X40 User Manual

Focusing on the Future

Scanprobe Techniques Limited

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Version 1.0

29 June 2022

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Introduction

The Scanprobe Techniques Limited X-Range 40 meter Pipeline Inspection Coiler (the "X40") is designed as a CCTV pipeline survey and inspection system and is suitable for use in non-hazardous locations where 90-degree pipe bends may be present. The system can be used in conjunction with the Maxprobe™ Camera Control Unit "CCU" (a bespoke control unit that can be purchased from Scanprobe Techniques) or with compatible mobile devices using the X-range or mina applications.

The X40 System is not designed for use in mines susceptible to firedamp, nor in hazardous areas where explosive atmospheres may be present.

Symbols

Throughout this document, symbols have been used to highlight points to note.

⚠ **Warning:**

This symbol highlights risks where death or injury may occur.

⚠ **Caution:**

This symbol highlights risks where damage to property or to the X40 System could occur.

Maintenance:

This symbol highlights maintenance and cleaning instructions.

About This Manual

This User Manual provides instructions and important information which must be adhered to when using the X40 System.

⚠ **Warning:**

When operating the X40 System, it is essential that you thoroughly read and understand this user manual first. It contains important information and warnings that help to avoid hazards, increase the reliability, and extend the life of the system and its components. Follow all the instructions carefully and observe all warnings to avoid putting yourself or other users of the system at risk and to prevent damage to the system.

Basic user instructions and maintenance tasks are covered within this User Manual. Basic operation and functionality of the X40 while surveying or inspecting pipelines is also included in this document, to provide instruction on the correct way to set-up, operate, and maintain all aspects of the X40 System.

Keep this document in a safe place for future reference.

Safety Instructions

This chapter illustrates the safety requirements that should always be adhered to when operating or maintaining any product purchased from Scanprobe Techniques Limited or one of their authorised agents. Please take the time to read and understand all the instructions within this document.

⚠ **Warning: Risk of injury due to electric shock:**
When using electrical equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and personal injury.

⚠ **Warning: Risk of damage to eyes and eyesight:**

The X40 System features bright LED illumination on the camera head which may cause damage to the eyes or to eyesight when fully illuminated. Do not look directly at them or point them at other people's eyes when illuminated.

Safety Instruction for the X40 System:

- **Charging:** Only use the power supply and charging cables supplied with the equipment orthose that have been supplied by Scanprobe Techniques Limited (or their approved suppliers).
- **Cables:** Repair or replace all damaged cables immediately.
- **Lifting:** Observe safe lifting procedures when lifting or moving any components of this system.
- **Mains operation:** The mains power adaptor supplied with the unit is not intended for use in outdoor environments. Do not attempt to charge or operate the unit from the mains supply outdoors.
- **Health and safety:** Foul sewer systems and other watercourses can be a source of biological hazards. Always use the appropriate PPE and take suitable precautions to prevent infection when using the X40 System.
- **Checks:** Before using the equipment, carefully check all parts to ensure there is no damage.
- **Maintenance:** The operator must ensure that all connectors and other interfaces are kept free from dust and dirt.

Battery Care

The battery is protected within the X40 System case and is not exposed to the user in normal operations. If the case is damaged and the battery pack is exposed:

- Call Scanprobe Techniques Limited, or an approved service centre, to arrange for the X40 System to be repaired. Do not use or charge an X40 System with an exposed battery pack.
- Do not send damaged batteries or cells through the mail service or by courier.
- Do not tamper with an exposed battery pack.
- Do not short-circuit a cell or the battery, or store a cell or the battery pack where it may be short-circuited by other metal objects.

- Do not dismantle, open or shred secondary cells or batteries.
- Do not subject cells or batteries to mechanical shock.
- In the event of a cell leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash thoroughly with clean water and seek medical advice.
- Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.
- Seek medical advice immediately if a cell or a battery has been swallowed.
- Keep exposed cells and batteries clean and dry.

To ensure the batteries are kept in the best condition, do not use any charger except the one specifically supplied with the equipment and do not leave the equipment on prolonged charge when not in use. After extended periods of storage, it may be necessary to charge and discharge the cells or batteries several times to obtain maximum performance.

General Safety Precautions

Always stay vigilant while operating the X40 System and remain aware of your surroundings. Use the correct personal protective equipment, tools, warning signs and barriers to ensure your own safety, and that of other people nearby.

To reduce the risk of injury or damage to the X40 System, all operators and maintenance personnel must read and understand the user manual before operating the system, changing accessories, or performing maintenance on this camera equipment.

Inspect the X40 System for any damage or degradation before and after use and undertake any necessary cleaning and maintenance promptly. Do not use this equipment without the appropriate training and experience. Always follow the instructions included in this manual, and always have this manual available for reference when using the equipment.

Intended Use

The X40 System is designed for the purpose of inspecting pipelines of all kinds. This lightweight push-rod camera inspection system is designed to provide both the flexibility to navigate tight bends and traps, whilst being strong enough to be pushed the distance in abrasive pipes. With an ultra-flexible spring-bound camera head and a tough but flexible push-rod, this product will navigate around 90deg bends and beyond.

Any other use deviating from or exceeding this purpose is deemed as misuse. In the event of misuse, the manufacturer declines any responsibility and shall not be held liable for any warranty or other claim whatsoever.

⚠ **Warning:**

The X40 System is not designed for use in mines susceptible to firedamp, nor in hazardous areas with explosive dust atmospheres. Surveys or inspections where these hazards are present are prohibited.

⚠ **Warning:**

Operators should remain aware of their surroundings and any other sources of danger while undertaking CCTV inspections or surveys, such as plant or heavy construction equipment movements, exposed electrical installations, exposed earthworks, excavations, etc.

About Your X40 System

The X40 System has been designed as a CCTV pipeline survey and inspection system and is suitable for use in non-hazardous locations. It consists of 40 meters of flexible pushrod with a robust outer jacket and a camera head designed to negotiate several tight bends within pipe sizes varying from 50mm up to 150mm. The X40 can be controlled using a Maxprobe™ CCU and iOS/Android devices, with a traceable 30mm TrapJumper camera head using a frequency magnetic sonde. The X40 System is designed to be used from a surface location outside the pipeline, with the camera head and pushrod being the only components to enter the pipeline under inspection.

The X40 System coiler has been designed for use on exposed outdoor locations and has a protection rating of IP56), meaning it can cope with heavy rain and a wash down afterwards. It is NOT protected against dust ingress and powerful water jets. The Pushrod and Camera are designed for use in flooded pipelines, drains and culverts, and are completely dustproof with a rated depth of 3m in standing water (rated to IP68).

By purchasing a X-Range system you are investing in a user-friendly Pipeline inspection system with outstanding robustness in rough conditions, state-of-the-art technology, and excellent functionality.

Operating Temperatures

Operating Temperature:	-20°C to +60°C
Charging Temperature:	+10°C to +45°C

⚠ **Caution:**

Do not attempt to operate or charge the X40 System outside the recommended temperature specifications, as this may damage the battery. Exposing the battery to temperatures below -20°C or above 60°C may damage the battery or activate the battery's safety systems, causing a permanent battery failure.

Disposal

The X40 System is classed as electrical equipment and is covered by the Waste Electrical and Electronic Equipment Regulations 2013 (as amended). The X40 coiler and the Maxprobe™ CCU both contain batteries and by law must not be disposed of in landfill waste.

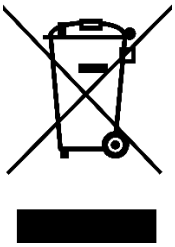


Figure 1: Waste Electrical and Electronic Equipment (WEEE)

Scanprobe Techniques Limited are registered with a WEEE Producer Compliance Scheme with Registration Number WEE/MM5507AA. Any Scanprobe-manufactured electronic device can be returned to the manufacturer at the end of its service life for disposal at no further charge. Please contact Scanprobe directly to ask about the scheme.

X40 Overview

Design and Application

The X40 consists of the following main components; all accessories for this product are listed in the Accessories section:

Qty 1 off X40 Coiler (model number 1007-1002-0)

Qty 1 off TrapJumper Camera (model number 1024-1002-0)

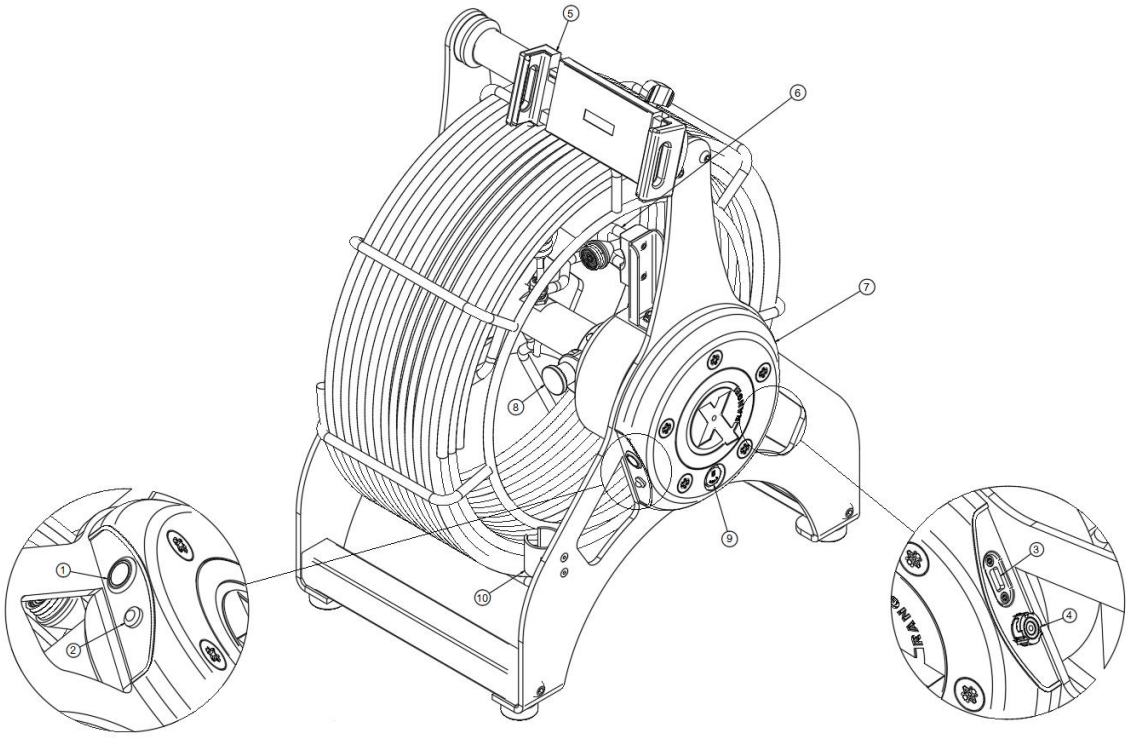
⚠ **Note:**

Switch on the X40 prior to connecting or disconnecting any components. The system needs to be powered up before any devices can be recognised.

X40 Coiler

The X40 Coiler contains the electronics hub and gathers the push rod in a uniformed and redistributable way. The X40 Coiler has been designed to be compact and user friendly. The top of the frame has a device holder used to hold a tablet or smart device in position and the base of the frame is designed to sit stable on a variety of surfaces (see Figure 2). Key components are identified in Figure 3.

Figure 2: X40 System



1	Power Button	6	Rod Guide
2	Status LED	7	Connector Side Plate
3	USB-C Connector	8	Coiler Brake
4	CCU and Charger Connector	9	Battery Breather
5	Device Holder	10	Camera Clip

Figure 3: X40 System Components

TrapJumper Camera

The TrapJumper Camera is illustrated in Figure 4. It is a sealed unit, rated to a depth of 3 metres in standing water. The camera provides a self-levelling picture with integrated LED illumination and a magnetic sonde emitting an oscillating magnetic field with a choice of two frequencies, 512Hz or 33kHz. The camera is designed to enter pipelines from 50mm diameter up to 150mm diameter for the express purpose of undertaking a visual survey. The sonde enables the camera head to be located inside the pipeline under survey using a detection device to a depth up of 4 meters in optimal conditions. This allows the surveying engineer to pin-point the areas of the pipeline needing repair, significantly reducing the amount of effort required to carry out the repair by minimising, for example, the area needed to be excavated to locate a pipeline fault.

Figure 4: TrapJumper Camera

⚠ **Warning:**
Do not attempt to open the camera head at any time. The camera enclosure has no user serviceable components.

⚠ **Warning: Risk of damage to eyes and eyesight:**
The X40 System features bright LED illumination on the camera head which may cause damage to the eyes or to eyesight when fully illuminated. Do not look directly at them or point them at other people's eyes when illuminated.

Component Identification

All Scanprobe components are marked with unique serial numbers for identification. Do not erase these identification markings or tamper with these in any way.

X40 Coiler

The product label displays the model number and relevant approval markings. The serial number can be found stamped into the rear leg strut of the coiler frame (see Figure 5).

Figure 5: X40 Coiler Product Label and Serial Number

TrapJumper Camera Head

The TrapJumper Camera Head has a serial number marking etched around a recess on the connector (see Figure 6). To access the serial number, the camera needs to be removed from the coiler pushrod and the spring must be pulled back to reveal the connector.

Figure 6: TrapJumper Camera Serial Number

Prior to Use

Be aware of your surroundings and any sources of danger that may cause serious harm or even fatal injuries. Before using the X40 System, the following checks should be undertaken:

- The operator must ensure that all connectors and other interfaces are kept free from dust and dirt. Contamination will affect the systems reliability.
- All connectors should be checked to ensure they are secure and in a good, clean, working condition at regular intervals.
- A visual inspection of the cables should be performed before each use.
- Be aware of your surroundings, many accidents are caused by lack of awareness.

Risk of harm occurring must be considered before operating the equipment, as these can cause severe or fatal injuries.

⚠ **Risk of Explosion**

Explosive atmospheres can be caused by flammable gases, mists, or vapours or by combustible dusts. Pipelines containing potentially explosive atmospheres should only be surveyed using appropriately certified equipment and by operators trained in the techniques necessary to safely survey such pipelines. To undertake pipeline surveys in potentially explosive atmospheres, contact Scanprobe Techniques Ltd to discuss alternative equipment designed for such environments.

⚠ **Environmental Risk**

Contamination of drinking water sources by sewage can occur when wastewater inspection systems are used in freshwater pipelines. Never use an inspection system alternately between wastewater and freshwater surveys, as cleaning your inspection system is not sufficient to sanitise the equipment. Always use a dedicated freshwater inspection system to survey freshwater pipelines.

⚠ **Risk of Infection**

Workers whose activities bring them into contact with sewage and sewage products are at risk of contracting a work-related illness. Most illnesses are relatively mild cases of gastroenteritis, but potentially fatal diseases, such as leptospirosis (Weil's disease) and hepatitis have been reported to HSE. Before undertaking any form of work where there is a risk of contact with sewage and sewage products, make sure you understand the risks to health and the ways you can pick up infections, use safe systems of work and wear appropriate protective equipment. Further information can be obtained the Employment Medical Advisory Service at any HSE area office within the UK, or through the HSE website at www.hse.gov.uk.

⚠ **Electric Shock**

Check the connector cable and pushrod are undamaged and cannot be bent or crushed. If damage has occurred, disconnect the power supply immediately and inform Scanprobe Techniques Ltd. customer service team or an authorised Scanprobe repair centre.

Ensure no liquid can enter the control box or coiler hub. Fit all rubber blanking bungs and check that the connector facia rubber flap is closed tight when operating in the rain. When the survey is finished wipe the rubber keypad dry and leave the lid open in a warm environment to allow any condensation to evaporate. When using the Maxprobe™ CCU, if any water has penetrated the box, do not connect the CCU to the mains and inform Scanprobe immediately.

Electrical work on the X40 System must only be carried out by Scanprobe Techniques Ltd or Scanprobe trained specialist engineers.

Planning and Organisation

The X40 camera system is designed and manufactured in accordance with EU Safety regulations. Nevertheless, when undertaking pipeline inspections, accidents can happen. These could endanger life or cause serious injuries for the user or third parties and could damage the inspection system itself as well as other machinery and property.

The operator of this camera system is bound to guarantee a safe and secure operation of the system. This can be achieved by the following measures:

- Ensure this user manual is always kept to the operator should he need it.
- Make sure the operators are familiar with the user manual.
- Keep all records of maintenance and care work undertaken.
- Attend training courses on a regular basis.
- Regularly check the safe working practices and risk awareness of staff.

The staff responsible for operation, maintenance and upgrade work must be trained or receive specific instructions from somebody with the specialist knowledge. Due to their professional training and experience these trained specialists will have sufficient knowledge on camera inspection systems, their components, and accessories. They will be familiar with the relevant work safety and accident prevention regulations and the general norms and standards to an extent that they are capable of judging that the inspection system is safe to operate.

- Identify, read, and follow, the operating instructions for your workplace.
- Adhere to the relevant accident prevention regulations.
- Obtain advice for the handling of hazardous substances.
- Follow all safety instructions as described in this document.

As the operator of the X40 Camera System, it is your responsibility to ensure the following:

- Use the camera system exclusively for the works described in the Intended Use section of this document.
- Adhere to the Intended Use section of this document for this inspection system, as defined in this user manual.
- Keep the equipment clean and well organised. Follow the “After Use, Care and Maintenance” instructions for this purpose.

X40 Use

Power Button

To power up your X40 coiler, please ensure there is significant charge in the battery within the unit. Please refer to the X-Range charging procedure for further details.

The ON/OFF button located on the side of the X40 has uses the following functionality:

While Unit is Powered Down:

Button Push	Action
Less than 2s	System turns on
Greater then 2s	No action

While Unit is Powered Up:

Button Push	Action
Less than 2s	Turn on/off Sonde
Press held for >3s	Start power down sequence
Held >20s	Hard shutdown

Table 1: Multifunction Button Actions

Follow these guidelines to turn your X40 ON /OFF and to use the sonde function.

Connectivity

Care should be taken when making and breaking connections using the various system connectors, as using excess force can damage the environmental seals and allow water to enter the system enclosures.

X40 Connections

To connect the charging cable or Maxprobe™ CCU, the same connector on the X40 is used. First align the connectors using the white line as a reference and then push the connector on gently and twist the outer shell a quarter of a turn until it locks in position (see Figure 7). Note that you cannot charge the X40 system while using the Maxprobe™ CCU.

Figure 7: CCU and Charger Connector

⚠ **Warning:**

Do not force the connector as this will result in damage. If you're struggling to get the connectors to mate, check the keyway is aligned and there is no dirt obstructing connectivity.

To connect a mobile device, simply push your device's data lead into the USB-C port, located above the charging connector.

Camera connection and removal

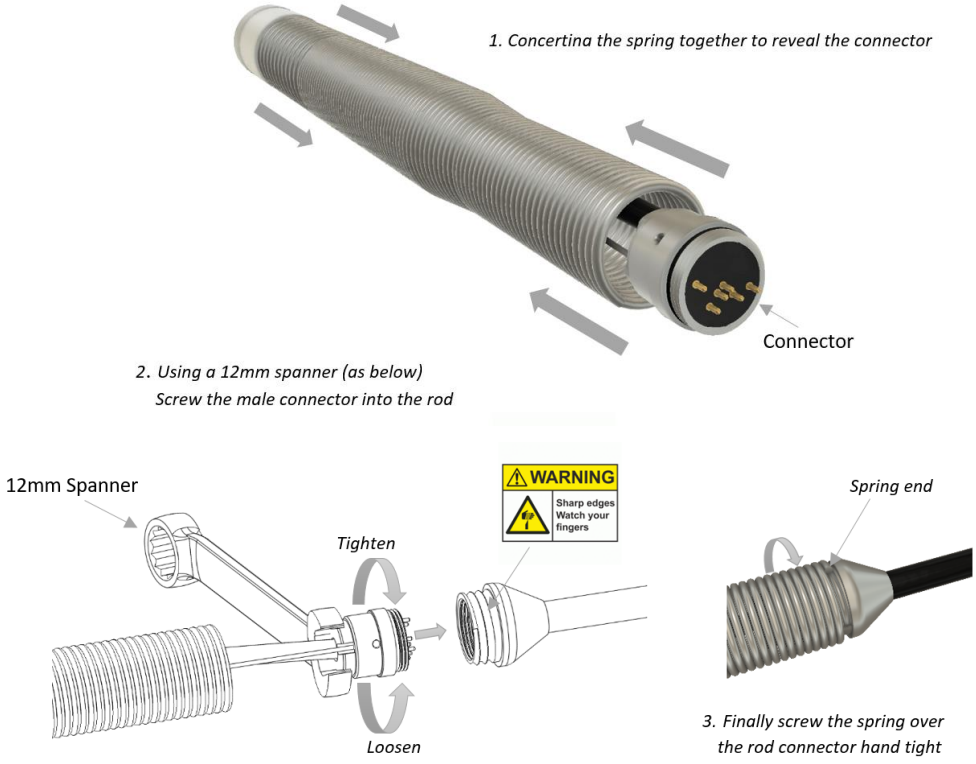


Figure 8: Connecting the TrapJumper Camera

Repeat the process in reverse to remove the camera.

Note

If the spring is difficult to unscrew when removing the camera, use the camera removal tool provided in the accessory kit. Align the inner tool with the end of the spring (see Figure 8) and apply the required force.

Note

Always ensure the connector is clean and the electrical contacts always remain grease free.

Warning

Always wear gloves; the spring thread contains sharp edges and should not be touched without hand protection. Use mole grips to hold the pushrod connector if you are having difficulty unscrewing the connector. Take care with the connector thread and avoid extreme force when tightening and loosening the connectors. Do not over tighten, as you may damage the camera connector contacts.

Charging procedure

To begin charging, connect the X-Range Battery Charger (Part No. 1007-3001-0) to the CCU and Charger connector, then connect the charger to mains power. The Status LED indicates the status of the system as illustrated in Table 2.

Table 2: LED State

State	LED State
Charger connected, fully charged	Solid green
Charger connected, charging	Solid red
Charger connected, charging fault	Solid amber
System running, Battery >50%	Solid green
System running, Battery 10% to 50%	Solid amber
System running, Battery <10%	Solid red

Lithium Battery Shipping

The X40 lithium-ion battery pack contains lithium ion cells and are subject to shipping regulations. Certification for the requirements of UN38.3 can be provided by Scanprobe Techniques Ltd. The X40 battery pack is less than the 100Wh shipping limit permissible for each battery.

Warning!

Damaged batteries or cells must never be sent by courier or mail service. If the X40 System has been damaged and the batteries are exposed or show signs of damage, call Scanprobe or an approved service centre and follow their advice.

Battery Maintenance

Lithium ion batteries do not suffer from the same memory effect that nickel-cadmium batteries suffered from; lithium ion battery life can be extended by performing shallow discharges and recharges rather than fully discharging the battery pack before recharging. For maximum battery life, recharge the battery when it reaches 50% charge, and charge to between 80-90% of the maximum capacity. Do not leave the X40 system plugged into the charger once the battery is fully charged, as this will also degrade the battery life.

Connectivity

The X40 System has been designed with connectivity in mind. The X40 System is designed to be controlled by smart phones, iPads, tablets and the Maxprobe CCU.

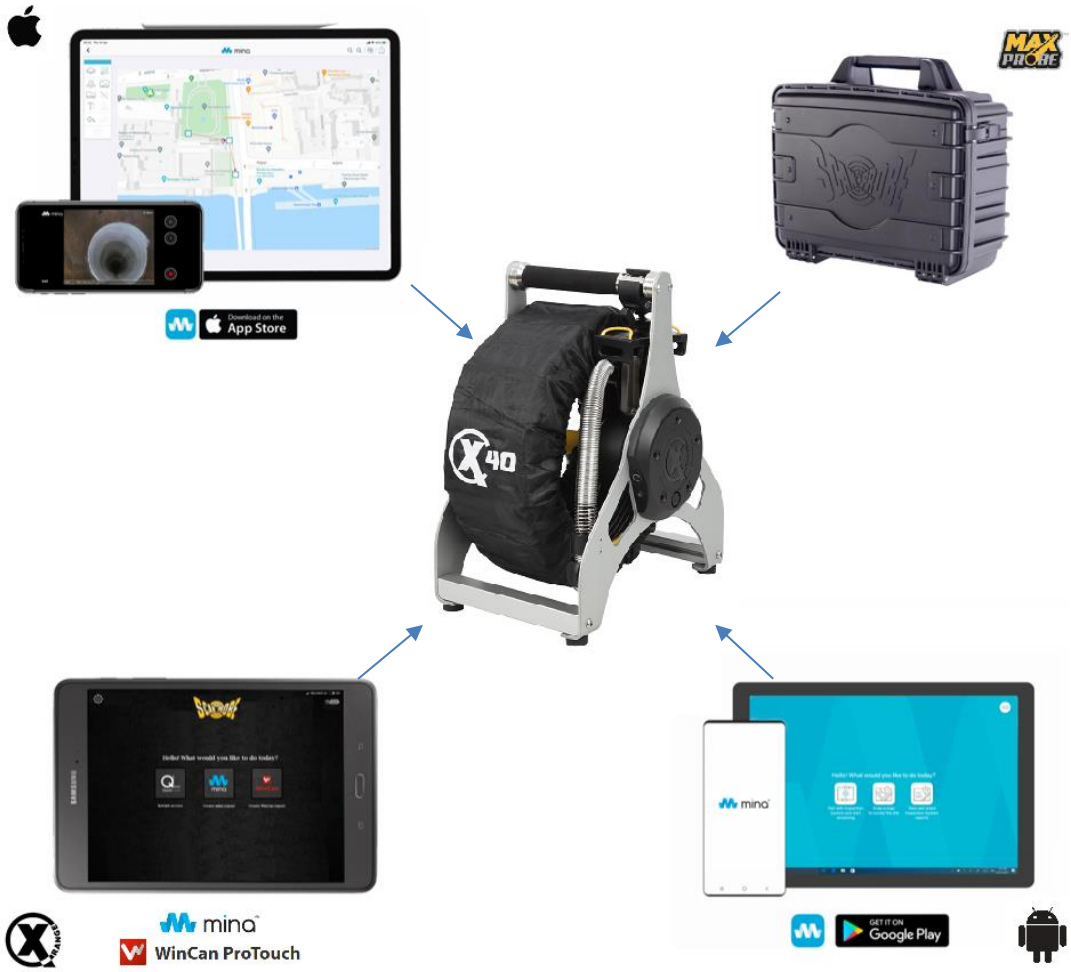


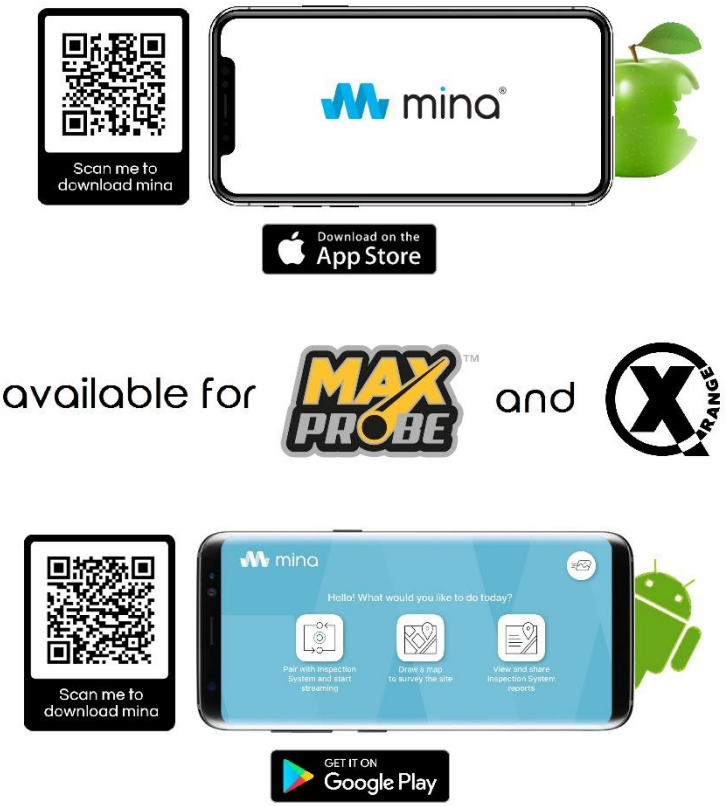
Figure 9: X-Range Connectivity

Maxprobe CCU

The Maxprobe CCU is a bespoke control unit specifically designed for the use in the pipeline inspection sector. This device is designed for use across the Scanprobe range of pipeline inspection systems, it is IP56 rated for outdoor use and has the capability of creating industry-recognised WRc reports using “mina”, “WinCan VX” or “WinCan Web” applications.

mina

The mina application can be downloaded on, and is compatible with, most iOS and Android devices. When used in conjunction with any X-Range product, it will give the user the ability to control the coiler functions, stream live video and (with a small subscription fee) create a small video report that will include text overlay and meterage. This option is ideal for those engineers who are new to the surveying world or to professionals with an occasional need to provide reports for pipeline inspections.



X-Range App

The X-Range application is a bespoke software platform designed to incorporate all the functionality of the Maxprobe™ CCU on a tablet and offers all the benefits that come with tablet designs i.e., touch screen, multiple sharing options, light-weight design. etc.

The X-Range application offers three options:

1. **Look-see:** This option allows users quick access to the video stream without the need to start a report. Users can record live, include text overlay, meterage, all the coiler functions and create a compact video ready to give to a client.
2. **mina Pro:** All the functionality of mina but with the added option to create a report. Users can personalise documents with company logos, and the software guides the user through the process of a pipeline inspection survey to create an industry recognised PDF report that can be edited and shared via email or any other sharing platform.
3. **WinCan ProTouch**: All the features you expect from WinCan at the touch of a button. WinCan ProTouch provides everything you need to easily document inspections with zoom and push cameras. Data captured by ProTouch can be used directly in WinCan VX for advanced reporting, filtering/query, GIS-Integration and WSA, WRc, EN13508 compliance.

Application Support

There is online help available within the "mina" and X-Range applications, using the "help" icon found within the software, or on the Maxprobe™ CCU by hitting the "Help" button on the keyboard. Alternatively, you can speak to one of our team by contacting the service department at Scanprobe.

Accessories

The X40 System is provided with the following:

Figure 10: Illustration of X40 System Accessories

If replacements are required, these can be purchased separately from Scanprobe or your authorised service centre. If required, the X-Range to Maxprobe Cable (Part No. 1007-2061-0) is also available for separate purchase; this item is not provided as standard with an X40 System, unless the X40 System is purchased with a Maxprobe™ CCU.

After Use, Care and Maintenance

- **Maintenance:**

  Do not use a high-pressure water jet (i.e., a pressure washer) to clean down the X40 System. Water may get into the coiler, and damage may occur to the protective seals, batteries, and printed circuit boards. To clean your pipeline inspection system, use a hosepipe and a damp cloth whilst the camera and all connectors are attached.

- **Maintenance:**

  To prolong battery life, the system should be stored and charged at temperatures between +10°C and +45°C.

The individual system components should be kept clean and in good condition to increase the longevity of your X40 System and to reduce the risk to the operator while operating the system. Maintaining the system in a clean working condition will also reduce abrasion and other wear and tear on the components while in use to significantly extend the operational life of the system and it will help to minimise repairs.

The X40 System should be kept clean by washing down with a hosepipe regularly. Connectors can be disconnected and cleaned using an air duster or a small amount of Isopropanol Alcohol on a cotton bud to remove any dirt. The pushrod can be cleaned by running the pushrod back in through a dampened cloth or towel to remove any detritus after each use.

Do not force the connectors together, as this may break the pins.

Always use the provided protection caps when transporting and ensure that cables do not get tangled up. Never deliberately bend any of the X40 System's cables. Perform a visual inspection of the cables prior to use and get the cable repaired or replaced as soon as any damage occurs or is found.

After use, the X40 System should be recharged by connecting the X-Range Battery Charger to the X40 System then plugging the charger into a suitable indoor mains power source.

Repairs

⚠ **Warning:**

The Maxprobe™ CCU, X40 Coiler and TrapJumper Camera have no user serviceable parts. Opening these enclosures may be dangerous and is liable to damage or destroy the seals protecting this equipment.

Due to the specialist knowledge and tools required to repair and reseal the X40 System components and verify that these repairs have been completed correctly, all repair work should only be undertaken by Scanprobe Techniques Limited, agents explicitly authorised by Scanprobe Techniques Limited, or following explicit direction from Scanprobe Techniques Limited.

Undertaking repair or modification work without Scanprobe Techniques Limited consent and authorisation is forbidden. Undertaking any unauthorised repair or modifications to the X40 System will invalidate the warranty.

User Notes

X40 Data Sheet

There is nothing usual about the X-Range, and the X40 is just the beginning. Our first drainage inspection camera system to come with multiple control & surveying options. You can use:

1) your own mobile phone/tablet (IOS or Android)
   i) with a free looksee app (mina) you can download, or
   ii) a reporting app with a monthly subscription
2) a bespoke tablet with full mina & WinCan ProTouch
3) a Scanprobe control box with full mina & WinCan embedded capabilities

The X40 rod and camera are designed to be flexible enough to pass through trap bends but rigid enough to push the distance in abrasive pipes.

Rod Length	40 metres / 130 foot
Rod Diameter	8.0mm
Coiler Weight	12.0 kg
Coiler Dimensions	W 296cm, H 483cm, L 392cm
Camera Diameter	30mm
Pipe Use	50mm to 150mm Ø, 2" to 6" Ø
Sonde/Beacon	33kHz or 512Hz (optional)
Meterage Counter	Yes
Self-levelling camera	Yes
Camera Resolution	PAL: 720Hx576V
Light Source	12 LED
Operating Temperature	-10°C - +50°C
Output	USB-C
Battery type	Li-ion
Battery Life	Up to 6 hours
Capacity	6.52Ah
Charge Current	1.5A
Nominal Voltage	7.4V
IP Rating	Camera: IP68, Coiler: IP54
Approvals	CE and UKCA

WinCan mina®

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D1/Sep21/Rev1/BG

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