



1 General

This document lists the functions of iCLASS reader/writers linked to Softcon HW and to PCs.

2 iCLASS

iCLASS is the product name for the HID Corporation Smart Proximity (SProx) range of cards and card reader / reader-writers. iCLASS is similar to HiTag and Mifare, with improved memory options (more application areas) and superior security features.

2.1. Cards

Cards are PVC credit sized cards that conform to ISO size standards and are manufactured in white. Cards are suitable for direct printing via card printers and contain an electronic device and antenna within the card. Cards cannot be embossed and clip slots can only be made in certain areas (not damaging the internal antenna). Cards are passive (no battery) and the internal electronic device is powered by electro-magnetic field when in proximity of an iCLASS reader / reader-writer, the distance depends on the reader / reader-writer and is typically 5cm.

Each card (within the electronic device) contains a unique manufactured 16 character serial number and a programmed (by Softcon) number consisting of a facility code and card number – typically 30 bit with facility and card number (1 to 64k). Cards contain 256 or 2048 (2k) bytes of re-writable, non-volatile data (not lost when no power) – referred to as non-volatile Random Access Ram (NOVRAM). Only the 30 bit number is read by Wiegand readers, all other data is read or written by serial writers (even when only read – see reader / writers below).

NOVRAM is divided into areas, each area protected by programmed security keys – reader keys must match card keys. Generally an application (e.g. vending, access or fingerprint) would use an area(s) and areas are referred to as application areas. 256 byte cards have two areas and 2k cards have 2 areas (2k/2 application) or 8 pages of 2 areas each (2k/16 application). As HID reserves one area for own data, available NORVAM is 104 bytes for 256 byte cards and 1560 bytes for 2k/16 cards 1904 bytes for 2k2 cards.

2.2. Reader and Reader-Writers

Readers and Writers are available in the following physical sizes:

- R10 Reader: Dimensions: 4.83 cm x 10.26 cm x 2.03 cm
- R30 Reader and RW300 Reader/Writer: Dimensions: 8.38 cm x 8.38 cm x 1.91 cm
- R40 Reader and RW400 Reader/Writer: 8.38 cm x 12.19 cm x 2.16 cm

Read / write card distance is less than 5cm. Readers (R10, R30, R40) have Wiegand interfaces only and only read the programmed facility and card number as programmed (e.g. 30bit, 35 bit, etc.). Reader-writers (RW300 and RW400) have Wiegand and serial interfaces. The programmed facility and card number is reported on the Wiegand interface and on the serial RS232 interface. NOVRAM can only be read or written on the serial interface. While reading or writing the NOVRAM the card must be kept within the 5cm.

Distance between reader and controller using Wiegand is 50m and when using serial, 5m should not be exceeded.

Readers and reader-writers contain 3 colors LED and a sounder – these are controlled via the Wiegand or serial interfaces. Softcon controllers control the LEDs to indicate Access denied (Red), reader / reader-writer ready (ORANGE, flashing optional), Access granted (GREEN) or card error – misread, communication errors or wrong facility code (RED and ORANGE). Sounder currently not controlled by Softcon.

2.3. IMPLEMENTATIONS

Implementations of iCLASS vary from simple to complex multi-applications and are only limited by card memory size. Typical applications are access control, vending, asset management, library information, etc. Access control data could include expiry date/time, where and when access can be granted, current anti-passback (APB) status, number of entries remaining, etc. Card could contain the holder's fingerprint template and a compressed photo. For vending the card could contain a cash purse that is decremented on each vend.

The major factor in implementation is whether the application is on-line (linked to a controller / network / PC) that contains all the card data or off-line, all data not available in the controller and data must be read/written from/to card. An implementation could be a combination of both (e.g. controllers are on-line but PCs are off-line, i.e. not interlinked). One application could be on-line (e.g. access) and another off-line (e.g. vending). On-line has the advantage that events are reported as they happen and data changed at a central point are known to all locations. Off-line simplifies installation but reading and writing card data is relatively slow – reading / writing photos can take up to 10 seconds by the controller (5 seconds by the PC).

The **simple implementation rules** are: if data is in the system – only read the programmed card number, requiring only readers that are lower cost, faster read time and longer distances from controller. Read / write photos only via reader / writers that are connected to a PC. Only write data that has changed – increasing speed. High volume access points (many transactions) should use readers only.

Typically for access control:

On-line – Programmed card numbers are read and access is granted or denied by the controller in accordance to data in the system, updating the data in the system, e.g. current location, number of entries, etc.

Off-line – Data on the card is read (via reader-writers) and access is granted or denied according to the data on the card. Data on the card can be updated (written), e.g. the reader number where last read, decrement the number of entries (and when zero, access is denied).

Combination – The card data on the card on card is read when entering the premises (via reader-writers) and update the data on the PC (passed to other on-line controllers in system), or change data on the card on entry (e.g. disable, change expiry, update entries available). Elsewhere in the system controllers read the programmed card number via readers and access is granted or denied using data in the system. Such a combination is typically used when systems (PCs) are not interlinked.

3 Softcon iCLASS

All Softcon controllers link directly to iCLASS readers on any of the Wiegand standards (26, 30, 32, 34, 35 bit), reading the programmed card numbers. Only the CR355 controller can interface to iCLASS reader-writers and MF350 can be interfaced in future updates. PCs can link directly to reader-writers via a COM port. No Softcon controllers currently interface directly to fingerprint readers to pass templates to the fingerprint reader (done via PC network). New developments are in progress that will interface directly to iCLASS reader-writers and fingerprint readers and can interface to iCLASS and fingerprint HW modules.

Due to the fact that iCLASS is new technology and implementations are numerous, implementations are added as and when required. Softcon implementations are flexible and configurable. The data on card is defined in memory maps that are reference via profiles, with the profile reference stored on card. All applications are controlled by sets of security keys that are linked to the profile, i.e. keys for a application (e.g. access) could vary for different profiles. Keys are propriety to Softcon and for security reasons are never divulged. Existing profiles are listed below.

Typically, profile 0 has certain card personal (name, employee number) and access control data (status, time-, area-, capture- groups, expiry) and the photo on the card. Profile 1 could have access and vending data on card.

4 Profiles

Existing profiles for data accessible via reader-writers are listed here. Please contact Softcon for profile updates or new profile requests. Data locations on the card, data formats and keys are never provided. The R/W column indicates if the controller Reads, Writes or Read/Writes the data.

Profile 0

Card database and photo (1k4):

DESCRIPTION	R/W	RANGE	REMARKS
PC Card reference	R	1 to 16M	
PC Card status	R		Enable, disable, capture
PC expire status	R		Enable, disable, capture
PC count status	R		Enable, disable, capture
PC Card Area group	R	0 to 64k	0=same as reference
PC Card Time group	R	0 to 14	Access Time Group
Pass Back	R		Ignore APB
Time back	R		Ignore ATB (reserved for future)
Clear ATB	R		Clear ATB, clear other Rd (future)
Start YYMMDD hh:mm	R	Month 0=not used	
Expiry YYMMDD hh:mm	R	Month 0=not used	
PIN	R	6 digits	
Capture group	R	0 – 255	
Count group	R	0 – 255	
Trigger group	R	0 – 255	
Asset group	R	0 – 255	
Employee Nr	R	8 ASCII	
ID Nr	R	16 BCD	
Surname	R	16 ASCII	
Initials	R	3 ASCII	
First	R	13 ASCII	
*Entry count	RW	0 to 64k	Incremented on every entry
*Last APB zn	RW	1 to 64k	
*Last ATB zn	RW	1 to 64k	Only when timing -out
*ATB minutes	RW	1 to 255	Added to last moved
*Card current	RW	Current status	enabled, expired, captured, cap/exp
*Last YYMMDD hh:mm	W		Last entered
*Last entered zn	W	1 to 64k	
*Last activity	W		entered, expired, cap, cap/exp, out-time, out-area, wrong-pin, duress, APB error, ATB error, In error

* Write functions depend on the application (typically only used when controllers are used in off-line mode).