

rota

Baseefa09ATEX0129
IECEX BAS 09.0057
IECEX TSA 12.0031
Ex ia IIC T4 Ga
Ex ia I Ma
⊕ II 1G
⊕ I M1
CE 1180

CSA.12.2486630
Class I, Zone 0
A Ex ia IIC T4 Ga
Ex ia IIC T4 Ga

LK Series

Linear Transducers

Compact Intrinsically Safe Linear Transducer

Certified to IEC Equipment Protection Levels Ga and Ma (ATEX Categories 1 and M1)
CSA Certified for Class I Zone 0 Hazardous Areas

- Suitable for Oil, Gas and Mining Applications
- No External Signal Conditioning
- Solid State ► Zero Wear
- Absolute Signal Output
- -40°C to +80°C Operating Temperature (+120°C / T3 on request)
- Excellent Shock and Vibration Resistance
- High Speed
- Up to 5 metre (197") Stroke

NEW up to 10 metre (394") Option



ATEX



reliable Operation tough application

Rota

Rota Limited is based in Manchester UK and was established in 1964. Linear Transducer production started in 1993. The company also specialises in the design and manufacture of patented ultra robust electrical and fibre optic connectors for use in explosive atmospheres. These are specified by all the major oil and oilfield service companies worldwide.

In-Cylinder Hall Effect Linear Transducers

Rota introduced Hall Effect Linear Transducers into the hydraulic cylinder market in 2004. Incorporating well protected solid state electronics in a high pressure tube, when installed in the piston rod the only moving part is the non-contact magnet moved by the piston.

An Intrinsically Safe version for explosive atmospheres followed shortly afterwards.

The LK design is Rota's latest Intrinsically Safe linear transducer.

In many oilfield applications Rota Transducers have proved to be particularly reliable be it subsea or hazardous atmospheres. This is why they are being used by the largest oil and oilfield equipment companies. Other OEMs include the largest companies in hydraulics, construction equipment, farm machinery, forestry equipment, military and mining equipment etc. Many of the applications have seen diverse combinations of shock, vibration, temperature, pressure spikes, EMC, etc.

Quality

Designing and building Transducers and Connectors for use in explosive atmospheres requires an obsession with quality. Rota's quality systems were originally approved to British Standard 5750 back in 1986, and are now assessed by Baseefa to ISO 9001-2008. The QA system is also Audited by Baseefa and CSA for Ex certified transducers and connectors.

Sensor Range

	Type	Construction	Material	O/Dia (mm)	Resolution (mm)	Max. Stroke (m)
LA	Transducer	Swaged	Aluminium	10	Medium	2
LB	Transducer	Swaged	304L SS	10	Medium	3
LF	Transducer	Welded	316L SS	12	High	2
LJ	Transducer	Welded	316L SS	12	High	5
LK	Transducer Ex ia	Welded	316L SS	12	High	5
LM	Transducer	Welded	316L SS	10	Medium	3
LP	Position Indicator	Welded	316L SS	16	Switches	6
LPM	Position Indicator	Welded	316L SS	10	Switches	3
LT	Transducer	Welded	316L SS	16/20	Low	15

Others

LFPS Welded 316L SS Combined High Resolution Linear and Pressure Transducer

LU Welded 316L SS High Resolution Transducer, Heavy Duty with Spherical Eye mountings

LUKY Welded 316L SS High Resolution **Ex ia** I.S. Transducer, Heavy Duty with Spherical Eye mountings

LZ Welded 316L SS Ex e mb Combined High Resolution Transducer and High Voltage Switching Device

RT Radial Transducer with Low Resolution 90 degree position monitoring

RJ Radial Transducer with High Resolution 300 degree position monitoring

LK Transducer

The LK solid state **Ex ia** Intrinsically Safe linear transducers are designed for high pressure hydraulic cylinders and valve actuators and may also be mounted externally. With no sensor head or external conditioning required, they fit easily into most cylinders without compromising their stroke to body length ratio.

Even at 5 metre stroke, the high accuracy and update speed are not diminished. The robust 316 stainless steel housing makes them ideal for offshore applications.

Housed in a 12mm diameter tube, the LK design allows the sensor head to be installed in Zone 0 / Category 1 Hazardous Areas, unlike some magnetostrictive designs.

LK Special Transducers

Please treat this brochure as a starting point, it may not provide exactly what you require. We do many special designs so please ask. For Externally mounted, Intrinsically Safe Transducers, consider the LUKY Range.

LK.02.02

Subject to reasonable modifications due to technical advances



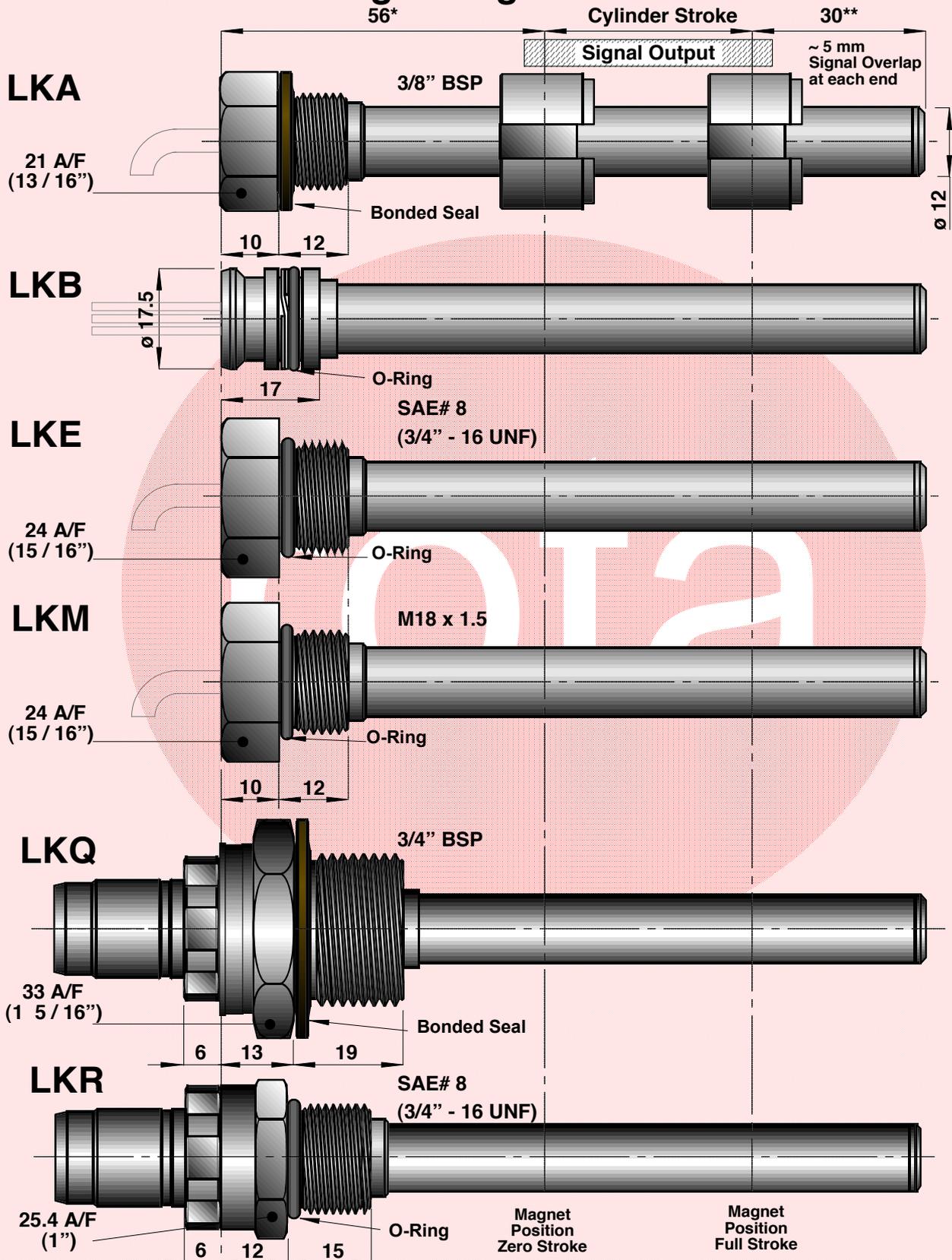
**Rota
Limited**

Wellington Street,
Bury, Manchester,
U.K. BL8 2BD

Tel: +44(0)161 764 0424
Fax: +44(0)161 762 9729
email: info@rota-ltd.com
Web: www.rota-ltd.com



Mounting Configurations



* For alternative lengths please contact Rota., ** For strokes < 200 mm the dead length of 30 mm may increase. Please contact Rota.

LK.03.03



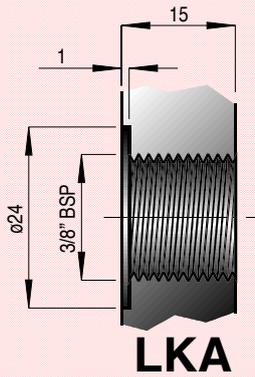
Rota Limited

Wellington Street,
 Bury, Manchester,
 U.K. BL8 2BD

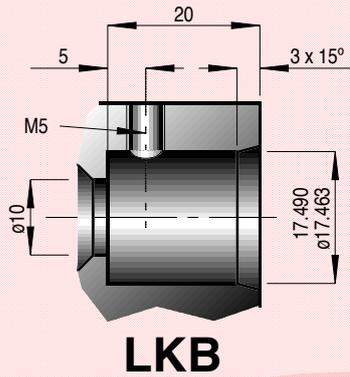
Tel: +44(0)161 764 0424
 Fax: +44(0)161 762 9729
 email: info@rota-ltd.com
 Web: www.rota-ltd.com



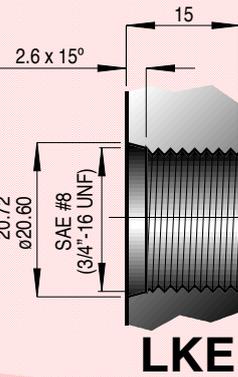
Machining Details



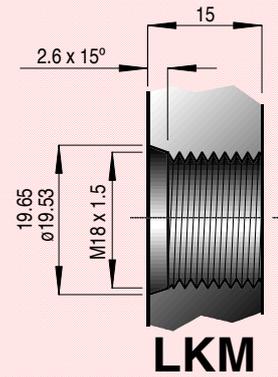
LKA



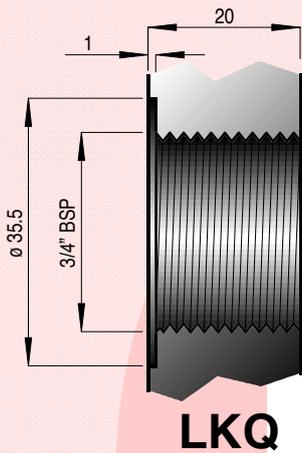
LKB



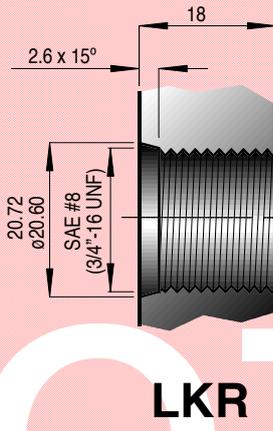
LKE



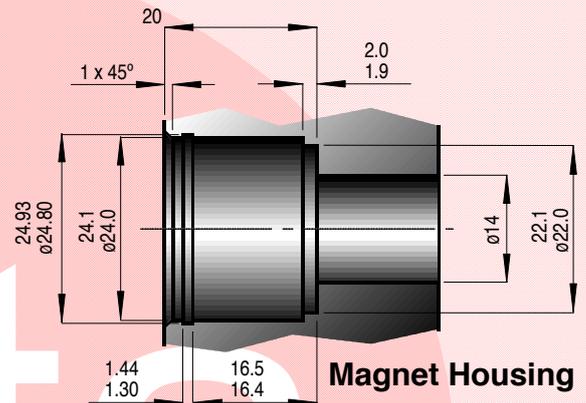
LKM



LKQ

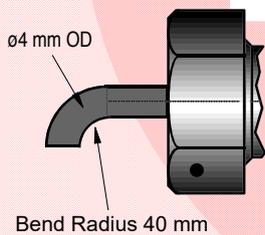


LKR

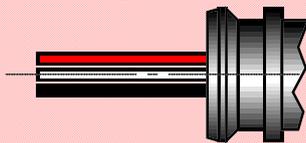


Magnet Housing

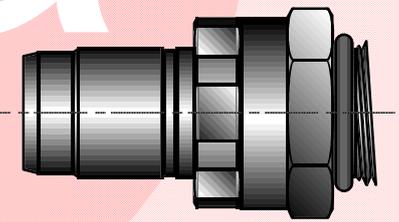
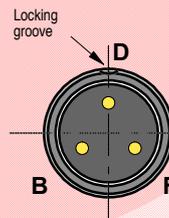
Electrical Terminations



E
Cables



W
Individual Wires



B (Patented Product)
Rota B Series Connector
(Fitted with Protection Cap)

To comply with EMC regulations flying lead is screened. Screening is connected internally to the transducer to form an overall shield. Transducer body must be earthed either directly or through cable screening.

To comply with EMC regulations. Transducer & wires must be housed in a conductive metal enclosure. Any external cables must be screened. Screening must be attached to metal enclosure and earthed.

To comply with EMC regulations Associated Cables must be Screened. For Unarmoured Cables, the Screening must be bonded to the Connector housing to form an overall shield. For Armoured Cables the Armour is bonded to the Connector housing to form an overall shield.

For installation in a Hazardous Area refer to relevant Customer Instruction Sheet for full details.

LK.04.04

LK Standard Performance Data

Update Frequency	(3 wire) 1000 Hz, (2 wire) 500 Hz - any length					
Update Period (3 wire)	1 ms, any length (gives 0.5 mm resolution @ 0.5 m/s magnet speed)					
(2 wire)	2 ms, any length (gives 0.5 mm resolution @ 0.25 m/s magnet speed)					
Resolution incl. ripple	0.1 mm (0.004"), any length Consult Rota for higher accuracy					
Repeatability	0.1 mm (0.004"), any length Consult Rota for higher accuracy					
Hysteresis	0.1 mm (0.004"), any length Consult Rota for higher accuracy					
Non-linearity	< 0.2 mm (0.008"), any length Consult Rota for higher accuracy					
Stroke	Up to 5.0m (197") Contact Rota for longer strokes					
Operating Temperature	- 40 °C to + 80 °C (- 40 °F to + 176 °F) (Special + 120 °C/T3 on Request)					
Storage Temperature	- 55 °C to + 105 °C (- 67 °F to + 221 °F)					
Surge Protection	Tranzorb Protection Diode (BS EN 61000 - 4 - 5 Compliant)					
Short Circuit Protection	All types protected to maximum input voltage					
Electrical Protection	All types fully protected against incorrect connection (all wires) to maximum input voltage					
Insulation Resistance	> 1000Mohm @ 4000VDC					
Analogue Outputs	0.25 - 4.75 V	0.50 - 4.50 V	0.50 - 5.00 V	0.50 - 10.00 V	3 wire 4-20mA	2 wire 4-20mA
Order Code	F	G	V	H	A*	T
Input Voltage	10 - 30 V	10 - 30 V	10 - 30 V	14 - 30 V	14 - 30 V	11.5 - 28 V
Temperature Coefficient	< 40ppm/°C (< 0.002%/°F)		< 90ppm/°C (< 0.005%/°F)		< 70ppm/°C (< 0.004%/°F)	
Current Consumption	12 mA		14 mA		13 mA + Signal	Signal
Digital Outputs	P.W.M.					
Order Code	P (1, 2, etc.)			W (1, 2, etc.)		
PWM Frequency	1 = 500 Hz			2 = 1220 Hz etc.		
Input Voltage	9 - 30V			5 - 10V		
Temperature Coefficient	± 15ppm/°C (± 0.0008%/°F) + 0.002mm/°C					
Current Consumption	12 mA					
Intrinsic Safety Device	See Customer Instruction Sheet					
Terminal Order Code	3 wire B (2 wire)		3 wire E (2 wire)		3 wire W (2 wire)	
WIRING	Input	B (B)	Red (White)	Red (White)	Red (White)	Red (White)
	Common	D	Black	Black	Black	Black
DETAILS	Signal	F (D)	White (Black)	White (Black)	White (Black)	White (Black)

* Output signal type "A" designed for a 24V input, 500ohm load. For other input voltages and load resistances please inform Rota.

Environmental Performance

Sensor and Magnet

Pressure Rating	Maximum Operation	=	500 bar (7350 psi)
	Minimum Collapse	=	720 bar (10500 psi)

Sensor

Ingress Protection	LKA	LKB	LKE	LKM	LKQ	LKR
	IP67	IP67	IP67	IP67	IP68	IP68

Enclosure Fusion welded, one piece 316L Stainless Steel Enclosure
Pressure tested to 340 bar (5000 psi)

Magnet Installation (for Magnet type M or N)

Piston Rod Material	Standard Hydraulic Cylinder Steel (Specify in order code to indicate magnetic [M] or non-magnetic [N] housing material)	
Magnet Speed	Up to 1 m/s based on piston rod hole size of 13.5mm	Contact Rota for higher speeds (Subject to oil viscosity and temperature)
Magnet Orientation	Any angle or rotation	

LK.05.06



Rota Limited

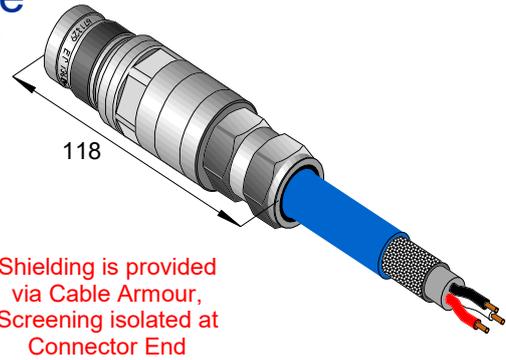
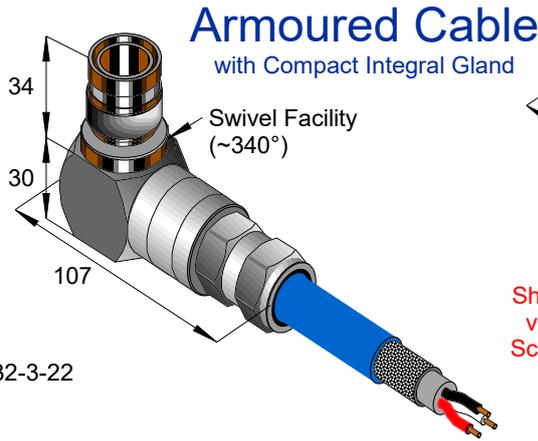
Wellington Street,
Bury, Manchester,
U.K. BL8 2BD

Tel: +44(0)161 764 0424
Fax: +44(0)161 762 9729
email: info@rota-ltd.com
Web: www.rota-ltd.com



Associated Cable Assemblies for LK-Y...**B** Transducers

When replacing Cable Assemblies marked * note colour change: Use Red for Power and fully insulate White Wire



Shielding is provided via Cable Armour, Screening isolated at Connector End

Cable Specification

Mud Resistant to NEK 606
Flame Retardant to IEC 60332-3-22
Halogen Free
GSWB Armour
0.75 mm² Conductors

Fire Resistant Cable

Fire Resistant to IEC 60331-21
Ø12.5 nom., Rota Ref. **GHM Y1T**

Flame Retardant Cable

CSA Cold Bend+Impact, -40°C
Ø12.9 nom., Rota Ref. **GJM Y1P**

90°

QBY 1837 L--

replaces QB 1028, QB 1029, *QB 1475

Wiring

Red **(B)**
Black **(D)**
White **(F)**
White **(B)**
Black **(D)**
N/A **(F)**

3 Wire

Power
Common
Signal

2 Wire

Power
Signal
Insulate on Installation
Power
Signal

Inline

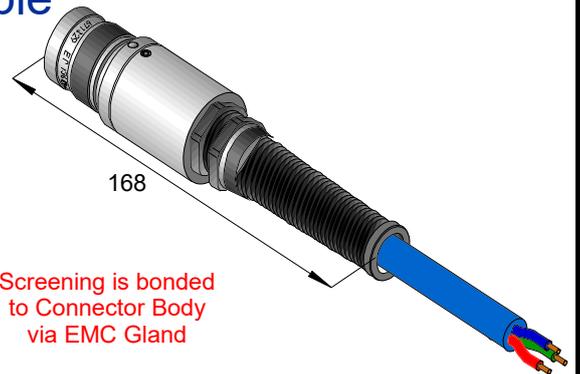
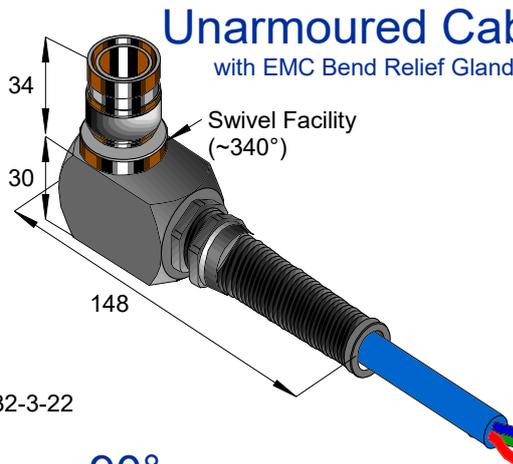
QBY 2299 L--

replaces QB 1026, QB 1027, *QB 1476

QBY 2811 L--

QBY 2820 L--

For Voltage Outputs use Armoured Cable Assembly



Screening is bonded to Connector Body via EMC Gland

Cable Specification

Mud Resistant to NEK 606
Flame Retardant to IEC 60332-3-22
Halogen Free
0.75 mm² Conductors

Fire Resistant Cable

Fire Resistant to IEC 60331-21
Ø8.8 nom., Rota Ref. **UHM Y1T**

Flame Retardant Cable

CSA Cold Bend+Impact, -40°C
Ø7.5 nom., Rota Ref. **UJM Y1P**

90°

QBY 2300 L--

replaces QB 1024, QB 1477

Wiring

Red **(B)**
Blue **(D)**
Green **(F)**
White **(B)**
Black **(D)**
N/A **(F)**

3 Wire

Power
Common
Signal

2 Wire

Power
Signal
Insulate on Installation
Power
Signal

Inline

QBY 1840 L--

replaces QB 1022, QB 1478

QBY 2833 L--

QBY 2842 L--

Example Order Codes

1 metre Inline Armoured Cable, Fire Res. (3 & 2 Wire) **QBY 2299 L01**
12 metre 90° Unarmoured Cable, Flame Ret. (2 Wire) **QBY 2833 L12**

All Cable Assemblies are supplied with Protective Caps and have a maximum length of 100 metres

B
Series
Patented
Connector

IP69K

150bar (2180psi), +85°C (+185°F)
Independent UKAS Test (IAF MLA)

IP68

3m
7days

Open Face rating for B Series Connectors (i.e. even with cap/connector not fitted).
Assembly rating dependent on Gland.

Subject to reasonable modifications due to technical advances.

LK.06.05



Rota Limited

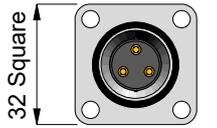
Wellington Street,
Bury, Manchester,
U.K. BL8 2BD

Tel: +44(0)161 764 0424
Fax: +44(0)161 762 9729
email: info@rota-ltd.com
Web: www.rota-ltd.com



Optional Flanged Plug for LK-Y...E or W Transducers

4 Mounting Holes
 Ø 4.5 (24 Centres)



View on
Solder Buckets

Order Code
QBY 1516

Cable Assemblies for use with
 Flanged Plugs must be specially marked

3 Wire		2 Wire	
Red B	Power	White B	Power
Black D	Common	Black D	Signal
White F	Signal	Not F	Connected

B
 Series
 Patented
 Connector

IP69K

150bar (2180psi), +85°C (+185°F)
 Independent UKAS Test (IAF MLA)

IP68

3m
 7days

Open Face rating for **B** Series Connectors
 (i.e. even with cap/connector not fitted)

LK Ordering Codes

LK A Y 0950 M 0.1 A* E 0.6 G 1234

LK Series
 Linear
 Transducer

Mounting Configuration

A = 3/8" BSP
B = Internal Cylinder Mtg
E = SAE #8 (3/4"-16 UNF)
M = M18 x 1.5P
Q = 3/4" BSP Quick Release
 (B Series Connector)
R = SAE #8 Quick Release
 (B Series Connector)

Intrinsically Safe

Stroke (millimetres)

Max. = **5000** (Contact Rota for 5-10m option)

Magnet Housing Material

M = Magnetic
N = Non-Magnetic

Signal Resolution

0.1 millimetres (Contact Rota for higher resolutions)

Unique
 Transducer
 Calibration
 Number

Optional

G = Gland (Nickel Plated Brass)
 (Electrical Termination E only)

Flying Lead Length (metres)

Electrical Termination

B = B Series Connector (LKQ & LKR only)
E*** = Triple Cable (LKA, LKE, LKM only)
W = Individual Wires (LKB only)

*** For Transducers with Voltage Output check
 Installation requirements prior to Order

Output Signal

A = Current 4 - 20mA, 3 Wire (14 - 30 V Input)
T = Current 4-20mA, 2 Wire (11.5 - 28 V Input)
F = Voltage 0.25 - 4.75V (10 - 30 V Input)
G = Voltage 0.5 - 4.5V (10 - 30 V Input)
V = Voltage 0.5 - 5.0V (10 - 30 V Input)
H = Voltage 0.5 - 10.0V (14 - 30 V Input)
P1 = P.W.M. 500Hz **P2** = P.W.M. 1220Hz **

* For reversed signal, e.g. 20 - 4mA, insert **R**

** Contact Rota for other frequencies



The CE Mark verifies that our Transducers
 meet the requirements of EC Directive
 2004/108/EEC (EMC Directive)

EN 61000 - 6 - 1 : 2007
 EN 61000 - 6 - 2 : 2005
 EN 61000 - 6 - 3 : 2007
 EN 61000 - 6 - 4 : 2007

Noise Immunity Tests

Electrostatic Discharge (ESD)	EN 61000 - 4 - 2	Severity Level 2
Electromagnetic Fields (RFI)	EN 61000 - 4 - 3	Severity Level 3
Fast Transient (Burst)	EN 61000 - 4 - 4	Severity Level 3
Surge	EN 61000 - 4 - 5	Severity Level 3
Immunity to:		
Conducted Disturbances	EN 61000 - 4 - 6	Severity Level 3
Magnetic Fields	EN 61000 - 4 - 8	Severity Level 4

LK.07.06



**Rota
 Limited**

Wellington Street,
 Bury, Manchester,
 U.K. BL8 2BD

Tel: +44(0)161 764 0424
 Fax: +44(0)161 762 9729
 email: info@rota-ltd.com
 Web: www.rota-ltd.com

