

Instructions manual

Series LC40 Float level switch





The art of measuring

R-MI-LC40 Rev.: 5 english version

PREFACE

Thank you for choosing a product from Tecfluid S.A.

This instruction manual allows the installation, configuration, programming and maintenance. It is recommended to read it before using the equipment.

WARNINGS

- This document shall not be copied or disclosed in whole or in any part by any means, without the written permission of Tecfluid S.A.
- Tecfluid S.A. reserve the right to make changes as deemed necessary at any time and without notice, in order to improve the quality and safety, with no obligation to update this manual.
- Make sure this manual goes to the end user.
- Keep this manual in a place where you can find it when you need it.
- In case of loss, ask for a new manual or download it directly from our website <u>www.tecfluid.com</u> Downloads section.
- Any deviation from the procedures described in this instruction manual, may cause user safety risks, damage of the unit or cause errors in the equipment performance.
- Do not modify the equipment without permission. Tecfluid S.A. are not responsible for any problems caused by a change not allowed. If you need to modify the equipment for any reason, please contact us in advance.

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1 INTRODUCTION

Series LC40 are swinging float level switches for liquids.

They are robust and they have excellent mechanical and chemical resistance (high pressures and temperatures and possibility of manufacturing in several materials).

They provide a level detection at a specific point in a tank.

2 WORKING PRINCIPLE

When a liquid reaches the level where the float is positioned, it follows the level variations in such way that the articulated rod is moved. A magnet placed in the opposite side of this rod activates a switch.



The limit switch can be a micro-switch, reed, inductive or pneumatic, depending on the requirements of the application.

3 RECEPTION

The LC40 level detectors are supplied individually packed for protection during transport.

On reception of the level detector, check:

- That the float pivots freely in the fork that supports it.
- That the pivot shaft has the two split pins, one on each end.

Before installation, it is recommended to check the limit switch.

To do this, unscrew the electrical housing cover to gain access to the electrical connections. Connection terminals are indicated on the circuit board and at point 6 on page 7.

Move manually the float from the bottom stop to the top stop of the fork.

The signal at the electrical connection terminals will vary according to the float's position (with the AMM and AMR switches this can be checked easily using a multimeter in continuity mode).

4 MODELS

- LC40: standard construction. Side mounting
- LC40-BA: side mounting. It is used when the desired switching level does not match the level of the tank connection
- LC40-V: top mounting
- LC40-VR: top mounting for high depths

In the LC40 model, when it is necessary that the switching hysteresis is bigger than the offered by the standard detector, the A21 accessory can be installed (see page 21).

5 INSTALLATION

The mounting position must be so that the float can move freely in a vertical plane.

5.1 Recommendation for the installation

LC40 / AISI 316L, A = 90 ... 100 mm LC40 / PVC, PP, PTFE, PVDF, A = 70 ... 80 mm

Note: for DN50 connection the maximum allowable PN for the counter flange is PN40





Important note: Check that the working pressure is not above that specified on the instrument's identification label.

Check that the liquid and ambient temperatures are within the limits specified on page 13.

5.2 External mounting to tank or boiler

In applications where it is required, an external chamber for side mounting is available as an option, outside the tank (models CB1 and CR1 whose details are indicated on pages 23 and 24).



6 ELECTRICAL CONNECTION

The limit switches of the LC40 series are provided of a terminal strip in order to connect the cables.

The different wirings according to each limit switch are indicated next to the terminal strip and in the attached diagram.



For the electrical installation it is recommended to use multiple conductor cables with sections between 0.25 and 0.5 mm² to make the connection easier.

Before starting the electrical installation, make sure that the cable to be used is the right size for the M16 x 1.5 cable gland. This will guarantee that the instrument is perfectly sealed (it is recommended the use of shielded pair wiring with an outer diameter between 5 and 8 mm).

Peel the outside insulation to free the inner cables. It is recommended to tin the ends of the wires to avoid loose ends. Pass the cables through the cable glands and screw down in the corresponding positions of the terminal strip. Once the wiring is finished make sure that the cables are well gripped by the cable glands to maintain the ingress protection.

The different connection diagrams depending on the limit switch are the following:

6.1 LC40 AMD

It consists of a NAMUR slot type inductive sensor, that is actuated by the float, by means of a vane that changes its position from one detection position to the other.



6.2 LC40 AMM

It consists of one or two micro-switches that are actuated by the magnetic field of the float, by means of a cam that pushes the micro-switch lever.

<u>Terminal</u>	
11	Common (micro-switch 1)
12	Normally open (micro-switch 1)
13	Normally closed (micro-switch 1)
23	Normally closed (micro-switch 2, optional)
22	Normally open (micro-switch 2, optional)
21	Common (micro-switch 2, optional)
÷	Earth
-	



Micro-switch 1

Micro-switch 2 (optional)

6.3 LC40 AMR

It consists of a reed sensor that is actuated by the magnetic field of the float.



Make sure that the contact rating is not exceeded. If high loads are to be switched, use an auxiliary relay.

When using inductive loads, such as relays or solenoid valve coils, surge arresters should be installed to protect the reed contacts.

With a DC supply, a diode should be connected as shown.

For an AC supply, a RC circuit can be used as shown, although a varistor (VDR) is better and is easier to select the right value. The VDR should have a breakdown voltage greater than 1.5 times the rms voltage. The standard varistor ratings specify the rms working voltage for the varistor, for example a S05K25 varistor will be for 25 $V_{\rm rms}$ working and will have a breakdown voltage of 39 V at 1 mA.



The electrical installation should provide a fuse or circuit breaker to protect the reed switch from overloads.

6.4 LC40 AMP

It consists of a pneumatic switch. It is used to open or close the air flow. It has an input and an output. The inlet pressure must be between 2 and 6 bar.

Its connection is made directly in the external quick connection fittings. It is not necessary to open the housing.

The flexible tube for compressed air that adapts to the fittings has an outer diameter of 4 mm.



7 MAINTENANCE

Mechanical: Maintain the float pivot shaft clean and remove dirt from the fork.

For the maintenance of the switches, the assembly should be removed by unscrewing the three screws of the connection board.

7.1 Maintenance of the AMD limit switch

7.1.1 Electrical verification

Check that the voltage at the terminals + and - is over 7.5 V when the vane is in the slot. Connect a multimeter with the scale in DC mA, in series with the terminal +.

Verify that the current is less than 1 mA when the vane is in the slot, and more than 3 mA when the vane is out of the slot.

If a NAMUR amplifier is not available, the verification can be done with the following circuit diagram:



Without the sensor, the operation of the amplifier can be checked by using the following circuit diagram:



With the potentiometer the current through the NAMUR amplifier can be modified. The switching point must be between 1.2 mA and 2.1 mA. That is, with the current below 1.2 mA the output relay must have a state and above 2.1 mA the output relay must have the other state.

7.2 Maintenance of the AMM limit switch

The micro-switch (1) has a roller that runs on the cam (2).

To check the operation and correct possible misalignments, proceed as follows:

Open the limit switch housing by removing the four M4 x 25 DIN 7985 screws.

Check that the magnet assembly (5) is firmly fixed to the shaft by the screw (4).

Position the screw (4) as in the drawing (against the stop in a clockwise direction). Position the cam (2) as in the drawing and tighten the screw (3).

If a multimeter with resistance measurement is available, connect it to terminals 1 & 2 of the connector. Move the cam (2) slowly in both directions over the whole of its travel. The multimeter must change from open circuit to short circuit in one direction and vice versa in the other, when the roller is half way up the eccentric zone of the cam.

When a multimeter is not available, the above can be done by hearing the "click" when the micro-switch (1) changes over.



NOTE: If due to bad handling of the micro-switch lever, the operation is not correct, the micro-switch lever (1) should be bent slightly until correct operation is obtained.



- 7.3 Maintenance of the AMR limit switch No special maintenance is required.
- 7.4 Maintenance of the AMP limit switch

Maintenance of this limit switch should be done at Tecfluid S.A. facilities.

8 TECHNICAL CHARACTERISTICS

Mounting

Top / Side mounting

Connection

EN 1092-1 DN65 PN16 flange. Others on request Special square flange 92 x 92 or 108 x 108

Minimum liquid density

0.45 ... 3 kg/l

Maximum liquid viscosity

3000 mPa·s

Repeatability

±3 mm of the level

Materials

EN 1.4404 (AISI 316L). PVC, PP, PTFE, PVDF on request

Housing

Coated anodized aluminium. EN 1.4401 (AISI 316), PP, PVC on request

Nominal pressure

PN16 (PN10 for plastic). PN40 ... PN400 on request

Ingress protection

IP66/IP67

Liquid temperature

According to the following table:

Materials	Liquid temperature range	Maximum product temperature (1) with thermal separator
EN 1.4404 (AISI 316L)	-50°C 150°C	400°C
PVC	0°C 50°C	-
PP	-20°C 80°C	-
PTFE	-20°C 150°C	-
PVDF	-20°C 145°C	-

(1) Working temperature is defined for an ambient temperature of 20°C and a good cooling capacity in the place where the level detector is installed.

Limit switch characteristics

Switch	System	Capacity	Maximum ambient temperature
AMM	SPDT micro-switch C/NO/NC	Maximum 250 V Maximum 3 A	-25°C +85°C
AMD	Inductive NAMUR	Max. level I > 2.2 mA Min. level I < 1.1 mA	-25°C +85°C
AMR	SPDT reed switch C/NO/NC	Maximum 250 V Maximum 0.5 A	-25°C +85°C
AMP	Pneumatic ON-OFF 2-way	2 6 bar	0°C +50°C

9 SAFETY INSTRUCTIONS

The series LC40 of level detectors are in conformity with all essential requirements of all EC directives applicable to them:

2014/68/EU Pressure equipment directive (PED)

Limit switches:

2014/30/EU	Electromagnetic compatibility directive (EMC)				
2012/19/EU	Waste electric and electronic equipment (WEEE).				
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS).				
2014/35/EU	Low voltage directive (LV)				

Equipment for hazardous areas:

Equipment and protective systems intended for use 2014/34/EU in potentially explosive atmospheres (ATEX).

In the last sections of this manual the EC type certificate and the declarations of conformity according to the ATEX directive are attached.

Other declarations of conformity EC can be downloaded from the section "Download" of the Tecfluid S.A. website. www.tecfluid.com

9.1 Pressure equipment directive

Series LC40 of level detectors, due to their size, are not subject to conformity assessment, are considered outside the scope of the directive and therefore they have not the CE mark according to pressure directive. These devices are subject to applicable sound engineering practice (SEP).

This equipment is considered as being a pressure accessory and NOT a safety accessory as defined in the 2014/68/EU directive, Article 2, paragraph 4.

9.2 Certificate of conformity TR CU (EAC marking)

Tecfluid S.A. have subjected the series LC40 of level meters to a certification procedure according to the technical regulations of the Customs Union of the Eurasian Economic Union (EEU).

This Certificate is an official document confirming the quality of production with the standards on the territory of the Customs Union, particularly regarding safety requirements and electromagnetic compatibility.









10 ADDITIONAL INSTRUCTIONS FOR THE ATEX VERSION

This chapter only applies to equipment intended for use in explosive atmospheres.

The equipment with AMM or AMR limit switches can be considered as simple apparatus according to the IEC 60079-11 standard, and thus they do not need to be marked as ATEX.

The equipment with AMD limit switches can be installed in potentially explosive atmospheres as elements of intrinsic safety. These equipment conform with the directive 2014/34/EU (Equipment and protective systems intended for use in potentially explosive atmospheres) as indicated in the EC-type examination certificate and its marking.

10.1 Flameproof enclosure

These equipment conform with the directive 2014/34/EU (Equipment and protective systems intended for use in potentially explosive atmospheres) as indicated in the EC-type examination certificate LOM 05ATEX2009 X and its marking.

Given that this instrument belong to group II, it is intended for use in places likely to become endangered by explosive atmospheres, but not in mines.

The category is 2GD, that is, it is intended for use in areas in which explosive atmospheres caused by mixtures of air and gases, vapours, mists or air/dust mixtures are likely to occur.

10.1.1 Surface temperature

Equipment is certificated as Exd IIC T6.

The maximum possible surface temperature is 85°C.

10.1.2 Non metallic parts



WARNING: POTENTIAL RISK OF ELECTROSTATIC CHARGE

If the detector has plastic parts, since the danger of ignition by electrostatic discharge can not be avoided, **the instrument must always be cleaned with a damp cloth**.

10.1.3 Electrical connection

The limit switches of the LC40 series are provided of a terminal block in order to connect the cables.

The connection indications according to each limit switch are the following:





10.1.3.1 LC40 AMD Exd

Terminal		
1	Earth	
2	+	
3	-	
4	Not connected	

10.1.3.2 LC40 AMM Exd

<u>Terminal</u>	
1	Earth
2	Common (micro-switch 1)
3	Normally closed (micro-switch 1)
4	Normally open (micro-switch 1)
5	Common (micro-switch 2, optional)
6	Normally closed (micro-switch 2, optional)
7	Normally open (micro-switch 2, optional)

10.1.3.3 LC40 AMR Exd

<u>Terminal</u>		
1	Earth	
2	Common	
3	Normally closed	
4	Normally open	

10.1.4 Connecting conductive parts to earth

When the instrument is not grounded securely through the connection process, it should be grounded through the housing screw, as shown in the figure.



10.1.5 Maintenance

Before performing any maintenance that involves opening the flameproof enclosure, **make** sure that there is no tension in any of its internal components.

Modification or reparation of the flameproof housing is not permitted.

The flameproof seals of the housing should kept greased to avoid corrosion, water ingress and seizing.

10.1.6 Technical characteristics of the ATEX version

The standard thread supplied for the cable gland is 3/4 "NPT.

ATEX cable glands can be placed for normal cable or armoured cable.

ATEX cable glands can be supplied on request.

The outer diameters of the cables that adapt to the %" NPT thread cable glands range from 6 to 21 mm.

The rest of characteristics are the same as in the section 8.

10.1.7 Marking



11 DIMENSIONS

Side mounting



DN		E	N 1.4404	(AISI 316	L)	
	DN	D	g	k	L x n⁰	b
16	65	185	122	145	18 x 8	18



PN		EN 1.4	4404 (AIS	I 316L)	
1 18	DN	D	g	k	L x nº
10	65	185	122	145	18 x 4





Requires manhole in the tank for the installation





	$2\beta = 2\alpha + 27^{\circ}$	H depending on L (mm)						
α		L=400	L=500	L=600	L=700	L=800	L=900	L=1000
0°	27°	184	228	276	324	370	418	466
5 ^a	37°	230	292	356	420	484	548	612
10°	47°	276	352	432	514	594	674	754
15°	57°	318	412	506	604	700	796	892
20°	67°	360	466	578	688	800	910	1022
25°	77°	398	520	644	770	894	1020	1144
30°	87°	434	568	706	844	984	1122	1260
35°	97°	468	614	764	914	1064	1214	1366

Square flange











External chamber CB1



DN	PN	D	k	l x n°	b	
	16	115	85	14 x 4	16	
25	25	115	85	14 x 4	17	
	40	115	85	14 x 4	18	
	64	140	100	18 x 4	18	
	100	140	100	18 x 4	28	

External chamber CR1



R (BSP/ NPT)	Material	А	DA
		160	185
		160	185
1"	AISI 316L / Steel	160	185
		160	205
		165	205

12 ATEX CERTIFICATE

(1)	EC-TYPE EXAMINATIO	ON CERTIFICATE
(2)	Equipment or protective system intended Directive 94/9/EC	for use in potentially explosive atmospheres
(3)	EC-Type Examination Certificate number	LOM 05ATEX2009 X
(4)	Equipment or Protection System	Float level switches Types LC40/
(5)	Applicant:	TECFLUID, S.A.
(6)	Address	Narcis Monturiol, 33 38960 SANT JUST DESVERN (BARCELONA) SPAIN
(7)	This equipment or protective system and documents therein referred to.	any acceptable variation thereto is specified in the schedule to this certificate and
(8)	Laboratorio Oficial J.M. Madariaga (LON of the European Parliament of 23 March the Essential Health and Safety Require intended for use in potentially explosive a The examination and test results are recor	(), notified body number 0163 in accordance with Article 9 of the Directive 94/9, 1994, certifies that this equipment or protective system has been found to comply v ments relating to the design and construction of equipment and protective syste mospheres, given in Annex II to the Directive. ded in confidential report nr. LOM 04.082 AP
(9)	Compliance with the Essential Health and - Standards EN 50014 EN 50018 EN 50281	Safety Requirements has been assured by compliance with: :1997 + A1:1999 + A2:1999 :2000 + A1:2002 -1-1:1998 + A1:2002
(10)	If the sign X is placed after the certifical conditions for safe use specified in the sch	e number, it indicates that the equipment or protective system is subject to spe edule to this certificate.
(11)	This EC-Type Examination Certificate re system in accordance with the Directive S of this equipment or protective system. T	elates only to the design and construction of this specified equipment or protect 4/9/EC. Further requirements of the Directive applies to the manufacture and sup hese are not covered by this certificate.
(12)	The marking of the equipment or protection	ve system shall include the following:
	Ex II 2 GD EEx d IIC T6	P67 T85 °C
	OFIC	AL Madrid, 14th February 200:
	oit se	A Starting
	A	Man Martin Martin
	LAT , NO	PIAC
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	DIRECTOR OF THE LABORATORY	Angel Vega Remesal Head of ATEX area
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(A1)	SCHEDUL		LON LON LON LON LON LON	Call Low	Lane Lane Lane Lane Lane Lane Lane Lane
(A2)	EC-Type Examin	nation Certificate:	LOM 054	ATEX2009 X	LONE LONE LONE LONE LONE LONE LONE LONE
(A3)	Description of eq	uipment or protec	tive system	LOW	LONE LONE LONE LONE LONE LONE LONE LONE
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LON LON	The head can cor	ntain different type	s of electrica	l or electronic limit switches	ION LONE CONTONE CONTROL CONTONE CONTO
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			LOW LOW LOW	Limit switch code	
(A4)	<u>Test report nr.</u> L	Max Max OM 04.082 AP	imum powe	r dissipation: 10W	
(A5)	Special condition	s for safe use	LOW LOW LOW LOW LOW LOW LOW LOW LOW	LONE LONE LONE LONE LONE LONE LONE LONE	CHE LOW
	For the models w	with a non-metallic	parts, electro	ostatic risks that may occur n	nust be taken into account, limiting its use in pla
(A6)	Individual tests	CHILCHILCHILCHILCHI UNFLONI LCHILCHI CHILCHILCHILCHI CHILCHILCHILCHI	LON LON LON LON LON LON LON LON LON	CONTRONAL CONTROL ON LONG LONG LONG LONG LONG LONG LONG	ON LONG THE CONTROL ON THE CONTROL O
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(A7)	Essential Health a	and Safety Require	ments	LONE LONE LONE LONE LONE LONE LONE LONE	the LONA LONA (LONA LONA LONA LONA LONA LONA LONA LONA
	Explosion safe re-	quirements are cov	vered by app	lication of the standards indic	cated in page 1/2 of this certificate.
(A8)	Descriptive docur	ments:	Rey		THE LONG LONG LONG LONG LONG LONG LONG LONG
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WF TECFLUID

UE Declaration of Conformity

Manufacturer:	TECFLUID S.A.
	Narcís Monturiol, 33 E 08960 Sant Just Desvern
Equipment:	Series LC40 of level detectors
Certification:	LOM 05ATEX2009X
Group and category:	(II 2GD EEx d IIC T6 IP67 T85%

Standards to which conformity is declared:

Directive ATEX 2014/34/EU

EN50014:1999	Equipment. General requirements
EN50018:2002	Equipment protection by flameproof enclosures "d"
EN50281-1-1:2002	Electrical apparatus for use in the presence of combustible
	dust. Part 1-1: Electrical apparatus protected by enclosures -
	construction and testing

Changes in the current standards regarding the standards mentioned in this declaration of conformity do not affect the EC-type examination certificate LOM 05ATEX2009 X corresponding to this equipment

For production, Tecfluid S.A. complies with the Module D (annex IV) of the directive 2014/34/EU, having the notification for production quality assurance n. LOM 02ATEX9033, of the notified body with identification number 0163 (Laboratorio Oficial J.M. Madariaga)

I, the undersigned, declare that the equipment stated above is in conformity with the essential requirements of the Directives of the European Parliament and the Council on the approximation of the laws of Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

In Sant Just Desvern Date: July 20, 2017

Esteve Cusidó (R&D manager)

WARRANTY

Tecfluid S.A. guarantee all the products for a period of 24 months from their sale, against all faulty materials, manufacturing or performance. This warranty does not cover failures which might be imputed to misuse, use in an application different to that specified in the order, the result of service or modification carried out by personnel not authorized by Tecfluid S.A., wrong handling or accident.

This warranty is limited to cover the replacement or repair of the defective parts which have not damaged due to misuse, being excluded all responsibility due to any other damage or the effects of wear caused by the normal use of the devices.

Any consignment of devices for repair must observe a procedure which can be consulted in the website www.tecfluid.com, "After-Sales" section.

All materials sent to our factory must be correctly packaged, clean and completely exempt of any liquid, grease or toxic substances.

The devices sent for repair must enclose the corresponding form, which can be filled in via website from the same "After-Sales" section.

Warranty for repaired or replaced components applies 6 months from repair or replacement date. Anyway, the warranty period will last at least until the initial supply warranty period is over.

TRANSPORTATION

All consignments from the Buyer to the Seller's installations for their credit, repair or replacement must always be done at freight cost paid unless previous agreement.

The Seller will not accept any responsibility for possible damages caused on the devices during transportation.



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Quality Management System ISO 9001 certified by



Pressure Equipment Directive certified by

ATEX European Directive certified by

HART is a trademark of FieldComm Group ™

The technical data described in this manual is subject to modification without notification if the technical innovations in the manufacturing processes so require.