



中文 | ENGLISH

**U-ONE®(-安全型)-光纤型 和 -紧凑型**  
通用型编码器系统—II代

**U-ONE®(-SAFETY)-LWL and -Compact**  
Universal encoder systems – Generation II

**SIL 2**  
Functional  
Safety  
**PL d**



## Johannes Hübner Giessen

### 精确、优势、关注客户

我们专注于技术— 我们了解我们的客户。我们坚定的站在客户一边为其提供特殊的设想、定制的解决方案。为了支持我们的客户， 我们提供了强大的编码器系统、强大的传动技术和全球化的服务。我们将与我们的客户一起克服在重工业领域或其它极其恶劣条件领域的巨大的挑战，继而不断的增进客户的业务。你有什么挑战？

### 我们的应用领域:

- 金属及轧制技术
- 港口和起重机技术
- 矿山工业
- 石油和天然气工业
- 运输
- 海洋工程
- 发电行业
- 其它应用领域

### Precision. Strength. Customer focused.

We are fascinated by technology – and we understand our customers. We stand firmly at your side with exceptional ideas and tailor-made solutions; to support our customers we offer robust encoder systems, powerful drive technology and a worldwide service. That is how we overcome together with our customers the huge challenges in heavy industry and other fields subject to harsh conditions to sustainably improve their business. What challenges do you have?

### Our fields of applications:

- Metal and rolling mill technology
- Port and crane technology
- Mining industry
- Oil and gas industry
- Transport
- Marine engineering
- Power generation
- ... and many other applications

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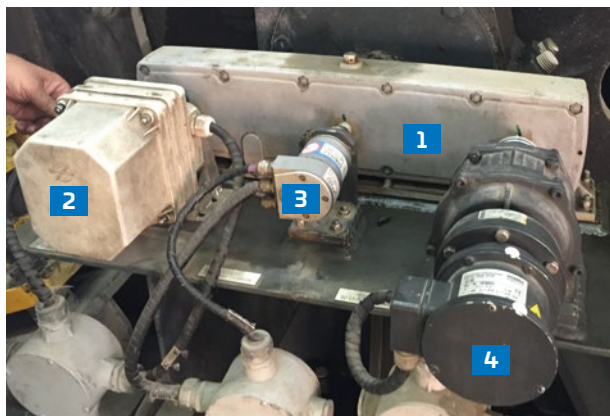
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## 任务 / Task

当需要监控速度和位置范围（例如在起重机上）时，通常使用下面或类似的安装。

The installation below or similar is very often used when speed and position ranges (e. g. on hoists) need to be monitored.



- 1 分配齿轮 / Distribution gear
- 2 机械凸轮限位开关 / Mechanical cam limit switch
- 3 绝对值编码器 / Absolute encoder
- 4 带增速齿轮的机械超速开关 / Mechanical overspeed switch with speed increasing gear

### 此类装置的缺点:

- 机械间隙造成的高精度
- 更长的处理时间，用于精确定位和最佳利用允许的速度范围
- 安装、调试和维护成本较高
- 缺乏满足最新标准和指令所需的安全功能的批准

### Disadvantages of such installations:

- High level of inaccuracies caused by mechanical play
- Longer processing times for precise positioning and optimum utilization of permissible speed ranges
- Higher costs for installation, commissioning and maintenance
- Lack of approvals for safety functions required to meet the latest standards and directives



## 最佳方案 / Optimized solution

优化安装，以监控速度和位置范围，例如在起重机上。

Optimized installation to monitor speed and position ranges, for example on a hoist.



U-ONE(-安全型)-紧凑型  
U-ONE(-SAFETY)-Compact



U-ONE(-安全型)-光纤型  
U-ONE(-SAFETY)-LWL



### 具有更高精度的完美交换方案

- 用电子速度开关替换带增速齿轮的机械超速开关
- 用电子位置开关替换机械凸轮限位开关
- 无需分布齿轮箱

### Perfect exchange solution with higher accuracy

- Replacement of mechanical overspeed switches with speed increasing gear by electronic speed switches
- Replacement of mechanical cam limit switches by electronic position switches
- No need of distribution gear

## 通用型编码器系统- II代 / Universal encoder systems – Generation II

U-ONE(-安全型) 是我们经过验证的第二代具有综合控制功能的通用编码器系统，有两种不同的系统设计类型可供选择。

U-ONE(-SAFETY) is the second generation of our proven universal encoder systems with integrated control functions. Two different system design types are available.

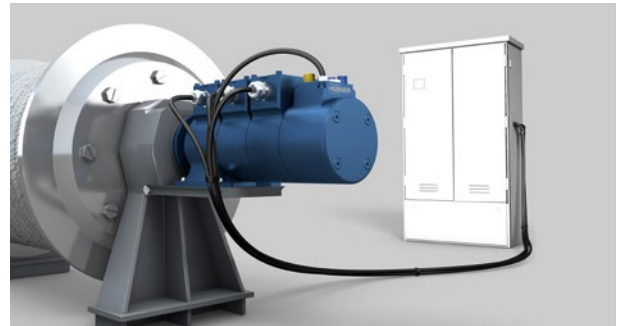
### U-ONE®(-安全型)-光纤型 / U-ONE-光纤型 U-ONE®(-SAFETY)-LWL / U-ONE-LWL



LWL (光纤)系统由一个基本单元和置于电控柜中的功能模块组成——当光纤可行且电控柜中有足够的空间时，这是理想的解决方案。

The LWL (FOC) system comprises a basic unit and function modules in the switchboard – this is the ideal solution when FOC is possible and there is sufficient space in the switchboard.

### U-ONE®(-安全型)-紧凑型 / U-ONE-紧凑型 U-ONE®(-SAFETY)-Compact / U-ONE-Compact



紧凑型系统包括由一个直接附带功能模块的基本单元组成– 这是继续使用原来铜电缆时的理想解决方案(例如升级改造)。

The Compact system consists of a basic unit with directly attached function modules – the ideal solution when continuing to make use of legacy copper cabling (e. g. at modernizations).

两种设计类型都可提供普通型和安全性：

Both system design types are available with and without safety certification:

#### 带安全认证 With safety certification

#### 无安全认证 Without safety certification

通过光纤进行信号传输，  
功能模块置于电控柜中  
Signal transmission via  
FOC and function modules  
in the switchboard



U-ONE-安全型-光纤型 (USL 42)  
U-ONE-SAFETY-LWL (USL 42)



U-ONE-光纤型 (UOL 40)  
U-ONE-LWL (UOL 40)

通过安装处的铜导线和功能模块进行信号传输  
Signal transmission via copper  
cable and function modules at the  
place of installation



U-ONE-安全型-紧凑型 (USC 42)  
U-ONE-SAFETY-Compact (USC 42)



U-ONE-紧凑型 (UOC 40)  
U-ONE-Compact (UOC 40)



## 系统优势 / System benefits

### 提高系统效率

使用我们新的通用编码器系统U-ONE(-安全型), 您将有多个好处:



性能

通过优化使用允许的速度范围以及快速精确的定位, 提高了性能



可用性

更高的可用性, 便于安装、配置和维护后的预设功能 (例如起重机上的绳索更换)



www.tuv.com  
ID 060000000

最大限度的安全与所有优点的测试和TÜV认证的安全系统

### Boost your system productivity

You will have multiple benefits by using our new universal encoder system U-ONE(-SAFETY):



PERFORMANCE

**Increased performance** thanks to optimized usage of permissible speed ranges as well as fast and precise positioning



AVAILABILITY

**Higher availability** thanks to easy installation, configuration and preset function after maintenance and repair work (e.g. rope exchange at cranes)



www.tuv.com  
ID 060000000

**Maximum safety** with all advantages of a tested and TÜV certified safety system

### 带有安全认证选项的模块化系统

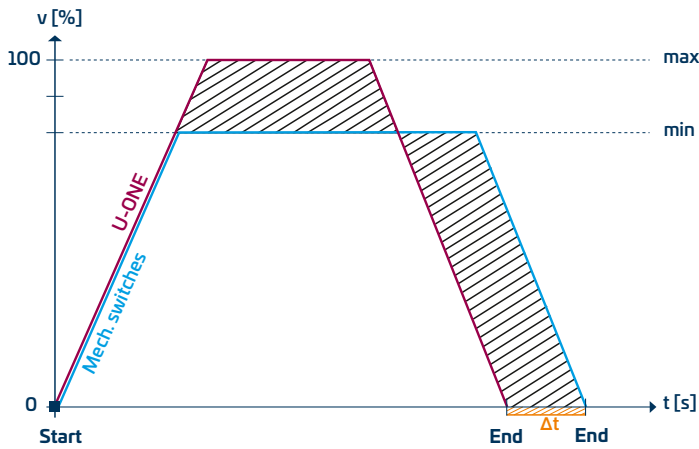
- 定制解决方案的模块化概念
- 安全位置和速度监控 – 即使没有安全型PLC
- 带有依据 DIN EN 61508 和 PL d 依据 DIN EN ISO 13849的 SIL 2安全认证选项
- 简化的风险分析和接受

### Modular system with optional safety certification

- Modular concept for tailor-made solutions
- Safe position and speed monitoring – even without a safety PLC
- Optionally with certification SIL 2 to DIN EN 61508 and PL d to DIN EN ISO 13849
- Simplified risk analysis and acceptance



## 系统优势 / System benefits

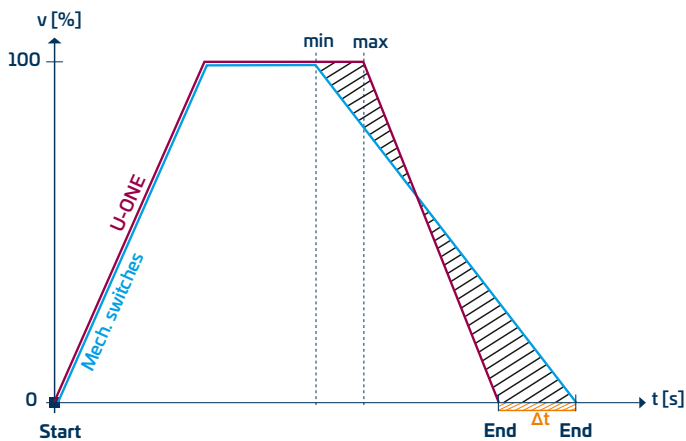


### 最大驱动速度 (例如起重机)

- 电子的速度监测替代机械式超速开关
- 利用整个速度范围
- 更高的精度 – 更低的切断偏差
- 不同的运行方向切断速度 不同 (例如: 以更快的速度行驶至岸边的STS 起重机)

### Maximum driving speed (e.g. cranes)

- Speed monitoring with electronic instead of mechanical over-speed switches
- Utilization of the whole speed range
- Higher accuracy – lower switching tolerances
- Different switching speeds for each driving direction (e.g. faster drive to land side at STS cranes)



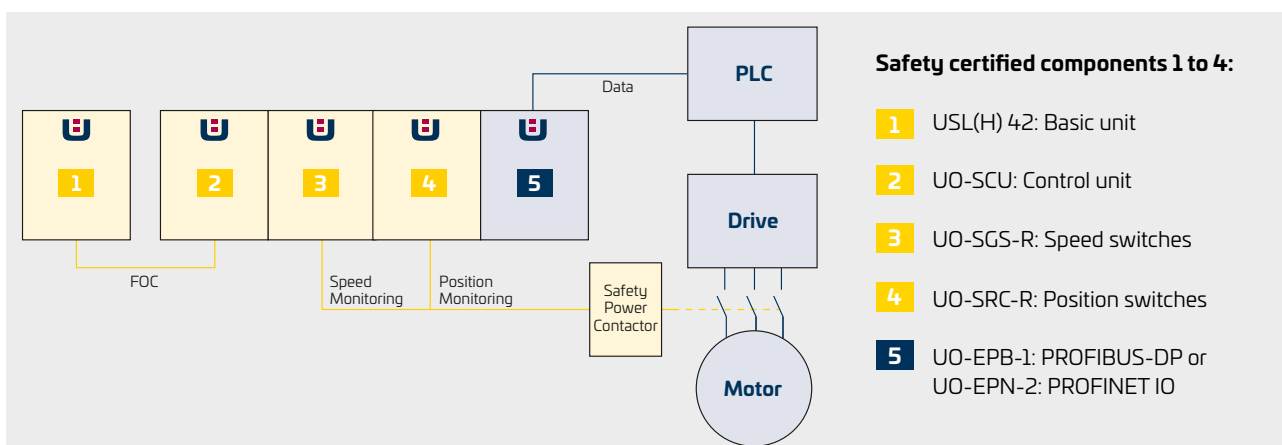
### 定位过程中的性能优化

- 使用电子位置开关替换机械式凸轮限位开关进行位置监控
- 由于具有较高的切断精度，可以更早达到最大速度
- 方向或速度变化期间无间隙影响

### Performance optimization during positioning

- Position monitoring with electronic position switches instead of mechanical cam limit switches
- Maximum speed will be achieved earlier due to higher switching accuracy
- No backlash influence during direction or speed change

$\Delta t$ : 每个运行周期节省时间 / Time saving per motion cycle



### Safety certified components 1 to 4:

- 1 USL(H) 42: Basic unit
- 2 UO-SCU: Control unit
- 3 UO-SGS-R: Speed switches
- 4 UO-SRC-R: Position switches
- 5 UO-EPB-1: PROFIBUS-DP or UO-EPN-2: PROFINET IO

### 安全开关输出 – 即使没有PLC

- 位置和速度监控，可选带安全认证
- 用于标准PLC或带有安全认证的PLC的应用
- 也适用于PLC故障情况下的紧急操作概念

### Safe switching outputs – even without PLC

- Position and speed monitoring, optionally with safety certification
- For applications with standard PLC or safety PLC
- Also for emergency operation concepts in case of PLC breakdown



## 系统优势 / System benefits



### 维护后快速同步

- 无需耗时调整机械开关
- 初始位置通过可配置的预设值
- 通过使用数字预设输入激活

### Fast synchronization after maintenance

- No time-consuming adjustment of mechanical switches
- Home position via configurable preset value
- Activation by using digital preset input



### 简单的参数配置代替PLC编程

- 包含拖拽功能的输入掩码
- 保存和导入数据设定
- 无需许可费用
- 无需专业编程人员

### Simply configure parameters instead of programming a PLC

- Input masks including drag-and-drop functionality
- Save and import data sets
- No license fees
- No need for specialist programmers

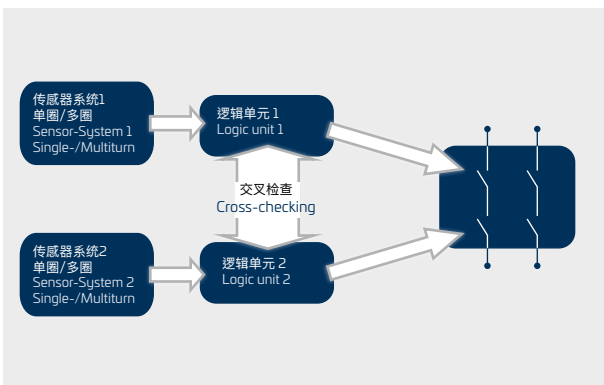


### 不同的设计类型

- 用于空心轴安装（仅适用于U-ONE(-安全型)-光纤型），法兰或底座安装
- 1个传感器用于安全位置和速度测量
- 坚固耐用的基本单元

### Different design types

- For hollow shaft mounting (U-ONE(-SAFETY)-LWL only), flange or foot mounting
- One sensor for safe position and speed measurement
- Robust, heavy-duty basic unit



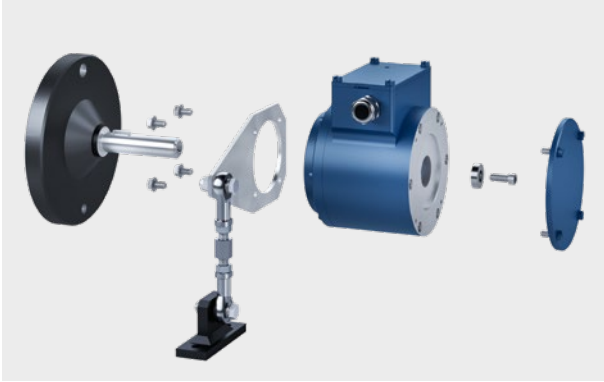
### 令人信服的安全概念

- 具有TÜV认证的全面内部诊断
- 双通道系统结构 (cat. 3 依据DIN EN ISO 13849)
- 交叉检查确保可靠的错误检测
- 双通道开关输出可实现信号线错误监控

### Convincing safety concept

- Comprehensive internal diagnostics with TÜV certification
- Two-channel system architecture (cat. 3 to DIN EN ISO 13849)
- Cross-checks ensure reliable error detection
- Two-channel switching outputs enable error monitoring of signal lines

## 系统优势 / System benefits



### 认证的安装方案

- 定制安装附件，具有实心轴和空心轴安装的安全认证
- 直接机械安装，无需分配齿轮
- 安全，正配合轴连接

### Certified mounting solutions

- Tailor-made mounting accessories with safety certification for solid and hollow shaft mounting
- Direct mechanical mounting without distribution gear
- Safe, positive fit shaft connections



### 高分辨率和精度

- 每转可达4096个脉冲
- 绝对值 13位单圈，15位多圈
- 正向驱动安全继电器确保精确的开关点

### High resolution and precision

- Incremental up to 4096 pulses per revolution
- Absolute 13 bit singleturn and 15 bit multiturn
- Positively driven safety relays ensure precise switching points



### 光纤信号传输

- 无干扰信号—甚至在更长的距离
- 传输距离可达1000 m (甚至总线接口)
- 所有数据通过一根光纤传输

### FOC signal transmission

- Interference-free signals – even over longer distances
- Long transmission distances up to 1000 m (even for bus interfaces)
- All data transmitted via one fiber optic cable



### 置于电控柜中的功能模块

- 独立的背板总线连接
- 热插拔模块更换
- 模块化可扩展性

### Function modules in the switchboard

- Separate backplane bus connections
- Hot swap module replacement
- Modular expandability

## 系统优势 / System benefits



### 可靠的接线技术

- 采用双层接线板进行可靠的电缆连接
- 通过USB 2.0实现配置和数据备份的简单连接
- 完全封装的接线盒底座

### Robust connection technology

- Reliable cable connection with double-tier terminal blocks
- Simple connection for configuration and data backups via USB 2.0
- Fully encapsulated terminal box base



### 重载制密封概念

- 带有特殊的O型密封圈的端子箱盖
- 对环境条件（潮湿、灰尘等）非常可靠的保护
- 防脱紧固螺丝

### Heavy duty sealing concept

- Terminal box covers with special o-ring seals
- Extremely reliable protection against environmental conditions (wet, dust, etc.)
- Captive fastening screws



### 高质量电缆入口

- 由于特殊的电缆填料函，可靠布线
- 高入口保护和电缆应变消除
- 电缆直径从5毫米到10.5毫米
- 带有电缆保护系统选项

### High-quality cable entries

- Reliable cable routing thanks to special cable glands
- High ingress protection and cable strain relief
- For cable diameters from 5 up to 10.5 mm
- Optional with cable protection system



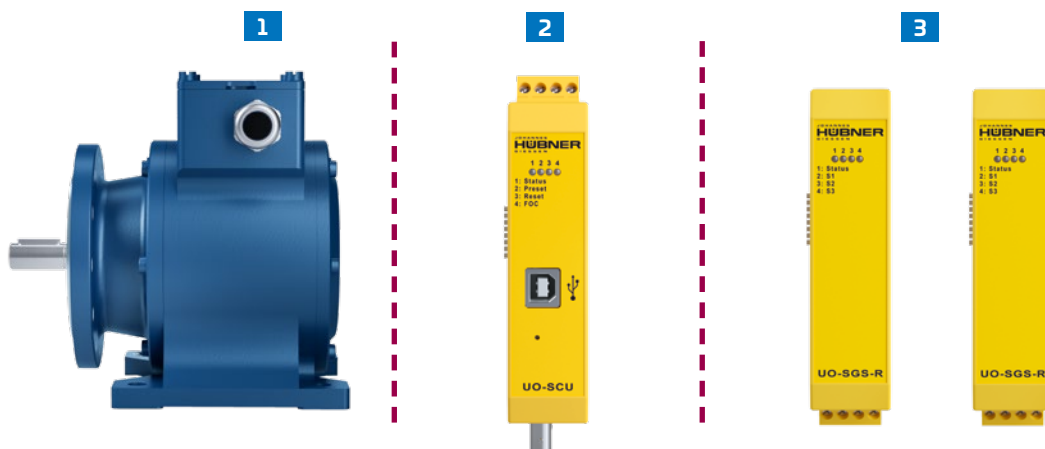
### 工业4.0就绪

- 内部诊断和状态监测
- 活动状态和错误消息
- 带总线接口的通讯模块

### Industry 4.0 ready

- Internal diagnostics and status monitoring
- Active status and error messages
- Communication modules with bus interfaces

# 模块化概念 – U-ONE®(-安全型)-光纤型 Modular concept U-ONE®(-SAFETY)-LWL



## 1 包含变送器的基本单元 / Basic units incl. transmitter

安全认证 Safety certified		标准 Standard	简述 Brief description
			铝外壳，实心轴，法兰安装 Aluminum housing, solid shaft, flange mounting
			铝外壳，实心轴，底座安装 Aluminum housing, solid shaft, foot mounting
			铝外壳，空心轴 Aluminum housing, hollow shaft
			铝外壳，贯穿式空心轴用于附加单元 Aluminum housing, through hollow shaft for add-on units

## 2 包含解码器的控制模块 / Controller modules incl. decoder

安全认证 Safety certified		标准 Standard	简述 Brief description
			安全认证或标准控制单元 Safety certified or standard control unit
			安全认证或标准控制单元 / Safety certified or standard control unit 附加输出 (无安全认证) : 4 – 20 mA 输出 Additional outputs (not safety certified): 4 – 20 mA output 增量输出 / Incremental output






## 模块化概念 — U-ONE®(-安全型)-光纤型 Modular concept U-ONE®(-SAFETY)-LWL



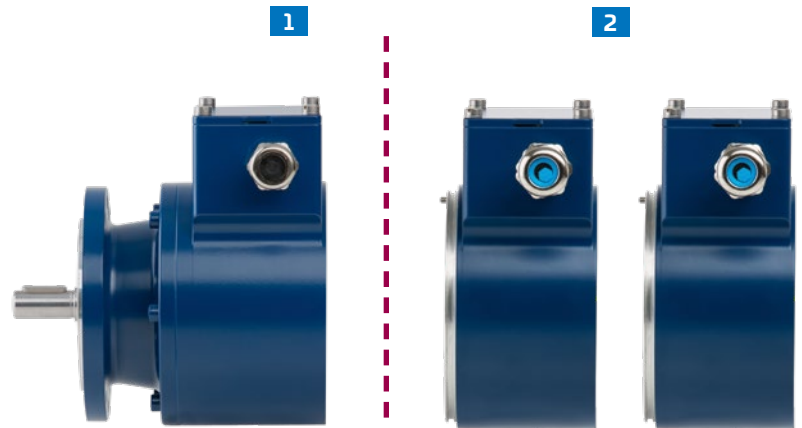
### 3 输入/输出模块 (最多5) / Input/output modules (max. 5)

安全认证 Safety certified		标准 Standard	简述 Brief description
			安全认证或标准速度开关 Safety certified or standard speed switches 3个安全继电器输出/3 safety relay outputs (每套系统最多2个模块)/(max. 2 modules per system)
			安全认证或标准速度开关 Safety certified or standard speed switches 3个安全继电器输出/3 safety relay outputs (每套系统最多5个模块)/(max. 5 modules per system)










### 4 通讯模块 (最多2) / Communication modules (max. 2)

安全认证 Safety certified		标准 Standard	简述 Brief description
			PROFINET IO PROFIsafe 协议或标准协议 PROFIsafe protocol or standard protocol
			PROFIBUS-DP PROFIsafe 协议或标准协议 PROFIsafe protocol or standard protocol

# 模块化概念— U-ONE®(-安全型)-紧凑型 Modular concept U-ONE®(-SAFETY)-Compact



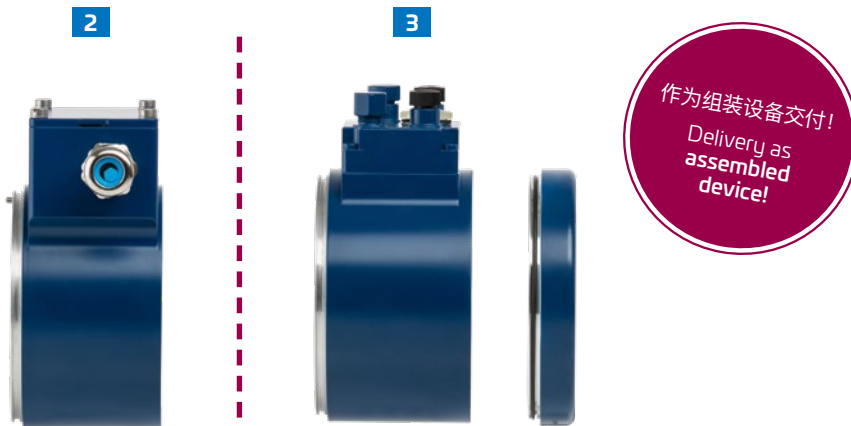
## 1 包含控制单元的基本单元 / Basic units incl. control unit

安全认证 Safety certified		标准 Standard	简述 Brief description
 USC 421 (B5)		 UOC 40 I (B5)	铝外壳，实心轴法兰安装，附加输出 (非安全认证型)：4-20 mA输出 Aluminum housing, solid shaft flange mounting, Additional output (not safety certified): 4-20 mA output
 USC 42 G (B5)		 UOC 40 G (B5)	铝外壳，实心轴法兰安装，附加输出 (非安全认证型)： 4-20 mA输出，增量输出 / Aluminum housing, solid shaft flange mounting, Additional outputs (not safety certified): 4-20 mA output, Incremental output
 USC 421 (B35)		 UOC 40 I (B35)	铝外壳，实心轴底座安装，附加输出 (非安全认证型)：4-20 mA输出，增量输出 Aluminum housing, solid shaft foot mounting, Additional output (not safety certified): 4-20 mA output
 USC 42 G (B35)		 UOC 40 G (B35)	铝外壳，实心轴底座安装，附加输出 (无安全认证)： 4-20 mA输出，增量输出 / Aluminum housing, solid shaft foot mounting, Additional outputs (not safety certified): 4-20 mA output, Incremental output



组装设备 (交付状态) / Assembled device (delivery status)





## 模块化概念— U-ONE®(-安全型)-紧凑型 Modular concept U-ONE®(-SAFETY)-Compact



### 2 输入/输出模块(最多15个继电器) / Input/output modules (max. 15 relays)

安全认证 Safety certified	 标准 Standard	简述 Brief description
 USC 42...-A	 UOC 40...-A	安全认证或标准速度开关 Safety certified or standard speed switches 3 安全继电器输出 / 3 safety relay outputs
 USC 42...-AA	 UOC 40...-AA	安全认证或标准速度开关 Safety certified or standard speed switches 6 安全继电器输出 / 6 safety relay outputs
 USC 42...-D	 UOC 40...-D	安全认证或标准位置开关 Safety certified or standard position switches 3 个安全继电器输出 / 3 safety relay outputs
 USC 42...-DD	 UOC 40...-DD	安全认证或标准位置开关 Safety certified or standard position switches 6 个安全继电器输出 / 6 safety relay outputs

### 3 通讯模块(最多2) / Communication modules (max. 2)

安全认证 Safety certified	 Sin certificación SIL Without SIL certification	简述 Brief description
 USC 42...-R	-	PROFINET IO PROFIsafe 协议 PROFIsafe protocol
 USC 42...-P	 UOC 40...-O	PROFIBUS-DP PROFIsafe 协议或标准协议 PROFIsafe protocol or standard protocol

## 概念示例 Concept examples




在下文中，我们将介绍两个基本的自动化概念，以实现安全位置和速度监控。

In the following we present 2 fundamental automation concepts to implement safe position and speed monitoring.

### 图例/ Legend


 安全认证/Safety certified

 标准/Standard


 USL(H) 42: 基本单元/Basic unit


 UO-SCU: 安全认证控制单元  
Safety certified control unit

 UO-SGS-R: 安全认证速度开关  
Safety certified speed switches

 Johannes Hübner 部件/component

 UO-SRC-R: 安全认证位置开关  
Safety certified position switches

 UO-EPB-1: PROFIBUS-DP 或/or  
UO-EPN-2: PROFINET IO

 UO-SPB-1: PROFIsafe via PROFIBUS-DP 或/or  
UO-SPN-1: PROFIsafe via PROFINET IO

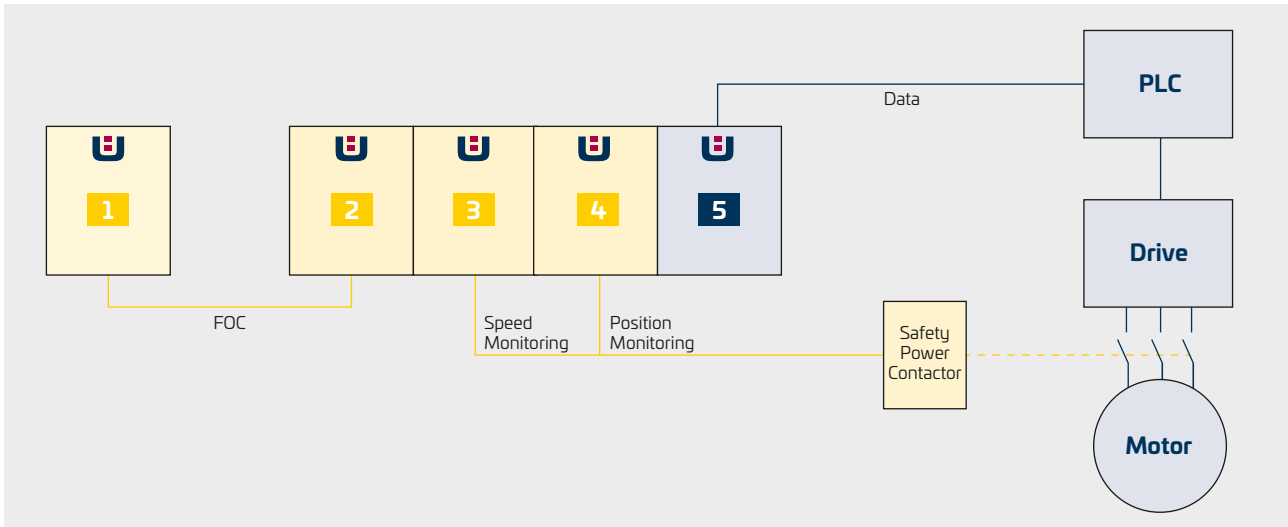


## 概念示例

### Concept examples

示例1: 无需经过安全认证的PLC和驱动器即可实现安全的速度和位置监控

Example 1: Safe speed and position monitoring without safety certified PLC and drive

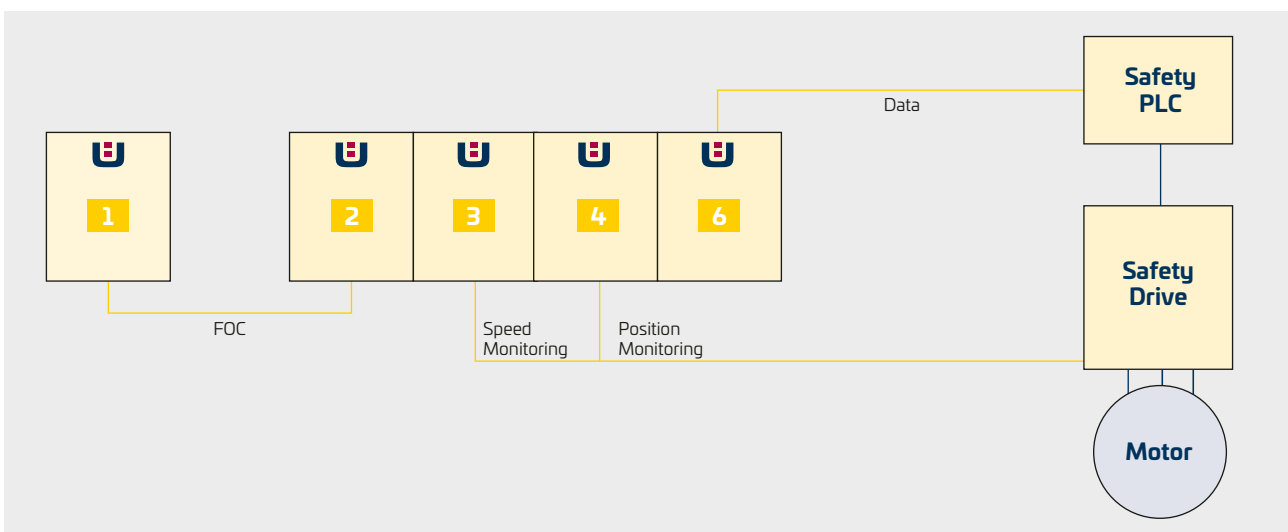


- 无安全PLC和驱动应用的概念（例如升级）
- U-ONE®(-安全型)开关模块监控安全的速度和位置
- 当电机超过设定的限值时，由电源接触器将电机安全停机

- Concept for applications without safety PLC and drive (e. g. modernizations)
- U-ONE®(-SAFETY) switching modules monitor safe speed and position
- The motor will be stopped safely by the power contactor in case of exceeding the configured limit values

示例2: 使用经过安全认证的PLC和驱动器进行安全速度和位置监控

Example 2: Safe speed and position monitoring with safety certified PLC and drive




- 安全型PLC和驱动器应用的概念
- U-ONE-安全型开关模块监控安全速度和位置
- 当电机超过设定的限值时，由驱动器将电机安全停机

- Concept for applications with safety PLC and drive
- U-ONE-SAFETY switching modules monitor safe speed and position
- The motor will be stopped safely by the drive in case of exceeding the configured limit values

# 实现驱动技术的安全功能 Implementing safety functions for drive technology

配置 U-ONE®(-安全型)-光纤型 或 -紧凑型 Configuration U-ONE®(-SAFETY)-LWL or -Compact						适用于: Suitable for:		
安全认证部件 Safety certified components						安全动作 Safe motion		
			- 光纤型 -LWL	- 紧凑型 -Compact		SLS	SSR	SDI
						Safely Limited Speed	Safe Speed Range	Safe Direction
基本单元 / Basic unit + 控制单元 Control unit + 速度开关 Speed switches						X <sup>1)</sup>	X <sup>1)</sup>	
基本单元 / Basic unit + 控制单元 Control unit + 位置开关 Position switch								
基本单元 / Basic unit + 控制单元 Control unit + 速度开关 Speed switches + 位置开关 Position switch						X <sup>1)</sup>	X <sup>1)</sup>	
基本单元 / Basic unit + 控制单元 Control unit + 速度开关 Speed switches + 通讯模块 Communication module						X <sup>1)</sup>	X <sup>1)</sup>	X <sup>2)</sup>
基本单元 / Basic unit + 控制单元 Control unit + 速度开关 Speed switches + 通讯模块 Communication module						X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>
基本单元 / Basic unit + 控制单元 Control unit + 速度开关 Speed switches + 位置开关 Position switch + 通讯模块 Communication module						X <sup>1)</sup>	X <sup>1)</sup>	X <sup>2)</sup>

 x = 无需任何附加设备即可实现  
can be implemented without any additional devices

 x<sup>1)</sup> = 可通过安全驱动或安全电源接触器实现  
can be implemented with safety drive or safety power contactor

# 实现驱动技术的安全功能 Implementing safety functions for drive technology

		安全定位 Safe positioning		安全监控 Safe monitoring		安全静止 Safe standstill		
SLA	SAR	SLP	SLI	SSM	SCA	SS1	SS2	SOS
Safely Limited Acceleration	Safe Acceleration Range	Safely Limited Position	Safely Limited Increment	Safe Speed Monitor	Safe Cam	Safe Stop 1	Safe Stop 2	Safe Operating Stop
				X		X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>
		X <sup>1)</sup>			X	X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>
		X <sup>1)</sup>		X	X	X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>
X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>	X	X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>
X <sup>2)</sup>	X <sup>2)</sup>	X <sup>1)</sup>	X <sup>2)</sup>	X <sup>2)</sup>	X	X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>
X <sup>2)</sup>	X <sup>2)</sup>	X <sup>1)</sup>	X <sup>2)</sup>	X	X	X <sup>2)</sup>	X <sup>2)</sup>	X <sup>2)</sup>

X<sup>2)</sup> = 只能通过附加的安全PLC或安全驱动装置实施  
can be implemented with additional safety PLC  
or safety drive

## 基本单元 U-ONE®(-安全型)-光纤型 Basic units U-ONE®(-SAFETY)-LWL

### USL 42, USLH 42 (安全认证 / safety certified)



### UOL 40, UOLH 40 (标准 / standard)



#### 可靠和精确的速度和位置测量，包括集成的 FOC

- 高精度归于直接无齿轮安装到应用轴上和高分辨率（13位单圈 / 15位多圈）
- 1根光缆（最长1000米）即可将无干扰的信号传输至电控柜中的功能模块上
- 即使在极端操作条件下也具有高可靠性
- 选项：无SIL/PL认证(UOL(H) 40);通过空心轴、实心轴进行法兰或底座安装

#### Reliable and precise speed and position measurement including an integrated FOC transmitter

- High accuracy thanks to direct gearless mounting to the application shaft plus high resolution (13 bit singleturn / 15 bit multiturn)
- Interference-free signal transmission to the function modules in the switchboard via just one fiber optic cable (up to 1000 m)
- High reliability even when exposed to extreme operating conditions
- Options: Without SIL/PL certification (UOL(H) 40); through hollow shaft, solid shaft for flange or foot mounting

### 技术数据 / Technical data

功能 / Function	测量应用轴的速度和位置，将电子数据转换为光信号，并通过1根光缆传输至控制器模块 / Measurement of speed and position of the application shaft, conversion of electronic data to optical signals and transmission to the controller module via one fiber optic cable
供电电压 / Supply voltage	15 – 27 VDC
分辨率 单圈 / Resolution singleturn	13 位 / Bit = 0,044° (360° / 8192 步 / steps)
分辨率 多圈 / Resolution multiturn	15 位 / Bit = 32768 圈 / revolutions
最大速度 / Max. speed	2800 rpm
设备温度范围 / Device temperature range	-25 °C ... +67 °C
保护等级 / Degree of protection	IP66
接线技术 / Connection technology	螺钉端子（电源电压） / Screw terminals (supply voltage) ST接头（光纤输出） / ST connector (FOC output)

## 电子功能模块 / Electronic function modules U-ONE®(-安全型 / -SAFETY)-光纤型 / -LWL 包含解码器的控制模块 / Controller modules incl. decoder

### UO-SCU, UO-SCU-G: 控制单元 / Control unit (安全认证 / safety certified)



### UO-ECU, UO-ECU-G: 控制单元 / Control unit (标准 / standard)





#### 包括集成光纤解码器的安全可配置信号评估

- 简易配置代替复杂的PLC编程
- 数字预置输入，快速调整
- 通过数字状态和错误输出进行状态监测
- 选项: 无SIL/PL认证(UO-ECU / UO-ECU-G); 附加增量和4 – 20mA输出(UO-SCU-G / UO-ECU-G)

#### Safe and configurable signal evaluation including an integrated FOC decoder

- Easy configuration instead of complicated PLC programming
- Fast adjustment via digital preset input
- Status monitoring via digital status and error output
- Options: Without SIL/PL certification (UO-ECU / UO-ECU-G); additional incremental and 4 – 20 mA output (UO-SCU-G / UO-ECU-G)

### 技术数据 / Technical data

功能 / Function	 	将基本单元的光信号转换为电子数据（解码器），对其进行处理，并为其它功能模块提供数据和工作电压 / Conversion of optical signals from the basic unit to electronic data (decoder), processing them and supplying the other function modules with data and operating voltage
供电电压 / Supply voltage		12 – 30 VDC
信号输入 / Signal input		重置，预设 / Reset, Preset
信号输出 / Signal output		状态，错误 / Status, error
增量输出 (选项 -G) / Incremental output (option -G)		HTL, 512, 1024, 2048 或 4096 ppr 可配置 (无安全认证) HTL, 512, 1024, 2048 or 4096 ppr configurable (not safety certified)
电流输出 (选项 -G) / Current output (option -G)		4 – 20 mA, 可配置速度和位置 (无安全认证) 4 – 20 mA, configurable for speed and position (not safety certified)
设备温度范围 / Device temperature range		-25 °C ... +60 °C
编程界面 / Programming interface		USB 2.0
接线技术 / Connection technology		ST 接头 (光纤输入) / ST connector (FOC input) 螺旋端子 / Screw terminals

# 电子功能模块 / Electronic function modules U-ONE®(-安全型 / -SAFETY)-光纤型 / -LWL 输出/输出模块 / Input/output modules

## UO-SGS-R: 速度开关 / Speed switches (安全认证 / safety certified)



## UO-EGS-R: 速度开关 / Speed switches (标准 / standard)



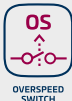
### 安全精确的速度监控

- 通过3个可配置的速度开关,配备正向驱动继电器用于监控超速和欠速
- 简单的配置代替了复杂的PLC编程
- 开关容量可达250 VAC / 500 mA或230 VDC / 180 mA
- 选项: 无SIL/PL认证 (UO-EGS-R) ; 组合最多可达6个速度开关 (等于2个模块)

### Safe and precise speed monitoring

- Monitor overspeed and underspeed by means of 3 configurable speed switches equipped with positively driven relays
- Easy configuration instead of complicated PLC programming
- Switching capacity up to 250 VAC / 500 mA or 230 VDC / 180 mA
- Options: Without SIL/PL certification (UO-EGS-R); combine up to 6 speed switches (= 2 modules)

## 技术数据 / Technical data

功能 / Function	 根据配置的速度门限值和基本单元的实际速度值进行无电位继电器触点的切换 Switching of potential-free relay contacts according to the configured speed threshold value and the actual speed value from the basic unit
供电电压 / Supply voltage	通过控制模块供电 Power supplied via controller module
开关输出 / Switching outputs	3个可配置速度开关(正驱动继电器) 3 configurable speed switches (positively driven relays)
开关容量 / Switching capacity	5 – 250 VAC (5 – 500 mA) 5 – 30 VDC (5 – 500 mA) > 30 – 230 VDC (5 – 180 mA)
错误开关 / Error switch	可选择将开关配置为错误开关, 例如, 用于直接集成在紧急停止电路中 Option to configure a switch as an error switch, e.g., for direct integration in an emergency stop circuit
可配置功能 / Configurable functions	迟滞、延时、独立于旋转方向的开关、安全型错误开关、开关测试诊断 Hysteresis, delay, switching independent of rotational direction, safe error switch, switch test diagnostics
设备温度范围 / Device temperature range	-25 °C ... +60 °C
接线技术 / Connection technology	螺旋端子 / Screw terminals

## 电子功能模块 / Electronic function modules U-ONE®(-安全型 / -SAFETY)-光纤型 / -LWL 输出/输出模块 / Input/output modules

### UO-SRC-R: 位置开关 / Position switches (安全认证 / safety certified)



### UO-ERC-R: 位置开关 / Position switches (标准 / standard)



#### 安全和精确位置监控

- 通过3个正向驱动的可配置的位置开关监控位置范围
- 简单配置, 替代复杂的PLC编程
- 开关容量可达250 VAC / 500 mA 或 230 VDC / 180 mA
- 选项: 无SIL/PL认证(UO-ERC-R): 组合可达15个位置开关(等于5个模块)

#### Safe and precise position monitoring

- Monitor position ranges by means of 3 configurable position switches equipped with positively driven relays
- Easy configuration instead of complicated PLC programming
- Switching capacity up to 250 VAC / 500 mA or 230 VDC / 180 mA
- Options: Without SIL/PL certification (UO-ERC-R); combine up to 15 position switches (= 5 modules)

#### 技术数据 / Technical data

功能 / Function	 <p>根据配置的位置门限值和基本单元的实际位置值进行无电位继电器触点的切换 Switching of potential-free relay contacts according to the configured position threshold value and the actual position value from the basic unit</p>
供电电压 / Supply voltage	通过控制模块供电 Power supplied via controller
开关输出 / Switching outputs	3 个可配置速度开关(正驱动继电器) 3 configurable position switches (positively driven relays)
开关容量 / Switching capacity	5 – 250 VAC (5 – 500 mA) 5 – 30 VDC (5 – 500 mA) > 30 – 230 VDC (5 – 180 mA)
错误开关 / Error switch	可选择将开关配置为错误开关, 例如, 用于直接集成在紧急停止电路中 Option to configure a switch as an error switch, e.g., for direct integration in an emergency stop circuit
可配置功能 / Configurable functions	切断范围, 迟滞、预置、安全错误开关、开关测试诊断 Switching range, hysteresis, preset, safe error switch, switch test diagnostics
设备温度范围 / Device temperature range	-25 °C ... +60 °C
接线技术 / Connection technology	螺旋端子 / Screw terminals

# 电子功能模块 / Electronic function modules U-ONE®(-安全型 / -SAFETY)-光纤型 / -LWL 通讯模块 / Communication modules

## UO-SPN-1: PROFINET 带 / with PROFIsafe (安全认证 / safety certified)



## UO-EPN-2: PROFINET (标准 / standard)



### 与PLC安全通讯

- UO-SPN-1: 通过PROFIsafe协议向安全型控制器传递安全位置和速度
- UO-EPN-2: 通过PROFINET IO协议向标准控制器传送位置和速度
- 分辨率: 13位单圈 / 15位多圈
- 选项: 无SIL/PL认证(UO-EPN-2); 在一个系统内可组合2个总线模块

### Safe communication with the PLC

- UO-SPN-1: Communicates safe position and speed to a safety controller via PROFIsafe protocol
- UO-EPN-2: Communicates position and speed to a standard controller via PROFINET IO
- Resolution 13 bit singleturn / 15 bit multiturn
- Options: Without SIL/PL certification (UO-EPN-2); it is possible to combine 2 bus modules within a system

## 技术数据 / Technical data

功能 / Function	 从U-ONE(-安全型)系统将位置、速度和状态数据传送到更高级别的控制器 Transmission of position, speed and status data from the U-ONE(-SAFETY) system to a higher-level controller
供电电压 / Supply voltage	通过控制模块供电(背板总线) Power supplied via controller module (backplane bus)
单圈分辨率 / Resolution singleturn	13 位 / Bit = 0,044° (360° / 8192 步 / steps)
多圈分辨率 / Resolution multiturn	15 位 / Bit = 32768 圈 / revolutions
预设功能 / Preset function	电子总线接口 (独立于控制器模块预置) Electronically via bus interface (independent of preset via controller modules)
可调参数 / Adjustable parameters	UO-SPN-1: 静止偏差, 预置, 计数方向, 集成时间安全/不安全, 监控窗口大小 UO-EPN-2: 计数方向 UO-SPN-1: Standstill tolerance, preset, counting direction, integration time safe / unsafe, size of monitoring window UO-EPN-2: Counting direction
总线寻址 / Bus addressing	带旋转编码开关 / with rotary coding switch
设备温度范围 / Device temperature range	-25 °C ... +60 °C
接线技术 / Connection technology	UO-SPN-1: M12 接头 / connector (2x) UO-EPN-2: RJ45 接头 / connector (2x)



## 电子功能模块 / Electronic function modules U-ONE®(-安全型 / -SAFETY)-光纤型 / -LWL 通讯模块 / Communication modules

### UO-SPB-1: PROFIBUS 带 / with PROFIsafe (安全认证 / safety certified)



### UO-EPB-1: PROFIBUS (标准 / standard)



#### 与PLC安全通讯

- UO-SPB-1: 通过PROFIsafe协议向安全型控制器传递安全位置和速度
- UO-EPB-1: 通过PROFIBUS-DP协议向非安全型控制器传递位置和速度
- 单圈分辨率13位 / 15位多圈
- 选项: 无SIL/PL认证(UO-EPB-1); 一个系统内可组合2个总线模块

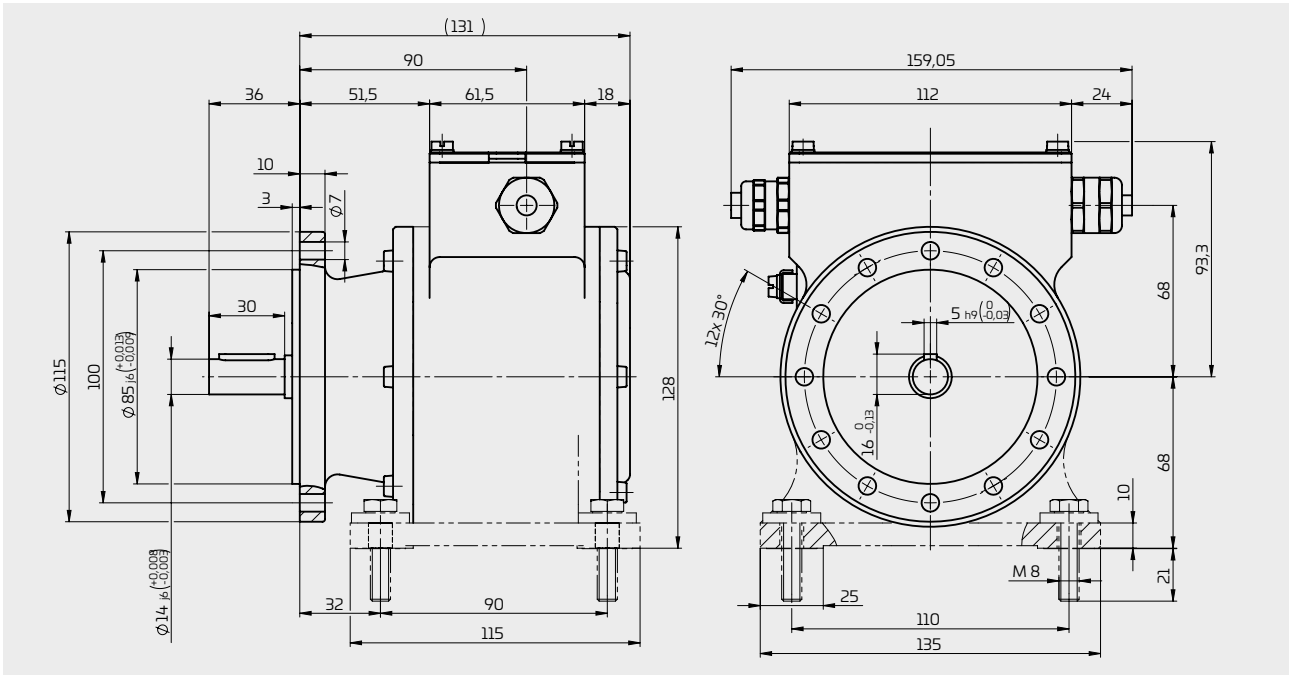
#### Safe communication with the PLC

- UO-SPB-1: Communicates safe position and speed to a safety controller via PROFIsafe protocol
- UO-EPB-1: Communicates position and speed to a non-safety controller via PROFIBUS-DP
- Resolution up to 13 bit singleturn / 15 bit multiturn
- Options: Without SIL/PL certification (UO-EPB-1); it is possible to combine 2 bus modules within a system

### 技术数据 / Technical data

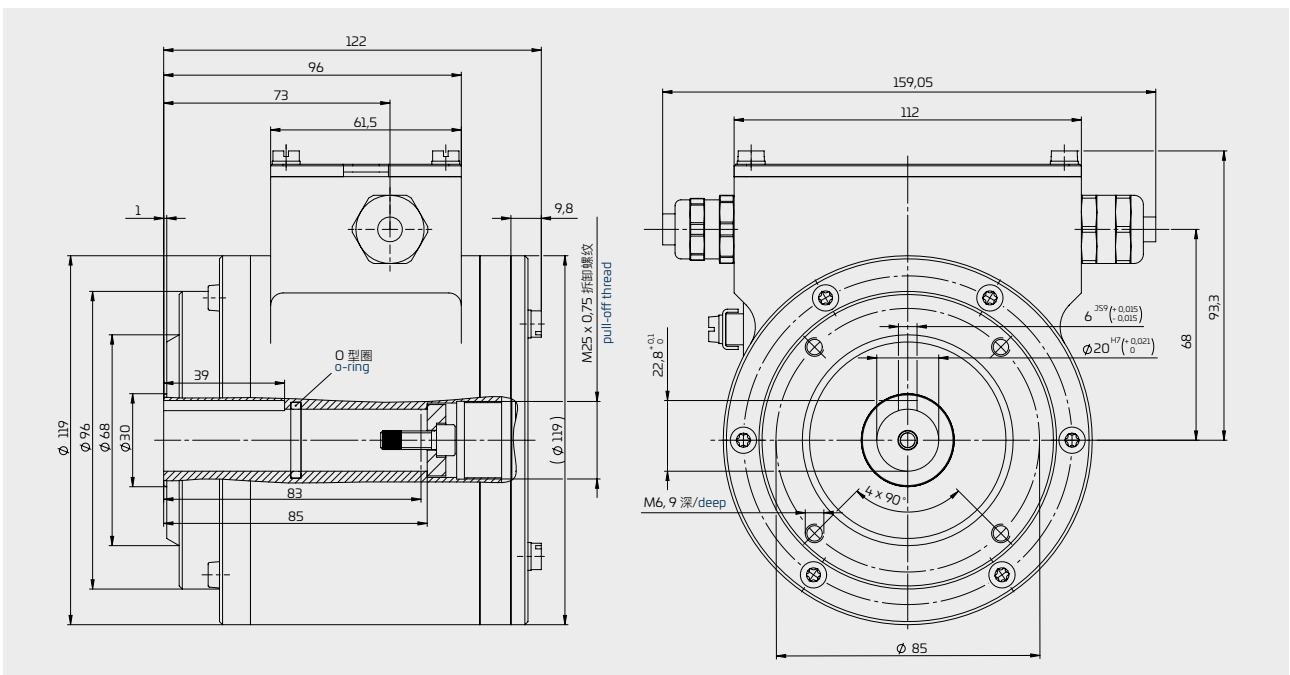
功能 / Function	 从U-ONE(-安全型)系统将位置、速度和状态数据送到更高级别的控制器 Transmission of position, speed and status data from the U-ONE(-SAFETY) system to a higher-level controller
供电电压 / Supply voltage	通过控制模块供电(背板总线) Power supplied via controller module (backplane bus)
单圈分辨率 / Resolution singleturn	UO-SPB-1: 13 位 / Bit = 0,044° (360° / 8192 步 / steps) UO-EPB-1: 12 位 / Bit = 0,088° (360° / 4096 步 / steps)
多圈分辨率 / Resolution multiturn	15 位 / Bit = 32768 圈 / revolutions
预设功能 / Preset function	电子总线接口 (独立于通过控制器模块的预设) / Electronically via bus interface (independent of preset via controller modules)
可调参数 / Adjustable parameters	UO-SPB-1: 静止偏差, 预设, 计数方向, 集成时间安全 / 非安全, 监控窗口尺寸 UO-EPB-1: 计数方向, 分辨率, 限位开关 UO-SPB-1: Standstill tolerance, preset, counting direction, integration time safe / unsafe, size of monitoring window UO-EPB-1: Counting direction, resolution, limit switches
总线寻址 / Bus addressing	带有旋转编码开关 / with rotary coding switch
设备温度范围 / Device temperature range	-25 °C ... +60 °C
接线技术 / Connection technology	UO-SPB-1: M12 接头 / connector (2x) UO-EPB-1: D-SUB 9 接头 / connector (1x)

尺寸图 U-ONE®(-安全型)-光纤型  
Dimension drawings U-ONE®(-SAFETY)-LWL



**USL 42 / UOL 40**

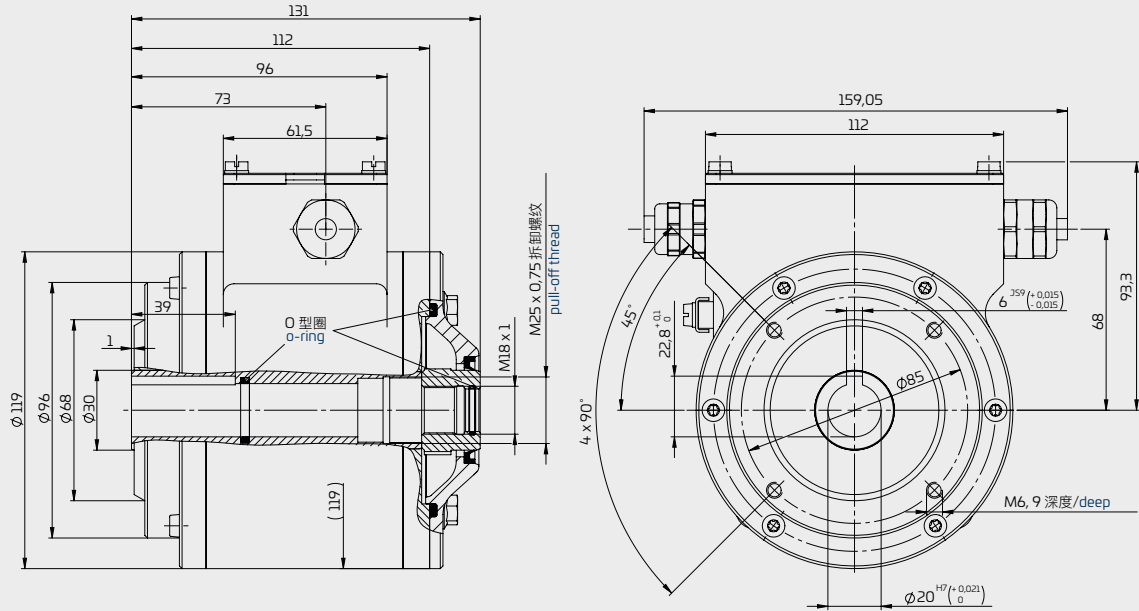
基本单元:设计类型 B35 / B5 ,底座用虚线表示  
Basic unit: Design type B35 / B5 foot indicated by dashed line



**USLH 42 / UOLH 40**

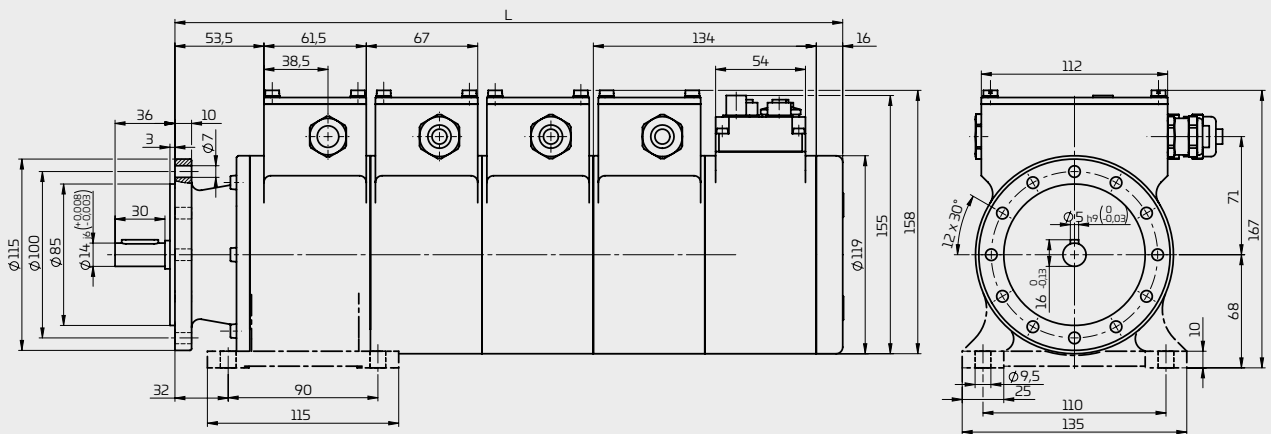
基本单元:空心轴设计  
Basic unit: Hollow shaft design

## 尺寸图 U-ONE®(-安全型)-光纤型 及 -紧凑型 Dimension drawings U-ONE®(-SAFETY)-LWL and -Compact



**USLH 42 / UOLH 40**

基本单元: 空心轴设计用于贯穿式适配轴(用于附加单元)  
Basic unit: Hollow shaft design for through adapter shaft (for add-on units)

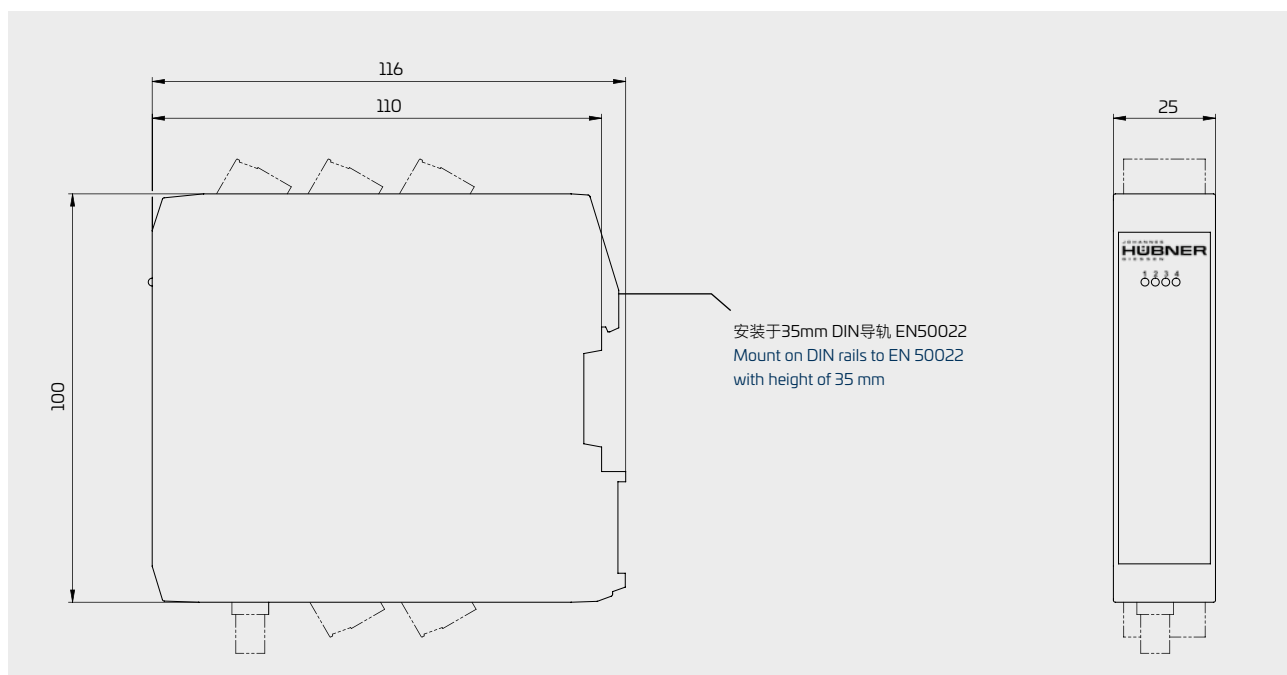


**USC 42 / UOC 40**

完整单元: 设计类型 B35/B5, 底座用虚线表示  
Complete unit: Design type B35/B5 foot indicated by dashed line



## 功能模块 U-ONE®(-安全型)-光纤型 尺寸图 Dimension drawings function modules U-ONE®(-SAFETY)-LWL



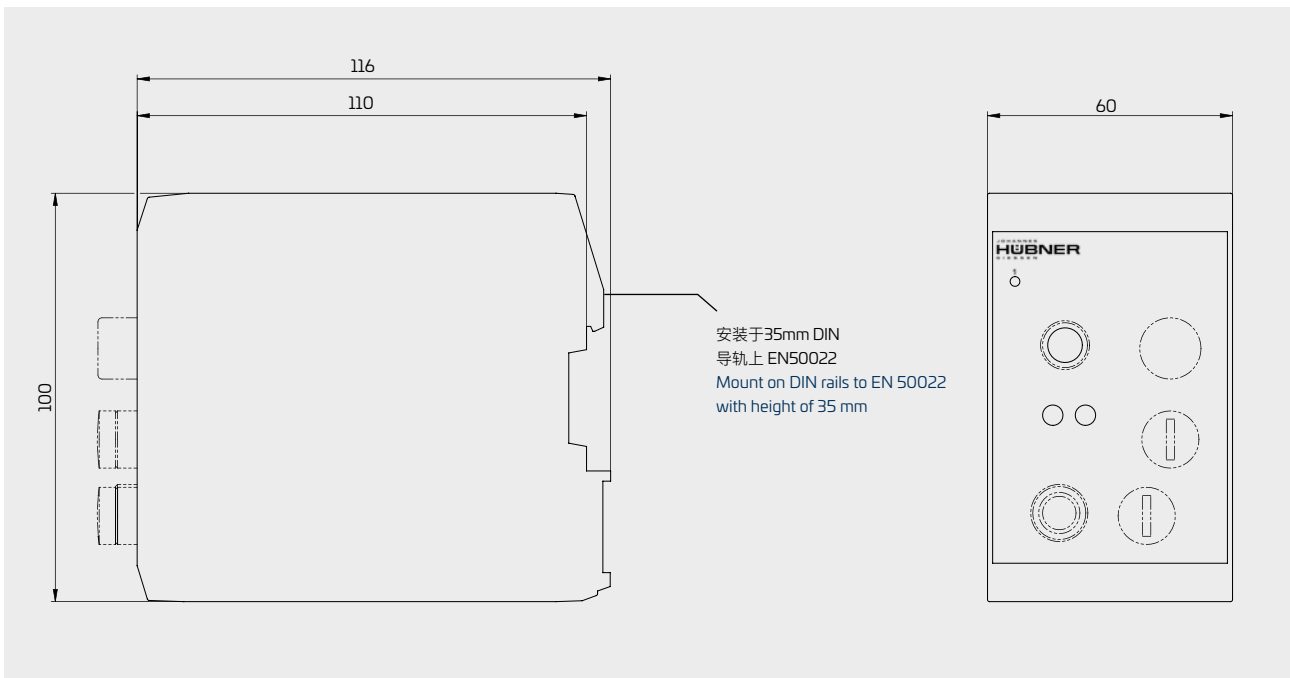
电子外壳：宽度为25 mm，8极DIN导轨总线连接器，用于以下功能模块：

**Electronic housing: with width of 25 mm and 8 pole DIN rail bus connector for the following function modules:**

- UO-SCU / UO-SCU-G: 安全认证的控制模块 / Safety certified controller modules
- UO-ECU / UO-ECU-G: 标准控制模块 / Standard controller modules
- UO-SGS-R: 安全认证的速度开关 / Safety certified speed switches
- UO-EGS-R: 标准速度开关 / Standard speed switches
- UO-SRC-R: 安全认证的位置开关 / Safety certified position switches
- UO-ERC-R: 标准位置开关 / Standard position switches
- UO-EPN-2: PROFINET IO
- UO-EPB-1: PROFIBUS-DP



功能模块 U-ONE®(-安全型)-光纤型 尺寸图  
 Dimension drawings function modules U-ONE®(-SAFETY)-LWL



电子外壳：宽度为60mm，8极DIN导轨总线连接器，用于以下功能模块：

**Electronic housing: with width of 60 mm and 8 pole DIN rail bus connector for the following function modules:**

- UO-SPN-1: PROFINET IO 带 /with PROFI-safe
- UO-SPB-1: PROFIBUS-DP 带 /with PROFI-safe

# 基本单元 U-ONE®(-安全型)-光纤型 订货号

## Article code basic units U-ONE®(-SAFETY)-LWL

				-	-				M	-	U	-
<b>系列 / Series</b>												
U4N = 基本单元 / Basic unit USL 42 (SIL 2 / PL d)												
U4L = 基本单元 / Basic unit UOL 40												
<b>版本 / Version</b>												
- = 标准 / Standard												
<b>接线技术 / Connection technology</b>												
- = 光纤型 / FOC												
<b>设计类型 / Design type</b>												
1 = 空心轴 / Hollow shaft												
2 = 贯穿式空心轴 (用于附加单元) Through hollow shaft (for add-on units)												
5 = 实心轴 / B5 设计 (法兰) / Solid shaft / B5 design (flange)												
8 = 实心轴 / B35 设计 (法兰 + 底座) / Solid shaft / B35 Design (flange + foot)												
A = 实心轴 / B3 设计 (底座) / Solid shaft / B3 Design (foot)												
<b>轴 / Shaft</b>												
带键 / 键槽 / with feather key / keyway												
A = 实心轴 / Solid shaft: Ø 11 j6 mm												
B = 实心轴 / Solid shaft: Ø 14 j6 mm												
C = 实心轴 / Hollow shaft: Ø 20 H7 mm												
<b>保护等级 / Degree of protection</b>												
M = IP66												
<b>选项 / Options</b>												
- = 喷漆 / Coated												
<b>温度范围 / Temperature range</b>												
U = -25 ... +67 °C												
<b>选项 / Options</b>												
- = 标准 / Standard												

## 电子功能模块 U-ONE®(-安全型)-光纤型 选型表

### Article code electronic function modules U-ONE®(-SAFETY)-LWL

E U M - - - - - - U

#### 系列 / Series

EUM = 电子功能模块 / Electronic function module

#### 版本 / Version

- = 标准 / Standard

#### 模块 / Modules

- SCU - = 安全认证控制模块 (SIL 2 / PL d)  
Safety certified controller module (SIL 2 / PL d)
- SCU G = 安全认证控制模块 (SIL 2 / PL d) 带电流和增量输出选项 (无安全认证)  
Safety certified controller module (SIL 2 / PL d) with optional current and incremental output (not safety certified)
- ECU - = 标准控制模块 / Standard controller module
- ECU G = 标准控制模块, 带电流和增量输出选项  
Standard controller module, with optional current and incremental output
- SGS R = 安全认证速度开关 (SIL 2 / PL d), 正驱动继电器  
Safety certified speed switches (SIL 2 / PL d), positively driven relay
- EGS R = 标准速度开关, 正驱动继电器 / Standard speed switches, positively driven relay
- SRC R = 安全认证位置开关(SIL 2 / PL d), 正驱动继电器  
Safety certified position switches (SIL 2 / PL d), positively driven relay
- ERC R = 标准位置开关,正驱动继电器 / Standard position switches, positively driven relay
- SPN 1 = PROFINET IO 带 PROFIsafe 协议  
PROFINET IO with PROFIsafe protocol
- EPN 2 = PROFINET IO
- SPB 1 = PROFINET IO 带 PROFIsafe 协议 (SIL 2 / PL d)  
PROFIBUS-DP with PROFIsafe protocol (SIL 2 / PL d)
- EPB 1 = PROFIBUS-DP

#### 保护等级 / Degree of protection

- = IP20

#### 温度范围 / Temperature range

U = -25 ... +60 °C







## 工程支持 Engineering support

### Hübner Giessen 工程支持

#### 技术. 人员. 定制

除了选择正确的编码器，最好的机械安装是确保可靠和无故障设备运行的决定性因素。

这就是为什么我们为新项目和改造项目提供个人咨询和定制的编码器系统解决方案。

在这样做的过程中，我们按照我们改造和新工厂概念开展工作，这已在世界各地被多次证明，请看下图。

### Hübner Giessen Engineering support

#### Technical. Personal. Tailor-made.

In addition to choosing the right encoder, the best-possible mechanical mounting is a decisive factor in ensuring reliable and trouble-free plant operations.

That is why we offer personal consultation and tailor-made encoder system solutions for greenfield and modernization projects.

In doing so, we work according to our modernization and new plant concept that has been proven many times over around the world; please see the graphic below.



## 定制的机械配件 Tailor-made mechanical accessories

只有在使用适当设计的机械配件时，才可能进行功能性安全安装。考虑到这一点，我们根据机械指令2006/42/EC向您提供故障排除的安全部件。我们在合格声明中确认其经过验证的耐力和疲劳强度，以及它们是否符合相关的安全标准。这大大简化了内部风险评估和工厂验收测试。

A functional safety mounting is only possible when using appropriately designed mechanical accessories. With this in mind, we offer you safety components with fault exclusion in accordance with the Machinery Directive 2006/42/EC. We confirm their verified endurance and fatigue strength as well as their conformity with the relevant safety standards in a Declaration of Conformity. That considerably simplifies in-house risk assessments as well as acceptance testing of your plant.

### 安全-集成实心轴安装 / Safety-integrated solid shaft mounting

对于安全集成、实心轴安装，我们提供了以下安全部件，包括适合单独安装地点的符合性声明。

For safety integrated, solid shaft mounting we offer the following safety components incl. Declaration of Conformity – suitably tailored to the individual place of installation.



#### 法兰附件 (B5):

- 带有键槽的安全联轴器（单节或双节联轴器），用于安全、正配合的连接
- 安全中间法兰，包括与机器外壳机械接口匹配的适当的间隔环

#### Flange mounting (B5):

- Safety couplings (single or double joint couplings) with keyway for a safe, positive fit connection
- Safety intermediate flange including suitable spacer ring matching with the mechanical interface of the machine housing



#### 底座附件:

- 带有键槽的安全联轴器（双节联轴器）用于安全、正配合的连接
- 带有摩擦增强垫圈，使得冲击载荷高达 100 g（不带垫圈的情况下为 20 g）

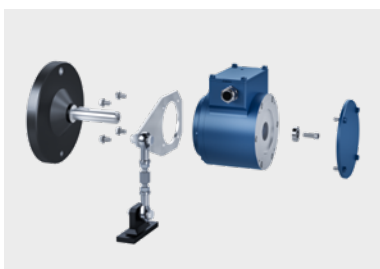
#### Foot mounting (B35):

- Safety couplings (double joint couplings) with keyway for a safe, positive fit connection
- Friction enhancing washers for shock loads up to 100 g (20 g without washers)

### 安全型集成空心轴安装 / Safety-integrated hollow shaft mounting

对于安全集成，空心轴安装，我们提供以下安全组件，包括合格性声明- 根据安装位置量身定制

For safety integrated, hollow shaft mounting we offer the following safety components incl. Declaration of Conformity – suitably tailored to the individual place of installation.



- 安全适配轴（法兰或拧入式适配轴），带键 用于安全、正配合连接
- 安全扭矩支架，具有适当设计的支撑臂和支架长度

- Safety adapter shafts (flange or screw-in type adapter shafts) with feather key for a safe, positive fit connection
- Safety torque brackets with suitably designed support arm and bracket lengths

## 定制的机械配件 Tailor-made mechanical accessories

### 电缆保护系统 / Cable protection systems



为了确保编码器电缆（铜、光纤）在极端环境条件下具有最好的保护，我们提供了电缆保护系统，该系统具有合适的电缆接头和密封插件，以及集成的屏蔽元件和应变消除，特别适应您的应用。

To ensure the encoder cabling (copper, FOC) has the best-possible protection in extreme ambient conditions we offer cable protection systems with suitable cable glands and sealing inserts as well as integrated shielding elements and strain relief specifically adapted to your application.

### 询价表 / Inquiry forms

如果您有一个具体的项目，请使用我们的询价表格发送给我们一个简单的产品请求。

请扫描以下二维码，可进入正确的询价表

请完成表格后发送到：  
[sales@huebner-giessen.com](mailto:sales@huebner-giessen.com)

我们会尽快回复您。

If you have a concrete project in mind, please use our inquiry forms to send us an uncomplicated product request.

To access the right inquiry form, please scan the appropriate QR code from those below.

Please send the completed form to:  
[sales@huebner-giessen.com](mailto:sales@huebner-giessen.com)

We will get back to you promptly.

#### 询价表



U-ONE(-安全型)-光纤型



U-ONE(-安全型)-紧凑型

#### Inquiry forms



U-ONE(-SAFETY)-LWL



U-ONE(-SAFETY)-Compact

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