DigiReader™ Series

Models Supported:

DR4200K

DR4201

DR4203

DR4205 (K, E, GM)

DR4208S

DR4220

INSTALLATION and OPERATION

WSE

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P/N 6600025 Rev. D

LIMITED WARRANTY

WSE warrants to the original user the equipment manufactured by WSE as described herein to be free from defects in material and workmanship for a period of one year from the date of purchase by such user or fifteen (15) months from the date of shipment from the factory, whichever is sooner (command key/ magnetic stripe card warranties differ, see below*), provided:

I WSE has been notified within such period by return of any alleged defective equipment, free and clear of any liens and encumbrances to WSE or its authorized dealer at the address specified, transportation prepaid;

II the equipment has not been abused, misused or improperly maintained and/or repaired during such period;

III such defect has not been caused by ordinary wear and tear;

IV such defect is not a result of voltage surges/brownouts, lightning, water damage/flooding, fire, explosion, earthquakes, tornadoes, acts of aggression/war, or similar phenomena;

V accessories used as integral to WSE systems have been approved by WSE (e.g., coaxial cables, batteries, etc.);

VI the equipment has been installed, the installation supervised or installation tested by an authorized WSE dealer.

WSE shall, at its option, either repair or replace, free of charge, the equipment found, upon WSE's inspection to be so defective, or if agreed upon, to refund the purchase price, less a reasonable allowance for depreciation, in exchange for the equipment.

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WSE'S MAXIMUM LIABILITY HEREUNDER IS LIMITED TO THE PURCHASE PRICE OF THE EQUIPMENT. IN NO EVENT SHALL WSE BE LIABLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL OR SPECIAL DAMAGES OF ANY NATURE ARISING FROM THE SALE OR USE OF THE EQUIPMENT.

Some states do not allow limitations on incidental or consequential damages or on how long an implied warranty lasts, so the above limitations may not apply. This warranty gives specific legal rights; however, other rights which vary from state to state, may pertain.

Digital command key and magnetic stripe card warranties vary, according to the particular card used. See the product literature.

The information in this manual is believed to be accurate and reliable. However, WSE assumes no responsibility for any errors that may appear. Possession of this manual does not imply the granting of licenses to make or sell equipment or software constructed according to descriptions provided.

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

This device complies with part 15, sub-part C of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference; and
2. This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

Regulatory labels are *not* attached at the factory. They are included in the ship-kit with the PC-board and must be applied visibly to the enclosure (if purchased), or (if not) to the back of the PC-board.

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INTRODUCTION

The DigiReader Series is a family of Digital Proximity Readers (***DigiReader***s). (Graphic representations of the DigiReader Series —not to scale— are shown in figure 1, below, and figure 2, on page 5.) DigiReaders are bi-directional security devices that read digital credentials, (from either side of the sensor), at ranges from 1 to 20 inches (2½ to 51 cm), depending upon the model and the environmental conditions. DigiReaders are used with the NexSentry 4100, 4102, 4104, Star I and Star II (4100 Series), SE818SC and SE422 Access Control Units (ACUs), with the ACUs either operating as stand-alone devices or operating in conjunction with a StarGaze, a NexSentry Manager (NSM), a NexSentry Command Center (NSCC), (an SE6000), or an SE5850, WSE Access Control Host System. Connection between a DigiReader and an ACU is over the WSE proprietary S-Net interface or over a Wiegand interface to a Wiegand ACU. (The Wiegand data can be either 26- or 34-bit Wiegand standard.) (Also included in the DigiReader Series is a keypad-only reader, the DR4200K, which is the only family member available with the *analog* 818SX ACU.)

DR4201

DR4203

DR4205/DR4208S

DR4205K/DR4200K

DR4220
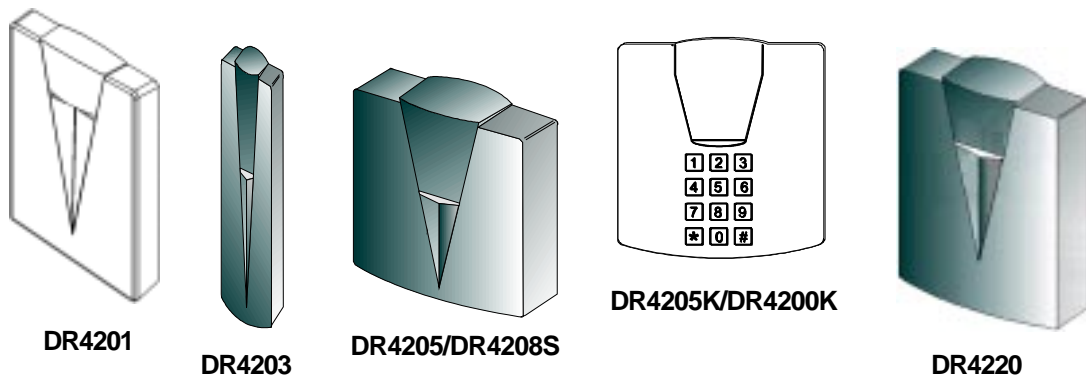
Figure 1: The Different DigiReader Models (Not to Scale)

CAUTION 1. Read this manual carefully before attempting to wire in place a DigiReader. **The warranty is void if damage occurs to the unit as a result of incorrect wiring.**

CAUTION 2. The information in this manual is not intended to conflict with the building codes, electrical codes, fire codes, or safety codes required for any given installation. In all cases, the prevailing building codes must take precedence.

GENERAL SPECIFICATIONS

	DR4200K	DR4201	DR4203	DR4205 Series *	DR4208S	DR4220
Description	DR4205K Look-Alike, Keyboard Only	Lowest cost/ smallest reader for 'light switch' type mountings	Digital proximity reader for door mullions	Different designs and mountings within series *	Digital proximity reader with increased read range	Digital proximity reader with maximum read range
Dimensions (Inch.)	5.0 x 5.0 x 1.3	3.3 x 4.8 x 0.7	1.8 x 7.5 x 1.2	*	5.3 x 5.74 x 1.27	14.3 x 12.4 x 1.0
Dimensions (Cm.)	12.7 x 12.7 x 3.2	8.4 x 12.2 x 1.8	4.5 x 19.0 x 3.0	*	13.5 x 14.6 x 3.2	36.3 x 31.5 x 2.5
Transmit Frequency	NA	132 kHz, full duplex operation				
Receiver Frequency	NA	66 kHz				
Receiver Demodulation	NA	Phase-Shift Key (PSK) signal				
Card Read Cycle	NA	100 msec				
Power Source: S-Net	+16 to +28 VDC, less than 80mA				+12 to +28 VDC, < 150mA	+13 to +28 VDC, 0.6 Amp nominal
Power Source: Wiegand	+16 to +28 VDC, less than 80mA				+12 to +28 VDC, < 150mA	
Wiegand Pigtail Connector	Yes			*	DR4208S - Yes (DR4208 - No)	DR4220 - Yes
Interface to ACU (9 wire capability)	9-wire pigtail = dual twisted pair (22 AWG + shield for RS-485, S-Net comm) +26/34-bit 5-wire Wiegand, OR, (W designation), 4-wire RS-485 + separate 5-wire Wiegand- for NS4100 Series, with NS Wiegand I/F Unit					
Interface to ACU (4 wire capability)	(41XX/818SC/ 818SX/422 ACUs)			Dual twisted pair (22 AWG, shielded for RS-485, S-Net comm) - for NS41XX or Alto 818SC or SE422		
Power Dissipation	Less than 2 watts					Less than 17 w
Controllers	NexSentry Star I and 4100 Series, Alto 818SC, SE 422. NOTE: DR4200K only - 818SX.					
Indicators	Single tri-color (green-yellow-red), programmable					
Tamper Protection	Yes					
Humidity	10% to 90% non-condensing	10% to 90% non-condensing	10% to 90% non-condensing	*	5% to 90% non-condensing	10% to 90% non-condensing
Temperature (°F)	-31 to 150			*	-31 to 150	
Temperature (°C)	-35 to 66			*	-35 to 66	
Environment	Indoor/Outdoor	Indoor/Outdoor	Indoor/Outdoor	*	Indoor and Outdoor use	
Weight (Lbs.)	0.75	0.3	< 1	*	.75	< 3
Weight (Kgrams)	.34	0.112	< 0.45	*	.68	< 2.3
ADA compliant	Yes; Special features for easing disabled access include: hands-free access, audible and visual indicators to indicate access status					

Max. Read Range	DR4200K	DR4201		DR4203		DR4205		DR4208S		DR4220	
(Units)	-	(In.)	(Cm.)	(In.)	(Cm.)	(In.)	(Cm.)	(In.)	(Cm.)	(In.)	(Cm.)
QuadraKey	NA	to 1.5	to 3.8	to 3	to 7.6	to 4	to 10	to 6	to 15	to 16	to 40
2Smart	NA	to 1.5	to 3.8	to 3	to 7.6	to 4	to 10	to 6	to 15	to 16	to 40
NexKey	NA	to 1.5	to 3.8	to 3	to 7.6	to 4	to 10	to 6	to 15	to 16	to 40
KeyMate	NA	to 1	to 2.5	to 1	to 2.5	to 2	to 5	to 3	to 8	to 14	to 35
	Maximum read range may vary depending on physical environment of installation.										

*See Table 1A for details on DR4205 Readers

Table 1: Digital Reader Specifications

DR 4205 SERIES SPECIFICATIONS

	DR4205	DR4205E	DR4205GM	DR4205K
Description	Digital proximity reader	Digital proximity reader conformally coated for external use	Digital proximity reader with capability of being glass mounted	Digital proximity reader with integrated waterproof keypad for indoor and outdoor use
Wiegand Capability	If model has 9-wire pigtail or is designated with a W: DR4205W DR4205WE DR4205WGM			
Interface to controller (9 wire capability)	9-wire pigtail containing dual twisted pair (22 AWG, shielded for RS-485, S-Net communication) and 26- or 34-bit 5-wire Wiegand, OR, (W designation), 4-wire RS-485 + separate 5-wire Wiegand - for NexSentry 4100 Series, with NexSentry Wiegand Interface Unit			
Interface to controller (4 wire capability)	Dual twisted pair (22 AWG, shielded for RS-485, S-Net communication) - for NexSentry 4100 Series, or Alto 818SC or SE422			
Dimensions	5.3" x 5.74" x 1.27" (13.5 x 14.6 x 3.2 cm)			
Transmit Frequency	140Khz, full duplex operation			
Receiver Frequency	70kHz			
Receiver Demodulation	Phase-Shift Key (PSK) signal			
Card Read Cycle	100 msec			
Power Source: S-Net	+16 to +28 VDC, less than 80mA			
Power Source: Wiegand				
Power Dissipation	Less than 2 watts			
Indicators	Single tri-color, programmable			
Tamper Protection	Yes			
Humidity	10% to 90% condensing	5% to 100% condensing	10% to 90% condensing	5% to 100% condensing
Temperature (°F)	32 to 120	-31 to 150	32 to 120	-31 to 150
Temperature (°C)	0 to 49	-35 to 66	0 to 49	-35 to 66
Environment	Indoor use only	Weatherized and splash-proof for outdoor use	Indoor use only	Weatherized and splash-proof for outdoor use
Weight (Ounces)	15	24	19	15
Weight (Grams)	420	672	532	420
ADA compliant	Yes; Special features for easing disabled access include: hands-free access, audible and visual indicators to indicate access status			
Maximum Read Range	All DR4205 Models			
(Units)	(Inches)		(Centimeters)	
QuadraKey	up to 4		up to 10	
2Smart	up to 4		up to 10	
NexKey	up to 4		up to 10	
KeyMate	up to 2		up to 5	

Table 1A: DR4205 Series Specifications

BASIC OPERATION

DigiReaders emit a low-level 140-kHz field. When a digital credential (card, KeyMate™, DuraTag™, etc.) is placed in this field, a digital chip embedded in the credential uses the field's energy for activation. Once activated, the credential responds by broadcasting a 70-kHz signal, modulated with a credential-specific code sequence, back to the reader. The reader receives this signal and converts it to a digital code which is then sent to the ACU, (the Controller). The Controller identifies the digital credential according to its code and makes either an access granted or an access denied decision, based on credential information stored in the Controller's database or the host system's database.

The DR4205K has a keypad on the face of the DigiReader. The keypad is used to enter the user's Personal Identification Number (PIN). The DR4205K keypad version can be configured for credential-only use, or keypad-only use, or both, from the ACU DOOR Command. If the S-Net Reader Type entry is set to DKR, the credential use will be activated for that door; set to NONE, the credential use for that door will be de-activated; (– this is true for all DigiReaders except the DR4200K). For the same door/reader combination, if the VIP Enable is set to Yes or No, the keypad portion will be activated or de-activated, respectively.

The DR4200K is a keypad-only reader look-alike of the DR4205K, activated from the ACU DOOR Command by setting VIP Enable (for that door) to Yes.

LED (AND BEEPER) OPERATION

LED (AND BEEPER) (S-NET OPERATION)

All DigiReaders have a single three-color (red-amber-green) LED controlled by the Access Control Unit (ACU) to which the DigiReader is attached. Figure 2 shows the location of the LED on each of the DigiReader models.

With the DigiReader on line to an ACU and with power applied, (the ready state), the DigiReader's LED will be a constant red. When a DigiReader is configured to read digital credentials only (with no keypad part of the DR4205K or VIP2 or DR4200K activated for the same door), a valid credential will produce a momentary amber LED, followed by a green LED for the door unlock time or until the door is closed following the credential-holder's access; (the LED will then return to the constant red). With a keypad also activated, the amber LED will continue until either both the valid digital credential and valid PIN, in either order, have been read/entered, producing the green unlock time LED, or until the PIN grace period has been exceeded, producing the red LED. With only the keypad activated, a valid PIN will produce the momentary amber, the unlock green and the return to the constant red.

The complete operational characteristics (LED and beeper behavior) for a DigiReader with or without keypad, or with the keypad only used, are shown, (respectively), in Tables 2, 2A and 2B, below.

LED

LED

DR4205K/DR4200K

LED

LED

LED

DR4201

DR4203

DR4205/4208S/4220
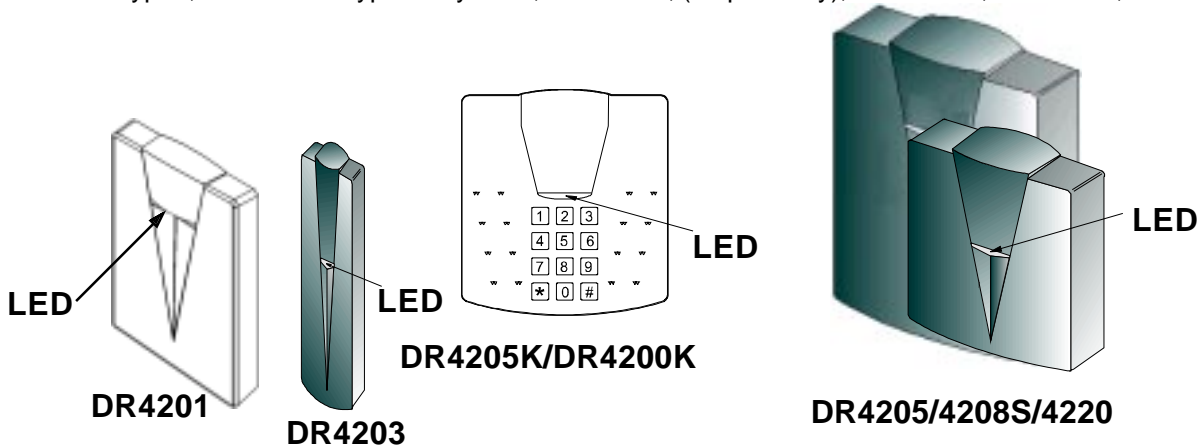
Figure 2: LED Locations for the Different DigiReader Models

NOTE: In each WSE security management system, the TUNE command (or its equivalent) is used to specify LED and beeper behavior when a valid key is presented.

Status	On-Line		Off-Line		Demo	
	LED	**Beeper**	**LED**	**Beeper**	**LED**	**Beeper**
No Credential Data Sent to ACU, No 4200K or 4205K Key Pressed	Steady red	Off	Cycle: Flash red for 4 sec., steady amber for 4 sec., off for 52 sec.	Off	Steady red	Off
Valid Credential Read	Steady amber, until PIN entry or grace period end	Single beep	Flash amber continuously ~0.2 seconds while card present	Beep continuously ~0.8 sec while card present	Steady amber & for ~10 sec after removing card	Beep every ~2 sec while card present
Invalid Credential	Steady off for reader disable time	Single beep				
Valid PIN Entered	Steady red until PIN entered, steady amber until card read or grace period end	Beep for each PIN digit entered	Cycle: Flash red for 4 sec., steady amber for 4 sec., off for 52 sec. (unchanged from no key pressed or card presented)	Beep once for every key pressed	Red until 6 keys pressed, then amber for ~10 seconds	Beep once for every key pressed (up to 6)
Invalid PIN	Steady amber until grace period end	Beep each digit				

Table 2:   **DR4205K/DR4200K System LED/Beeper Behavior, (both digital reader and keypad capability enabled) (. . . . . if DR4200K, with DigiReader also on same door)**

(LED behavior under ACU control, determined by ACU programming)

	On-Line		Off-Line		Demo	
Status	**LED**	**Beep-er**	**LED**	**Beeper**	**LED**	**Beeper**
No Credential Data Sent to ACU	Steady red	Off	Cycle: Flash red for 4 sec., steady amber for 4 sec., off for 52 sec.	Off	Steady red	Off
Valid Credential Read	Steady green as door unlocks	Beep ~5 sec	Flash amber continuously ~0.2 seconds while card present	Beep continuously ~0.8 sec while card present	Steady amber & for ~10 sec after removing card	Beep every ~2 sec while card present
Invalid Credential	Steady off for reader disable time	Beep once				

Table 2A: **DigiReader System LED/Beeper Behavior, (only reader capability enabled)**

(LED behavior under ACU control, determined by ACU programming)

	On-Line		Off-Line		Demo	
Status	**LED**	**Beeper**	**LED**	**Beeper**	**LED**	**Beeper**
No 4200K or 4205K Key Pressed	Steady red	Off	Cycle: Flash red for 4 sec., steady amber for 4 sec., off for 52 sec.	Off	Steady red	Off
Valid PIN Entered	Steady red until PIN entered, momentary amber, steady green for reader disable/ door open time	Beep for each PIN digit entered	Cycle: Flash red for 4 sec., steady amber for 4 sec., off for 52 sec. (unchanged from no key pressed or card presented)	Beep for each PIN digit entered	Red until 6 keys pressed, then amber for ~10 seconds	Beep once for every key pressed (up to 6)
Invalid PIN	Steady amber	Beep each digit				

Table 2B: **DR4205K/DR4200K System LED/Beeper Behavior, with only digital keypad enabled**

(LED behavior under ACU control, determined by ACU programming)

LED (WIEGAND OPERATION)

The LED is controlled to be red or green by the level of the Wiegand LED control input. This is a function of the particular Wiegand unit.

120-OHM TERMINATION JUMPER (INTERNAL/EXTERNAL)

The jumper places 120 ohms of resistance between Data A and Data B for proper end-of-line termination. Install the jumper only if the DR4200 Series DigiReader is the last device on the cable.

Reader	Termination Jumper		Reader	Termination Jumper	
	Internal *	Location		Internal *	Location
DR4200K	Yes	W1	DR4205 **	Yes	W1
DR4201	Yes	W1	DR4208S	Yes	W1
DR4203	Yes	W3	DR4220	Yes	W1

Jumper only available on surface mount technology (SMT) models
* *All models: DR4205, DR4205E, DR4205GM, DR4205K and DR4205W*

Table 3: Termination Jumpers

INTERNAL INTERFACE CABLE (*FOR* DR4200K, DR4201, DR4203, DR4205--*ALL MODELS*, DR4208S * & DR4220)

An attached pigtail cable assembly provides the connection from the printed-circuit assembly and keypad to the access control unit wiring on all of the following DigiReader models: DR4200K, DR4201, DR4203, DR4205, DR4205E, GM, K and W, DR4208S (- note the wider voltage range) and DR4220. The cable is color coded as follows:

COLOR	FUNCTION	(S-Net Use)	(Wiegand Use)	
Red	+16 to +28 VDC	S-Net Nominal	Wiegand Nominal	
	+12 to +28 VDC *			
Green	S-Net A	For use with WSE S-Net access control panels	NA	
White	S-Net B			
Black	DC Return	S-Net DC Return	Wiegand DC Return	
Shield	Signal Shield	S-Net Shield	Wiegand Shield: Tied to Wiegand DC Return	
Blue	Data 0 (Out 0)	NA	For use with Wiegand access control panels	
Orange	Data 1 (Out 1)			
Yellow	LED 0		(Red)	Both LEDs are ACU controlled and are ON / low or OFF/high
Brown	LED 1		(Green)	

Table 4: Internal Interface Cable for DR4200K, DR4201, DR4203, all models of DR4205, DR4208S, and DR4220

RECOMMENDED S-NET CABLE

The type of cable used for the S-Net will depend on the total length and the number of devices connected. Table 5 lists WSE-recommended cables:

	MANUFACTURE	PHYSICAL DESCRIPTION	GAUGE
Data and Power < 4000 Ft.	Southwest Wire & Cable SW 179/ Gray	2 Conductor: Data 2 Conductor: Power	22 AWG 16 AWG
Data and Power < 500 Ft.	Belden 9552 Belden 1069	2 - Pair Shielded	18 AWG 16 AWG
Data Only > 500 Ft.	Belden 9841	1- Pair Shielded	24 AWG
Power Only > 500 Ft.	Belden 9341 Belden 1342 Belden 9343	2 Conductor	18 AWG 16 AWG 14 AWG

Table 5: Recommended S-Net Cable

DIGIREADER ADDRESS SWITCHES

Rotary Address Switches for DR4200K, DR4203, and DR4205 (all models)

Each DigiReader must have a unique address. The DR4200K, DR4203, and DR4205 (all models) DigiReaders use two address switches S1 and S2, (as shown in Figure 3):

SW1   SW2
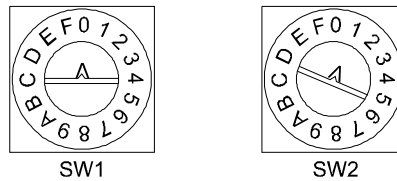
Figure 3: Address Switches for DR4200K, DR4203, and DR4205 (all models)

- Switch SW1 is used to select the special reader modes of operation, (as shown in Table 6). SW1 is set to 0 (factory default setting) for S-Net operation and F for Wiegand operation.

- Switch SW2 is used to set the Reader/Door address, and, with SW1 set to F, for additional options, including (SW2 = A or B) the Wiegand number of bits. SW2 has a factory default setting of 1, but it may be set to any address from 1 to F (15). A 16th DigiReader address is provided by setting switch SW2 to 0 and switch SW1 to 8 (for Normal Mode), or C, D or E (for DR4205K PIN/Credential Mode - see below).

Valid addresses may be limited by the controller; (see the appropriate controller manual).

When used with an SE422, addresses 01 and 02 should be assigned to nodes 13 (VIP2/DR4200K) and 15 (DKR), and 14 (VIP2/DR4200K) and 16 (DKR), respectively, see section 6 of the SE422 Installation Manual (p/n 66108328001), under Entry (Door) programming, questions 14 and 15.

SW1 * (Normal Mode)	SW1 * (PIN/Credential Mode)	SW2	FUNCTION
0	4, 5 or 6	1	Reader/Door addresses 1-F hexadecimal (1-15 decimal)
0	4, 5 or 6	2	
.	.	.	
.	.	.	
0	4, 5 or 6	E	
0	4, 5 or 6	F	
8 **	C, D or E **	0 **	Reader/Door address 16 decimal
F		A	Wiegand 26-bit
F		B	Wiegand 34-bit
F		E	Demo Mode
F		F	RF Test Mode ***

Table 6: Valid Switch Settings for Switches 1 and 2

(* See DR4205K SPECIAL OPERATING FEATURE, page 11)
(See NORMAL MODE, page 11 or PIN/CREDENTIAL MODE, page 12,**
respectively, for S-Net address 16, Normal or PIN/Credential explanations)
(* See TESTING THE DIGIREADER LOCATION, page 18)**

DIP Address Switch for DR4201, DR4208S, and DR4220

The DR4201, the DR4208S, and the DR4220 readers each have a 5-position DIP-switch S1, (as shown in Figure 4, with S-Net address 1 selected), which combines the functions of the rotary address switches S1 and S2 used by the other DR4200 Series DigiReaders.
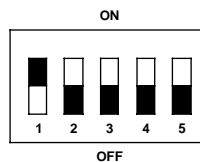
Figure 4: Address (DIP) Switch for DR4201/4208S/4220 Showing Reader Address 1 Selected

Table 7, below, shows the possible selections for S-Net address selection and Wiegand, DEMO mode and TEST mode selections.

Switch S1 (Settings)					Reader/Door Address / Function
1	**2**	**3**	**4**	**5**	
Off	Off	Off	Off	Off	Off-line 0
On	Off	Off	Off	Off	1
Off	**On**	Off	Off	Off	2
On	**On**	Off	Off	Off	3
Off	Off	**On**	Off	Off	4
On	Off	**On**	Off	Off	5
Off	**On**	**On**	Off	Off	6
On	**On**	**On**	Off	Off	7
Off	Off	Off	**On**	Off	8
On	Off	Off	**On**	Off	9
Off	**On**	Off	**On**	Off	10
On	**On**	Off	**On**	Off	11
Off	Off	**On**	**On**	Off	12
On	Off	**On**	**On**	Off	13
Off	**On**	**On**	**On**	Off	14
On	**On**	**On**	**On**	Off	15
Off	Off	Off	Off	**On**	16
Off	**On**	Off	**On**	**On**	Wiegand Interface (26-bit)
On	**On**	Off	**On**	**On**	Wiegand Interface (34-bit)
Off	**On**	**On**	**On**	**On**	DEMO Mode
On	**On**	**On**	**On**	**On**	TEST Mode

Table 7: DR4201, DR4208S, and DR4220 Address DIP-Switch Selections

SPECIAL FEATURES OF THE DR4201 AND DR4208S DIGIREADERS:

READER OPERATION (SNET MODE)

- The reader responds as both a DKR-type and an MSR-type device. The assigned address message determines the reporting method for this reader.

- The RF field is powered at all times.

- The microcontroller uses a synchronous technique to sample the incoming data bits and shift them into a 48-byte data buffer. The data collection and reporting techniques are key-type dependent. The reader alternates between the two key types as follows:

    - Key type 1 (WSE QuadraKey™, NexKey™, 2Smart™, and KeyMate™):

    For 50 msec the key message data is serially shifted into a buffer while searching for an 88-bit PSK key message signal in WSE format. The received key data is validated if it contains:

        - the proper 8-bit preamble,

        - a 32-bit reserved field,

        - a 32-bit keycode field,

        - a valid mode character,

        - a valid parity character,

        - a valid checksum byte, and

        - the receive buffer contains two identical 88-bit key messages.

    Reporting as an SNET DKR-type, only the key ID is reported to the ACU.

    Reporting as an SNET MSR-type, the WSE key is reported to the ACU in an SNET MSR-type log response with:

        - key data in message characters 2-10,

        - site code (always 9999) in message characters 11-14, and

        - company code (always 9999) in message characters 19-22.

- Key type 2 (HID ProxPro™, ISOProx™, DuoProx™, and Corporate 1000™):

    For 120 msec the key message data is serially shifted into a buffer while searching for a 48-bit FSK-modulated Manchester-encoded signal. The received key data is valid if it contains:

    - a start character with 2 Manchester code violations,

    - no other Manchester coding violations, and

    - the receive buffer contains two identical 48-bit key messages.

    Reporting as an SNET DKR-type, only the key ID is reported to the ACU.

    Reporting as an SNET MSR-type, this key is reported to the ACU in an SNET MSR-type log response. The MSR data sent depends on the key type recognized:

    - 26-bit key:

        - key data in message characters 7-10,
        - site code in message characters 11-14,
        - company code (always 9999) in message characters 19-22.

    - 35-bit key:

        - key data in message characters 6-10,
        - site code in message characters 11-14,
        - company code (always 9999) in message characters 19-22.

    - 37-bit key:

        - key data in message characters 6-10,
        - site code in message characters 11-14,
        - company code (always 9999) in message characters 19-22.

- Only one keycode is received and reported at a time. A 1-second timer is started when a key is read to prevent the same key from being repeated too quickly.

READER OPERATION (26-BIT AND 34-BIT WIEGAND MODE)

- The RF field is powered at all times.

- A digital key is received in the same fashion as for the SNET operation. (See above).

- If the key is in 88-bit WSE format, then either the 32-bit (or 26-bit) keycode is immediately transmitted via the data 0 and data 1 lines, most-significant-bit first.

- If the key is a 48-bit type then the key content is checked to determine if 26-bit, 35-bit or 37-bit data is to be sent. If the content cannot be determined then no message is sent.

- Only one keycode is received and reported at a time. A 1-second timer is started when a key is read to prevent the same key from being repeated too quickly.

DR4205K SPECIAL OPERATING FEATURE

For the NexSentry 4100 Series ACUs, the DR4205K reader has two modes of operation, the Normal Mode and the KeyPad-Credential (or KP-Credential Mode). Address switch SW1, (the upper byte of the address), determines mode selection. If SW1 is set to 0 or 8, the Normal Mode is selected. If SW1 is set to 4, 5 or 6, (or C, D or E), the KP-Credential Mode is selected.

NORMAL MODE

With address switch SW1 set to 0, the DR4205K operates in its normal mode. Address switch SW2 is then set to the physical Reader/Door address of the DR4205K: 1 through 9 and A through F, (for DigiReader addresses 1 through 15).

Since there are 16 possible reader addresses, a special provision is made to address the 16th reader in the normal mode. For the 16th address, set switch SW1 to 8 and switch SW2 to 0.

(With both address switches SW1 and SW2 set to 0, a DigiReader is off-line.)

		Normal Mode														
Reader Address	(Off-Line)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	**16**
SW1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**8**
SW2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	**0**

Table 8: DR4205K Normal Mode Switch Settings, Switches SW1 and SW2

Operation in Normal Mode:

■ **DKR portion only enabled**: the credential is sent as a credential, and no PIN is expected.

■ **VIP portion only enabled**: the PIN is sent as a PIN, with the number of PIN digits to be entered set in the SYSTEM command. No credential is expected.

■ **Both DKR and VIP portions enabled**: the credential is sent as a credential, the PIN is sent as a PIN. Both the credential and the PIN are expected (in either order). The number of PIN digits to be entered is set in the PIN DIGITS entry of the SYSTEM command.

■ **NOTE**: Deselecting either the DKR or VIP portion requires powering off and on (or issuing a RESET command in the terminal mode) to establish the deselected state.

KP-CREDENTIAL MODE

With address switch SW1 set to 4, 5 or 6, the DR4205K operates in its 'KP-Credential' mode. In the KP-Credential Mode the DigiReader operates in a special manner if only the DKR portion or the VIP portion of the DigiReader is enabled: see *Operation in KP-Credential Mode*, below. The number of digits in the KP-Credential is determined by the 4, 5 or 6 of address switch SW1. Address switch SW2 determines the physical Reader/Door address of the DR4205K for nodes 1 to 15.

For the physical S-Net addresses 1 through 9, set switch SW1 to the S-Net values and switch SW2 to the number of KP-Credential digits, 4, 5 or 6. For Reader/Door addresses 10 through 15, set switch SW1 to A through F and switch SW2 to the number of KP-Credential digits 4, 5 or 6.

For the 16th address, for a number of KP-Credential digits equal to 4, 5 or 6, set switch SW1 to C, D or E, respectively, and switch SW2 to 0.

(With both address switches SW1 and SW2 set to 0, a DigiReader is off-line.)

Reader Address		(Off-Line)	KP-Credential Mode															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	**16**
SW1	**4 PIN Digits**	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	**C**
	5 PIN Digits		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	**D**
	6 PIN Digits		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	**E**
SW2		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	**0**

Table 9: DR4205K KP-Credential Mode Switch Settings, Switches SW1 and SW2

Operation in KP-Credential Mode:

■ **NOTE**: Enabling only either the DKR or VIP portion, as described below, i.e. deselecting either the VIP or DKR portion, requires powering off and on (or issuing a RESET command in the terminal mode) to establish the **DKR-only** or **VIP-only** state.

■ **SW1 set to 4, 5, or 6** (*or C, D or E*): determines the number of KP-Credential digits, 4, 5 or 6, (which must match the number of digits set in the PIN DIGITS entry of the SYSTEM command).

■ **DKR portion only enabled**: a credential presented (or a KP-Credential entered) is sent as a credential.

■ **VIP portion only enabled**: a KP-Credential entered (or a credential presented) is sent as a PIN.

■ *Both DKR and VIP portions enabled: the operation is the same as for the normal mode.*

TAMPER SIGNAL (S-NET ONLY)

DR4200 Series DigiReaders send a tamper signal to an S-Net-based Controller each time an address switch (SW1 or SW2, described above) is changed. (The DR4201, DR4208S, and DR4220 have separate physical tamper switches.)

DigiReader Model:	DR4200K	DR4201	DR4203	DR4205*	DR4208S	DR4220
Tamper Switch(es):	via SW1 or SW2	via Tamper or SW1	via SW1 or SW2	via SW1 or SW2	via Tamper Switch	via Tamper Switch

* all 4205 models: DR4205, DR4205K, DR4205W, DR4205WE, DR4205GM and DR4205WGM

Table 10: Tamper Switch(es)

S-NET CONNECTIONS

The S-Net is an RS485 serial network for communication between the Controller and node devices. Typically, the cable used is two twisted pairs with an overall shield; one pair is for data, the other pair is for DC power. Terminate the last S-Net device with a 120-ohm, ¼ watt resistor or termination jumper as shown in Figure 5. The maximum S-Net length is 4000 feet (1200 meters).
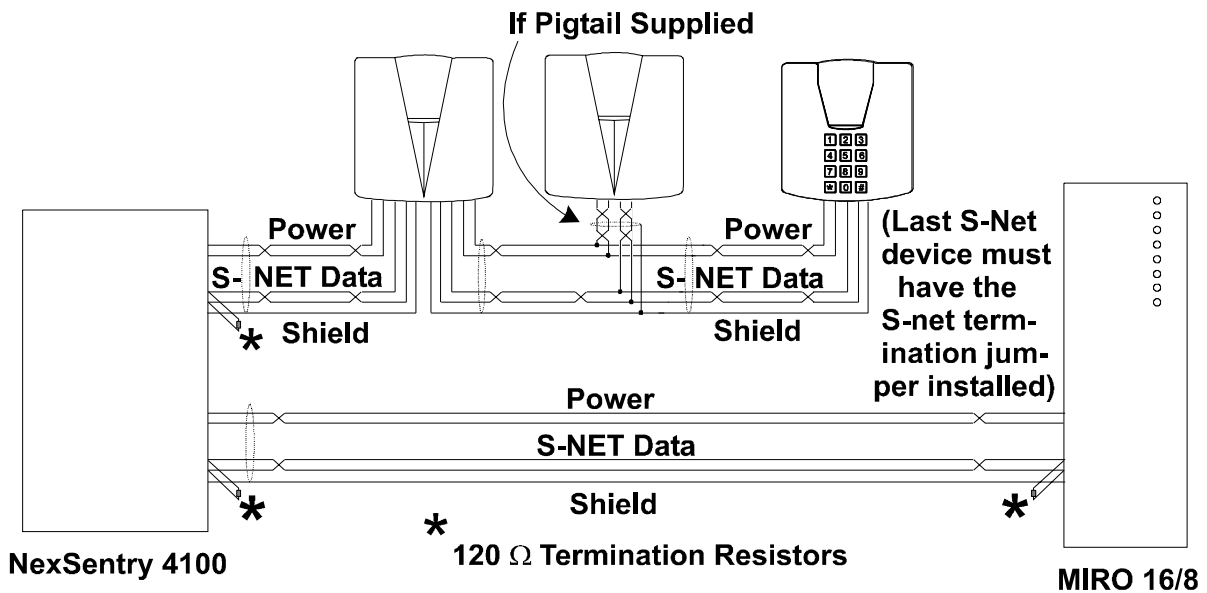

Figure 5: S-Net Wiring

S-Net cable should only be installed in a daisy-chained fashion. WSE strongly recommends replacing all crimp lug/soldered splices by daisy-chained connections in and out of each device. (Note that up to two AD4305 NexStar RS485 Multiplexers may be used to simplify wiring and extend a network.)

Where a pigtail cable is provided with the reader, a splice is required and the installer should, if possible, keep the splice within 3 feet of the reader, to allow splice inspection at the reader location.

The type of cable used for the S-Net should be separate twisted-pair (data and power). See Table 5, above, for WSE recommended S-Net cables.

WIEGAND CONNECTIONS

Refer to Table 11 for the proper wire size for a particular cable length to use in a DigiReader Wiegand application. Figure 6, below, illustrates a typical Wiegand connection.

6-CONDUCTOR WIEGAND CABLE WITH SHIELD	
Minimum Wire Size	Maximum Length
22 AWG	200 Feet
20 AWG	300 Feet
18 AWG	500 Feet

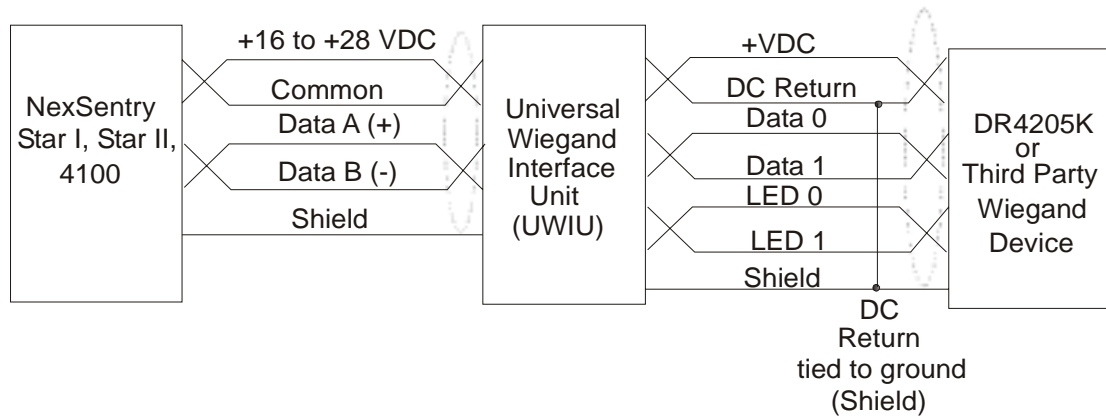**Table 11: Recommended Wiegand Cable Gauge**

Figure 6: Typical Wiegand Connection

MOUNTING LOCATION

Use care when choosing the installation site. To avoid possible external sources of RF interference, do not locate the unit near motors, pumps, generators, DC-AC converters, AC switching relays, light dimmers, or any other devices that emit an electronic radar frequency. Do not locate the unit within 10 feet (3 m) of a computer terminal.

For the mounting of the DR4201 reader, see SPECIAL MOUNTING LOCATION: DR4201 READER, on page 16.

The DR4203, which is designed to be mounted on a metal door mullion, is the only reader that is specifically designed to be mounted on metal. Metal in the vicinity of any of the other devices can reduce the read range. In general, as the amount of metal in close proximity to the device increases, the reliable maximum read range decreases. For optimum operation, ensure that a DigiReader has a minimum of 6 inches (15 cm) clearance at the rear and surrounding sides, as shown in Figure 7. Never cover the front of the DigiReader with any type of metal.

Use the method appropriate to the mounting surface material; if required, use sealing compound to maintain water-resistance.
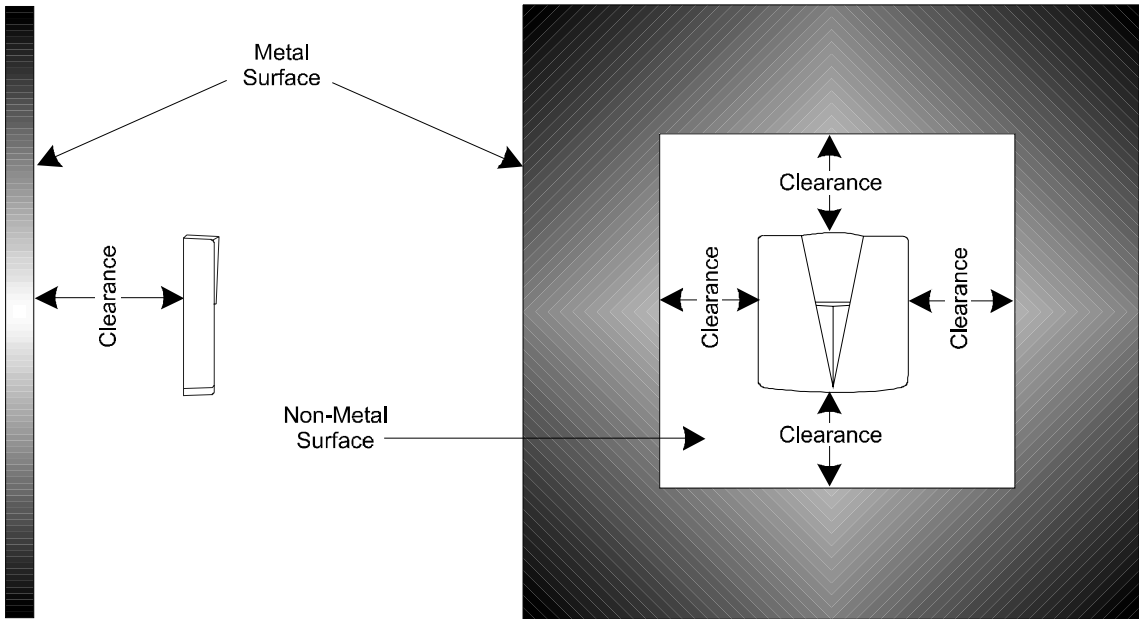
Figure 7: Mounting (DR4205 and DR4208S) For Optimum Read Range With Metal In The Vicinity

SPECIAL MOUNTING LOCATION: DR4201 READER

The DR 4201 reader is designed to be mounted in a single-gang wiring box, (European or US), as shown in figures 8 and 9, below, although it can be otherwise mounted. (Especially when mounted outdoors, we recommend using a caulking compound around the edges of the unit after mounting.)
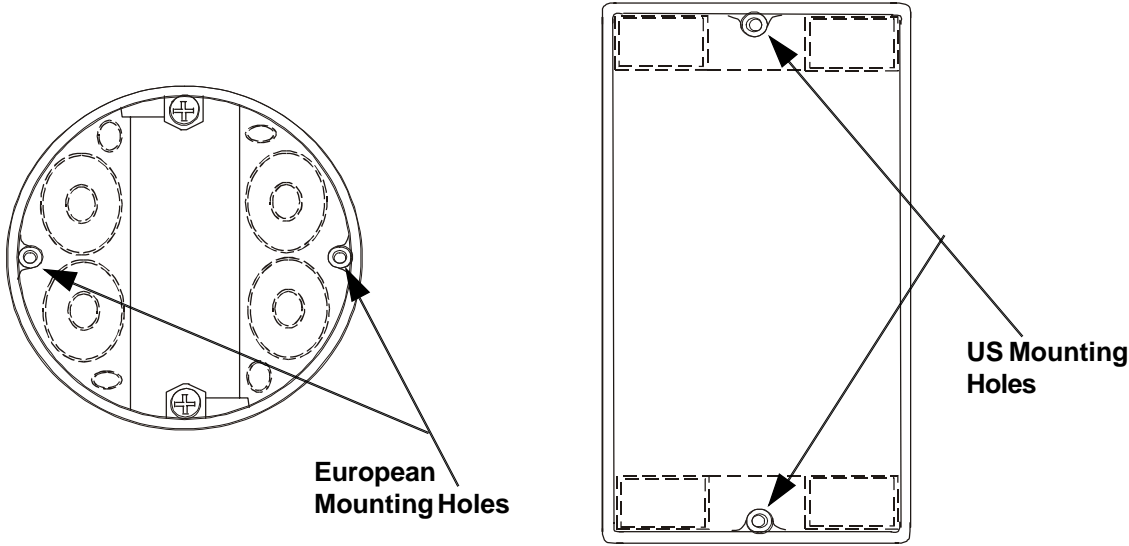
Figure 8: European and US Gang Box Mounting Holes Indicated

Snap Fasteners x 4

Mounting Holes for
European Gang Boxes

Mounting Holes for
US Gang Boxes
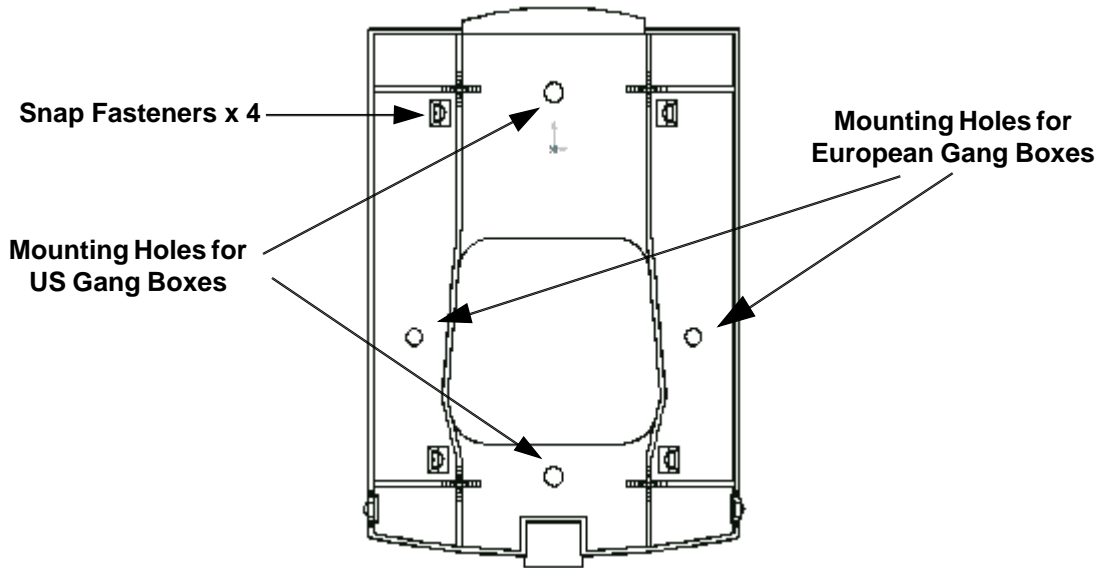
Figure 9: DR4201 Mounting Holes Indicated

Hole A

CAUTIONARY NOTE:
Since the .pdf format slightly
shrinks all images, the original
.p65 image has been expanded so
that this .pdf image IS to scale.

(The distances between hole centers
are provided as an added safeguard.)

Hole C   Hole D

A to B = 3.25 in. = 8.25 cm.
C to D = 2.36 in. = 6.00 cm.

Hole B

Figure 10: DR4201 Mounting Template
(To Scale: .pdf   file only)

TESTING THE DIGIREADER LOCATION

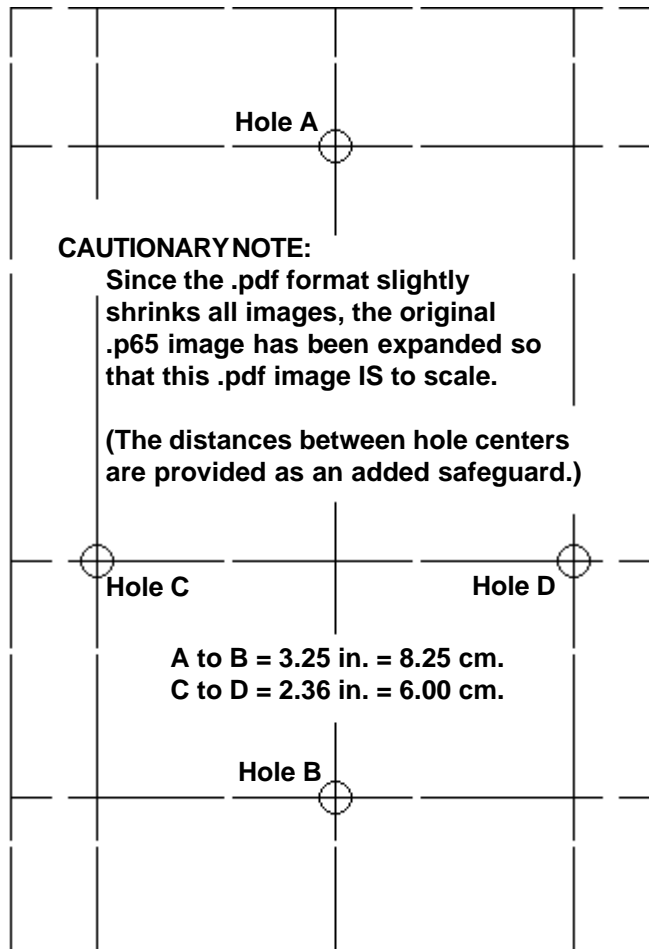If you suspect the presence of RF interference at a location where you plan to install a DigiReader, you should check the site prior to mounting the DigiReader unit. The presence of RF interference may affect a DigiReader in two different ways:

- If RF interference is present, the DigiReader unit may exhibit false reads (or 'ghost' reads), i.e., the unit may beep and the LED illuminate, with no access credential present.

- Alternatively, with RF interference present, the DigiReader unit may read an access credential inaccurately, slowly, or even may be prevented from reading the credential.

The following procedures will make it easier for you to identify a suitable location and to position the DigiReader to minimize any RF interference:

1. The DigiReader models DR4200, DR4203, and DR4205 (all models) have two address switches, SW1 and SW2. Set the switches on the DR4203 and DR4205 to **FF** for the test mode. The DigiReader models DR4201, DR4208S, and DR4220 have a five-position dip-switch for the address. Set all five dip-switch positions to **ON** for the test mode. Then perform the following steps:

    - Connect only the S-Net wires which provide power, (DC positive power and the DC return, and the grounding shield), between the DigiReader and the controller.

    - Hold the DigiReader against the installation surface.

    - Verify that there are no cards or other credentials in the area capable of being detected by the reader. (A credential in your pocket, or somewhere-else where it can be detected, could be the source of any beeping, so you must be sure this is not the case.)

    - If you are sure no credentials are present and the reader beeps, then there is RF interference present, causing the beeping. (The number of beeps is an indication of the degree of noisiness: more beeping indicates a more noisy environment than less beeping.)

    - Keep testing locations until you find one where no false or 'ghost' reads occur.

2. With no false or 'ghost' reads occurring, and with the reader still in test mode, present a credential to the reader . The reader should now beep, indicating that the card has been read. (If the reader does not beep when the card is presented, there may be a source of RF present blocking the reading of the card. In this case also, keep trying new locations,)

    - With the credential reading correctly, verify the read time and the maximum read distance. Using the charts on pages 2 and 3 (Tables 1 and 1A), you can determine the reader's capability with your chosen credential type(s). This same performance is what you would expect once the system is completely installed.

3. When a suitably quiet location has been identified, (relatively free from RF noise), connect the DATA A and DATA B wires between the DigiReader and the Access Control Unit.

    - Set switches SW1 and SW2, for the DR4203 and DR4205 models (or, for the DR4201, the DR4208S,or the DR4220, the 5-position dip-switch) to the correct address. With the

controller now physically connected to the S-Net, and the address switch(es) set, set up the controller to read credentials.

- Present a valid credential to the unit.

- Verify that the credential can be read from the expected distance.

4 The read-range on the DigiReader should now be optimal, but,

- If trouble persists, verify the S-Net wiring and grounding, and / or

- Repeat steps 1, 2, 3, as necessary, to assure the best (most optimal) installed location.

GENERAL INSTALLATION

See the procedures for the reader model and installation type below for additional instructions.

CABLE PREPARATION:

1. Route the data and power cable to the DigiReader location and prepare the cable for attachment to the DigiReader.

2. Remove two inches of the plastic jacket and the shielding foil from the cable.

3. Strip each wire back 1/4" for connecting to the DigiReader.

DR4200K, DR4203, DR4205 SERIES, DR4208S, AND DR4220 INSTALLATION:

1. The S-Net cable on the DigiReader may be routed from the back, bottom or the side of the DigiReader. The reader is pre-configured for cable installation through the back mounting plate. **Note:** S-Net cable is routed directly through the back on the DR4203, DR4208S, and DR4220, and, from the back, on the side on the DR4205GM DigiReader only. (See Figures 11 and 16, below), and on the back, through the gap made by removing the plastic notch on the DR4200K, DR4205, DR4205E, and DR4205K DigiReaders.

2. For the DR4200K, DR4205, DR4205E, and DR4205K DigiReaders, remove the plastic notch from the bottom of the cover. A rattail file may be used to enlarge the opening (Figure 11).

3. The DR4208S DigiReader cable is designed to be routed in two ways. The unit comes from the factory with the cable, secured by a 'SW-NE' strap, routed through the hole in the middle of the upper left quadrant (looking at the back of the unit). Alternately you can re-route the cable through the bottom notch, (removed as in paragraph 2, above) by opening the case, carefully removing the PCB (four screws), snipping the 'SW-NE' strap, securing the cable with a 'W-E' strap, (via the holes provided for this purpose in the PCB), and re-assembling the unit.
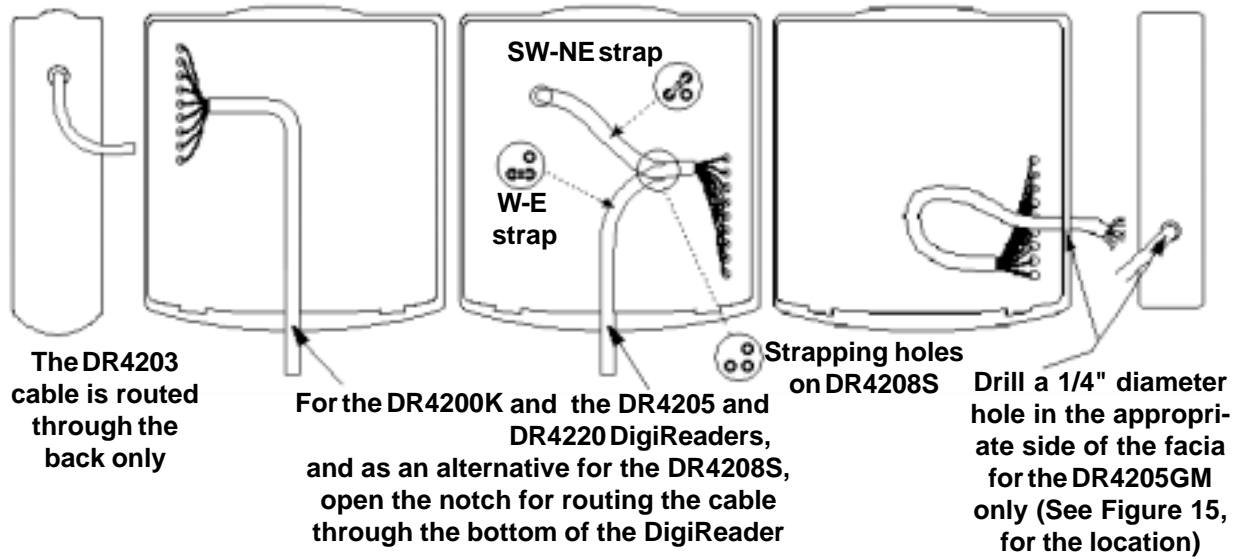
SW-NE strap

W-E strap

The DR4203 cable is routed through the back only

For the DR4200K and the DR4205 and DR4220 DigiReaders, and as an alternative for the DR4208S, open the notch for routing the cable through the bottom of the DigiReader

Strapping holes on DR4208S

Drill a 1/4" diameter hole in the appropriate side of the facia for the DR4205GM only (See Figure 15, for the location)

Figure 11: Cable Routing Configurations

- Connect the DigiReader interface cable to the controller wiring run according to Table 4. If the DigiReader is the last S-Net device on the S-Net cable run, install the termination jumper as directed on page 7, **120 OHM TERMINATION JUMPER (INTERNAL/EXTERNAL)**, (Table 3).

- Set the address switch, as required.

WALL MOUNTING WITH SCREWS

DR4203, DR4205 SERIES, DR4208S, AND DR4220

- Mount the reader base to the wall. Use the WSE-supplied, 1 1/4" Flathead, #6-32 thread or other means appropriate to the wall composition.

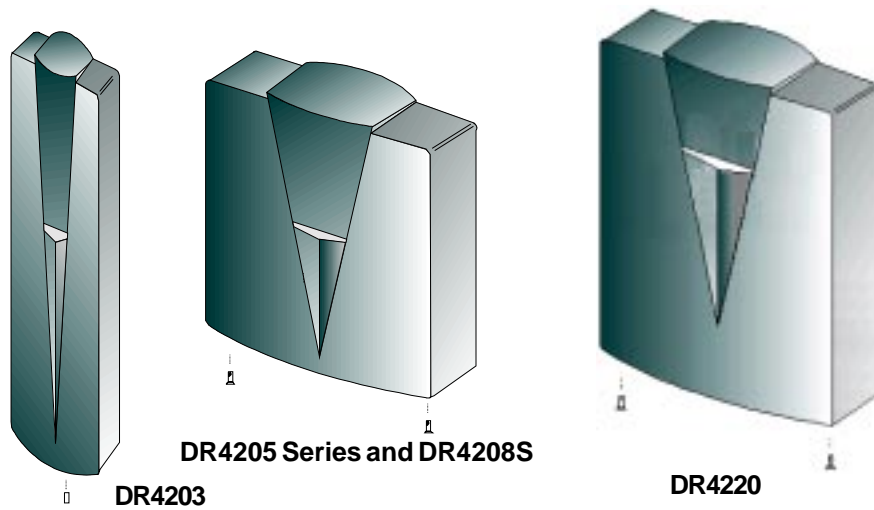- Put the DigiReader cover in place and secure the cover with the supplied screw(s) from the bottom.

DR4205 Series and DR4208S

DR4203

DR4220

Figure 12: Securing The DR4203, DR4205 Series, DR4208S, and DR4220 Covers

WINDOW MOUNTING THE GLASS-MOUNTED UNITS

This type of mounting is necessary for DR4205GM units.

1. Clean the window with glass cleaner or isopropyl alcohol and dry thoroughly.

2. Spray or wipe the window with slightly soapy water.

3. While the window is still wet, peel off the paper backing of the decal and press against the wet section of the window and move around to release any air bubbles to assure maximum contact with the window. Wipe dry any extra water coming out from the sides. See Figure 15.

4. Once the reader and decal are in place, it may be necessary to temporarily tape the reader to the window while the adhesive sets. It should take approximately 10 minutes.
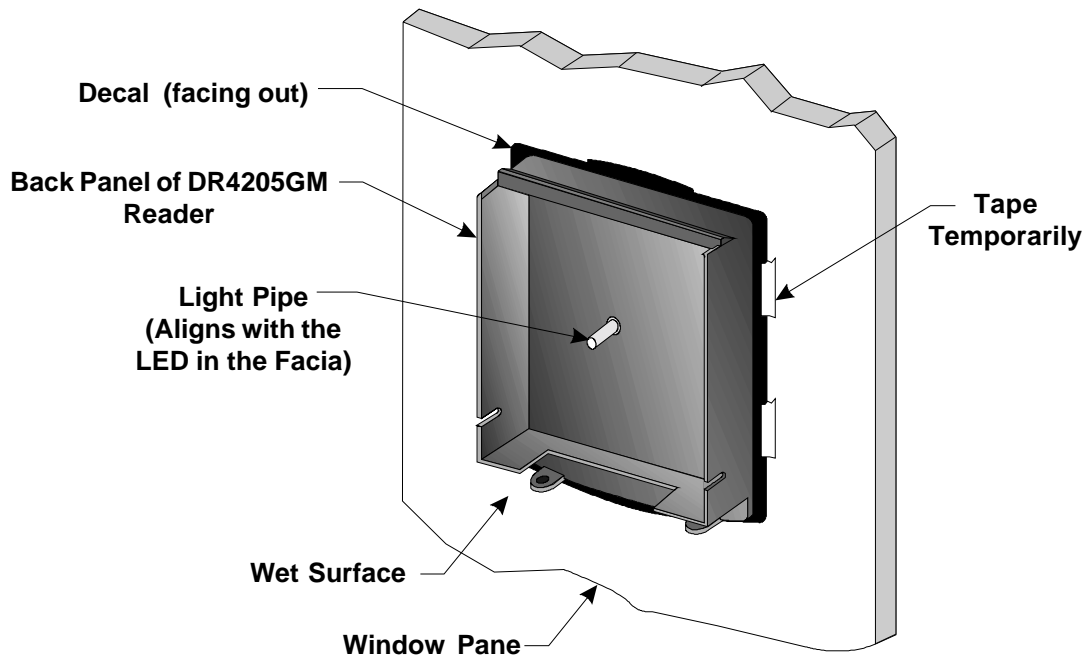
Figure 13: DR4205GM: Placement of Decal and Reader onto Glass

5. While the adhesive is setting, follow the general installation instructions on routing the cable through the side channel and addressing the unit. After determining on which side the cable will be routed through, drill a hole in that side of the front facia to match the pre-drilled slots in the back panel of the reader.
    Note: Reference page 20 for cabling instructions. Also see Figure 16 below.

6. Secure the cover as shown in Figure 13.

DR4205GM Reader Facia

4.72" (12 cm.)

0.25" (0.63 cm.) diameter

Drill Hole to Match Slot
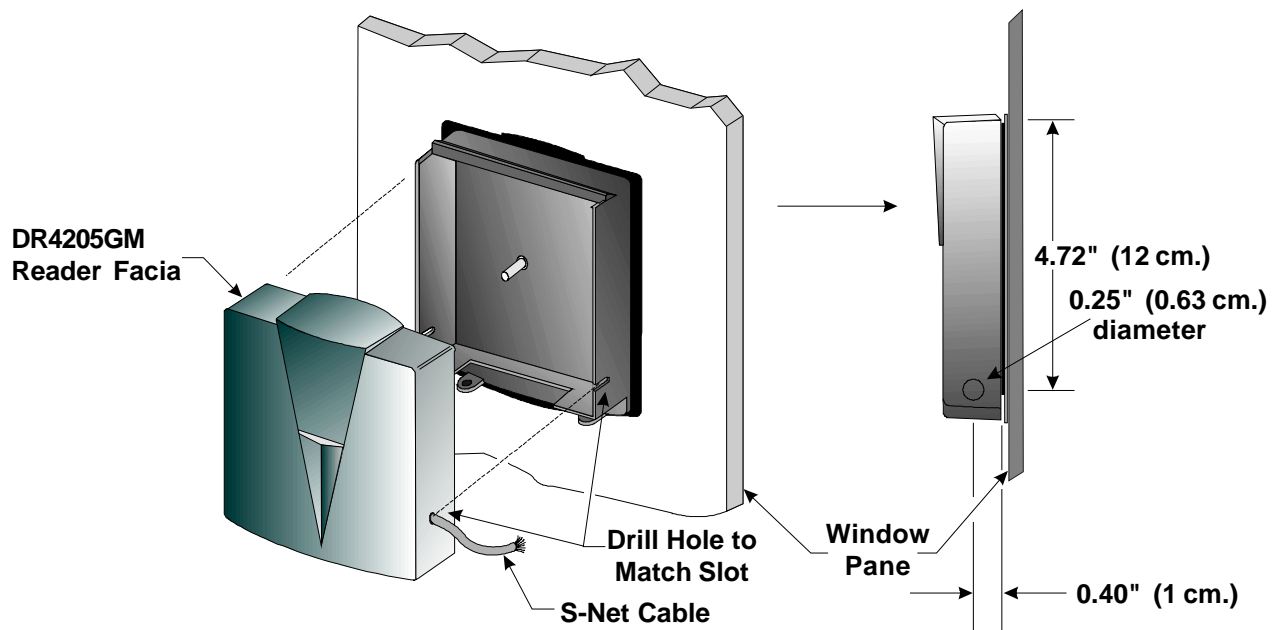
Window Pane

S-Net Cable

0.40" (1 cm.)

Figure 14: DR4205GM: Routing the Cable and Attaching the Facia

7. After the reader is securely set to the window, remove any masking tape used and clean the window surrounding the reader.

Troubleshooting

Field troubleshooting methods fall into three categories: power, communication errors, and communication failures. The table below lists the most common symptoms of these conditions and provides suggested actions to identify and remedy the problem.

Symptom	Troubleshooting Action		
LED not lit in ready mode	Check power	Check power supply	
		Check Phoenix connector	
		Check fuses	
		Check socketed ICs	
Comm Failure	Check LED lit in ready mode	If not, see above	
	Check S-Net	Check cable connections	
		Check power supply grounding	
No Read Slow Read Short Read Range (Comm Errors)	Check EPROMs		
	Check S-Net	Verify correct termination	
		Network length - need NexStar?	
		Verify common groundings	
		Check shield connections	
		Perform TUNE command *	
Mis-reads (Ghost reads)	See the section above: Testing the DigiReader Location		

* See discussion of TUNE command, below:

TUNE Command (for the NexSentry Star and 4100-Series controllers)

```
YOUR COMMAND? TUNE
DOOR (1-16) ? 1                                     (door with a DKR reader)
1. DIGITAL KEY READER RANGE (0-255): 253 ?          (power control)
2. SEND TO ACU ONCE (Y/N): Y ?                      (no. of times the DKR sends key to ACU)
3. NUMBER OF VERIFICATION KEY READS (0-255): 0 ?    (no, of retries, for high RF environment)
4. VERIFICATION TIME WINDOWS (0000-FFFF): 20 ?      (hex 20 = decimal 32)
5. BEEPER BEHAVIOR WITH A VALID KEY
     ON DURATION (0000-FFFF): A ?                   (hex A = decimal 10)
     OFF DURATION (0000-FFFF): A ?
     ON-OFF TOOTAL  DURATION (0000-FFFF): 14 ?      (hex 14 = decimal 20)
```

NOTE: DR4201, DR4208S, and DR4220 readers use only question 5, for the beeper.

CONTACTING WSE TECHNICAL SERVICE

Telephone:

United States:

1-800-227-1667   (voice: toll free)

or

1-510-360-7996   (voice)

6:00am —to— 6:00pm

(Pacific Time Zone = GMT - 8 hours)

Monday through Friday

1-510-360-7823   (fax)

Europe (Germany):

+49 (0) 70 31 637 782   (voice)

8:30am —to— 12:00noon & 1:00pm —to— 4:15pm

(Central European Time Zone = GMT + 1 hour)

Monday through Friday

+49 (0) 70 31 637 769   (fax)

NOTE: The German telephone numbers should be used for
technical service for the whole of Europe.
The United States telephone numbers should be used for
technical service for the rest of the world.

E-mail:

wsehelp@wse.com

Web Site:

http://www.wse.com

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Name of Manual: **DigiReader Series: Installation and Operation Manual**
    Part Number: **P/N 6600025**   **Revision: D**

Organization: _____
                         _____

    Address: _____
                         _____
                         _____
                         _____

Other Equipment Ordered
  With Your
  DigiReader(s):

Evaluation of Manual:

	POOR	FAIR	ADEQUATE	GOOD	EXCELLENT	
Organization:	1	2	3	4	5	NA
Content:	1	2	3	4	5	NA
Style:	1	2	3	4	5	NA
Thoroughness:	1	2	3	4	5	NA
Clarity (Words):	1	2	3	4	5	NA
Clarity (Figures):	1	2	3	4	5	NA
Clarity (Tables):	1	2	3	4	5	NA

    Were you able / was your integrator able to set
    up your DigiReader(s) by using this manual?   Y   N   NA
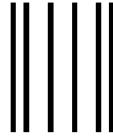
and/or   **Did you have to call Customer Service for help on one**
    or more issues?   Y   N   NA

What additional aid(s) did you use to bring up your equipment?

    _____
    _____

Other Comments
(Positive):   _____
               _____
               _____
               _____

Other Comments
(Negative):   _____
               _____
               _____
               _____

Please tear off this sheet, fill it out, and return it within 3 months of system installation.

BUSINESS   REPLY   MAIL

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