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for Future Generations

IQ Range



Mechanical Position Indicator
Instruction Manual

⚠ This manual contains important safety information. Please ensure it is thoroughly read and understood before installing, operating or maintaining the equipment.

PUB002-137-00
Date of issue 10/23



UK
CA

The CE mark, consisting of the letters 'C' and 'E' in a stylized, bold font.

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1. Introduction

The IQ Mechanical Position Indicator provides local valve position indication. The indicator disc is driven by mechanical gearing directly from the actuator output drive and remains connected during electrical and manual override operation of the actuator.

The IQ Mechanical Position Indicator contains no electrical components and meets the same environmental considerations as the connected IQ actuator.

The IQ Mechanical Position Indicator must not be used as part of a SIL system.

2. Specification

Environmental:

Operating temperature -30 to +70 °C (-22 to +158 °F).

Enclosure: IP68 (7 m for 72 hours)

Materials:

Body: Aluminium

Centre

Column: Steel

Gearing: Steel

Indicator

Window: Nylon

Sealing: Rubber

Lubricant: Food grade grease

Mechanical:

Flange: F10 or F14

Weight: 4 kg (F10)
6 kg (F14)

3. Health and Safety

WARNING: Lubrication

The equipment is lubricated with grease suitable for the environmental conditions and sealed for life. Routine maintenance is not required.

WARNING: Cleaning

Potential electrostatic charging hazard, clean only with a damp cloth.

WARNING: Lifting

The Mechanical Position Indicator can be fixed to the actuator body or fixed to the actuator base / 2nd stage gearbox before installation to the valve. When fixing to the actuator body, lift the actuator and position indicator assembly per instructions specified in PUB002-039.

PROTECTIVE MEASURE:

Hot surfaces are limited as worm and wheel gears are greased and sealed to prevent loss of lubricant. Temperature rise in the gear cartridge does not exceed T4 / T120°C temperature class.

PROTECTIVE MEASURE:

Sparks from gearing are prevented as rotational speed is below the energy threshold of 1 m/s.

PROTECTIVE MEASURE:

Heat and/or sparks from bearings are prevented through selection of bearings designed to prevent excessive wear during the life of the equipment.

PROTECTIVE MEASURE:

Static charge can be prevented by adhering to cleaning instructions described in this section.

4. Operating Range

A configurable gear mechanism permits tuning for the required number of actuator turns.

Actuator Output Turns	Gear Set Configuration
1 – 3	A
3 – 6	B
6 – 12	C
12 – 25	D
25 – 50	E
50 – 100	F
100 – 200	G
200 – 400	H
400 – 800	J
800 – 1,700	K

Refer to section 9 for gear set configuration details.

5. Supplied Equipment

The IQ Mechanical Position Indicator is supplied with 25 – 50 turns configuration (gear set E) with the following kit of parts:

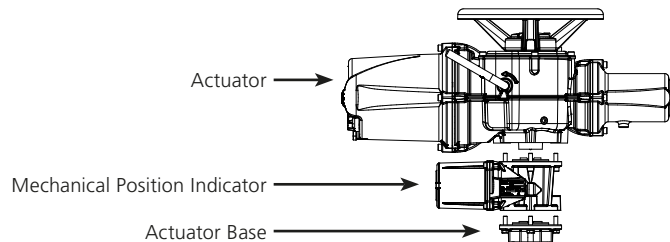
- Anti-clockwise to close indicator
- Gears and spacers for gear set adjustment
- Replacement O-ring for the indicator cover
- Additional mounting bolts for the actuator interface

6. Tightening Torque

Connecting components and parts of the Mechanical Position Indicator require tightening to specific torque values.

Fixing	Torque	
	Nm	Lbf.ft
Cover Screw (x3)	6.1	4.5
Cartridge Mounting Screw	1.1	0.8
Cartridge Chassis Screw (x2)	0.7	0.5
Indicator Disc Retention Nut	1.1	0.8

Fixings from the Actuator body to the Mechanical Position Indicator and the Mechanical Position Indicator to the Actuator base must conform to tightening torques specified in PUB002-039 Table A.



7. Commissioning

⚠ WARNING: Always configure the actuator position limits prior to commissioning the IQ Mechanical Position Indicator.

The IQ Mechanical Position Indicator must be commissioned as part of the actuator and valve assembly.

The following commissioning instructions are for clockwise to close operation.

Remove the IQ Mechanical Position Indicator cover by unscrewing the three fixing bolts.



Operate the actuator to the open position limit.

Using a 5.5 mm hex socket or hex wrench, loosen off the indicator disc retention nut by one full turn.



Adjust the CLOSE indicator disc so the blank edge of the white section aligns with the indicator arm.



Tighten the disc retention nut by one turn to secure both discs in place.



Rotate the indicator arm and position indicator discs clockwise against the hard stop to slip the drive clutch, then release the assembly. The mechanism will back drive due to the integral spring.

Operate the actuator to the closed position limit to account for backlash and then operate the actuator to the open position limit.



Hold the indicator arm and CLOSE indicator disc then loosen off the indicator disc retention nut by one full turn.



Hold both indicator discs and tighten the disc retention nut by one turn to secure both discs in place.



Adjust the OPEN indicator disc so the edge marked OPEN aligns with the cover arrow. Temporarily fit the cover if necessary.



Rotate the indicator arm and position indicator discs clockwise against the hard stop to slip the drive clutch, then release the assembly. The mechanism will back drive due to the integral spring.



Temporarily fit the indicator cover.

Operate the actuator to the closed position limit and check the CLOSE indicator aligns with the cover arrow.

Operate the actuator to the open position limit and check the OPEN indicator aligns with the cover arrow.

Repeat commissioning steps as necessary if further adjustment is required.

Refit the IQ Mechanical Position Indicator cover and securely fasten the three fixing bolts.



8. Adjusting the Gear Set

The IQ Mechanical Position Indicator is provided with a default operating range of 25 – 50 turns.

The operating range can be adjusted through fitment or removal of gears from the gear cartridge.

Removing the gear cartridge

Using a 4 mm Allen (hex.) key, unscrew the gear cartridge retaining bolt.



The cartridge can now be separated from the enclosure.

Types of gears

The IQ Mechanical Position Indicator is provided with sufficient spare parts to reconfigure the operating range from 1 turn up to 1,700 turns.

Four different components are used in the gear cartridge (left to right as pictured):

- Cartridge Input
- Cartridge Output
- Spacer
- Gear



The Cartridge Input transfers rotation from the actuator drive train to the gear cartridge. It must always be fitted at the rear of the chassis on the input shaft.

The Cartridge Output transfers rotation from the gear assembly to the indicator disc. It is fitted for all operating range configurations below 400 turns.

Spacer components transfer rotation to other components. Spacers are fitted in place of gears where necessary.

Gear components reduce rotation from input to output. Gears are fitted where necessary for the desired operating range.

Accessing the gears

Using a 3 mm Allen (hex.) key, unscrew two retaining bolts on the rear of the gear chassis.



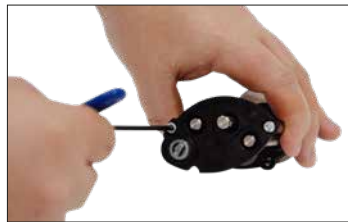
Pull the rear end of the chassis away from the gear shafts to completely remove it.



Adding and removing components

Gears and spacers will slide onto the transfer shafts in specific combinations to offer a variety of operating ranges. Add or remove the components required for the chosen gear set (refer to section 9).

One of the gears is pinned to the shaft. Removal of this gear is necessary for some configurations of gearing. Ensure the pin is refitted after modifying the gear set.



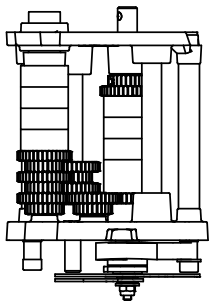
⚠ WARNING: Gears must be added or removed in pairs. Rotation will not transfer to subsequent gears if only one gear is installed.

One pair

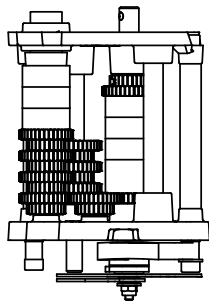


9. Gear Set Configurations

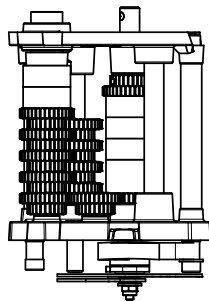
Configure the gear cartridge as shown in the applicable gear set configuration.



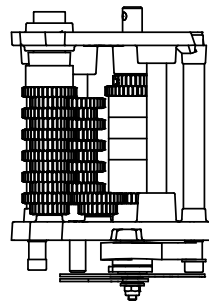
CONFIGURATION A
1 - 3 TURNS



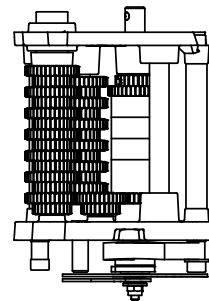
CONFIGURATION B
3 - 6 TURNS



CONFIGURATION C
6 - 12 TURNS

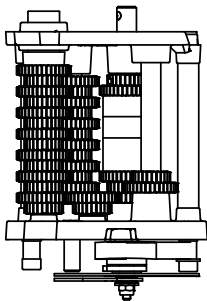


CONFIGURATION D
12 - 25 TURNS

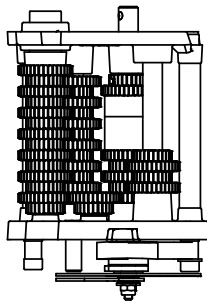


CONFIGURATION E
25 - 50 TURNS

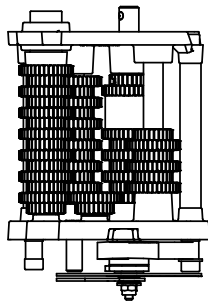
Configuration	A	B	C	D	E
Gear	7	9	11	13	15
Spacer	7	6	5	4	3
Cartridge Output	1	1	1	1	1



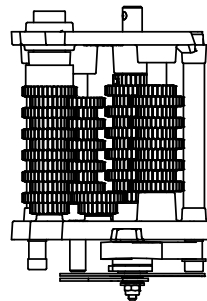
CONFIGURATION F
50 - 100 TURNS



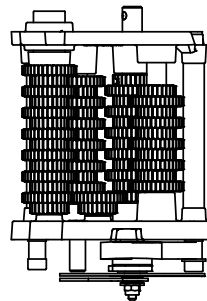
CONFIGURATION G
100 - 200 TURNS



CONFIGURATION H
200 - 400 TURNS



CONFIGURATION J
400 - 800 TURNS



CONFIGURATION K
800 - 1700 TURNS

Configuration	F	G	H	J	K
Gear	17	19	21	22	24
Spacer	2	1	0	1	0
Cartridge Output	1	1	1	0	0

Note: Selecting the incorrect operating range will not cause damage to the IQ Mechanical Position Indicator but it may prevent accurately displaying position.

10. Approvals

EU & UK – Hazardous Area

ATEX (2014/34/EU)

UKEX (2016 No. 1107)

II 2 G D

Ex h IIC T4 Gb

Tamb -30 °C to +70 °C

Non-Hazardous Locations

BS EN 60529

IP66 & IP68 (7 m for 72 hours)

Tamb -30 °C to +70 °C



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