

# User's guide

## DWI Series



Miniature incremental draw-wire encoder

- Incremental draw-wire encoder with quadrature signal output
- Robust and compact design
- Resolution from 0.25 mm down to 0.05 mm
- Max. measuring length: 2, 5, and 10 meter
- Universal output circuit: 5-30 VDC Push-Pull (Totem Pole) or NPN/PNP Open Collector (HTL), or Line Driver (TTL)

### Suitable for the following models:

- DWI-2M-H0500-RL2
- DWI-5M-H2000-RL2
- DWI-10M-H2000-RL2

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# Typographic and iconographic conventions



This icon, followed by the word **WARNING**, is meant to highlight the parts of the text where information of great significance for the user can be found: user must pay the greatest attention to them! Instructions must be followed strictly in order to guarantee the safety of the user and a correct use of the device. Failure to heed a warning or comply with instructions could lead to personal injury and/or damage to the unit or other equipment.

## Preliminary information

This guide is designed to provide the most complete and exhaustive information the operator needs to correctly and safely install and operate the **DWI series incremental draw-wire encoders**.

DWI series cable-pulling encoders are aimed at speed and position measurements and controls in a variety of industrial applications through the movement of a **2, 5, or 10 meter** stainless steel wire. The typical back and forth travel of the moving equipment causes the wire to reel and unreel and thus the linear movement to be converted into a rotative motion detected by the encoder which is coupled to the drum.

The DWI series encoder provides quadrature signals through the universal output circuit HTL/TTL (Push-Pull, Open Collector, or Line Driver output signals).

# 1 Safety summary



## 1.1 Safety

- Always adhere to the professional safety and accident prevention regulations applicable to your country during device installation and operation;
- installation and maintenance operations have to be carried out by qualified personnel only, with power supply disconnected and stationary mechanical parts;
- device must be used only for the purpose appropriate to its design: use for purposes other than those for which it has been designed could result in serious personal and/or the environment damage;
- high current, voltage and moving mechanical parts can cause serious or fatal injury;
- warning ! Do not use in explosive or flammable areas;
- failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment;
- Lika Electronic assumes no liability for the customer's failure to comply with these requirements.



## 1.2 Electrical safety

- Turn OFF the power supply before connecting the device;
- connect according to the explanation in the "Electrical connection" section on page 11;
- the wires of unused output signals must be cut at different lengths and insulated singularly;
- in compliance with 2014/30/EU norm on electromagnetic compatibility, following precautions must be taken:
  - before handling and installing the equipment, discharge electrical charge from your body and tools which may come in touch with the device;
  - power supply must be stabilized without noise; install EMC filters on device power supply if needed;
  - always use shielded cables (twisted pair cables whenever possible);
  - avoid cables runs longer than necessary;
  - avoid running the signal cable near high voltage power cables;
  - mount the device as far as possible from any capacitive or inductive noise source; shield the device from noise source if needed;



- to guarantee a correct working of the device, avoid using strong magnets on or near by the unit;
- minimize noise by connecting the shield and the frame to ground. Make sure that ground is not affected by noise.



### 1.3 Mechanical safety

- Install the device following strictly the information in the “Mechanical installation” section on page 7;
- mechanical installation has to be carried out with stationary mechanical parts;
- do not disassemble the unit;
- do not tool the unit;
- delicate electronic equipment: handle with care; do not subject the device to knocks or shocks;
- respect the environmental characteristics of the product;
- we suggest installing the unit providing protection means against waste, especially swarf as turnings, chips, or filings; should this not be possible, please make sure that adequate cleaning measures are in place in order to prevent the wire from jamming;
- to avoid failures, never exceed the maximum measuring length and prevent the wire from tangling up;
- never release the wire freely, always help the wire wind properly: risk of personal injury and/or equipment damage;
- always keep the wire aligned not to damage the equipment;
- the feed out per turn of the DWI-2M draw-wire encoder is 100mm (3.937”). The feed out per turn of the DWI-5M and DWI-10M draw-wire encoder is 200mm (7.874”).

## 2 Mechanical installation

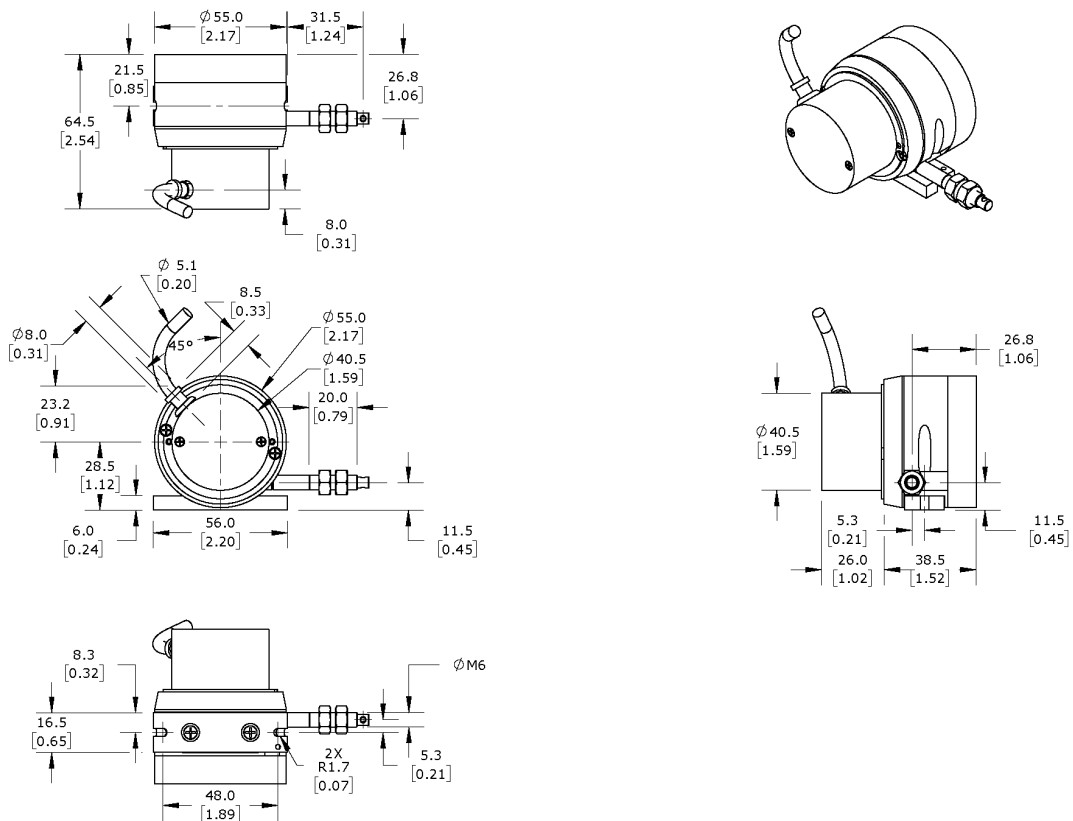


## WARNING

Installation has to be carried out by qualified personnel only, with power supply disconnected and mechanical parts completely stopped.

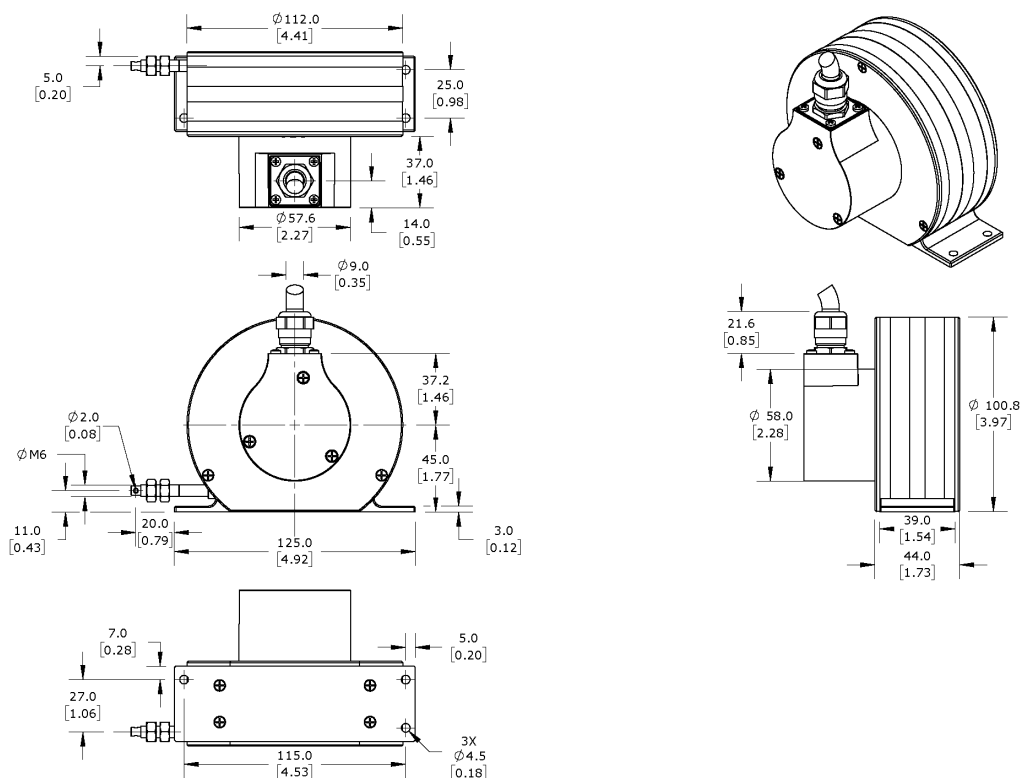
## 2.1 Overall dimensions

**DWI-2M-H0500-RL2**

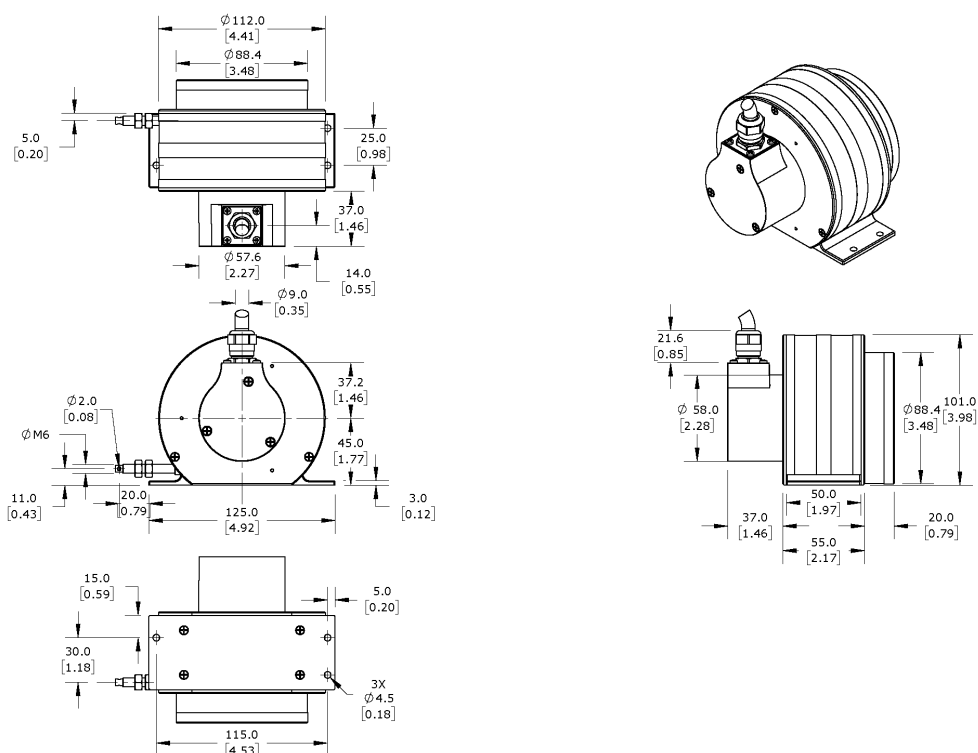


Values are expressed in mm

### DWI-5M-H2000-RL2



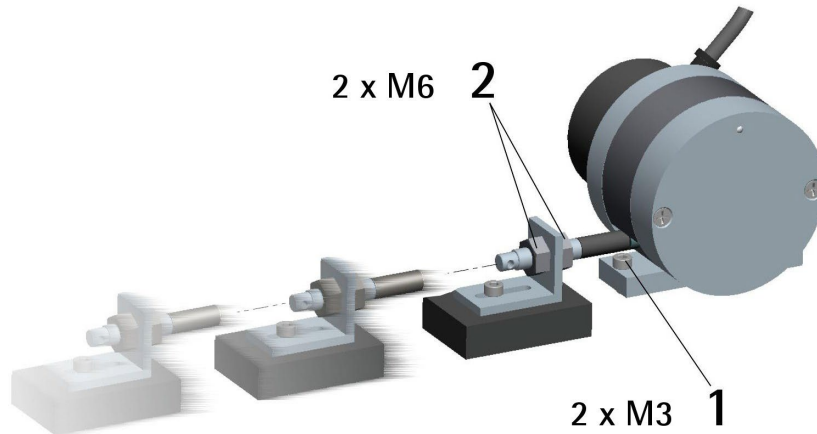
### DWI-10M-H2000-RL2



Values are expressed in mm

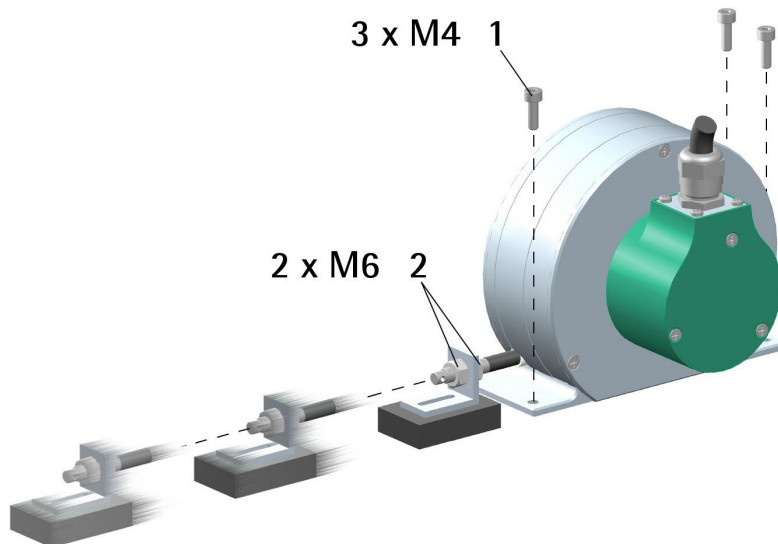


## 2.2 Mounting instructions for DWI-2M



- Fasten the draw-wire unit onto a fixed support using two M3 screws **1**;
- remove the transport safety wire that pins the end of the measuring wire;
- fix the end of the measuring wire to the moving element using the provided M6 nuts **2**.

## 2.3 Mounting instructions for DWI-5M/10M



- Fasten the draw-wire unit onto a fixed support using three M4 screws **1**;
- remove the transport safety wire that pins the end of the measuring wire;
- fix the end of the measuring wire to the moving unit using the provided M6 nuts **2**.

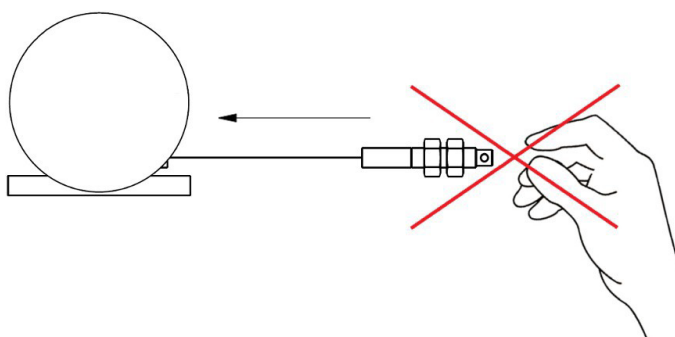


## WARNING

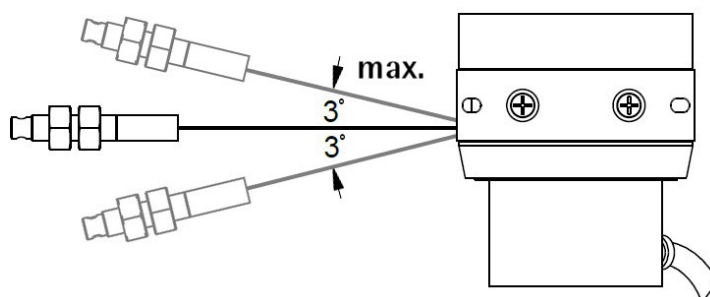
We suggest installing the unit providing protection means against waste, especially swarf such as turnings, chips, or filings; should this not be possible, please make sure that adequate cleaning measures are in place in order to prevent the wire from jamming.

To avoid irreparable failures, never exceed the maximum measuring length and prevent the wire from tangling up.

Never release the wire freely, always help the wire wind properly: risk of personal injury and/or equipment damage.



Always keep the wire aligned not to damage the equipment (maximum deviation:  $3^\circ$ ).



## **2.4 Maintenance**

The measuring system does not need any particular maintenance; but it should be handled with care like any delicate electronic equipment. From time to time we recommend the following operations:

- the unit and the wire have to be cleaned regularly using a soft and clean cloth to remove dust, chips, moisture etc.; do not use oil to clean the wire.

### 3 Electrical connection



**WARNING**

Electrical connection must be carried out by qualified personnel only, with power supply disconnected and mechanical parts completely stopped.



**WARNING**

If wires of unused signals come in contact, irreparable damage could be caused to the device. Thus they must be cut at different lengths and insulated separately.

#### 3.1 DWI-2M cable connection

Function	Wire Color
A	Yellow
/A	Blue
B	Green
/B	Orange
N/C	White
N/C	Grey
+5Vdc to +30Vdc	Red
0Vdc	Black
Shielding	Shield

#### 3.2 DWI-2M cable specifications

Model:	LIKA encoder cable
Cross section:	8 x 0.22 mm <sup>2</sup> (24 AWG)
Jacket:	PVC, oil and flame retardant
Shield:	Tape aluminum/PET, coverage 100%
Outer diameter:	5.1 mm ±0.2 mm / 0.2" ±0.0079"
Min. bend radius:	Outer diameter x 10, static application Outer diameter x 15, dynamic application
Work temperature:	-20°C +80°C / -4°F +176°F, static application -5°C +70°C / +23°F +158°F, dynamic application, not for continuous use

### 3.3 DWI-5M/10M cable connection

Function	Wire Color
A	Violet
/A	Yellow
B	Grey
/B	Pink
Z	Green
/Z	Brown
+5Vdc to +30Vdc	Brown_Green
0Vdc	White_Green
N/C	White
N/C	Blue
N/C	Red
N/C	Black
Shielding	Shield

### 3.4 DWI-5M/10M cable specifications

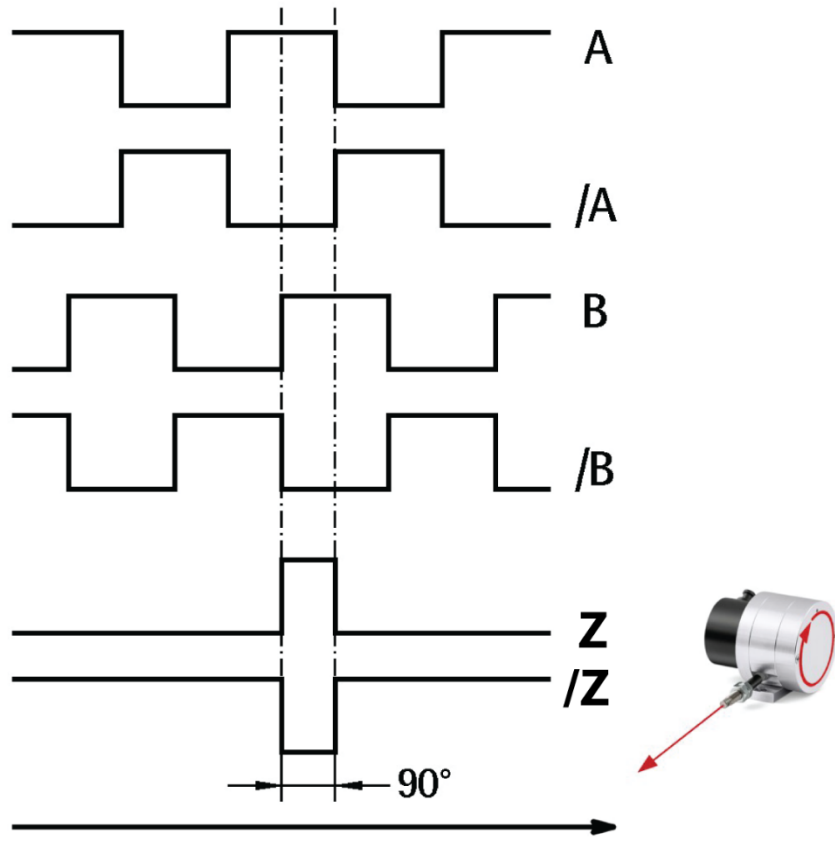
Model:	LIKA High-Flex Twisted Encoder cable
Cross section:	8 x 0.14 mm <sup>2</sup> (26 AWG) + 4 x 0.25 mm <sup>2</sup> (24 AWG)
Jacket:	Matt Polyurethane (TPU) halogen free, oil, hydrolysis, abrasion resistant
Shield:	Tinned copper braid, coverage ≥ 85%
Outer diameter:	6.1 mm ± 0.1 mm / 0.24" ± 0.004"
Min. bend radius:	Outer diameter x 7.5
Work temperature:	-50°C to +90°C / -58°F to +194°F, static application -40°C to +90°C / -40°F to +194°F, dynamic application

### 3.5 Ground connection

Minimize noise by connecting the shield and the frame to ground. Make sure that ground is not affected by noise. Ground the encoder cable shield at the cable end. If this is not sufficient, the ground can also be attached at the encoder side, but there is the risk of increasing conducted EMI by creating a ground loop. The best solution to minimize the interference will be unique to each installation and must ultimately be determined by the user.

## 4 Output signals

### 4.1 Quadrature signals



Positive counting direction (count up information) when pulling the wire out



#### WARNING

Connecting /A, /B, or /Z signal wires to each other or to +Vdc or to 0Vdc may cause permanent damage to the unit.

The number of output pulses is proportional to the displacement of the moving unit (axis) the wire is fastened to.

The resolution can be read in the order code:

<b>Order code</b>	<b>Resolution x1</b>	<b>Resolution x4</b>
DWI-2M-H0500-RL2	0.2 mm	0.050 mm
DWI-5M-H2000-RL2	0.1 mm	0.025 mm
DWI-10M-H2000-RL2	0.1 mm	0.025 mm

Resolution x1: reading 1 edge at every period.

Resolution x4: reading 4 edges at every period.

The Z and /Z signals (5M and 10M models only) are generated every 200 mm (i.e. once per revolution).

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