Radarcont® RP4IR

Electronic Radar filling level sensor
with freely radiating 122GHz FMCW signal

ACS CONTROL-SYSTEM

Technical Information TI06.25

liquids | non-contact measurement | slim design | IO-Link | overvoltage protection | integrated temperature measuring °C

Application

- Non-contact level and volume measurement
- Flow measurement at open channels and measuring weirs
- Water and waste water sector
- Process industry
- Environmental technology
- Storage tanks, storage bunkers, silos

Main features

- Measuring ranges up to 10m
- Connector plug M12
- High protection class IIP65/IP67 (EN/IEC 60529)
- Process temperature range -20...+70°C (-4°F... +158F)
- Characteristic deviation ≤ ±0.1%FSI (linearity + repeatability + hysteresis)
- Integrated overvoltage protection
- Temperature compensation

Description

The device is an electronic radar filling level sensor for continuous measurement of filling levels in liquid media.
The device operates with a pulsed FMCW radar (Frequency Modulated Continuous Wave) and detects contactless the distence to motionloss objects.
The sensor outputs a periodic radar signal with linear frequency which varies upwards and downwards. The rate of change of frequency over time remains constant. Objects in the detection range reflect the transmitted signal. The change in the signal delay and frequency of the reflected signal are used to determine the distance to the object.
The device is suitable for applications in virtually all industries, optimally for use within container up to 10m.
Due to the small opening angle especially disturbances by foreign objects or internals will be reduced.
It is advisible for applications, where optical or ultrasonic sensors are unsuitable because of disruptive factors like temperature, gas or dust stratification, under or overpressure resp. vacuum, dust, wind or incidence of light.
The Radar technology allows depending on the application:

- Measurement of liquids, also at gas stratification (e.g. ammonia) or foaming
- Measurement though the container wall, e.g. IPC container or through a protection window, e.g. PTFE or PP

Modbus

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TECHNICAL DATA

Distance input
Sensor type FMCW radar, pulsed
Frequency 122...123 GHz
Radiated power EIRP ≤ 10dBm
Beam angle 10°
Pulse rate ≥ 10Hz / ≤ 100ms
Measuring range 0 ... 10m (FSI)
Blind zone ≤ 30cm
Resolution ≤ 1mm
Characteristic deviation ≤ ±0.1%FSI (linearity + repeatability + hysteresis)
Linearity ≤ ±0.1%FSI
Repeat accuracy ≤ ±2mm
Hysteresis negligible
Influence of auxiliary energy ≤ ±0.002%FSI/V
Influence of temperature ≤ ±0.005%FSI/K
Long-term drift ≤ ±0.02%FSI/year
Influence of installation position without

Electronics output IO-Link
Interface - Co
Specification IO-Link V1.1 / Port Class A / Com2 (38.4 kBaud), Com3 (230.4 kBaud)
Cycle time ≥ 2.3ms
Time response t90-min ≤ 100ms (td = 0s)
Switching output - So
Specification 2x PP (push-pull), switching to +L/-L
Output signal Uo ≤ 0.2V...≥ (Us - 2V) / Io = 0...200mA (current-limited ≤ 450mA, short-circuit proof)
Switching delay time ≤ 30µs (RL ≤ 3kR / Io ≥ 4.5mA)
Switching cycles ≥ 100,000,000
Analog output - Io
Signal range 4...20mA: Signal range 3.8...20.5mA, error ≤ 3.6mA / ≥ 21mA (22mA)
0...20mA: Signal range 0...20.5mA, error ≤ 0.05mA / ≥ 21mA (22mA)
Resolution ≤ 1µA
Permissible load RL ≤ (Us - 8V) / 22mA
Influence of auxiliary energy ≤ ±0.5µA/V
Influence of temperature Ta ≤ ±0.5µA/K
Power supply
Supply voltage Us IO-Link inactive: 9...35VDC reverse polarity protected / residual ripple ≤ 2Vpp
IO-Link active: 18...30VDC reverse polarity protected / residual ripple ≤ 2Vpp
Input current Is ≤ 20mA (Co / So / Io = 0mA)
Switch-on delay time ≤ 0.5s (td = 0s)

Electronics output RS485 Modbus-RTU
Interface - Co
Specification RS485, bidirectional / Modbus-RTU / 4.8...38.4 kBaud
Input resistance 112kΩ
Time response t90-min ≤ 100ms (td = 0s)
Power supply
Supply voltage Us 6...35VDC reverse polarity protected / residual ripple ≤ 2Vpp
Input current Is ≤ 20mA (Co = 0mA)
Switch-on delay time ≤ 0.5s (td = 0s)

Materials
not in contact with the process PE-HD, POM, PA, FPM

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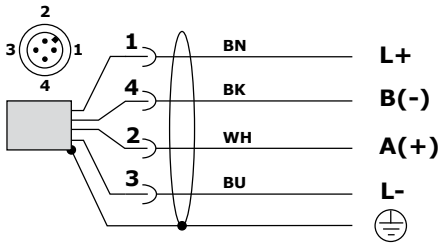
Process conditions
Process temperature Tp -20...+70°C (-4°F...+158F)
Process pressure -0.2...+0.5bar

Ambient conditions
Ambient temperature Ta -20...+70°C (-4°F... +158F)
Protection class IP65/IP67 (EN/IEC 60529)
Climate class 4K4H (EN/IEC 60721-3-4)
Shock resistance 50g [1ms] (EN/IEC 60068-2-27)
Vibration resistance 20g [10...2000 Hz] (EN/IEC 60068-2-6)
EM compatibility Equipment class B / industrial area (EN/IEC 61326)
Overvoltage protection Integrated overvoltage protection (EN/IEC 61000-4-5)
Insulation voltage ≥ 50VDC / rated leakage current 10kA (8/20µs)
Protection class III
Pollution degree 4
Operating altitude 2000m above sea level

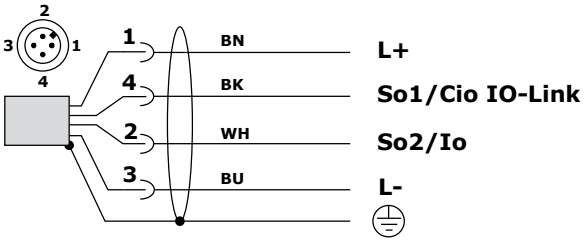
ELECTRICAL CONNECTION

Terminal connection

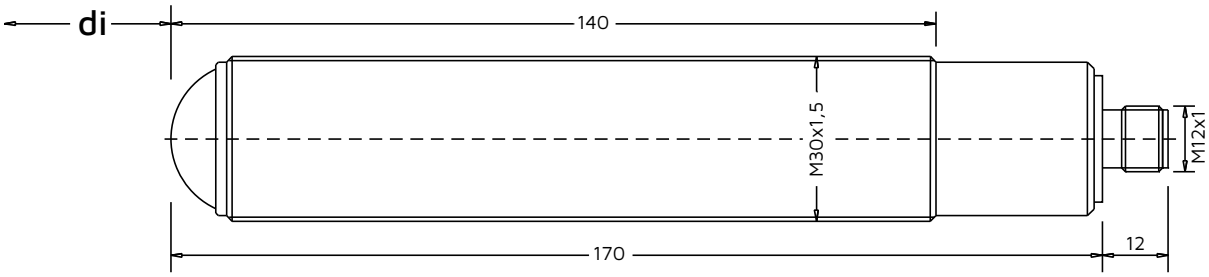
RS485 Modbus-RTU



IO-Link



DIMENSIONS (MM)



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ORDE CODE

Type

Application type
I Industry

Sensor
R Radar FMCW

Approval
S Without

Process connection
U Thread DIN 13 – M30x1,5

Electronics output
V RS485 Modbus-RTU, 4-wire
L IO-Link, current 0/4...20mA / 1x/2x switch PP, 3-/4-wire

Electronics function
0 Without
3 Temperature -20°C...+70°C (-4°F...+158°F)

Electrical connection
S Plug M12-A-4P

Radarcont® RP4	I	R	S	U			S

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