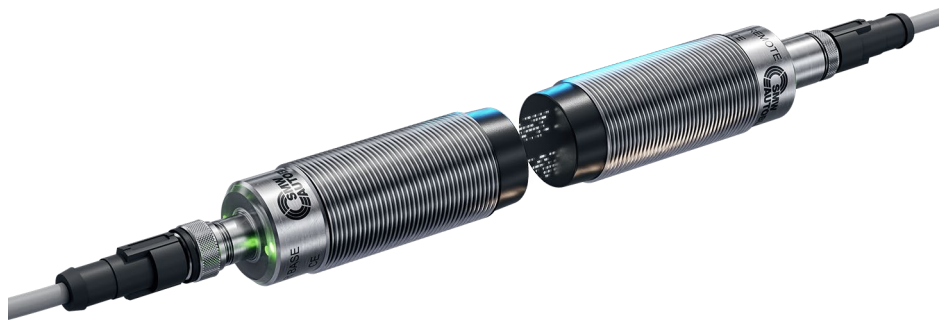




MANUAL

Inductive Coupler System M30-4A



Validity

0E010958	Inductive Coupler M30-4A 0-10V Base	04.07.2022	V1.3	EN
0E010958	Inductive Coupler M30-4A 0-10V Remote	04.07.2022	V1.3	EN
0E010960	Inductive Coupler M30-4A 4-20mA Base	04.07.2022	V1.3	EN
0E010961	Inductive Coupler M30-4A 4-20mA Remote	04.07.2022	V1.3	EN

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Safety instructions

Important!

Vor Inbetriebnahme ist die Betriebsanleitung sorgfältig zu lesen.

Intended use

The device is designed to transmit energy and signals without contact. The system must not be used in applications where the safety of persons depends on the device function.

Liability claims against the manufacturer expire in the event of damage caused by:

- unauthorized tampering
- use not in accordance with the intended purpose
- use, installation, handling contrary to the regulations of these operating instructions.

Authorized personnel

Installation and commissioning are only permitted by trained specialist personnel.

Duties of the operator

The operator must ensure that the locally applicable national and international safety regulations are observed. The unit may only be operated with an approved power supply.

Operating faults

In case of defective and unrecoverable device malfunctions, put the device out of operation and secure it against unauthorized use.

Meaning of the warnings

It is essential to observe the warnings in this manual and the measures described to avoid danger. The warnings contain the following signal words, which indicate the seriousness of the danger:



Danger

Denotes an immediate hazard that will result in serious injury or death to persons if not avoided.



Caution!

Indicates a potential hazard that can lead to minor injury to persons or damage to property if it is not avoided.



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Attention

Indicates a situation which, if not avoided, may result in property damage.
The following warnings apply to the handling of the present product.

Caution!



Danger of burns from hot surfaces!

The active surface heats up even under normal operating conditions.

Keep hands and objects away from the active surface.

Avoid contact of metallic objects on the active surface. Fire hazard!

CE Certification

With the CE mark we confirm that our products comply with the requirements of the EC Directives 2004/108/EC (EMC) and the EMC Act.

In an accredited EMC laboratory, proof was provided that the products meet the EMC requirements of the basic technical standards:

- EN 61000-6-4 (emitted interference) and
- EN 61000-6-2 (immunity to interference)



Protection against electromagnetic fields during operation and assembly

The permissible values according to VDE 0848 Part 3-1 are observed from a distance of >3 mm. Persons with physical aids (e.g. pacemakers) may be exposed to health hazards due to the magnetic fields emitted by the coupler system. The minimum distance for this group of persons is >5 mm. The operator must ensure that this minimum distance is also maintained during operation by taking suitable measures.

Function

The Beta inductive transmission system has the task of transmitting up to 4 analog sensor signals from a mobile unit to a stationary receiver unit without contact. In addition to the signal transmission of the analog sensor signals, sufficient electrical energy for the power supply of sensors or actuators is also transmitted contactlessly to the mobile unit. The following figure shows the basic structure of contactless signal transmission.

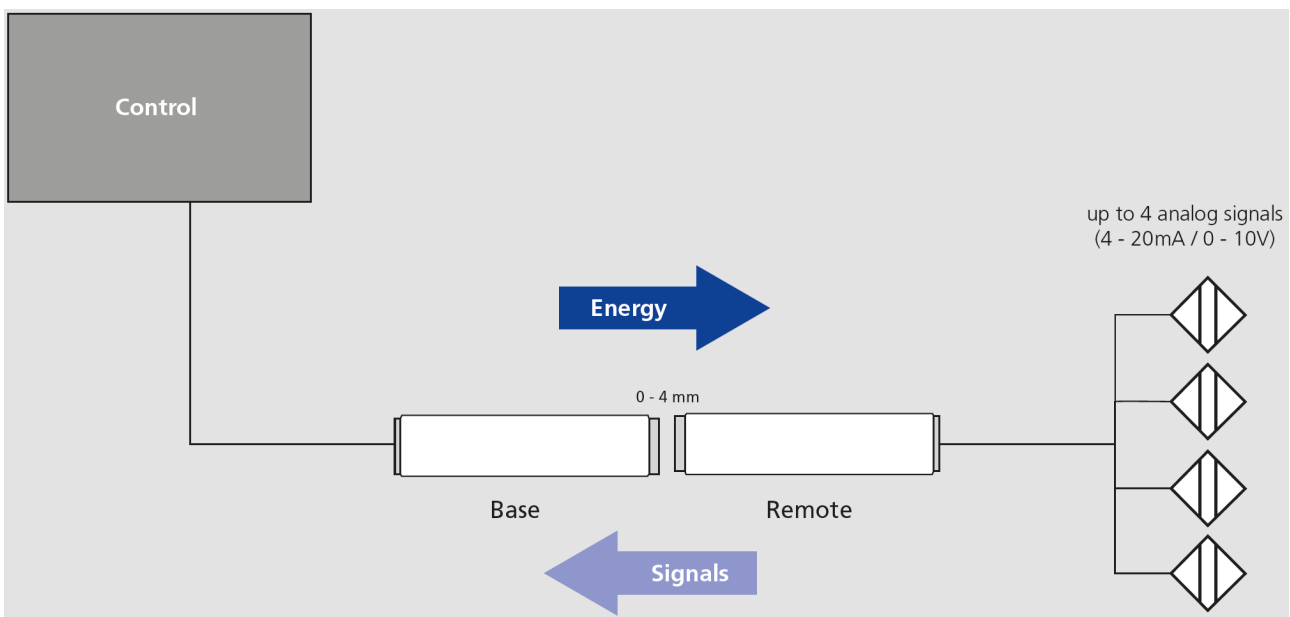


Figure 1 **Function inductive transmission system M30 BETA**

The contactless transmission has a stationary unit (base) in the M30 standard housing. The associated mobile unit (remote) is mounted axially and at a distance of up to 4 mm. An integrated coil system ensures contactless transmission of energy and signals on an inductive basis. The transmission is independent of whether the mobile unit is rotating or not. The transmitted sensor signals are usually forwarded by the stationary electronics to the PLC of the machine or used directly for measuring purposes. In terms of signal technology, the transmission system causes only a small dead time.



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Furthermore, the system has a self-monitoring function. Faults such as wire breakage at the sensors are signaled by outputting a 0mA level to the PLC.

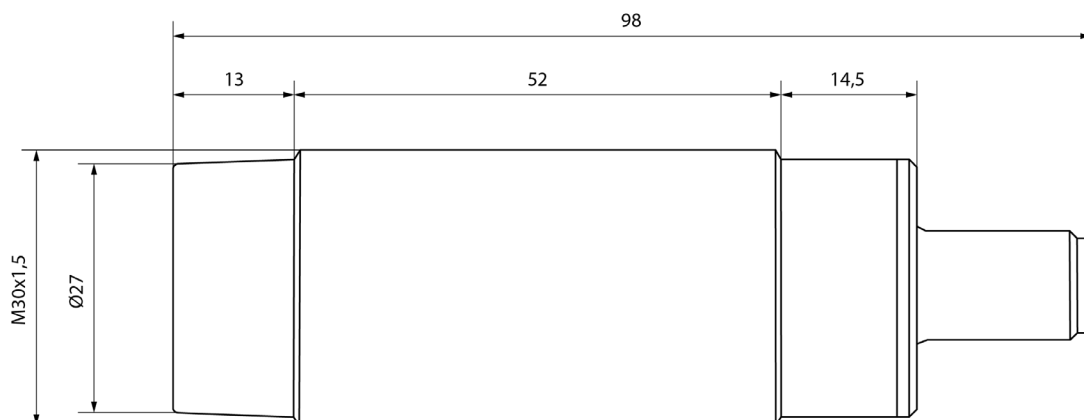
The system has a modular design, so that integration into the customer's plant is possible with manageable effort. All important interfaces are designed to be separable, so that replacement during maintenance and service is possible without time expenditure. The stationary and mobile units are compatible and interchangeable (dynamic pairing). The electrical and mechanical interfaces of the individual function blocks are described in the following chapters. The functional elements have been designed in such a way that polarity reversal or short circuits cannot cause any permanent damage. Nevertheless, for safety reasons, the components must always be installed in a de-energized state. In addition, it must be ensured that only the sensors or actuators intended for this purpose are connected to the signal connections on the stationary and mobile units. Connecting the signal interface lines to the power supply (24V) can lead to permanent destruction of the stationary electronics.

Technical Data

Stationary Unit (Base)

Length	98 mm
Housing thread	M30x1.5
Housing material	Brass, coated
Protection class	IP67 (in plugged condition)
Operating temperature	0...+60°C
Supply voltage	24 V DC $\pm 10\%$
Power consumption	max. 500 mA
Reverse polarity protection	Yes
Short circuit protection	Yes
Number of analog outputs	4
Type analog outputs	4x 0-10 V / 4-20 mA
Function LEDs	Power on: green; Connected: yellow
Connection	Connector Plug M12 12-pol
Installation type	Not align

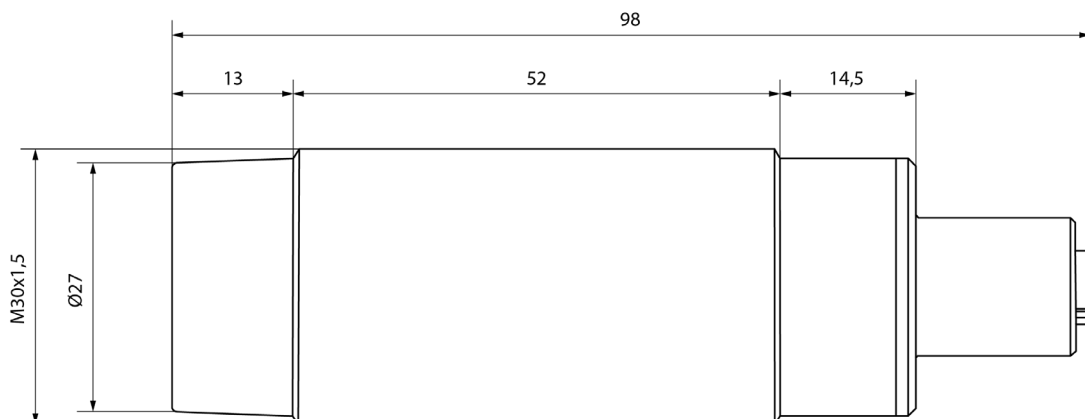
Dimensions:



Mobile Unit (Remote)

Length	98 mm
Housing thread	M30x1.5
Housing material	Brass, coated
Protection class	IP67 (in plugged condition)
Operating temperature	0...+60°C
Output voltage	24 V DC \pm 10%
Power output	< 250 mA
Short circuit protection	Ja
Number of Analog Signals	4
Resolution	12bit
Measuring Range	4x 0-10 V / 4-20 mA
Function LEDs	Power on: green
Connection	Flanschbuchse M12 12-polig
Installation type	Not align

Dimensions:





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Device descriptions

Base Unit

The stationary electronics are integrated in the M30 stationary unit. The electronics are supplied with 24 V DC via the 12-pin connector plug. An inverter on the circuit board supplies the electrical energy for the contactless power supply of the mobile electronics. The coupling is done via a stationary coil, which is integrated in the housing of the stationary unit. Similarly, the modulated measurement data transmitted by the contactless coupled mobile electronics are inductively fed to the stationary electronics. There, these data are demodulated and processed as 0-10 V/ 4-20 mA signals for the analog interface. To avoid unwanted and disturbing current loops, the outputs of the stationary electronics in the direction of the analog interface are galvanically isolated with an isolating DC-DC converter. The analog interface is also connected via the above mentioned connector, to which the wires of the 24 V supply and the isolated 4 pairs of the current interface are connected. In case of wire break at the sensor lines (mobile side) the outputs of the current interface are set to 0 mA.



Figure 2 Base Unit



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The 24 V input is protected against polarity reversal. In case of incorrect assignment, however, the function is disturbed. The current consumption at 24 V must be $< 0.5 \text{ A}$, otherwise there is a fault or incorrect wiring. The pin assignment is described in the section Interfaces stationary unit or Commissioning.

The +24 V supply may only be connected to the stationary electronics when the complete chain of stationary electronics and mobile electronics has been set up.

Remote unit

The mobile electronics is also integrated in a standard M30 housing. The contactless transmission from and to the stationary unit is guaranteed when the modules are arranged axially and the limit distance of 4 mm is observe.



Figure 3 Remote Unit

Interfaces

Interfaces stationary unit (Base)

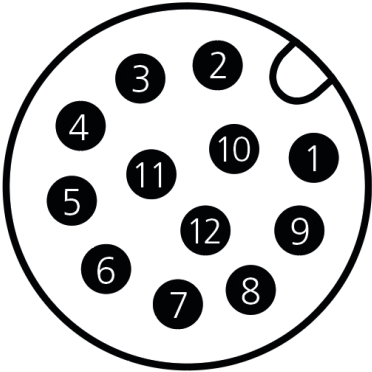
Interfaces stationary unit – mechanical

Weight of the Base unit	145 g
Thread of the housing	M30x1.5

Interfaces Base unit - electrical

The stationary unit is supplied with 24V DC \pm 10% from the control / PLC. We recommend limiting the power supply to a maximum of 0.5A. The connector of the stationary unit is assigned as follows:

Plug M12 Pin assignment:

Connector Base M12x1 12-pol Plug			
Pin	Name	Colour	
1	VCC (+24V) IN	brown	
2	CH1	blue	
3	AGND-CH1*	white	
4	CH2	green	
5	AGND-CH2*	pink	
6	CH3	yellow	
7	AGND-CH3*	black	
8	CH4	grey	
9	AGND-CH4*	red	
10	GND (0V)	violet	
11	NC	grey/pink	
12	Data Valid Out **	red/blue	

* AGND = Analog Ground (galvanically isolated from GND)

** Data Valid Out nur bei M30-4A 0-10 V (0 V = no Remote detected, 24 V = Remote detected)

Interfaces mobile Unit (Remote)

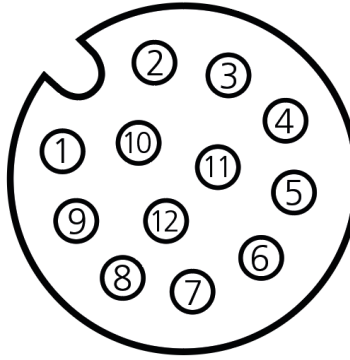
Interfaces mobile unit - mechanical

Weight of the Remote unit	145 g
Thread of the housing	M30x1.5

Interfaces Remote unit - electrical

The connector of the mobile unit is assigned as follows:

Socket M12 Pin assignment:

Connector Remote M12x1 12-pol Socket			
Pin	Name	Colour	
1	+24V OUT	brown	
2	CH1	blue	
3	GND-CH1	white	
4	CH2	green	
5	GND-CH2	pink	
6	CH3	yellow	
7	GND-CH3	black	
8	CH4	grey	
9	GND-CH4	red	
10	GND (0V)	violet	
11	NC	grey/pink	
12	NC	red/blue	



Attention!

Damage to the remote unit due to overvoltage peaks if the cables are too long!

In order to meet the EMC requirements, the receiver cable must not be longer than 15m. If a longer cable is nevertheless used, take all measures to protect the receiver from overvoltage peaks.

Integration

The integration of the stationary and the mobile unit of the contactless transmission is carried out by mounting in an axial orientation, taking into account the limit distance. The assembly must take place in the (electrical) voltage-free state.

The following sections describe important installation instructions that must be observed for correct operation.

Mutual influence in parallel operation



Attention!

Improper assembly can impair the function of the system and lead to damage. The values specified for the installation must therefore be observed.

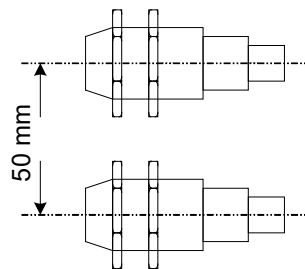


Figure 4 Influence each other

Installation in metal



Attention!

The coupler can be damaged by induction effects, metallic objects in the vicinity of the coil cap lead to overheating. When installing in metal, the specified minimum distances must be observed.

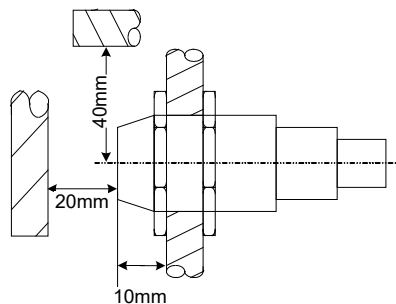


Figure 5 Installation in metal



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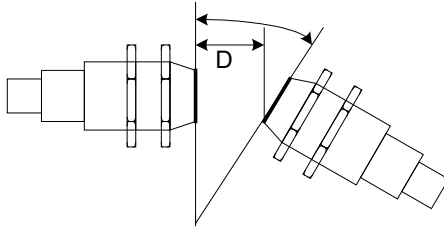
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Permissible angular misalignment

The permissible angular misalignment enables function in special installation positions.



Distance D	Angle °
1mm	23°
2mm	20°
3mm	15°
4mm	10°

Figure 6 Angular misalignment

Permissible offset

The maximum lateral offset between the stationary and mobile unit is $\pm 3\text{mm}$.

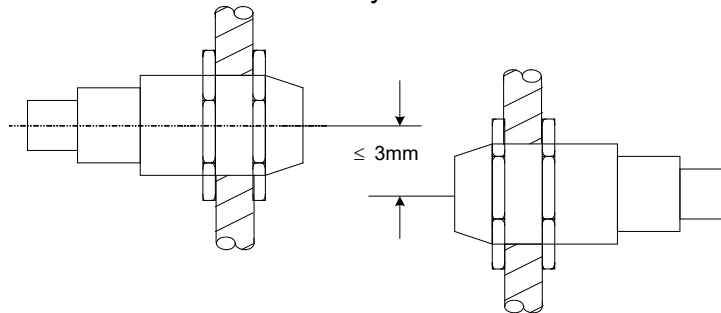


Figure 7 Offset

Installation

Commissioning can only take place after the entire transmission chain has been completely set up. The simplest way to check the system can be realized with a 24V power supply, one or more analog sources and a digital ammeter (DAM). The transmission chain with the pin assignments based on these components is shown below.

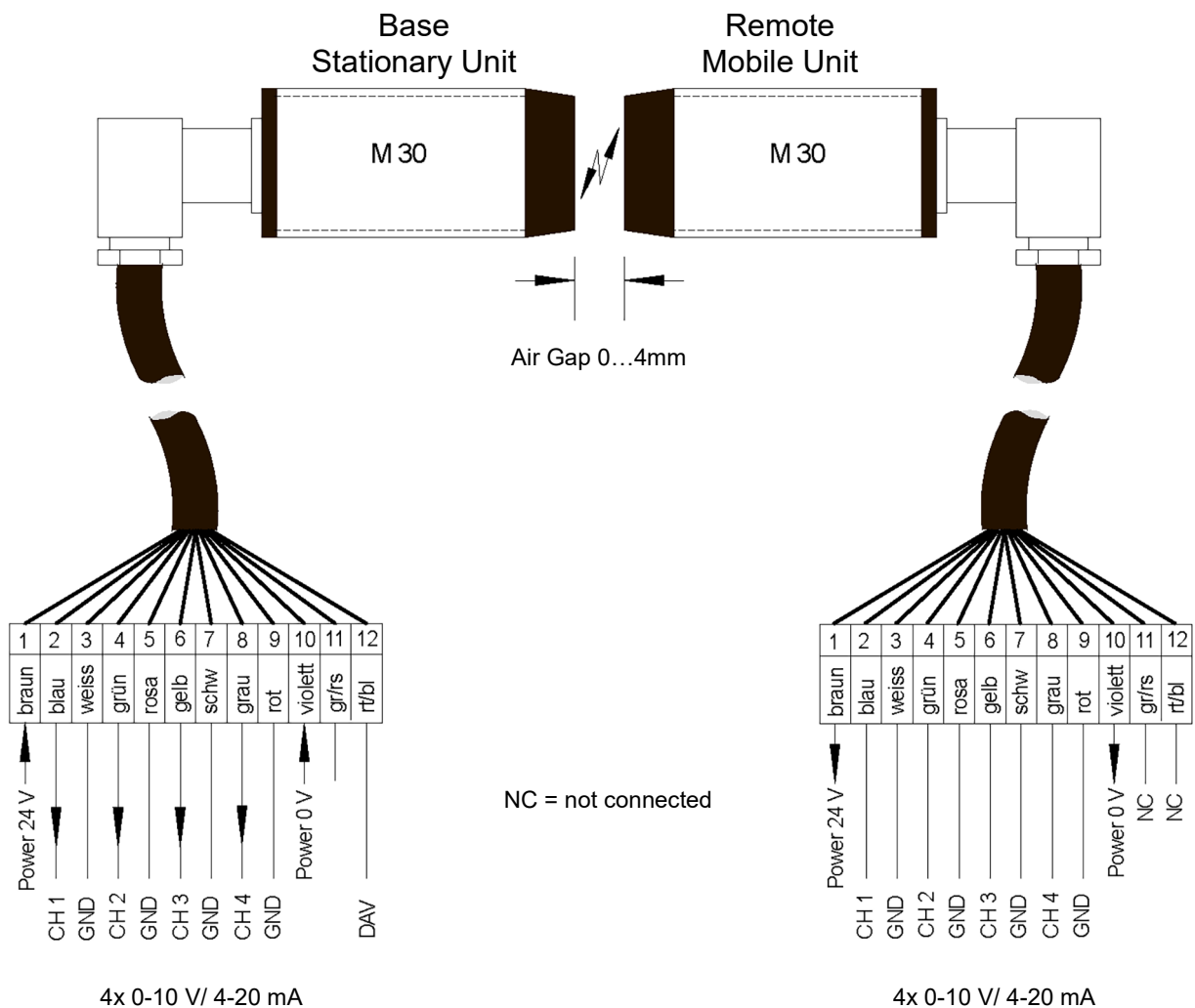


Figure 8 Transmission Scheme



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After switching on the supply voltage of 24V, the following steps should be initiated to check the correct function:

- Check current consumption: <500mA
- Check the LEDs of the stationary unit (green and yellow LEDs on)
- Check the LED of the mobile unit (LED green on)
- Check the wire break monitoring; if a sensor line is interrupted, the corresponding current is set to 0mA

If irregularities occur during one of the above tests, all electrical connections and the mechanical distances of the entire transmission path must be checked again. If there are no obvious faults, any defective units can be isolated and eliminated by exchanging individual components (replacement modules). It is therefore recommended to keep a spare parts package for service purposes.

Troubleshooting

The occurrence of malfunctions will primarily become noticeable through the lack of interface signals or through the occurrence of implausible measurements. The troubleshooting should be carried out according to the following checklist:

- Check the mechanically correct installation
- Measurement of the voltage supply and the current consumption
- If there are no obvious faults, replace components with spare parts, replace the entire system if necessary

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