



Ver. RIL400.01 anno 2016

RIL400 | RIL405 | RIL410 | RIL415 | RIL420 | RIL425 Instruction and Maintenance manual



Index

Section I

Presentation of The Manual Annexed Documentations Authorised Assistance

Section li

Guarantee General Description Technical Data Identification Label Planned Use And Not Planned Use Planned Use Not Planned Use Residual Risks

Section lii

Product Overview Product Introduction Model Selection Parameter Selection Tabel Technical Parameter Intstrument Linear Dimension

Section lv

Product Overview

Installation Requirements

Electrical Connection

Debugging

Keys Description

Operating Instruct

Section V

Maintenances and disposal of

Riels Instruments srl - Instructions and Maintenance Manual

Riels Instruments srl - Manuale d'uso e manutenzione



Section I

Declaration of conformity Information on the documentation

Manufacturer's data

Annexed Documentations

Declaration of conformity



The undersigned Maria Alberta Righetti with head office at No. 28, Via Guido Rossa – 35020 – Ponte San Nicolò (PD) – ITALY. In her capacity of legal representative of the Riels Instruments s.r.l. Company, Partita IVA: 02488080280:

Declares

that product: Ultrasounds level transmitter ModelS: RIL400 | RIL405 | RIL410 | RIL415 | RIL420 | RIL425 Year of construction: 2016

It was manufactured in compliance with the following rules:

- Directive 2014/35/EU known as "Low voltage Directive"
- Directive 2014/30/EU known as "Electromagnetic compatibility Directive"
- Directive 2011/65/EC known as "RoHS Directive"
- Directicve ATEX Intrinsically safe "Exia II CT6 Ga"

And is therefore inn conformity with the current regulations

Ponte San Nicolò 10 gennaio 2016

Signature

Upin Sthel N



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DATI DEL COSTRUTTORE

Legal Representative:	Maria Alberta Righetti
Company name:	Riels Instruments S.r.l.
Company Headquarters: Street and City	Via Guido Rossa, 28 – 35020 – Ponte San Nicolò (PD)
VAT N.:	02488080280
Name of product:	Misuratore di portata ad ultrasuoni - DMTF-EX
Office Tel. No.	+39 049 8961771
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Website:	www.riels.it

PRESENTATION OF THE MANUAL



NOTE

UPON RECEIPT OF THE CAPACITY MEASURER, BEFORE CARRYING OUT ANY OPERATION, READ CAREFULLY THE INSTRUCTIONS AND MAINTENANCE MANUAL.

This Manual contains the instructions for the installation, the use and the maintenance of the RIL400, RIL405, RIL410, RIL415, RIL420, RIL425 lvel measurer, later called RIL400.

The Manual consists of several Sections, each of which deals with a number of topics, divided into Chapters and paragraphs. The general index lists all the topics of the entire Manual.

Page numbering is progressive and on each page is shown its number. This Manual is intended for the personnel assigned to the Installation, use and maintenance of the RIL300, and it relates to the technical life after its production and sale.

In the event that later it may be sold to third parties for any reason (sale, loan of use, or any other reason), the device must be delivered complete with all the documentation.

Before starting any operation on any unit, it is necessary to have read the entire Manual.

This Manual contains information of confidential proprietary and it cannot be, even partially, supplied to third parties for any use and in any form without the prior written consent of Riels Instruments S.r.l.

Riels Instruments S.r.l. declares that the information contained in this Manual is consistent with the specifications of the product for which the Manual refers.

Copy in conformity of this Manual is filed in the RIL400 technical Dossier, kept at the Manufacturer's Company.

Riels International S.r.l. disclaims any documentation that has not been produced, issued or distributed by the latter or by one of its authorised representative.

ANNEXED DOCUMENTATIONS



NOTE

BEFORE USING THE RIF030P DEVICE, CHECK THAT ALL THE LISTED ANNEXED DO-CUMENTATIONS ARE PRESENT.

To the product are Annexed the following documents:

- Manual
- Declaration of conformity



NOTE

IN THE EVENT THAT RIL300 IS TRANSFERRED TO THIRD PARTIES, ALL THE DOCUMENTATION MUST BE DELIVERED WITH IT.

AUTHORISED ASSISTANCE

The Riels Instruments S.r.l. Manufacturing Company carries out directly any type of intervention on the product.

Restitution of the instrument

To send a capacity measurer to RIELS INSTRUMENTS, for Example, for repair or calibration, take the Following measures:

• Always attach a "Declaration of decontamination" form, carefully filled out. RIELS INSTRUMENTS may transport, examine and repair the devices returned by the customers only in the presence of this document.

! Note!

A copy of the "Declaration of Decontamination" is given in the concluding part of this Manual.

- If necessary, attach any special handling instructions, for example, safety cards, in compliance with the EC Regulation No 1907/2006 REACH.
- Remove any residue. Pay particular attention to the gasket grooves and any cracks, which could hide deposits, and it is all the more important above all if the substance is hazardous to health, for example, flammable, toxic, caustic, carcinogenic, etc..

Caution!

- Do not return a measurer unless you are absolutely certain that all traces of hazardous substances have been removed, for example, substances penetrated into the interstices or filtered through the plastic.
- Costs incurred for the removal of residuals or for any injuries (burns, etc.) due to insufficient cleaning are at the plant owner's charge.



Section II

Guarantee

Technical features

General description

Planned and not planned use

GUARANTEE

The guarantee rules, listed integrally in the Sales Contract , have value only if the RIL400 and variations of the same model device is used under the planned use conditions.

Once excluded the regular and extraordinary maintenance interventions described in Section MAINTENANCE and executed, following the indicated procedures, any repair or modification brought about to the device by the user or by unauthorised companies makes the guarantee void.

The guarantee does not extend to damages caused by incompetence or negligence in the use of the RIL400, or by poor or omitted maintenance.

The p	products sold by us are covered by guarantee regarding the product at the following conditions:
1	The guarantee is valid for a period of twelve/twenty-four (12) months
2	The Manufacturing Company undertakes to replace, at its discretion, the malfunctioning parts or incorrect manufacturing, only after careful quality control and detection of bad manufacture.
3	The cost of transport and/or delivery are always at the purchaser's charge in case of misuse of the guarantee terms
4	During the period of guarantee, the replaced products become the property of the Manufacturer
5	Of this guarantee can only benefit the original purchaser who has met the maintenance instructions contained in the Manual. Our liability on the guarantee becomes void when the original owner transfers the property of the product, or changes are made on the product.
б	The guarantee does not cover damages caused by excessive stress such as, for example, use of the product after detection of an anomaly, use of unsuitable operating methods as well as failure to follow the use and maintenance instructions.
7	The manufacturer disclaims any liability for any difficulties that might arise in the resale or using abroad due to provisions in force in the Country where the product was sold.
8	The product part of the defective product must be delivered to the Manufacturing Company for replacement; otherwise the replaced part will be charged to the purchaser.
9	Riels Instruments S.r.I. guarantees that its Products are free from defects in materials and/or workmanship for 12 months from their delivery to the purchaser.
10	12) The guarantee is not valid for products that have been tampered with, repaired by third parties or used in a manner not in conformity with the planned conditions of use. Products with defects caused by transportation, accidents, tampering, repair, negligence, abuse or improper use, lack of reasonable or proper maintenance, tampering or methods that made by unauthorised persons, accident, wear and deterioration due to use and any other cause not attributable to defects in the product are not covered by the guarantee.
11	14) The Purchaser must, under penalty of forfeiture of the guarantee, report in writing the defect to Riels Instruments S.r.I. within 8 days from receipt of the products for visible defects and 8 days from the detection of hidden defects. Where Riels Instruments S.r.I. acknowledges the existence of the reported defects or discrepancies, the guarantee will be limited, at its discretion, to repair or replacement free of charge, in the normal time required, or the issuance of a credit note for the invoice value of the product acknowledged to be defective, by way of a consensual and final settlement of any damage claimed by the purchaser or third parties, with the exclusion of any other legal or conventional guarantee or entitled to reimbursement of any expenses and compensation for damages both direct and indirect, except in cases of wilful misconduct or gross negligence.

Notice: if use of the guarantee is deemed necessary, please indicate the following data:

1	Туре
2	Date of purchase (presentation of the purchase document)
3	Detailed description of the problem



NOTE

IFAILURE TO MEET THE RIF030P INSTALLATION, USE AND MAINTENANCE ETHODS DESCRIBED IN THIS DOCUMENTATION IMPLIES VOIDANCE OF THE GUARANTEE TERMS.

GENERAL DESCRIPTION

RIL400 is an radar level transmitter intended to be used in environments potentially explosive.

The environment classification is ATEX Ex ia II CT6 Ga , this type does not require the intervention of a Notified Body, and related certificates, nevertheless the product has been designed and manufactured to be used in this type of environment, which in general requires constant attention of the operators to the explosiveness potential aspects.

All behaviours that may present a risk of generating sparks or start fires must be strictly avoided.

All behaviours that may present a risk of generating sparks or start fires must be strictly avoided.

RIL400 Series Radar Level Transmitter is high-frequency level measurement instruments with the maximum measuring distance up to 70 meters. The antenna is further optimized, and the new-type microprocessor can perform higher rate of signal analysis and processing, making the instrument available for complex measurement conditions, such as reactors, solid silos.

Priciple

Radar Level Antenna emits narrow microwave pulses that transmitted down by the antenna. The microwave comes into contact with the measured medium surface then reflected back and receiving by the antenna system. The signal is transmitted to electronic circuit and partly concert to level signals(sa the microwave featured with high propagation speed, it's almost instantaneous for the electromagnetic waves to reach the target and return to the receicer).

TECHNICAL DATA

Housing	Seal between the housing and the housing cover: Silicone rubber Housing window : Stainless steel Ground terminal: Stainless steel
Supply voltage (Two-wire)	Standard type: (16~26)V DC Intrinsically Safe: (21.6~26.4)V DC Power consumption: max22.5mA/1w Allowable ripple wave: -<100Hz Uss<1V / -(100~100K)Hz Uss<10mV
Cable parameters	Cable entry /Plug: M20×1.5 Amphenol connector: cross-section1.0mm
Output parameters	Output signal: (4~20)mA Communication protocol: HART Resolution ratio: 1.6uA Fault signal: current output unchanged; 20.5mA, 22mA, 3.9mA Integration time: (0~50)s Adjustable
Dead zone	The ends of the antenna
Dead zone Distance	The ends of the antenna The maximum measuring distance 70m
Dead zone Distance Microwave frequency	The ends of the antenna The maximum measuring distance 70m 26GHz
Dead zone Distance Microwave frequency Communication interface	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol
Dead zone Distance Microwave frequency Communication interface Measurement interval	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings)
Dead zone Distance Microwave frequency Communication interface Measurement interval Adjustment time	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings)
Dead zone Distance Microwave frequency Communication interface Measurement interval Adjustment time Display resolution	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings) 1mm
Dead zone Distance Microwave frequency Communication interface Measurement interval Adjustment time Display resolution Temperature	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings) 1mm Working storage and transport temperature -40÷+100°C
Dead zone Distance Microwave frequency Communication interface Measurement interval Adjustment time Display resolution Temperature Process temperature	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings) 1mm Working storage and transport temperature -40÷+100°C (temperature of the antenna part): -40÷+250°C
Dead zone Distance Microwave frequency Communication interface Measurement interval Adjustment time Display resolution Temperature Process temperature Pressure	The ends of the antennaThe maximum measuring distance 70m26GHzHART protocol1s (Depending on the parameter settings)about 1s (Depending on the parameter settings)1mmWorking storage and transport temperature -40÷+100°C(temperature of the antenna part): -40÷+250°CMax. 4MPa

Radar Level Transmitter

Model No:RIL400-IKDV3LMATemperature: $-40^{\circ}C...+150^{\circ}C$ Process Pressure:-0,1...+2 barOutput current: $4\div20mA$ Power supply:24VdcProtection:IP67Explosion-Proof: $C \in _{2452} \bigoplus Ex$ ia IIC T6 GaYear:2016



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CAUTION

TO SAFEGUARD THE INTEGRITY OF ALL THE DEVICE COMPONENTS IT IS ESSENTIAL TO CONFORM WITH THE TECHNICAL DATA SHOWN IN THE LABEL.

CE

RoHS

PLANNED USE AND NOT PLANNED USE

Planned use

The device is designed and manufactured exclusively to be used as a level of a fluid for purposes of NOT-COMMERCIAL NATURE (trading of water or any other fluid, of which the capacity is measured).

RIL400 can be used in private homes and in businesses, for all permitted civilian uses. It is suitable to be used in potentially explosive environments zone Exia II C T6 Ga.

Installation, commissioning and operation

Please note the following points:

- The installation, the connection onto the electrical supply mains, commissioning and maintenance of the instrument must be performed by qualified and appropriately trained technicians authorised to carry out such operations by the Owner/Manager of the establishment.
- The technician must read and make sure to have understood these instructions, by conforming with them during carrying out the operations.
- The instrument must be operated by personnel authorised and trained by the Owner/ Manager.
- It is recommended to strictly adhere to these operating Instructions.
- The Riels instruments' technical personnel is available to describe in depth the chemical resistance features of parts in contact with special fluids, including detergents.
- However, even small variations in temperature, of the concentration or the degree of contamination of the process can lead to a variation of the corrosion resistance.
- For this reason, Riels instruments cannot guarantee or assume any liability for the corrosion resistant properties of wetted parts materials for specific applications.
- The operator is responsible of the choice of wetted parts materials suitable for the process.
- If welding on piping is perform, the welding machine must not be earthed through the measurer.
- The fitter operator must make ensure that the measuring system is connected as shown in the wiring diagrams. The transmitter must be earthed, unless there have been already taken special protection measures (for example, SELV or PELV galvanically isolated electrical power supply).
- Anyhow, always comply with the local regulations, governing the opening and repair of electrical devices.

Not planned use

It is not planned any different use than those described in paragraph PLANNED USE. It is also absolutely forbidden:

- in environments classified with degree of explosion probability above ZONE 0;
- use of the equipment or parts of it for operations other than those planned;
- use of the equipment with electrical power supplies and electrical power suppliers other than those indicated in technical features and not acknowledged by Riels Instruments S.r.I.
- use of RIL400 as a device for commercial purpose measurements

Reuse of any unit after the decommissioning of the equipment relieves the Manufacturing Company from any liability arising from the use of the unit.

NOTA

RIELS INSTRUMENTS S.R.L. CANNOT BE DEEMED IN ANY CASE LIABLE OF ACCIDENTS OR DAMAGES RESULTING FROM USES NOT PLANNED OF THE DEVICE. ANY NOT PLANNED USE OF RIL400. IMPLIES FURTHERMORE THE VOIDNESS OF THE GUARANTEE TERMS.

RESIDUAL RISKS

The risk of explosion is connected to the environmental situation and can change over time, the device is suitable for this type of environment, but the operators must keep constantly in mind the environmental situation.

During the connection and the subsequent use of the product there may occur operating situations which are incorrect and not planned in the Manuals.

These situations, completely abnormal, sometimes can be caused by environmental factors or by incidental faults unplanned by the Manufacturer.

In the event that there should occur any not planned anomaly after powering the device, it is recommended to follow the following procedure:

- turn it off (see Section 4);
- contact immediately the technical assistance.

In the event that there should occur any not planned anomaly after connecting the measurer to a data reading device, it is recommended to follow the following procedure:

- turn it off (see Section 4);
- contact immediately the technical assistance.

In the event that there should occur any communication problems with radio equipment after powering the device, it is recommended to follow the following procedure:

- turn it off (see Section 4);
- disconnect it from the electrical power supply (see Section 4);
- contact immediately the technical assistance.

In the event that there should occur any not planned electrical nature anomaly after powering the device, it is recommended to follow the following procedure:

- disconnect the electrical current from the place where it is connected;
- disconnect it from the electrical power supply (see Section 4);
- contact immediately the technical assistance.

Add any other instructions to be followed in the event of other anomalies that you deem might happen; it is also possible to enter all the surveys in a table "Possible malfunctions and consequent interventions".

It is absolutely forbidden to bring about any modifications on the capacity measurer. Any damage to people, animals, and things as well as to this system, resulting from the use of the improperly modified equipment by an operator not authorised by the Manufacturer Company, relieves the latter from any liability.

Keep carefully this Manual and those Annexed, necessary for a correct and safe use of the device. Periodically check the state of the label applied on the product and if damaged restore it. (In necessary contact the Riels Instruments S.r.I. Company).

If, as a result of a fall and/or a knock, the outer casing of the product were to have edges or sharp corners, it is necessary to contact the Manufacturer, Riels Instruments S.r.l. Company and follow the received instructions.



HAZARD

ACCESS TO THE PROTECTED OR INTERNAL PARTS OF THE RIL400 DEVICE MUST BE PERFORMED ONLY FOR MAINTENANCE OPERATIONS, EXCLUSIVELY BY PERSON-NEL AUTHORISED BY THE MANUFACTURER COMPANY.

Important:

do not wet with water or any other liquid to the electrical connections; it is necessary to perform the maintenances described in the Manual; the maintenances must be performed by following the instructions in the Manual.

OPERATIONS THAT INVOLVE RISKS FOR THE OPERATOR:

In the operations of use observe the general safety rules. In particular:

Any work on the electrical parts must be performed with the instrument unplugged from the electrical mains.

Already in the design stage have been adopted solutions aimed to make the use of the device safe at all stages of use: transport, assembly, adjustment, activities and maintenance. Nevertheless, not all the possible risks for operators and the environment have been eliminated, both for technological reasons (reliability of the devices) and management (excessive difficulty of elimination), consequently are reported the residual risks present, for example, electrocution, etc.



Section III

Product Overview

Product Introduction

Model Selection

Parameter Selection Tabel

Technical Parameter

Intstrument Linear

Dimension

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Product Overview

Summary

RIL400 Series Radar Level Transmitter is high-frequency level measurement instruments with the maximum measuring distance up to 70 meters. The antenna is further optimized, and the new-type microprocessor can perform higher rate of signal analysis and processing, making the instrument available for complex measurement conditions, such as reactors, solid silos.

Priciple

Radar Level Antenna emits narrow microwave pulses that transmitted down by the antenna. The microwave comes into contact with the measured medium surface then reflected back and receiving by the antenna system. The signal is transmitted to electronic circuit and partly concert to level signals(sa the microwave featured with high propagation speed, it's almost instantaneous for the electromagnetic waves to reach the target and return to the receicer).



A: measuring range setting B: min. adjustment C: max. adjustment D: near blanking

Measuring datum is threaded bottom or flange sealing surface.

Note: When applying theradar level transmitter, make surethat the highest material level cannot reach the measurement blind spot(the tertitory that indicate as D).

Feature

- With small antenna size, easy to install, non-contact radar, no wear, no pollution.
- Almost free from corrosion, foam impact; hardly affected by the change of the temperature, pressure and water vapor in the atmosphere.
- Severe dust environment is not likely to affect the work of the high-frequency level transmitter.
- Shorter wavrlength can achieve better reflection for the inclined solid surface.
- The small field angle and energy concentration enhanced echo capabilities, and beneficial to avoid interference.
- Minimized measuring blind spot can gain better result in better performance.
- High SNR, even in the case of fluctuations can result of small tank measurement.
- High frequency is the best choice to measure solids and low dielectric media.

Product Introduction

Introduction

RIL400	Application: all kinds of strong corrosiveliquid, strong acid. strong, acid. strong base, chemical liquid. Measuring range: 20m Process connection: screw, flange Medium Temperature: -40~120°C Process pressure: -0.1~0.3MPa Precision: ±5mm Frequency tange: 26GHz Safety grade: IP67 Anti-explosion: Exia IIC T6 Ga Signal output: 4-20mA/HART(Two-wire/Four-wire)RS485/ Modbus
RIL405	Application: Temperature resistance, withstand pressure, slightly corrosive liquid. Measuring range: 30m Process connection: Screw,Flange Medium Temperature: -40~250°C Process pressure: -0.1~4MPa Precision: ±3mm Frequency tange: 26GHz Safety grade: IP67 Anti-explosion: Exia IIC T6 Ga Signal output: 4-20mA/HART(Two-wire/Four-wire)RS485/ Modbus
RIL410	Application: Storage containers, process vessels or strong dust and crystallization, condensation occasion Measuring range: 70m Process connection: Screw,Flange Medium Temperature: -40~250°C Process pressure: Atmospheric Precision: ±15mm Frequency tange: 26GHz Safety grade: Ip67 Anti-explosion: Exia IIC T6 Ga Signal output: 4-20mA/HART(Two-wire/Four-wire)RS485/ Modbus

RIL415	Application: Storage containers, process vessels or strong dust and crystallization, condensation Measuring range: 70m Process connection: Universal flange Medium Temperature: -40~250°C Process pressure: Atmospheric Precision: ±15mm Frequency tange: 26GHz Safety grade: Ip67 Anti-explosion: Exia IIC T6 Ga Signal output: 4-20mA/HART(Two-wire/Four-wire)RS485/ Modbus
RIL420	Application: Solid particles, powder,dust Measuring range: 30m Process connection: Screw,Flange Medium Temperature: -40~250°C Process pressure: Atmospheric Precision: ±10mm Frequency tange: 26GHz Safety grade: IP67 Anti-explosion: Exia IIC T6 Ga Signal output: 4-20mA/HART(Two-wire/Four-wire)RS485/ Modbus
RIL425	Application: Hygienic liquid storage container, strong corrosive container Measuring range: 20m Process connection: Flange Medium Temperature: -40~150°C Process pressure: Atmospheric Precision: ±3mm Frequency tange: 26GHz Safety grade: IP67 Anti-explosion: Exia IIC T6 Ga Signal output: 4-20mA/HART(Two-wire/Four-wire)RS485/ Modbus

Model Selection Table

Descriptiom	Code	Parameter	Selection
Anti-explosion	Р	Standard (non-Ex)	
	I	Intrinsically Safe (Exia IIC T6 Ga)	
	G	Screw thread G11/2B SS304	V
	N	Screw thread 1½NPT SS304	
Due and a superstant (Material	A	Flange DN50 PP	
Process conection Material	В	Flange DN80 PP	
	С	Flange DN100 PP	
	Y	Special custom	
Antenna Type Material Process Temperature	F	Sealed horn PTFE (-40÷120°C)	
Antonno Eutonoion	А	100mm	
Antenna Extension	В	200mm	
	2	4÷20mA 24V DC 2-wire	
Electropics unit	3	4÷20mA 24V DC HART 4-wire	
Electronics unit	4	4÷20mA 220V AC 4-wire	
	5	RS485 Modbus	
Llausian Cafatu avada	L	Aluminum IP67	
Housing Safety grade	G	SS304 IP67	
Cable Entry	М	M20×1.5	
Cable Entry	Ν	1/2NPT	
	А	With	
	Х	Without	
Special custom	Y	Special custom	

Descriptiom	Code	Parameter	Selection
	Ρ	Standard(non-Ex)	
Anti-explosion	I	Intrinsically Safe (Exia IIC T6 Ga)	
	G	Screw thread G11⁄2B SS304	
	Ν	Screw thread 11/2NPT SS304	
Process conection Material	Α	Flange DN50 SS304	
	В	Flange DN80 SS304	
	С	Flange DN100 SS304	
	В	Horn antenna Φ 46 mm SS304	
Antonna Tuna Matavial	С	Horn antenna Φ 76 mm SS304	
Antenna Type Matenai	D	Horn antenna Φ 96 mm SS304	
	Y	Special custom	
	V	Viton (-40÷150°C)	Ø
Seal Process Temperature	К	Kalrez (-40÷250°C)	
	2	4÷20mA 24V DC 2-wire	
Fla stuanias unit	3	4÷20mA 24V DC HART 4-wire	V
Electronics unit	4	4÷20mA 220V AC 4-wire	
	5	RS485 Modbus	
Housing Cofoty grade	L	Aluminum IP67	
Housing Salety grade	G	SS304 IP67	
Cable Entry	М	M20×1.5	
Cable Entry	Ν	1/2NPT	
Display Programming	Α	With	
uspiay riogramming	Х	Without	
Special custom	Y	Special custom	

Descriptiom	Code	Parameter	Selection
Anti-explosion	Ρ	Standard (non-Ex)	V
		Intrinsically Safe (Exia IIC T6 Ga)	
	G	Screw thread G11/2B SS304	V
	Ν	Screw thread 11/2NPT SS304	
	А	Flange DN50 SS304	
	В	Flange DN80 SS304	
	С	Flange DN100 SS304	
	D	Flange DN125 SS304	
	E	Flange DN150 SS304	
Process conaction Material	F	Flange DN200 SS304	
Process conection Material	Н	Flange DN250 SS304	
	М	Flange DN150 Universal joint SS304	
	К	Flange DN200 Universal joint SS304	
	Т	Flange DN250 Universal joint SS304	
	Ζ	Flange DN150 Universal joint SS316	
	W	Flange DN200 Universal joint SS316	
	V	Flange DN250 Universal joint SS316	
	Y	Special custom	
	В	Horn antenna Φ 76 mm SS304	\checkmark
Antenna Type Material	С	Horn antenna Φ 96 mm SS304	
	D	Horn antenna Φ 121 mm SS304	
	V	Viton (-40÷150°C)	V
Seal Process Temperature	K	Kalrez (-40÷250°C)	
	2	4÷20mA 24V DC 2-wire	
	3	4÷20mA 24V DC HART 4-wire	
Electronics unit	4	4÷20mA 220V AC 4-wire	
	5	RS485 Modbus	
Llausian Cafatu avada	L	Aluminum IP67	V
Housing Safety grade	G	SS304 IP67	
Cable Fretwy	М	M20×1.5	
	Ν	1/2NPT	
Dicplay Brogramming	А	With	V
Display Programming	Х	Without	
Special custom	Y	Special custom	

Descriptiom	Code	Parameter	Selection
Anti-explosion	Р	Standard (non-Ex)	Ø
	I	Intrinsically Safe (Exia IIC T6 Ga)	
	G	Screw thread G1½B SS304	
	Ν	Screw thread 11/2NPT SS304	
	А	Flange DN50 SS304	
	В	Flange DN80 SS304	
	С	Flange DN100 SS304	
	D	Flange DN125 SS304	
	E	Flange DN150 SS304	
Dragon constitution Material	F	Flange DN200 SS304	
Process conection Material	Н	Flange DN250 SS304	
	М	Flange DN150 Universal joint SS304	
	К	Flange DN200 Universal joint SS304	
	Т	Flange DN250 Universal joint SS304	
	Z	Flange DN150 Universal joint SS316	
	W	Flange DN200 Universal joint SS316	
	V	Flange DN250 Universal joint SS316	
	Y	Special custom	
Antenna Type Material	С	Parabolic antenna Φ 242mm SS304	\checkmark
	V	Viton (-40÷150°C)	V
Seal Process Temperature	К	Kalrez (-40÷250°C)	
	2	4÷20mA 24V DC 2-wire	
	3	4÷20mA 24V DC HART 4-wire	V
Electronics unit	4	4÷20mA 220V AC 4-wire	
	5	RS485 Modbus	
Use and Cafety and I	L	Aluminum IP67	V
Housing Safety grade	G	SS304 IP67	
Califa Frateria	М	M20×1.5	
Cable Entry	Ν	1/2NPT	
	А	With	V
Display Programming	Х	Without	
Special custom	Y	Special custom	

Descriptiom	Code	Parameter	Selection
Anti-explosion	Р	Standard (non-Ex)	V
	I	Intrinsically Safe (Exia IIC T6 Ga)	
	G	Screw thread G11⁄2B SS304	V
	Ν	Screw thread 1½NPT SS304	
	В	Flange DN80 SS304	
	С	Flange DN100 SS304	
	D	Flange DN125 SS304	
	E	Flange DN150 SS304	
	F	Flange DN200 SS304	
Process conection Material	Н	Flange DN250 SS304	
	М	Flange DN150 Universal joint SS304	
	К	Flange DN200 Universal joint SS304	
	Т	Flange DN250 Universal joint SS304	
	Z	Flange DN150 Universal joint SS316	
	W	Flange DN200 Universal joint SS316	
	V	Flange DN250 Universal joint SS316	
	Y	Special custom	
	В	Horn antenna Φ 76 mm SS304	\checkmark
Antenna Type Material	С	Horn antenna Φ 96 mm SS304	
	D	Horn antenna Φ 121 mm SS304	
	V	Viton (-40÷150°C)	V
Seal Process Temperature	K	Kalrez (-40÷250°C)	
	2	4÷20mA 24V DC 2-wire	
	3	4÷20mA 24V DC HART 4-wire	V
Electronics unit	4	4÷20mA 220V AC 4-wire	
	5	RS485 Modbus	
	L	Aluminum IP67	V
Housing Safety grade	G	SS304 IP67	
	М	M20×1.5	V
Cable Entry	N	1/2NPT	
	А	With	Ø
Display Programming	Х	Without	
Special custom	Y	Special custom	

Descriptiom	Code	Parameter	Selection
A .: 1 ·	Р	Standard (non-Ex)	
Anti-explosion	I	Intrinsically Safe (Exia IIC T6 Ga)	
	В	Flange DN80 SS304	
	С	Flange DN100 SS304	
	D	Flange DN125 SS304	
	E	Flange DN150 SS304	
	F	Flange DN200 SS304	
	Н	Flange DN250 SS304	
	Y	Special custom	
	В	Horn antenna Φ 46 mm SS304	
Antenna Type Material	С	Horn antenna Φ 76 mm SS304	
	D	Horn antenna Φ 121 mm SS304	
Seal Process Temperature	V	Viton (-40÷150°C)	
	2	4÷20mA 24V DC 2-wire	
Ele atus u incit	3	4÷20mA 24V DC HART 4-wire	Ø
Electronics unit	4	4÷20mA 220V AC 4-wire	
	5	RS485 Modbus	
Llausian Cafatu avada	L	Aluminum IP67	
Housing Salety grade	G	SS304 IP67	
Cable Entry	М	M20×1.5	
Cable Entry	Ν	1/2NPT	
Dicplay	А	With	\checkmark
	Х	Without	
Special custom	Y	Special custom	

Parameter Selection

Customer Information

Company:	ATTN:
ADD:	Postcode:
Tele:	E-mail:
Mobile:	Fax:
	Date:

Anti-explosion

Intrinsically Safe (Ex ib IIC T6 Gb)	Intrinsically Safe (Exib IIB T5)
Intrinsically safe explosion-proof (Exd [ib] IIC T6 Gb)	Standard(non-Ex)
Exib IIC T6 Gb	

Tank/Container Information

T C				
Tank Structure:		Pressure:		
Size:		Material:		
Height:		Diameter:		
Tank type:	Storage tank	Reaction tank	 Sonaration tank	 Marino tank
Talik type.				 Marine tarik
Top type:	Vaulted	🗖 Flat	Open	Conic
Bottom type:	🗖 Conic	🗖 Flat	Slope	Arc
Installation In	formation			

Height: mm Diameter: mm

Measuring medium

Medium Information:			
Medium Temperature:			
Permittivity:			
Medium type:	Liquid	Solid	Mixed media
Hanging:	With	Without	
Stirring:	With	Without	

Process | Electrical connection

Screw:	G11⁄2B	11/2NPT	
Flange:	DN=	ANSI=	
Current:	24VDC 2-wire	24VDC 4-wire	220VAC 4-wire
Output:	4-20mA	HART	
Displays:	display programming with head part	display programming without head part	

Technical Description

Technical parameter

Housing	Seal between the housing and the housing cover: Silicone rubber Housing window : Stainless steel Ground terminal: Stainless steel
Supply voltage (Two-wire)	Standard type: (16~26)V DC Intrinsically Safe: (21.6~26.4)V DC Power consumption: max22.5mA/1w Allowable ripple wave: -<100Hz Uss<1V / -(100~100K)Hz Uss<10mV
Cable parameters	Cable entry /Plug: M20×1.5 Amphenol connector: cross-section1.0mm
Output parameters	Output signal: (4~20)mA Communication protocol: HART Resolution ratio: 1.6uA Fault signal: current output unchanged; 20.5mA, 22mA, 3.9mA Integration time: (0~50)s Adjustable
Dead zone	The ends of the antenna
Deau zone	
Distance	The maximum measuring distance 70m
Distance Microwave frequency	The maximum measuring distance 70m 26GHz
Distance Microwave frequency Communication interface	The maximum measuring distance 70m 26GHz HART protocol
Distance Microwave frequency Communication interface Measurement interval	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings)
Distance Microwave frequency Communication interface Measurement interval Adjustment time	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings)
Distance Microwave frequency Communication interface Measurement interval Adjustment time Display resolution	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings) 1mm
Distance Microwave frequency Communication interface Measurement interval Adjustment time Display resolution Temperature	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings) 1mm Working storage and transport temperature -40÷+100°C
Distance Microwave frequency Communication interface Measurement interval Adjustment time Display resolution Temperature Process temperature	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings) 1mm Working storage and transport temperature -40÷+100°C (temperature of the antenna part): -40÷+250°C
Distance Microwave frequency Communication interface Measurement interval Adjustment time Display resolution Temperature Process temperature Pressure	The ends of the antenna The maximum measuring distance 70m 26GHz HART protocol 1s (Depending on the parameter settings) about 1s (Depending on the parameter settings) 1mm Working storage and transport temperature -40÷+100°C (temperature of the antenna part): -40÷+250°C Max. 4MPa

Instrument linear

RIL400

Launching angle 20°

Precision see below:



RIL405

Launching angle depends on antenna size

- Φ46mm 18°
- 076mm 12°
- Φ96mm 8°

Precision see below:



RIL410

Launching angle depends on antenna size

- 076mm 12°
- 096mm 8°
- Φ121mm 6°

Precision see below:



RIL415

Launching angle depends on antenna size

- Φ196mm 4°

Precision see below:



RIL420

Launching angle depends on antenna size

- Φ76mm 12°
- Φ96mm 8°
- Φ121mm 6°

Precision see below:



RIL430

Launching angle depends on antenna size

- 046mm 18°
- Φ76mm 12°
- 096mm 8°

Precision see below:



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Dimension (Unit: mm)

Housing









Outer Dimension

RIL400





RIL405

Flange	Horn mouth D	Horn Height H
DN50	Ø 46	140
DN80	Ø 76	227
DN100	Ø 96	288



RIL410

Flange	Horn mouth D	Horn Height H
DN80	Ø 76	227
DN100	Ø 96	288
DN150	Ø 121	620








RIL420

Flange	Horn mouth D	Horn Height H
DN80	Ø 76	227
DN100	Ø 96	288
DN150	Ø 121	620





RIL425

Flange	Horn mouth D	Horn Height H
DN50	Ø 46	99
DN80	Ø 76	132
DN100	Ø 96	156





Section IV

Product Overview

Installation Requirements

Electrical Connection

Debugging

Keys Description

Operating Instruct

Riels Instruments srl - Instructions and Maintenance Manual

Installation and Debugging

Installation Requirements

Installed on fourth or sixth of diameter.



Note: The minimum distance from the tank wall shall be tenth of the tank height. 1) datum plane - 2) vessel center or axis of symmetry

For conical tank top plane, it can be installed on the middle of the tank top to ensure the measurement of the conical bottom.



When there's the material pile, the antenna need to perpendicularly alignment to the material surface. If the material is uneven, and the heap angle is large then the universal flange is needed to adjust the horn angle to aim the charge level. (Due to the inclination of the solid surface it will cause the echo decay or even the signal loss problem)



Radar cannot be installed above the tapered tank into the mouth. In outdoor installation, sunshade and rainproof measures should be taken.



As shown: 1) right - 2) wrong

Instrument cannot be installed in the middle of the arch or round tank top. In addition to indirect echo, it will be affected by multiple echoes. The multiple echoes may be larger than the true echo signal threshold, because the top can be concentrated by multiple echoes. It cannot be installed in a central position.



As shown: 1) right - 2) wrong

When the tank obstacles affect the measurement, the baffleboard must be installed for proper measurement.



To reflect away the obstacle signal As shown: 1) right - 2) wrong

The pipe joint height requirements: it must ensure that the antenna extends into the tank for at least 10mm.



Electrical Connection

Supply voltage

- (4~20) mA/HART (two-wire) Power supply and output current signals share a two-core shielded cable. Specific supply voltage ranges see technical data. For intrinsically safe power supply, guard grating should be added between supply power and the instrument.
- (4~20) mA/HART (four-wire) Power supply and current signal is separated by individually using a cable. Specific supply voltage ranges see technical data.
- RS485/Modbus The supply voltage and Modbus signal line respectively use a shield cable. Specific supply voltage ranges see technical data.

Connection

24V two-wire wiring diagram:



220V four-wire wiring diagram:



24V RS485/Modbus wiring diagram:



Safety guidance

- Please comply with local electrical installation regulations requirements!
- Please abide by local health and safety personnel procedures requirements!
- All operations on the instrument electrical components must be done by trained professionals!
- Please check the meter nameplate to ensure that specifications meet your requirements!
- Make sure that the supply voltage fit the meter nameplate requirement!

Protection grade

The instruments fully meet the requirements of protection class IP66/67; make sure the cable sealing head waterproofness. As shown below.



How to ensure that the installation meets IP67 requirements:

- Make sure the seal head is not damaged!
- Make sure that the cable is not damaged!
- Make sure the used cable is in line with the electrical connection specifications!
- Before access the electrical interface, the cable will bend down, to ensure that water does not flow into the housing, see 1
- Please tighten the cable sealing head, see 2
- Keep unused electrical interface stopped up with blind block, see 3

Instrument debugging

Three debugging method:

- Display/ keypad,
- Upper computer debugging,
- HART handheld programmer.

Display/ keypad

To debug by the four keys on the LCD of the instrument, the language is optional; after debugging, it generally used for display. It's quite clear to read off the measured values (See instrument keypad setup instructions)

1. LCD 2. Keypad



Upper computer debugging

Connect with upper computer by HART



1) RS232 / USB interface - 2) Radar Level Transmitter - 3) HART adapter - 4) 250Ω resistor

HART handheld programmer

Connect with upper computer by HART



1) HART handheld programmer - 2) Radar Level Transmitter - 3) 250 Ω resistor

Key set the operating instructions

Interface Keypad Description

As shown:



Operating Instruction

Min. Adjustment

Min. adjustment is used to adjust the measuring range. It determines the corresponding relationship of output current with Max. adjustment. In the main menu, when the menu number displays 1, please press "OK" key to enter the basic setup sub menu, the LCD displays as following:

Min. adjustment	1.1
0.00%	
35.000m(d)	
1.346m(d)	

1.2

Press key to enter programming lowest level percent and edit a percent value and distance according to the above characters or digital parameters in the parameter edit method of programming methods. If the editing is finished, please press "OK" key to confirm, otherwise, press "BK" key to give up programming.

Max. Adjustment

	Max. adjustment
Max. adjustment is used to adjust the measuring range. It	U
determines the corresponding relationship of output current with	100.00%
Min. Adjustment .When the LCD displays 1.1, please press the "↔"	0.000m(d)
key to enter Max. Adjustment, the LCD displays as following:	1.406m(d)

At this time, please press "OK" key to edit the Max. Adjustment, press "~" key to choose character position, and press 1 key to edit number.

Medium

Fast Level Change

Medium menu is used to choose solid, liquid or micro DK, to further determine the other material natures which can affect the measurement. When the LCD displays 1.2, press " \sim " key to the medium programming, the LCD displays as following.	Medium Liquid >	1.3
At this time, press "OK" key to edit the medium, press "~" key to choose medium and press "OK" key to confirm. Press "1" key to quit and back to previous menu.	Medium > Liquid Solid Micro DK	1.3

	Fast level	1.31
When choosing solid or liquid medium, press "OK" key to enter fast change menu, the LCD display as following:	No >	
Then press "OK" key to enter fast change menu, press "�" key to choose "Yes" or "No":	Fast level Yes > No	1.3.1

First echo

When choosing solid or liquid medium, the LCD menu displays 1.3.1, press key \uparrow to choose the next menu, enter first echo selection menu, the LCD displays as following:	First ecno Normal >	1.3.2
Then press "OK" to enter first echo selection menu, the LCD displays as following:	First echo > Normal Small	1.3.2 Bigr Bigger Biggest

- Normal: without processing the head wave range (Default value)
- Small: the first echo weakens 10dB
- Big: the first echo range enhances 10dB
- Bigger: the first echo range enhances 20dB
- Biggest: the first echo range enhances 40dB

(Liquid) Agitated Surface

When the material is liquid and the LCD menu displays 1.3.2, press "~" key to choose the next menu, enter agitated surface menu, the LCD displays as following:	Agitated No >	13.4
Then press "OK" key to enter agitated surface menu, the LCD displays as following:	Agitated Yes >No	13.4

(Solid) Large Angle Repose

When the medium is solid and the LCD menu displays 1.3.2, press "~" key to choose the next menu, enter large angle repose menu, the LCD displays as following:	Large angle No >	13.3
Then press "OK" key to enter large angle repose menu, the LCD displays as following:	Large angle Yes >No	1.3.3

(Liquid) Foaming

When the LCD menu displays 1.3.3, press " \mathbf{P} " key to choose the next menu, enter liquid foaming menu, the LCD displays as following:	Foamin No >	1.34
Then press "OK" key to enter liquid foaming menu, the LCD displays as following:	Foamin Yes >No	1.3.4

(Solid) Powder/ Dust

When the LCD menu displays 1.3.3, press " \sim " key to choose the next menu, enter powder/dust selection menu, the LCD displays as following:	Power/dust No >	13.4
Then press "OK" key to enter powder/ dust selection menu, the LCD displays as following:	Power/dust Yes >No	13.4

Low DK

	Low DK	13.5
When the LCD displays 1.3.4, press key to enter DK value adjusting and setup menu, the LCD displays as following:	No >	
Then press "OK" key to enter DK value adjusting and setup menu, the LCD displays as following:		

Low DK	13.5	Low DK	1.3.6
Yes		Yes	
> N 0		Empty Span	
		10.00m	

(Liquid) Guided Wave Tube Setting

When the LCD menu displays 1.3.5, press "~" key to enter guided wave tube setup menu, the LCD displays as following:	Measure in tube No >	1.3.6
Then press OK" key to enter guided wave tube measure selection menu, the LCD displays as following:	Measure in tube Yes > No	1.3.6
Press "~" key to choose YES", then press OK" key to enter diameter of guided wave tube setup menu, the LCD displays as following:	Measure in tube Tube diamet 0000 mm	1.3.6

Note: guided wave tube setup is valid only if there is a guided wave tube.

Micro DK

When the medium is micro DK, press key to enter micro DK setup menu, the LCD displays as following:	Mcro DK setu Empty Span True Level DK	p 10.00m 0.00m 1.00	1.3.1
	0.000 m((d)	

Usually it used for less than 1.4 dielectric constant when the medium is micro DK, the direct echo of medium surface is very weak, or can not be measured, but the medium level can be measured by tank bottom reflection. The following two parameters need to be input:

1. Empty span, it's the empty height of empty tank or container.

2. True level or dielectric constant of the medium under measure. Input one of the two parameters is enough. The accuracy of the above parameters directly affects the precision of the measurement result. "Micro DK" needs to be selected carefully, it's inappropriate for most measurement. When "Micro DK" is selected, the system will estimate to get measuring result by directly echo way or bottom reflection way according to the echo situation.

Damping

	Damping	1.4
When the LCD menu displays 1.3, press " \sim " key to enter damping setup menu, the LCD displays as following:	6s	

Press "OK" key to enter parameter editing condition, use "~" key to choose editing number bits, use "1" key to set number.

Mapping Curve

Mapping curve is used in choosing non-linear output map or linear map which has set by host computer. When the LCD menu displays 1.4, press " \uparrow " key to enter output maps editing menu, the LCD displays as following:

Mapping curve	1.10
Linear >	

Press "OK" key to enter parameter editing condition, use " \sim " key to choose linear or other optional map modes, such as linear, cone. Press "OK" key to confirm after editing. When choosing linear output maps, it is used to select different display unit.

Scaled Units

	Scaled units	1.6
When the LCD menu displays 1.5, press " \sim " key to enter scaled units setting menu, the LCD displays as following:	Height > m >	

Press "OK" key to enter parameter editing condition, use " \sim " key to select different dimensions. Press "OK" key to confirm, and further select corresponding display unit, then press "OK" key to confirm.

Scaling

	Scaling	1.'	7
When the LCD menu displays 1.6, press key to enter scaling setup menu, the LCD displays asfollowing:	0%= 100%=	0.00 m 0.00 m	

Press "OK" key, parameter domain black, use "~" key to set the decimal point position, then press "OK" key to confirm; 0% corresponding parameter domain black, use "1" and "~" key to set parameters, then press "OK" key to confirm. Set the 100% corresponding value by the same way.

Range

	Range	1.8
In order to get the correct measurements, it is necessary to setup the measuring range of the instrument. When the LCD menu displays 1.7, press " \sim " key to enter measuring range setup menu, the LCD displays as following:	9.000 m(d)	

Near Blanking

The near blanking setting functions can be used to avoid	Near blanking	1.9
measurement error if some fixed obstacles exist near the sensor surface, and the highest medium level will not reach the obstacles. When the LCD menu displays 1.8, press " \uparrow " key to enter near	0.800 m(d)	
blanking setup menu, the LCD displays as following:		

Use "OK" key to enter, press "1" and "~" key to setup parameters, and then press "OK" key to confirm.

Sensor Tag

	Sensor tag	1.10
When the LCD menu displays 1.9, press " \mathbf{a} " key to remove the menu to sensor tag display item, the LCD displays as following:	SENSOR	
Press "OK" key to enter parameter editing condition, then press "OK" to	confirm after edit.	

Above is the content of the basic setup menu!

Display

	Basic settings 2	
This function is used for display programming.	>Display	
When the LCD displays the main menu, press " \sim " key and move	Diagnostics	
the arrow to display items, the LCD displays as following:	Service	
	Info	

Press "OK" key to enter display mode programming and then press "~" key to choose the desired item.

Display Value

Enter the display mode programming, the LCD displays as following:	Display value 2.1 Distance >	
Said that the parameter of current display value is empty span, which is the measured empty span value the instrument shows. Press "OK" key to enter editing condition, the LCD displays as following:	Display value 2.1 Shut off Map percent > Distance Scaled Height Current Percent	

Move "~" key to required parameter, press "OK" to confirm. Press "1" key to exit and return to previous menu after edit.

LCD Contrast

When the LCD menu displays 2.1, press "~" key to enter LCD contrast adjustment, it displays as following:	LCD contrast Adjust ?	2.2
Press "OK" key to enter adjustment condition	LCD contrast	2.2

Use "1" and "~" key to increase or decrease the contrast, then press "OK" key to confirm and save the result.

Diagnostics

	Basic settings Display >Diagnostics Service Info	3
Diagnostic function is used in test and system debugging the working status of the instrument and its components. Press "OK" key to enter diagnostic function, the LCD displays as following:	Peak values Distance-min: 0.451 m(d) Distance-max: 7.777 m(d)	3.1)

Peak Value Measurement

Peak value is shown as empty height peak value in the process of measurement; this parameter can be eliminated by 4.4 reset item of the service menu. When the LCD displays the main menu, press " \sim " key to move the arrow to the diagnostic item.

Measuring Status

	Meas. status	3.2
When the LCD menu displays 3.1, press " \sim " key to enter next diagnostic measuring status, the sensor working status displays as following:	Meas. reliability 99 dB Sensor status 0 K	

Choose Curve

When the LCD menu displays 3.2, press " \mathbf{P} " key to enter echo curve display function, the LCD displays as following:	Choose Curve Echo curve >	3.3
If other curve is needed, press "OK" key to enter curve selection menu, the LCD displays as following:	Simulation > Echo curve False echo curve Output trend	3.3

Press "~" key to move the arrow to the curve needed, then press "OK" key to confirm.

Echo Curve

 When the LCD menu displays 3.3, press "→" key, the LCD displays the selected curve. Output Trend Output trend function is used for magnify curve on time line and range to observe more clearly. When the LCD displays curve, press "OK" key to enter output trend editing menu, the LCD displays as following: 	Echo curve 3.4 >X-Zoom Y-Zoom Unzoom
Press "�" key to choose zoom direction or without zoom, the press "" key to confirm, the LCD displays as following:	Echo curve +10.000 \$\vee \vee \vee \vee \vee \vee \vee \vee
When choosing X-zoom, press " \sim " key to move to the desired position	on, then press "OK" key to confirm: At

this time, the selected curve is amplified to full screen, then press "BK" key to exit curve display.

Simulation

Simulation function is simulation data of $4\sim 20$ mA current, it's used to inspect the current output function of the instrument is normal or not. It's also used in system debugging. When the LCD menu displays 3.4, press " \sim " key to enter simulation condition, the LCD displays as following:	Simulation Start simulation >	3.4
Press "OK" key to confirm emulation function, the LCD displays as following:	Simulation > Percent Current Distance	3.5

Press " \sim " key to choose the mapping way of current output, then press "OK" key to confirm. Enter the corresponding Settings menu, press "OK" key to confirm after numerical value setting. At this time, the setting of the corresponding output current of the current value.

Note: description of three alternative menu items:

- Percent: output current according to the specified percent. For instance, 100% corresponds to 20mA output, 0% corresponds to 4mA output.
- Current: output current according to the specified currend. For instance, 16.6mA corresponds to 16.6mA output.
- Distance: output current according to the specified empty height.(The corresponding relation of the value and current value is determined by 1.1 low position setting, 1.2 high position setting and 1.5 output mapping)

Service

Service menu contains Service menu contains functions, for the use of trained personnel. Mainly contain false echoes study, time-varying gain control, reset and save the instrument parameters, etc. When the LCD displays main menu, press " ~" key to move the arrow to service item, it displays as following:

Basic settings Display Diagnostics >Service Info 4

False Echo Memory

When some fixed obstacles exist in the measuring range, the function of learning false echo memory is used to overcome the influence. When the LCD displays main menu 4, press "~" to enter service item, it displays as following:	False echo memory 4. > Delete Update Create new Edit	.1
If update/create false echo curve is needed, press "~" key to move the arrow to desired item, then press "OK" key to confirm, the LCD displays as following:	False echo memory 4. Update 01.000 m(d)	1

Input the real echo distance value prompted, then press "OK" key to confirm. The LCD displays "please wait", the instruments atart false echo learning, and then retum to false echo learning menu.(note: the distinction of update and create new false echo is:the false echo cure will be reset after the real echo when create; but it remains after the real echo when update.)

If the false echo curve editing is needed, press "~" key to move the arrow to desired item, and press "OK" key to confirm. This function can edit or modift the established false echo to meet the requirements of special conditions. The LCD displays as following after entering false echo editing.

Note: this menu needs to be operated by professional personnel. !

False echo memory	4.1	False echo m	nemory	4.1
Delete				
Update		Start 01.0	AMP	0000
Create new		End 2.0	AMP	0000
> Edit		m(d)		

Curve editing take two points, initial point and end point as position coordinate of the desired editing curve each time. Followed by the corresponding amplitude value is to be modified (note: When the distance coordinate input or modified, followed by the corresponding amplitude will automatically update according to the current saved data, as reference of the amplitude modifying); after finished the two coordinate modifying, press "OK" key to confirm the change; the instrument will automatically together the two input points into a straight line and generate a new false echo curve, to replace the original curve. After press "OK" key to confirm, the interface will display the modified false echo curve for reference, and then press "BK" key can return to the above editing interface to continue editing. When confirm the false echo editing meets the working condition requirements, press "BK" key again to quit the false echo the edit menu. The LCD displays as following:

	False echo memory	4.1
Press "OK" key to save the above modification, press "BK" key to quit.	Save ?	

Current Output

This setup is used to select current output mode. When the LCD displays main menu 4.1, press " \sim " key and the LCD displays as following:	Current output 4.2 Output mode: 4-20mA > Failure mode: No change > Min. current: 4mA >
Press "OK" key	Current output 4.2 > Output mode Failure mode Min. current
Output Mode Output Mode is used to select 4-20mA or 20-4mA; 4-20mA indicates that the low material level corresponds to 4mA,high material level corresponds to 20mA; 20-4mA indicates that the low material level corresponds 20mA,high material level corresponds 4mA. When eht LCD displays current output selection menu 4.2, press "~" key to move the arrow to the output mode and press "OK" key to confirm. The displays as following:	Current output 4.2 >4-20mA 20-4mA
Failure Mode Press " ~ " key to choose the desired setup and press "OK" key to confirm. Failure miode is used to select when a fault alarm, output current is not changed, output 20.5mA, 22mA or <3.8mA. When the LCD displays current output selection menu 4.2, press "OK" key to move the arrow the arrow to the fault mode and press " ~ " key to confirm. The LCD displays as following:	Current output 4.2 > No change 20.5mA 20.0mA 4.0mA
Press " $\boldsymbol{\sim}$ " key to choose the desired setup and press "OK" key to confirm	n.
Minimum Current Minimu current is used to select output minimum electtric injection as 4mA or 3.8mA.When the lcd displays current output selection menu 4.2, press " \mathcal{P} " key to move the arrow to the minimum current and press "OK" key to confirm. The LCD displays as following:	Current output 4.2 3.9mA > 4mA

Reset

Reset funtion is used to reset the instrument parameters. There are four reset functions: basic setup, factory setup, measured peak value and cumulative flow. Basic setup is a basic set of the instrument parameters restore to factory default Setup; the measured peak value reset is to reset the cumulative flow when the instrument is used for open-channel meter. When the LCD displays current output(menu 4.2), press "~" key to enter reset funtion, it displays as following:

Reset	4.3
Select reset >	

Press "OK" key to enter reset selection menu to select the corresponding reste function.

Unit of Measurement

Measurement unit provide user metric or inch. When the LCD displays reset menu(menu 4.3), press " \sim " key to enter measurement unit setup menu, it displays as following:

Units of measurement	4.6
m(d) >	

Press "OK" key to enter measurement unit selection menu to choose the corresponding unit.

Language

There are four languages selection function for user, as Italian, English, French and Chinese. When the LCD displays measurement unit(menu 4.5), press "~" key to enter language setup function, it displays as following:

	Languge	4.5
n, nt it	English >	

Press "~" key to enter language selection menu to choose the desired language.

HART Operation Mode

When two or more instruments are connected to upper computer by HART communication interface, this function is needed to set the instruments to multidrop working mode. When the LCD displays measurement unit(menu 4.5), press " \sim " key to enter HART operation mode, it displays as following:	HART operation mode 4.6 Standard Address 0	
Press "OK" key to enter HART operation mode step menu ,the LCD displays as following:	HART operation mode 4.6 > Standard > Multidrop	
Press "~" key to choose standard and muitidrop operation mode. Then computer address is sepifide as 0 when choosing standard working mode. When choosing HART working mode as multidrop, it displays as following:	HART operation mode 4.6 Address 0 Current 4mA	

The address can be changed to 1~15, working current 4mA and 8mA optional, press "~" key to confirm.

Copy Sensor Date

Copy sensor data contains two sub-menus, copy from the sensor		
include the sensor. This function is used to protect the	Copy Sensor Date	4.7
according to the workong conditions, copy from sensor function		
can be used to protect the set parameters. Copy to sensor function	Copy Sensor Date?	
can be used to recover the parameters if they were changed		
unexpectedly. When the LCD displays HART working mode menu		
(menu 4.6), press " \sim " key to enter sensor data copying function, it		
displays as following:		

Then press "OK" key:

Copy Sensor Date 4.7 > Copy from sensor Copy to sensor

Press "~" key to choose the menu, press "OK" key to confirm and perfirm the functions.

Pin

The PIN is used to protect instrument parameters. When start the PIN function, the PIN needs to be input when change any instrument parameters. When input the correct PIN, the PIN protection function period is canceled, and the instrument parameters can be modified. When the LCD displays copy the sensor data menu, press " \sim " key to enter the PIN function.



Distance Adjustment

Distance adjustment setting is used to modify the error	Distance Adj	4.9
measurement value of instrument to the difference of the actual distance and diplay. When the LCD displays the menu number as 4.8, press " \sim " key to enter distance adjustment setting menu, it displays as following:	+0.000m(d)	

Note: this menu needs to be operated by professional personnel !

Thresh Setting

Threshold setting can setup the threshold magnitude of effective echo. The greater of the threshold setup, stronger of the effective echo amplitude on site is required, and then it's more beneficial to eliminate small signal noise interference. But must pay attention to: if the modified threshold is greater than the effective echo amplitude, it will cause the result of misunderstanding wave. This munu contains echo threshold and envelope level, the default range of echo threshold is 60mV, and the default range of envelope level is 10mV.

Threshold		4.10
Echo Threshold	60	
Envelope Level	10	

Info

Info menu contains all the basic information of the instrument production, such as Serial NO. production date, software version, etc. When the LCD displays main menu, press " \sim " key to move the arrow to information item, the LCD dispays as following:	Basic settings 5 Display Diagnostics Service >Info	
Press "OK" key to choose information display funtion, the LCD displays as following:	Sensor type 0000000 Serial Number 0000000	5.1
Then press " $\mathbf{\diamond}$ " key, it displays as following:	Date of manufacture 0000–00–00 Software version 00.00.00	5.2



Section V

Maintenance and disposal of

MAINTENANCES AND DISPOSAL OF

Safety

All maintenance operations possibly performed at the place of installation must take into consideration that the operations take place in a safe area.

During operations, actions that could trigger sparks and consequent explosion must be avoided. It is always appropriate to keep the room fully ventilated during all maintenance operations. The maintenance operations must be performed by personnel qualified and/or authorised by the Riels Instruments S.r.I. Company, and who have previously read the Manual.

Any type of intervention, whether internal or that includes the use of a liquid or a product for cleaning, must always be carried out with the device disconnected from the electrical power supply network. In performing these operations, strictly follow the instructions described in this Manual.



HAZARD

DISCONNECT THE DEVICE FROM ANY OF ITS ELECTRICAL POWER SUPPLY SOURCE BEFORE PERFORMING ANY CLEANING OR MAINTENANCE OPERATION.

For any intervention of maintenance, assembly, disassembly, reassembly and replacement of components, besides the indications contained in this Manual, the general safety rules must be met and possibly the specific safety rules current in the place in which these operations are carried out.

Regular maintenances

The measuring system of the RIL400 capacity does not require special maintenance interventions.

External cleaning

To clean the outside of the measurer always use cleaning agents that do not attack the surface of the casing and the gaskets.

Extraordinary maintenances

The extraordinary maintenances are required in cases of failures or breakages, following unplanned incidents or an inappropriate use of RIL400.

The situations which from time to time can be created are completely unpredictable, and therefore it is not possible to describe appropriate intervention procedures.

If necessary contact the Riels Instruments S.r.l.'s Technical Service to receive appropriate instructions with respect to the situation.

All interventions, mechanical or electrical, regular or extraordinary, must anyhow be carried out by specialised personnel.

Inappropriate maintenances and/or performed by personnel not authorised also invalidate the product guarantee terms.

Deactivation of the device

RIL400 is produced and manufactured according to criteria of robustness, durability and flexibility that allow using it foe several years. Once reached its end of the technical and service life, it must be decommissioned and placed in such conditions as not to be used again for the purposes for which originally it had been designed and manufactured.

The same procedures of deactivation must be met in all the following cases:

- decommissioning of the device and storage in the warehouse;
- final deactivation and subsequent disposal of.

NOTE



THE MANUFACTURING COMPANY DISCLAIMS ANY LIABILITY FOR DAMAGES TO PERSONS OR PROPERTY RESULTING FROM THE REUSE OF INDIVIDUAL PARTS OF THE DEVICE FOR FUNCTIONS OR IN DIFFERENT ASSEMBLY CONFIGURATIONS FROM THE ORIGINAL ONES.

THE MANUFACTURING COMPANY DISCLAIMS ANY ACKNOWLEDGEMENT, IMPLICIT OR EXPLICIT, OF SUITABILITY FOR PARTICULAR PURPOSES OF THE DEVICE'S PARTS REUSED AFTER THE FINAL DEACTIVATION IN VIEW OF ITS DISPOSAL OF.

Disposal of

The RIL400 manufacture materials do not require any special procedures for disposal of. If necessary, refer to local rules for the disposal of electrical and electronic equipment.

For no reason at all disperse the product in the environment.

NOTE



THE MANUFACTURING COMPANY IS NOT IN ANY WAY LIABLE FOR DAMAGES AUSED BY THE DEVICE IF NOT USED IN THE INTEGRAL VERSION, ND FOR THE USES AND METHODS OF USE SPECIFIED IN THIS MANUAL.

THE MANUFACTURING COMPANY IS IN NO WAY LIABLE FOR ANY DAMAGE TO PERSONS OR PROPERTY RESULTING FROM THE RECOVERY OF PARTS OF THE PRODUCT USED AFTER ITS DISPOSAL OF.

Riels Instruments srl - Instructions and Maintenance Manual





Riels Instruments srl

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