

KOPEX

Hazardous Applications

Cable Management for Hazardous areas

Gas & Vapours / Dust Environments

www.kopex.co.uk/hazardous

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Hazardous Area Applications - Introduction

Cable Management Products for Hazardous Areas

From its UK based facility Kopex International manufactures a wide range of ATEX and IECEx approved cable management products including metallic and non metallic conduit and fittings along with a full range of conduit accessories, DIN rail terminals and non metallic cable glands.

Kopex is committed to an extensive and on going R&D programme, this along with on going investment, will continue to deliver innovative and high performance products for installation within safety critical areas.

Our current range of high performance products lend themselves to many market sectors including petrochemical, pharmaceutical and offshore environments or indeed any safety critical or harsh environment where correct product choice and performance is essential.

At Kopex we are renowned for quality of manufacture along with the support and service that is so vital within today's high performance marketplace.

The ATEX Directives

ATEX requires employers to eliminate or control risks from dangerous substances and to classify areas where explosive atmospheres may occur into zones, as laid down in regulations. (See below)

ATEX Directives are designed to protect employees, the public and the environment from accidents owing to explosive atmospheres and since July 1st 2006 all existing sites, as well as new sites, must be fully ATEX compliant. Directive ATEX 100 a applies to equipment suppliers and manufacturers and ATEX 137 applies to end users. These directives are complementary, but have different purposes.

ATEX 100 a covers both electrical and non-electrical products intended for use in hazardous areas, including mechanical equipment. The Directive came into existence in 2003 and products sold within the European Union designed for use in hazardous areas must have ATEX certification and bear the ATEX marking on the certificate plate. The obligation is placed upon the manufacturer or supplier of the product and the intention is to facilitate free movement of goods within the EU.

Products are categorised 1, 2 and 3 with category 1 meaning the product employs a very high level of protection; category 2, a high level of protection; category 3, a normal level of protection.

The ATEX 137 Directive is implemented in the UK by DSEAR and sets out to improve the health and safety protection of all workers potentially at risk from explosive atmospheres with duties placed upon the employer. The directive is designed to harmonise the law of EU member states concerning equipment and protective systems intended for use in potentially explosive areas.

Its main requirements are the need to classify areas as Zones 0, 1 and 2 for gases and vapours and Zones 20, 21, 22 for dusts. Equipment for use in these areas must be selected in accordance with ATEX 100 a and marked with an EX sign. In workplaces where safety restrictions apply throughout the site, such as refineries, the sign must be applied at the entrance of the site – individual signs would not be required.

A mixture of air and hazardous gases may ignite by coming into contact with a hot surface. Ignition depends on surface area, temperature and concentration of the gases. Certified equipment, tested by approved agencies, receives a temperature code (T1-T6) indicating the maximum surface temperature where it can be used.

Kopex International, with its extensive ranges of specialist electrical conduit systems, is renowned for its experience with and supply of ATEX approved products for use within hazardous areas. The latest addition to the company's range are HAM, HAMM and HAMS ATEX flameproof glands for use in Zones 1, 2, 21 and 22 classifications. Designed for use in conjunction with Kopex Liquid Tight flexible metallic conduits, Kopex is unique as a supplier in offering a combination of glands and conduits which are third party approved or self certified. Kopex can provide all organisations with advice on the specification of ATEX approved electrical conduit systems for specific hazardous area applications.

The IECEX Certified Equipment Program

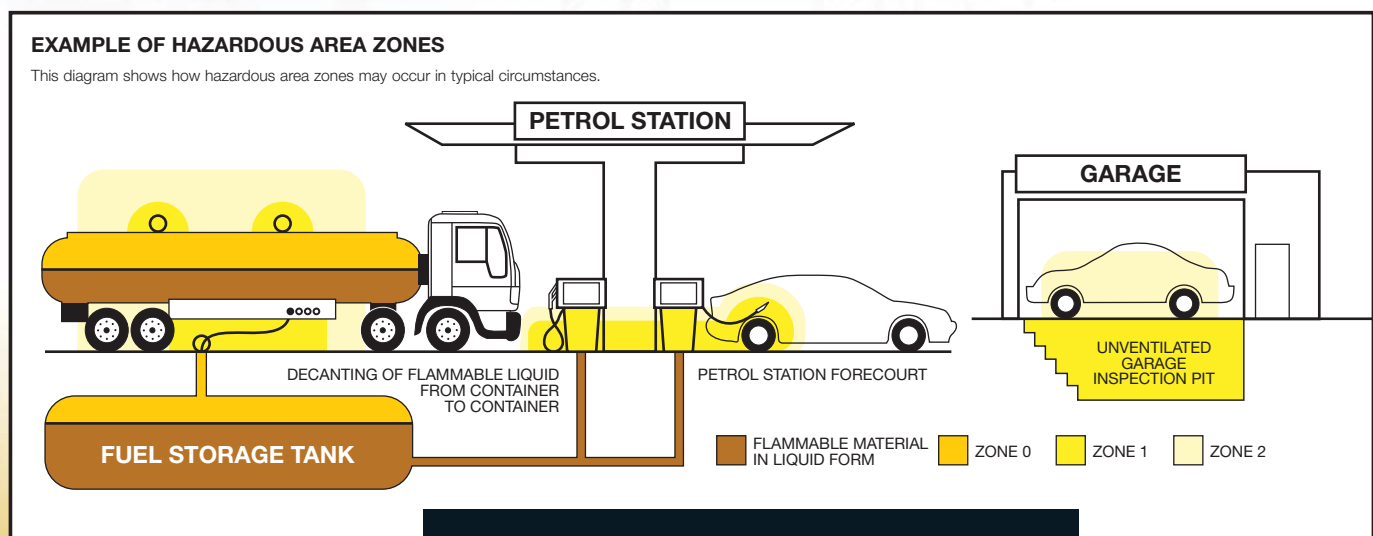
Meeting the requirements of international standards such as those prepared by TC31, the IECEX Certified Equipment Program provides a certificate of conformity that includes testing and assessment of samples, compliance of samples with IEC standards, assessment of manufacturing premises and ongoing surveillance audits.

All the products specified as IECEX compliant have been certified through the program and Kopex remains the only provider of this range of cable management products to carry the scheme certification.

HAZARDOUS AREAS – A GUIDE TO THE USE OF EQUIPMENT AND COMPONENTS IN AREAS HAVING THE POTENTIAL FOR EXPLOSION

Wherever there is a risk of gas/air or dust/air mixtures or other flammable combinations giving rise to a risk of explosion, the law and specific regulations necessitate the elimination of sources of ignition. Areas must be assessed for the level of risk and equipment used in each area certified by an authorised body as suitable for that area.

The information below sets out in simple terms what is required under the various regulations but should be used only as a guide. Expert guidance should always be sought when assessing areas and when choosing materials and equipment for use in those areas.



Ex Environment

Ex Classifications


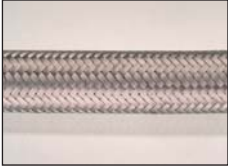




Classification of equipment for use in potentially explosive atmospheres

Classification of hazardous areas		European/IEC or NEC classifications		Subdivision of gases and vapours						Restriction for using apparatus							
Flammable substances	Temporary behaviour of flammable substances in hazardous places	Subdivision of hazardous places	Required marking for installation		Apparatus may be used in	Explosion subgroup	Gases and vapours						Requirements	Marking			
			equipment group	category group													
gases vapours	is present continuously or for long periods or frequently	zone 0	II	1G	IIA	IIA	ammonia	ethyl alcohol	gasoline	acetaldehyde					without restriction	-	
	is likely to occur in normal operation occasionally	zone 1	II	2G or 1G			IIB	IIB	methane	cyclohexane	n-hexane					special condition may be noted	X
	is not likely to occur in normal operation but, if it does occur, will persist for a short period only	zone 2	II	3G or 2G or 1G					IIC	IIC	ethane	propane	ethylene glycol	hydrogen sulphide	ethyl-ether		
dusts	is present continuously or for long periods or frequently	zone 20	II	1D	Temperature classes subdivision of gases and vapours according to the ignition temperature T1 > 450 °C T2 > 300 to ≤ 450 °C T3 > 200 to ≤ 300 °C T4 > 135 to ≤ 200 °C T5 > 100 to ≤ 135 °C T6 > 85 to ≤ 100 °C												
	is likely to occur in normal operation occasionally	zone 21	II	2D or 1D	apparatus may be used in _____ T1 _____ T2 _____ T3 _____ T4 _____ T5 _____ T6												
	it is not likely to occur in normal operation but, if it does occur, will persist for a short period only	zone 22	II	3D or 2D or 1D													
methane dusts	-	mines	I	M1													
	-	mines	I	M2 or M1													



Notified Bodies	Country	Code	Application	Principle of protection	Type of protection	Symbol	Marking	May be used in zone	CENELEC	IEC
LCIE	France	0081	all applications	-	general requirements		-	-	EN 50014	IEC 60079-0
INERIS	France	0080	control stations, motors, fuses, switchgear, power electronics	an propagation of an explosion inside to the outside is excluded	flameproof enclosure		EEx d	1 or 2	EN 50018	IEC 60079-1
BAM	Germany	0589	installation materials, motors, luminaries	avoidance of arcs, sparks and excessive temperature	increased safety		EEx e	1 or 2	EN 50019	IEC 60079-7
DMT	Germany	0158	measurement and control, automation technology, sensors, actuators	limitation of energy as well as arcs and temperature	intrinsic safety		EEx i	0, 1 or 2***	EN 50020* EN 50039**	IEC 60079-11
IBExU	Germany	0637	switch- and control cupboards, analyse-apparatus, computers	ex-atmosphere keep at a distance from the ignition source	pressurisation		EEx p	1 or 2	EN 50016**	IEC 60079-2
PTB	Germany	0102	coils of motors or relays, solenoid valves	ex-atmosphere keep at a distance from the ignition	encapsulation		EEx m	1 or 2	EN 50028	IEC 60079-18
TÜV (Nord Cert)	Germany	0044	transformers, relays, control stations, magnetic contactors	ex-atmosphere keep at a distance from the ignition source	oil immersion		EEx o	1 or 2	EN 50015	IEC 60079-6
SEE	Luxembourg	0499	capacitors, transformers	an propagation of an ignition inside to the outside is excluded	powder filling		EEx q	1 or 2	EN 50017	IEC 60079-5
KEMA	Netherlands	0344	see at the top - only for zone 2	see at the top - only for zone 2	'non sparking'		EEx n	2	EN 50021	IEC 60079-15
SP	Sweden	0402								
LOM	Spain	0163								
EECS (BASEEFA)	UK	0600								
SCS	UK	0518								

		Temp. Rating	Special Characteristics	Approvals	Material
Anti-Static Polyamide 12		Static -20°C to +80°C	Specialist Anti-Static Grade Surface Resistivity 10 ⁹ Ω RTI 110°C to EN60079-0	Baseefa08 ATEX0003X IECEX BAS08.0001X	Anti Static Nylon 12
		Static -20°C to +80°C	EMC Screening level: 60dB at 1MHz RTI 110°C to EN60079-0	Baseefa08 ATEX0003X IECEX BAS08.0001X	Anti Static Nylon 12 with Stainless Steel Overbraid

		Temp. Rating	Suitable Conduit	Approvals	IP Rating
Straight male (Nickel Plated Brass)		Static -20°C to +80°C	Unbraided Nylon Conduit EXB	Baseefa08 ATEX0003X IECEX BAS08.0001X	IP66
		Static -20°C to +80°C	Overbraided EXBB	Baseefa08 ATEX0003X IECEX BAS08.0001X	IP66

Non-Metallic Nylon Conduit System



BRITISH CONDUIT SIZE (mm)	16	20	25	32	40	50
PITCH (T=fine, G=coarse)	T	T	T	T	G	G
COIL LENGTHS (m)	10/30/50	10/30/50	10/30/50	10/30/50	10/30/50	10/30/50
MINIMUM BORE (mm)	11.15	16.45	21.5	27.5	35.2	46.2
OUTSIDE DIAMETER (mm)	16.5	21.20	28.35	34.5	42.4	54.3

Colour						
BLACK	EXB03*	EXB04*	EXB05*	EXB06*	EXB07*	EXB08*

COIL LENGTHS (m)	10/30	10/30	10/30	10/20	10/20	10/20
INSIDE DIAMETER (mm)	11.15	16.45	21.5	27.5	35.2	46.2

SELF	EXBB03*	EXBB04*	EXBB05*	EXBB06*	EXBB07*	EXBB08*
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* add coil length to complete part number e.g 10 metres = EXB0510

METRIC THREAD SIZE (mm)	16	20	25	32	40	50
NPT THREAD SIZE (in)	1/2"	1/2"	3/4"	1"	1 1/4"	1 1/2"

METRIC	EXPQM0303	EXPQM0404	EXPQM0505	EXPQM0606	EXPQM0707	EXPQM00808
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NPT	EXPQA0304	EXPQA0404	EXPQA0505	EXPQA0606	EXPQA0707	EXPQA00808
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METRIC FIXED	EXBQM0303	EXBQM0404	EXBQM0505	EXBQM0606	EXBQM0707	EXBQM00808
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NPT FIXED	EXBQA0304	EXBQA0404	EXBQA0505	EXBQA0606	EXBQA0707	EXBQA00808
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LOCKNUTS & SEALS PAGE 16 & 17

CONDUIT SELECTION

See pages 10 - 12 for suitable connectors

		General	Flame Propagation	Special	Approvals
		Temp. Rating		Characteristics	
General Oil Resistant		Static	Flame dies in less than 30	Flame retardant PVC covering	IEC 61386
		-25°C to +105°C	seconds after ignition source		
		Flexing	is removed		
		-5°C to +105°C			
Low Fire Hazard		Static	Flame dies in less than 30	Limited Fire Hazard, zero halogen (BS6425 Pt 1)	LUL Fully Compliant (E1042A6), MOD to NES 518:Issue 3 DEF STAN 61-12 (Part 31) Issue 1, IEC 61386
		-25°C to +90°C	seconds after ignition source		
		Flexing	is removed		
		-5°C to +90°C			
High Temperature		Static	Flame dies in less than 30	Flame resistance: UL94 V ₂	EC 61386
		-50°C to +130°C	seconds after ignition source		
		Flexing	is removed	Chemical and oil resistant	
		-5°C to +130°C			

Liquid Tight Flexible Metallic Conduit System



BRITISH CONDUIT SIZE (mm)	10	12	16	20	25	32	40	50	63
US TRADE SIZE (INCHES)	1/4	5/16	3/8	1/2	3/4	1	1 1/4	1 1/2	2
INSIDE DIAMETER (mm)	7.1	10.0	12.5	16.0	21.0	26.4	35.3	40.4	51.6
COIL LENGTHS (m)	10/30	10/30	10/30	10/30	10/30	10/20	10/20	10/20	10/20

Colour

BLACK EXLB01* EXLB02* EXLB03* EXLB04* EXLB05* EXLB06* EXLB07* EXLB08* EXLB09*

BLACK - - EXLT03* EXLT04* EXLT05* EXLT06* EXLT07* EXLT08* EXLT09*





BLACK - - EXLH03* EXLH04* EXLH05* EXLH06* EXLH07* EXLH08* EXLH09*

BLUE - - EXLLH03* EXLLH04* EXLLH05* EXLLH06* EXLLH07* EXLLH08* EXLLH09*

*add coil length to complete part number e.g. 10 metres of LT-PVC 10mm in black is FLB0110

CONNECTOR SELECTION

See pages 8 - 9 for suitable conduits

	Connector Description	Suitable Conduits & IP Rating	Approvals	BRITISH CONDUIT SIZE (mm) US TRADE SIZE (INCHES)
Fixed Straight	Straight male, brass/nickel plated 	EXLB	IP66 & 67 IEC 61386 UL UL file number E60625 CSA - Material Dependant	Pack Quantity
		EXLT		Thread Size - Metric (mm)
		EXLH		Ordering Code
		EXLLH		Thread Size - PG Ordering Code
KF-F 45°	45° male elbow, brass/nickel plated 	EXLB	IP66 & 67 IEC 61386 UL CSA - Size & Material Dependant	Pack Quantity
		EXLT		Thread Size - Metric (mm)
		EXLH		Ordering Code
		EXLLH		Thread Size - PG Ordering Code
KF-F 90°	90° male elbow, brass/nickel plated 	EXLB	IP66 & 67 IEC 61386 UL CSA - Size & Material Dependant	Pack Quantity
		EXLT		Thread Size - Metric (mm)
		EXLH		Ordering Code
		EXLLH		Thread Size - PG Ordering Code
KF-C Straight	Straight male, black PVC sleeve, brass/nickel plated body 	EXLB	IP66 & 67 IEC 61386 CSA - Size & Material Dependant	Pack Quantity
		EXLT		Thread Size - Metric (mm)
		EXLH		Ordering Code
		EXLLH		Thread Size - PG Ordering Code
				Thread Size - NPT (in.) Ordering Code

Liquid Tight Flexible Metallic Conduit System



10 1/4	12 5/16	16 3/8	16 3/8	20 1/2	25 3/4	32 1	40 1 1/4	50 1 1/2	63 2
25	25	25	25	25	10	5	5	2	1
16	16	16	20	20	25	32	40	50	63
EXQM0103	EXQM0203	EXQM0303	EXQM0304	EXQM0404	EXQM0505	EXQM0606	EXQM0707	EXQM0808	EXQM0909
7	9	11	13.5	16	21	29	36	42	48
EXQP0101	EXQP0202	EXQP0303	EXQP0304	EXQP0405	EXQP0506	EXQP0607	EXQP0708	EXQP0809	EXQP0910
-	-	-	1/2	1/2	3/4	1	1 1/4	1 1/2	2
-	-	-	EXQA0304	EXQA0404	EXQA0505	EXQA0606	EXQA0707	EXQA0808	EXQA0909
-	-	10	10	10	10	5	5	2	1
-	-	16	20	20	25	32	40	50	63
-	-	EXRM0303	EXRM0304	EXRM0404	EXRM0505	EXRM0606	EXRM0707	EXRM0808	EXRM0909
-	-	11	13.5	16	21	29	36	42	48
-	-	EXRP0303	EXRP0304	EXRP0405	EXRP0506	EXRP0607	EXRP0708	EXRP0809	EXRP0910
-	-	-	1/2	1/2	3/4	1	1 1/4	1 1/2	2
-	-	-	EXRA0304	EXRA0404	EXRA0505	EXRA0606	EXRA0707	EXRA0808	EXRA0909
-	-	10	10	10	10	5	5	2	1
-	-	16	20	20	25	32	40	50	63
-	-	EXSM0303	EXSM0304	EXSM0404	EXSM0505	EXSM0606	EXSM0707	EXSM0808	EXSM0909
-	-	11	13.5	16	21	29	36	42	48
-	-	EXSP0303	EXSP0304	EXSP0405	EXSP0506	EXSP0607	EXSP0708	EXSP0809	EXSP0910
-	-	-	1/2	1/2	3/4	1	1 1/4	1 1/2	2
-	-	-	EXSA0304	EXSA0404	EXSA0505	EXSA0606	EXSA0707	EXSA0808	EXSA0909
-	-	25	25	25	10	5	5	2	1
-	-	16	-	20	25	32	40	50	63
-	-	EXMM0303	-	EXMM0404	EXMM0505	EXMM0606	EXMM0707	EXMM0808	EXMM0909
-	-	11	13.5	16	21	29	36	42	48
-	-	EXMP0303	EXMP0304	EXMP0405	EXMP0506	EXMP0607	EXMP0708	EXMP0809	EXMP0910
-	-	-	1/2	1/2	3/4	1	1 1/4	1 1/2	2
-	-	-	EXMA0304	EXMA0404	EXMA0505	EXMA0606	EXMA0707	EXMA0808	EXMA0909

ATEX FLAMEPROOF GLAND SELECTION See pages 8 - 9 for suitable conduits

Constructed from either brass or stainless steel, with a nylon seal and epoxy resin, the ATEX FLAMEPROOF GLAND is high quality, high specification, ideal for Ex II 2 GD gas and dust, EExd IIC and EExe II applications.



Material	Brass (BS2874)
Connector Type	Straight, male
Temperature Range	-60°C to +80°C (depending on conduit type)
Approvals	Full BASEEFA certification to the requirements of EN60079-0:2004; EN60079-1:2004; EN60079-7:2003 + Amendment 1; IEC61241-0:2004; IEC61241-1:2004. BASEEFA certificated to Ex II 2 GD, EExd IIC & EExe II. BASEEFA Certificate number 06ATEX0256X for use in Zones 1 & 2 Gas and Dust. Certificate number IECEx Bas060059X

BRITISH CONDUIT SIZE (mm)	16	20	25	32	40	50	63		
US Trade Size (in.)	3/8	1/2	3/4	1	1 1/4	1 1/2	2		
Suitable Conduits & IP Rating									
EXLB EXLT EXLH EXLLH	} IP66	Thread Size - Metric (mm)	20	20	25	32	40	50	63
		Ordering Code	HAM0304	HAM0404	HAM0505	HAM0606	HAM0707	HAM0808	HAM0909
		Nickel Plated	HAMM0304	HAMM0404	HAMM0505	HAMM0606	HAMM0707	HAMM0808	HAMM0909
		Thread Size - NPT (in)	1/2	1/2	3/4	1	1 1/4	1 1/2	2
Ordering Code	HAA0304	HAA0404	HAA0505	HAA0606	HAA0707	HAA0808	HAA0909		
Nickel Plated	HAAM0304	HAAM0404	HAAM0505	HAAM0606	HAAM0707	HAAM0808	HAAM0909		

Material	316 Stainless Steel
Connector Type	Straight, male
Temperature Range	-60°C to +80°C (depending on conduit type)
Approvals	Full BASEEFA certification to the requirements of EN60079-0:2004; EN60079-1:2004; EN60079-7:2003 + Amendment 1; IEC61241-0:2004; IEC61241-1:2004. BASEEFA certificated to Ex II 2 GD, EExd IIC & EExe II. BASEEFA Certificate number 06ATEX0256X for use in Zones 1 & 2 Gas and Dust. Certificate number IECEx Bas060059X

BRITISH CONDUIT SIZE (mm)	16	20	25	32	40	50	63		
US Trade Size (in.)	3/8	1/2	3/4	1	1 1/4	1 1/2	2		
Suitable Conduits & IP Rating									
EXLB EXLT EXLH EXLLH	} IP66	Thread Size - Metric (mm)	-	20	25	32	40	50	63
		Ordering Code	-	HAMS0404	HAMS0505	HAMS0606	HAMS0707	HAMS0808	HAMS0909
		Thread Size - NPT (in)	-	1/2	3/4	1	1 1/4	1 1/2	2
		Ordering Code	-	HAAS0404	HAAS0505	HAAS0606	HAAS0707	HAAS0808	HAAS0909

Additional epoxy resin packs available.

35g	55g	90g	135g
EX35PUTTY	EX55PUTTY	EX90PUTTY	EX135PUTTY

Exd "Flameproof" & Exe Increased Safety Enlargers, Reducers. And Thread convertors

Kopex's range of Adaptors and Reducers provide a method of matching threadforms on hazardous area approved equipment whilst ensuring the integrity and Ex approval of the installation is maintained.

Manufactured in the UK to highest standards all are independently tested so that they are both ATEX and IECEx approved.

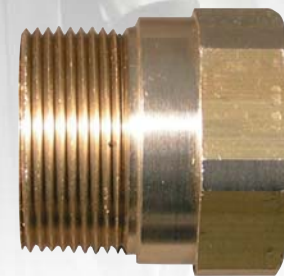
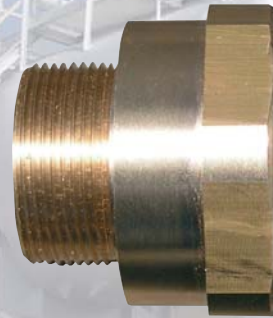
Enlargers (/E) are used where the thread size of the Female side of the device is larger than the male side,

Reducers (/R) are used where the thread size of the female side of device is smaller than the male side

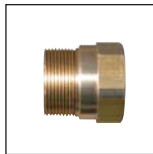
Thread Converters (/TC) are used where a conversion is required between thread types e.g Metric to PG

Kopex's Enlargers, Reducers and thread converters are designed for hazardous area applications and are certified to protection concepts Exd "Flameproof" and Exe "Increased Safety" for use in Zone 1 and Zone 2 applications.

Approved to the latest international standards adaptors and reducers can be supplied with ATEX, and IECEx Certification. For downloads of all IECEx certification visit www.iecex.com



**Enlargers,
Reducers &
Convertors**



**Connector
Description**

EX - Brass
EXN - Nickel Plated Brass
EXS - Stainless Steel 316

**IP
Rating**

IP66

Approvals

ATEX Certification. BASEEFA07 ATEX 0247X
IECEX Certification. IECEX BAS07.0090X

**MALE EXTERNAL
THREAD**

METRIC FEMALE INTERNAL THREAD

	M16	M20	M25	M32	M40	M50	M63	M75
M16		EX/M16-M20/E	EX/M16-M25/E					
M20	EX/M20-M16/R		EX/M20-M25/E	EX/M20-M32/E				
M25	EX/M25-M16/R	EX/M25-M20/R		EX/M25-M32/E	EX/M25-M40/E			
M32	EX/M32-M16/R	EX/M32-M20/R	EX/M32-M25/R		EX/M32-M40/E	EX/M32-M50/E		
M40	EX/M40-M16/R	EX/M40-M20/R	EX/M40-M25/R	EX/M40-M32/R		EX/M40-M50/E		
M50	EX/M50-M16/R	EX/M50-M20/R	EX/M50-M25/R	EX/M50-M32/R	EX/M50-M40/R		EX/M50-M63/E	EX/M50-M75/E
M63	EX/M63-M16/R	EX/M63-M20/R	EX/M63-M25/R	EX/M63-M32/R	EX/M63-M40/R	EX/M63-M50/R		EX/M63-M75/E
M75	EX/M75-M16/R	EX/M75-M20/R	EX/M75-M25/R	EX/M75-M32/R	EX/M75-M40/R	EX/M75-M50/R	EX/M75-M63/R	
PG9	EX/PG9-M16/TC	EX/PG9-M20/TC						
PG11	EX/PG11-M16/TC	EX/PG11-M20/TC						
PG13	EX/PG13-M16/TC	EX/PG13-M20/TC						
PG16	EX/PG16-M16/TC	EX/PG16-M20/TC	EX/PG16-M25/TC					
PG21	EX/PG21-M16/TC	EX/PG21-M20/TC	EX/PG21-M25/TC	EX/PG21-M32/TC				
PG29	EX/PG29-M16/TC	EX/PG29-M20/TC	EX/PG29-M25/TC	EX/PG29-M32/TC	EX/PG29-M40/TC			
PG36	EX/PG36-M16/TC	EX/PG36-M20/TC	EX/PG36-M25/TC	EX/PG36-M32/TC	EX/PG36-M40/TC	EX/PG36-M50/TC		
PG42	EX/PG42-M16/TC	EX/PG42-M20/TC	EX/PG42-M25/TC	EX/PG42-M32/TC	EX/PG42-M40/TC	EX/PG42-M50/TC	EX/PG42-M63/TC	
PG48	EX/PG48-M16/TC	EX/PG48-M20/TC	EX/PG48-M25/TC	EX/PG48-M32/TC	EX/PG48-M40/TC	EX/PG48-M50/TC	EX/PG48-M63/TC	
NPT 3/8	EX/038-M16/TC							
NPT 1/2	EX/050-M16/TC	EX/050-M20/TC	EX/050-M25/TC					
NPT 3/4	EX/075-M16/TC	EX/075-M20/TC	EX/075-M25/TC	EX/075-M32/TC				
NPT 1	EX/100-M16/TC	EX/100-M20/TC	EX/100-M25/TC	EX/100-M32/TC	EX/100-M40/TC			
NPT 1 1/4	EX/125-M16/TC	EX/125-M20/TC	EX/125-M25/TC	EX/125-M32/TC	EX/125-M40/TC	EX/125-M50/TC		
NPT 1 1/2	EX/150-M16/TC	EX/150-M20/TC	EX/150-M25/TC	EX/150-M32/TC	EX/150-M40/TC	EX/150-M50/TC	EX/150-M63/TC	
NPT 2	EX/200-M16/TC	EX/200-M20/TC	EX/200-M25/TC	EX/200-M32/TC	EX/200-M40/TC	EX/200-M50/TC	EX/200-M63/TC	










FOR ASSEMBLY INSTRUCTION SEE PAGE 22

Thread Converters



MALE EXTERNAL THREAD	NPT FEMALE INTERNAL THREAD								
	PG9	PG11	PG13	PG16	PG21	PG29	PG36	PG42	PG48
M16	EXM16-PG9/TC	EXM16-PG11/TC	EXM16-PG13/TC						
M20	EXM20-PG9/TC	EXM20-PG11/TC	EXM20-PG13/TC	EXM20-PG16/TC					
M25	EXM25-PG9/TC	EXM25-PG11/TC	EXM25-PG13/TC	EXM25-PG16/TC	EXM25-PG21/TC				
M32	EXM32-PG9/TC	EXM32-PG11/TC	EXM32-PG13/TC	EXM32-PG16/TC	EXM32-PG21/TC	EXM32-PG29/TC			
M40	EXM40-PG9/TC	EXM40-PG11/TC	EXM40-PG13/TC	EXM40-PG16/TC	EXM40-PG21/TC	EXM40-PG29/TC	EXM40-PG36/TC		
M50	EXM50-PG9/TC	EXM50-PG11/TC	EXM50-PG13/TC	EXM50-PG16/TC	EXM50-PG21/TC	EXM50-PG29/TC	EXM50-PG36/TC	EXM50-PG42/TC	
M63	EXM63-PG9/TC	EXM63-PG11/TC	EXM63-PG13/TC	EXM63-PG16/TC	EXM63-PG21/TC	EXM63-PG29/TC	EXM63-PG36/TC	EXM63-PG42/TC	EXM63-PG48/TC
M75	EXM75-PG9/TC	EXM75-PG11/TC	EXM75-PG13/TC	EXM75-PG16/TC	EXM75-PG21/TC	EXM75-PG29/TC	EXM75-PG36/TC	EXM75-PG42/TC	EXM75-PG48/TC
PG9									
PG11	EXPG11-PG9/TC								
PG13	EXPG13-PG9/TC	EXPG13-PG11/TC							
PG16	EXPG16-PG9/TC	EXPG16-PG11/TC	EXPG16-PG13R		EXP16-PG21/E				
PG21	EXPG21-PG9/TC	EXPG21-PG11/TC	EXPG21-PG13R	EXPG21-PG16R		EXPG21-PG29/E			
PG29	EXPG29-PG9/TC	EXPG29-PG11/TC	EXPG29-PG13R	EXPG29-PG16R	EXPG29-PG21/R		EXPG29-PG36/E		
PG36	EXPG36-PG9/TC	EXPG36-PG11/TC	EXPG36-PG13R	EXPG36-PG16R	EXPG36-PG21/R	EXPG36-PG29/R		EXPG36-PG48/E	
PG42	EXPG42-PG9/TC	EXPG42-PG11/TC	EXPG42-PG13R	EXPG42-PG16R	EXPG42-PG21/R	EXPG42-PG29/R	EXPG42-PG36/R		EXPG42-PG48/E
PG48	EXPG48-PG9/TC	EXPG48-PG11/TC	EXPG48-PG13R	EXPG48-PG16R	EXPG48-PG21/R	EXPG48-PG29/R	EXPG48-PG36/R	EXPG48-PG42/R	
NPT 3/8									
NPT 1/2	EX050-PG9/TC	EX050-PG11/TC	EX050-PG13/TC	EX050-PG16/TC					
NPT 3/4	EX075-PG9/TC	EX075-PG11/TC	EX075-PG13/TC	EX075-PG16/TC	EX075-PG21/TC				
NPT 1	EX100-PG9/TC	EX100-PG11/TC	EX100-PG13/TC	EX100-PG16/TC	EX100-PG21/TC	EX100-PG29/TC			
NPT 1 1/4	EX125-PG9/TC	EX125-PG11/TC	EX125-PG13/TC	EX125-PG16/TC	EX125-PG21/TC	EX125-PG29/TC	EX125-PG36/TC		
NPT 1 1/2	EX150-PG9/TC	EX150-PG11/TC	EX150-PG13/TC	EX150-PG16/TC	EX150-PG21/TC	EX150-PG29/TC	EX150-PG36/TC	EX150-PG42/TC	
NPT 2	EX200-PG9/TC	EX200-PG11/TC	EX200-PG13/TC	EX200-PG16/TC	EX200-PG21/TC	EX200-PG29/TC	EX200-PG36/TC	EX200-PG42/TC	EX200-PG48/TC

MALE EXTERNAL THREAD	NPT FEMALE INTERNAL THREAD						
	NPT 3/8	NPT 1/2	NPT 3/4	NPT 1	NPT 1 1/4	NPT 1 1/2	NPT 2
M16	EXM16-038/TC	EXM16-050/TC					
M20		EXM20-050/TC	EXM20-075/TC				
M25		EXM25-050/TC	EXM25-075/TC	EXM25-100/TC			
M32		EXM32-050/TC	EXM32-075/TC	EXM32-100/TC	EXM32-125/TC		
M40		EXM40-050/TC	EXM40-075/TC	EXM40-100/TC	EXM40-125/TC	EXM40-150/TC	
M50		EXM50-050/TC	EXM50-075/TC	EXM50-100/TC	EXM50-125/TC	EXM50-150/TC	EXM50-200/TC
M63		EXM63-050/TC	EXM63-075/TC	EXM63-100/TC	EXM63-125/TC	EXM63-150/TC	EXM63-200/TC
M75		EXM75-050/TC	EXM75-075/TC	EXM75-100/TC	EXM75-125/TC	EXM75-150/TC	EXM75-200/TC
PG9		EXPG9-050/TC					
PG11		EXPG11-050/TC					
PG13		EXPG13-050/TC					
PG16		EXPG16-050/TC	EXPG16-075/TC				
PG21		EXPG21-050/TC	EXPG21-075/TC	EXPG21-100/TC			
PG29		EXPG29-050/TC	EXPG29-075/TC	EXPG29-100/TC	EXPG29-125/TC	EXPG29-150/TC	
PG36		EXPG36-050/TC	EXPG36-075/TC	EXPG36-100/TC	EXPG36-125/TC	EXPG36-150/TC	
PG42		EXPG42-050/TC	EXPG42-075/TC	EXPG42-100/TC	EXPG42-125/TC	EXPG42-150/TC	EXPG42-200/TC
PG48		EXPG48-050/TC	EXPG48-075/TC	EXPG48-100/TC	EXPG48-125/TC	EXPG48-150/TC	EXPG48-200/TC
NPT 3/8							
NPT 1/2			EX050-075/E				
NPT 3/4		EX075-050/R		EX075-100/E			
NPT 1		EX100-050/R	EX100-075/R		EX100-125/E		
NPT 1 1/4		EX125-050/R	EX125-075/R	EX125-100/R		EX125-150/E	
NPT 1 1/2		EX150-050/R	EX150-075/R	EX150-100/R	EX150-125/R		EX150-200/E
NPT 2		EX200-050/R	EX200-075/R	EX200-100/R	EX200-125/R	EX200-150/R	

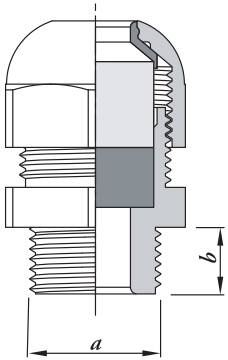
	Connector Description	IP Rating	Approvals	CONDUIT SIZE (mm)
Hazardous Area Index EExe Cable Gland		IP68	SIRA 00 ATEX 1072X  II2GD EExell	Pack Quantity
				Thread Size - Metric (mm)
Hazardous Area Stopping Plug		IP66	SIRA 00 ATEX 1074X 	Pack Quantity
				Thread Size - Metric (mm)
Hex Locknut Metric		Material		Thread Type - Metric
		Stainless Steel		Colour Dimension Across Flats (mm) Thickness (mm) SELF
		Brass		Dimension Across Flats (mm) Thickness (mm) SELF
Sealing Joint Washer Metric		Nickel plated brass		Dimension Across Flats (mm) Thickness (mm) NICKEL
		Nylon		Outside Diameter (mm) Thickness (mm) BLACK
Hex Locknut PG		Material		Thread Type - PG
		Brass / Nickel plated		Dimension Across Flats (mm) Thickness (mm) NICKEL
Sealing Joint Washer PG		Nylon		Outside Diameter (mm) Thickness (mm) BLACK
		Material		Thread Type - NPT
Hex Locknut NPT		Brass / Nickel plated		Dimension Across Flats (mm) Thickness (mm) NICKEL
		Steel		Lug Diameter (mm) Thickness (mm) SELF
'Tiger Tail' Locknut NPT				
P Clip		Galvanised Steel/ PVC insert		
Couplers		Brass	IP66	
		Nickel plated Brass		

Index EExe Cable Gland, Stopping Plug & Locknuts



16	20	25	32	40	50	63			
25 M16 EX-8160	20 M20 EX-8240	10 M25 EX-8560	5 M32 EX-8640	2 M40 EX-8720	1 M50 EX-8800	-			
EXFM03 EXFP03	EXFM04 EXFP04	EXFM05 EXFP05	EXFM06 EXFP06	EXFM07 EXFP07	EXFM08 EXFP08	- -			
100 M16 EX-M16	100 M20 EX-M20	100 M25 EX-M25	50 M32 EX-M32	10 M40 EX-M40	10 M50 EX-M50	10 M63 EX-M63			
16	20	25	32	40	50	63			
- - -	28.0 3.5 MXWH04	28.0 4.0 MXWH05	38.0 5.0 MXWH06	- - -	- - -	- - -			
22.0 2.0 WHMB03	27.0 2.0 WHMB04	33.0 2.0 WHMB05	41.0 4.3 WHMB06	47.0 3.0 WHMB07	64.0 3.0 WHMB08	- - -			
22.0 3.0 WHMM03	24.0 3.5 WHMM04	30.0 3.5 WHMM05	35.0 4.5 WHMM06	44.0 4.5 WHMM07	55.0 7.0 WHMM08	70.0 7.5 WHMM09			
22.0 1.6 EXFM02	26.0 1.6 EXFM03	31.5 1.7 EXFM04	41.5 1.7 EXFM05	52.0 2.0 EXFM06	66.5 2.0 EXFM07	84.5 2.0 EXFM09	- - -	- - -	- - -
7	9	11	13.5	16	21	29	36	42	48
15.0 3.0 WHPM01	18.0 3.0 WHPM02	21.0 3.0 WHPM03	23.0 3.0 WHPM04	26.0 3.0 WHPM05	32.0 3.5 WHPM06	41.0 4.0 WHPM07	51.0 5.0 WHPM08	60.0 5.0 WHPM09	64.0 5.0 WHPM10
- -	19.0 2.0 EXFP02	22.5 2.0 EXFP03	22.5 2.0 EXFP04	27.0 2.0 EXFP05	33.5 3.0 EXFP06	43.5 3.0 EXFP07	- - -	- - -	- - -
1/2"	3/4"	1"	1 1/4"	1 1/2"	2"				
27.0 3.3 WHAM04	30.0 3.5 WHAM05	37.5 5.0 WHAM06	47.0 5.2 WHAM07	56.0 6.0 WHAM08	70.0 6.7 WHAM09				
28.5 5.3 WHAS04	33.5 6.0 WHAS05	43.5 6.0 WHAS06	52.2 6.0 WHAS07	60.3 5.8 WHAS08	73.5 6.8 WHAS09				
Pack Quantity	10	10	10	10	-	10	10	5	5
BLACK	YCNAC01	YCNAC02	YCNAC03	YCNAC04	-	YCNAC05	YCNAC06	YCNAC07	YCNAC08
THREAD SIZE	M16 EX/M16/C EXN/M16/C	M20 EX/M20/C EXN/M20/C	M25 EX/M25/C EXN/M25/C	M32 EX/M32/C EXN/M32/C	M40 EX/M40/C EXN/M40/C	M50 EX/M50/C EXN/M50/C			

Index EExe Hazardous Area Cable Gland



Nr	a	b	Ø	
			Max.	Min.
202-8160	M16	9.0	8.0	5.0
202-8240	M20	10.0	13.0	8.0
202-8560	M25	11.0	19.0	13.0
202-8640	M32	12.0	25.0	18.0
202-8720	M40	14.0	32.0	24.0
202-8800	M50	16.0	38.0	29.0

Installation:

INTO NON-THREADED ENCLOSURE

Unscrew cap and remove sealing ring. The moulded dust shield must be removed. (A screwdriver or similar may be a useful aid). Replace the seal, (external chamfer to the cap). Replace the cap and give it half a turn. Pass the cable the required distance through the Gland and tighten cap onto body. The tightening action will cause the seal to deform and close onto the cable. The entry thread is passed into the enclosure and the nut fitted. Use cable clamps to secure the cable.

THREADED ENCLOSURE

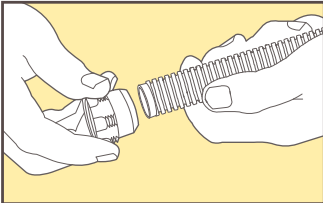
Unscrew cap and remove sealing ring. The moulded dust shield must be removed. (A screwdriver or similar may be a useful aid). Screw the body into the enclosure and tighten. Replace the grip and seal, (external chamfer to the cap). Replace the cap and give half a turn. Pass the cable through the Gland to the required distance and tighten the cap. close onto the cable. Use cable clamps to secure the cable.

Routine Checking & Maintenance:

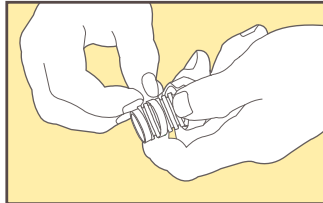
Nylon Glands are items that once assembled do not require maintenance. An occasional check to ensure cable has not been damaged or pulled would be advisable.

Fittings for Non-metallic Conduit

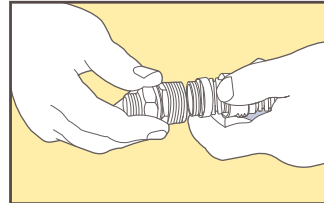
Fitting Assembly



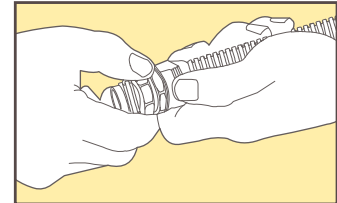
Apply Capnut



Apply sealing ring - chamfered edge towards capnut, 3 corrugations in from end of conduit.



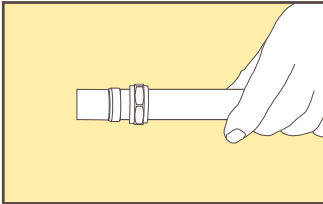
Apply body over conduit



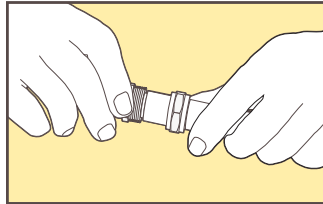
Hand tighten body of fitting onto inner capnut.

Fittings for Liquid Tight Conduit

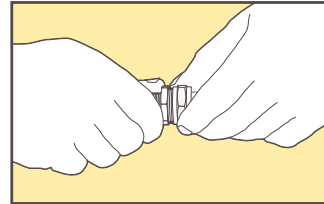
Fitting Assembly types A & B



Apply capnut and sealing ring over conduit, ensuring chamfered edge of seal is towards fitting body.



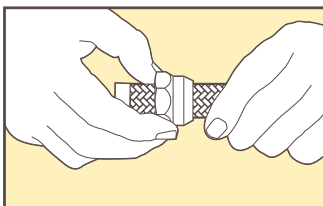
Fully screw the fitting into the conduit.



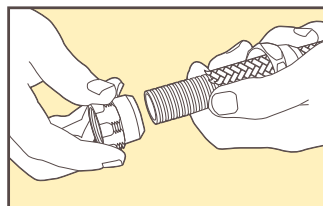
Screw the capnut onto the fitting and tighten with grips or spanners as above.

Fittings for Overbraided Conduit

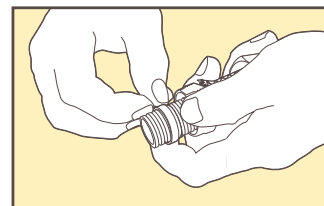
Fitting Assembly



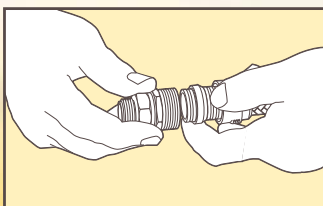
Apply the outer capnut over the braiding before removing tape.



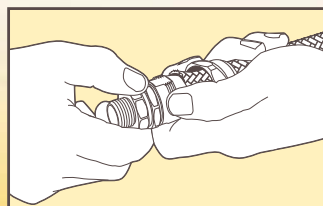
Remove tape and pull back braided sheath. Apply inner capnut.



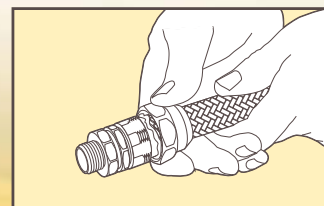
Apply sealing ring - chamfered edge towards capnut, 3 corrugations in from end of conduit.



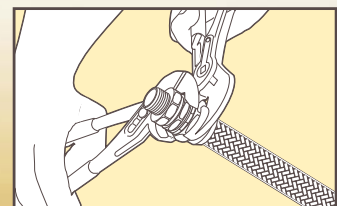
Apply body over conduit



Hand tighten body of fitting onto inner capnut.

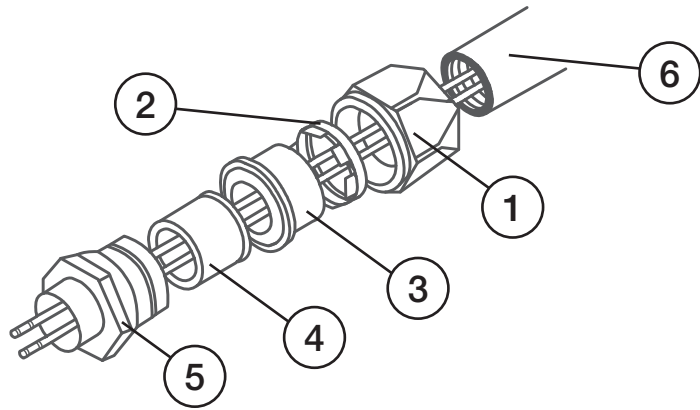


Position braiding over steps of inner locknut and secure with outer capnut. (Ensure braid is trapped between capnuts).

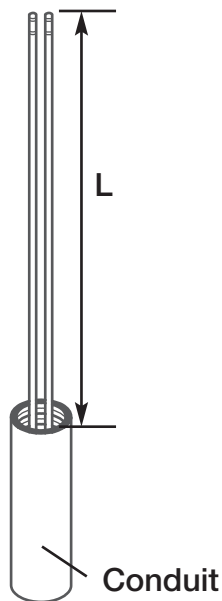


Tighten components as shown.

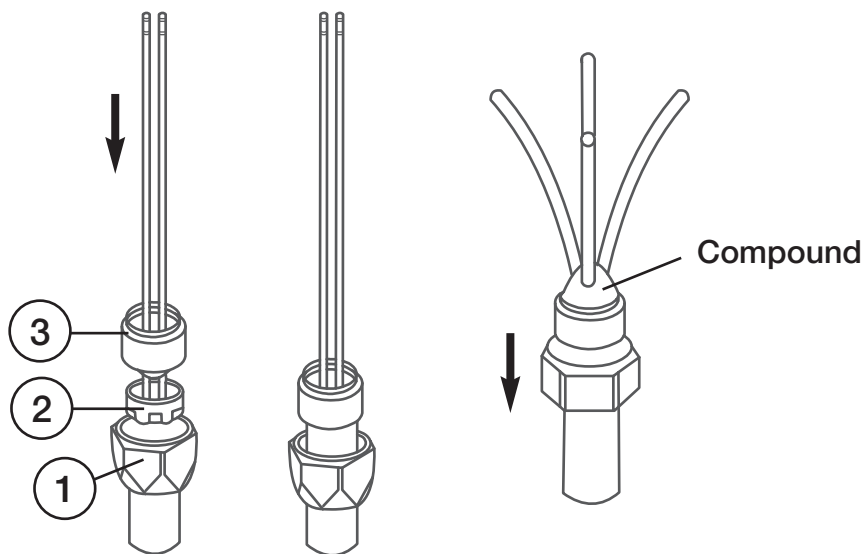
1. Backnut
2. Gland Ring
3. Spigot / Fixed Coupler
4. Rubber Pot
5. Entry
6. Conduit (Kopex)



Cable Preparation



Cable Gland Preparation



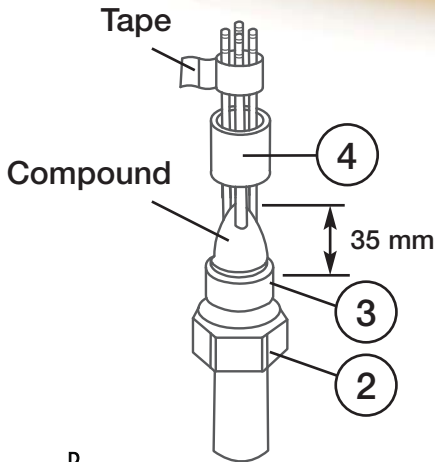
A Conduit Preparation

Cut conduit square using a hacksaw with a minimum of 30 teeth per inch. Pull sufficient length 'L' of conduit to suit equipment and twist to form a helix, this gives maximum flexibility.

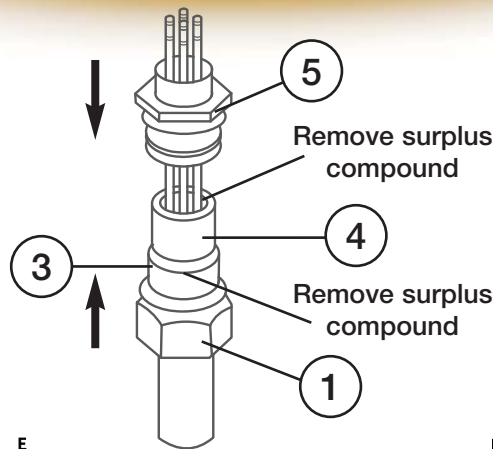
B Pass parts (1) and (2) over the conduit and conductors ensuring that the cut outs of the gland ring race the enclosures. Pass part (3) over the conductors and screw into the conduit.(6). Remove the rubber pot (4) from the entry (5), pass the entry (5) over the conductors, assemble the gland and tighten backnut (1) onto entry (5) until the gland ring (2) is drawn into the spigot (3), then remove entry (5).

C Spread the conductors out for the compound packing. Pack the compound between the conductors as shown. See Notes overleaf and Fig. 7 for compound preparation.

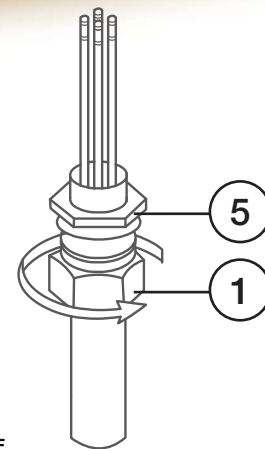
Fitting Instructions EExd / EExe II Cable Gland



D
With all gaps and voids filled, bring the conductors back together and pack more compound around the outside of the conductors. Tape the conductors together to prevent disturbance of the compound seal. Pass the rubber pot (4) over the spigot (3) and remove any surplus compound from the top of the rubber pot (4) and the joint face as indicated.



E
Pass the conductors through the entry (5), which may have been previously fitted into the equipment. Ensure that compound does not cover end of the rubber pot (4).
Fit the rubber pot (4) into the entry (5).



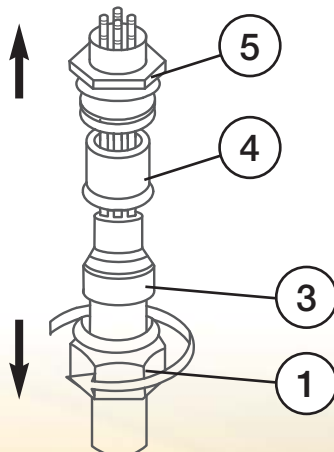
F
Locate and hand tighten backnut (1) to the entry (5).

IMPORTANT NOTE :
THE CONDUCTORS MUST NOT BE MOVED FOR A MINIMUM OF FOUR HOURS.

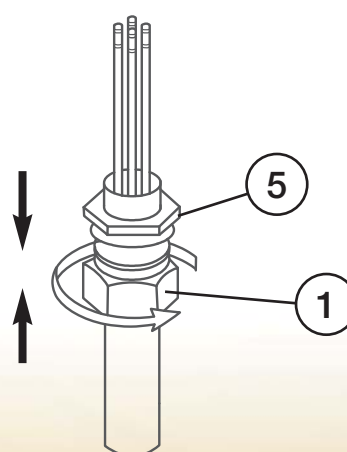
EPOXY COMPOUND PREPARATION

When handling this material, the gloves supplied must be worn. The epoxy compound is supplied in the form of a two part package. These should be mixed into the ratio of 1:1 until both colours have blended into one, without any streaks. Rolling and folding is the most satisfactory method of obtaining an even blend. Once mixed, the compound must be used within 30 minutes. After this time it will begin to stiffen. The compound should be kept at an ambient temperature of no less than 20°C prior to using. At lower temperatures it becomes difficult to mix. Should any compound come into contact with the skin it should be cleaned off with skin cleaner and not allowed to dry on the skin. Only compound for immediate terminations should be mixed.

The mixing and installation of the compound at an ambient temperature below 4°C is not recommended due to extended curing periods.



G
Allow the compound to cure. (See fig. 7 for curing times).
Untighten the backnut (1) from the entry (5) to enable inspection. The rubber pot (4) may be removed for inspection to ensure that the compound packing is satisfactory. Add further compound if necessary.



H
Re-assemble the rubber pot (4) and the entry (5).
Hand tighten the backnut (1) onto the entry (5) and add half a turn with a spanner / wrench.



Installation Instructions for Kopex Adaptor & Reducer

These installation instructions give guidance on selection of Kopex products and general instructions for safety and installation of chosen Kopex products. All Kopex products should only be used in applications and environments as detailed in these instructions and other Kopex literature.

Kopex will not take responsibility for any damage, injury or form of loss caused where products are not installed or used as detailed in these instructions. If in doubt, further advice can be obtained from our Technical Department.

Product Certification

Part No	ATEX Cert	IECEx Cert	Operating Temp	IP Rating
EX	BASEEFA07 ATEX 0247X	IECEx BAS07.0090X	-60 TO +100°C	IP66

Notes: For ingress protection above IP54 the use of a sealing washer or thread sealant is recommended.

Certification and Material Variations for Standard Thread Sizes

Product	Description	Part No.	Material
E	Enlarger	EX	Brass
R	Reducer	EXN	Nickel plated brass
TC	Thread convertor	EXS	Stainless steel

Standard Male and Female Thread Sizes

Male Thread	Female Thread	Male Thread	Female Thread
M16	038	3/8" NPT	PG9
M20	050	1/2" NPT	PG13.5
M25	075	3/4" NPT	PG16
M32	100	1" NPT	PG21
M40	150	1 1/2" NPT	PG29
M50	175	1 3/4" NPT	PG36
M64	200	2" NPT	PG42
M75	250	2 1/2" NPT	

Male thread is shown first. Example: EXN/M20-M25/E.
Material - Brass, Nickel Plated, M20 Male to M25 Female

Specification

In accordance with IEC60079-0, IEC60079-7, EC60079-1, EN60079-0, EN 60079-7, EN60079-1. EC61241-07:2006, EC61241-1, EN61241-0, EN61241-1

Selection

- All Kopex products should be selected in accordance with all relevant Standards and Codes of Practice.
- Ensure that the product is certified to the same method of protection as the equipment to which it is to be installed.
- Ensure that the correct threadform and size is selected for the cable and/or entry hole of the enclosure.
- Ensure that the material the product is manufactured from is suitable to the enclosure material and cable gland, and also to the surrounding environmental conditions.
- Ensure that surrounding conditions do not exceed the Operating Temperatures stated in the product Information table.
- Ensure that the product can maintain the same Ingress Protection levels as the equipment to which it is to be installed.
- Ensure that the impact resistance of the product is suitable to that of the equipment to which it is to be installed as stated in the Product Information Table.

Marking details

Components will be marked in the following format.

CMPL BASEEFA07 ATEX0247X II 2GD IP66
Exd IIC Exe II ExeD (year of manufacture) B46 1HT UK 1180
IECEx BAS07.0090X 07 -60 to +100°C Ex/Type designation

Example

CMPL BASEEFA07 ATEX0247X II 2GD IP66
Exd IIC Exe II ExtD A21 B46 1HT UK 1180
IECEx BAS07.0090X 07 -60 to +100°C Ex/M32-M25/R

Installation Guide

- All Kopex products should be installed in accordance with all relevant Installation Standards and Codes of Practice. BS EN 60079-14: 1997. Electrical Installations in hazardous areas (other than mines)
- The installer should ensure that no damage occurs to any thread or form of seal during installation. Where component is plated care should be taken to prevent damage or chipping.
- Threaded Entries – Components can be installed directly into threaded entries and the recommended torque applied.
- Clearance Holes – Clearance holes should be 0.5 mm larger than the major diameter of the male thread. Components installed in clearance holes should be secured with an appropriate sized locknut to recommended torque.
- Recommended Installation Torque – In order to maintain the integrity of the enclosure it is important that an installation torque as detailed below be applied.

Installation Torque

Kopex adaptors and reducers should be installed to the recommended torque values detailed in the following table. Torque values apply to non-metric thread equivalents.

Male Thread Size	Metallic components (N.m.)
M16 & M20 and Equivalents	32.5
M25 and Equivalents	47.5
M32 and Equivalents	55.0
M40 and Equivalents	65.0
M50 and Equivalents	80.0
M63 and Equivalents	95.0
M75 and Equivalents	110.0

Routine Checking and Maintenance

All Kopex products should be checked during routine maintenance of the enclosure.

Special Notes

- Exe equipment should not be used with Exd equipment.
- Two adaptors installed in series is not permitted under certification.
- When the fitting is used for increased safety or dust protection the entry on the enclosure and the female thread on the fittings shall be suitably sealed (in accordance with IEC60079-14) to maintain the IP of the associated enclosure



EX/038-M16/TC	14	EX/M16-PG9/TC	15	EX/M63-PG42/TC	15	EX/PG42-M40/TC	14	EXFM04	17	EX-M40	17	EXSM0707	11
EX/050-075/E	15	EX/M20/C	17	EX/M63-PG48/TC	15	EX/PG42-M50/TC	14	EXFM05	17	EX-M50	17	EXSM0808	11
EX/050-M16/TC	14	EX/M20-050/TC	15	EX/M63-PG9/TC	15	EX/PG42-M63/TC	14	EXFM05	17	EX-M63	17	EXSM0909	11
EX/050-M20/TC	14	EX/M20-075/TC	15	EX/M75-050/TC	15	EX/PG42-PG11/TC	15	EXFM06	17	EX/MA0304	11	EXSP0303	11
EX/050-M25/TC	14	EX/M20-M16/R	14	EX/M75-075/TC	15	EX/PG42-PG13/R	15	EXFM06	17	EX/MA0404	11	EXSP0304	11
EX/050-PG11/TC	15	EX/M20-M25/E	14	EX/M75-100/TC	15	EX/PG42-PG16/R	15	EXFM07	17	EX/MA0505	11	EXSP0405	11
EX/050-PG13/TC	15	EX/M20-M32/E	14	EX/M75-125/TC	15	EX/PG42-PG21/R	15	EXFM07	17	EX/MA0606	11	EXSP0506	11
EX/050-PG16/TC	15	EX/M20-PG11/TC	15	EX/M75-150/TC	15	EX/PG42-PG29/R	15	EXFM08	17	EX/MA0707	11	EXSP0708	11
EX/050-PG16/TC	15	EX/M20-PG13/TC	15	EX/M75-200/TC	15	EX/PG42-PG36/R	15	EXFM09	17	EX/MA0808	11	EXSP0809	11
EX/050-PG9/TC	15	EX/M20-PG16/TC	15	EX/M75-M16/R	14	EX/PG42-PG48/E	15	EXFM09	17	EX/MA0909	11	EXSP0910	11
EX/075-050/R	15	EX/M20-PG9/TC	15	EX/M75-M25/R	14	EX/PG48-050/TC	15	EXFP02	17	EX/MA0909	11	EXSP0910	11
EX/075-100/E	15	EX/M25/C	17	EX/M75-M30/R	14	EX/PG48-075/TC	15	EXFP03	17	EX/MIM0303	11	HAAS0304	12
EX/075-M16/TC	14	EX/M25-050/TC	15	EX/M75-M32/R	14	EX/PG48-100/TC	15	EXFP04	17	EX/MIM0404	11	HAAS0404	12
EX/075-M20/TC	14	EX/M25-075/TC	15	EX/M75-M40/R	14	EX/PG48-125/TC	15	EXFP04	17	EX/MIM0505	11	HAAS0505	12
EX/075-M25/TC	14	EX/M25-100/TC	15	EX/M75-M50/R	14	EX/PG48-150/TC	15	EXFP05	17	EX/MIM0606	11	HAAS0606	12
EX/075-M32/TC	14	EX/M25-M16/R	14	EX/M75-M63/R	14	EX/PG48-200/TC	15	EXFP06	17	EX/MIM0707	11	HAAS0707	12
EX/075-PG11/TC	15	EX/M25-M20/R	14	EX/M75-PG11/TC	15	EX/PG48-M16/TC	14	EXFP06	17	EX/MIM0808	11	HAAS0808	12
EX/075-PG13/TC	15	EX/M25-M32/E	14	EX/M75-PG13/TC	15	EX/PG48-M20/TC	14	EXFP07	17	EX/MIM0909	11	HAAS0909	12
EX/075-PG16/TC	15	EX/M25-M40/E	14	EX/M75-PG16/TC	15	EX/PG48-M25/TC	14	EXFP07	17	EX/MP0303	11	HAAM0304	12
EX/075-PG21/TC	15	EX/M25-PG11/TC	15	EX/M75-PG21/TC	15	EX/PG48-M32/TC	14	EXFP07	17	EX/MP0304	11	HAAM0404	12
EX/075-PG9/TC	15	EX/M25-PG13/TC	15	EX/M75-PG29/TC	15	EX/PG48-M40/TC	14	EXFP07	17	EX/MP0405	11	HAAM0505	12
EX/100-050/R	15	EX/M25-PG16/TC	15	EX/M75-PG36/TC	15	EX/PG48-M50/TC	14	EXFP08	17	EX/MP0506	11	HAAM0606	12
EX/100-075/R	15	EX/M25-PG21/TC	15	EX/M75-PG42/TC	15	EX/PG48-M63/TC	14	EXFP08	17	EX/MP0607	11	HAAM0707	12
EX/100-125/E	15	EX/M25-PG9/TC	15	EX/M75-PG48/TC	15	EX/PG48-PG11/TC	15	EXFP08	17	EX/MP0708	11	HAAM0808	12
EX/100-M16/TC	14	EX/M32/C	17	EX/P16-PG21/E	15	EX/PG48-PG13/R	15	EXL0110	9	EX/MP0809	11	HAAM0909	12
EX/100-M20/TC	14	EX/M32-050/TC	15	EX/PG11-050/TC	15	EX/PG48-PG16/R	15	EXL0130	9	EX/MP0910	11	HAAS0404	12
EX/100-M25/TC	14	EX/M32-075/TC	15	EX/PG11-M16/TC	14	EX/PG48-PG21/R	15	EXL0210	9	EX/MP0910	11	HAAS0505	12
EX/100-M32/TC	14	EX/M32-100/TC	15	EX/PG11-M20/TC	14	EX/PG48-PG29/R	15	EXL0230	9	EX/MP0910	11	HAAS0606	12
EX/100-M40/TC	14	EX/M32-125/TC	15	EX/PG11-PG9/TC	15	EX/PG48-PG36/R	15	EXL0310	9	EX/MP0910	11	HAAS0707	12
EX/100-PG11/TC	15	EX/M32-M16/R	14	EX/PG13-050/TC	15	EX/PG48-PG42/R	15	EXL0330	9	EX/MP0910	11	HAAS0808	12
EX/100-PG13/TC	15	EX/M32-M20/R	14	EX/PG13-M16/TC	14	EX/PG48-PG48/TC	15	EXL0410	9	EX/MP0910	11	HAAS0909	12
EX/100-PG16/TC	15	EX/M32-M25/R	14	EX/PG13-M20/TC	14	EX/PG9-050/TC	15	EXL0430	9	EX/MP0910	11	HAM0304	12
EX/100-PG21/TC	15	EX/M32-M40/E	14	EX/PG13-PG11/TC	15	EX/PG9-16/TC	14	EXL0510	9	EX/MP0910	11	HAM0404	12
EX/100-PG29/TC	15	EX/M32-M50/E	14	EX/PG13-PG9/TC	15	EX/PG9-M20/TC	14	EXL0620	9	EX/MP0910	11	HAM0505	12
EX/100-PG9/TC	15	EX/M40/C	17	EX/PG16-050/TC	15	EX-8160	17	EXL0710	9	EX/MP0910	11	HAM0606	12
EX/125-050/R	15	EX/M40-050/TC	15	EX/PG16-075/TC	15	EX-8240	17	EXL0810	9	EX/MP0910	11	HAM0707	12
EX/125-075/R	15	EX/M40-075/TC	15	EX/PG16-M16/TC	14	EX-8560	17	EXL0820	9	EX/MP0910	11	HAM0808	12
EX/125-100/R	15	EX/M40-100/TC	15	EX/PG16-M20/TC	14	EX-8640	17	EXL0910	9	EX/MP0910	11	HAM0909	12
EX/125-150/E	15	EX/M40-125/TC	15	EX/PG16-M25/T	15	EX-8720	17	EXL0920	9	EX/MP0910	11	HAMM0304	12
EX/125-M16/TC	14	EX/M40-150/TC	15	EX/PG16-PG11/TC	15	EX-8800	17	EXL0930	9	EX/MP0910	11	HAMM0404	12
EX/125-M20/TC	14	EX/M40-M16/R	14	EX/PG16-PG13/R	15	EXB0310	7	EXL0930	9	EX/MP0910	11	HAMM0505	12
EX/125-M25/TC	14	EX/M40-M20/R	14	EX/PG16-PG16/R	15	EXB0330	7	EXL0930	9	EX/MP0910	11	HAMM0606	12
EX/125-M32/TC	14	EX/M40-M25/R	14	EX/PG16-PG19/TC	15	EXB0350	7	EXL0930	9	EX/MP0910	11	HAMM0707	12
EX/125-M40/TC	14	EX/M40-M32/R	14	EX/PG21-050/TC	15	EXB0410	7	EXL0930	9	EX/MP0910	11	HAMM0808	12
EX/125-M50/TC	14	EX/M40-M32/R	14	EX/PG21-075/TC	15	EXB0430	7	EXL0930	9	EX/MP0910	11	HAMM0909	12
EX/125-PG11/TC	15	EX/M40-M40/E	14	EX/PG21-100/TC	15	EXB0450	7	EXL0930	9	EX/MP0910	11	HAMS0404	12
EX/125-PG13/TC	15	EX/M40-M50/E	14	EX/PG21-M16/TC	14	EXB0510	7	EXL0930	9	EX/MP0910	11	HAMS0505	12
EX/125-PG16/TC	15	EX/M40-PG11/TC	15	EX/PG21-M25/TC	14	EXB0530	7	EXL0930	9	EX/MP0910	11	HAMS0606	12
EX/125-PG16/TC	15	EX/M40-PG13/TC	15	EX/PG21-M32/TC	14	EXB0550	7	EXL0930	9	EX/MP0910	11	HAMS0707	12
EX/125-PG21/TC	15	EX/M40-PG16/TC	15	EX/PG21-PG11/TC	15	EXB0610	7	EXL0930	9	EX/MP0910	11	HAMS0808	12
EX/125-PG29/TC	15	EX/M40-PG21/TC	15	EX/PG21-PG13/R	15	EXB0630	7	EXL0930	9	EX/MP0910	11	HAMS0909	12
EX/125-PG36/TC	15	EX/M40-PG29/TC	15	EX/PG21-PG16/R	15	EXB0650	7	EXL0930	9	EX/MP0910	11	MXWH05	17
EX/125-PG9/TC	15	EX/M40-PG36/TC	15	EX/PG21-PG29/E	15	EXB0670	7	EXL0930	9	EX/MP0910	11	MXWH06	17
EX/150-050/R	15	EX/M40-PG9/TC	15	EX/PG21-PG29/E	15	EXB0710	7	EXL0930	9	EX/MP0910	11	WHAM04	17
EX/150-075/R	15	EX/M50/C	17	EX/PG21-PG11/TC	15	EXB0730	7	EXL0930	9	EX/MP0910	11	WHAM05	17
EX/150-100/R	15	EX/M50-050/TC	15	EX/PG21-PG13/R	15	EXB0750	7	EXL0930	9	EX/MP0910	11	WHAM06	17
EX/150-125/R	15	EX/M50-075/TC	15	EX/PG21-PG16/R	15	EXB0770	7	EXL0930	9	EX/MP0910	11	WHAM07	17
EX/150-200/E	15	EX/M50-100/TC	15	EX/PG21-PG19/TC	15	EXB0790	7	EXL0930	9	EX/MP0910	11	WHAM08	17
EX/150-M16/TC	14	EX/M50-125/TC	15	EX/PG21-PG29/TC	15	EXB0810	7	EXL0930	9	EX/MP0910	11	WHAM09	17
EX/150-M20/TC	14	EX/M50-150/TC	15	EX/PG29-050/TC	15	EXB0830	7	EXL0930	9	EX/MP0910	11	WHAS04	17
EX/150-M25/TC	14	EX/M50-M16/R	14	EX/PG29-075/TC	15	EXB0850	7	EXL0930	9	EX/MP0910	11	WHAS05	17
EX/150-M32/TC	14	EX/M50-M20/R	14	EX/PG29-100/TC	15	EXB0870	7	EXL0930	9	EX/MP0910	11	WHAS06	17
EX/150-M40/TC	14	EX/M50-M25/R	14	EX/PG29-125/TC	15	EXB0890	7	EXL0930	9	EX/MP0910	11	WHAS07	17
EX/150-M50/TC	14	EX/M50-M32/R	14	EX/PG29-150/TC	15	EXB0910	7	EXL0930	9	EX/MP0910	11	WHAS08	17
EX/150-M63/TC	14	EX/M50-M40/R	14	EX/PG29-M16/TC	14	EXB0930	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG11/TC	15	EX/M50-100/TC	15	EX/PG29-M20/TC	14	EXB0950	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG13/TC	15	EX/M50-125/TC	15	EX/PG29-M25/TC	14	EXB0970	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG16/TC	15	EX/M50-150/TC	15	EX/PG29-M32/TC	14	EXB0990	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG16/TC	15	EX/M50-200/TC	15	EX/PG29-M40/TC	14	EXB1010	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG21/TC	15	EX/M50-M16/R	14	EX/PG29-PG11/TC	15	EXB1030	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG21/TC	15	EX/M50-M16/R	14	EX/PG29-PG13/R	15	EXB1050	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG29/TC	15	EX/M50-M20/R	14	EX/PG29-PG16/R	15	EXB1070	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG36/TC	15	EX/M50-M25/R	14	EX/PG29-PG19/TC	15	EXB1090	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG42/TC	15	EX/M50-M40/R	14	EX/PG29-PG21/R	15	EXB1110	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/150-PG9/TC	15	EX/M50-M63/E	14	EX/PG29-PG36/E	15	EXB1130	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-050/R	15	EX/M50-M75/E	14	EX/PG29-PG9/TC	15	EXB1150	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-075/R	15	EX/M50-PG11/TC	15	EX/PG36-050/TC	15	EXB1170	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-100/R	15	EX/M50-PG13/TC	15	EX/PG36-075/TC	15	EXB1190	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-125/R	15	EX/M50-PG16/TC	15	EX/PG36-100/TC	15	EXB1210	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-150/R	15	EX/M50-PG21/TC	15	EX/PG36-125/TC	15	EXB1230	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-M16/TC	14	EX/M50-PG29/TC	15	EX/PG36-150/TC	15	EXB1250	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-M20/TC	14	EX/M50-PG36/TC	15	EX/PG36-M16/TC	14	EXB1270	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-M25/TC	14	EX/M50-PG9/TC	15	EX/PG36-M20/TC	14	EXB1290	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-M32/TC	14	EX/M50-PG9/TC	15	EX/PG36-M25/TC	14	EXB1310	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-M40/TC	14	EX/M5-M32/R	14	EX/PG36-M32/TC	14	EXB1330	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-M50/TC	14	EX/M63-050/TC	15	EX/PG36-M40/TC	14	EXB1350	7	EXL0930	9	EX/MP0910	11	WHAS09	17
EX/200-M													



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LIT-135 / 12-07

Designed & Printed by www.uc4.co.uk