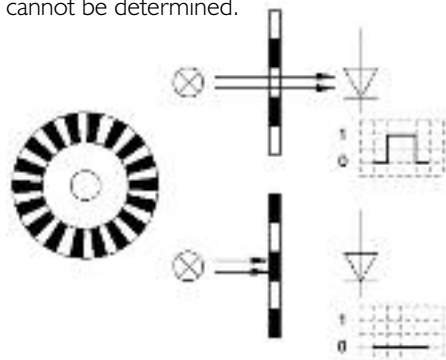


# Incremental encoders - engineering and function principle

In automation, rotary encoders are used as sensors for angle, position, speed and acceleration. By the use of spindles, gear racks, measuring wheels or cable pulls, linear movement can also be monitored.

They convert the actual value of a mechanical parameter into electrical signals which can be processed by counters, tachometers, PLC's and industrial PC's.

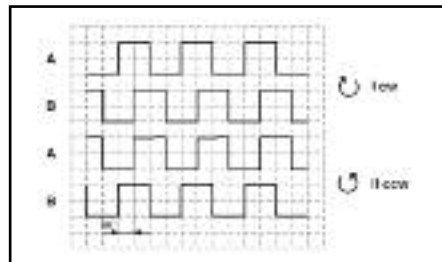
Transparent and non-transparent fields are applied to a disk made of glass or plastic. If a light source is fitted to one side of the disk and a light sensitive sensor on the other side, the rotary movement is picked up contactless. If a light beam hits a transparent field, the receiver recognises a pulse. If, however, the beam is interrupted by a dark field, no pulse is released. LED's which emit infrared light are usually used as a light source. Photodiodes or phototransistors are used as receivers. If no other functions are added to this principle, it can be deduced only that the disk is being rotated. the direction of rotation or even an absolute position cannot be determined.



## Rotation direction monitoring in incremental rotary encoders

In order to determine the direction of rotation of a movement, the scanning principle is extended by a receiver on channel A and channel B. The direction of rotation can be determined by evaluating the 2 resulting phase shifted signals by 90° (see diagram below).

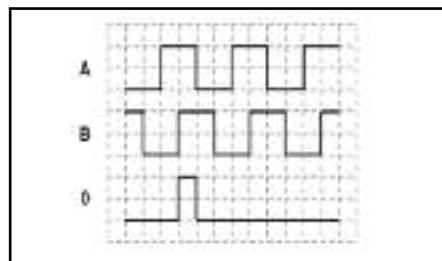
In the first representation (I cw) channel A precedes channel B. This fact indicates clockwise rotation. I I ccw shows the anti-clockwise rotation. The direction of rotation is defined by viewing onto the encoder shaft.



## Zero signal

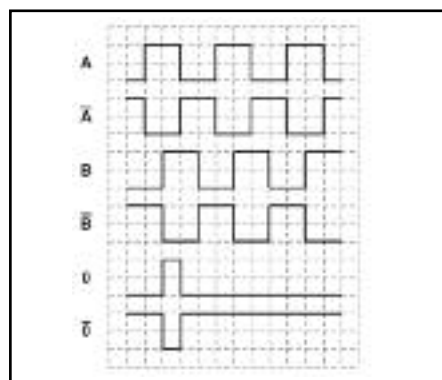
If the detection takes place not only within one revolution, another signal is required, which appears once per revolution. This signal (third channel) is called a zero signal or channel 0. The zero signal is frequently used as a reference signal.

The picture shows the course of the signal of a three-channel incremental encoder.



## Inverted channels

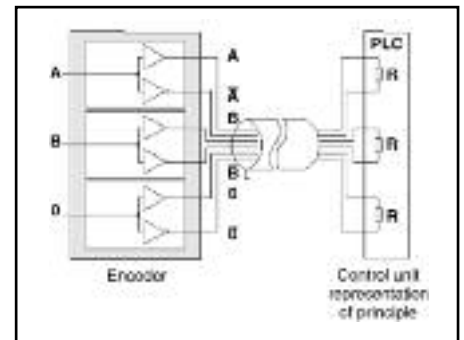
The inverted signals are transmitted in addition to the tracks A, B and 0 in order to improve the signal transmission. Inverted signals are a standard feature in RS422 interfaces and can be supplied optionally for push-pull outputs.



## Interface - line driver (RS422)

This symmetrical interface is ideal for use where high interference safety and/or a longer cable length is required. For maximum interference rejection, the corresponding core pairs must be twisted.

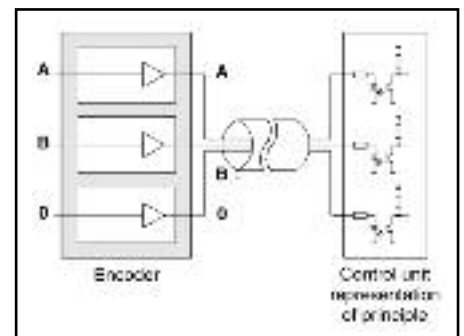
This interface can also be used as a replacement for the TTL interface. In this case the inverted outputs are not used.



## Interface - push-pull output

The push-pull output is a combination of NPN and PNP outputs, providing improved flank rise compared to open collector outputs. No external wiring is required as in NPN or PNP.

It also gives improved resistance to interference and the output has inverted channels. The main application of this output is in median switching frequencies. The open collector outputs can be replaced by this interface (in this case only the non-inverted outputs are used).



# Incremental rotary encoders type TVI40N



### Features

- Compact design
- Up to 1024ppr
- 4.75... 30Vd.c. short circuit proof output

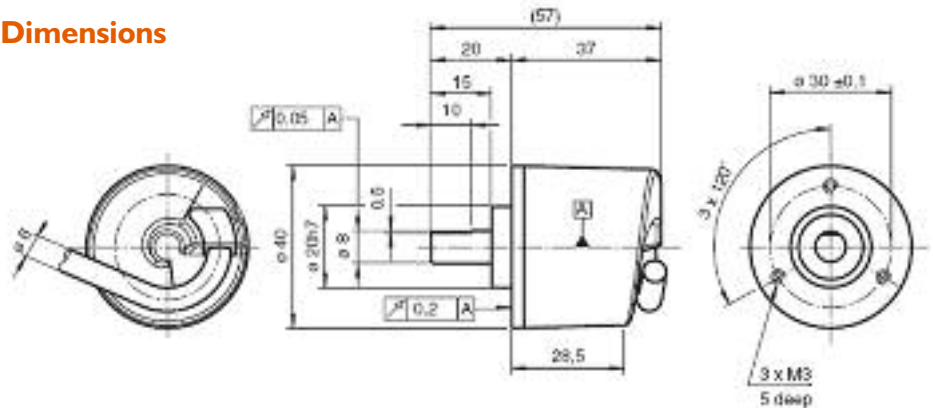
### Technical specification

Supply voltage	4.75... 30Vd.c. 5V for line driver (RS422) O/P	Connection	.8 core 0.5m cable
Output	push pull, incremental (RS422)	Housing	polycarbonate
Output current	.30mA per channel	Flange	aluminium
		Shaft	stainless steel

### Electrical connection

Signal	Cable Ø6 mm, 8-core
GND	Blue
+U <sub>b</sub>	Brown
A	Black
B	White
$\bar{A}$	Violet
$\bar{B}$	Grey
0	Orange
$\bar{0}$	Yellow
Screen	-

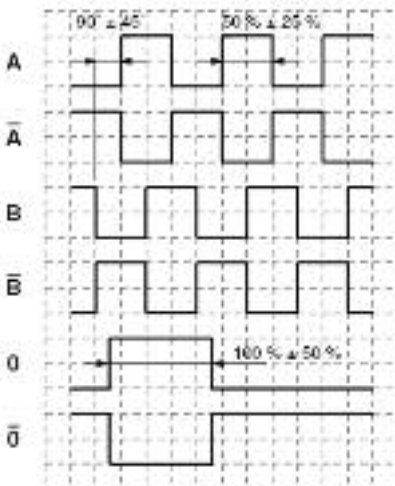
### Dimensions



### Order code information

T	V	I	4	0	N	-	0	9	T	K	T	6	T	N	-				
																	Pulse count	50, 100, 200, 360, 400, 500, 1000, 1024	
																	Temperature range	N Normal	
																	Output switching	T 4.75 V ... 30 V, push-pull	
																	Signal output	6 A + B + 0 and $\bar{A}$ + $\bar{B}$ + $\bar{0}$	
																	Exit position	T Tangential	
																	Connection type	K0 Cable Ø6 mm, 8 x 0.128 mm <sup>2</sup> , 0.5 m K2 Cable Ø6 mm, 8 x 0.128 mm <sup>2</sup> , 2 m	
																	Flange version	T Clamping flange	
																	Shaft dimension	14 Shaft Ø6 mm x 15 mm 06 Shaft Ø6 mm x 16 mm	
																	Housing material	N Plastic	
																	Shaft version	V Solid shaft	

### Signal outputs

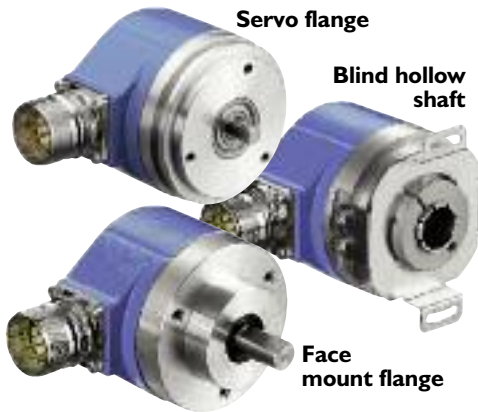


Please call our head office sales department on 01254 685900 for price details for your specific encoder





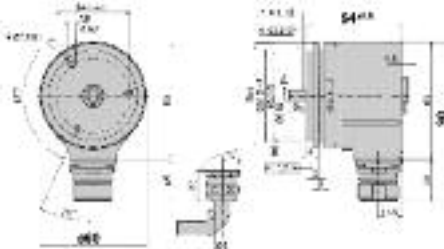
# Programmable rotary encoders - type DRS6 I



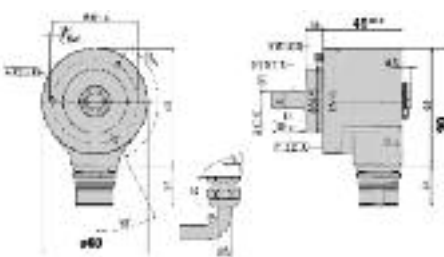
## Features

- Programmable ppr (1 to 8192ppr)
- Zero pulse teach button
- Reduced stock and lead times
- Clamp or servo flange options
- IP66 protection

## Dimensions - Servo flange



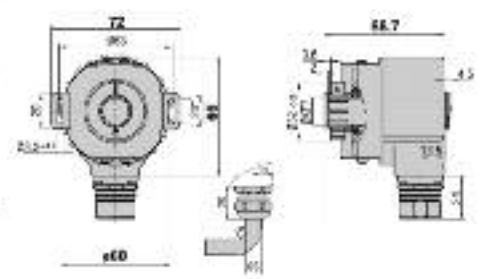
## Face mount flange version



## Technical specification

Supply voltage . . . . . 4.5-5.5Vd.c. or 10-32Vd.c. 5V for line driver (RS422) O/P  
 Output . . . . . HTL push pull, incremental TTL (RS422, incremental)  
 Output current . . . . . 20mA TTL/RS422 or 60mA HTL/push-pull  
 Connection . . . . . 11 core cable or 12pin plug  
 Protection . . . . . IP66 cable/IP65 plug

## Dimensions - Blind hollow shaft version



Sick programmable incremental encoders allow the number of pulses per revolution to be freely programmed from 1 to 8192, and configure the zero pulse width.

The DRS6 I is ideal for end users & system integrators, covering your requirements with a smaller number of units & reducing your delivery lead times. These are essential encoders for many applications.

They are especially suitable for machine tools, textile machines, woodworking machines and packaging machines.

Programming the encoder is also very easy using the PGT-05-S software and USB interface (not supplied). Zero-pulse-teach is as simple as pressing a button located under a cap on the rear of the encoder.

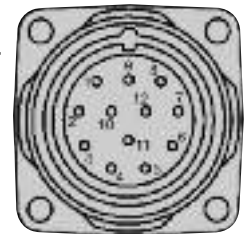
## DRS6 I Series Accessories

Description	Order code	Price
Hollow shaft collet 6mm	2029174	£7.39
Hollow shaft collet 1/4"	2029175	£7.39
Hollow shaft collet 8mm	2029176	£7.39
Hollow shaft collet 3/8"	2029177	£7.39
Hollow shaft collet 10mm	2029178	£7.39
Hollow shaft collet 12mm	2029179	£7.39
Hollow shaft collet 1/2"	2029180	£7.39
12-pin connector with 3m cable	2029213	£41.25
Programming software and USB interface	1035342	£75.56

**Please call our head office sales department on 01254 685900 for price details for your specific encoder**

## PIN and wire allocation/cable 11 core

PIN	Signal	Wire colour cable outlet	Explanation
1	$\bar{B}$	black	Signal line
2	Sense +	grey	Connected internally to $U_5$
3	$\bar{Z}$	lilac	Signal line
4	Z	yellow	Signal line
5	$\bar{A}$	white	Signal line
6	A	brown	Signal line
7	N.C.	orange	Not connected
8	B	pink	Signal line
9	Screen		Housing Potential
10	GND	blue	0V connected to encoder
11	Sense -	green	Connected internally to GND
12	$U_5$	red	Supply voltage



View of the connector M23 fitted to the encoder body

## Order code information

**DRS61 - 08192**

### Electrical interface

4.5... 5.5V, TTL/RS422 =A  
 10... 32V, TTL/RS422 =C  
 10... 32V, HTL/push-pull =C

**08192**

### Number of lines

Factory programmed to 8,192

### Mechanical interface

Face mount flange, solid shaft 10mm =4  
 Servo flange, solid shaft 6mm =1  
 Blind hollow shaft 15mm =A  
 (see pricing box on left for collets)

### Connection type

Connector M23, 12-pin, radial =A  
 Connector M23, 12-pin, axial =B  
 Cable 11 core, radial 1.5m =K  
 Cable 11 core, axial 1.5m =R

# Identification systems introduction

## Automated processes and improved traceability

Automatic object identification has entered many areas of industrial production, providing information on products, goods and persons and making it possible to link data and material flow. Ideal for rough industrial environments, they are more robust than barcode or data matrix code systems where the label cannot become dirty or mechanically stressed.



Where they are integrated in logistic applications, the code or data carrier can remain with the end product to complete the chain to the end customer. New cost-effective designs of code carriers are also offering new options for more comprehensive logistics applications.



## Inductive identification systems...

...operate according to the transformer principle in the near field, using frequencies between 125kHz and 13MHz. High frequencies make faster communication possible. 125kHz systems offer robust data carriers which are ideally suited for automation in the industrial environment - an integrated ferrite core even makes it possible to install a data carrier in metal!



## System configuration

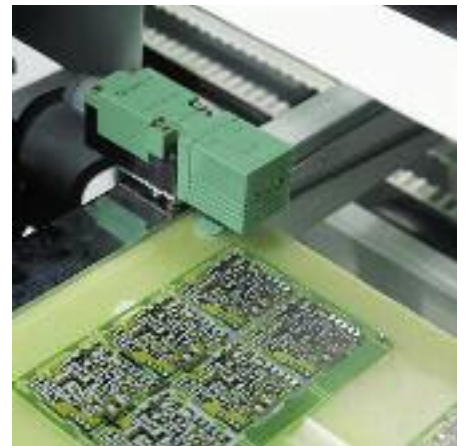
Identification systems consist of a control unit with an interface, read/write heads & code or data carriers. In the case of read/write stations, control unit, interface and head are contained in one device. Code carriers contain a worldwide unique fixed code of typically 40 bits ( $2^{40} = 1,099,511,627,776$  possibilities).

## How does it work?

An IDENT or identification system detects objects by means of code or data carriers, using either fixed code systems, (where data can only be read) or read/write systems where it is possible to store information on the data carrier.

## Customer benefit - why an ident system is worth it..

IDENT systems can save time and money in automated production applications, offering product tracking and identification throughout the entire production process.



Data carriers have a freely usable memory area, which can be overwritten many times, and sometimes they also have a fixed area code. The read/write process is triggered by the control commands via current Fieldbuses EtherNet, ProfiBus, DeviceNet or a serial interface. This way several hundred read/write points (ID Points) can be accessed in one system.



## Read/write station with integrated controller



### Features

- Integrated control interface unit
- Serial and field-bus interfaces are selected through the base unit
- Read distance of up to 100mm
- Write distance of up to 50mm
- 3 LED's for function indication
- Optimised reading speed for fixed codes
- Suited for writing of IPC I I

### Function

The IPT I-FP read/write station is used in combination with a base which contains the interface for connecting to PC or PLC. The base gives a choice of using either serial or fieldbus interfaces.

The analysis system is integrated in the device and simplifies the system construction. Protection class IP67 allows the device to be installed directly in the field. This unit can be used in conjunction with any of the data or code carriers listed on page 55.

### Read/write distances in air (at 25° C, in mm)

Code/ data carrier	IPT I-FP	
	Read	Write
IPC02-20W	0...40	
IPC02-30W	0...50	
IPC02-50W	0...80	
IPC03-20W	0...30	0...25
IPC03-30W	0...35	0...30
IPC03-50P	0...60	0...45

### Technical specification

Supply voltage . . . . .20-30V d.c.  
 Power consumption . . . . .5W  
 Operating frequency . . . . .125KHz  
 LED indication . . . . .power on, IPC detected and fieldbus fault  
 Operating temperature . . -25 to +70°C  
 Connection . . . . .screw terminal  
 Housing . . . . .sensor head PBT, base unit aluminium die-cast  
 Protection . . . . .IP67

### Dimensions

- 49 x 80 x 80mm (HxWxD) including base module
- 49 x 80 x 161mm (HxWxD) including ProfiBus DP base

Description	Code	Price
Ident read/write station	IPT I-FP	£302.84
RS232 base unit	U-P3-RX	£46.00
RS485 base unit	U-P3-R4	£46.00
Profibus DP base unit	U-P6-B6	£252.60

## Identification controllers with network interfaces



### Features

- Connect up to a maximum of 4 read/write heads
- As an alternative, 2 read/write heads & 2 trigger sensors can be connected
- LCD with background lighting
- Direct operation via 4 keys
- LED status indicator of bus communication and read/write heads
- Synchronous or multiplex mode for read heads

### Technical specification

Supply voltage . . . . .20-30V d.c.  
 Operating frequency . . . . .125KHz  
 No. of read/write heads . . .max 4 heads or 2 heads and 2 trigger sensors  
 LED indication . . . . .power on, IPC detected and fieldbus fault  
 LCD screen . . . . .configuration and control interface  
 Setup . . . . .via 4 key push buttons  
 Connection . . . . .read/write 5pin M12 power supply 4pin M12

Network connection . . . . .RS232 M12, Ethernet RJ45, Profibus DP M12, DeviceNet mini style  
 Operating temperature . . -25 to +70°C  
 Housing . . . . .base unit aluminium die-cast  
 Protection . . . . .IP67  
 Installation . . . . .Din-rail or screw mounting

### Dimensions

- 73 x 148 x 107mm (HxWxD)

Description	Code	Price
Ident controller with RS232 interface	IC-KP-R2-V1	£840.64
Ident controller with ethernet interface	IC-KP-B12-V45	£1257.97
Ident controller with Profibus DP interface	IC-KP-B6-V15B	£988.71
Ident controller with DeviceNet interface	IC-KP-B7-V95	£956.34

# Identification read/write heads



### Technical specification

Sensing distance . . . . .see selection chart  
 Operating frequency . . . . .125KHz  
 Power supply . . . . .supplied by network controller  
 Power consumption . . . . .1.2W

LED indication . . . . .power, read/write and carrier detected  
 Ambient temperature . . . .-25 to +70°C  
 Protection . . . . .IP67

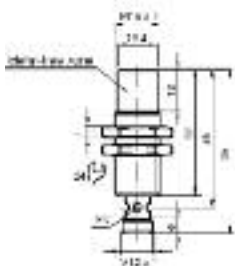
### Features

- Use with Ident network controllers
- Reads fixed code or read/write heads
- Standard M12 connection for easy installation and maintenance
- 125kHz operating frequency
- LED indication

### Read/write distances in air (at 25° C, in mm)

Code/ data carrier	IPH-18GM-V1		IPH-30GM-V1		IPH-L2-V1		IPH-FP-V1		IPH-F15	
	Read	Write	Read	Write	Read	Write	Read	Write	Read	Write
IPC02-20W	0...20		0...30		0...30		0...35			
IPC02-30W	0...28		0...40		0...40		0...50			
IPC02-50W	0...40		0...55		0...60		0...80		0...100	
IPC03-20W	0...20	0...15	0...30	0...20	0...30	0...20	0...35	0...25		
IPC03-30W	0...28	0...20	0...40	0...25	0...40	0...30	0...50	0...35		
IPC03-50P	0...40	0...30	0...55	1...35	0...60	0...40	0...80	0...60	0...100	0...80

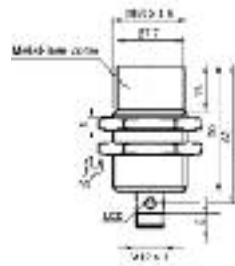
## M18 read/write heads



### Additional specification

Housing . . . . .M18 PBT/stainless steel  
 Minimum distance between heads in synchronous mode . . . . .300mm (no separation required in multiplex mode)

## M30 read/write heads



### Additional specification

Housing . . . . .M30 PBT/stainless steel  
 Minimum distance between heads in synchronous mode . . . . .270mm (no separation required in multiplex mode)

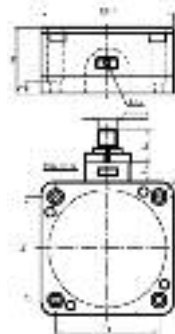
## Varikont L type read/write heads



### Additional specification

Housing . . . . .PA-GF35  
 Minimum distance between heads in synchronous mode . . . . .450mm (no separation required in multiplex mode)

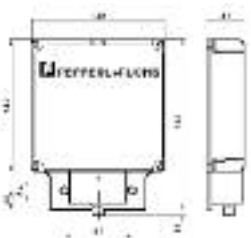
## 80mm square head read/write heads



### Additional specification

Housing . . . . .PBT with aluminium die-cast base  
 Minimum distance between heads in synchronous mode . . . . .550mm (no separation required in multiplex mode)

## 140mm square head read/write heads



### Additional specification

Housing . . . . .PA-GF35  
 Minimum distance between heads in synchronous mode . . . . .1100mm (no separation required in multiplex mode)

Description	Code	Price
M18 read/write head	IPH-18GM-V1	£222.87
M30 read/write head	IPH-30GM-V1	£269.41
VariKont L type read/write head	IPH-L2-V1	£278.21
80mm square head read/write head	IPH-FP-V1	£332.50
140mm square head read/write head	IPH-F15-V1	£337.92
5m lead with M12 plug	V1-G-IVH-5M-PUR-ABG	£19.13
15m lead with M12 plug	V1-G-IVH-15M-PUR-ABG	£39.12

