

# SECTION 2

## SMART Hopper MANUAL SET

## FIELD SERVICE MANUAL

INTELLIGENCE IN VALIDATION

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## 2. FIELD SERVICE MANUAL

This section is one part of a complete manual set: typically, a field service engineer who is maintaining the product would use this section.

This section contains the essential information that the field engineer needs to clean, maintain and fault find a SMART Hopper unit that is installed in a host machine.

The SMART Hopper unit has been designed to minimise any problems or performance variations over time. This has been achieved by careful hardware and software design; this attention to the design means there is very little user maintenance required.

## 2.1 Clearing A JAM

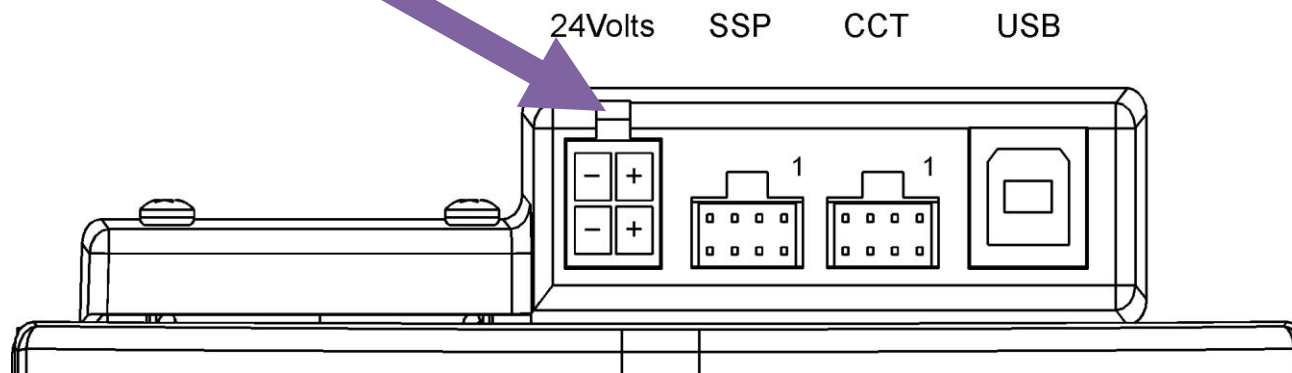
In the unlikely event of a coin jamming within the SMART Hopper, follow the steps below

1. Power off the hopper and remove 24volt 4 way power cable.

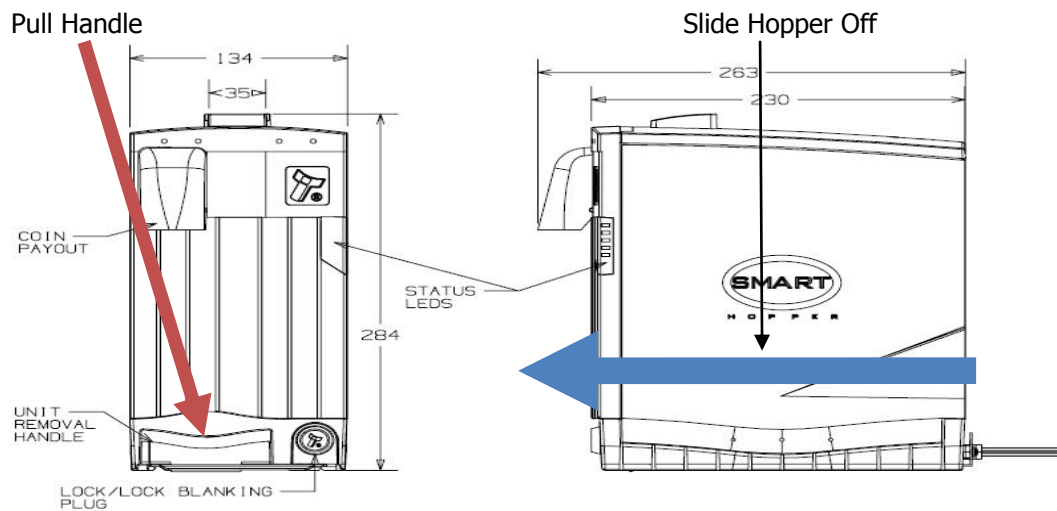


### Caution!

Power off Hopper before removing JAM.

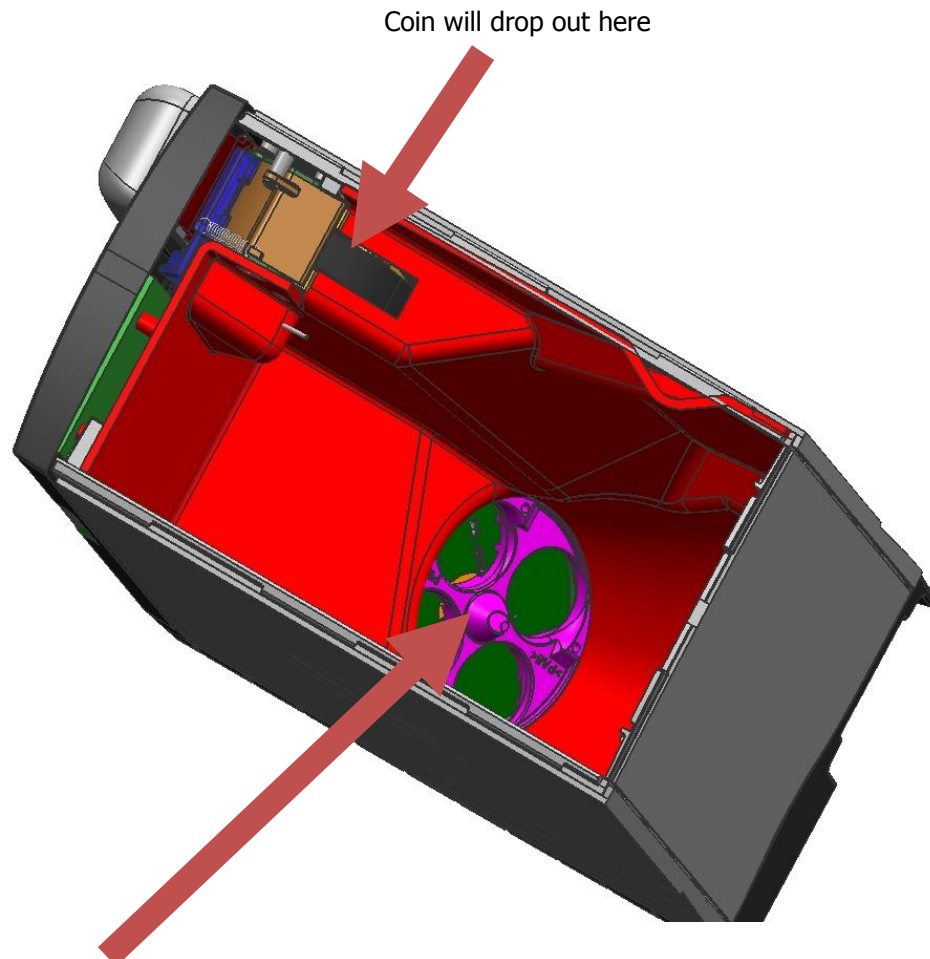


2. Remove the hopper from the mounting plate



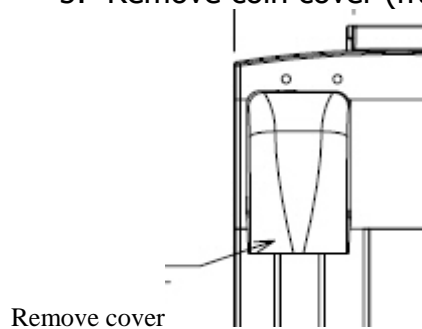
3. Empty all coins from the coin bowl

4. Clear the jammed coin from the disk

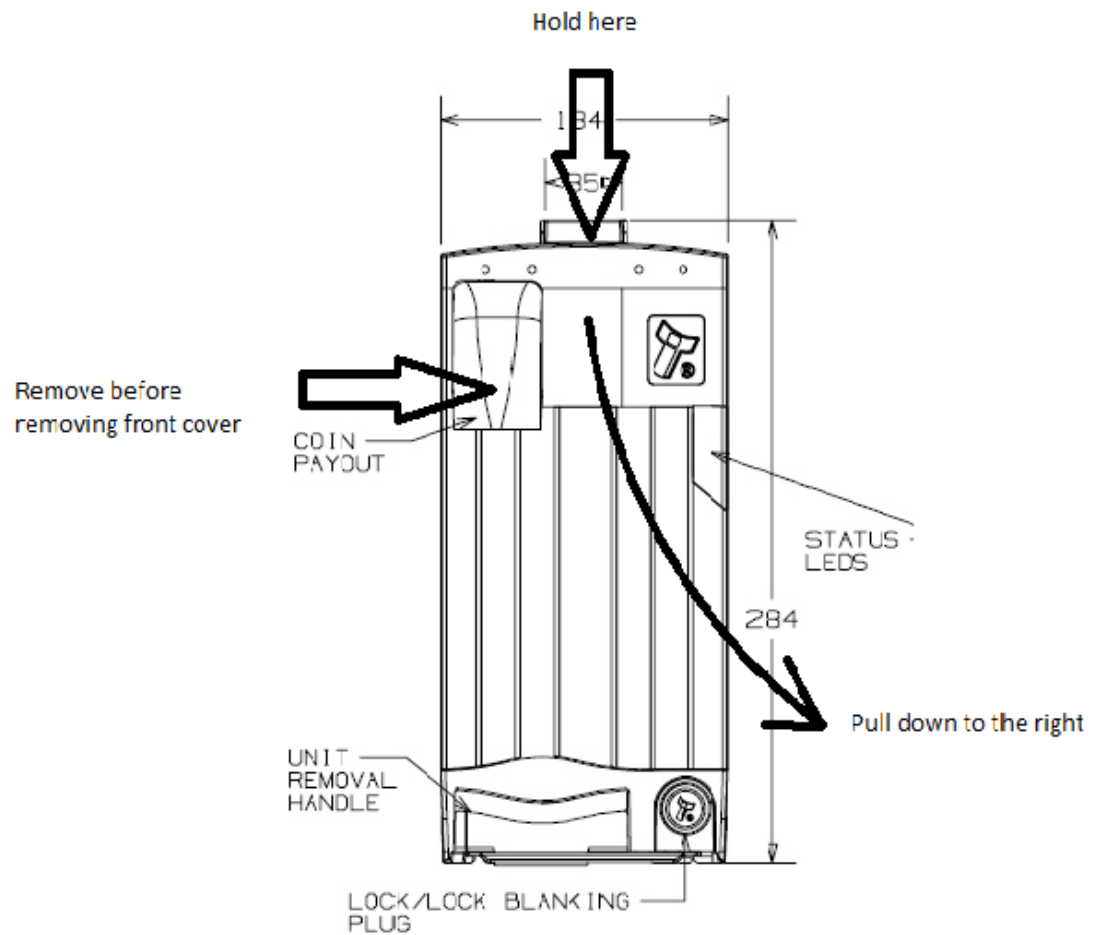


Turn coil anti-clockwise but be cautious to avoid harm.

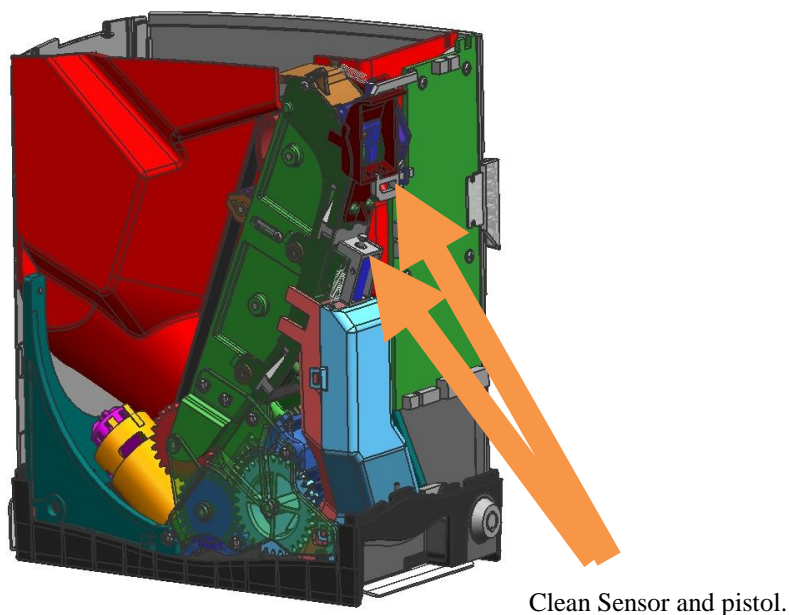
5. Remove coin cover (fraud cover)



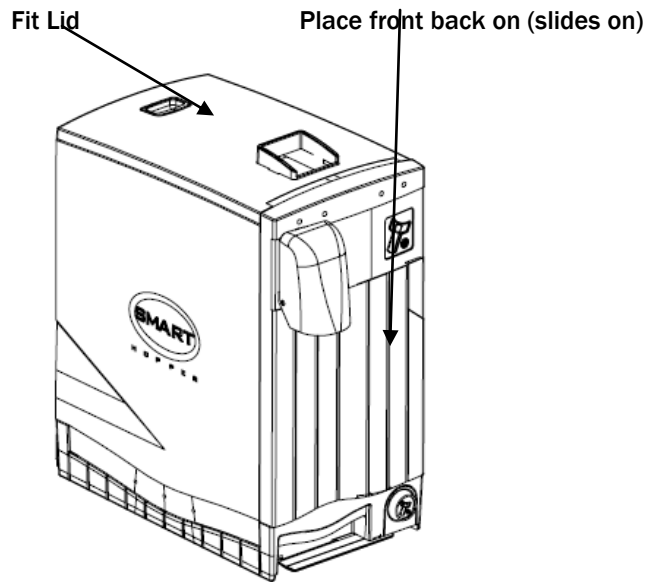
6. Re-move the front panel. From the top pull down and right (twist) and the panel clips off.



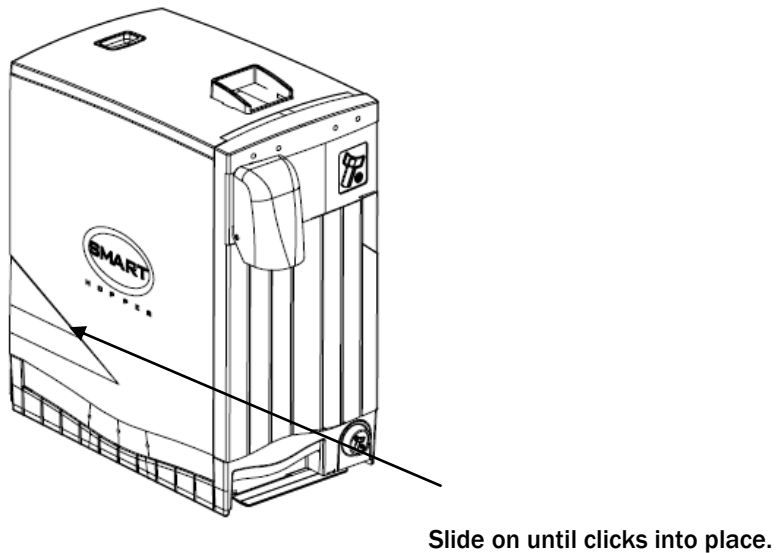
7. Once the cover is removed check the pistol is not sticking and that the sensor is clean, see picture below.



8. Re-fit all parts



9. Re-attach the hopper to the mounting base plate



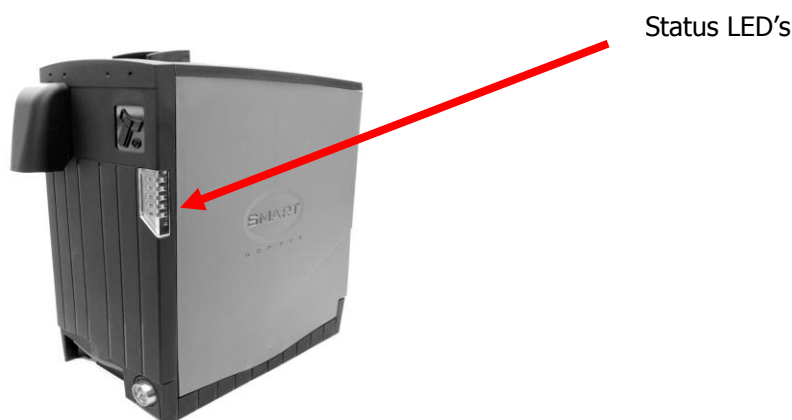
10. Re-fill the hopper and apply levels to host.

11. Apply power

12. Test operation

## 2.2 Fault Finding - Flash Codes

The Smart Hopper module has inbuilt fault detection. If there is a configuration or other error, the Smart Hopper module LED's well indicates will flash in a particular sequence. The Smart Hopper module status indicators are on the front of the Smart Hopper module, seen below:



A summary of the Status Indicator Flash Codes for the payout module are shown here:

Led Colour	Status	Description	Action
Green	Flashing 1Hz	Enabled and ready to dispense	
Red	1 Flash	Hopper disabled	Host system to send enables command.
Red	2 Flashes	Calibration Fault	Optical sensor contaminated. Operator to clean exit sensor light pipe. If fault persists, return to ITL for service.
Red	3 Flashes	No Encryption key set	Host system to negotiate key.
Red	4 Flashes	Coin jammed	Remove power, manually empty coins from bowl and check hopper base for stuck coins. Try manually turning the disc. Persistent jam may require returning to ITL for service.
Red	5 Flashes	Fraud Attempt detected.	Reset hopper. If this persists it indicates a problem with the top pay-out flap, light guide or exit sensor.
Red	6 Flashes	Legacy, no longer used. (Hopper empty)	
Red	7 Flashes	Memory checksum error	Re-download hopper firmware. If this persists return to ITL for service.
Red	8 Flashes	Hopper sensors not initialised	Return to ITL for service.
Red	9 Flashes	Legacy, no longer used. (Lid removed).	



## 2.3 Technical Specifications

The full technical specifications for the SMART Hopper unit can be found in Section 6, Appendix B of this manual set. A brief summary is given here:

<b>DC Voltage</b>	<b>Minimum</b>	<b>Nominal</b>	<b>Maximum</b>
Absolute limits	21.6 V	24 V	26.4 V
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
<b>Supply Current :</b>			
Standby	200 mA		
Running	3 A		
Peak (motor stall)	6.5 A		

<b>Interface Logic Levels</b>	<b>Logic Low</b>	<b>Logic High</b>
Inputs	0 V to 0.5 V	+3.7 V to +12 V
Outputs (2.2 k $\Omega$ pull-up)	0.6 V	Pull-up voltage of host interface
Maximum current sink	50 mA per output	

We recommend that your power supply is capable of supplying 24V DC at 8 A.

## 2.4 Frequently Asked Questions

### a. What currencies does the SMART Hopper support?

- New currency dataset files are published on the ITL website as they are released. To find available datasets visit the Currency Download section within Support. Select the SMART Hopper and the currency you require to see all available dataset options. The blue icon provides more details to assist selections.

### b. I can't find the currency I need, how do I get it created?

- To create a new dataset, ITL requires 100 coins of each denomination. This process will take around 4 weeks to process and then coins can be returned and the dataset will be made available. Please email [support@innovative-technology.co.uk](mailto:support@innovative-technology.co.uk) for information.

### c. Where can I get the software examples for the SMART Hopper?

- please email [support@innovative-technology.co.uk](mailto:support@innovative-technology.co.uk) for software example

### d. What communication protocols does the SMART Hopper support?

- ENCRYPTED SSP (eSSP) is a secure serial interface specifically designed to address the problems experienced by cash systems in gaming machines. Problems such as acceptor swapping, reprogramming acceptors and line tapping are all addressed. The interface uses a master slave model, the host machine is the master and the peripherals (note acceptor, coin acceptor or coin hopper) are the slaves. Data transfer is over a multi-drop bus using clock asynchronous serial transmission with simple open collector drivers. The integrity of data transfers is ensured through the use of 16 bit CRC checksums on all packets. A Diffie-Hellman key exchange is used to allow the host machine and SMART hopper to jointly establish a shared secret key over an insecure communications channel. The encryption algorithm used is AES with a 128-bit key; this provides a very high level of security.

IMPORTANT: All transactions with the SMART Hopper must be encrypted to prevent dispense commands being recorded and replayed by an external device.

For detailed information and full protocol specification please refer to SSP Interface Specification (ITL Drawing GA138), this is available from the ITL website [www.innovative-technology.co.uk](http://www.innovative-technology.co.uk).

### d. How fast does the SMART Hopper pay out?

- The SMART Hopper can pay out up to 12 Coins per second.



e. How many coins does the SMART Hopper hold?

- The capacity of the SMART Hopper depends on the size of coins. The table below shows approximate capacity for various coins and assumes all the coins within the hopper are the same coin type.

Type	Diameter	Thickness	Approximate Capacity
UK £1	22.5mm	3.15mm	1300
UK £2	28.4mm	2.5mm	800
Euro €1	23.25mm	2.33mm	1500

- SMART Hopper Weights

Coin Type	Coin Weight	Total Weight
Empty	-	2.60kg
UK £1	9.5g	Approximately 14.95Kg when full (1300)
UK £2	12.0g	Approximately 12.20Kg when full (800)
Euro €1	7.5g	Approximately 13.85Kg when full (1500)

## 2.5 Available cable assemblies for SMART Hopper

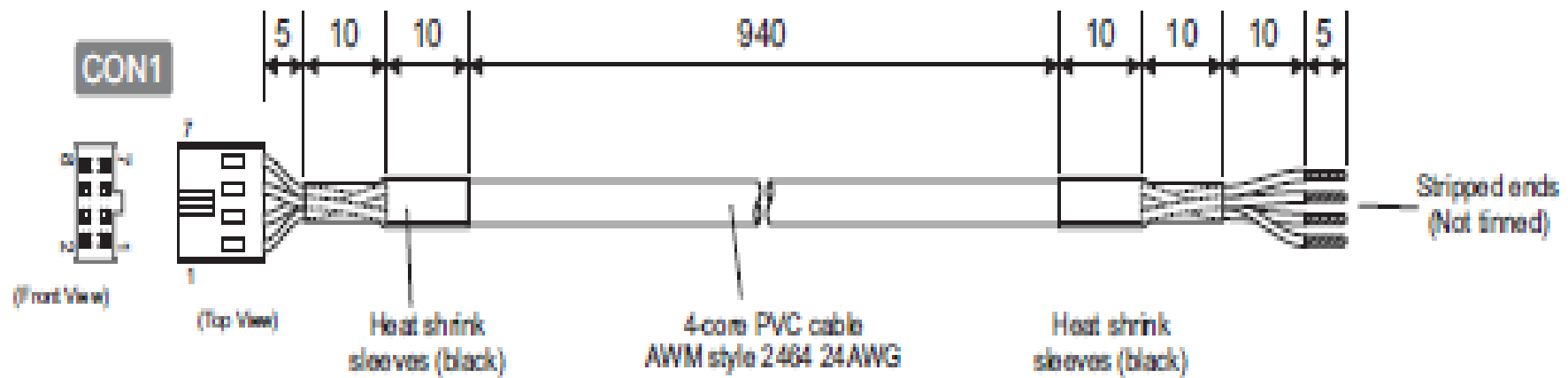
The available cable to use Smart Hoppers is listed in table below:

Setup Options	CN214	CN384	CN385	CN389	CN391	CN398	Comments
<b>Smart Hooper only</b>							
Host machine connects to Hopper (via a TTL based system)			x	x			TTL based systems would need to have a 16 way 2.54mm pitch connector
<b>Smart Hooper and Coin Mech</b>							
Host machine connects to Hopper (Via a TTL based system) and a Coin Mech		x	x	x			TTL based systems would need to have a 16 way 2.54mm pitch connector
<b>Smart Hopper, Smart Payout and NV200</b>							
Host machine connects to Hopper (via TTL based system) and Payout				x		x	TTL based systems would need to have a 16 way 2.54mm pitch connector
<b>Smart Hopper, Coin Mech, Smart Payout and NV200</b>							
Host machine connects to Hopper (via TTL based system) Payout and Coin Mech		x		x		x	CN398 connects to both Smart Hopper and Payout Via essp interface

These cables are detailed on the following pages and can be ordered from ITL.

ITL Part Number	Description	Details
CN214	USB Cable	USB 2.0 Compliant Type A to Type B cable
<p>Technical drawing of a USB 2.0 Compliant Type A to Type B cable. The drawing shows the cable with dimensions and pin labels. The Type A connector on the left has a width of 8 MAX. and a height of 16 MAX. The Type B connector on the right has a width of 10.5 MAX. and a height of 11.5 MAX. The cable length is 48 ± 1.0. The distance from the connector to the cable body is 11.75 MIN. The pin labels are PIN 1, PIN 4, PIN 3, PIN 2, PIN 1, and PIN 4.</p>		
<b>Notes:</b> USB cable should be USB 2.0 compliant, electrically shielded and less than 5 metres long.		

ITL Part Number	Description	Details
<b>CN384</b>	SMART Hopper Coin Mech cable	The stripped ends need to be fitted with a suitable connector that matches the coin mech's connector



ITL Part Number	Description	Details
<b>CN391</b>	SMART Payout to SMART Hopper eSSP interface cable	Connects SMART payout to SMART hopper for eSSP communications. Also provides 12V supply to SMART Payout

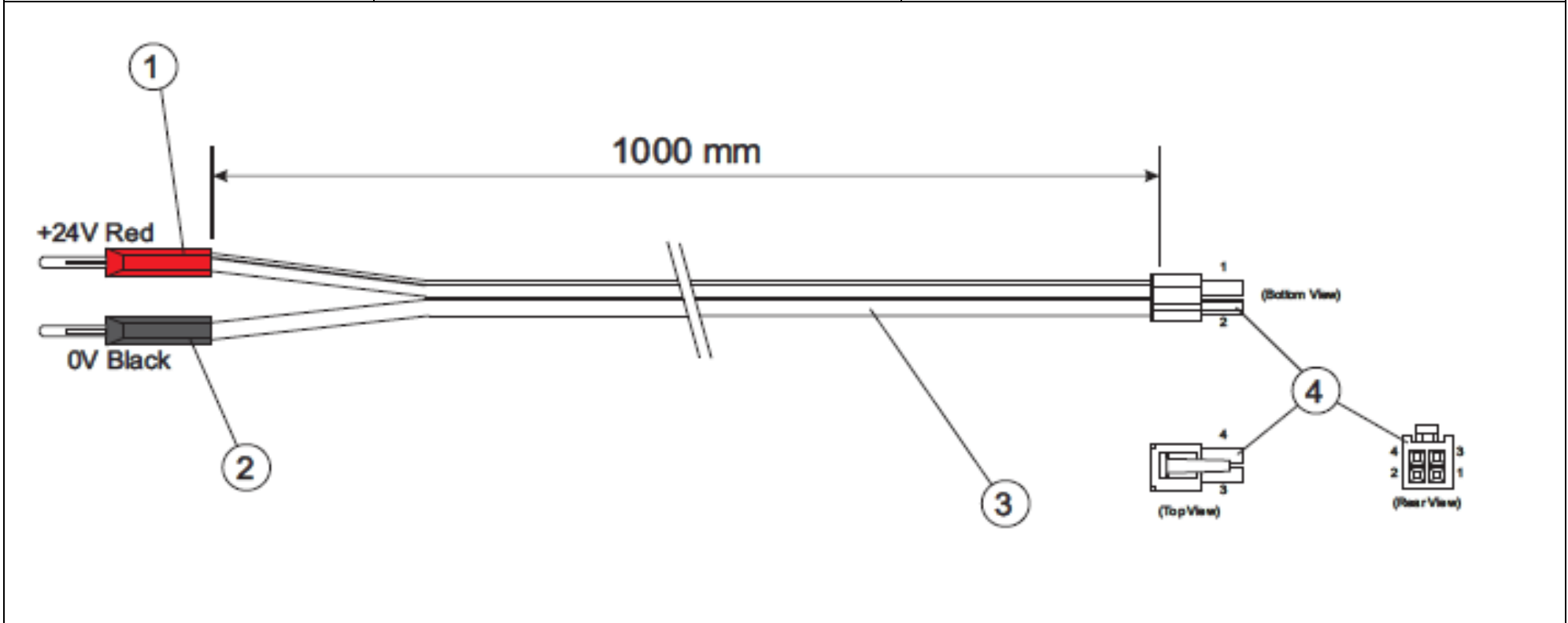
  

The diagram illustrates the CN391 cable assembly. The top view shows a cable of length 1000 units, with a 40-unit section at the left end and an 890-unit section to the right. The front view shows the cable's profile with dimensions of 15, 10, and 15 units for the left section, and 920 units for the main body. The left end features a 16-pin connector (CON1) with a top view showing pins 1 through 9 and 16, and a front view showing pins 8 and 16. The right end features a 7-pin connector (CON2) with a top view showing pins 1 through 7 and a front view showing pins 1, 2, 7, and 8. Additionally, there are two other connectors, CON3 and CON4, shown at the right end of the cable.

Part Number	Description	Details
CN385	SSP Smart Hopper Interface cable	Communicates the Hopper to SSP Host



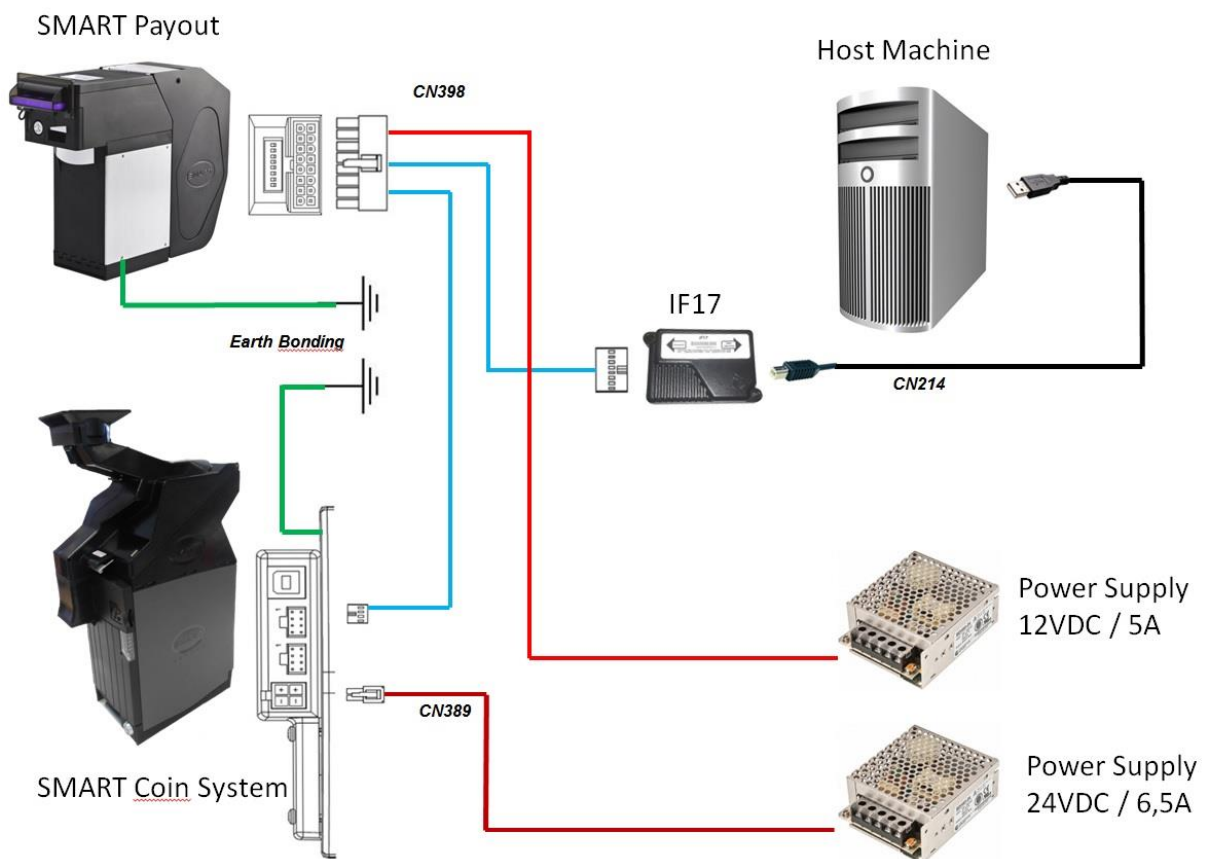
Part Number	Description	Details
CN389	Smart Hopper Power Cable	24 Volts power cable



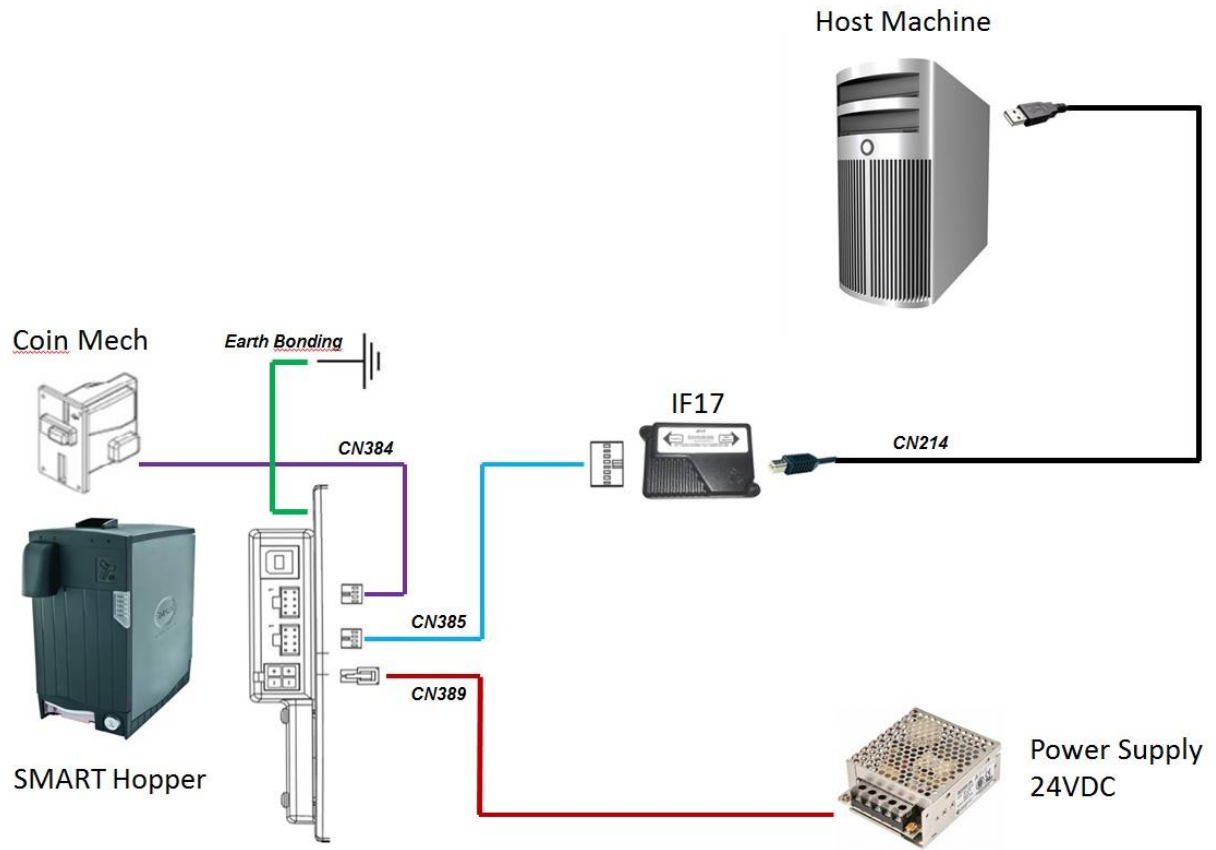
## 2.6 SMART Hopper Installation

There are various ways of connecting a SMART Hopper; with a SMART Payout as a complete money handling system, on its own and also with a coin mech attached. The most common configurations are shown below. The SMART Hopper and the SMART Payout can be connected together with only one connection to the host machine. Alternatively, the SMART Hopper and SMART Payout can also be connected to the host machine separately using TTL level communications.

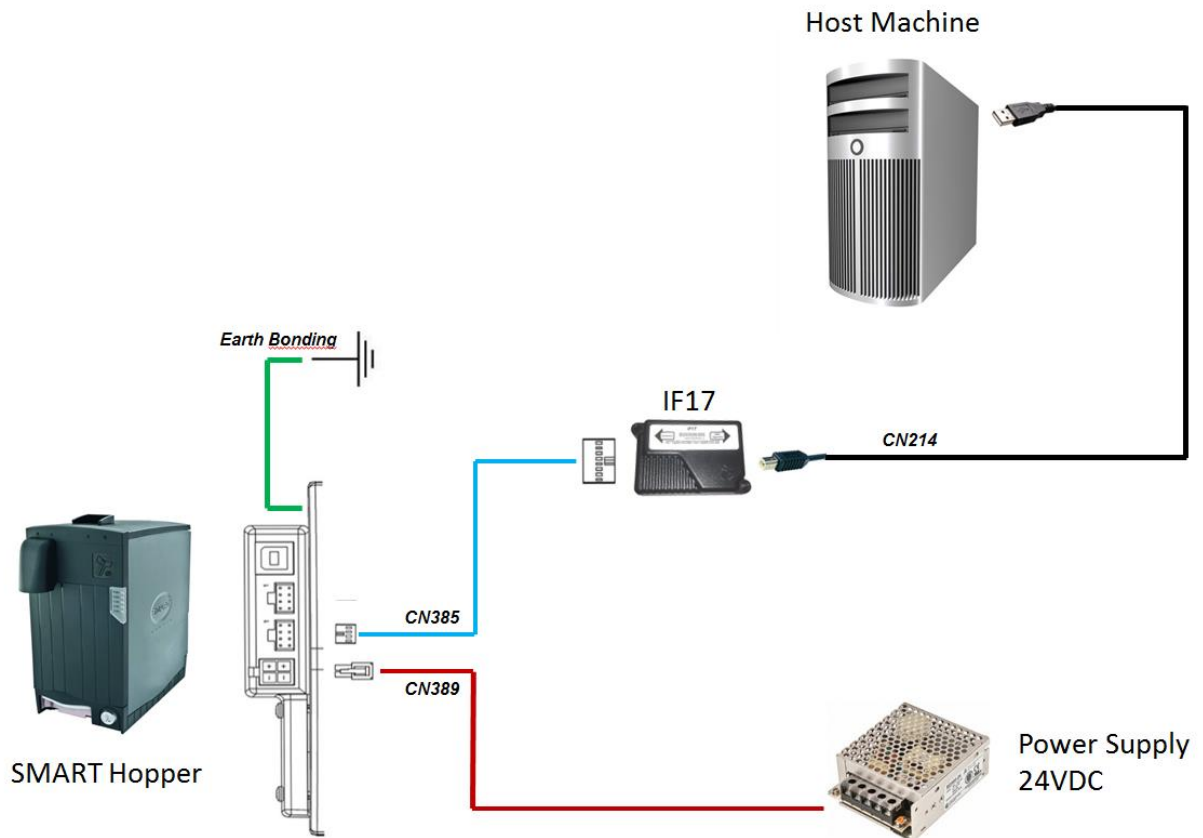
### **SETUP OPTION 1** – SMART Payout & SMART Hopper



**SETUP OPTION 2** – SMART Hopper & Coin Mech



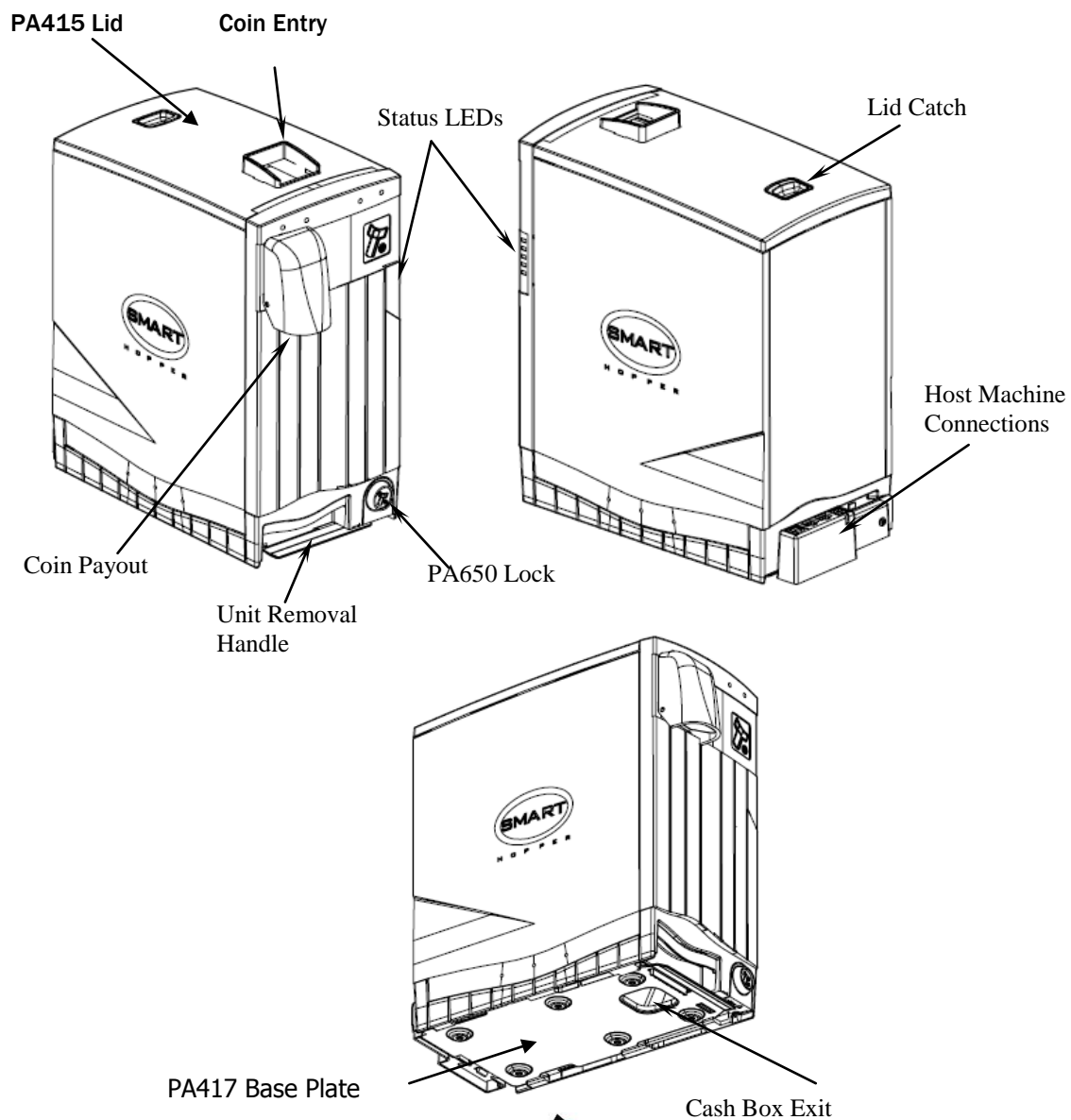
**SETUP OPTION 3** – SMART Hopper



## SMART Hopper

The user can obtain the following parts for the SMART Hopper:

ITL Part Number	Description
<b>PA417</b>	SMART Hopper Base plate
<b>PA415</b>	SMART Hopper Lid Assembly
<b>PA650</b>	Lock Assembly
<b>MC211</b>	Lock Cam
<b>PA650</b>	Lock Assembly



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