

CM728B and CM729B Fingerprint Reader Modules



Security Systems

EN

Installer Reference Guide
Security System

BOSCH

LAN FINGERPRINT READERS

CM728B - BLACK AND CM729B - WHITE

The addition of a CM728B or CM729B Fingerprint reader to your installation will allow users to turn areas on and off or open a door simply by presenting their unique fingerprint credential to the reader. The fingerprint reader features 3D pixel sensing technology and can read virtually any finger; wet or dry. The sensor's hard coating protects against scratches, impacts and everyday wear-and-tear and provides in excess of 15KV ESD isolation.

| Fingerprint Reader Compatibility | | |
|----------------------------------|---------|-------------------|
| Panels Supported | Version | Readers Supported |
| Solution 144 | 2.00 | Up to 16 |

Table 1: Fingerprint Reader Compatibility

The CM728B and CM729B readers include red, green and blue indicators which are used to show area and or door lock status at all times. To simplify installation, an egress input and lock output are also provided.

A large blue reader status indicator is provided in the finger placement area to simplify user enrolment and day to day operation. The readers also include haptic technology that takes advantage of the users sense of touch by applying vibrations to the user's finger during the analysis and enrolment of fingerprint credentials.

Unlike other systems, the readers are fully integrated with the control panel which means that fingerprint credentials are automatically transferred between other readers on the system reducing programming and installation time.

Credentials can also be uploaded using the Solutionlink RAS software for backup purposes and can even be copied from one panel to another simplifying configuration for users with multiple sites.

Fingerprint readers connect to the control panel via the RS485 encrypted LAN and occupies a standard keypad position in the panel configuration.

Various options can be configured via the Devices - Keypad & Readers menu in panel programming. User access events are stored in the panel log and can also be reported if required.

Box Contents

The CM728B and CM729B are supplied with the following items,

- Module Base Housing
- Module Top Housing
- Mounting Template - 1:1 Scale
- Installer Reference Guide
- Plug On Connection Cable
- M3 x 6mm Hex Screws x 2
- 2mm Hex Key



Figure 1: CM728B Fingerprint Reader

Module Addressing

Each reader fitted to the system must be assigned a unique address on the LAN using the on board rotary address switch. The following table shows the address setting for each reader as well as the number of keypad, reader devices each panel can support.



Figure 2: Address Switch

| Module Address Setting | |
|------------------------|-----------|
| Address No | Keypad No |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |
| 11 | 11 |
| 12 | 12 |
| 13 | 13 |
| 14 | 14 |
| 15 | 15 |
| 16 | 16 |

Solution 144 Panel

Table 2: Address Table



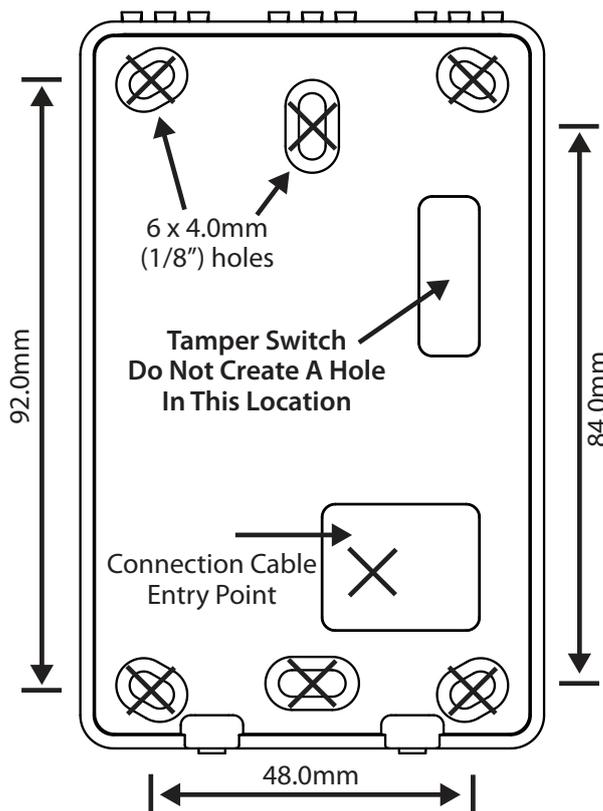
Note Only 1 reader can be assigned to each address. All modules are supplied from the factory set to address 1. You must power cycle the panel or perform a LAN scan whenever you change the module address.

Installation

The reader should be installed onto a solid surface using suitable mounting fixtures. Wiring should only be performed while the control panel is powered off.

- 1) Using the 1:1 mounting template supplied, mark out the location of the 2 mounting holes and the cable exit hole before drilling out all points as necessary.

CM728B & CM729B Mounting Template



CM728B & CM729B Mounting Template.ai Rev 1

Figure 3: Mounting Template (Not to Scale)

- 2) If the reader is to occupy an address on the LAN other than address 1, you will need set the required address before mounting. Each reader on the system must have a unique address. See Table 2: for more information.
- 3) Once the address has been set, terminate the required wires referring to the Connection Diagram on page 7. Unused wires should be insulated to prevent short circuits.
- 4) If using the on board lock output to open the door, you must make sure to use a relay and protection diode as shown.
- 5) Once the wiring is complete, mount the reader to the wall and fit the cover plate using the M3 x 6mm hex screws.

Fingerprint Reader Operation

Fingerprint readers can be configured to provide system area control, door access control or both depending on the installation requirements.

As there is no LCD display on the reader, feedback is provided via the red, green and blue indicators and the reader sounder.

The readers also include an egress input and lock output which can be used to control door access if required.



Using the on board lock output is not recommended when the reader is being used on an external wall of the building. In this case it is recommended that you run the lock control wires directly to an output located on the main panel or output expander module located inside the building.

LED Indicators

The red and green indicators on the reader show area status while the blue indicator shows door status. The addition of the blue indicator allows the system to display both area and door status at the same time if required.

| LED Operation For Area Control | | |
|--------------------------------|---------------------------|--|
| Led | Condition | Meaning |
| Red | On | Area All On |
| | Flashing | Area Alarm |
| Green | On | Area is OFF |
| | Flashing | Area not ready to turn on - zone(s) unsealed |
| Red & Green | Both On | Area armed in Part mode and all zones sealed. |
| Red & Green | Red On and Green Flashing | Area armed in Part mode with zones unsealed. |
| Red & Green | Alternate Flashing | Keypad initialising during power up or LAN scan. |
| Red & Green | Both Off | Home Area and Door not programmed or keypad not powered. |

Table 3: Reader LED's - Area Control



The LED indicators will only display the status of the programmed home area. You cannot move between areas from this reader. If you require multiple area status visibility you should use a display keypad like the CP700.

To have the reader control an area on the alarm system you must assign the reader to a home area. See the Devices-Keypads & Readers-Home Area menu option in panel programming. If alarm system control is not required then you should set the home area option to No Area.



When the reader has only been configured for alarm area control, the blue, door indicator will remain off at all times.

To have the reader control an output (door) on the system you must assign the reader to a door. See the Devices-Keypads & Readers-Door Assignment menu option in panel programming.

Once assigned, the on-board Lock output and Egress input are automatically assigned to the same door as the reader.

| LED Operation For Door Control | | |
|--------------------------------|-----------------------|---|
| Led | Condition | Meaning |
| Blue | On | Door Locked |
| Blue | Fast Flash | Door Unlocked |
| Blue | Continuous Fast Flash | Door manually unlocked or overridden. |
| Blue | Continuous 2 Flashes | Door automatically unlocked by schedule or time zone. |
| Red & Green | Alternate Flashing | Reader initialising during power up or LAN scan. |
| Blue | Off | Door not programmed or reader not powered. |

Table 4: Reader LED's - Door Control

If both alarm area and door control is required, you must assign a home area and a door to the reader.



When the reader has been configured for door control only, the green and red indicators will remain off at all times.

Alert Tones

The reader emits several distinct tones to alert you of particular system events. The volume level can be adjusted or turned off via programming by setting the reader volume to the lowest level. See the Devices-Keypads & Readers-Commands menu in panel programming.

| Reader Alert Tones | |
|-----------------------|--|
| Event | Alert Tone Emitted |
| Fire Alarm | If the system registers a fire alarm, the reader will sound 3 short beeps followed by a 1.5 second pause. This will repeat until reset by the user or until the siren run time expires. |
| Burglary Alarm | If the system registers a burglary alarm, the reader will sound a continuous siren tone until reset by a user or until the siren run time expires. |
| Trouble | If a system trouble condition occurs, the reader will sound 4 x fast short beeps followed by a 5 second pause and will repeat this tone until the user acknowledges the trouble condition from a display keypad |
| Exit Delay | The exit delay warning will sound 1 short beep every second when the area the reader has been assigned to is armed. During the last 10 seconds of exit time the warning tone will speed up indicating that the time has nearly expired. |
| Entry Delay | The hi/lo entry delay warning tone will sound once every second when an entry delay zone in the area the reader has been assigned to is triggered. If the system is not disarmed before the entry time expires then an alarm will occur. |
| Error | If an invalid finger is presented to the reader the unit will sound a 2 second warning tone indicating that the credential was rejected for some reason. See the panel log for more details. |
| Chime Alert | If chime mode is active then the reader will sound fast short beeps to alert the user when a zone programmed for chime is opened. Chime mode is only applicable when the area is disarmed. |

Table 5: Reader Tones



In some situations, you may prefer that the alert tones are disabled. See the Devices-Keypads & Readers-Indicator Options menu in panel programming to disable these features. Setting the reader volume to off will stop all audible warning signals at the reader.

Egress and Lock Control

The fingerprint reader includes an egress input and a lock output which can be used to simplify the wiring when the reader is being used for door or access control.

The lock output consists of a protected open collector transistor that can be used to operate a relay to control the door lock. The output will go from open to low for fixed 5 seconds whenever the associated door is triggered.



The on board lock output will operate for a fixed time period of 5 seconds when triggered. If a different time is required then you should use another output on the system to operate the door lock.

The lock output, and LAN+ power supply are not designed to operate and power the door lock directly. You should always fit a relay and protection diode to the lock output in combination with a separate power supply.

The optional CM444 Relay Module has been designed to suit this task. If you require the door to operate when the mains power has failed then you will also need to fit a battery backup to the external power supply. See the wiring diagram in Figure 5: for more details.

The Egress input on the readers allow you to simplify the wiring required to implement a egress button on the inside of the door. The egress input triggers the lock output on the reader by operating or firing the associated Door.

The egress input should be connected via a momentary or push button switch to system ground. When the button is pressed the lock output on the reader will trigger for a fixed 5 second period.

For greater security, if the egress input is not being used it should be disabled via panel programming. See Devices-Keypads & Readers-General Options in panel programming.



Any zone on the system can be configured to trigger a door and can therefore also be used to operate the lock output on the reader.

Tamper Switch Operation

The fingerprint reader includes a built-in tamper switch which will trigger when the cover is removed or the unit is removed from the wall. You should adjust the angle of the switch lever to suit the wall surface. If the tamper alarm is not required it can be disabled via panel programming.

Reader Front View Showing Indicators And Sensor

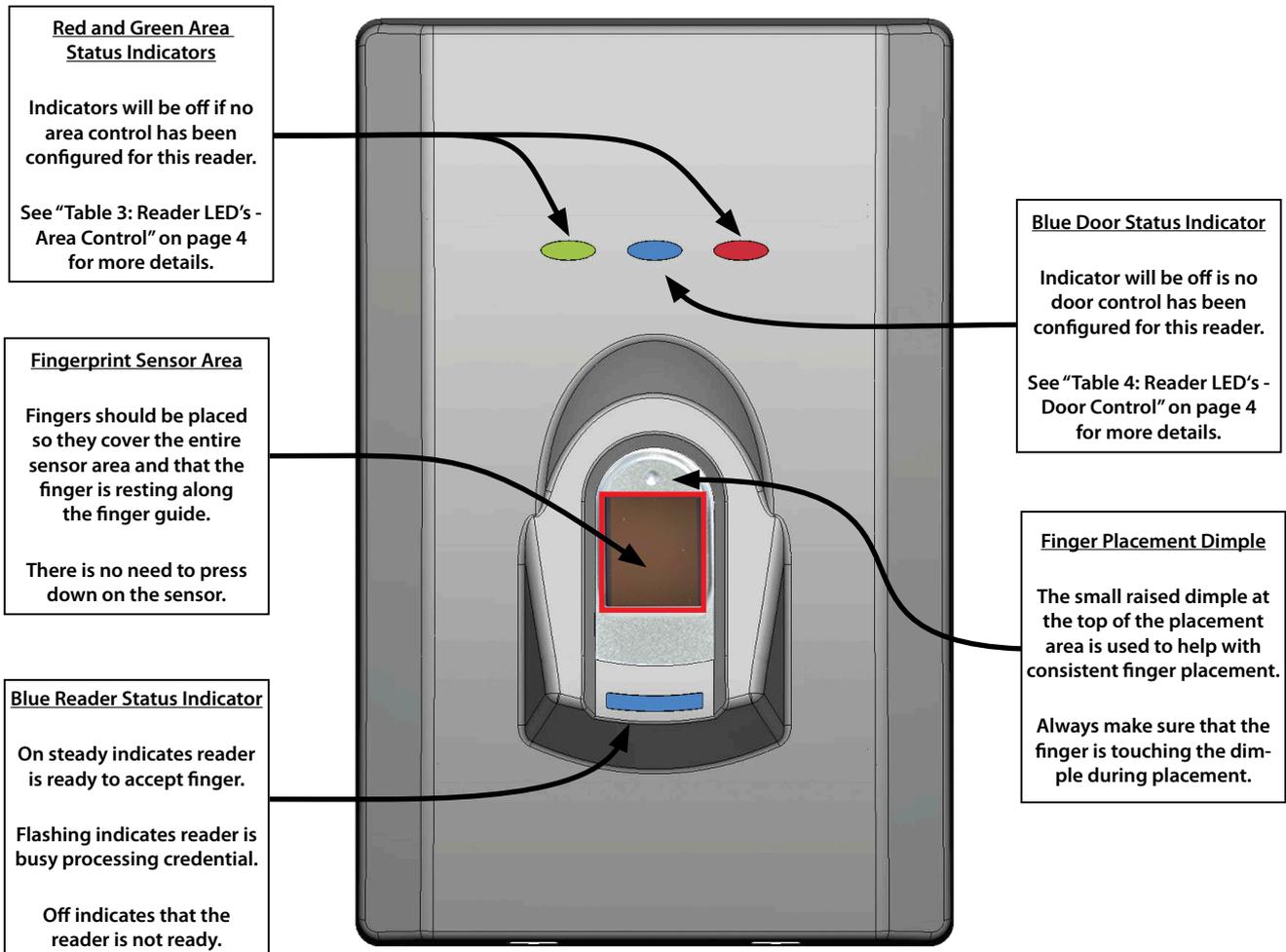


Figure 4: Reader Indicators and Sensor View

Cleaning the Sensor

Under normal use it is not necessary to clean the fingerprint sensor every day, however from time to time and especially in dirty environments cleaning the will help ensure reliable performance. If only minor cleaning is needed, use a lint-free cloth and carefully wipe the sensor surface. If a more thorough cleaning is needed, follow the method presented below.

You will need the following,

- Lint-free cloth OR cotton swab.
- Isopropyl alcohol (IPA)

How to clean:

- 1) Put a small amount of IPA on a lint-free cloth or cotton swab. Only a small amount is needed to make the cloth or cotton swab slightly damp. If the surface is heavily contaminated with a greasy substance the amount of IPA should be increased so that the contaminant can be fully dissolved. Do not pour the IPA directly onto the reader.
- 2) Gently rub the cloth or cotton swab over the whole sensor surface. Make sure to reach the area close to the frame where dirt/grease can accumulate.
- 3) Use a dry piece of cloth or cotton swab and wipe the sensor surface dry. Look carefully at the sensor surface and make sure that no residual liquid remains on the sensor.
- 4) Repeat the process if necessary.



Avoid using detergents and soaps containing oily substances since they can leave contaminants that negatively effect the sensor performance.

Wiring / Connection Diagram

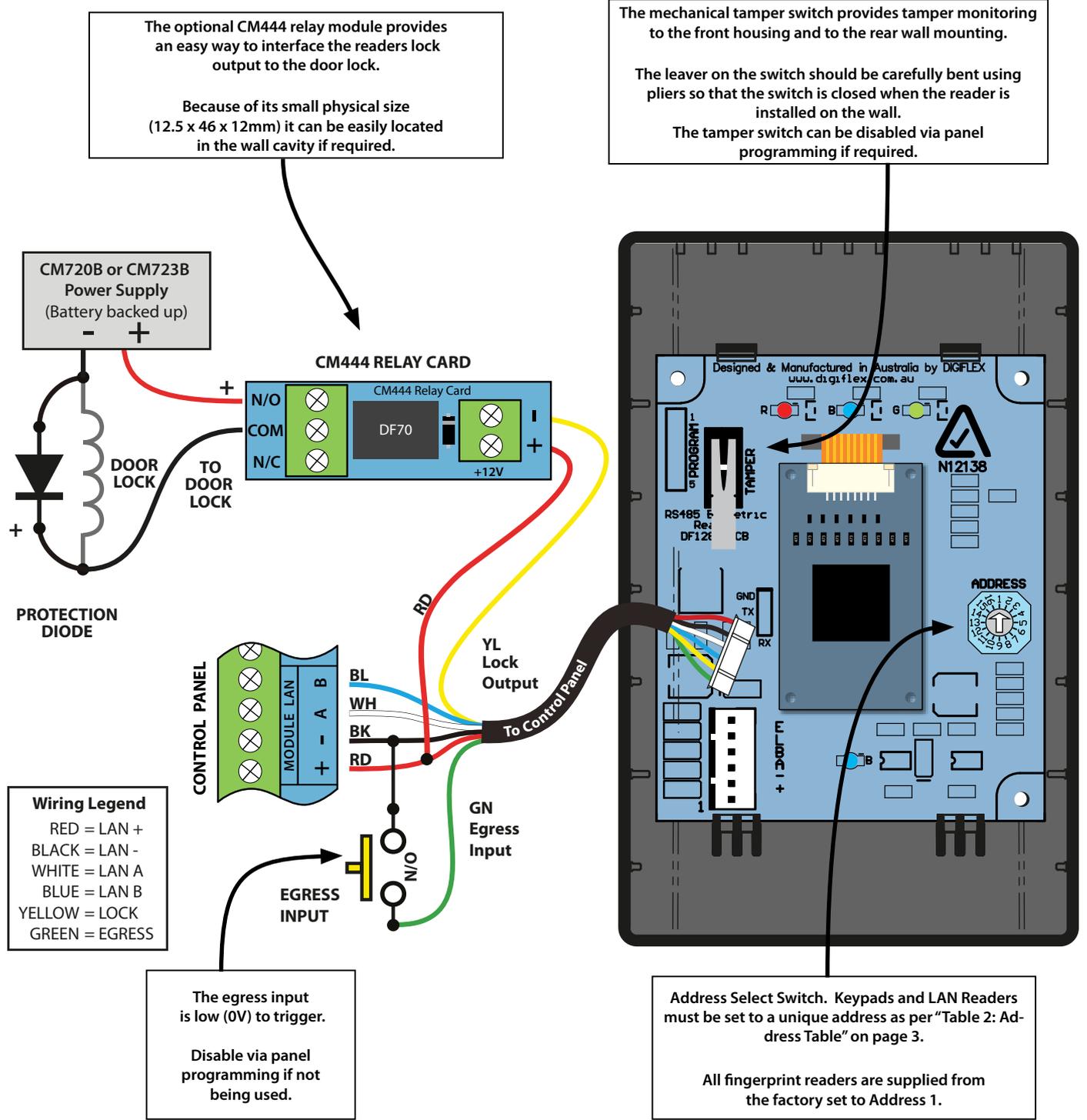


Figure 5: CM728B and CM729B Connection Diagram

Note You must power cycle the panel or perform a LAN scan after connecting the CM728B or CM729B for the system to initialise the module.

Understanding Fingerprint Analysis, Reader Limitations And Other Considerations

Fingerprint patterns are made up of shapes, which determine the general classification characteristics of the print. In all fingerprints a centre part can be found, which is called the fingerprint core. The area surrounding the core holds many of the interesting fingerprint characteristics that are unique for each individual.



Figure 5: Fingerprint Core

The upper parts of all fingerprints look very much alike (parallel curves) with very few distinct areas. To ensure adequate fingerprint detail is available, users should make sure to place the entire core area of the fingertip onto the sensor area using the placement dimple as a guide.

Do not point the end of the finger onto the sensor as this part of the fingerprint does not contain enough unique biometric information for high security applications. Also note that you do not need to place any downward pressure for the sensor to read the credential.

According to the fingerprint and system characteristics described above, the following conclusions can be made regarding placement of the finger:

- The finger should be placed in the same position every time.
- The fingertip should cover the whole sensor surface.
- The fingerprint core should be placed as near the sensor centre as possible.

Fingerprint recognition systems are limited by the number of calculations required for authentication, and the number of iterations can be reduced by means of correct fingertip placement and repeatability. There are several situations which can arise when the using the system that may lead to unreliable performance. These can be divided into the following four areas; translation, rotation, finger pitch and finger roll.

Translation - is defined as the difference in horizontal and/or vertical direction from the enrolled template to the verification occasion.

The CM728B and CM729B readers allow a few millimetres in both horizontal and vertical direction (between the enrolled fingerprint and the verified fingerprint). Translation is essentially a result of the lack of guidance of the fingertip in both directions. The level of translation depends also on the finger size. If the user has small fingers then there is more space for the finger to move around compared to a bigger finger.

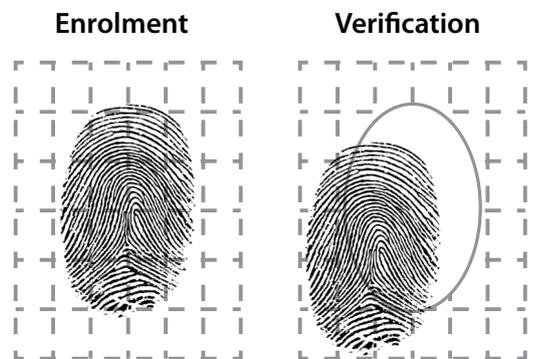


Figure 6: Fingerprint Core

Finger Rotation - is defined as the angle difference between an imaginary centre line of the finger from one placement to another.

The CM728B and CM729B readers allow some variation from the enrolment occasion but when the rotation exceeds a certain angle, the algorithms will not be able to handle this variation. Small fingers are generally more susceptible to finger roll issues.

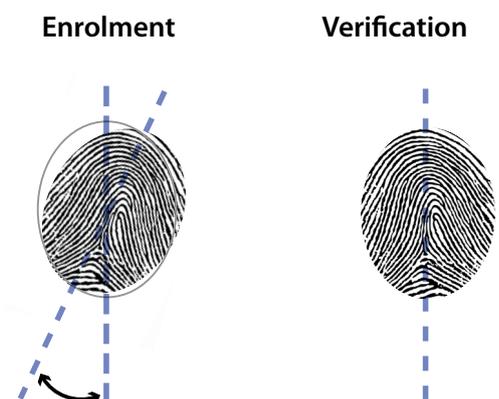


Figure 7: Fingerprint Core

Finger Pitch - occurs when only the upper part of the fingertip is placed on the sensor, as if the user is pointing at something.

As the upper parts of all fingerprints look very much alike with very few distinct areas, this situation should be avoided. To ensure the reader receives enough fingerprint detail make sure the fingertip core is covering the sensor area during placement.

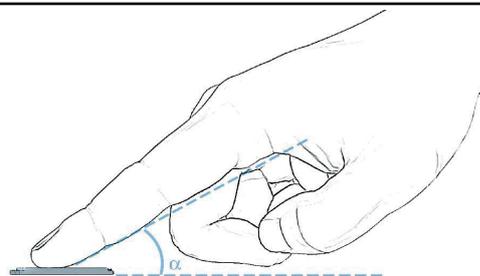


Figure 8: Fingerprint Core

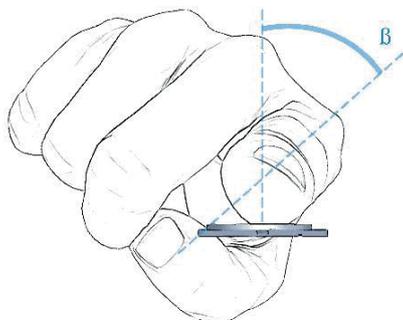


Figure 9: Fingerprint Core

Finger Roll - is defined as an incorrect positioning due to the finger rolling in a sideways direction.

As with the finger pitch scenario it is important to understand that the system needs to receive enough fingerprint detail. If the finger is big enough and/or the rolling is not too severe, then sufficient information can be captured.

Working Environment - Some environments are known to negatively affect human fingerprints in a way that damages the finger skin. For example bricklaying, landscaping and other work places where the hands / fingerprints are regularly damaged. In these situations using a proximity reader or keypad may be more suitable than the fingerprint reader.

Ergonomics - The ergonomic considerations vary depending on which type of applications the fingerprint reader is integrated into. Generally, the most natural position of the body is preferred and will give the most repeatable results.

If the user is standing, the relative position to the reader is crucial. When integrating a technical system in different environments, one important parameter is to try to adapt the system into the regular behaviour of the user. If for example the reader is positioned besides the door, it might lead to one of the four main problems described earlier. Another essential parameter is at which height the reader is placed. If it is placed too low, the finger pitch problems are more likely to arise, and if placed too high the user cannot see where to position their fingertip.

Enrolling Fingerprints And Using The Reader

The following steps will help you to get the best performance from the fingerprint reader. You will need to select the various programming options using the standard LCD keypad before moving to the reader. Various options can be configured for each reader fitted to the system and these are programmed via the Keypads & Readers menu.

- 1) When adding or enrolling fingerprints it is important to place and hold the finger in the correct position while the system records the credential. Fingers should be placed so that the pad is making full contact with the sensor. Do not use fingertips.
- 2) Enrolling can take up to 5 seconds to complete and users should keep their finger still during this process until the reader vibrates and beeps to indicate successful enrolment. If a long error beep is heard then you should repeat the procedure.
- 3) Users should present their finger in the same position as they did when it was enrolled. Use the raised dimple on the reader surface as a guide. People with smaller fingers may find this difficult at first but with practice even they will be able to use the reader.
- 4) The reader will vibrate as soon as it has completed reading the fingerprint. Once you feel the vibrations you should remove your finger.

- If authentication fails on the first attempt, remove your finger and wait for the large blue status indicator to come on before trying again. Whenever the reader is busy working you may see the following screen on the lcd keypad. Wait for a few seconds before trying again.

```
Fr9 Unit Busy. Please try
later.
```

```
Press OK or MENU
```

- In some cases the unit may not be able to read a finger because the finger is cut or damaged by other means. Extremely wet or dry fingers may also cause read errors but these are rare. In this case you should revert to using your PIN number on the standard keypad.

The following programming menus are available,

Access > Fingerprint >

Add Fingerprint MENU 1-8-0

This menu allows a master user to add a new fingerprint for users that have been assigned to the same area(s) as the Master user.

Enter programming mode (PIN + MENU) then,

- Enter [MENU] + [1] + [8] + [0].
A list of users will display on the keypad.
- Use the [↑] and [↓] keys to select the user that you want to add a fingerprint for, then press [OK].t.

```
Ur1 John Smith
Ur2 Debbie Smith
Ur3 User 3 Name
Press ▲▼ OK or MENU
```

- The system will prompt you to present the finger to the reader. If more than 1 fingerprint reader is installed then the system will prompt you to select the reader to learn from.

```
Fr9 Keypad 9 Name
Fr10 Keypad 10 Name
Fr11 Keypad 11 Name
Press ▲▼ OK or MENU
```

- You must hold your finger on the reader without moving until you hear a confirmation beep which could take up to 5 seconds.

```
Position Finger for Ur1
John Smith at Fr9
Press OK or MENU
```

- A Master user can only delete a fingerprint of a user that has been assigned to the same area(s) as the Master user.



Only one fingerprint can be assigned to each user. To change a fingerprint for an existing user, you will need to delete the old fingerprint first.

Access > Fingerprint >

Delete Fingerprint MENU 1-8-1

This menu allows a Master user the ability to delete a fingerprint for those users that have been assigned to the same area(s) as the Master user.

Enter programming mode (PIN + MENU) then,

- Enter [MENU] + [1] + [8] + [1].
A list of users will display on the keypad.
- Use the [↑] and [↓] keys to select the user who's fingerprint you want to delete, then press [OK].

```
Ur1 John Smith
Ur2 Debbie Smith
Ur3 User 3 Name
Press ▲▼ OK or MENU
```

The keypad will display;

```
Press Ok to delete
fingerprint for Ur1
John Smith
Press OK or MENU
```

- When prompted press the [OK] key to confirm fingerprint deletion.

Access > Fingerprint >

Fingerprint Status MENU 1-8-2

This menu allows a master user the ability to identify a fingerprint which has been programmed into the system. Only fingerprints that have been assigned to the same area(s) as the Master user can be identified.

Enter programming mode (PIN + MENU) then,

- Enter [MENU] + [1] + [8] + [2].
The system will prompt you to present the finger to the reader.

```
Position Finger at
Fr9
Press OK or MENU
```

- Once presented the system will display the user assigned to the fingerprint.

```
Finger belongs to Ur1
John Smith
Press OK or MENU
```

Configuration Examples Quickstart

Using the Fingerprint reader for alarm control only.

1. Install the fingerprint reader as per instructions.
2. Set the home area for the reader (keypad).
3. Set reader (keypad) options as required.
4. Assign users to the area.
5. Learn or add users fingerprints.

Using the Fingerprint reader for access control function only.

1. Install the reader (keypad) as per instructions.
2. Set the door for the reader (keypad).
3. Set reader (keypad) options as required.

If using the on board reader lock output, jump to step 6.

4. Set output event type to door.
5. Set output event assignment.
6. Assign users to the door.
7. Learn or add users fingerprints.

Using the Fingerprint reader for both Alarm and Access control functions.

1. Install the reader (keypad) as per instructions.
2. Set the home area for the reader (keypad).
3. Set the Door for the reader (keypad).
4. Set reader (keypad) options as required

If using the on board reader lock output, jump to step 7.

5. Set output event type to door.
6. Set the output event assignment.
7. Assign users to the area.
8. Assign users to the door.
9. Learn or add users fingerprints.

The above examples show how to configure the CM728B and CM729B readers to control an area and / or a door on a Solution 144 panel. Consult the installation manual for programming information if you are using a different panel.

Points To Remember

1. The reader is not weatherproof and should not be exposed to water or direct sunlight.
2. Mount the reader at a suitable height for all users where possible.
3. In some cases it may be preferable to learn a users thumb print if this helps with the presentation angle.
4. Repeatable finger placement is a critical factor in the performance and reliability of the fingerprint reader.
5. A user can enrol a different finger under a different user to allow multiple area control if required.
6. During finger presentation always wait to feel the vibration before removing the finger from the reader.
7. During enrolment it is important to hold the finger as still as possible to ensure the best image quality.
8. If the blue status light on the reader is off then the reader is busy and cannot process fingerprints.

CM728B - CM729B Specifications

| | |
|---|--|
| Part Number: | CM728B - Black - LAN Fingerprint Reader (RS485). CM729B - White - LAN Fingerprint Reader (RS485). |
| Format: | Proprietary |
| Operating Voltage: | 10.0V D.C - 14.5V D.C. @ 100mA Max. |
| Module Connection: (RS485 LAN) | Max total LAN length using multi strand security cable = 300m , Max total LAN length using 2 pair twisted shielded data cable (Belden 8723) = 1200m. See full control panel manual for complete wiring instructions. |
| Lock Output: | Protected open collector transistor output 500mA. |
| Egress Input: | Low (0V) to trigger. Can be disabled via software control. |
| Dimensions: | 74mm(W), 23mm(D), 116mm(H). CM444 = 46mm(W), 12.5mm(D), 12mm H) |
| Environment: | -30° to 55°C RH 5 to 85% at 30°C non-condensing. |
| Fixing Method: | The CM728B and CM729B should be mounted on a sturdy vertical wall using fixtures appropriate for the wall construction type. |
| Warranty: | 3 years from date of manufacture (return to base). |



In the interest of ongoing product development this document is subject to change without notice.

Bosch Security Systems
25 Huntingwood Drive
Huntingwood, NSW 2148
Australia
Phone: +612 9672 1777
Facsimile: +612 9672 1717

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