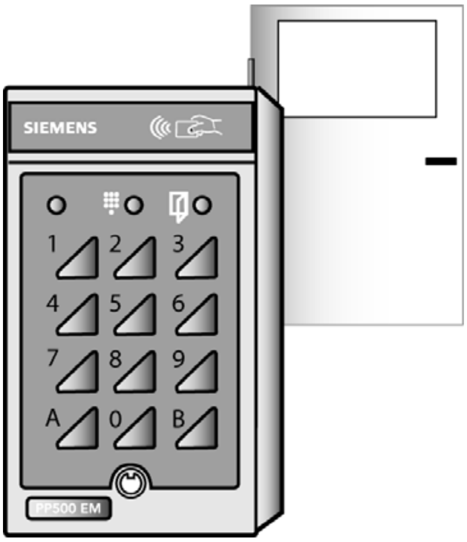
SIEMENS




# Card Reader

## PP500-EM
## PP500-Cotag

## Advanced Programming Manual

**Building Technologies**

Fire Safety & Security Products

# Contents

# 1 General

The PP500 can be connected to many systems for example SiPass Entro and SiPass Entro Lite, Granta and SiPass Integrated. The PP500 can be ordered in two different variants supporting two different reading technologies:

- Cotag technology (both active & passive)
- EM4102 technology

Normally the four pre-configured modes are sufficient to fit all the need of an access control system. However – the reader allows advanced re-configuring. See chapter *12 Reconfiguring the function* for more information.

## 1.1 Main Functions

- Support for Cotag Technology cards & tags (both active & passive).
- Support for EM4102 cards & tags.
- Distributor Code re-teachable (in Cotag Technology form).
- Configuration re-teachable by a configuration card.
- Pre-defined reader configurations enabled through the keypad.
- Jumper selectable Entry or Exit for BCLINK.
- Tamper Switch.
- External connectors for Tamper contact output.
- Backlit keypad.
- Wiegand, Clock & Data and BCLINK protocols supported.
- Internal, External (R, G, Only) and Single wire control of LED's.
- Power supply 12-24V DC.

## 1.2 About this document

This document is mainly aimed for installers that want to customize the operation of the PP500, e g to re-configure the card reading parameters.

The basic configuration and installation is also described in the *PP500 Installation guide* supplied with the product.

# 2 Safety

- Read the general safety precautions before operating the device.
- Follow all warnings and instructions marked on the device.
- Keep this document for reference.
- Always pass this document on together with the product.
- The device has been approved for use in the European Union. In countries outside the EU, the local conditions and regulations need to be checked before putting the device into service.
- Please also take into account any additional country-specific, local safety standards or regulations concerning project planning, operation and disposal of the product.
- Maintenance work must only be carried out by trained specialists.

# 3 Standards & guidelines

This product complies with the requirements of the European Directives.

The EU declaration of conformity is available from:

Siemens Building Technologies
Fire & Security Products GmbH & Co. oHG
76181 Karlsruhe, Germany

**European Directive 1999/5/EC on Radio Equipment and Telecommunications Terminal Equipment (R&TTE):**

Compliance with the European Directive 1999/5/EC has been proven by testing according to the following standards:

| | |
|---|---|
| R&TTE Directive 1999/5/EC | EN 300 330-2 V1.3.1:2006-04<br>EN 301 489-3 V1-4-1:2002-08 |

**European Directive 2004/108/EC on Electromagnetic Compatibility (EMC):**

Compliance with the European Directive 2004/108/EC has been proven by testing according to the following standards:

| | |
|---|---|
| EMC Directive 2004/108/EC | EN 50130-4:1995 + A1:1998 + A2:2003 |

**European Directive 2006/95/EC on Low-Voltage Directive (Safety):**

Compliance with the European Directive 2006/95/EC has been proven by testing according to the following standard:

| | |
|---|---|
| LVD Directive 2006/95/EC | EN 60950-1:2006 |

**Power supply**

Any power supply connected to the PP500 must conform to CE regulations regarding safety and EMC. This includes conformity to SELV (Safety Extra Low Voltage) according to EN 60950-1. The supply line fuse shall, independent of host system, not in any case exceed 10A.

**Cable recommendations**

The cables used for this product shall be screened and not exceed 30 m. E g the Belden 9534/9538, Li-YCY.

The screen shall be connected to any screen connector (if this exist) in a door controller - otherwise to the back plate of the PP500.

Note! - Due to the risc of potential differences in the protection earth system of buildings, only one (1) connection to earth shall be made in a system.

# 4 Technical data

| | |
|---|---|
| **Power supply:** | 12 -24 V DC<br>Min. 10,5 V DC<br>Max. 35 V DC |
| **Power consumption:** | Typ. 400 mW<br>17 mA@24V<br>33 mA@12V<br>Max. 1 W (while horn sounds) |
| **IP class:** | IP54 |
| **Frequency range:** | EM: 125 kHz.<br>Cotag: 66-132 kHz. |
| **Temperature range:** | -30° C to +50° C |
| **Dimensions (HxWxD) mm:** | 140x80x40 |

If needed, complete the installation with flush mounting kit BB3.

## 4.1 Reading distances

| | |
|---|---|
| EM4102 (passive): | up to 5 cm. |
| Cotag (passive): | up to 5 cm. |
| Cotag (active): | up to 10 cm. |

# 5 General features

## 5.1 Power Up

The factory default configuration is BCLINK.  In this configuration the reader sounds a rising tone at power up.

If the reader is reconfigured by any means to another interface, the new configuration is remembered so at subsequent power up events the configuration does NOT default to BC-link.  Under these conditions there is no rising tone at power up.

## 5.2 Horn / Buzzer Sounds

Using BCLINK configuration the horn outputs all tones that are defined within the BCLINK protocol. When using other configurations the horn acts the same as the xx500 series readers.

## 5.3 Key Presses

When the reader is configured to use BCLINK protocol, the key presses acts the same as the BC43 and work according to the BCLINK protocol.

Configurable through a configuration card so that each time a key is pressed the horn sounds continuously and the YELLOW LED is lit. When the key is released the sound stops and the YELLOW LED cease to be lit.

Alternately, so that the horn input can be controlled externally and also so that the Yellow LED doesn't light at all on key presses.

## 5.4 Addressable  Entry/Exit (BCLINK)

When the reader is using BCLINK configuration the external jumper connections, defines the address of the reader whether it is an Entry or an Exit reader.

## 5.5 Programming Mode

Programming mode is enabled when powering up the reader with the 'B' button pressed for 2 seconds. This is indicated by red and green LEDs blinking.

### 5.5.1 Timeout Period

When the reader is in programming mode and if no cards are presented to the reader or short code keys pressed, the reader will automatically time out to normal operation after 60 seconds.

## 5.6 Exit Programming Mode

Programming mode can be cancelled by pressing ‘B’ when red and green LEDs are flashing together.

## 5.7 Re-Teachable Distributor Code

The unit is able to be re-taught the distributor code when being **in programming mode.** The distributor code and configuration card can be taught in either order. Configuration and distributor code is saved by pressing B. **Default distributor code is Bewator**.

## 5.8 Re-Teachable Configuration (Card)

The configuration of the reader is able to be taught and re-taught using configuration cards when **in programming mode**. This can be taught in any order in regards to the distributor coded card.

# 6 Preset Configurations

After entering **programming mode**, you can then select alternate configurations that are pre-defined and accessed using short codes.

These short codes are in the form of A<x>. After selecting the pre-defined configuration the reader will return to programming mode.

These are key presses and after pressing A there is only one key press between values 0-9.

| Command | Function |
|---|---|
| A1 | Preconfigured interface BCLINK |
| A2 | Preconfigured interface 12 (26 bit Wiegand) |
| A3 | Preconfigured interface BE (Clock & Data) |
| A4 | Preconfigured interface 59 (48 bit Wiegand) |

The Preconfigured interfaces are stored in non-volatile memory and will have other parameters such as LED control and horn control defined later. These only apply for A2, A3 and A4.

A3 Preconfigured should be interface BE (Clock & Data), with external control of Red LED, Green LED and Horn. Also, the yellow LED should not be active at all, show no indication of noise or key presses.

# 7 Interfaces

The reader is able to support the following interfaces (in line with the 500 series of readers).

- Wiegand Interfaces: 00, 02, 04, 0E, 12, 24, 59
- Clock & Data Interfaces: 47, 4D, 4E, 4F, BE
- BCLINK Protocol

The reader may also be configured as BD. In this condition it recognizes signals from the controller to which it is connected and automatically selects either interface BE or BCLINK, as appropriate.

## 7.1 Wiegand - PIN code output

After sending the card data the reader then outputs the PIN code entered into the keypad.

If a **Wiegand interface** the PIN is output as follows:

| Key | Hex | Binary |
|---|---|---|
| 0 | F0 | 11110000 |
| 1 | E1 | 11100001 |
| 2 | D2 | 11010010 |
| 3 | C3 | 11000011 |
| 4 | B4 | 10110100 |
| 5 | A5 | 10100101 |
| 6 | 96 | 10010110 |
| 7 | 87 | 10000111 |
| 8 | 78 | 01111000 |
| 9 | 69 | 01101001 |
| * | 5A | 01011010 |
| # | 4B | 01001011 |

## 7.2 Clock & Data - PIN code Output

If a Clock & Data interface the PIN code is output as follows:

**<10 leading zeroes>BPFC<10 trailing zeroes>**

| Data | Length | Description |
|---|---|---|
| B | 1 byte | Start character, constant ‘1011’ |
| P | 1 byte | PIN-code character |
| F | 1 byte | End character, constant ‘1111’ |
| C | 1 byte | Checksum |

**Output Data:**

| Key | Hex | Binary Output |
|---|---|---|
| 0 | 0 | 11010 00001 11111 00100 |
| 1 | 1 | 11010 10000 11111 10101 |
| 2 | 2 | 11010 01000 11111 01101 |
| 3 | 3 | 11010 11001 11111 11100 |
| 4 | 4 | 11010 00100 11111 00001 |
| 5 | 5 | 11010 10101 11111 10000 |
| 6 | 6 | 11010 01101 11111 01000 |
| 7 | 7 | 11010 11100 11111 11001 |
| 8 | 8 | 11010 00010 11111 00111 |
| 9 | 9 | 11010 10011 11111 10110 |
| * | A | 11010 01011 11111 01110 |
| # | E | 11010 01110 11111 01011 |

## 7.3 BCLINK - PIN code output

If the reader is using BCLINK, the PIN code is output according to the BCLINK protocol.

# 8 Operating Configuration

The default configuration of the unit can be different dependant on product variant. Entro product variant is default BCLINK and the OEM / Granta is configured Wiegand.

### 8.1.1 Backlight

The backlight will be on permanently when configured for Clock & Data or Wiegand interfaces.

When the reader is configured for BCLINK this will follow the BCLINK control for the backlight.

### 8.1.2 Yellow LED Control

The yellow LED is configurable so that when interface BCLINK is selected it follows this.

There is an internal control that means every time a key is pressed it lights the yellow LED as long as the key is pressed. Also the any noise detected in the area will result in a pulsing yellow LED in the same way as the *PR500* reader.

There is also a configuration that allows the yellow LED to be off permanently no matter if there is noise, or keys pressed.

# 9 Inputs

## 9.1 Green LED Control

- If the unit is configured for **internal control**, no external connections will affect it.
- If the reader is configured for **external control** of the Green LED when G drops to 0V then the Green LED is lit.
- If the unit is configured for **single wire LED control**, if terminal G is +5V then Red LED will be shown, when G drops down to 0V then Red LED goes off and the Green LED is lit.
- In **BCLINK** configuration it will follow BCLINK protocol.

## 9.2 Red LED Control

- If unit is configured for **internal control**, no external connections will affect it.
- If the reader is configured for **external control**, when R is 0V the Red LED will be lit.
- When configured for **single wire control**, Red LED is in relation to the state of G, if G is +5V then Red is lit. If G is 0V then Red is not lit.
- In **BCLINK** configuration it will follow BCLINK protocol.

## 9.3 Data Hold

- The configuration card can configure input *signal polarity*. It can be Active-High and Active-Low.
- When configured in **BCLINK** the data hold works as one of the communication lines to the door controllers.

## 9.4 Buzzer / Horn

- The horn can be configured to work in different ways.
- **External control** can sound continuously when the line is pulled to 0V, or for 1 second until the line floats high.
- The **internal control** of the horn allows it to sound for 100ms or none at all when a card is presented.
- When in **BCLINK** configuration it follows BCLINK protocol using multi-tone sounds. Improved continuity in tones in relation to PR500.

## 9.5 Entry/Exit Addressable Jumper

There is a jumper option to allow you to select whether the reader is an **Entry** or **Exit reader** when being used in **BCLINK** configuration.

No use when in other configurations.

# 10 Outputs

## 10.1 Data Zero (D0)

- When the reader interface is configured to output **Wiegand** this outputs “Data Zero”.
- When the reader interface is configured to output **Clock & Data** this outputs “Data”.
- When the reader interface is configured to **BCLINK** that acts as a data line to the door controllers.

## 10.2 Data One (D1)

- When the reader interface is configured to output **Wiegand** this outputs “Data One”.
- When the reader interface is configured to output **Clock & Data** this outputs “Strobe”.

## 10.3 Data Available (DA)

- When the reader is configured for output interfaces either **Wiegand** or **Clock & Data** this signal becomes active 1ms before the data is sent, then released 1ms after the data has been sent. The polarity of the signal is active-low.

## 10.4 Tamper Status

- When the reader is in the **normal condition**, the tamper terminals will give a **closed contact**. When the tamper is activated the contacts are open.
- This is **jumper selectable** so that the contacts give a normally closed and normally open contact or, monitored with 10 kohms.
- When the reader is configured for **BCLINK** protocol, this sends the tamper status digitally through the communication lines.

# 11 Installation

## 11.1 Mechanical

Please mount the reader at a suitable height also catering for disabled persons.

1. Open the reader with the key supplied. The lock is located beneath the key-pad.
2. Fasten the back plate against the wall, using three screws ❶, ❷ and ❸ according to figure 1. Seal the screw and cable holes with sealant if the reader is externally mounted.
3. Make sure the back plate is earthed. Use a separate cable to the earthing point. Make sure the front and back plates are connected with an insulated cable.
4. Fit the front and check that the reader is securely fastened.

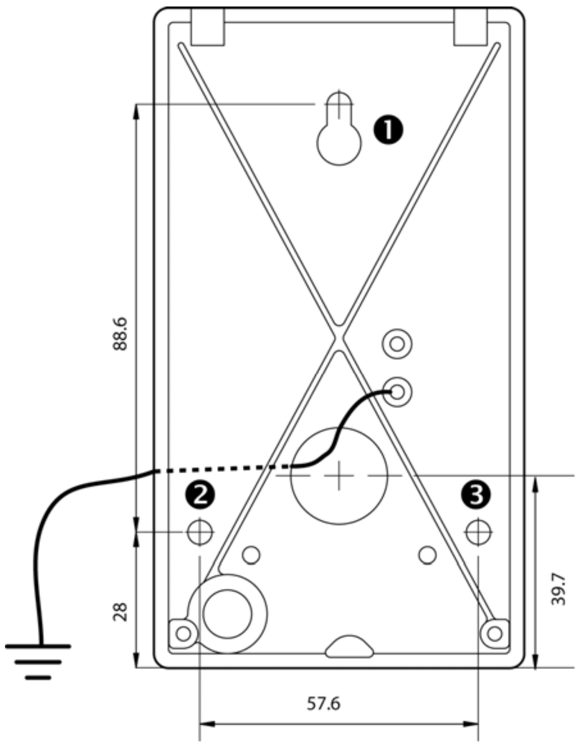



Fig. 1 PP500 back plate. Dimensions in mm.

# 11.2 Wiring

Depending on which host system the unit is connected to, the wiring may look different. Please refer to next section for wiring.

## 11.2.1 Basic

The illustration below shows the basic layout of the terminal blocks etc.

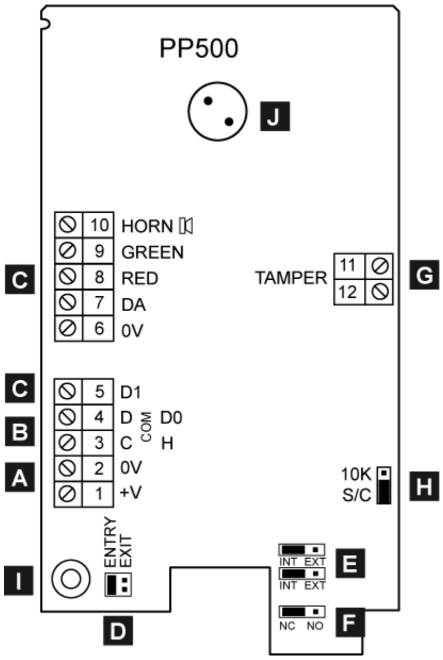



Fig. 2 PP500 layout. Please refer to the items below.

| | |
|---|---|
| **A** | Power in, terminal nos 1(+) and 2. 12-24 Vdc. |
| **B** | Terminal blocks 3 & 4 are used for BCLINK Com C and Com D (pre-configured interface A1).<br>The connections 3 & 4 changes function when pre-configuration A2, A3 or A4 are selected. See table of connections for each host system.<br>*Default: Com C and Com D.* |
| **C** | Terminal blocks 5, 7, 8, 9 & 10 can be used in pre-configuration A2, A3 or A4. See table of connections for each host system. |
| **D** | Entry or Exit selection (sub-addressing technique in BCLINK).<br>*Default: ENTRY.* |
| **E** | INT = Internal tamper function (digital signal to system).<br>No hardware signal on connection 11 & 12.<br>EXT = The tamper status signal exists on 11 & 12.<br>Both jumpers must be placed on the same selection.<br>*Default: INT.* |
| **F** | Selection of logic for tamper switch.<br>NC= Closed when the housing is closed.<br>*Default: NC.* |
| **G** | Tamper switch connection, terminal nos 11 and 12.<br>*Default: Not used.* |
| **H** | Optional resistor 10 kohm for tamper monitoring.<br>Used in serial with tamper switch.<br>*Default: Not used.* |
| **I** | Mechanical tamper switch. |
| **J** | Buzzer. |

Table 1 PP500 Connections.

### 11.2.2 Entro DC22 & DC12 connections

This is how to connect to an Entro DC22 or DC12 door controller. The BCLINK interface is used and which is the **factory setting** for the PP500.

| DC22 & DC12 | *Signal* | PP500 | |
|---|---|---|---|
| 11 | *V+* | 1 | V+ |
| 12 | *0V* | 2 | 0V |
| 13 | *Com C* | 3 | C (H) |
| 14 | *Com D* | 4 | D (D0) |

Table 2 DC12 & DC22 connections

### 11.2.3 DC800 connections

This is how to connect to a DC800 door controller for Stand-alone or Entro Lite use. The BCLINK interface is used and which is the **factory setting** for the PP500.

The jumpers in the DC800 shall be set as below:

**J1** = **Vin** (incoming power).

**J4 = BCLINK**

| DC800 | *Signal* | PP500 | |
|---|---|---|---|
| 14 | *V+* | 1 | V+ |
| 15 | *0V* | 2 | 0V |
| 18 | *Com C* | 3 | C (H) |
| 19 | *Com D* | 4 | D (D0) |

Table 3 DC800 connections

## 11.2.4 Granta 4422 connections

This is how to connect to a Granta 4422 module. The Wiegand interface is used which must be configured with the **A2 Preset** configuration.

The jumpers in the 4422 shall be set as follows:

**JU1/JU4 = A**

**JU2/JU5 = B**

**JU3/JU6 = B**

Use interface 300 when configuring in the system.

| **Granta** | ***Signal*** | **PP500** | |
|---|---|---|---|
| +V | *V+* | 1 | V+ |
| 0V | *0V* | 2 | 0V |
| D1 | *Data 1* | 5 | D1 |
| D0 | *Data 0* | 4 | D (D0) |
| $\overline{R}$ | *Red LED* | 8 | RED |
| $\overline{G}$ | *Green LED* | 9 | GREEN |
|  | *Horn* | 10 | HORN |

Table 4 Granta 4422 connections

## 11.2.5 SiPass Integrated ADD5100 connections

| **ADD5100** | ***Signal*** | **PP500** | |
|---|---|---|---|
| +12V | *V+* | 1 | V+ |
| 0V | *0V* | 2 | 0V |
| D0 | *Data 0* | 4 | D (D0) |
| D1 | *Data 1* | 5 | D1 |
| RED | *Red LED* | 8 | RED |
| GRN | *Green LED* | 9 | GREEN |

Table 5 SiPass Integrated ADD5100 connections

# 12 Reconfiguring the function

Although the PP500 can be user configured for different type of interfaces and protocols, it has the capabilities to be re-configured for different purposes. The following chapters describe a range of parameters which can be altered.

## 12.1 Default configuration

You must set the following functions on a Reader before it will operate correctly:

– Distributor Code
– Secondary Code

You will probably need to set the following:

– Data interface option

You may need to set the following:

– Horn operation
– Internal/external/single-wire control of LEDs
– Hold-off time and repeat data delay
– Leading parity calculation for Wiegand data output
– Position of Secondary Code in data output
– Secondary Code check disable
– Data Hold input signal polarity

## 12.2 Configuring the Reader

You configure the Reader by presenting it with **two coded cards**. The first card (the configuration card) defines the type of data interface, and all the features listed in the third group above. The second card (any of the ordinary Distributor Coded cards which will be used with the system) teaches the Reader its Distributor and Secondary Codes. Note that you cannot teach the Reader its Distributor and Secondary Codes without first presenting the configuration card.

When the Reader is powered up, it waits 4 seconds for a configuration card to be presented. If it doesn’t read a configuration card in this time, it enters its configured operating mode.

## 12.3 The configuration card

If you need to change the data interface or any of the other settings, you need to use a configuration card programmed in 63 bit display format on the *633-2 Programmer*. Data fields in the configuration card set up various options described below.

The configuration code is a 64-bit binary number which determines how the Reader operates. Here is the complete 64-bit configuration code, with each bit represented by a letter or number. The fields in the code represented by the letters and numbers are defined in the next section “Programming the configuration card”.

**0xxs xxxx xxxx xxxx xxxx xbff xxxx xxxh xxhe hhhh pxxx xxrg crrr rrrr iiii iiii**

The code is written down as sixteen 4-bit groups. Each 4-bit group can be represented by a single hexadecimal digit which can be typed directly into the *633-2 Programmer* in 63-bit display format.

An **x** means that this bit of the code is not used.

(BCLINK users please note that “type” bits are not shown here.)

The next section “Programming the configuration card” defines each of the fields in the configuration code. You should type each field into the *633-2 Programmer* in the order in which they are described. We have shown a diagram with each entry, showing the position of the hex character in the configuration code. For example, the hex character determining the horn configuration is the ninth character:

| | | | | | | | | **9** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0** | **0** | **0** | | **0** | | | | | | | | | |

Because the second to the fifth and the seventh characters are unused, they are set to zero, and we have shown this in the diagram.

### 12.3.1 The DC/SC card

To teach the Reader its Distributor and Secondary Codes you use any of the normal cards which will be used with the system (any of the cards which are issued to cardholders). We shall call this the “DC/SC card”.

# 12.4 Programming the configuration card

## 12.4.1 0xxs (secondary code swap)

| 1 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0** | **0** | **0** | | **0** | | | | | | | | | |

The **s** bit determines whether the secondary code is output from the Reader's data interface as bits 33 to 48 (the position which it occupies in the code which is programmed into the cards and tags), or whether its position in the data output is swapped to bits 17 to 32.

This feature is available so that cards programmed in the Dec/Dec display format on the *633-2 Programmer* can output secondary code data using the 32-bit Wiegand or 26-bit Wiegand data interfaces (interface numbers 02 and 12 hex respectively). This feature is invalid for interfaces 47, 4D, 4E, 4F, 59, BC, BD and BE.

Secondary code swap bit (**s**):

0 The secondary code is output in its normal position (bits 33 to 48).

**1** The secondary code is output in the swapped position (bits 17 to 32).

## 12.4.2 xxxh (Data Hold input signal polarity)

| | | | | | | | 8 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0** | **0** | **0** | | **0** | | | | | | | | | |

The **h** bit determines the polarity (active-low or active-high) of the Data Hold input.

To work out the hex number you need to type into the Programmer, refer to the following table:

| **Hex number** | **Data Hold polarity** |
|---|---|
| 0 | Active-low |
| 1 | Active-high |

## 12.4.3 xxhe (horn configuration)

| | | | | | | | | 9 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0** | **0** | **0** | | **0** | | | | | | | | | |

The **h** bit determines whether the horn bleeps for 100ms when the Reader reads a valid card.

The e bit determines how the horn operates when it is controlled externally by the host. If this bit is 0, the horn sounds when the host pulls the horn input down to 0V and continues sounding until the host lets the horn input float high again. If this bit is 1, the horn sounds for 1 second when the host pulls the horn input down to 0V and then switches off automatically, irrespective of the state of the horn input.

| Hex number | Internal control | External control |
| --- | --- | --- |
| 0 | 100ms bleep | follows horn input |
| 1 | 100ms bleep | sounds for 1 second |
| 2 | no bleep | follows horn input |
| 3 | no bleep | sounds for 1 second |

## 12.4.4 hhhh (hold-off time)

| | | | | | | | | | 10 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0** | **0** | **0** | | **0** | | | | | | | | | |

When the Reader reads a valid card, it does not poll again until the hold-off time has elapsed. During the hold-off time the Reader maintains the state of the LED indicator (if the LEDs are under internal control).

To work out the hex number you need to type into the Programmer, refer to the following table:

| Hex number | Hold-off time |
|---|---|
| 0 | **1s** |
| 1 | **1s** |
| 2 | **2s** |
| 3 | **3s** |
| 4 | **4s** |
| 5 | **5s** |
| 6 | **6s** |
| 7 | **8s** |
| 8 | **10s** |
| 9 | **15s** |
| A | **20s** |
| B | **30s** |
| C | **40s** |
| D | **50s** |
| E | **60s** |
| F | **do not use - for test purposes only** |

## 12.4.5 pxxx (calculation of leading parity bit for 26-bit Wiegand interfaces)

| | | | | | | | | | | 11 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0** | **0** | **0** | | **0** | | | | | | | | | |

Leading parity bit (p):

**0** The Reader does not calculate a leading parity bit.

**8** The Reader calculates an even leading parity bit based on the first 13 bits of the 26-bit Wiegand interface (interface number 12). This saves you from having to program the leading parity bit into the cards. The trailing odd parity bit is still calculated as normal.

## 12.4.6 xarg (internal/external control of red and green LEDs)

| | | | | | | | | | | | 12 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0** | **0** | **0** | | **0** | | | | | | | | | |

To work out the hex number you need to type into the Programmer, refer to the following table:

| **Hex number** | **Red LED** | **Green LED** | **Amber LED** |
|---|---|---|---|
| 0 | External | External | On key press or noise |
| 1 | Internal | Internal | On key press or noise |
| 2 | Internal | External | On key press or noise |
| 4 | External | External | Disabled |
| 5 | Internal | Internal | Disabled |
| 6 | Internal | External | Disabled |

Use the **0** or **4** setting when the drives for the red and green LED indications are supplied by the host system. When you drive the LEDs externally, you have to pull down the corresponding connection from +5V to 0V. The R/G connection lights the green LED and the R connection lights the red LED.

Use the **1** or **5** setting if you want the Reader alone to control the LEDs. The red LED is lit when no card or tag is in range. The green LED light after a valid card read and stays on until the card is removed from the reading area of the Reader, or the hold off time expires, whichever is longer. The amber LED flashes if there is electrical noise in the reading area which may affect reading of cards and tags.

The **2** or **6** setting requires external control of the green LED from the host, but the Reader controls red and amber LEDs. This provides single-wire control of the LED indication from the host. It works as follows:
The red LED is lit when no card or tag is in range.

- When the Reader reads a card or tag, the host processes the data from the Reader, unlocks the door and lights the green LED by pulling the R/G connection down to 0V. This also turns the red LED off.
- When the host releases the green LED control, the green LED goes off and the red LED lights.

If this number is set to **0**, **1** or **2** the amber LED flashes rapidly while there is electrical or magnetic noise in the reading area which may affect reading of cards and tags. The amber LED is also illuminated while a key is pressed. Use the **4**, **5** or **6** settings to disable the amber LED so it remains off at all times.

## 12.4.7 crrrrrrr (Secondary Code check disable, and repeat data delay - RDD)

| | | | | | | | | | | | 13 | 14 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | | 0 | | | | | | | | | |

Bit **c**, when set to 1, disables the Secondary Code check so the Reader outputs data from a card or tag without checking that the Secondary Code is valid. (This bit does not affect interfaces 47, 59, BC, BD or BE.)

The seven bits **rrrrrrr** set the repeat data delay time or RDD. If you set these bits to any number from 0 to 127 (00 to 7F in hex), the RDD is set to this number of seconds (note that the timings are approximate). You must convert the decimal number into hexadecimal, for example, 10 is (A in hex, 20 is (14 in hex) etc. If you are setting bit c, remember that you will have to add 128 (80 in hex) to the RDD value.

**What is the Repeat Data Delay?**

When the Reader reads data from a card, it sends card data to the host. After it has done this, it will not send the same card data to the host again until the RDD time has elapsed. This prevents the system becoming overloaded with lots of data from one card being read over and over again.

## 12.4.8 iiiiiiii (interface number)

| | | | | | | | | | | | | | | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **0** | **0** | **0** | | **0** | | | | | | | | | |

This field sets the data interface number (two hexadecimal digits). See the chapter on *Data interfaces* and, if necessary, contact your supplier to find out what setting you should be using. The interface number given to you by your supplier is a two digit hexadecimal number and therefore can be entered directly into the *633-2 Programmer* without conversion.

**NOTE**

The Proximity Readers have a limited set of interfaces available compared with earlier Readers. Please check that the interface number you are using is available on the Reader - the following interface numbers are available: 00, 02, 04, 0E, 12, 24, 47, 4D, 4E, 4F, 59, 60, 64, 6A, BC, BD and BE.

## 12.5 Programming the DC/SC card

The card you use to teach the Reader the Distributor and Secondary Codes can be any normal Distributor Coded card programmed with the correct Secondary Code (any of the cards which are issued to cardholders).

Set your *633-2 Programmer* to any of the Distributor Coded display formats (usually Dec/Dec, but could be Hex/Dec or Hex/Hex or Hex/BCD), enter the correct Secondary Code in the SITE or SECONDARY field and program the card (the card number does not matter).

## 12.6 Presenting configuration card and DC/SC card to the Reader

- Power up the Reader and present the configuration card within 4 seconds of power up. During this 4 second period, the green LED is lit.
  The Reader bleeps when it has read the configuration card and the amber LED lights for a short period.
- After reading the configuration card, the Reader gives you a further 8 seconds to present one of the normal programmed cards which will be used with the system. Doing this teaches the Reader its Distributor and Secondary Codes. (If you do not present a DC/SC card to the Reader within the 8 seconds, the Reader enters its normal operating mode.)
  The Reader bleeps when it has read the DC/SC card and the amber LED lights for a short period. After the newly configured hold-off time has elapsed, the Reader enters its normal operating mode.

## 12.7 Changing the Secondary Code or Distributor Code

If, after setting the Distributor and Secondary Code, you need to change either of them, power up the Reader, present the configuration card within 4 seconds and then present the new DC/SC card within 8 seconds.

## 12.8 Examples of working out what to program into the configuration card in 63-bit mode on the Programmer

When you refer to the earlier section entitled "*Programming the configuration card*", you can look up the hexadecimal numbers you need in the tables and write them down as you go. You then enter the hexadecimal numbers into the Programmer in 63-bit display format.

If you ever need to convert decimal and binary numbers to hexadecimal digits, here is a table giving the decimal (top row), binary (middle row) and hexadecimal (bottom row) equivalents for all possible 4-bit numbers:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0000 | 0001 | 0010 | 0011 | 0100 | 0101 | 0110 | 0111 | 1000 | 1001 | 1010 | 1011 | 1100 | 1101 | 1110 | 1111 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |

### 12.8.1 Example 1

- Output the secondary code as bits 17 to 32 of the data output (1 in hex)
- Next four digits always zero (0000 in hex)
- Next digit always zero (0 in hex)
- Data Hold active-low (0 in hex)
- Horn enabled (0 in hex)
- Hold-off time: 2 seconds (look up in table - 2 in hex)
- Wiegand leading parity enabled (8 in hex)
- Single-wire control of red/green LED (2 in hex)
- Secondary Code check enabled (msb zero). RDD: 5 seconds decimal (05 in hex)
- Wiegand data output (interface number 12 in hex)

Write down the hex digits in order: 1000000002820512 and enter it into the *633-2 Programmer* in 63-bit display format.

## 12.8.2 Example 2

- Do not swap position of secondary code (0 in hex)
- Next four digits always zero (0000 in hex)
- Next digit always zero (0 in hex)
- Data Hold active-low (0 in hex)
- Internal horn disabled (2 in hex)
- Hold-off time: 30 seconds (look up in table - B in hex)
- Wiegand leading parity disabled (0 in hex)
- Internal control of red/green LED (1 in hex)
- Secondary Code check enabled (msb zero). RDD: 60 seconds decimal (3C in hex)
- 4101/4010 data output (interface number 59 in hex)

Write down the hex digits in order: 000000002B013C59

The Programmer doesn't need the leading zeros, so the number you enter in 63-bit display format is: 2B013C59 (hexadecimal).

**NOTE**

The reader will start to work normally only after the selected hold-off time has elapsed.

# 13 Data interfaces

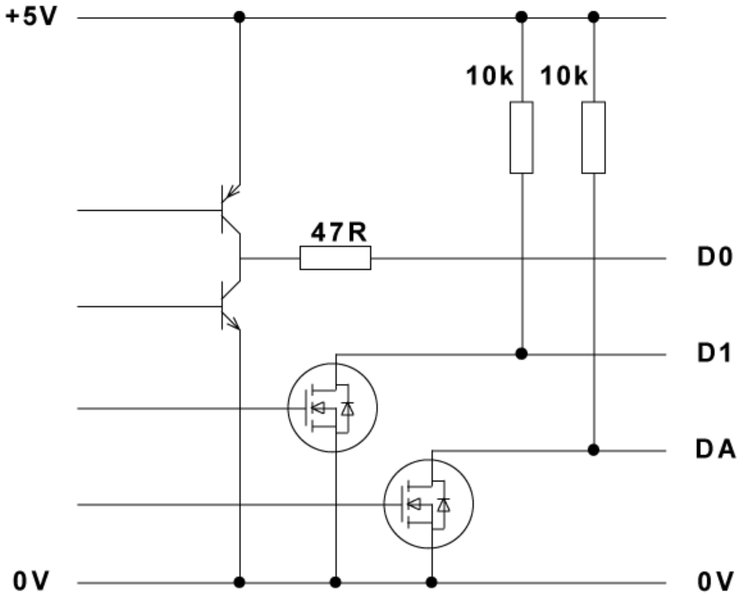
The Reader Interface offers a choice of Wiegand or Magnetic Stripe data output to communicate with a host system. You select the interface you require by programming a 63-bit configuration card and presenting it to the Reader, see chapter *12 Reconfiguring the function*.

## 13.1 Electrical characteristics of outputs from the Reader

The Wiegand and Magnetic Stripe interfaces use the data lines D0, D1 and DA.

The D1 and DA outputs are driven by open drain drivers which can each sink up to 250mA. When a driver is off, its output is pulled up to +5V (the regulated logic voltage on the board) by a 10k resistor (and also by whatever is connected at the host end). D0 is not pulled up - it can be driven high or low by the Reader, and can also float in a high impedance state as shown in the diagram below.

The diagram below shows the logical implementation of the data outputs:



## 13.2 Data Hold input

With the Wiegand and Magnetic Stripe interfaces, the Data Hold input (H) can be used by the host to buffer one data message in the Reader until the host is ready to read it. This enables the data lines from two Readers to be connected in parallel, the host polling each in turn by releasing its Data Hold input, reading the data, then asserting the Data Hold input again. The Reader will store the message until the next card is read.

## 13.3 Wiegand

### 13.3.1 Connections

The pin connections for the Wiegand interface are as follows:

| | |
|---|---|
| 0V | Ground |
| D0 | Logic 0 |
| D1 | Logic 1 |
| DA | Data available |

### 13.3.2 Electrical characteristics

The interface provides three outputs: logic zero data D0, logic one data D1 and data available DA.

Data transfer is performed by pulsing the D0 line to indicate a logic zero and by pulsing the D1 line to indicate a logic one. The pulses are active-low. The voltage of the data lines is +5V or 0V.

The Data Available output DA is provided to tell the host system it must read a data message from the Reader. If the Data Hold input see above is not active, DA becomes active 1ms before data is sent and is released 1ms after the data has been sent. If the Data Hold input is active, DA becomes active but data is not sent until Data Hold is released, DA remaining active until 1ms after the data has been sent. When used in association with the Data Hold input see above, DA enables the data lines from two Readers to be connected in parallel. The polarity of the DA output is active-low.

### 13.3.3 Data format

There are three aspects to the format of the data message, all of which can be varied, depending on the interface number you use:

- Framing bits at the start and finish of the message.
- Any parity bits which may be used.
- The data from the card.

The following diagram shows a typical message structure.


Framing bits are usually either not used or confined to start and stop bits which have a fixed state.

Parity bits are used to check the integrity of the data message. Parity may be odd or even and it may be calculated from the data only or from the data and some framing bits. The Reader can calculate the leading parity bit based on the first 13 bits of 26-bit Wiegand format if you require, see chapter *12.4.5 pxxx (calculation of leading parity bit for 26-bit Wiegand interfaces)*.

**Card data**

Data from the card can be any number of bits up to a maximum of 48. This includes any parity check bits which may be stored in the card code. The interface selected also determines whether the data is sent most significant bit first or least significant bit first.

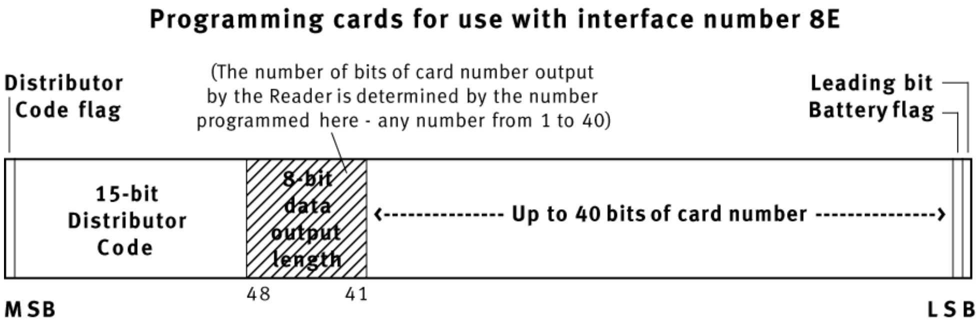
### 13.3.4 Interface settings

All other options to do with the Wiegand interface such as variation of pulse width and interval are selected using the interface number programmed into the configuration card (see chapter *12.3 The configuration card*). The following table shows some typical timing for a Wiegand interface:

| Interface Number | Function |
|---|---|
| 02 | Lower 32 bits of data msb first, 100µs pulse, 400µs space |
| 04 | Start bit 1, lower 32 bits of data lsb first, stop bit 0, 50µs pulse, 2ms space |
| 0E | Lower 25 bits of data msb first, trailing parity bit, 50µs pulse, 450µs space |
| 12 | Leading parity bit (if configured), lower 24 bits of data msb first, trailing parity bit, 50µs pulse, 3ms space (use for “standard” 26-bit Wiegand). |
| 24 | Data bit 32, four zeros, lower 31 bits of data msb first, 50µs pulse, 1.2ms |
| 59 | 4101/4010 Controller interface - use when connecting to 4422 swipe module or 4010 swipe Controller - set 4101/4010 Controller to interface 303. |
| 8E | Card-determined variable length data output (see below) |

**Card-determined variable length Wiegand data output (interface number 8E)**

If the Reader is set to interface number 8E, the length of Wiegand data it outputs when it reads a card is determined by the number programmed into bits 41 to 48 of that card. Bits 41 to 48 are the shaded area shown in the diagram below:




Interface 8E can output any number of bits of “card number” from 1 to 40. Bits 41 to 48 which determine the length of data output are actually the most significant byte of the secondary code, and you need to remember this when you program a card. It is best to use the 633-2 Programmer in either HEX/HEX or HEX/DEC mode, so you enter the secondary code in hexadecimal. The first two hexadecimal digits of the secondary code will be the data output length, and the last two hexadecimal digits of the secondary code will be bits 33 to 40 of the card number.

For example, if you want to output 24 bits of data: 24 decimal is 18 hex.

- You program the card number in the normal way, and you program the secondary code to be 1800 in HEX/HEX or HEX/DEC mode on the *633-2 Programmer*.

As another example, if you want to output 40 bits of data: 40 decimal is 28 hex.

- You program the least significant 32 bits of card number into the card number field on the 633-2 Programmer.
- You program the secondary code to be 28xx where xx is the most significant byte of the card number.

Interface 8E outputs the specified number of data bits, most significant bit first, 100µs pulse, 400µs space, 2s RDD.

(If you program bits 41 to 48 of the card to be zero, or any number greater than 40, interface 8E outputs 40 bits of card number.)

# 13.4 Magnetic Stripe

A Magnetic Stripe interface is provided which simulates the output of a magnetic card reader.

## 13.4.1 Connections

The pin connections for the Magnetic Stripe interface are as follows:

| | |
|---|---|
| 0V | Ground |
| D0 | Data |
| D1 | Strobe |
| DA | Present |

## 13.4.2 Electrical characteristics

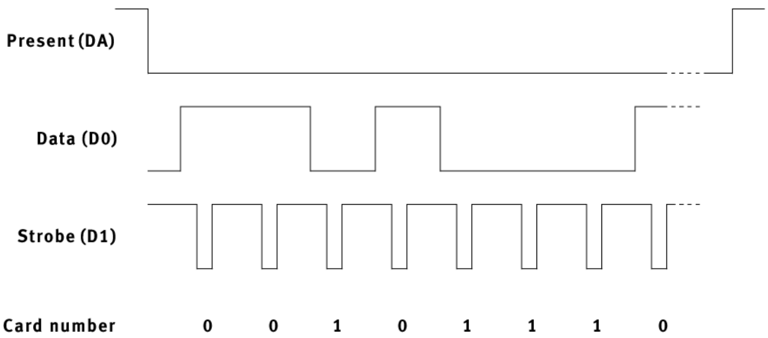
The interface provides three outputs: Present, Data and Strobe.

**Present** is a signal given by a magnetic card reader indicating that a card has been inserted in the slot. On the Proximity Readers, this signal becomes active just before data is sent and is released after the data has been sent. The polarity of the signal is active-low.

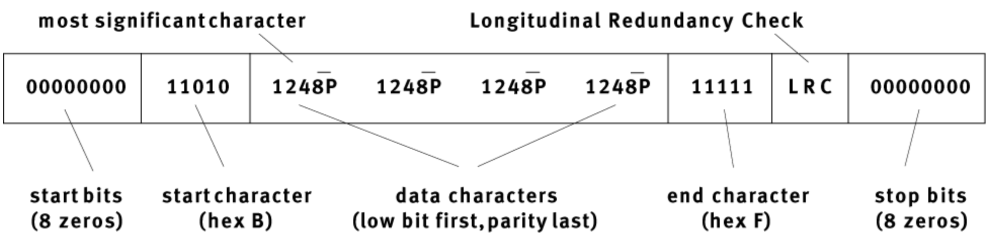
**Data** is a signal whose level reflects the value of the bit in the code. The polarity of the signal is “inverse logic”, which means a high signal indicates a zero and a low signal indicates a one.

**Strobe** is a series of clock pulses. The polarity of the signal is active-low. Data can be sampled on either the rising edge or the falling edge of the Strobe signal.

The following diagram should make clear the action of all three signals in a data transfer:




The following diagram shows the format of the Magnetic Stripe output:




This example shows an output of 4 data characters only - all of the MagneticStripe interfaces which are available on the Proximity Readers output 10 or 11 data characters as shown below.

The following Mag Stripe data outputs are available:

| Interface Number | Function |
|---|---|
| 47 | 5 Secondary Code characters (Secondary Code not checked), 5 data characters (lower 16 bits of data), 1.5ms bit period, 500µs strobe. |
| 4D | 5 Secondary Code characters, insert character “6”, 5 data characters (middle 16 bits of lower 32 bits of data), 1.5ms bit period, 500µs strobe. |
| 4E | 5 Secondary Code characters, insert character “6”, 5 data characters (lower 16 bits of data), 1.5ms bit period, 500µs strobe. |
| 4F | 5 Secondary Code characters, 5 data characters (lower 16 bits of data), 1.5ms bit period, 500µs strobe. |
| BE | with bit 32 of the card programmed to 0: 5 Secondary Code characters, 5 data characters, 1.5ms bit period, 500µs strobe. |
| BE | with bit 32 of the card programmed to 1: bottom 31 bits of card code are converted to a decimal number and are then output as ten data characters, 1.5ms bit period, 500µs strobe (this interface is used for Bewator IB1 coded cards). |

With interface BE (bit 32 programmed to 0) and interfaces 47, 4D, 4E and 4F, secondary codes from 0 to 65535 and card numbers from 0 to 65535 are each output as five decimal characters, ten characters in all, Secondary Code first, most significant character first. It is best to use the Cotag Programmer in DD display format to program the cards, but even if it is set up in HH and the Secondary Code or card number contain hexadecimal digits A to F, the card will still work with the magnetic stripe interface.

With interface BE (bit 32 programmed to 1), the bottom 31 bits of card code are converted to a single decimal number which is then output as ten characters, most significant character first.

## 13.5 4101/4010 Controller interface

The Readers can be connected to a 4422 swipe card module installed in a 4101 or 4010 Controller, or directly to a 4010 swipe Controller, the pin connections being as follows:

| Reader | 4422 swipe module or 4010 swipe Controller |
|---|---|
| D0 | D0 |
| D1 | D1 |
| 0V | 0V |

| Interface Number | Function |
|---|---|
| 59 | Wiegand output to 4422 swipe module or 4010 swipe Controller |

# 14 Keyword index

Issued by
Bewator AB
SE-171 24 Solna
Sweden

www.siemens.com/buildingtechnologies



Document no. **A6V10201729**
Edition 07.2008