



**Efficient Assembly Solutions
for Solar Power Plants**

EVERY JOB. EVERY SIZE. EVERY SPEC.

INGERSOLL RAND QX CONNECT SERIES™

INGERSOLL RAND QX CONNECT SERIES™ gives you the flexibility to control and program different torque targets – even on the same tool. The INSIGHTConnect mobile application lets you log and monitor all your data to ensure quality requirements are 100% fulfilled – as you cut the time it takes to do the job.

- More productivity
- More precision
- More quality
- More traceability

Main Body Assembly

The main body is the main structure on which PV panels are mounted. Each part can require up to 30 bolts, with torque levels ranging from 40 to 105 Nm.

QX CONNECT SERIES™ Cordless Angle Tools



40-80 Nm bolt tightening



50-80 Nm bolt tightening

PV Cell Assembly

As these critical structures are getting more compact they are increasingly difficult to access. Ingersoll Rand's customized solution enables easier access and precision tightening, which reduces the risk of damage to the most expensive parts of the structure due to overtorque issues.



18-21 Nm bolt tightening

QX CONNECT SERIES™ Cordless Angle Tools with Customized Crowfoot

Programming strategy



QX CONNECT SERIES™ Cordless Pistol Tools



18 Nm bolt tightening



Sun Tracker Units Assembly

QXM Cordless Torque Multiplier

Sun Tracker Units rotate the structure towards the Sun in order to optimize the efficiency of PV cells. Generally the fastening requirements here are high torques due to the mechanics of these high-precision structures, which are fully compatible with Ingersoll Rand QXM torque multiplier tools.



150Nm – 500 Nm bolt tightening



FASTER, MORE ACCURATE ASSEMBLY. EVERY SINGLE TIME.

THREE OPERATIONS. ONE TOOL.

Standard tool fastening



Ingersoll Rand QX Connect Precision Tools Solution



Five times faster tightening

Inaccurate tightening causes big problems in solar assembly from metallic structure deformation and failure to incorrect panel orientation leading to reduced efficiency.

Traditionally assemblers ensure they meet quality standards in three steps:

1. **Tightening** with a tool without torque control
2. **Fine-tuning** with a manual torque meter
3. **Checking** with a digital torque meter

With hundreds of thousands of bolts in the average array – and arrays growing all the time – this three-stage, labour-intensive process means lost time, lower productivity and increased cost.



Our solution:

QX precision tools allow you to tighten and go. Set the expected torque level on every tool using our mobile app or the display on the tool – and you're ready to go with accurate tightening every time. Plus you get precise monitoring of all your tightening information.



RIGHT FIRST TIME. EVERY TIME.

Checking and adjusting every bolt tightened using simple tools costs you time and money. What's more, an average 20% of bolts are overtightened, risking deformation of panels, structures and bolts... and even higher costs.

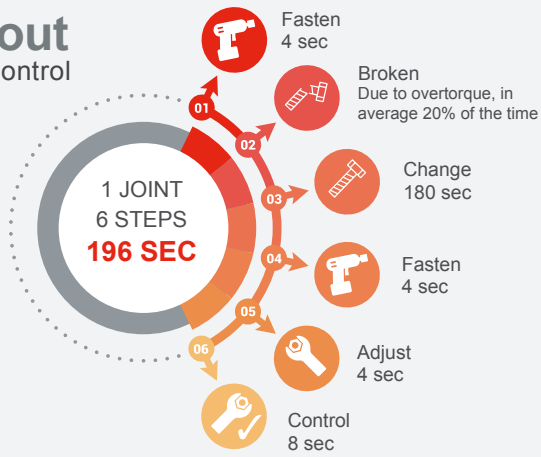
Our solution:

QX precision tools with their torque control system and transducer are accurate to around 3% every single time. That means more quality and lower costs due to overtorque deformations, penalties and customer complaints.



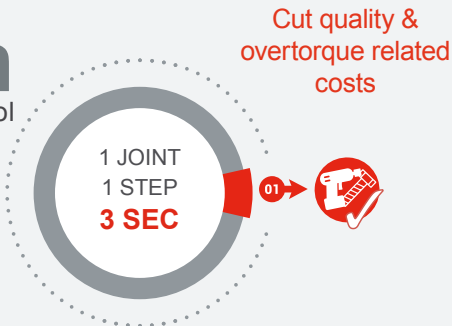
Standard tool fastening

without torque control



Ingersoll Rand QX Connect Precision Tools Solution

with torque control



INSIGHT™ CONNECT APP

The Insight Connect app is the easy way to boost quality assurance as you cut project delays and reduce the risk of penalties caused by quality issues.



Our FREE, user-friendly app is all you need to set up, train, audit and program every QX tool.



Increase quality and cut risks in four simple steps:

- 1 Download the FREE app.
- 2 Connect your tool by Bluetooth or cable

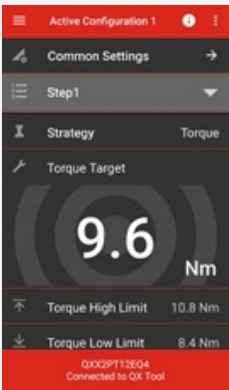


Available in Android & IOS Stores

QXX2PT12EQ4
Connected to QX Tool

MicroUSB Cable or Bluetooth

- 3 Set your targets and go!
- 4 Get and share results

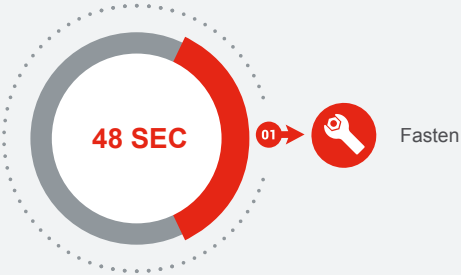


1200 Cycles can be downloaded in excel format

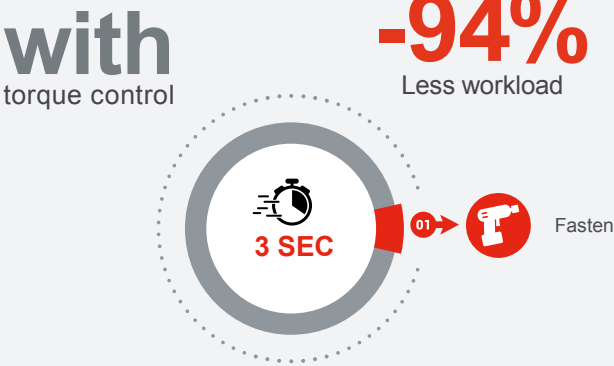


ACCESS ANY BOLT. ANYWHERE.

Manuel fastening



Ingersoll Rand QX Connect Precision Tools Solution



94% less workload in compact PV cell tightening

Today's smaller, more compact PV cells mean it can be hard to access bolts with standard assembly tools. Using manual tools or manual adjustment is time-consuming and fiddly, and can cause expensive damage.



Metallic structures are getting tighter and tighter – and traditional tools often have problems accessing joints. That makes it tough to tighten bolts to the right torque levels, which means lost productivity and even structural deformations, which can cause big problems in the field.

Our solution:

Ingersoll Rand's new solution addresses this challenge with the 'Crowfoot' – a metallic part mounted on the tool itself. It helps you access even the tightest areas, while the inbuilt torque system combines three tasks in one. So you tighten right first time, every time.






QX CONNECT SERIES™ CORDLESS PRECISION FASTENING SYSTEMS

CHOOSE THE RIGHT TOOL

The QX Connect Series™ gives you total, closed-loop control of the fastening process, while its different connectivity options means you can use it wherever there's a job to be done.

- **Flexibility** Use the same tool for multiple torque targets, and choose the right level of acceleration, free speed and shutdown speed to match the tool to any job.
- **Feedback** with visual and audio alerts when you need them
- **Accurate** Set torque accurate to around 3% (depending on application, tested to ISO 5393 standards)
- **Quality monitoring** Send tightening information via the Insight Connect mobile app for easy quality control
- **Maintenance alarms** programmable to match your needs
- **Indicators** for maintenance, troubleshooting and diagnostics

SUGGESTED PRODUCTS	 QX CONNECT SERIES™ Cordless Pistol Tools		 QX CONNECT SERIES™ Cordless Angle Tools		 QXM Cordless Torque Multiplier
	QXFN	QXFD	QXFN	QXFD	QXFD
Max Torque (Nm)	18Nm	18Nm	80Nm	80Nm	4000Nm
Certified Accuracy / Torque Control with Transducer	✓	✓	✓	✓	✓
Monitoring, Data Logging	✓	✓	✓	✓	✓
Setup with Mobile Application	✓	✓	✓	✓	✓
Display / Keypad	—	●	—	●	●
Ergonomic Tightening System	Optional	Optional	Optional	Optional	Standard reaction arm
Applications	PV Cells assembly, Tracker Module (18-21Nm)		Main body &Tracker Structure 40-80 Nm		Torque Tube; Tracker Motor Fixation (150-500Nm)
Speed range (rpm)	Min: 500 rpm Max: 1500 rpm		Min: 375 rpm Max: 1200 rpm		Min: 3.3 rpm Max: 83 rpm

ASK FOR A FREE FIELD TEST



Need to see QX Connect Series™ tools in action? Just scan this QR code to talk about a field trial close to you.



Ingersoll Rand (NYSE:IR), driven by an entrepreneurial spirit and ownership mindset, is dedicated to helping make life better for our employees, customers and communities. Customers lean on us for our technology-driven excellence in mission-critical flow creation and industrial solutions across 40+ respected brands where our products and services excel in the most complex and harsh conditions. Our employees develop customers for life through their daily commitment to expertise, productivity and efficiency.