# 5 - Technical notes

	TECHNICAL NOTES encoder series XC77-XAC77
1.	Series XC77= Incremental encoder with explosion proof ATEX housing.
	Series XAC77 = Absolute encoder with explosion proof ATEX housing.
2.	Marking: Ex II 2 GD Ex d IIC T6, Ex tD A21 IP65 T 85°C
	Certificate N° CESI 08 ATEX 013
	Encoders intended for use in potentially explosive atmospheres in compliance with: EN 60079-0: 2004-03 / EN 60079-1: 2007 EN 61241-0: 2006 / EN 61241-1: 2004 EN 61000-6-4 / EN 61000-6-2 EN 5501 Classe A
	<ul> <li>Ex: Equipment for use in potentially explosive atmospheres.</li> <li>d: Explosion-proof housing.</li> <li>II: Electrical equipment for use in environments with an explosive gas atmosphere othe than mines susceptible to firedamp.</li> <li>C: Highest classification of protection mode based on maximum experimental gap.</li> <li>T6: Maximum housing surface temperature 85°C.</li> <li>tD: Protection of electric devices with housing for use in Zones with inflammable dusts.</li> <li>A21: Zone where the equipment is allowed to be used (Zone 21 and 22) with the Protection identification (Practice A)</li> <li>IP65: IP protection degree for dust-proof housings to use in Zone 21 or 22.</li> <li>T 85°C: Maximum surface temperature.</li> </ul>
3 The encoder is a electro-mechanical device used to convert an angular position of a rotary shaft into It allows to detect angular displacements and to measure rotational speed and accelerations dedicated controller and/or mechanical interface. The conversion of mechanical motion into d obtained by a optoelectronic set reading an optical disk. The optical disk has opaque and transpa light generated by a collimated source (infrared LED) passes the transparent marks. The passing ligh a set of photo-receivers and generates an electric signal. The signal is processed and supplied by the	
	the optical disk. The resolution is given by the number of mark in respect to a unique index mark each turn. XAC77 absolute version: On absolute encoders the position is determined by a number of coded marks which return a distinct quote for each rotational position of the shaft.

# 6 - Safety instructions

	lika			
	SAFETY INSTRUCTIONS encoder series XC77-XAC	277		
1. Markir	ng: Ex II 2 GD Ex d IIC T6, Ex tD A21 IP65 T 85°C			
Certifi	icate N° CESI 08 ATEX 013			
Encod	lers intended for use in potentially explosive atmospheres in compliance with: EN 60079-0: 2004-03 / EN 60079-1: 2007 EN 61241-0: 2006 / EN 61241-1: 2004 EN 61000-6-4 / EN 61000-6-2 EN 5501 Classe A			
The do	<ul> <li>Ex: Equipment for use in potentially explosive atmospheres.</li> <li>d: Explosion-proof housing.</li> <li>II: Electrical equipment for use in environments with an explosive g than mines susceptible to firedamp.</li> <li>C: Highest classification of protection mode based on maximum expe</li> <li>T6: Maximum housing surface temperature 85°C.</li> <li>tD: Protection of electric devices with housing for use in Zones with in</li> <li>A21: Zone where the equipment is allowed to be used (Zone 21 and 22 identification (Practice A)</li> <li>IP65: IP protection degree for dust-proof housings to use in Zone 21 or 2</li> <li>T 85°C: Maximum surface temperature.</li> </ul>	as atmosphere other rimental gap. flammable dusts. ) with the Protection 22.		
	<ul> <li>ZONE 1, ZONE 2 (mixture: gases/air, vapours/air, mists/air),</li> <li>ZONE 21, ZONE 22 (dusts/air mixture)</li> </ul>			
ATTEN	NTION: do not use it in ZONE 0			
LIKA Electronic s.n.c Via S. Lorenzo, 25 36010 Carrè (VI) - It	SAFETY INSTRUCTIONS encoder series XC77-XAC77	Page 1 / 2 Tel. +39 0445 382814 Fax +39 0445 382797 eMail info@lika.biz web www.lika.biz		

#### XC77 XAC77 - Encoder ATEX



## 7 – Electrical connections

#### WARNING

Turn off power supply before connecting the device.

#### WARNING

If wires of unused signals come in contact, irreparable damage could be caused to the device. Please insulate them singularly.

Minimize noise by connecting the shield and/or the frame to ground. Make sure that ground is not affected by noise. The connection point to ground can be situated both on the device side and on user's side. The best solution to minimize the interference must be carried out by the user.

#### 7.1 XC77-...-ZCU...

Function	8-wire cable
A	Yellow
/A	Blue
В	Green
/В	Orange
0	White
/0	Grey
+VDC	Red
OVDC GND	Black
Shield	Screen

#### 7.2 XAC77 with SSI interface

Function	8-wire cable
Clock +	White
Clock -	Brown
Data +	Green
Data -	Yellow
Zero setting	Pink
Complementary (counting	Blue
direction)	Ыйс
+10VDC +30VDC	Red
OVDC GND	Black
Shield	Screen

7.3 XAC77 with bit pa	arallel output (NPN o.c. /	' Push-Pull)
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Function	16-wire cable	19-wire cable	32-wire cable
1 LSB	Brown	Brown	Brown
2	Red	Red	Red
3	Pink	Pink	Pink
4	Yellow	Yellow	Yellow
5	Green	Green	Green
6	Blue	Blue	Blue
7	Violet	Violet	Violet
8	Grey	Grey	Grey
9	White	White	White
10	Black	Black	Black
11	White-Green	White-Green	Brown-Red
12	Brown-Green	Brown-Green	White-Red
13	-	Red-Blue	Red-Blue
14	-	Grey-Brown	Grey-Pink
15	-	White-Grey	White-Yellow
16	-	-	Brown-Green
17	-	-	White-Green
18	-	-	Yellow-Brown
19	-	-	White-Blue
20	-	-	Brown-Blue
21	-	-	White-Pink
22	-	-	White-Grey
23	-	-	Pink-Brown
24	-	-	Grey-Brown
25	-	-	Brown-Black
Zero setting	Red-Blue	White-Pink	Grey-Green
Complementary	Grey-Pink	Grey-Pink	Yellow-Pink
+10VDC +30VDC	White-Yellow	White-Yellow	Green-Blue
OVDC GND	Yellow-Brown	Yellow-Brown	Yellow-Blue
Shielding	Case	Case	Case

## 7.4 XAC77 with Profibus-DP interface (XAC7716/16384PB-14)

ATEX encoders with Profibus interface are based on the Hx58 FB series encoders, thus refer to the transmission specifications described in the enclosed Hx58 FB Profibus manual. Furthermore they need the HM58\_V3.gsd GSD file. User's manual and GSD file are available on the supplied CD or at the address: www.lika.biz > PRODUCTS > ROTACOD > Hx58 FB).

Function	Wires	
+10VDC +30VDC Supply voltage	Red	
OVDC GND Supply voltage	White	
Profibus B (bus input)	Blue	
Profibus A (bus input)	White	
Profibus B (bus output)	Green	
Profibus A (bus output)	White	
+5VDC out for RT <sup>1</sup>	Yellow	
OVDC out for RT <sup>1</sup>	White	
Profibus Shielding	Case	
1 Both wires are supplied with a heat-shrink tubing protection; ensure it is always applied over		

them if the bus termination resistor is not provided (Danger! Irreparable damages!).

### WARNING

- The node address must be set via software by the bus Master (see SAP55 service and "Set node number via BUS" section in the enclosed Hx58 FB Profibus "User's manual").
   Node address = 125 is set by Lika Electronic by default; to set a different address you must connect to the network one encoder at a time and then set the node ID, otherwise an address conflict will occur.
- Baud rate is set automatically by the bus Master.
- Do not open the device for any setting!
- The diagnostic LEDs are not available for this model.
- Provided cable is not a Profibus certified cable, anyway it is fitted with bus input and output to avoid installing stubs on the Profibus network.
- If the encoder is at the end of the transmission line (last device of the network), a certified bus active termination resistor must be installed; otherwise the following connection must be provided at outputs:



• To avoid irreparable damages to the encoder wires which are not used must be cut at different lengths and insulated singularly.

### 7.5 XAC77 with CANopen interface (XAC7716/16384CB-14)

ATEX encoders with CANopen interface are based on the Hx58 FB series encoders, thus refer to the transmission specifications described in the enclosed Hx58 FB CANopen manual. Furthermore they need the Lika\_HMCB\_DS406\_V3.eds EDS file. User's manual and EDS file are available on the supplied CD or at the address: www.lika.biz > PRODUCTS > ROTACOD > Hx58 FB).

Function	Wires
+10VDC +30VDC Supply voltage	Red
OVDC GND Supply voltage	White
CAN L (bus input)	Blue
CAN H (bus input)	White
CAN L (bus output)	Green
CAN H (bus output)	White
Non used	Yellow
Non used	White
CAN Shielding	Case

### WARNING

- The node address and the baud rate must be set via software by the bus Master (see objects 3000h e 3001h in the "Object dictionary" section of the enclosed Hx58 FB CANopen manual). Node address = 1 and baud rate = 500 Kbit/s are set by Lika Electronic by default; to set a different address you must connect to the network one encoder at a time and then set the node ID, otherwise an address conflict will occur.
- Do not open the device for any setting!
- The diagnostic LEDs are not available for this model.
- Provided cable is not a CANopen certified cable, anyway it is fitted with bus input and output to avoid installing stubs on the CANopen network.
- If the encoder is at the end of the transmission line (last device of the network), the bus termination resistor must be provided outside the device ( $120\Omega$  bus termination resistor between CAN High and CAN Low outputs) as shown in the following scheme:



• To avoid irreparable damages to the encoder wires which are not used must be cut at different lengths and insulated singularly.

#### 7.6 XAC77 with analog output

Function	T12 cable
TxD (RS232) *	Red
RxD (RS232) *	Green
0VDC (RS232)	Brown
Fault	Yellow
+lout	Gray
0VDC Analog	Violet
+Vout	Pink
Complementary	Blue
Preset (Zero setting)	White
+15VDC +30VDC	Brown/Green
oVDC	White/Green
Shield	Shield

\* Make sure that RxD on PC side is connected with TxD on device side and TxD / PC is connected with RxD / device



#### Description

- "OVDC Analog" signal is internally connected to OVDC;
- Preset: Data latch in memory (active high for at last 100ms);
- **Complementary:** set counter clock wise (active high);
- Fault: Open collector signal for cable integrity check (only current output). To connect fault signal refer to Figure 2 and Figure 3, pay attention to the value of R2. No enc. error = transistor ON (in conduction). Encoder error = transistor OFF (open).

Fault connected to PLC input	Fault connected to relay
$R2 = \left(\frac{Vdc}{I}\right) - R1$	$Imax = 50mA$ $R1 = 47\Omega$
Fig. 2	
Frample	Fig. 3
$1K\Omega < R2 < 10K\Omega$ No enc. error = PLC input Low (0 VDC). Encoder error = PLC input High (+VDC).	$VDC = +24V$ $I = 30mA  (current necessary to energize the coil of a small relay)$ $R2 = 750\Omega$ No enc. error = coil energized. Encoder error = coil not energized.

#### 7.7 XAC77 with integrated cam switch programmer (XAC7712/256CS-14-...)

ATEX encoders with integrated cam switch programmer are based on the AMR58/AMRC series encoders. Thus for any information on the the communication characteristics and on programming the encoder please refer to the documentation of the AMR58 series encoder at the address: www.lika.biz > PRODUCTS > ROTACOD > ASR58 • AMR58).

Function	A32 cable
OUT 1	Brown
OUT 2	Red
OUT 3	Pink
OUT 4	Yellow
OUT 5	Green
OUT 6	Blue
OUT 7	Violet
OUT 8	Grey
Data OUT +	Blue/Red
Data OUT -	Pink/Grey
Clock IN +	White/Yellow
Clock IN -	Brown/Green
Load Program	White/Green
Select Program 2 <sup>o</sup> (1)	Yellow/Brown
Select Program 2 <sup>1</sup> (1)	White/Blue
Select Program 2 <sup>2</sup> (1)	Brown/Blue
Select Program 2 <sup>3</sup> (1)	White/Pink
Fault	White/Grey
RxD RS-232 (2)	Pink/Brown
TxD RS-232 (2)	Grey/Brown
0VDC (3)	Brown/Black
0VDC RS-232 (4)	White/Black
Zero setting	Grey/Green
Complementary	Yellow/Pink
+10VDC +30VDC Power supply	Green/Blue + Pink/Green
OVDC Power supply (3)	Yellow/Blue + Yellow/Grey
Shield	Shield

#### NOTE

- 1. Program selection inputs (Select Program) are internally connected to 0VDC through pulldown resistors. They are active at +VDC.
- 2. Please always make sure that the RxD of the ENCODER is cross-wired to the TxD of the PC while the TxD is cross-wired to the RxD.
- 3. OVDC and OVDC Power supply are internally connected.
- 4. OVDC RS-232 is internally insulated from OVDC Power supply.

# 8 – Mechanical characteristics

8.1 XC77

8.2 XAC77

#### 8.3 Solid shaft (LKM-1758) and Fixing plate (LKM-1520)

LKM-1758 is an accessory thus it has to be ordered separately.

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Document release	Description
1.0	1 <sup>st</sup> issue
1.1	Adding section 7.6
1.2	Adding sections 7.7 and 7.8
1.4	Updating section 7
1.5	Updating section 7.4
1.6	Updating section 7.6
1.7	Updating section 7.6
1.8	Updating sections 7.4 and 7.5
2.0	Updating sections 7.4, 7.5 and 7.6
2.1	Added information on cam switch encoder (section 7.7)



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