

SOLO Pro 360

Pipeline Inspection System

Users Guide



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Notice

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Company Registered in England & Wales No: 3728693

VAT Reg No: GB693035920

Certification

Mini-Cam Ltd. certifies that this product met its published specifications at the time of shipment from the factory.

Regulatory Information

CE Declaration

We Mini-Cam Ltd. Unit 4 Yew Tree Way, Stonecross Park, Golborne, Warrington, WA3 3JD hereby declare that the product SOLO Pro Pipeline Inspection System, part no CCU-205 to which this declaration refers is in compliance with the following standards or standardizing documents:

EN61000-6-2:2005 Generic standards – Immunity for industrial environments

EN61000-6-4:2007 Generic standards – Emission for industrial environments

EN61204-7:2006 Safety requirements – Low-voltage power supplies DC output

The following are the stipulated operating and environmental conditions for said compliance:

Residential, business, commercial, small-company and light industrial environments.

This declaration is based on test report(s) of the relevant EMC testing laboratory.

Operator Safety

The SoloPro 360 Pan and Rotate camera has externally accessible moving parts. Please ensure that care is taken when handling the camera as, under certain circumstances, these parts can move without warning.

FCC Declaration

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

LIMITED WARRANTY

Congratulations on the purchase of your new MINI-CAM SOLO Pro 360 Inspection System. Our products are the result of many years of experience and continuous development.

Conscientious manufacturing and checking are essential objectives in our company. Nevertheless failures cannot be excluded totally. If this occurs, you are covered by our generous warranty.

Please consider that even the best products can only be durable and work properly with the right handling and maintenance.

EXTENT OF THE LIMITED WARRANTY

MINI-CAM LTD warrants that your equipment will be in good working condition and free of defects in material and workmanship for a period of one year.

If a failure occurs, which is provable due to a defect in material and/or workmanship, we will remedy it during the warranty period free of charge. We reserve the right, at our option, to repair the equipment or to replace the whole unit or the faulty parts or to refund the then-current value of the equipment, if we are unable to repair or replace the unit.

The warranty is a 'return to base' warranty and we are not liable for any shipping costs.

CONDITIONS OF THE LIMITED WARRANTY

Disassembling the camera, coiler, control unit or any part of the system, without approval of the manufacturer, is forbidden! Non-compliance of this direction will result in the loss of the warranty.

The beginning of the warranty period is the date of delivery.

This limited warranty does not cover damage due to improper treatment of the system, inadequate maintenance, alteration, repair, normal wear and tear or external causes like lightning, fire or frost.

The warranty does not cover "wear and tear" parts like front camera lenses, O-rings, cable, push rod etc.

If you want to obtain warranty service please return the system with the original invoice to your dealer or the closest service centre. EQUIPMENT RETURNED MUST BE CONSIGNED CARRIAGE PAID. WE WILL NOT BE LIABLE FOR CARRIAGE COSTS.

WARRANTY LIMITATIONS

Our responsibility under this warranty is limited to repair, replacement or refund, as set forth above.

MINI-CAM LTD is not responsible for direct, special, incidental or consequential damages resulting from any breach of warranty including lost profits, downtime, goodwill, damage to or replacement of equipment and/or property.

COMPLIANCE

This instrument has been designed and tested in accordance with IEC Publication 348, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

SAFETY NOTES

The following safety notes are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument.

WARNING

Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.

CAUTION

Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

General Safety Considerations

WARNING!

No operator serviceable parts inside. Refer servicing to qualified personnel at Mini-Cam Ltd or one of our authorised dealers. To prevent damage, do not remove any covers.

If this instrument is not used as specified, the protection provided by the equipment may be impaired. This instrument must be used in a normal condition (in which all means for protection are intact) only.

CE

The CE mark is a registered trademark of the European Community (If accompanied by a year, it is when the design was proven).

Manual Conventions

Keyboard Key

This represents a key physically located on the instrument keyboard of the instrument.

'Softkey'

This indicates a "softkey," a key whose label is determined by the firmware of the instrument.

Screen Text

This indicates text displayed on the instruments screen.

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1 Preparing for Use

1.1 What you'll find in this chapter

This chapter describes the process of getting the SOLO Pro 360 Pipeline Inspection System ready to use when you have just received it.

1.2 Initial Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, keep it until you have verified that the contents are complete and you have tested your SOLO Pro 360 mechanically and electrically.

"Accessories" contains the accessories shipped with SOLO Pro 360. If the contents are incomplete or if SOLO Pro 360 does not operate as you would expect, notify the nearest Mini-Cam office or authorised dealer. If the shipping container is damaged or the cushioning material shows signs of stress, also notify the carrier. Keep the shipping materials for the carrier's inspection. The Mini-Cam office will arrange for repair or replacement without waiting for a claim settlement.

If the shipping materials are in good condition, retain them for possible future use, you may wish to ship your SOLO Pro 360 to another location or return it to Mini-Cam Ltd for service.

1.3 Power Supplies

The SOLO Pro 360 unit will operate from an external **12 volt DC** power source or from internal batteries. The external power source will also charge the internal batteries when connected.

Operating the unit while the batteries are being charged has no effect whatsoever on the time taken to recharge the batteries.

The external power source must be **12 volt DC** nominal and the unit may consume up to 2.5 Amps if operated while the internal batteries are being charged.

1.4 Battery charging

When you receive your SOLO Pro 360 unit, the batteries will be in a partially discharged state. It is recommended that the unit is fully charged before use. The equipment may be used while the batteries are being charged from a mains or **12 volt DC** car/van battery supply, but should not be used on internal battery supply until the batteries have been fully charged.

To charge the batteries, connect the power inlet socket on the rear of the unit to either the **12 volt DC** mains power supply unit, or the **12 volt DC** 'cigarette lighter' lead to a **12 volt DC** supply. The red 'charging' indicators on the front and rear of the unit should illuminate, showing that battery charging is in progress. The batteries should be fully charged within 8 hours (from empty – partially charged batteries will take less time) at which point the 'charging' indicators will extinguish and the green 'charged' indicator on the rear of the unit will illuminate.

When the batteries are fully charged, the battery charger automatically switches off, preventing battery damage due to overcharging. Therefore the external power supply may be left connected and switched 'on' indefinitely with no ill effects.

Never plug the control unit into a power supply source that is

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WARNING: more than 12 volts DC nominal.
Failure to ignore this will result in system damage and invalid any warranty.

1.5 Physical Installation

To install the SOLO Pro 360 on to a push camera coiler align the two vertical pillars on the top of the coiler with the receptacles behind the aluminium plates on the lower rear of the SOLO Pro 360 unit and push down to locate.

Connect the curly lead supplied with the coiler to the 'Coiler In' connector on the rear of the SOLO Pro 360 unit (having first removed the connector dust cover).

N.B. The unit does not need to be installed on the coiler to operate. It can be operated stand alone for setting up, viewing recorded surveys and generating reports.

It only needs to be installed on a coiler when actually performing a survey.

1.6 Switching On

If you are using the SOLO Pro 360 control unit with the Pan & Rotate camera the system must be fully connected before turning the system on.

It is important to note that the SOLO Pro 360 control unit will automatically detect whether a standard self-levelling camera or a Pan & Rotate camera is connected. This is done at power up.

Should the SOLO Pro 360 control unit be powered up without being connected to the coiler without Pan & Rotate camera it then assumed that a standard self-levelling camera is attached. You will not be able to control the Pan & Rotate camera functions unless you reboot the control unit.

To switch the SOLO Pro 360 on, press the on/off power button on the front panel (to the left of the screen). The green 'Power' indicator will start to flash to show that the unit is initialising. This will take approximately 35 seconds. Nothing will appear on the screen until this process has completed.

When the SOLO Pro control unit has initialised the green 'Power' indicator stops flashing and is permanently illuminated. The Mini-Cam logo will now be displayed on the screen. When the Mini-Cam logo disappears the live video picture from the push-rod camera will be shown, surrounded by a selection of icons showing system status.

If a camera or coiler is not connected then the screen will remain black but the icons will still be displayed.

1.7 Switching Off

To switch the SOLO Pro 360 off, press the on/off power button and a dialogue will be displayed asking for confirmation. Press down on the joystick or press the Carriage Return key and the unit will switch off in a controlled fashion.

Under extreme circumstances, the unit may fail to turn off in this fashion, in which case, press and hold the on/off power button for 10 seconds; when the power button is then released the unit will turn off.

2 Display Features

2.1 What you'll find in this chapter

This chapter describes the characteristics of the front panel LCD display.

2.2 Introduction

The front panel of the SOLO Pro 360 unit houses an 8" Liquid Crystal Display (LCD) which is used to display live and recorded video and on screen menus. The display parameters such as contrast, brightness, colour and backlight intensity may be adjusted to suit the environment in which the unit is being viewed.



The live or recorded video picture is displayed in the left portion of the screen.

The right hand side is used to display a number of status icons which are seen on the screen but are not recorded.

There are areas of text at the bottom of the picture showing date, time and camera meterage. This text is recorded with the video picture.

Text can also be entered manually anywhere on the display. This is free text and is used to annotate the survey and is recorded with the video picture. The colour and position of this text may be controlled with dedicated keys on the keypad.

There is an area below the picture where the filename of a recorded or played back video file is displayed. This is not recorded with the picture.

If power saving mode is enabled, the screen backlight intensity will automatically reduce to a low level if the keypad is not used for a pre-set time period returning to its normal intensity when any key is pressed.

2.3 Status Icons

The status Icons are shown in Fig 1.1 and described below:-



Camera status – This shows whether or not there is a video signal available from the push-rod camera. If the camera is not connected or faulty, then a red cross appears over the icon.



Internal memory – The 'gauge' to the right of this icon shows the available capacity of the internal memory as a fraction of the total capacity. The 'used' proportion of the internal memory is shown as the un-coloured bars at the top of the gauge and the available portion is shown as the coloured bars at the bottom of the gauge.



SD/MMC card memory - The 'gauge' to the right of this icon shows the available capacity of an SD (secure digital) or MMC (Multimedia Card) memory card in the front panel memory card receptacle, as a fraction of the total memory card capacity.



External USB memory - The 'gauge' to the right of this icon shows the available capacity of a memory 'stick' in the front panel USB socket, as a fraction of the total memory stick capacity.



Internal battery – This Icon shows whether an external power source is available (power plug icon) or if the unit is operating on internal batteries (battery icon). The 'gauge' to the right of this icon shows the available capacity of internal batteries as a fraction of their total capacity. The available proportion of the internal battery is shown as the coloured bars at the bottom of the gauge, a fully charged battery showing all coloured bars and a fully discharged battery showing no coloured bars.



The gauge shows battery capacity available while the unit is being operated on battery and the charge state when the unit is being operated from an external power source. When connected to an external power source, the battery icon is replaced with a 'power plug' icon and when the battery is charging a 'lightning strike' symbol appears to the right of this icon.

2.4 Display Brightness

The display brightness may be controlled by pressing **Fn** followed by the Camera Illumination key  in the top row of the keyboard keys. This will cause a 'bar' to be displayed which shows the current level of display brightness. Moving the joystick left will decrease the brightness and moving the joystick right will increase it.

3 Keyboard

3.1 What you'll find in this chapter

This chapter describes how functions are selected from the keyboard.

3.2 Keyboard description.

The keyboard may be divided into several sections as shown in Fig 3.1 (below).

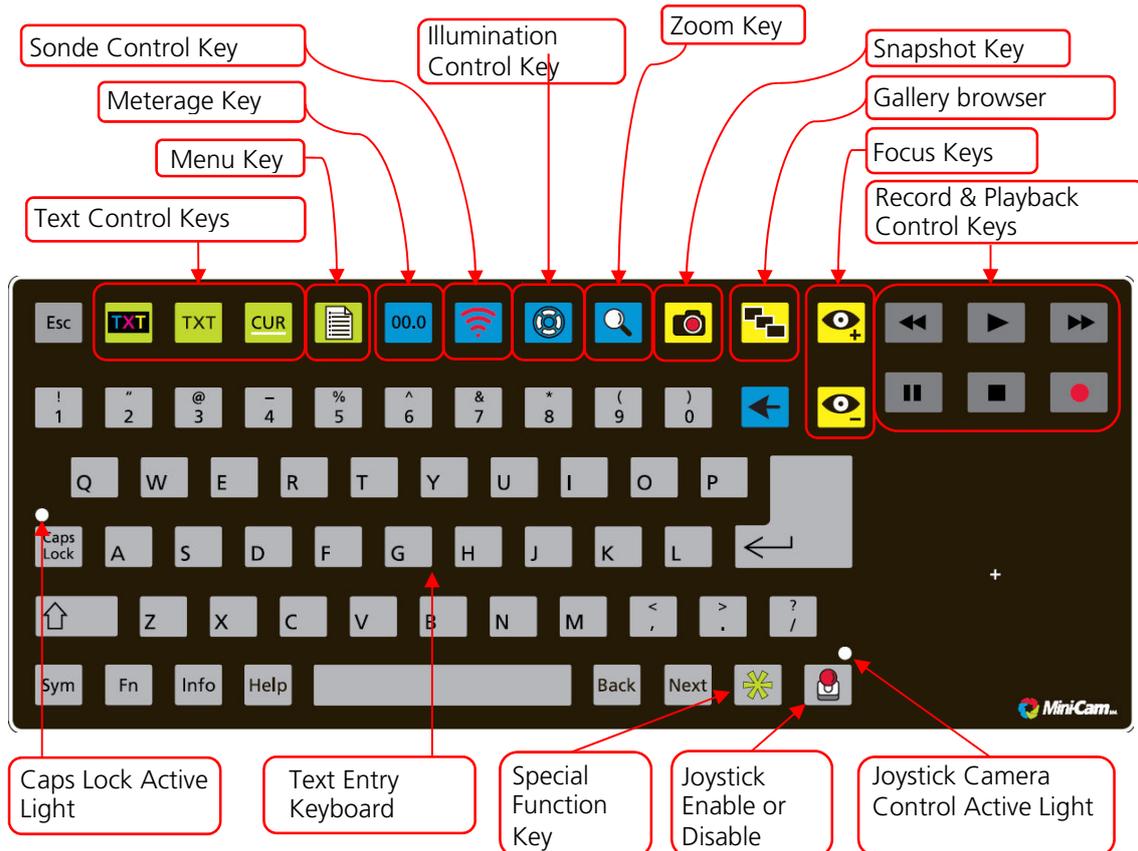


Fig 3.1 Keyboard layout

The **Help** key can be used to display a screen on which all the key symbols are identified.

3.3 Text Control Keys

These three keys are used to create a report pro-forma by altering the free text that appears on the screen. This free text is recorded on top of the survey video.



This key allows the user to control the colour of the text and the background on which the text appears.



This key turns the free text on and off. Thus the user can turn free text on, change the colour as required, type in identification information which is recorded on the video picture and then turn the free text off.



This key turns the cursor on and off. The cursor when on indicates where text is to be entered.

3.4 Menu Key



This key displays the setup menu (See chapter 4).

For ProPipe & WinCan users this key is also used to raise defects during surveys. Consult the relevant ProPipe/WinCan manual for further information.

3.5 Meterage Key



This key can be used to reset the distance counter to zero or to a pre-set distance.

3.6 Sonde Control Key



This key turns the Sonde locator beacon on and off. When the Sonde is ON, an icon on the screen will flash to indicate this feature is active to the operator.

3.7 Illumination Control Key



This key controls the intensity of the camera illumination. Pressing this key causes a 'bar' to be displayed on screen which shows the current level of camera illumination. Moving the joystick to the left will decrease the level and moving the joystick to the right will increase it.

You can control the backlight illumination by pressing the **Fn** key first followed by this illumination key.

3.8 Zoom Key



This key controls the level of digital zoom. Press this key to cycle through the zoom factors of 1.5x, 2x and 3x. A fourth press will return to the normal view. A flashing zoom icon on the right hand side of the LCD will indicate this function is active and

the current zoom factor. This may be used whilst viewing live video, recording, or playing back recorded video.

3.9 Snapshot Key



This key generates a snapshot picture of the video currently being displayed. This may be used whilst viewing live video, recording or playing back recorded video. If the video being viewed is 'zoomed in' then the snapshot will be of the 'zoomed in' view.

3.10 Gallery Browser



This key is the Gallery Browser key and this is used to view, copy, move and delete any of the stored video or image files across internal and external memory. The functions which may be invoked by this key are further described in section 5.

3.11 Focus Keys



The focus keys are used solely on the Pan & Rotate camera to allow the user to focus the camera on objects near or far from the camera.

3.12 Recorder Control Keys

These keys control the recording and playback functions in the same way as a commercial video tape recorder. These functions are explained in detail in section 6.

3.13 Joystick Enable Key



This key enables/disables the joystick control of the Pan & Rotate camera.

When enabled the green light will illuminate and the joystick will control the Pan & Rotate camera only.

When disabled the green light will be extinguished and the joystick will navigate the free text and menu system only.

3.14 Special Function Key



This key is used when the joystick control of the Pan & Rotate camera is enabled. It brings up a special menu especially for Pan & Rotate camera functions.

3.15 Other Function Keys



This key is the **Symbol** key which allows you to select graphic symbols or commonly used symbols and foreign characters which may be added to any test field on the screen. Use the joystick to move around the array and press down on the joystick to select a character.



This key is the **Function** key which allows special functions to be selected. An example is the onscreen Time, Date and Meterage text. By pressing **Fn** followed by the **TXI** key in the top row this will allow you to change the colour of the text.



This key manipulates the position and visibility of the Time, Date and Meterage text. It is explained in further detail in section 7.3



The help key displays the help screen displaying the meaning of the key symbols, identifies the owner name, and serial number of the CCU. The current software version is also displayed in the title bar of the help screen.

3.16 Text Entry Keyboard

These keys have the same function as a conventional computer keyboard.

If a single upper case character is required, the **Shift** key should be pressed first and then the required text key.

If all upper case characters are required the **Caps Lock** key should be pressed. All subsequent text keys will cause upper case characters to appear, until the **Caps Lock** key is pressed for a second time.

When the Caps Lock function is active a green light above the key will illuminate to inform the user that Caps Lock mode is active.

4 Setup Menus

4.1 What you'll find in this chapter

Your SOLO Pro 360 CCU can be configured for your specific requirements using the setup menus; this chapter describes how to customize the operation of your SOLO Pro 360 CCU.

4.2 Enter Setup

To display the setup menu press the **Menu** key (See fig 3.1). The following menu will then be displayed:-

- Files and Formats
 - ↳Base Filename
 - ↳Video File Format
 - ↳Theme
 - ↳Licences
- Time and Date
- Camera
 - ↳External Monitor (*If option installed*)
 - ↳Joystick Flight Mode
 - ↳Colour Level
 - ↳Brightness
 - ↳Hue
 - ↳Contrast
- Power Saving
 - ↳Camera and LCD Dimming
 - ↳Automatic Shutdown
- Sonde
 - ↳Not using Sonde
 - ↳Sonde 512Hz
 - ↳Sonde 640Hz
 - ↳Sonde 33kHz
- Software Update
- Service Centre

Each of these setup functions will be described in detail.

4.3 Files and Formats

This menu entry allows the user to select the default filename and file format.

↳Base filename

When recording a survey, SOLO Pro 360 automatically creates a filename which is made up from the date (in YYMMDD format) followed by an underscore character followed by the time (in HHMM format) followed by the default base filename. Thus the default filename can be set to be the company or industry standard and all recorded files will automatically be given a unique filename based on this default.

An example filename is shown below:-

100106_1059-Minicam.avi

This indicates that the file was recorded on the 6th January 2010 and started at 10:59. Mini-Cam is the default filename and .avi shows that the file is in the motion video AVI format

↳Video File Format

.AVI (MPEG4) is a motion video file which can be played back using WinCan v7 and v8, Windows Media Player and most other third party readers.

Please note that an additional codec may need to be installed on the host PC to play back video files. We recommend DivX.

↳Theme

This feature allows the user to select the colour theme used for the menu system on SOLO Pro 360.

↳Licences

This feature allows the user to install or view currently installed licences on the SOLO Pro 360. Certain features require a licence to be installed to activate them i.e. ProPipe Report and WinCan.

4.4 Time and Date

This menu allows the time and date to be set for the local area. Having selected the **Time and Date** option move the joystick up or down to change the highlighted number then move it left and right to move from one field to another.

When you have set the date and time press down on the joystick to save and return to the setup menu.

4.5 Camera

↳External Monitor

This is a cost option on SOLO Pro 360. If installed you can turn the video output ON/OFF by selecting this option. When ON a green tick sits alongside this option to signify that it is active.

↳Joystick Flight Mode

Inverts the joystick 'Y' axis control of the Pan & Rotate camera.

↳Colour Level

Adjusts the colour level of the picture. Move the joystick left or right to change the setting. Press '0' to reset to default setting.

↳Brightness

Adjusts the Brightness of the picture. Move the joystick left or right to change the setting. Press '0' to reset to default setting.

↳Hue

Adjusts the Hue of the picture. Move the joystick left or right to change the setting. Press '0' to reset to default setting.

↳Contrast

Adjusts the Contrast of the picture. Move the joystick left or right to change the setting. Press '0' to reset to default setting.

These settings do not affect the display of the menus on the screen, only the video from the camera is affected.

4.6 Power Saving

This menu allows the user to set the power saving features of the SOLO Pro 360.

↳Camera and LCD Dimming

The camera illumination and LCD backlight will dim after a period of inactivity.

The options are: Never / 5 / 15 / 30 minutes.

↳Automatic Shutdown

When the SOLO Pro is powered only by internal batteries this feature will power down the SOLO Pro after a period of inactivity.

The options are: Never / 15 / 30 / 60 minutes.

4.7 Sonde

This feature allows the user to set the frequency of the Sonde transmitter.

By pressing the **Sonde** key the Sonde can be cycled through three states – OFF, PULSED, ON.

A symbol is displayed on the right hand side of the screen indicating the current status and frequency of the Sonde:

1) OFF			
2) PULSE ON/OFF			
3) ON			

4.8 Software Update

This feature allows the user to update the SOLO Pro software, when available, in the field using removable media such as a USB memory stick or SD card.

Selecting “Software Update” will bring up the “Software Updates Browser”. Select the removable media you are using and press down on the joystick to select.

Now highlight the update you want to install and press down on the joystick to select.

You will now be prompted to type “install”. Then press down on the joystick to confirm the update. The SOLO Pro 360 will now restart.

Onscreen text will show the status of the update.

IMPORTANT: DO NOT remove the external media during the update.

NOTE: SOLO Pro will not allow the user to use the “Software Update” feature if the internal batteries are less than 40% charged. This feature will then appear

greyed out in the menu.

4.9 Service Centre

This menu option is for sole use by Mini-Cam and its authorised dealers. As such, this option is password protected.

5 Gallery

5.1 What you'll find in this chapter

This chapter describes how the  key is used to access and manipulate recorded survey video files.

5.2 Gallery Menu

Pressing the  key displays a menu that shows which of the three main memory types is being used and the contents of that memory type.

The three memory types are:-

- 1) **Internal memory** (usually used to record video surveys)
- 2) **USB memory** (usually a memory stick plugged into the front panel connector)
- 3) **SD card memory** (an SD or MMC card inserted into the front panel slot)

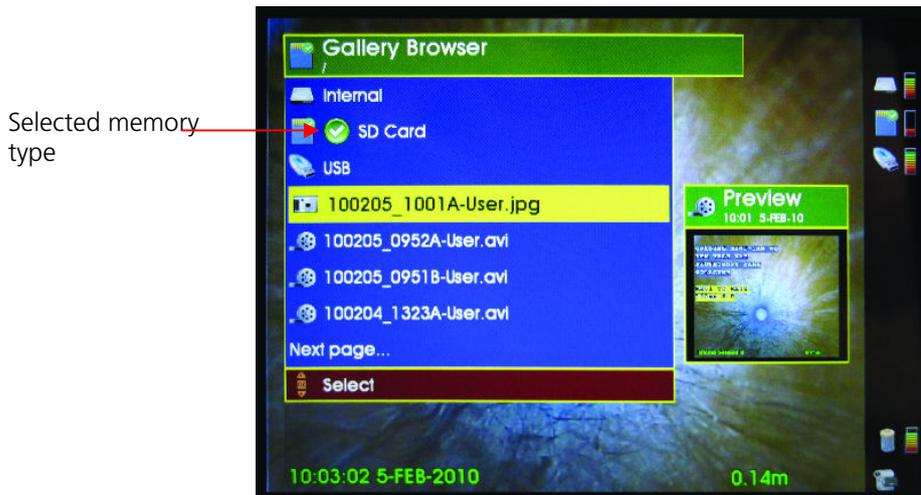
Surveys are stored in a Daily Directory which is automatically created when a survey is recorded or a picture is taken. This allows you to keep all the surveys organised by the day they were done. This is especially useful, for instance, at the end of the day when you want to copy all of the day's work from the CCU to an external media to hand into the office.

Daily Directories are named by the date they were created in the format YYMMDD, e.g 110702_Survey.dgs.

To view files contained inside the Daily Directory, highlight it and press down on the joystick and select 'explore'.

By default all Daily Directories and surveys are recorded onto internal memory and are then copied to an SD card or USB stick using the Gallery **copy** function. However, surveys may be recorded directly to an SD card or USB stick by selecting either of these as the default recording memory in the **Gallery** menu.

The memory types are shown in the gallery in the following way:-



Selected memory type

The 'tick' next to one of the memory types shows which one is selected for viewing and where the video files are automatically recorded to.

To change the selected memory type, move the cursor so that a new memory type is highlighted in yellow. Press down on the joystick and a menu is displayed with an **Explore** option. Select this option and the new memory type will now be 'ticked' to show it is now the default memory type.

The daily directories or video files in the selected memory type are then displayed in the order in which they were recorded (most recent at the top of the list). The filename shown is of the format described in the default Filename section **Error! Reference source not found.**

To select one of the files for viewing, highlight it and press down on the joystick. A sub-menu is displayed as shown below:-

- Play / Show (see note below)
- Copy to
- Rename
- Delete

Note: If the selected file is a .jpg picture, then the first menu entry is Show and if the selected file is an .mp4 or .avi movie file, then the first menu entry is Play.

5.3 Show/Play function

The **Show/Play** menu entry will be highlighted in yellow. Press down on the joystick again and the selected video will play or picture will be displayed.

An alternative way to play a video file is to press the 'play' key on the control section of the keyboard, which will play the selected file instantly.

The file list is able to display 7 files at a time, if more than 7 files have been stored in the selected memory, then a **Next Page** menu item is shown at the bottom. The next page of files may be selected by moving to this menu item and pressing down on the joystick or by pressing **Next**.

Similarly if you wish to navigate to the previous list of files, move to the **Previous Page** menu item and press down on the joystick or press **Back**.

5.4 Copy function

With the copy function the user to copy all files from one memory type to another, e.g. Copy all files from the Internal memory to the external USB memory.

It is also possible to copy a daily directory or individual file directly to another media.

To use this function open the Gallery Browser and highlight the source memory, daily directory, or file then press down on the joystick. You will now be presented with the option to copy directly to another media, e.g. Copy to SD or Copy to USB. Highlight the appropriate media and press down on the joystick.

If copying all files you will now be prompted to press "Y" to confirm copying all files.

A progress bar will show the status of the transfer. When you are copying multiple files the system will show you overall progress and individual file progress on two separate progress bars.

5.5 Rename

This function allows the user to change to file name to something more useful or meaningful.

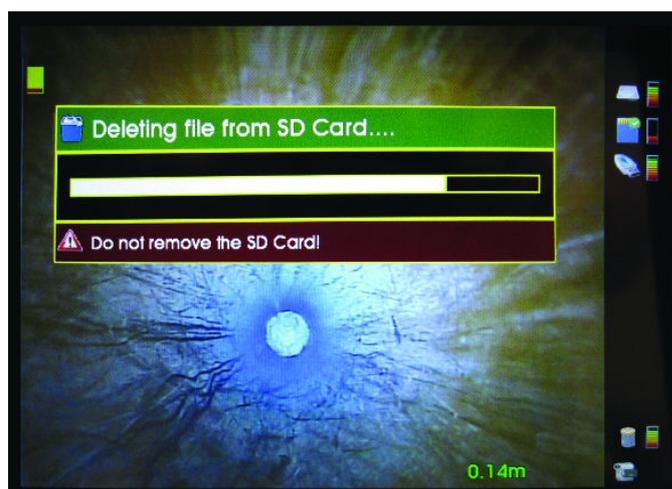
However, it does not change the entire file name. It only changes the name after the time and date stamp of the survey. This is to keep the files in order.

5.6 Delete function

The **Delete** function permanently removes the selected file from the system.

If this function is selected then a window is displayed asking the user to confirm that this file is to be deleted by pressing the 'Y' key.

N.B. The **Delete** function may take a short time to execute so to show how much of the function has been completed a progress bar is displayed on the screen (see below).



5.7 Un-mounting external memory

Before any external memory device (SD card or USB memory stick) is removed from the unit, it must be un-mounted.

To do this open the **Gallery** and select the memory which needs to be removed using the up and down actions on the joystick. Press down on the joystick and select the **Remove** option.

During the un-mounting process, the memory icon next to the fuel gauge will show a downward pointing, green arrow with a red cross over it to show that the memory should not be removed. For the SD memory and USB memories the icons will look like this:-



When it OK to remove the selected memory, the red cross will disappear so only the green arrow will remain, indicating that the memory may be removed.. For the SD memory and USB memories the icons will look like this:-



N.B: It is very important that external memory is un-mounted before it is removed. If this is not done and the memory is simply unplugged, then files on the memory device may become corrupted.

5.8 USB / SDHC Media Types

Due to variations in USB / SD flash media technology, Mini-Cam cannot guarantee that all types and sizes will function correctly. For USB we recommend a read speed of at least 15MB/s and a write speed of a least 8MB/s. For SDHC we recommend a card of CLASS 5 or higher. Therefore it is recommended that they are purchased directly from Mini-Cam or its authorised dealers.

6 Recorder Control Keys

6.1 What you'll find in this chapter

This chapter describes the functions of the Recorder Control Keys and how these can be used to make recordings and control the playback of stored surveys.

6.2 Making a recording

To start the recording of a survey, the record key  should be pressed. This will cause a recording to commence; the file name for the recording will be as defined in section **Error! Reference source not found.** This filename will be displayed at the bottom left of the screen together with an icon to show which memory type it is being recorded on. The elapsed time of the recording in minutes and seconds and a red dot  to indicate that a recording is taking place is displayed at the bottom right of the screen.

At any time the pause key  may be pressed which will pause the recording although the display will continue to show the live video and a 'pause' symbol  will be displayed, and flashes, to show that the recording has been paused. To resume the recording press either the pause key  or the record key .

To stop the recording, the stop key  should be pressed. This will cause the record filename, the recording elapsed time and the record button to be removed from the display, and a pale blue rotating 'progress' circle may appear on the right of the picture to show that the file is being saved and closed.

While this progress icon is displayed, no action, such as removing a USB memory stick or an SD card, should be attempted as it may result in corrupted or bad files.

6.3 Playing back a recording

To play back a recording, use the **Gallery** (see section 5.3) to select the .avi or .mp4 file which you wish to view, and either press down on the joystick twice (once to select the file and once to select **Play** from the sub-menu) or press the play key .

The selected video file will now start to play and the filename will be displayed at the bottom left of the screen together with an icon to show which memory type it was recorded on.

In the centre bottom of the screen, a progress bar is displayed to show the current position in the total length of the recorded file. To the right of this is the total length of the recording (in minutes and seconds) and to the right of this is the elapsed time into the recorded file (also in minutes and seconds), and finally to the right of this is a pale blue 'Play' symbol .

Once again, pause key  may be pressed which will pause the playback and the picture on the screen will become stationary and the 'pause' symbol  will be displayed, and flashes, to show that the playback has been paused. To resume playback of the recording press either the pause key  or the play key .

6.4 Fast Forward.

During playback, the playback speed may be increased by pressing the  key. Pressing this key once will cause the playback speed to advance at twice the normal speed (x2). Press this key a second time to increase the playback speed to 5 times normal speed (x5) and a third time

to increase to the fastest playback speed of 12 times normal speed (x12). To return to normal playback speed press play key .

To reduce the fast forward speed, press the rewind key , each press reducing the playback speed from 12x to 5x to 2x and finally back to normal playback speed.

While the recording is fast forwarding, the 'play' symbol on the screen  becomes a 'fast-forward' symbol  with the fast forward speed being displayed to the right as x2, x5 or x12.

6.5 Fast Rewind

Fast Rewind is similar to fast forward except that there are only two rewind speeds, times five (x5) and times 12 (x12). While the recording is rewinding, the play symbol on the screen  becomes a 'rewind' symbol  with the rewind speed being displayed to the right as x5 or x12.

6.6 Zoom

The survey picture may be zoomed in to see small details in the survey.

To zoom in press the Zoom key (see section 3.4). Pressing this key once will zoom in by a factor of 1.5, pressing a second time will increase the zoom ratio to 2 and pressing a third time will increase it to 3. Pressing this key a fourth time returns the picture to normal view.

At each stage of zoom, the area of the total survey picture which is being viewed on the screen is shown as a red box on a white background in the bottom left of the picture. The area which is viewed in zoom mode can be moved around the survey picture using the joystick control.

If the survey picture is zoomed in during a recording then the zoomed view will be recorded together with the red on white symbol to show which area of the survey picture is being viewed.

6.7 Snapshot capture

While a survey is being recorded or played back, a still image may be captured and stored by pressing the snapshot key  (see section 3.9). The still image will be stored as a .jpg still image using the default filename as described in section **Error! Reference source not found.**

Snapshots may be taken whilst recording or playing back a survey. If a snapshot is taken whilst the picture is zoomed in (see section 6.6) then it will be the 'zoomed' image which is stored as the snapshot.

7 Text Entry, Symbols and Graphics

7.1 What you'll find in this chapter

This chapter describes the way in which free text and onscreen graphics may be entered on to the screen for recording with the survey video. It also shows how the date, time and meterage information may be manipulated.

7.2 Date, Time and meterage display

By default, the date and time are displayed in the lower left of the picture and the meterage is displayed in the lower right.

If the Info key **Info** is pressed, the date and time are removed so just the meterage is displayed in the lower right of the picture.

If the Info key **Info** is pressed a second time, the date and time are replaced in the upper left of the picture and the meterage is moved to the upper right.

If the Info key **Info** is pressed for a third time, the date and time are removed so just the meterage is displayed in the upper right of the picture.

If the Info key **Info** is pressed for a fourth time, all the date, time and meterage text is removed.

If the Info key **Info** is pressed for a fifth time, the date and time are replaced in the lower left of the picture and the meterage is replaced in the lower right.

7.3 Meterage setting.

If the **00.0** key is pressed, then the meterage value displayed will start to flash, indicating that it can be set. If the zero key followed by pressing down on the joystick then the meterage value will be set to zero and the display will stop flashing.

Alternatively, while the value is flashing, the joystick is moved up or down to increase and decrease the meterage value in increments of 0.1 metres. When the correct value has been set, press down on the joystick to set the meterage to the displayed value.

To change the units used for the meterage display, press **Fn** followed by the **00.0** key. This will cycle the units between the following settings:-

- a) Metres and decimals of a metre.
- b) Metres and centimeters
- c) Feet and inches
- d) Inches and decimals of an inch.

7.4 Free Text Entry

Free text may be typed on the screen using the text entry keys. Free text can be turned on and off and manipulated whilst a survey is being recorded, all changes being recorded with the survey video.

To enter text, press the **TXI** key, any text which has previously entered will be displayed on the screen. If no text has previously been entered, then just a cursor will be displayed in the top left corner of the display. Pressing any of the text entry keys on the keyboard will cause the corresponding character to

appear at the cursor position and the cursor will automatically move one place to the left ready for the next character.

Pressing 'carriage return' will cause the cursor to move down and back to the beginning of the previous line, allowing a second line of text to be entered.

At any stage during the survey text can be entered on the screen.

7.5 Pages

There are 16 pages of text that can be stored. These can be accessed by using the **Next** or **Back** keys that are located to the right of the **Space Bar**.

A blue icon along with the page number selected is shown in the bottom right hand side of the screen.

7.6 Text colour (free text)

The text colour can be changed at any time by pressing the **TXI** key. A menu will be displayed and a new colour can be selected by moving the joystick up and down to highlight and then by pressing down on the joystick.

The text colour always defaults to white after clearing the screen (by using **ESC**) or after switching the CCU switch on.

7.7 Text colour (date, time and meterage status line)

The text colour of the time, date and meterage status line is changed independently to that of the free text. To access this menu, press **Fn** followed by the **TXI** key.

The colour can be changed by moving the joystick up and down and then by pressing down on the joystick.

This new text colour will be remembered and will be displayed until it is changed again.

7.8 Symbols & Graphics

Symbols & Graphics can be added to the recording, such as an arrow or circle, to highlight an area of interest.

Press the **Sym** key to bring up the Symbol and Graphics menu.

Select your symbol or graphic and follow the on screen prompts to further refine your selection (Size and Colour).

The symbol or graphic will now appear on the screen with a flashing icon on the right hand side. This indicates that you can now place your symbol or graphic anywhere on the screen using the arrows keys. Press down on the joystick to confirm the position and the flashing icon will disappear.

To erase symbols and graphics from the screen press the **Sym** key and select 'Erase All'.

8 Pan & Rotate Camera

8.1 What you'll find in this chapter

This chapter describes the operation and control of the Pan & Rotate camera on the SOLO Pro 360.

8.2 Basic camera operation

When the SOLO Pro 360 CCU is first switched on the joystick is in a default cursor mode to drive the on screen text and menu system.

There is a set procedure to follow to operate the camera:

- Activate
- Home
- Check Pressure

Activate: To control the camera the joystick control of the camera must be enabled by pressing the joystick icon key on the keyboard. The green LED will illuminate above it when the joystick is in control of the camera.

When the joystick control of the camera is enabled extra symbols are displayed on the right hand side of the display. These are not recorded on the video but provide a visual cue to the operator of the camera pressure and rotation.

A further two symbols are drawn on the very top left of the display showing pan and rotation angles. These are recorded on the video.

Home: The Pan & Rotate camera should now be homed by pressing down on the joystick. After the homing is complete the camera will now auto-level when in use until the joystick is moved. If the joystick is moved, press down on the joystick to home the camera and to enable auto-level again.

Note: The camera will only home when it is positioned within +/-45 degrees of horizontal. Otherwise it is unaware of which way is up! If the camera fails to home check the camera body position.

Likewise the auto-level feature will only work up to +/-45 degrees from horizontal.

Check Pressure: The camera pressure bar displayed on the right hand side of the display will either show a red bar with "LO" written within it or it'll be green with the pressure written within it (In mBar).

The Pan & Rotate camera must only be used when the bar is green.

To pressurise the camera see the pressurisation section below.

Warning: Attempting to record a video when the camera pressure is displayed "LO" in a red bar will display a warning on screen to the operator:

"The camera pressure is low! Using the camera with low pressure will void the warranty and may damage the camera!"

"If you still wish to record with the camera now, press the 'Y' key to confirm, or press ESC to cancel."

If the camera is used with low pressure this information is recorded inside the camera and the warranty void.

Pressing the menu key when the joystick camera control is enabled will automatically disable it to allow the operator control of the menu system. The operator must enable the joystick camera control manually afterwards.

8.3 Camera Pressurisation

To pressurise the Pan & Rotate camera it must be connected to the SOLO Pro 360. If not already done so, follow the guide in section 8.2 to get the camera working first.

Move the camera with the joystick to allow easy access to the valve on the side.

Unscrew the protection cap from the camera and screw in the recharge valve.

Press the special function key on the keyboard and select menu options **Setup > Pressurise**

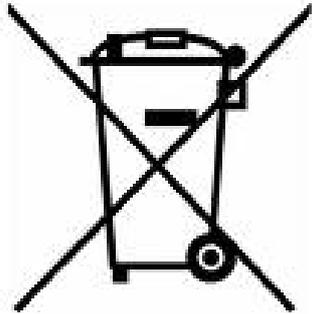
This now gives a big screen version of the live pressure gauge. The camera can now be pressured to approximately 500mBar with the pressurisation kit.

Do not over pressure! The CCU will warn for under/over pressure.

8.4 Driving the camera with pre-set movements

A range of pre-set camera movements are available to drive the camera e.g. drive a full 360 degrees clockwise or anti-clockwise.

To view the full range of pre-set movements press the **Special Function** key and select **Go** from the menu. Highlight the required movement and press down the joystick to activate it.



Attention: Your product is marked with this symbol. It means that used electrical and electronic products should not be mixed with general household waste. There is a separate collection system for these products.

Information on Disposal for Business Users:

Attention: If you want to dispose of this equipment, please do not use the ordinary dust bin!

Used electrical and electronic equipment must be treated separately and in accordance with legislation that requires proper treatment, recovery and recycling of used electrical and electronic equipment.

In the European Union

Please contact your Mini-Cam dealer who will inform you about the take-back of the product. You might be charged for the costs arising from take-back and recycling. Small products (and small amounts) might be taken back by your local collection facilities.

For Spain: Please contact the established collection system or your local authority for take-back of your used products.

In other Countries outside the EU

If you wish to discard of this product, please contact your local authorities and ask for the correct method of disposal.