

Developer's Guide

DSC[®]
PowerSeries[™]

PC5401

Serial Interface Module
Version 1.0

IMPORTANT

This manual contains information on limitations regarding product use and function and information on the limitations as to liability of the manufacturer. The entire manual should be carefully read.

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1. Introduction

This manual describes the commands that are available to developers of third-party control applications for the PowerSeries™ line of panels through the PC5401 Serial Interface Module.

For instructions on installing and setting up a PC5401 module on a PowerSeries™ panel, please see the *PC5401 Installation Instructions*.

How to Use This Document

This document describes the commands available to developers of third-party applications through the PC5401 interface. For information on how to integrate these commands into your application, please refer to the documentation available for the programming language you have used.

Please read through the introductory material on pages 1 and 2 for information about the PC5401 interface, the command structure, and sample transmissions. For information on each command, refer to the command tables on pages 3 to 7.

2. Developing PowerSeries™ Applications

PowerSeries™ panels through the PC5401 module, provide an Application Programming Interface (API) to allow third-party applications to communicate with the security system.

You can incorporate PC5401 API commands in any application that can send and receive hexadecimal ASCII codes.

When you are programming your application, you can use any of the API commands described in this Guide.

There are two types of commands available to you:

1. Commands which your application sends to the PC5401
2. Event-driven or State-Change commands which the PC5401 sends to your application.

The PC5401 API does not support handshaking. As a corollary to this the PC5401 does not know if the application is active or not and the PC5401 does not buffer events, so if the application computer stops functioning any events occurring during that time will be overwritten.

Common Uses of PowerSeries™ Applications

You can use the PC5401 commands for whatever purpose you and your users want. Some common applications include:

- o a custom interface for your users
- o integration of other building systems (e.g. a CCTV system) with a PowerSeries™ security system.

3. PC5401 Module Serial Connection

The PC5401 module uses a serial cable to connect to the computer running your application. Refer to the *PC5401 Installation Instructions* for more information

4. Communications Protocol

The module will communicate with the Application using the RS-232 interface (DB9 connector) on the board.

All data is sent as hex ASCII codes. The transmission from will consist of the following:

CCC DDD...DDD CKS CR/LF

CCC => 3 Digit Command

This tells the module or the application what to do. Commands are 3 characters long. For example, the Status Command (001) would be sent as hex ASCII codes '30 30 31'. See the following tables for a list of supported commands.

DDD...DDD => Data Byte(s)

This is the data that may be needed for the command. For example, after the Partition Arm command (030), the application must specify which partition should be armed (1-8). The following tables show what the data requirements are for each command. Some commands, like the User Closing, have space holding zeros. In this case all 4 digits are sent even though this module ever uses only two.

CKS => Checksum

The checksum is calculated by adding the hex value of all command and data digits, and truncating the result to 8 bits. The upper and lower nibbles of the result are converted to ASCII characters before sending. For example, a Partition Alarm on partition 3 would be sent like this:

The command and data fields contain: 6 5 4 3

The ASCII codes for this would be: 36 35 34 33

$36 + 35 + 34 + 33 = D2$. Since the result is already 8 bits we don't have to worry about the length and simply send it.

Format	Command	Data	Checksum	CR/LF
Code	6 5 4	3	D 2	CR LF
ASCII	36 35 34	33	44 32	0D 0A

CR/LF => Carriage Return & Line Feed

Each transmission is followed with a carriage return (hex ASCII 0D) and a line feed (hex ASCII 0A) to indicate the end of a transmission.

5. Application Originated Commands

Description	Command	# of Data Bytes	Data Bytes
Poll - responds with a <i>Command Acknowledge</i> code	000	0	
Status Report - sends general zone, partition, and trouble status updates to the "Control Software Application". Troubles are limited to the status of the trouble LED on a keypad. Only the partitions that have been detected, and their trouble states, will be displayed. Please see section 6 for more information. Note: When connected to a PC5020 the module will send the status of all 64 zones, troubles and the status of enabled partitions only. For other panels it will report the status of 32 zones, troubles and the status of enabled partitions only.	001	0	
Set Time & Date - changes the time and date sent in the data packet.	010	10	hhmmMMDDYY
Command Output Control - activates the selected <i>Command Output</i> .	020	2	Partition (1-8) Output (1-4)
Partition Arm Control - arms selected partition in <i>AWAY</i> mode (no zones bypassed).	030	1	Partition (1-8)
Partition Arm Control – Stay Arm - arms selected partition in <i>STAY-ARM</i> mode.	031	1	Partition (1-8)
Partition Arm Control – Zero Entry Delay - arms selected partition with NO entry delay.	032	1	Partition (1-8)
Partition Arm Control – With Code – requires a <i>user code</i> to arm the selected partition. Note: This is identical to entering an access code when a partition is in <i>Ready</i> mode.	033	7	Partition (1-8) Code (4-6 digit)
Partition Disarm Control - disarms the selected partition. Sending the Partition Disarm command will silence any alarms as well as disarm the partition.	040	7	Partition (1-8) Code (4-6 digit)
Descriptive Arming Control - This command followed by a "1" enables Descriptive Arming control. Default is "0" disabled. This control adds arming mode information (i.e. <i>AWAY</i> , <i>STAY</i> , <i>ZERO-ENTRY-AWAY</i> , or <i>ZERO-ENTRY-STAY</i>) to the <i>Partition Armed Command (652)</i> . This command is sent at the end of an Exit Delay and after an alarm if the Bell Cutoff expires.	050	1	On/Off (1,0)
Time Stamp Control - This command followed by a "1" enables the Time Stamp control. Default is "0" disabled. This control prefixes all PC5401 commands with an 8-digit time stamp followed by a space (0x20).	055	1	On/Off (1,0)
Time Broadcast Control - This command followed by a "1" enables the Time Broadcast control. Default is "0" disabled. This control causes the PC5401 to transmit system time broadcasts (PC5401 Command 560) at 2 minute intervals.	056	1	On/Off (1,0)
Temperature Broadcast Control - This command followed by a "1" enables the Temperature Broadcast control. Default is "0" disabled. This control causes the PC5401 to transmit interior and exterior temperatures (PC5401 Commands 561 & 562) at 2 minute intervals.	057	1	On/Off (1,0)
Trigger Panic Alarm - emulates the FAP (Fire, Ambulance, Panic) keys on a DSC keypad causing an instant alarm.	060	1	1 = Fire 2 = Ambulance 3 = Police

Description	Command	# of Data Bytes	Data Bytes
<p>Code Send - This command is required to send an access code. A command, such as <i>Command Output</i>, will be sent to the module and the module will then send command 900 to tell the user to enter an access code. The <i>Code Send</i> command transfers this code.</p> <p><i>NOTE:</i> The code entered will be sent to the partition that sent the 900 request. The PC5401 remembers which partition the code request came from.</p>	200	4-6	Access Code (4-6)

6. PC5401 Originated Commands

Description	Command	# of Data Bytes	Data Bytes
Command Acknowledge - indicates that a Command has been received.	500	3	Previous CMD received
Command Error - indicates that a Command has been received with a bad checksum.	501	0	
System Error - indicates that an error has been detected. Refer to section 5.4 for error code list.	502	3	000-255 (error code)
Time/Date Broadcast - sends the current security system time.	550	10	HH:MM MM/DD/YY
Ring Detected - indicates that the panel has detected a ring on the telephone line. Note: An ESCORT™5580TC module is required to receive this command.	560	0	
Indoor temperature Broadcast - displays interior temperature and thermostat number. (ESCORT™5580TC module and minimum of one ENERSTAT thermostat required.) Note: The three digit temperature is a decimal representation of a signed byte representing -127 to +127 degrees Fahrenheit or centigrade depending on panel settings (most significant bit is the sign bit).	561	4	Thermostat (1-4) Temperature (XXX)
Outdoor temperature Broadcast - displays exterior temperature and thermostat number. (ESCORT™5580TC module and minimum of one ENERSTAT thermostat required.) Note: The three digit temperature is a decimal representation of a signed byte representing -127 to +127 degrees Fahrenheit or centigrade depending on panel settings (most significant bit is the sign bit).	562	4	Thermostat (1-4) Temperature (XXX)
Zone Alarm - indicates that a zone has gone into alarm.	601	4	Partition(1-8) Zone (001-064)
Zone Alarm Restore - indicates that a zone alarm has been restored.	602	4	Partition(1-8) Zone (001-064)
Zone Tamper - indicates that a zone has a tamper condition.	603	4	Partition(1-8) Zone (001-064)
Zone Tamper Restore - indicates that a zone tamper condition has been restored.	604	4	Partition(1-8) Zone (001-064)
Zone Fault - indicates that a zone has a fault condition.	605	3	Zone (001-064)
Zone Fault Restore - indicates that a zone fault condition has been restored.	606	3	Zone (001-064)
Zone Open - indicates the general status of the zone.	609	3	Zone (001-064)
Zone Restored - indicates the general status of the zone.	610	3	Zone (001-064)
Duress Alarm - indicates that a duress code has been entered on a system keypad.	620	4	0000 cannot trace user
[F] Key Alarm - indicates that a Fire key alarm has been activated	621	0	
[F] Key Restore - indicates that a Fire key alarm has been restored (sent automatically after the alarm).	622	0	
[A] Key Alarm - indicates that an Auxiliary key alarm has been activated.	623	0	
[A] Key Restoral - indicates that an Auxiliary key alarm has been restored (sent automatically after the alarm).	624	0	
[P] Key Alarm - indicates that a Panic key alarm has been activated	625	0	

Description	Command	# of Data Bytes	Data Bytes
[P] Key Restore - indicates that a Panic key alarm has been restored (sent automatically after the alarm).	626	0	
2-Wire Smoke Alarm - indicates that a 2-wire smoke alarm has been activated.	631	0	
2-Wire Smoke Restore - indicates that a 2-wire smoke alarm has been restored.	632	0	
Partition Ready - indicates that the partition can now be armed (all zones restored, no troubles, etc). Also issued at the end of Bell Timeout if the partition was READY when an alarm occurred.	650	1	Partition (1-8)
Partition Not Ready - indicates that the partition cannot be armed (zones open, trouble present, etc).	651	1	Partition (1-8)
Partition Armed - indicates that the partition has been armed – sent at the end of exit delay. Also issued at the end of Bell Timeout if the partition was ARMED when an alarm occurred.	652	1	Partition (1-8)
Partition Armed - Descriptive Arming Enabled - indicates that a partition has been armed and the mode it has been armed in. (i.e. AWAY, STAY, ZERO-ENTRY-AWAY, or ZERO-ENTRY-STAY). This command is sent at the end of an Exit Delay and after an alarm if the Bell Cutoff expires.	652	2	Partition (1-8) Mode (0,1,2,3)
Partition In Alarm - indicates that a partition is in alarm.	654	1	Partition (1-8)
Partition Disarmed - indicates that a partition has been disarmed.	655	1	Partition (1-8)
Exit Delay in Progress - indicates that a partition is in Exit Delay.	656	1	Partition (1-8)
Entry Delay in Progress - indicates that a partition is in Entry Delay.	657	1	Partition (1-8)
Keypad Lock-out - indicates that a partition is in Keypad Lockout due to too many failed user code attempts.	658	1	Partition (1-8)
Invalid Access Code - indicates that an access code that was entered was invalid.	670	1	Partition (1-8)
Function Not Available - indicates that a function that was selected is not available.	671	1	Partition (1-8)
User Closing - indicates that a partition has been armed by a user – sent at the end of exit delay.	700	5	Partition (1-8) User (0001-0042)
Special Closing - indicates that a partition has been armed by one of the following methods: Quick Arm, Auto Arm, Keyswitch, DLS software, Wireless Key.	701	1	Partition (1-8)
Partial Closing - indicates that a partition has been armed but one or more zones have been bypassed.	702	1	Partition (1-8)
User Opening - indicates that a partition has been disarmed by a user.	750	5	Partition (1-8) User (0001-0042)
Special Opening - indicates that a partition has been disarmed by one of the following methods: Keyswitch, DLS software, Wireless Key.	751	1	Partition (1-8)
Panel Battery Trouble - indicates that the panel has a low battery	800	0	
Panel Battery Trouble Restore - indicates that the panel's low battery has been restored.	801	0	
Panel AC Trouble - indicates that AC power to the panel has been removed.	802	0	
Panel AC Restore - indicates that AC power to the panel has been restored	803	0	
System Bell Trouble - indicates that an open circuit has been detected across the bell terminals.	806	0	
System Bell Trouble Restoral - indicates that the bell trouble has been restored.	807	0	

Description	Command	# of Data Bytes	Data Bytes
TLM Trouble - indicates that the phone line is a open or shorted condition.	810	0	
TLM Trouble Restore - indicates that the phone line trouble condition has been restored.	811	0	
TLM Trouble Line 2 - indicates that the phone line is a open or shorted condition on the secondary line.	812	0	
TLM Trouble Restore Line 2 - indicates that the phone line trouble condition has been restored on the secondary line.	813	0	
FTC Trouble - indicates that the panel has failed to communicate successfully to the monitoring station.	814	0	
Buffer Near Full - indicates that the panel's Event Buffer is 75% full from time last uploaded to DLS.	816	0	
Device Low Battery - indicates that a wireless zone has a low battery.	821	3	Zone (001-064)
Device Low Battery Restore - indicates that the low battery condition on a wireless zone has been restored.	822	3	Zone (001-064)
Wireless Key Low Battery Trouble - indicates that a wireless key has a low battery condition.	825	3	Key (001-016)
Wireless Key Low Battery Trouble Restore - indicates that a wireless key low battery condition has been restored.	826	3	Key (001-016)
Handheld Keypad Low Battery Alarm - indicates that a handheld keypad has a low battery condition.	827	3	HHK (001-004)
Handheld Keypad Low Battery Restore - indicates that a handheld keypad low battery condition has been restored.	828	3	HHK (001-004)
General System Tamper - indicates that a tamper has occurred with one of the following modules: Zone Expander, PC5132, PC5204, PC5208, PC5400, PC59XX, LINKS 2X50, PC5108L, PC5100, PC5200.	829	0	
General System Tamper Restore - indicates that a general system Tamper has been restored.	830	0	
Home Automation Trouble - indicates that there is a problem with the ESCORT™5580TC module.	831	0	
Home Automation Trouble Restore	832	0	
Trouble Status - shows the general trouble status that the trouble LED on a keypad normally shows. Sent when there is a trouble present on system.	840	1	Partition (1-8)
Trouble Status Restore - shows the general trouble status that the trouble LED on a keypad normally shows. Sent when there are no troubles on system.	841	1	Partition (1-8)
Fire Trouble Alarm	842	0	
Fire Trouble Alarm Restore	843	0	
Code Required - indicates that an access code is required. Once the code is entered, the 200 command will be sent to perform the required action. The code should be entered within the window time of the panel.	900	0	

Notes:

- 1) It is possible that when using a PC5020 (POWER864) panel, the first command after power-up of the PC5401 will show incorrect partition information if that command displays the partition. This is due to the method the PC5401 uses to detect which type of panel it is connected to. If partition information is critical, the installer should open and close a zone to clear this condition before leaving the installation.
- 2) For commands 621 through 626 the partition will always be zero.

7. Special USER/MASTER Code Requirements

Some PC5401 commands require a user code in order to execute. An example would be command output (CMD 020). If a code is required by the panel, the PC5401 will issue a 900 command to indicate to the application that a 4-digit or 6-digit code must be entered.

Arming, disarming and functions that require codes to execute should follow this simple protocol.

1. Select the function (arm, disarm, output) by sending the appropriate command.
2. If a code is required, the PC5401 will send command 900.
3. The application must then respond with command 200 containing a valid user code.

If no code is required a command 200 is not required. The application will have the panel's time window for entering the access code. If a command 200 is issued to the PC5401 outside of the panel's window, it is ignored. Maintenance codes are not supported by the PC5401.

8. Special Considerations For PC5401 Commands

Most of the commands the PC5401 issues are event driven (e.g., API command or security system event). The remaining commands reflect the status of certain systems and are only issued when a *change-of-state* is encountered. For example, command 650 tells the API that the indicated partition is READY. Because this is state information, it is only sent when the partition state changes from another state (e.g., PARTITION_IN_ALARM, to the READY state). This also applies to zone states.

The specific commands are:

609, 610, 650, 651, 652, 654, 655, 656, 657, 670, and 671

Loss-of-power Considerations

On power-up, the PC5401 is not immediately aware of the state of all partitions and zones. When the PC5401 detects a *change-in-state* the appropriate *change-of-state* command listed above will be sent. The output of the API Command 001 (STATUS) state information it displays may be false if the PC5401 has recently been added to the security system bus. This is because the PC5401 has not seen a state transition yet and therefore reports the default state for both partitions and zones; READY and CLOSED respectively. Partition information also may not be displayed if the PC5401 has not detected a partition status change for that partition. These issues are only relevant for 5 minutes maximum after the PC5401 has been added to the system bus.

Configuration commands for the PC5401 module (e.g., 010, 050, 055, 056, 057) will be cleared if power is lost to the module and will require reloading by the application. DSC recommends periodically reloading these values to ensure consistent operation.

9. PC5401 Error Codes

- 00 No Error
- 01 RS-232 Receive Buffer Overrun (a command is received while another is still being processed)
- 02 RS-232 Receive Buffer Overflow
- 03 Keybus Transmit Buffer Overrun

- 10 Keybus Transmit Buffer Overrun
- 11 Keybus Transmit Time Timeout
- 12 Keybus Transmit Mode Timeout
- 13 Keybus Transmit Keystring Timeout
- 14 Keybus Not Functioning (the PC5401 cannot communicate with the security system)
- 15 Keybus Busy (Attempting to Disarm or Arm with user code)
- 16 Keybus Busy – Lockout (The panel is currently in Keypad Lockout – too many disarm attempts)
- 17 Keybus Busy – Installers Mode (Panel is in installers mode, most functions are unavailable)

- 20 API Command Syntax Error
- 21 API Command Partition Error (Requested Partition is out of bounds)
- 22 API Command Not Supported
- 23 API System Not Armed (sent in response to a disarm command)
- 24 API System Not Ready to Arm (system is either busy, or already armed)
- 25 API Command Invalid Length
- 26 API User Code not Required
- 27 API Invalid Characters in Command (no alpha characters are allowed except for checksum)

Notes:



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