0.1 to 60 s	10 s
This parameter is not available if OIL = OFF. Time delay tOL is activated as soon as the motor current rises above threshold LOC. It is reset to zero if the current falls below this threshold LOC again by at least 10% (hysteresis).			



The factory configuration of a monitoring alarm (ALA) indicates the presence of a fault but will not directly protect the installation

Protection menu (PrO)

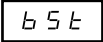
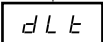
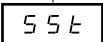
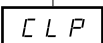
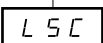
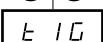
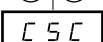
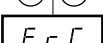
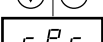
Code	Description	Setting range	Factory setting
PHr	Protection against line phase inversion	321 or 123 or no	no
	If the line phases are not in the order configured, the starter locks and displays the fault PIF. - 321: reverse (L3 - L2 - L1) - 123: forward (L1 - L2 - L3) - no: no monitoring		
tbS	Time before starting	0 to 999 s	2 s
	Avoids starts in quick succession which may overheat the motor. The time delay starts when the motor changes to freewheel mode. In 2-wire control, the motor is restarted after the time delay if the RUN command input is still activated. In 3-wire control, the motor is restarted after the time delay if a new RUN command is sent (rising edge). The starter displays "tbS" during the time delay.		
PHL	Phase loss threshold	5 to 10%	10%
	If the motor current falls below this threshold in one phase for 0.5 s or in all three phases for 0.2 s, the starter locks and displays the fault PHF. Can be set at between 5 and 10% of the ICL starter rating.		
PLC	Activation of motor monitoring by PTC probes		OFF
	The PTC probes on the motor must be connected to the correct analog input. This protection is independent of the calculated thermal protection (tHP parameter). Both types of protection can be used simultaneously. - ALA: an alarm is activated (internal bit and assignable logic output) - dEF: the starter is locked and the OtF fault is displayed - OFF: no protection		
RrS	Automatic restart	On - OFF	OFF
	After locking on a fault, if the fault has disappeared and the other operating conditions permit the restart. A series of automatic attempts are made to restart the starter at intervals of 60 s. If a restart has not been possible after 6 attempts, the procedure is abandoned and the starter remains locked until it is switched off then switched on again or reset manually (see "Faults - causes - remedies"). The following faults permit this function: PHF, FrF, CLF, USF. The starter fault relay remains activated if this function is active. The run command must be maintained. This function can only be used in 2-wire control. - OFF: Function inactive - On: Function active  Check that an accidental start will not endanger personnel or equipment in any way		
r t H	Reset motor thermal state calculated by the starter	no - YES	no
	- no: Function inactive - YES: Function active		



The factory configuration of a monitoring alarm (ALA) indicates the presence of a fault but will not directly protect the installation

Advanced settings menu (drC)

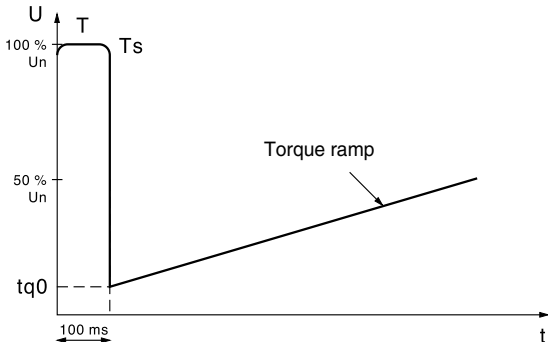
ENGLISH

	 
Torque limit as a % of the nominal torque	
	 
Voltage boost level	
	 
Starter with delta winding connection	
	 
Tests on small motor	
	 
Torque control	
	 
Stator loss compensation	
	 
Deceleration gain	
	 
Activation of the cascade function	
	 
Line voltage (to calculate P in kW)	
	 
Line frequency	
	 
Reset kWh or the operating time	
	 
Return to factory settings	

 Parameters in menu

Advanced settings menu (drC)

The Advanced setting parameters can only be modified when the motor is stopped.

Code	Description	Setting range	Factory setting
t L l	Torque limit Can be used to limit the torque reference to avoid regenerative behaviour in applications with high inertia. Can be used for constant torque starting if tq0 = tLI. - OFF: no limit - 10 to 200: limit set as a % of the nominal torque	10 to 200% or OFF	OFF
b 5 t	Voltage boost level An adjustable voltage can be applied when a run command is present for 100 ms. Once this time has elapsed, the starter follows a standard acceleration ramp starting at the initial torque value set (tq0). This function can be used to avoid any "starting" torque (phenomenon caused by friction on stopping or by mechanical play). - OFF: Function inactive - 50 to 100: setting as a % of the nominal motor voltage	50 to 100% or OFF	OFF
	  In the case of overrating the starter ($I_m \text{ motor} > I_m \text{ ATS48}$), a value of the parameter bSt too high can cause the starter to trip in OCF		
d L t	Starter with delta winding connection This configuration will permit a rating increase of 1.7 in the starter power but does not permit braking or deceleration. - OFF: normal line torque - On: motor with delta winding connection The nominal motor current I_n is the same as that specified on the motor rating plate and the current displayed corresponds to the line current of the line supply. The nominal current value I_n (SEt menu) is the same as that specified on the motor rating plate for the delta connection. The starter carries out the conversion itself to control the current in the windings. This parameter can only be accessed for ATS 48•••Q starters.	on - OFF	OFF
	 • With this function, only freewheel type stopping is possible • Cascading is not possible • Preheating is not possible		

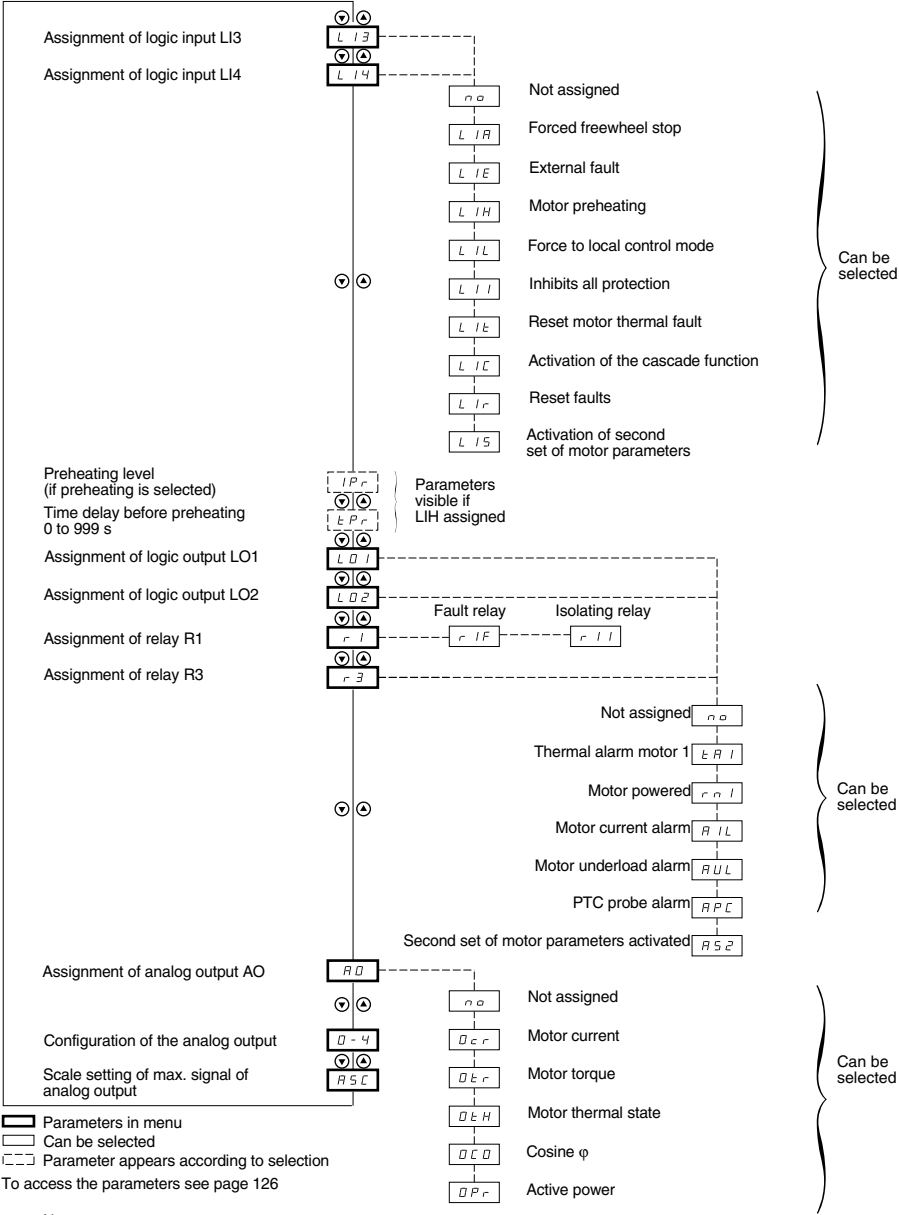
Advanced settings menu (drC)

Code	Description	Setting range	Factory setting
55L	Tests on small motor To check the starter in a testing or maintenance environment, on a motor whose power is very much lower than the starter rating (in particular for high power starters). The torque control parameter CLP is automatically deactivated. - OFF: function inactive - On: function active SSt returns to the OFF state as soon as the control voltage is disconnected. On the next power up, the PHF fault and the CLP parameter return to their initial configuration.	On - OFF	OFF
CLP	Torque control (type of control) - OFF: function inactive - On: function active In the On position, starting and deceleration follow the torque ramp. In the OFF position, starting and deceleration are controlled by voltage variation. Voltage control is recommended for applications which use motors in parallel on one starter or a motor whose power is very low in relation to the starter rating (use of an undersized motor to test the starter) (CLP = OFF).	On-OFF	On
L5C	Stator loss compensation Parameter active in acceleration phases (and deceleration phases if StY = -d-). In the event of torque oscillations, reduce this parameter gradually until the device is functioning correctly. Oscillations are most common if the starter is connected in the motor delta winding or in motors with excessive slip.	0 to 90%	50%
LIG	Deceleration gain (for torque control) This parameter can only be accessed if CLP = On and if the StY parameter (SEt Settings menu) = -d-. Can be used to eliminate instability during deceleration. Adjust the parameter in accordance with the oscillations.	10 to 50%	40%
CSL	Activation of the cascade function See page 120 - On: function active - OFF: function inactive This parameter can only be accessed if relay R1 has previously been assigned to the "isolating relay" function and if the "forced freewheel stop", "starter in the motor delta winding" and "preheating" functions are not configured. Assign an input LI = LIC. 255 motors max.	On-OFF	OFF
ULn	Line voltage This parameter is used to calculate the power displayed (LPr and LAP parameters from the SUP menu). The display will only be accurate if this parameter has been set correctly.	170 to 460 V (ATS48••Q) 180 to 790 V (ATS48••Y)	400 V (ATS48••Q) 690 V (ATS48••Y)

Advanced settings menu (drC)

Code	Description	Adjustment range	Factory setting
FrL	Line frequency	50-60-AUt	AUt
	- 50: 50 Hz (monitoring tolerance of frequency fault FrF = $\pm 20\%$). - 60: 60 Hz (monitoring tolerance of frequency fault FrF = $\pm 20\%$). - AUt: automatic recognition of the line frequency by the starter with frequency fault monitoring tolerance FrF = $\pm 5\%$. Selections 50 and 60 are recommended if the power supply is provided by a generating set, given their high tolerance.		
rPr	Reset kWh or the operating time	no-APH-trE	no
	- no: function inactive - APH: kWh reset to zero - trE: operating time reset to zero The reset command must be confirmed with ENT. APH and trE take effect immediately. The parameter then automatically returns to no.		
FLS	Return to factory settings	no-YES	no
	Used to reset all parameters to their factory settings. - no: function inactive - YES: function active, must be pressed and held down (for approx. 2 s) in order to be taken into account. The display flashes to confirm. The FCS parameter is then automatically reset to no by pressing ESC. This parameter cannot be modified via the remote terminal.		

I/O menu (IO)



The I/O parameters can only be modified when the motor is stopped.

Code	Description	Setting range	Factory setting
L 13 L 14	Logic inputs The selected function is active if the input is powered up. - no: not assigned. - LIA: forced freewheel stop as soon as a STOP command is received. This selection does not appear if the CSC parameter in the drC menu is set to "On". Forces the configuration of a freewheel type stop, but does not control the stop. - LIE: external fault. Enables the starter to detect an external user fault (level, pressure, etc.). The motor comes to a freewheel stop and the starter displays EtF. - LIH: (1) motor preheating. This selection does not appear if the CSC parameter in the drC menu is set to "On". Used to prevent the motor from freezing or to prevent temperature deviations which may cause condensation. Once the motor has stopped an adjustable current IPr flows through it after an adjustable time delay tPr, if the input is active. This current heats the motor without causing it to rotate. IPr and tbr must be adjusted (see below). Speed RUN LI IPr current tbS tPr Preheating starts when the input is activated and the motor has stopped, after time delays tPr and tbS (PrO menu) have elapsed. Preheating stops if the input is deactivated, if a run command is sent or if the STOP input is activated. - LIL: force to local control mode. If a serial link is used, changes from line mode (control via serial link) to local mode (control via terminals). - LLI: (1) inhibits all protection. Warning: This type of use invalidates the starter warranty. Used to override the starter in the event of an emergency (smoke extraction system for example). - LIt: reset motor thermal fault - LIC: activation of the cascade function. In this case motor thermal protection is disabled and relay R1 must be configured as an isolating relay. Can be used to start and decelerate several identical motors one after the other with a single starter (see application diagram). - LIr: reset faults which can be reset - LIS: activation of second set of motor parameters. Used to start and decelerate two different motors one after the other or one motor with two different configurations using a single starter.		LIA LIL

(1) In order for this assignment o take effect, ENT must be pressed for 10 s (confirmed by flashing display).
This parameter cannot be modified via the remote terminal.

I/O menu (IO)

Code	Description	Setting range	Factory setting
IPr	Preheating level	0 to 100%	0%
	This parameter appears after LI3 or LI4 have been assigned to function LIH: motor preheating. It can be used to set the preheating current. Use a true value current reading ammeter to set the current level. Parameter In has no effect on the current IPr.		
tPr	Time delay before preheating	0 to 999 mn	5 mn
	This parameter appears after LI3 or LI4 have been assigned to function LIH: motor preheating. Preheating starts when the input is activated, after time delays tPr and tBS (PrO menu) have elapsed.		
L O 1 L O 2	Logic outputs		tAl rnl
	- no: not assigned. - tAl: motor thermal alarm. See page 121. - rnl: motor powered (indicates that there may be current in the motor). - AIL: motor current alarm (threshold OIL and time tOL of PrO menu exceeded). See "Function active only in steady state", page 136. - AUL: motor underload alarm (threshold LUL and time tUL of PrO menu exceeded). See page 135. - APC: motor PTC probe alarm. See "Activation of motor monitoring by PTC probes", page 137. - AS2: second set of motor parameters activated. See LIS "Logic inputs", page 143.		
r I	Relay R1		rIF
	- rIF: fault relay. Relay R1 is activated when the starter is powered up (minimum CL1/CL2 control). Relay R1 is deactivated when a fault occurs and the motor switches to freewheel mode. See the special case when the automatic restart function is activated and Faults - causes - remedies. - r1I: isolating relay. Relay R1 is designed to control the line contactor on the basis of the RUN and STOP commands and to indicate faults. Relay R1 is activated by a RUN command (or a preheating command). It is deactivated at the end of braking or deceleration or when the motor switches to freewheel mode after a STOP command. It is also deactivated when a fault occurs. The motor switches to freewheel mode at this point.		
r 3	Relay R3		rnl
	- no: not assigned. - tAl: motor thermal alarm. See page 121. - rnl: motor powered (indicates that there may be current in the motor). - AIL: motor current alarm (threshold OIL and time tOL of PrO menu exceeded). See "Function active only in steady state", page 136. - AUL: motor underload alarm (threshold LUL and time tUL of PrO menu exceeded). See page 135. - APC: motor PTC probe alarm. See "Activation of motor monitoring by PTC probes", page 137. - AS2: second set of motor parameters activated. See LIS "Logic inputs", page 143.		

End of starting relay R2 (cannot be assigned)

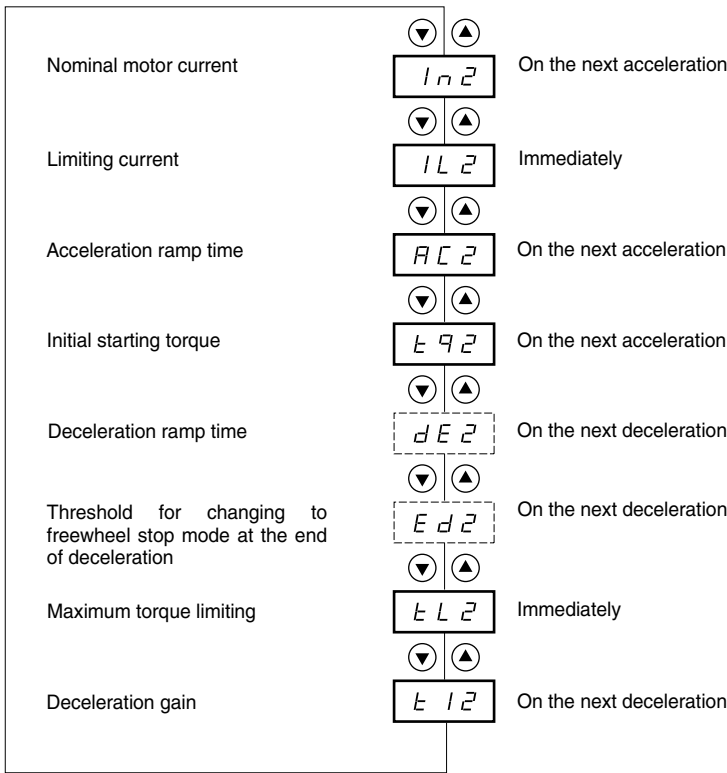
The end of starting relay R2 is activated when the starter is powered up, no faults are present and the motor has completed the start-up phase. It is deactivated in the event of a stop request or a fault. It has one normally open contact (N/O).

It can be used to bypass the ATS 48 at the end of the starting phase.

Code	Description	Setting range	Factory setting
R0	Analog output		OCr
	- no: not assigned - OCr: motor current - Otr: motor torque - OtH: motor thermal state - OCO: cosine φ - OPr: active power		
	Configuration of the type of signal supplied by output AO	020 - 420	020
	- 020: 0 - 20 mA signal - 420: 4 - 20 mA signal		
	Scale setting of max. signal of the analog output	50 to 500%	200
R5C	As a percentage of the nominal value of the parameter configured or of 1 for the cosine φ .		

2nd motor parameters menu (St2)

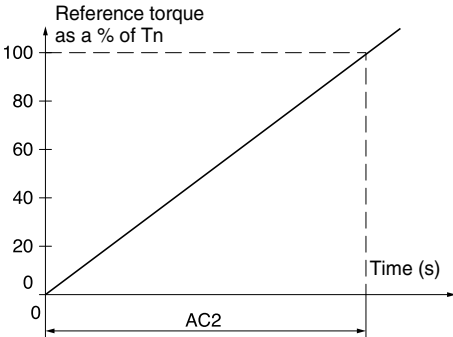
The parameters for 1st or 2nd motor are selected by the logic input (LIS). Taking into account the motor parameters selected :



-  Parameters in menu
-  Paramèter appears according to the selection and to the assignment of StY in the SEt menu

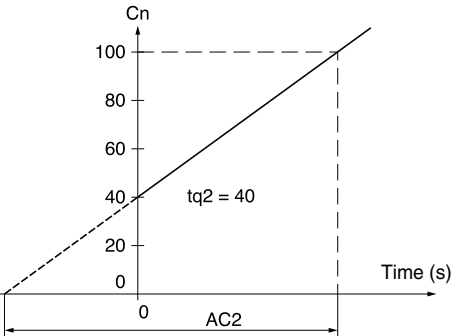
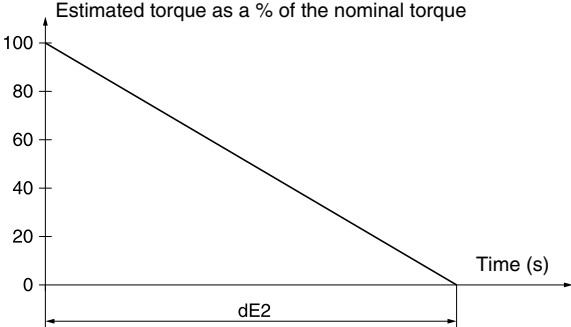
2nd motor parameters menu (St2)

This menu is only visible if a logic input is assigned to the function for activating a second set of motor parameters (LIS) in the I/O menu.

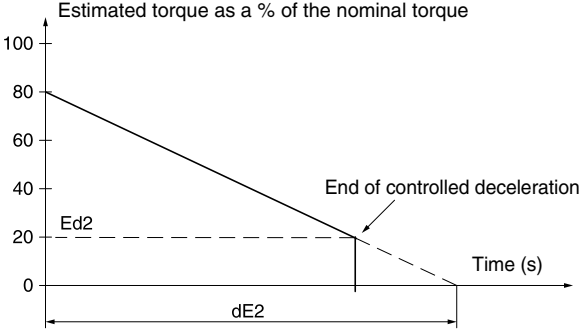
Code	Description	Setting range	Factory setting
<i>In2</i>	Nominal motor current	0.4 to 1.3 ICL	(1)
	Adjust the value of the nominal motor current indicated on the rating plate, even if the starter is connected in the motor delta winding (PrO). Check that the current is between 0.4 and 1.3 ICL (ICL: starter rating). See "Starter-motor combinations", page 94.		
<i>IL2</i>	Limiting current	150 to 700% of In, limited to 500% of ICL	400% of In
	The limiting current IL2 is expressed as a % of In2. It is limited to 500% of ICL (starter rating, see "Starter-motor combinations", page 94). Limiting current = IL2 x In2 Example 1: In2 = 21 A, IL2 = 300%, limiting current = 300% x 21 A = 66 A Example 2: ATS 48C21Q, with ICL = 210 A In2 = 195 A, IL2 = 700%, limiting current = 700% x 195 = 1365, limited to 500% x 210 = 1050 A		
<i>AC2</i>	Acceleration ramp time	1 to 60 s	15 s
	This is the rise time of the starter torque between 0 and the nominal torque Tn, i.e. the gradient of the torque ramp on acceleration. 		

- (1) Factory setting of In2 corresponding to the usual value of a 4-pole 400 V standardised motor with class 10 protection (for ATS 48***Q).
Factory setting of In2 corresponding to the usual value of a 460 V standardised motor in accordance with NEC and with class 10 protection (for ATS 48***Y).

2nd motor parameters menu (St2)

Code	Description	Setting range	Factory setting
t 92	Initial starting torque	0 to 100% of Tn	20%
	Initial torque setting during the starting phases, varies from 0 to 100% of the nominal torque. 		
dE2	Deceleration ramp time	1 to 60 s	15 s
	This parameter can only be accessed if StY = -d-. Used to set a time between 1 to 60 s to switch from the estimated torque to zero torque (= gradient of the torque ramp on deceleration when a -d- stop is applied). This modifies the progression of the deceleration and avoids hydraulic shocks in pump applications by modifying the gradient of the torque reference. 		

2nd motor parameters menu (St2)

Code	Description	Setting range	Factory setting
Ed2	Threshold for changing to freewheel stop mode at the end of deceleration This parameter can only be accessed if StY = -d- and if the CLP parameter in the drive menu (drC) is still set to the factory setting (On). Used to set the final torque level between 0 and 100% of the torque estimated at the beginning of deceleration. In pump applications, deceleration control is not necessarily below a load level set by Ed2. If the estimated torque at the start of deceleration is below 20, i.e. 20% of the nominal torque, controlled deceleration is not activated, and the motor changes to freewheel mode.	0 to 100%	20%
	 Estimated torque as a % of the nominal torque 100 80 60 40 20 0 Ed2 End of controlled deceleration Time (s) dE2		
tL2	Maximum torque limit Used to limit the torque reference to avoid regenerative behaviour in applications with high inertia. Can be used for constant torque starting if tq2 = tL2. - OFF: no limit - 10 to 200: limit set as a % of the nominal torque	10 to 200% or OFF	OFF
t12	Deceleration gain (for torque control) This parameter can only be accessed if CLP = On and if the StY parameter (SEt Settings menu) = -d-. Used to eliminate instability during deceleration. Adjust the parameter in accordance with the oscillations.	10 to 50%	40%

Communication menu (COP)

ENGLISH

Starter address	▼▲ R d d
Communication speed	▼▲ ℓ b r
Communication format	▼▲ F □ r
Serial link timeout setting	▼▲ ℓ L P
Configuration of the link for communication with the remote terminal or the software workshop	▼▲ P □ ℓ

Parameters in menu

Communication menu COP

The communication menu parameters can only be modified when the motor is stopped.
The internal protocol used is Modbus.

Code	Description	Setting range	Factory setting
<i>Rdd</i>	Starter address by the RS485 serial link	0 to 31	0
<i>tbr</i>	Communication speed in kbps.	4.8 - 9.6 - 19.2	19.2
<i>FOr</i>	Communication format 8o1: 8 data bits, odd parity, 1 stop bit 8E1: 8 data bits, even parity, 1 stop bit 8n1: 8 data bits, no parity, 1 stop bit 8n2: 8 data bits, no parity, 2 stop bits		8n1
<i>LLP</i>	Serial link timeout setting (1)	0.1 to 60 s	5 s
<i>PCT</i>	Configuration of the serial link for communication with the remote terminal On: function active. Temporarily configures the starter (tbr and FOr) for communication with the remote terminal. OFF: function inactive PCT returns to the OFF state as soon as the control voltage is disconnected. On the next power up, the tbr and FOr parameters return to their initial configuration.		OFF



(1) Check that the time set will not interfere with the safe operation of the machine

Parameter displayed menu (SUP)

ENGLISH

Cosine φ	▼ ▲ COS	
Motor thermal state as a %	▼ ▲ thr	
Motor current	▼ ▲ LCr	
Operating time since the last reset	▼ ▲ rnt	
Active power as a %	▼ ▲ LP%	
Motor torque as a %	▼ ▲ Ltr	
Active power in kW	▼ ▲ LAP	Set ULn in the drC menu
Display of the current state (ACC, rUn, dEC, etc.)	▼ ▲ ELP	
Last fault detected	▼ ▲ LFt	
Phase rotation direction, 1-2-3 or 3-2-1	▼ ▲ PHE	
Terminal locking code	▼ ▲ Cd	

Parameters in menu

Parameter displayed menu (SUP)

The parameter to be displayed can be modified with the motor stopped or running.

The factory setting displays the motor current (parameter LCr).

The display chosen is saved by:

- Pressing the ENT key once: the choice is temporary, it will be cleared at the next power up.
- Pressing the ENT key again for 2 seconds: the display flashes, the choice is permanent and cannot be modified.

Code	Parameter	Unit
CD5	Cosine φ	0.01
tHr	Motor thermal state Varies from 0 to 125% 100% corresponds to the nominal thermal state for the current In set.	%
LCr	Motor current In amperes up to 999 A (examples: 01.5 = 1.5 A; 15.0 = 15 A; 150 = 150 A) In kiloamperes starting at 1000 A (examples: 1.50 = 1500 A; 1.15 = 1150 A)	A or kA
rne	Operating time in hours since the last reset. In hours up to 999 hrs (examples: 001 = 1 hr; 111 = 111 hrs) In kilo-hours from 1000 to 65535 (examples: 1.11 = 1110 hrs; 11.1 = 11100 hrs) Above 65535 hrs (65.5) the display is reset to zero. Operating time is counted when the motor is not stopped, i.e. when the thyristors are fired (heating, acceleration, steady state, deceleration, braking) and in continuous bypass operation. The hour counter can be reset in line mode using the control word or via the terminal with the motor stopped. When the control part is switched off the hour counter is saved in the EEPROM.	h or kh
LP r	Active power Varies from 0 to 255% 100% corresponds to the power at nominal current and at full voltage.	%
Lt r	Motor torque Varies from 0 to 255% 100% corresponds to the nominal torque.	%
LAP	Active power in kW This parameter requires configuration of the exact value of the line voltage ULn in the drC menu.	kW
EEA	Display of the current state - nLP: starter without run command and power not supplied - rdY: starter without run command and power supplied - tbS: starting time delay not elapsed - ACC: acceleration in progress - dEC: deceleration in progress - rUn: steady state operation - brL: braking in progress - CLl: starter in current limiting mode - nSt : force to freewheel stop by serial link	
LFt	Last fault detected (see page 157). If no faults have been saved, the display shows nDF .	
PHE	Phase rotation direction viewed from the starter - 123: forward (L1 - L2 - L3) - 321: reverse (L3 - L2 - L1)	

Parameter displayed menu (SUP)

Code	Parameter
└ 0 d	Terminal locking code Enables the starter configuration to be protected using an access code. Caution: Before entering a code, do not forget to make a careful note of it • OFF: no access locking codes - To lock access, enter a code (2 to 999). The display can be incremented using the ▲ key. Now press ENT. "On" appears on the screen to indicate that the parameters have been locked. • On: a code is locking access (2 to 999) - To unlock access, enter the code (incrementing the display using the ▲ key) and press ENT. The code remains on the display and access is unlocked until the next power down. Parameter access will be locked again on the next power-up. - If an incorrect code is entered, the display changes to "On" and the parameters remain locked. • XXX: parameter access is unlocked (the code remains on the screen). - To reactivate locking with the same code when the parameters have been unlocked, return to "On" using the ▼ button then press ENT. "On" appears on the screen to indicate that the parameters have been locked. - To lock access with a new code when the parameters have been unlocked, enter a new code (increment the display using the ▲ or ▼ keys) and press ENT. "On" appears on the screen to indicate that the parameters have been locked. - To clear locking when the parameters have been unlocked, return to "OFF" using the ▼ button and press ENT. "OFF" remains on the screen. The parameters are unlocked and will remain unlocked until the next restart.

When access is locked using a code, only the monitoring parameters can be accessed, with only a temporary choice of parameter displayed.

Compatibility table

The choice of application functions can be limited by the incompatibility between certain functions. The functions that are not listed in the table are not incompatible with any other functions.

Functions	Soft stop	Dynamic braking stop	Force freewheel stop	Thermal protection	Loss of a motor phase	Connecting to "delta in the motor"	Test on small motor	Cascade	Preheating
Soft stop									
Dynamic braking stop									
Force freewheel stop									
Thermal protection									(2)
Loss of a motor phase						(1)			(1)
Connecting to "delta in the motor"					(1)				
Test on small motor									
Cascade									
Preheating				(2)	(1)				

	Compatible functions
	Incompatible functions
	Not significant

(1) Motor phase loss not detected

(2) While motor's preheating, the thermal protection is not assured. Set the preheating current IP_r.

Maintenance

Servicing

The Altistart 48 does not require any preventative maintenance. It is nevertheless advisable to perform the following regularly:

- Check the condition and tightness of connections
- Ensure that the temperature around the unit remains at an acceptable level and that ventilation is effective (average service life of fans: 3 to 5 years depending on the operating conditions)
- Remove any dust from the heatsink if necessary

Assistance with maintenance

If a problem arises during setup or operation, ensure that the recommendations relating to the environment, mounting and connections have been observed.

The first fault detected is memorized and displayed on the screen: the starter locks and relays R1 and R2 change state according to their assignment.

Clearing the fault

Switch off the starter power supply in the event of a fault which cannot be reset.

Wait for the display to go off completely.

Find the cause of the fault in order to correct it.

Restore the power supply: this clears the fault if it has disappeared.

In some cases there may be an automatic restart once the fault has disappeared if this function has been programmed.

Monitoring menu

This is used to prevent and find the causes of faults by displaying the starter status and its current values.

Spares and repairs

Consult Schneider Electric product support.

As a general rule, if a problem arises when the starter is started, it is advisable to return to the factory settings and repeat your settings step by step.

Starter does not start, no fault displayed

- No display: check that the line supply is present on the control supply CL1/CL2 (see page 109).
- Check that the code displayed does not correspond to the normal state of the starter (see page 127).
- Check for the presence of the RUN/STOP commands (see page 110).

Faults which cannot be reset

When this type of fault appears the starter locks and the motor switches to freewheel mode.

Signalling:

- Opening of end of starting relay R2
- Opening of relay R1 (following starter locking)
- Fault code flashes on the display
- Storing of the last 5 faults, visible with the PowerSuite software workshop

Restart conditions:

- Disappearance of the causes of the fault
- Disconnection and reconnection of the control supply

Fault displayed	Probable cause	Procedure, remedy
<i>InF</i>	Internal fault	Disconnect and reconnect the control supply. If the fault persists, contact Schneider Electric product support.
<i>OCF</i>	Overcurrent: • impeding short-circuit on starter output • internal short-circuit • bypass contactor stuck • overrate starter	Switch the starter off. • Check the connecting cables and the motor isolation • Check the thyristors • Check the bypass contactor (contact stuck) • Check the parameter value bSt in the menu drC page 139
<i>P IF</i>	Phase inversion Line phase inversion does not conform to the selection made by PHr in the Protection menu.	Invert two line phases or set PHr = no
<i>EEF</i>	Internal memory fault	Disconnect and reconnect the control supply. If the fault persists, contact Schneider Electric product support.

Faults which can be reset as soon as their causes disappear

When this type of fault appears the starter locks and the motor switches to freewheel mode.

Signalling:

- Opening of end of starting relay R2.
- Opening of relay R1 only if it is configured as an isolating relay.
- The fault code flashes on the display as long as the fault is present.
- Storing of the last 5 faults, visible with the PowerSuite software workshop.

Restart conditions:

- Disappearance of the causes of the fault.
- In 2-wire control the run command must be maintained on the RUN input.
- In 3-wire control a new run command (rising edge) is required on the RUN input.

Fault displayed	Probable cause	Procedure, remedy
CF F	Invalid configuration on power-up	• Revert to the factory setting in the drive menu drC. • Reconfigure the starter.
CF I	Invalid configuration The configuration loaded in the starter via the serial link is incompatible.	• Check the configuration loaded previously. • Load a compatible configuration.

Faults which can be reset and can generate an automatic restart (1)

When this type of fault appears the starter locks and the motor switches to freewheel mode.

Signalling with automatic restart:

- Opening of end of starting relay R2
- Opening of relay R1 only if it is configured as an isolating relay. R1 remains closed if it is configured as a fault relay, see page 144
- The fault code flashes on the display as long as the fault is present
- Storing of the last 5 faults, visible with the PowerSuite software workshop

Restart conditions for the following faults with automatic restarting (in 2-wire control only):

- Disappearance of the causes of the fault
- Run command maintained on the RUN input
- 6 restart attempts are carried out at intervals of 60 seconds. At the 6th attempt if the fault is still present it trips requiring a manual reset (see following page) and R1 opens if it is configured as a fault relay

Fault displayed	Probable cause	Procedure, remedy
<i>PHF</i>	Loss of a line phase Loss of a motor phase If the motor current falls below an adjustable threshold PHL in one phase for 0.5 s or in the three phases for 0.2 s. This fault can be configured in the Protection menu PrO, parameter PHL.	• Check the line, the connection to the starter and any isolating devices located between the line and the starter (contactor, fuses, circuit-breaker, etc.). • Check the motor connection and any isolating devices located between the starter and the motor (contactors, circuit-breakers, etc.). • Check the motor state. • Check that the configuration of the PHL parameter is compatible with the motor used.
<i>FrF</i>	Line frequency, out of tolerance This fault can be configured in the Advanced settings menu drC, parameter FrC.	• Check the line. • Check that the configuration of the FrC parameter is compatible with the line used (generating set for example).

Restart conditions for the following faults:

- Disappearance of the causes of the fault
- Run command maintained (2-wire control only)

Fault displayed	Probable cause	Procedure, remedy
<i>USF</i>	Power supply fault on a run command	• Check the power supply circuit and voltage.
<i>CLF</i>	Control line failure	• Loss of CL1/CL2 for more than 200 ms

(1) If the automatic restart function is not selected, see page 160 for the signalling and restart conditions of these faults.

Faults which can be manually reset

When this type of fault appears the starter locks and the motor switches to freewheel mode.

Signalling:

- Opening of end of starting relay R2
- Opening of relay R1
- The fault code flashes on the display as long as the fault is present
- Storing of the last 5 faults, visible with the PowerSuite software workshop

Restart conditions:

- Disappearance of the causes of the fault
- A run command (2 or 3-wire control, requires a rising edge on the RUN input) to reset the fault (1)
- Another run command (2 or 3-wire control, requires a rising edge on the RUN input) to restart the motor

Fault displayed	Probable cause	Procedure, remedy
5 L F	Serial link fault	• Check the RS485 connection.
E L F	External fault	• Check the fault taken into account.
5 L F	Excessive starting time	• Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). • Check the value of the tLs setting in the PrO menu page 135. • Check the sizing of the starter-motor in relation to the mechanical requirement.
OL L	Current overload	• Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). • Check the value of the LOC and tOL parameters in the PrO menu page 136.
OL F	Motor thermal fault	• Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). • Check the sizing of the starter-motor in relation to the mechanical requirement. • Check the value of the tHP parameter in the PrO menu page 135 and that of the In parameter in the SEt menu page 130. • Check the electrical isolation of the motor. • Wait for the motor to cool before restarting.
OH F	Starter thermal fault	• Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). • Check the sizing of the starter in relation to the motor and the mechanical requirement. • Check the operation of the fan (if the ATS48 used has one), ensuring that the air passage is not obstructed in any way and the heatsink is clean. Ensure that the mounting recommendations are observed. • Wait for the ATS48 to cool before restarting.

(1) A reset will not take place on a run command if LI is assigned to the "fault reset (LIr)" function.

Faults which can be manually reset

Fault displayed	Probable cause	Procedure, remedy
OTF	Motor thermal fault detected by the PTC probes	• Check the mechanism (wear, mechanical play, lubrication, blockages, etc.). • Check the sizing of the starter-motor in relation to the mechanical requirement. • Check the value of the PTC setting in the PrO menu page 137. • Wait for the motor to cool before restarting.
ULF	Motor underload	• Check the hydraulic circuit. • Check the value of the LUL and tUL parameters in the Pro protection menu page 135.
LF	Locked rotor in steady state This fault is only active in steady state with starter bypass contactor. It is detected if the current in a phase is greater than or equal to 5 In for more than 0.2 s.	• Check the mechanism (wear, mechanical play, lubrication, blockages, etc.).

Reset faults using a logic input

If a logic input LI is configured as "reset motor thermal fault" or "reset faults which can be reset", the following conditions must be met:

- A pulse on logic input LI
- In 2-wire control the motor will restart if the run command is maintained on the RUN input
- In 3-wire control the motor will restart on a new run command (rising edge) on the RUN input

Configuration/Settings tables

ATS 48 starter.....
Customer identification no.(if applicable).....
Access code (if applicable).....

Settings menu *SEt*

Code	Factory setting	Customer setting	Code	Factory setting	Customer setting
<i>In</i>	(1)		<i>dEt</i>	15 s	
<i>ILt</i>	400%		<i>Edt</i>	20%	
<i>RLt</i>	15 s		<i>brt</i>	50%	
<i>t90</i>	20%		<i>EbR</i>	20%	
<i>StY</i>	-F-				

 The parameters in shaded boxes appear if the corresponding functions have been configured.

Protection menu *Pr0*

Code	Factory setting	Customer setting	Code	Factory setting	Customer setting
<i>tHP</i>	10		<i>tDL</i>	10.0	
<i>ULL</i>	OFF		<i>PHr</i>	no	
<i>LUL</i>	60%		<i>tbs</i>	2 s	
<i>tUL</i>	60%		<i>PHL</i>	10%	
<i>tLs</i>	OFF		<i>PtL</i>	OFF	
<i>0IL</i>	OFF		<i>Rrs</i>	OFF	
<i>L0C</i>	80%		<i>rtH</i>	no	

 The parameters in shaded boxes appear if the corresponding functions have been configured.

(1) Depends on the starter rating.

Configuration/Settings tables

Advanced settings menu *d r C*

Code	Factory setting	Customer setting	Code	Factory setting	Customer setting
<i>t L I</i>	OFF		<i>L 5 C</i>	50%	
<i>b 5 t</i>	OFF		<i>t I G</i>	40%	
<i>d L t</i>	OFF		<i>C 5 C</i>	OFF	
<i>5 5 t</i>	OFF		<i>U L n</i>	(1)	
<i>C L P</i>	On		<i>F r C</i>	AUt	

 The parameters in shaded boxes appear if the corresponding functions have been configured.

I/O menu *I O*

Code	Factory setting	Customer setting	Code	Factory setting	Customer setting
<i>L I 3</i>	LIA		<i>r I</i>	r1I	
<i>L I 4</i>	LIL		<i>r 3</i>	rn1	
<i>I P r</i>	0%		<i>R O</i>	OCr	
<i>t P r</i>	5 mn		<i>O 4</i>	020	
<i>L O I</i>	tA1		<i>R 5 C</i>	200	
<i>L O 2</i>	rn1				

 The parameters in shaded boxes appear if the corresponding functions have been configured.

- (1) -ATS 48 ***Q: 400 V
-ATS 48***Y: 460 V

Configuration/Settings tables

2nd motor parameters menu *5 E 2*

This menu is only visible if a logic input is assigned to the function for activating a second set of motor parameters (LIS) in the I/O menu.

Code	Factory setting	Customer setting	Code	Factory setting	Customer setting
<i>I n 2</i>	(1)		<i>d E 2</i>	15 s	
<i>I L 2</i>	400%		<i>E d 2</i>	20%	
<i>R C 2</i>	15 s		<i>t L 2</i>	OFF	
<i>t 9 2</i>	20%		<i>t I 2</i>	40%	

Communication menu *C D P*

Code	Factory setting	Customer setting	Code	Factory setting	Customer setting
<i>A d d</i>	0		<i>t L P</i>	5 s	
<i>t b r</i>	19.2 kbps		<i>P C t</i>	OFF	
<i>F D r</i>	8n1				

(1) Depends on the starter rating.

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只有经过我们的业务部门确认以后，才对我们有约束。



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