

# Angle sensor AN2 series 30

**RE 95143**

Edition: 10.2013

Replaces: 04.2012



- ▶ Hall-effect sensor for angular measurement

**Features**

- ▶ Angle sensor element based on the Hall-effect principle
- ▶ Shaft can be turned through mechanically
- ▶ Integrated electronics with temperature compensation
- ▶ Output signal ratiometrically proportional to angle
- ▶ Zero point and sensitivity are calibrated

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## Ordering code

01	02	03	04	05	06
<b>AN2</b>				/	<b>30</b>

### Type

01	Hall-effect angle sensor	<b>AN2</b>
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### Version

02	Without pin	<b>V1</b>
	With pin to the bottom	<b>V2</b>
	With pin to the top	<b>V3</b>

### Characteristics

03	Positive course	<b>A</b>
	Negative course	<b>B</b>

### Angles

04	±17°	<b>17</b>
	±28°	<b>28</b>
	±35°	<b>35</b>
	±36°	<b>36</b>
	±41°	<b>41</b>
	±44°	<b>44</b>

### Supply voltage      Signal voltage

05	5 ±0.5 V	10% to 90% $U_{sup}$	<b>05</b>
	8 to 10.4 V	25% to 75% $U_{sup}$	<b>10</b>

### Series

06		<b>30</b>
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## Description

The AN2 angle sensor is used for angular measurement from ±17° to ±44°.

The sensor returns a ratiometric voltage with rising characteristic (positive course) or inverted characteristic (negative course).

This sensor is a typical part of an electro-hydraulic hitch control (EHC) and is supplied directly from a Rexroth EHR controller or an SRC controller.

### Available variants

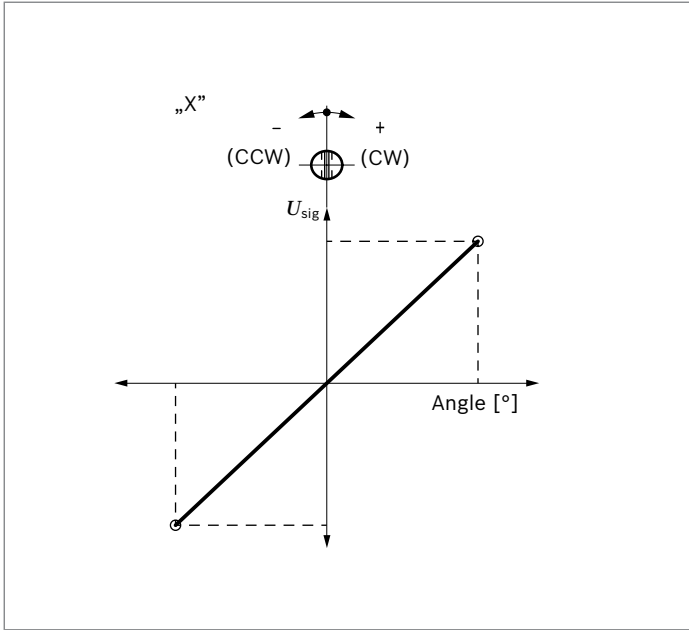
Type							Material number
AN2	V1	B	35	05	/	30	R917008154
AN2	V1	B	35	10	/	30	R917005164
AN2	V1	A	41	05	/	30	R917005568
AN2	V1	A	41	10	/	30	R917005165
AN2	V2	A	36	05	/	30	R917008155
AN2	V2	A	36	10	/	30	R917005166
AN2	V1	A	44	05	/	30	R917008160
AN2	V1	A	44	10	/	30	R917004856
AN2	V3	A	28	05	/	30	R917008156
AN2	V3	A	28	10	/	30	R917005167
AN2	V1	A	17	05	/	30	R917008157
AN2	V1	A	17	10	/	30	R917005168
AN2	V2	A	41	05	/	30	R917008158
AN2	V2	A	41	10	/	30	R917005169
AN2	V3	A	41	05	/	30	R917008159

## Technical data

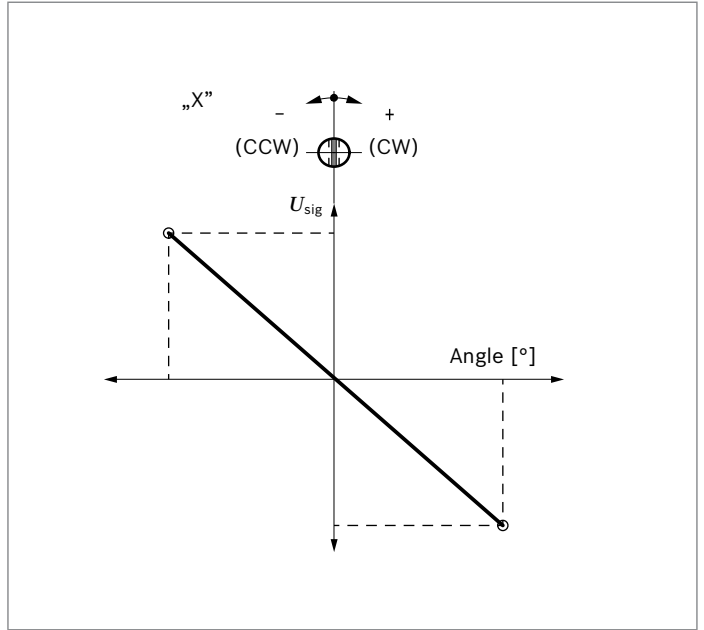
Type	AN2					
Measuring principle	Hall effect Maximum permissible external magnetic field: 0.3 mT					
Nominal angular range	±17°	±28°	±35°	±36°	±41°	±44°
	Shaft can be mechanically rotated					
Starting torque	≤ 5 Ncm					
Shaft loading	radial	≤ 10 N				
	axial	≤ 20 N				
Supply voltage $U_{sup}$	8 to 10.4 V DC			5 ±0.5 V DC		
Supply current $I_{sup}$	≤ 15 mA			≤ 15 mA		
Signal voltage $U_{sig}$ (ratiometric)	25% to 75% $U_{sup}$			10% to 90% $U_{sup}$		
Load resistance	> 3 kΩ			≥10 kΩ		
Linearity	< ±1%					
Zero position	Marking on shaft (see drawing)					
Sensitivity of the end points	< ±1% of the supply voltage					
Hysteresis	Immeasurable					
Resolution	0.025% $U_{sup}$					
Temperature coefficient of zero point	≤ ±0.15% / 10 °C					
Temperature coefficient of sensitivity	≤ ±0.2% / 10 °C					
Operating temperature range	-30 °C to +85 °C					
Storage temperature range	-35 °C to +100 °C					
Housing material	PBT GF 30					
Shaft material	X 5 CrNi 18					
Type of protection with installed mating connector (IEC 60529)	IP67 and IP69K					
Connector	3-pin connector with dust boot and single-wire seal					
Insulation resistance to housing	> 100 MΩ					
Dielectric strength of insulation to housing	< 200 V					
Electromagnetic compatibility EMC (ISO 11452-2)	1 MHz to 1 GHz	200 V/m, permissible deviation 1% $U_{sup}$				
	1 GHz to 4 GHz	100 V/m, permissible deviation 1% $U_{sup}$				
Electrostatic discharge ESD (ISO TR 10605, intensity IV)	Contact discharge	±8 kV				
	Air discharge	±15 kV				
Overvoltage / inverse-polarity protection / short circuit resistance	Overvoltage protection up to 18 V Resistance against inverse-polarity and short circuits					
Dynamic tests	Broadband noise test (IEC 68-2-64)	$a_{eff} = 0.05 g^2/Hz$ , 10 to 2000 Hz				
	Transport shock (IEC 60068-2-27)	15 g, 11 ms, 3x each direction (pos./neg.)				
	Continuous shock (IEC 60068-2-29)	25 g, 6 ms, 1000x each direction (pos./neg.)				

## Characteristics

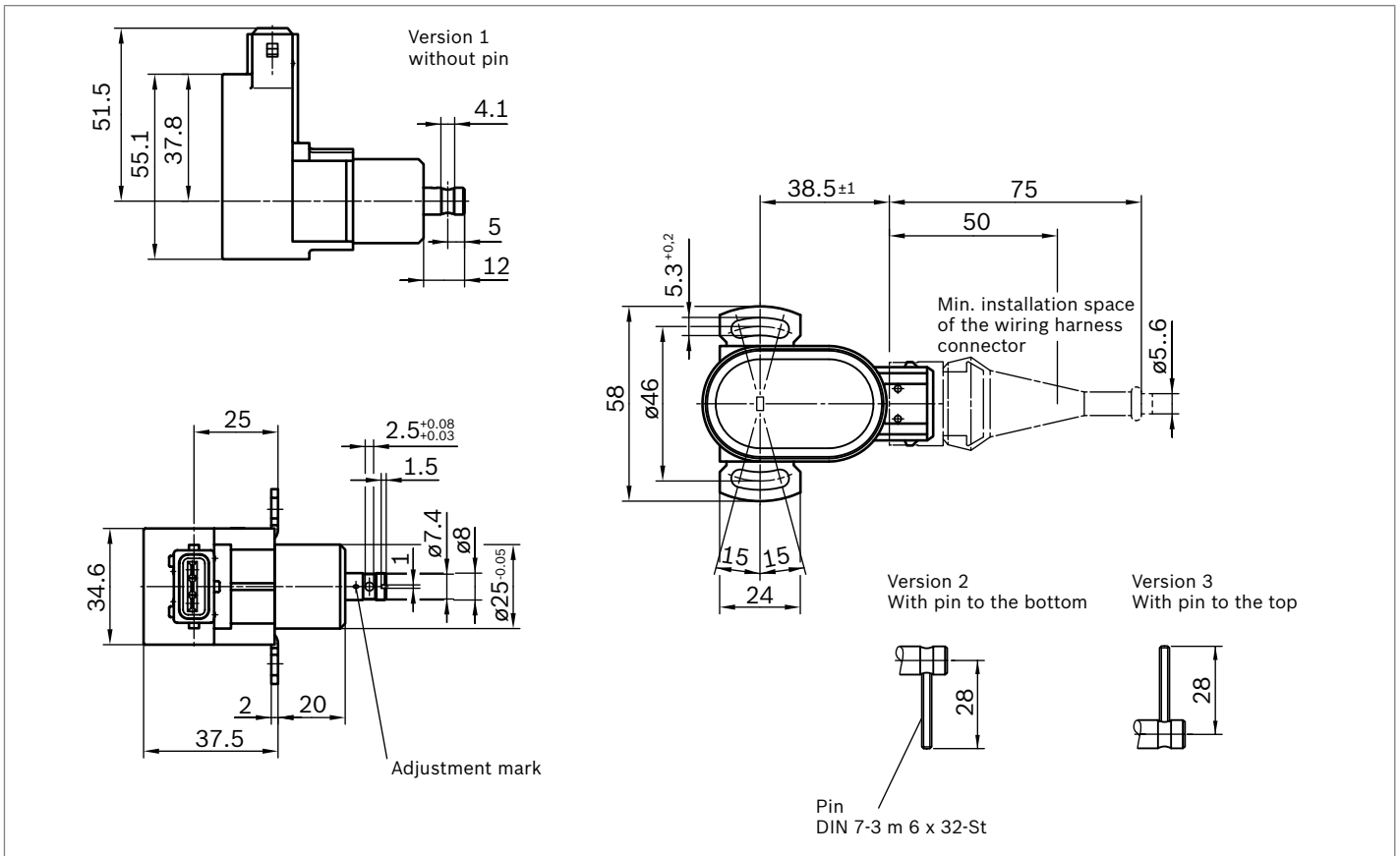
### ▼ Positive course



### ▼ Negative course

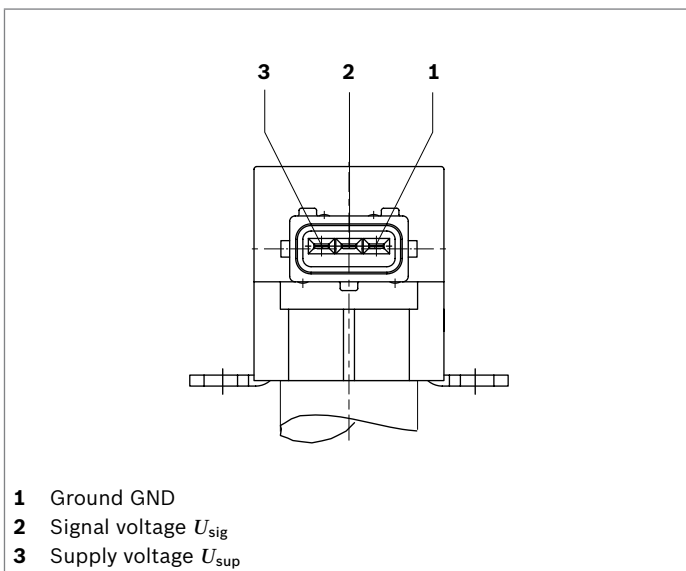


## Dimensions



## Connector AMP Superseal

### ▼ Pin assignment



### ▼ Mating connector<sup>1)</sup>

Designation	Number	Material number
Housing	1	1928402579 <sup>2)</sup>
Protection cap	1	1280703022 <sup>2)</sup>
Contacts	3	929939 <sup>3)</sup>
Single-wire seal (wire size: 0.5 to 1.0 mm <sup>2</sup> )	3	828905-1 <sup>3)</sup> with FLK cable type 828904-1 <sup>3)</sup> with FLKr, FLX cable

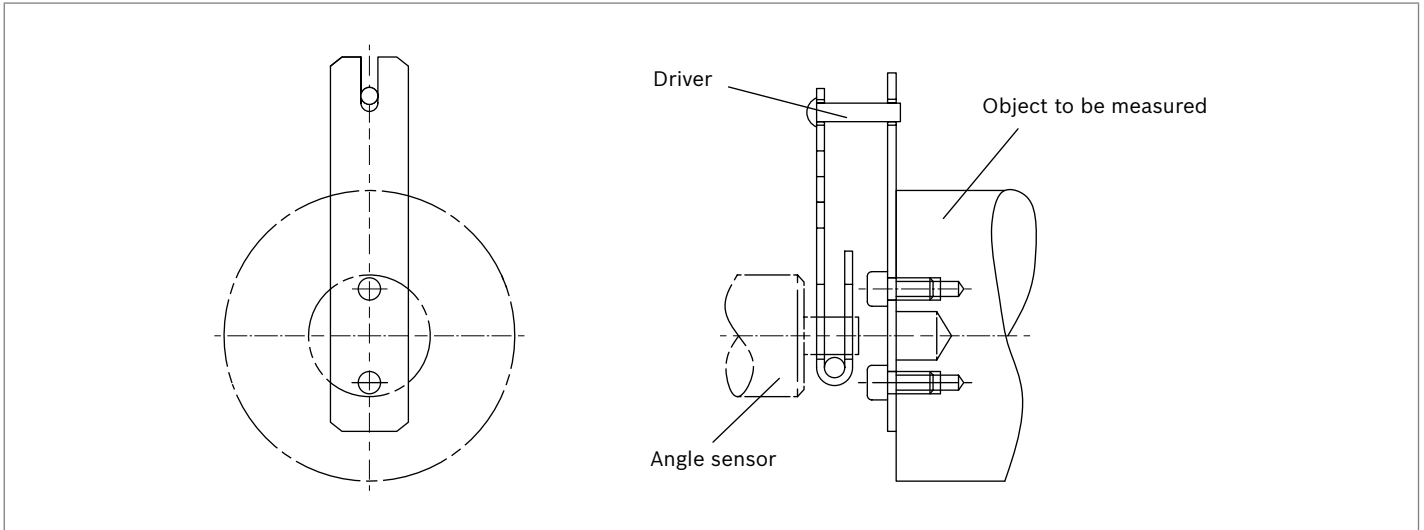
1) The mating connector is not included in the scope of supply.

2) Available from Bosch

3) Available from AMP

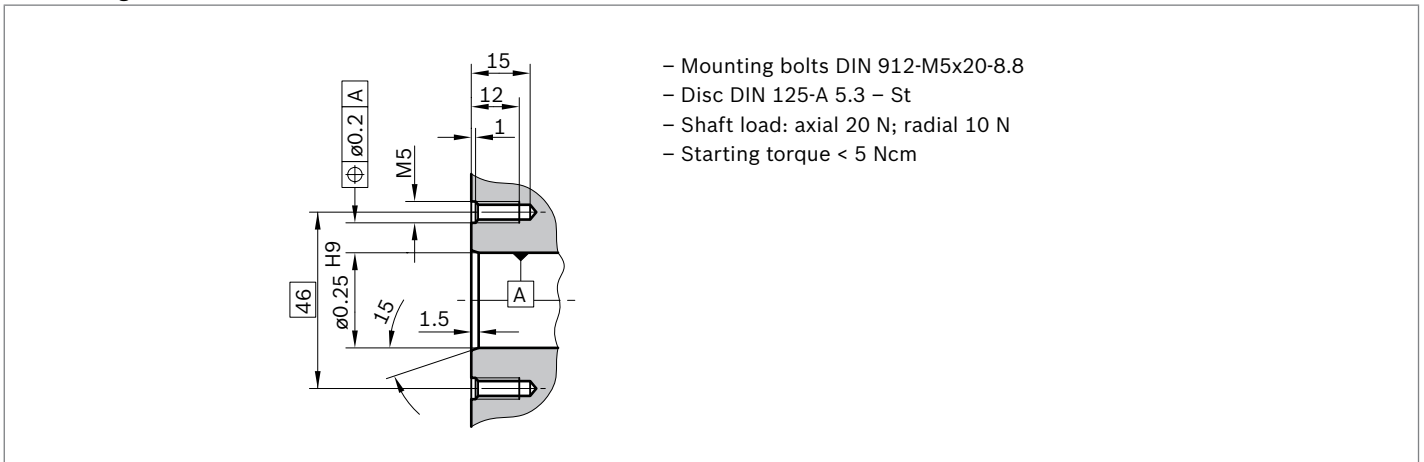
## Installation instructions

### ▼ Coupling example



The angle sensor shaft is to be coupled to the measurement object as free of force and play as possible.

### ▼ Mounting hole



## Safety instructions

### General instructions

- ▶ The proposed circuits do not imply any technical liability for the system on the part of Bosch Rexroth.
- ▶ It is not permissible to open the AN2 angle sensor or to modify or repair the AN2 angle sensor. Modifications or repairs to the wiring could result in dangerous malfunctions.
- ▶ System developments, installation and commissioning of electronic systems for controlling hydraulic drives must only be carried out by trained and experienced specialists who are sufficiently familiar with both the components used and with the complete system.
- ▶ While commissioning the AN2 angle sensor, the machine may pose unforeseen dangers. Before commissioning the system, you must therefore ensure that the vehicle and the hydraulic system are in a safe condition.
- ▶ Make sure that nobody is in the machine's danger zone.
- ▶ No defective or incorrectly functioning components may be used. If the AN2 angle sensor should fail or demonstrate faulty operation, it must be replaced.

### Notes on the installation point and position

- ▶ Do not install the AN2 angle sensor close to parts that generate considerable heat (e.g. exhaust).
- ▶ A sufficiently large distance to radio systems must be maintained.
- ▶ The connector of the AN2 angle sensor is to be unplugged during electrical welding and painting operations.
- ▶ Cables/wires must be sealed individually to prevent water from entering the device.

### Notes on transport and storage

- ▶ If it is dropped, the AN2 angle sensor must not be used any longer as invisible damage could have a negative impact on reliability.

### Notes on wiring and circuitry

- ▶ Lines to the angle sensors are so short as possible and be shielded. The shielding must be connected to the electronics on one side or to the machine or vehicle ground via a low-resistance connection.
- ▶ The product should only be plugged and unplugged when it is in a de-energized state.
- ▶ Lines from the AN2 angle sensor to the electronics must not be routed close to other power-conducting lines in the machine or vehicle.

- ▶ The AN2 angle sensor and the connection line should be supported mechanically near the installation location.
- ▶ If possible, lines should be routed in the vehicle interior. If the lines are routed outside the vehicle, make sure that they are securely fixed.
- ▶ Lines must not be kinked or twisted, must not rub against edges and must not be routed through sharp-edged ducts without protection.
- ▶ Lines are to be routed with sufficient distance from hot or moving vehicle parts.
- ▶ The sensor lines are sensitive to radiation interference. For this reason, the following measures should be taken when operating the sensor:
  - Sensor lines should be attached as far away as possible from large electric machines.
  - If the signal requirements are satisfied, it is possible to extend the sensor cable.

### Intended use

- ▶ The AN2 angle sensor is designed for use in mobile working machines provided no limitations/restrictions are made to certain application areas in this data sheet.
- ▶ Operation of the AN2 angle sensor must generally occur within the operating ranges specified and released in this data sheet, particularly with regard to voltage, temperature, vibration, shock and other described environmental influences.
- ▶ Use outside of the specified and released boundary conditions may result in danger to life and/or cause damage to components which could result in consequential damage to the mobile working machine.

### Improper use

- ▶ Any use of the AN2 angle sensor other than that described in chapter "Intended use" is considered to be improper.
- ▶ Use in explosive areas is not permissible.
- ▶ Damages which result from improper use and/or from unauthorized, unintended interventions in the device not described in this data sheet render all warranty and liability claims with respect to the manufacturer void.

### Use in safety-related functions

- ▶ The customer is responsible for performing a risk analysis of the mobile working machine and determining the possible safety-related functions.

- ▶ In safety-related applications, the customer is responsible for taking suitable measures for ensuring safety (sensor redundancy, plausibility check, emergency switch, etc.).
- ▶ Product data that is necessary to assess the safety of the machine can be provided on request or are listed in this data sheet.

#### **Further information**

- ▶ Further information about the AN2 angle sensor can be found at [www.boschrexroth.com/mobile-electronics](http://www.boschrexroth.com/mobile-electronics).
- ▶ The AN2 angle sensor must be disposed according the national regulations of your country.

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