Innovative Technology

POWERING TRANSACTIONS AND INTERACTIONS

NV9 Spectral Range User Manual

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Change History

Version	Date	Comment
1	03 Nov 2025	Initial Release

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NV9 Spectral Range Product Information

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Product overview

The NV9 Spectral is a highly secure and technologically advanced banknote validator, offering casino level security at a mid-range price. State of the art spectral sensors provide high resolution imaging, scanning 1.28 million data points to authenticate the validity of notes.

This versatile banknote validator can be mounted horizontally or vertically, with cashbox and bezel options to suit all applications.

> Keep in mind that the NV9 Spectral Range supports the protocols: SSP, CCT, CC2, CC4, MDB and IF3.
>
> Please refer to the specific protocol section for more information about requirements and recommendations.

Key features

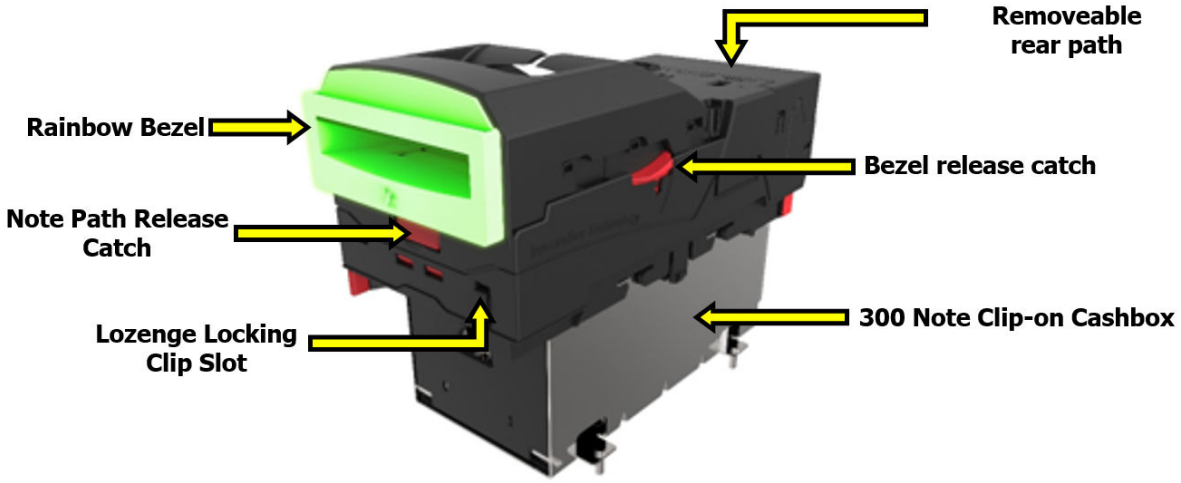
- Full note high resolution imaging –1.28 million data points
- MicroSD card slot for data logging and updates
- Faster note to note processing
- Exceptional note handling
- Optical and mechanical anti-strimming technology
- Stained note detection
- Modular design
- 40 note mixed denomination with the recycler
- Host communication via USB or TTL

Typical applications

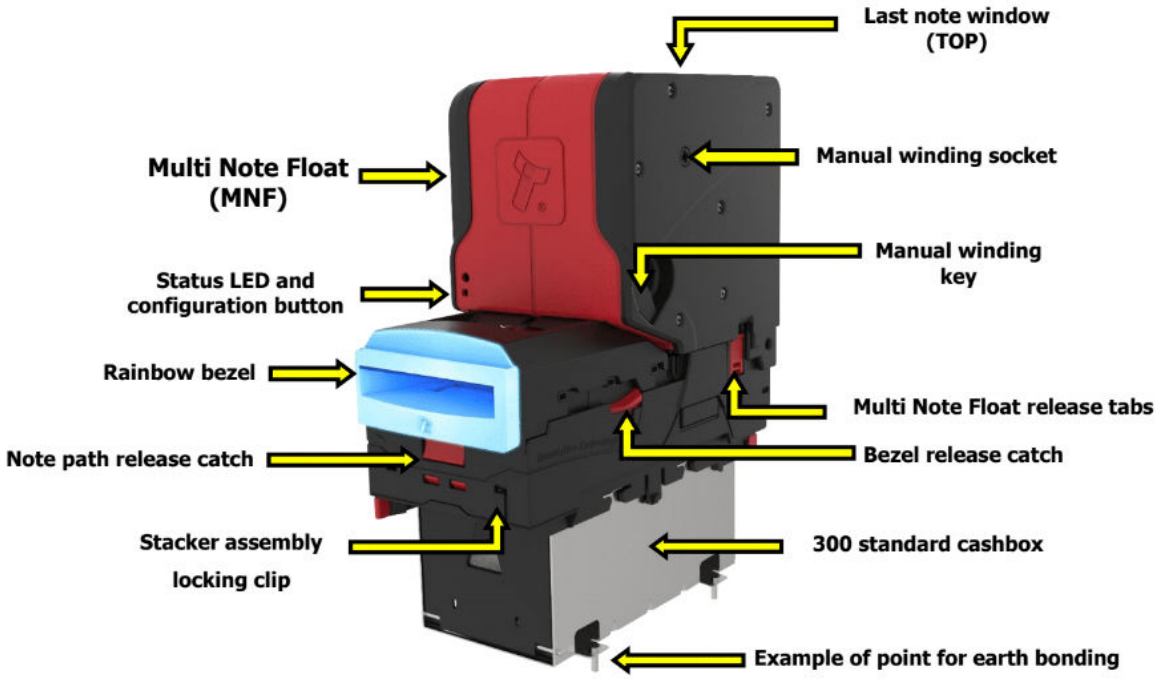
- Gaming Amusement and Vending (GAV)
- Retail Kiosk and Banking (RKB)

Component overview

NV9 Spectral (NV9S)



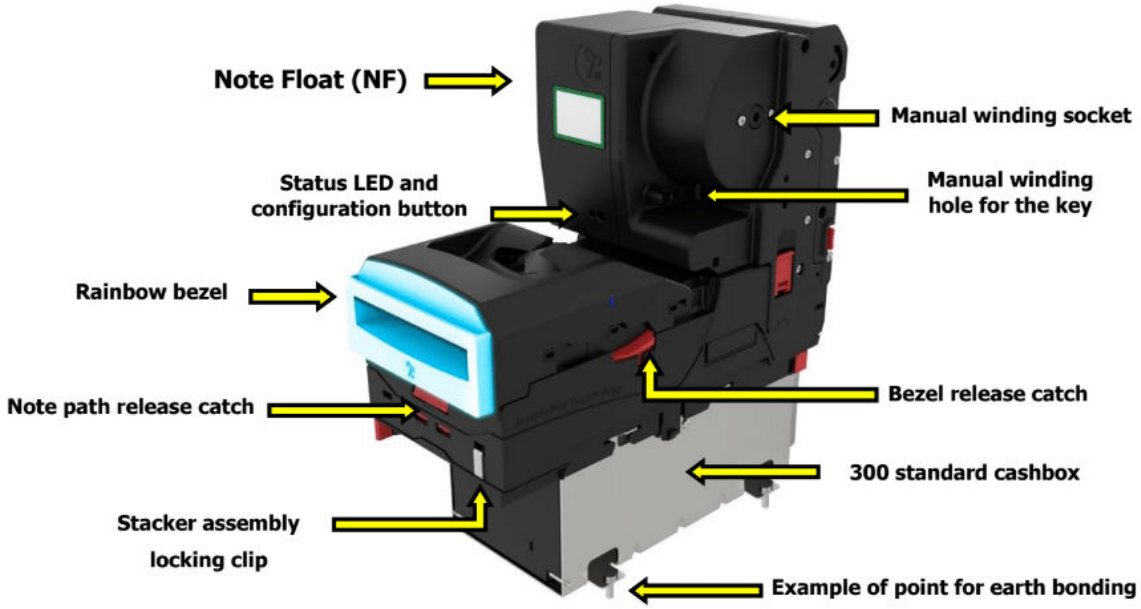
NV22



NV11 Spectral (NV11S)

Note Float support is disabled with NV9S firmware ≥ 1.21.

Please contact your sales representative for more information.



The NV11 Spectral only can be used at 12 V limited by the Note Float.

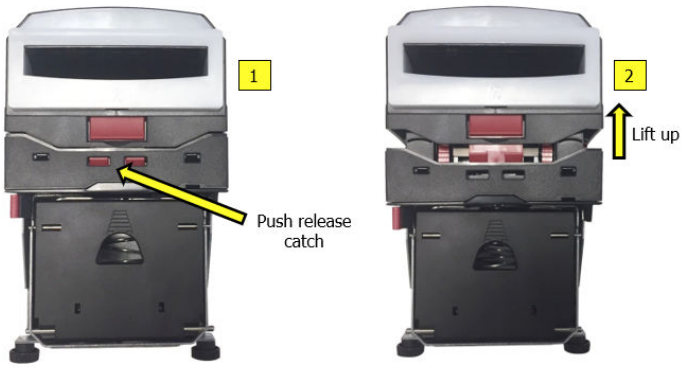
Interface connectors

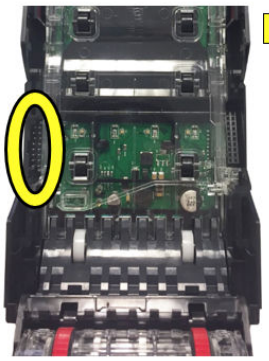
NV9 Spectral makes use of a 16-pin socket connector to interface the validator to the host machine via USB or TTL.

The 16-pin socket is located within the housing assembly, the upper housing assembly will need to be opened before accessing the connector.

To access the interface connector, push the release catch and lift the upper housing assembly.

Main connector





Once the upper housing assembly is lifted, the 16-pin connector socket can be seen on the left-hand side.

Please refer to the following video for a visual guide to interface connectors.

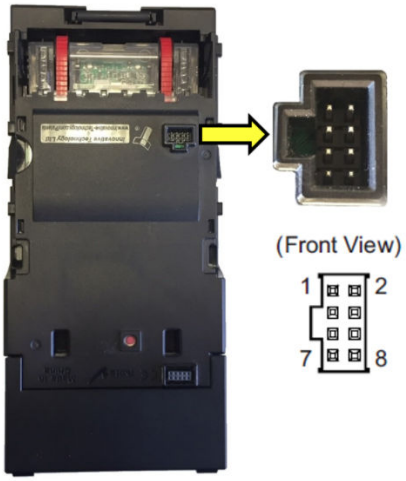
The pin numbering of the 16-way socket:

Pin	Description
1	Serial data out (Tx)
5	Serial data In (Rx)
11	USB Data +
12	USB Data -
13	USB power (+5V)
15	V+ (12/24V)
16	GND (0V ground connection)

Power is always required on pins 15 and 16 of the 16-way connector.

Bezel connector

The NV9 Spectral has a second connector which is an 8-way socket which is used in conjunction with the rainbow bezel, refer to appendix for the cable drawing (WR02128).



Configuration button

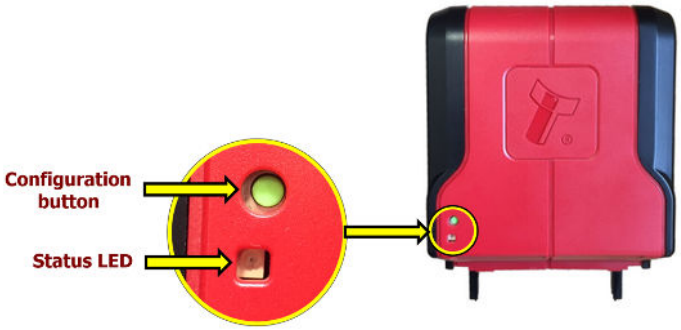
The configuration button has multiple functions, the common function of the configuration button is to switch the protocol to SSP, commonly known as programming mode.

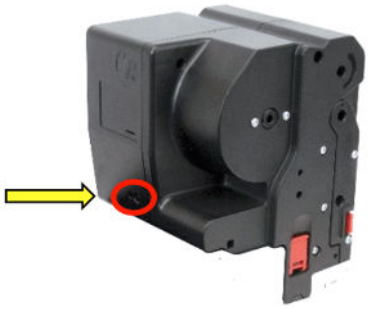
Please refer to the flash code section for more information.

Button extension and status LED

Once the recycler is attached the configuration button on the NV9 Spectral is not accessible, use the configuration button on the front of the recycler as extension.

Additionally there is a status LED to show the status of the recycler. Please refer to the flash code section for more information.





Button functions

Action	Power status	Function	Applies to
Switch between the selected main protocol programmed to SSP	Powered ON	Press and hold more than 3 seconds until the bezel illuminates, then release	validator recycler
Shows current interface type	Powered ON	Press twice within half a second	validator recycler
Sets SSP address to 0 and baud rate to 9600	Powering ON	Press and hold as validator are powered up	validator recycler
Trusted mode	Powering ON	With the note path open, apply power, then press and hold for more than 3 seconds until red LED lights up	validator
Empty recycler, will stack all notes	Powered ON	Press and hold for 6 seconds, then release. Bezel will illuminate, then turn off after 6 seconds	recycler
Cashbox full acknowledge	Powered ON	Press once. The unit is re-enabled when the cashbox is emptied	validator recycler

Device options

The device offers a variety of configuration options, as example:

Bezel

The bezel used with the NV9 Range are compatible with the NV9 Spectral Range.

ITL Part Number	Description	Details
PA04280	NV9 Horizontal 82 mm Illuminated Bezel Cable sold separately - WR02128	
PA02383	NV9 Vertical 69mm Illuminated Bezel Includes WR02035 **Other options** WR02015 WR02040 (USB to host)	
PA02388	NV9 Vertical 78mm Illuminated Bezel Includes WR02035 **Other options** WR02015 WR02040 (USB to host)	

Metal cashbox

The metal cashbox used with the NV9 Range are compatible with the NV9 Spectral Range.

The moulded cashbox must be used for new projects. Please refer to the appendix for 2D drawings.

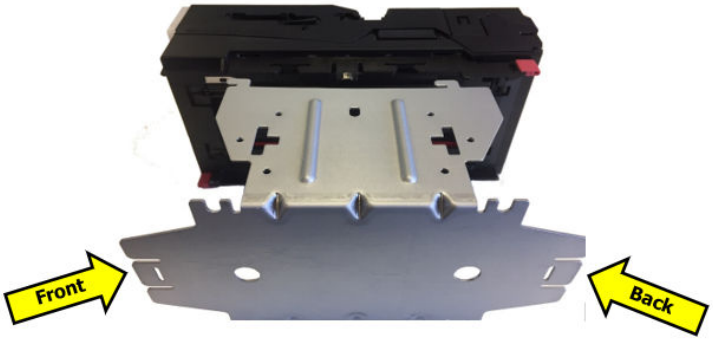
Some national currencies differ in thickness and circulation practices, can impact cash box capacities by 10-15%. Consult ITL for more details.

ITL part number	Description	Details
PA00185	NV9 300 clip on cashbox	
PA00193	NV9 600 clip on cashbox	
PA00192	NV9 300 slide in cashbox	Bending point recommended
PA00194	NV9 600 slide in cashbox	Bending point recommended

ITL part number	Description	Details
PA00898	NV9 300 standard cashbox	

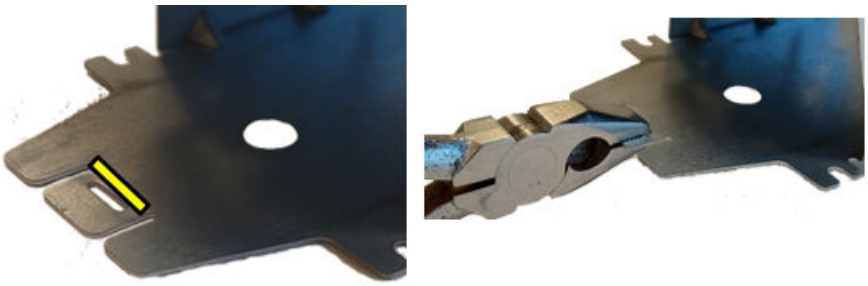
Bending point

Cashbox stops can be folded up at the end of the cashbox chassis.



They determine which side you would like to block the cashbox being removed, front or back.

Only bend at the line indicated below or the slide in cashbox may not fit correctly.



The tab can be fold by hand but if required it can be started with pilers.

They determine which side you would like to block the cashbox being removed, front or back.

Moulded cashbox

The moulded cashbox should be used for new implementations or projects:

- Compatible only with firmware ≥ 1.20 and build revision ≥ 8
  - This build revision includes electronics of the sensor and PA04349 (rear houssing moulded compatible for clip-on and slide-in)
- The presence sensor can be configured by
  - Validator Manager with the option “NV9S Cashbox Detect"
  - SSP commands

The moulded cashbox with the requirements described above includes the cashbox presence sensor functionality and confirmation that it is properly inserted.

ITL part number	Description	Details
PA03576	NV9S 300 Note Clip-on Moulded Cashbox	
PA03577	NV9S 600 Note Clip-on Moulded Cashbox	
PA03578	NV9S 1500 Note Clip-on Moulded Cashbox	
PA03579 Chassis sold separately	NV9S 300 Note Slide-in Moulded Cashbox	
MC03432	300 Note Slide-in Chassis - NV9S Moulded Cashbox Chassis	

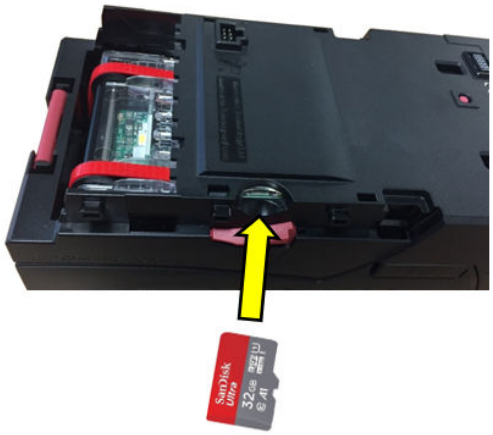
ITL part number	Description	Details
PA03580 Chassis sold separately	NV9S 600 Note Slide-in Moulded Cashbox	
MC03433	600 Note Slide-in Chassis - NV9S Moulded Cashbox Chassis	
PA04388	NV9S Moulded Cashbox Door Lock Assembly only Only suitable for moulded cashboxes **Requirements:** • MC02186 (Locking clip)	

MicroSD card slot

The card slot can be found on the exterior side of the housing assembly after the bezel has been removed.

Requirements	Partition style	Format	Capacity	Speed class
Minimum	MBR	FAT32	4 GB	4
Maximum			32 GB *	10

** A larger capacity should not be an issue provided the card is formatted as FAT32/MBR.*



The internal bezel, or rainbow bezel if fitted will flash once when the SD card has been detected.

Recommendation

Description	Manufacturer reference
SanDisk Ultra microSDHC 32 GB	SDSQUA4-032G-GN6MA
SanDisk High Endurance microSDHC 32GB	SDSQQNR-032G-GN6IA

NV9 Spectral Range Technical Data

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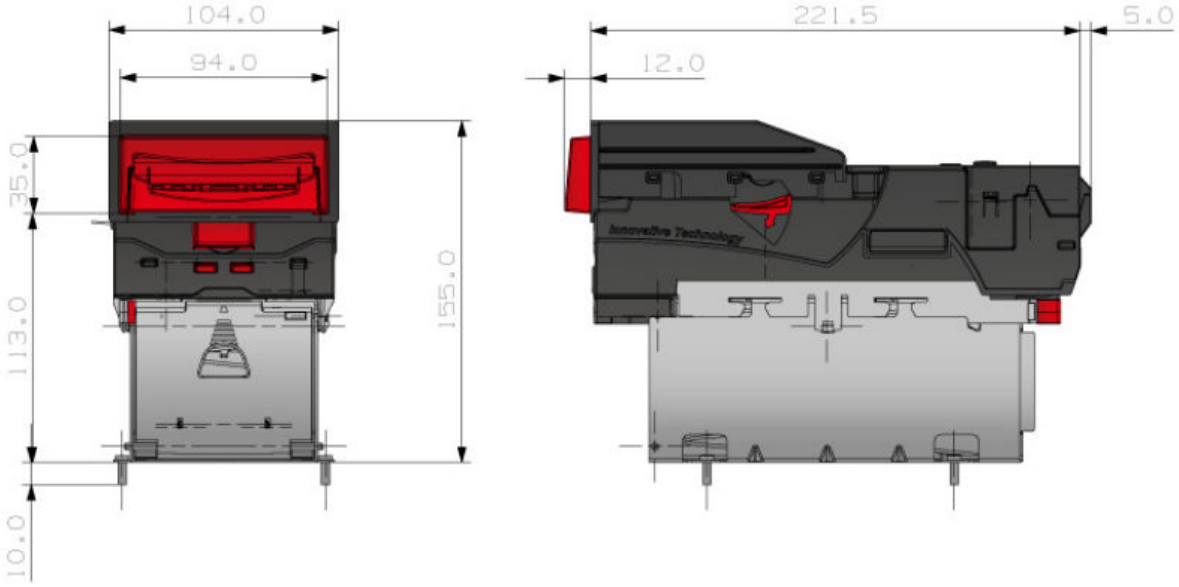
- Dimensions
  - NV9 Spectral dimensions
    - Vertical Bezel Mounting
  - NV22 dimensions
  - NV11S dimensions
- Weights
- Environmental requirements
- Power requirements
  - Supply voltages
  - 12 V
  - 24 V
  - Supply currents
  - Power supply guidance
    - Power supply examples
- Interface logic levels
- Reliability data
  - NV9 Spectral
  - NV11S and NV22
- Notes requirements
  - Notes

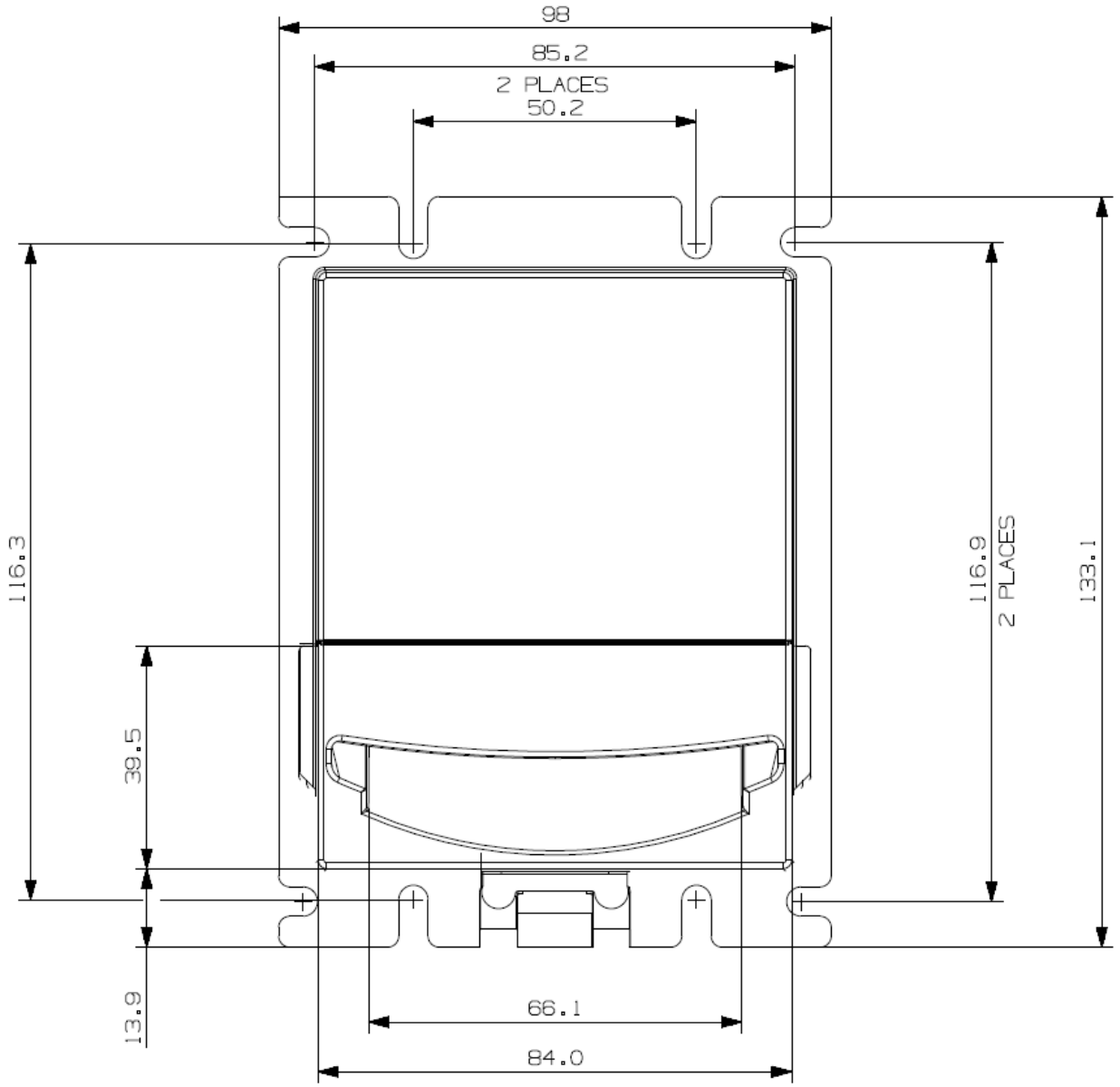
Dimensions

Note: If required 3D models are available on request from Innovative Technology technical support: support@innovative-technology.com.

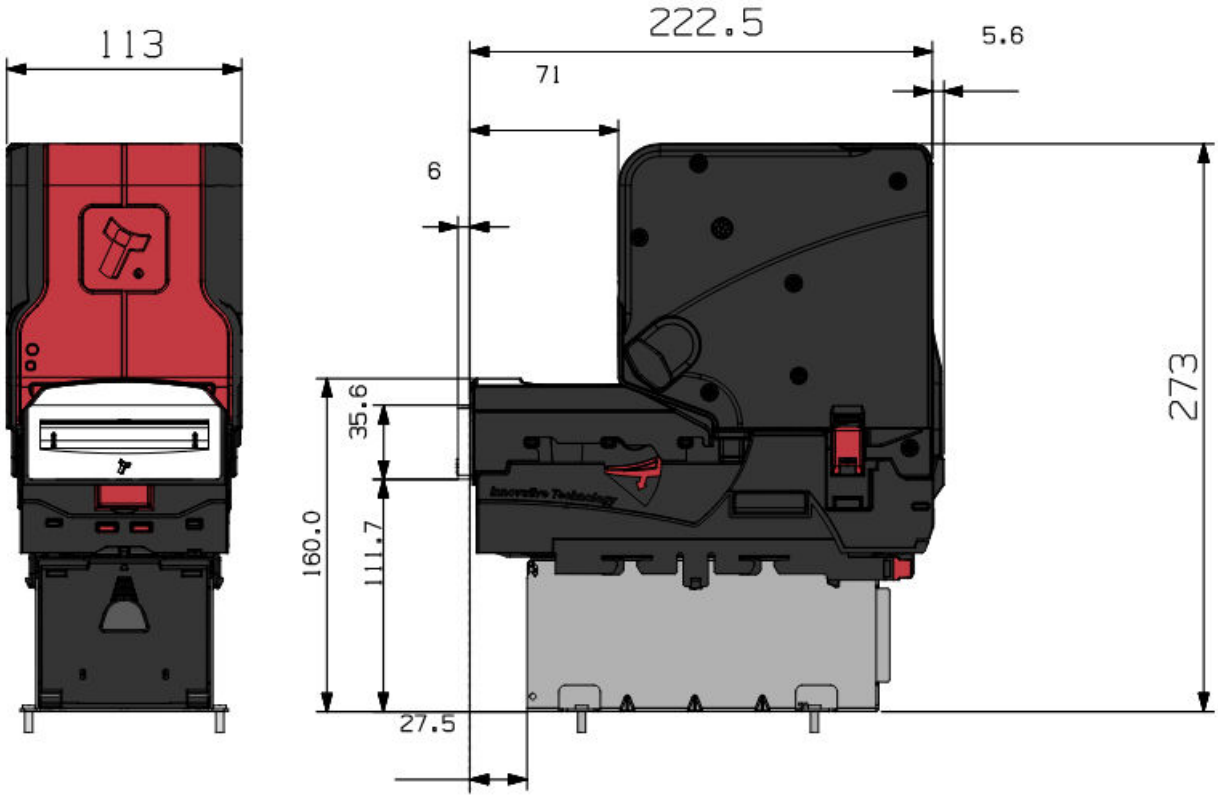
NV9 Spectral dimensions



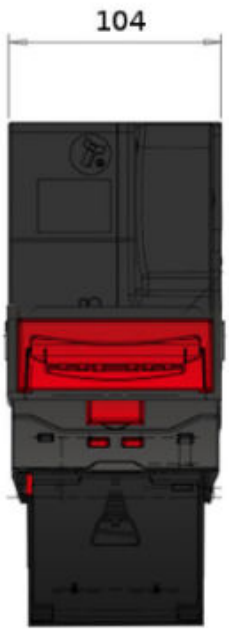
Vertical Bezel Mounting

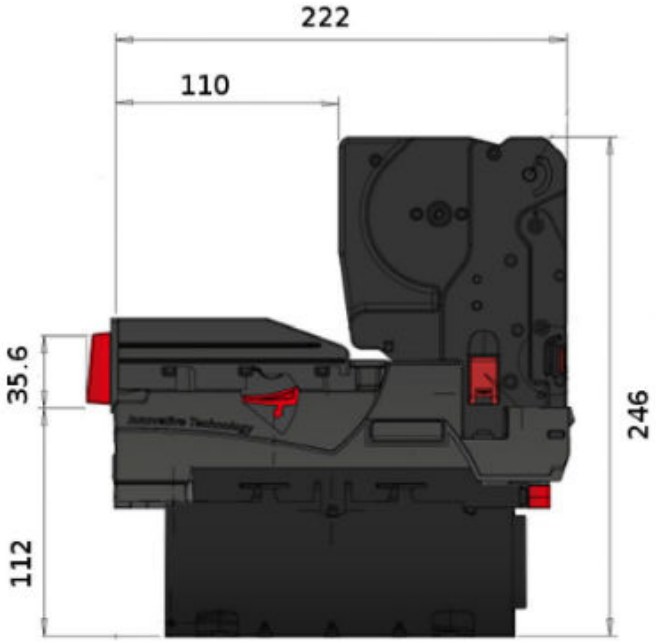


NV22 dimensions



NV11S dimensions





Weights

Weights listed below without notes unless otherwise indicated.

Validator NV9S	1.05 Kg
Bezel (standard)	0.10 Kg
Cashbox (Slide In)	0.57 Kg
Combined	1.72 Kg
Multi Notefloat	1.2 Kg
Note Float	1.04 Kg
NV22	2.92 Kg
NV11S	2,04 Kg

Environmental requirements

Environment	**Minimum**	**Maximum**
Temperature	+5°C / 37.4°F	+50°C / 122°F
Humidity	5%	95% Non-condensing

Power requirements

Supply voltages

12 V

Supply Voltage	Minimum	Nominal	Maximum
Supply Voltage (V DC)	+ 10.8 V DC	+ 12 V DC	+ 13.2 DC
Supply Ripple Voltage	0 V	0 V	0.25 V @ 100 Hz

24 V

Supply Voltage	Minimum	Nominal	Maximum
Supply Voltage (V DC)	+ 21.6 V DC	+ 24 V DC	+ 26.4 V DC
Supply Ripple Voltage	0 V	0 V	0.25 V @ 100 Hz

Supply currents

NV9 Spectral					NV22					NV11S		
Run	Current				Run	Current				Run	Current	
Standby	12 V	0.3 A	24 V	0.13 A	Standby	12 V	0.34 A	24 V	0.21 A	Standby	12 V	0.3 A
Running	12 V	2 A	24 V	1.5 A	Running	12 V	2.5 A	24 V	1.5 A	Running	12 V	3.5 A
Peak	12 V	2.5 A	24 V	2 A	Peak	12 V	4 A	24 V	2.5 A	Peak	12 V	3.5 A

Power supply guidance

Power supply examples

Check the power requirements of the host machine and other peripherals to dimension a suitable environment for the machine setup.

TDK Lambda manufactures suitable power supplies. See table below as example:

Power Supply Unit	Specification
TDK Lambda LS75-12	+12 V DC / 6 A
TDK Lambda LS150-24	+24 V DC / 6.5 A

Interface logic levels

Interface Logic levels	Logic low	Logic high
Inputs	0V to +0.5V	+3.7V to +12V
Outputs with 2K2Ω pull-up resistor	+0.6V	Pull-up voltage of host interface
Maximum Current Sink	50mA per Output	

Reliability data

The below data refers to the 'Mean Cycles Between Failure' (MCBF) and the 'Mean Cycles Between Intervention' (MCBI).

The difference between the two is that a failure would usually require a service call. Whereas an intervention would be an issue that is easily clearable such as a reset or clearing a note path jam.

A cycle is classed as a note being either accepted or dispensed.

For example, if a unit accepts a note and then dispenses a note as change, it is classed as two cycles.

NV9 Spectral

MCBF: 200,000 Cycles

MCBI: 100,000 Cycles

> It is important to note that when adding a recycler you are doubling the number of modules.
>
> Thus the MCBF/MCBI will naturally be halved.

NV11S and NV22

MCBF: 100,000 Cycles

MCBI: 50,000 Cycles

Notes requirements

Notes

The device supports multiple currencies and denominations including polymer and windowed notes, as for example 5 AED.

NV9 Spectral	Minimum	Maximum	Multi Note Float	Minimum	Maximum
Length	115 mm	167 mm	**Length**	115 mm	160 mm
Width	60 mm	82 mm	**Width**	62 mm	80 mm

The values for the NV11S are the same as for the NV9S.

In case a note is routed to a recycler and exceeds the maximum allowed width, the note will be sent to the cashbox automatically.

NV9 Spectral Range Mechanical Installation

Contents

- Compatibility
  - Hardware compatibility
    - Machine mounting
    - Machine interfacing
    - Power supply
  - Software compatibility
    - Interface protocols
    - Re-programming
    - Earth bounding
- Bezel mounting
  - Bezel removal
  - Bezel fitting
- Cashbox mounting
  - Metal cashbox (Clip on)
  - Moulded cashbox (Clip on)
  - Metal cashbox (Slide In)
  - Moulded cashbox (Slide In)
- Moulded cashbox door lock
- Removing the rear cover
- Multi Notefloat mounting
  - Mounting the Multi Noteflote
  - Removing the Multi Notefloat

Compatibility

Hardware compatibility

Machine mounting

The NV9 Spectral may be used as fitting replacement for the following products: NV9USB.

The NV22 may be used as fitting replacement for the following products: NV11.

> We have a policy of continuous product improvement. Due to design changes older model or product bezels and cashboxes may not be compatible with the NV9 Spectral. Refer to the appendix.

Machine interfacing

By design the NV9 Spectral Range is pin to pin compatible with the NV9/NV11 series. Refer to the protocol section for more information.

Power supply

It is vital that the NV9 Spectral is connected to a power supply being able to provide the required power environment. A weak power supply causes malfunctioning of the NV9 Spectral such like note rejects or missing credits.

The power supply of the machine might be designed for the older model or product but not suitable for the NV9 Spectral. The NV9 Spectral might have higher power consumption.

A weak power supply can cause malfunction.

Software compatibility

Interface protocols

When using the NV9 Spectral Range as a fitting replacement for an older model or product some events such like credits may be given earlier or later.

This is due to improved firmware routines and faster motors being used. This may cause missing events such like credits in those host machines where timeouts are defined for the older model or product.

Contact the machine manufacturer for full compatibility of the NV9 Spectral Range.

Timing issues may cause missing events such a credits.

Re-programming

For re-programming the NV9 Spectral use the latest version of Validator Manager. Further details on Re-programming the NV9 Spectral refer to Dataset/Firmware Programming.

Earth bounding

The cashbox configuration has four mounting points, for each corner. These should be used to secure the validator to a base/shelf inside the host machine.

An example has been marked for each type.

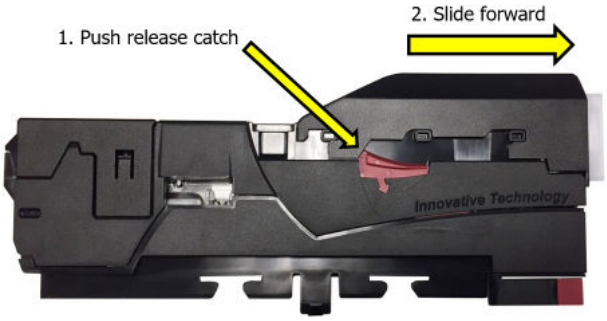
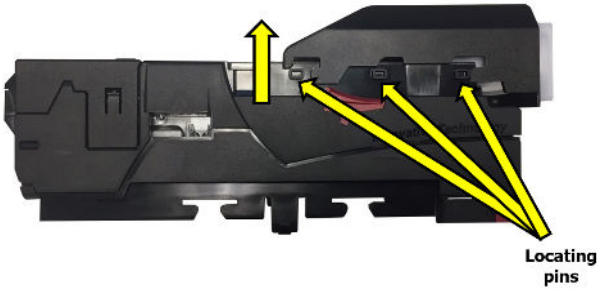
300 slide in cashbox	300 standard cashbox

It is very important that the validator is properly bonded to earth. Lack of proper bonding can cause communication issues and other failures.

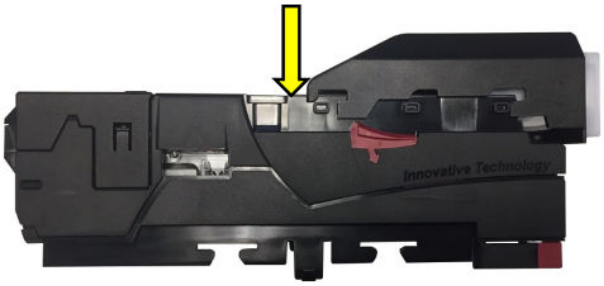
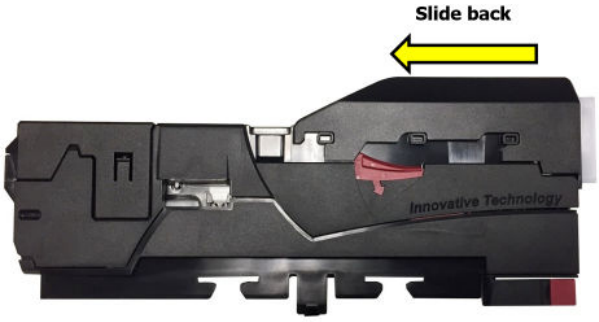
The mounting point is recommended as a point of earth bonding.

Bezel mounting

Bezel removal

Bezel release catch The bezel is removed by pushing the red bezel latches on both sides of the validator downwards, and sliding the bezel forwards away from the bezel latches. Ensure the bezel has slide forward enough to clear the steep part of the latch.	
Dislocating the bezel from the locating pins Lift the bezel upwards once it has been slid forward and is clear of the locating pins, the process should not be forceful.	

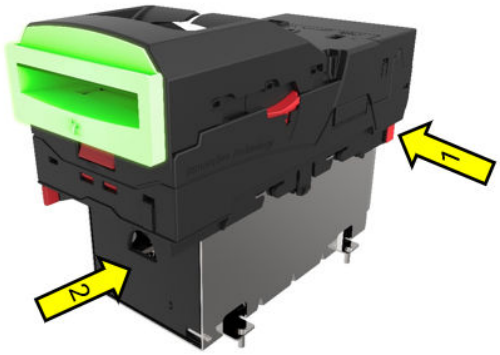
Bezel fitting

Positioning the bezel for fitting When fitting the bezel onto the validator ensure that the bezel sits in place ready to be interlocked with the locating pins on the housing assembly.	
Sliding the bezel into place Once the bezel is in place with respect to the locating pins, slide the Bezel back until it clicks into place. ensure that both sides have clicked into place.	

Ensure bezel is secured to the validator.

Cashbox mounting

Metal cashbox (Clip on)

To insert the cashbox, slide the front part (2) towards the rear part (1), fitting the guides into place. To remove the cashbox, push the release catch (1) away from the unit and pull the cashbox backwards (2).	

Moulded cashbox (Clip on)

To insert the cashbox, open the door (1) and push the cashbox backwards (2). To remove the cashbox, open the door (1) and pull the cashbox backwards (2).	

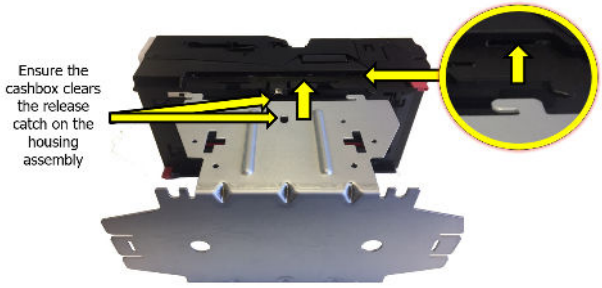
Metal cashbox (Slide In)

Positioning the cashbox chassis for fitting

Firstly, ensure the cashbox hooks are aligned with the accommodating grooves on the main housing assembly. Thereafter push the cashbox hooks into place.

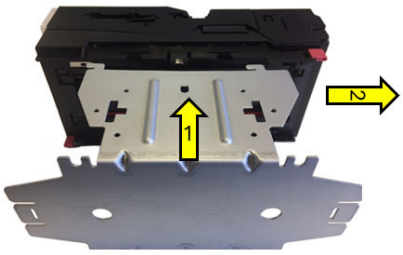
Sliding the cashbox chassis into place

Ensure the cashbox hooks are aligned and inserted into the accommodating grooves on the under-housing assembly.



Removing the cashbox chassis

Firstly, push for each side the cashbox hooks (1). Thereafter push the cashbox hooks out of place pushing the chassis (2).



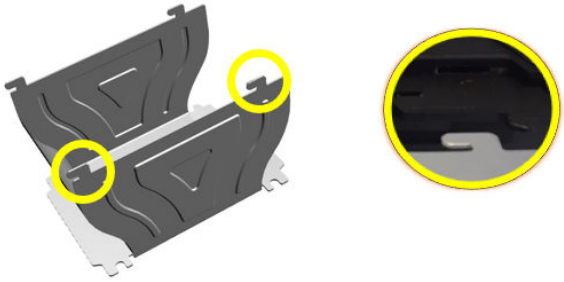
Moulded cashbox (Slide In)

Positioning the cashbox chassis for fitting

Firstly, ensure the cashbox hooks are aligned with the accommodating grooves on the main housing assembly. Thereafter push the cashbox hooks into place.

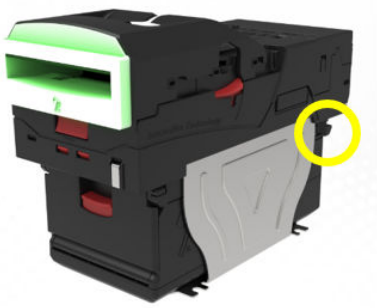
Sliding the cashbox chassis into place

Ensure the cashbox hooks are aligned and inserted into the accommodating grooves on the under-housing assembly.



Removing the cashbox chassis

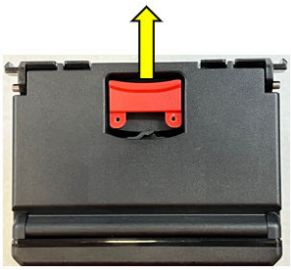
Firstly, push for each side the cashbox stopers. Thereafter push the cashbox hooks out of place pushing the chassis out.



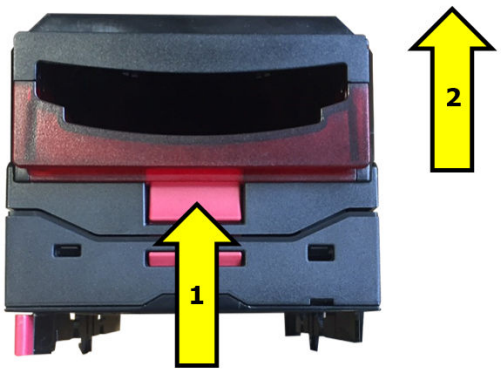
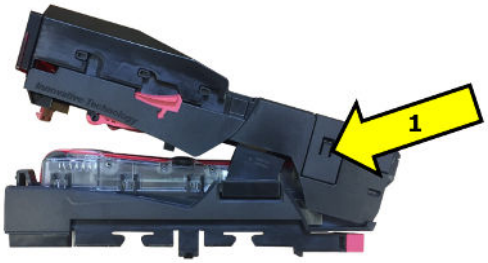
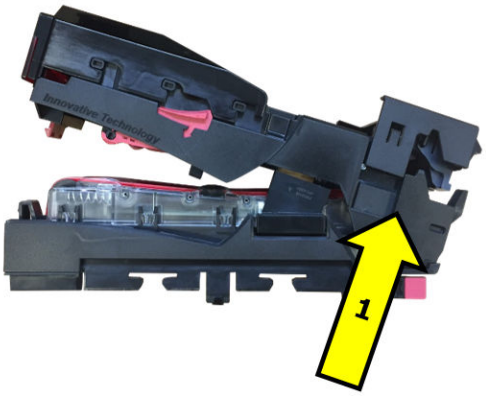
Moulded cashbox door lock

Requirements

- Moulded cashbox (only possible with this model)
- PA04388 - Moulded cashbox door lock assembly
- T6 Torx screwdriver

Opening moulded cashbox Push the latch of the cashbox door to open the door and unscrew the two Torx 6 screws.	
Remove the latch Pull upward to remove the latch.	
Install the lock It must fit into the slot that the lock and mould share. The two holes in the lock are oriented downward.	
Screw in the lock Screw the two Torx 6 screws.	
Lock fitted Final assembly.	

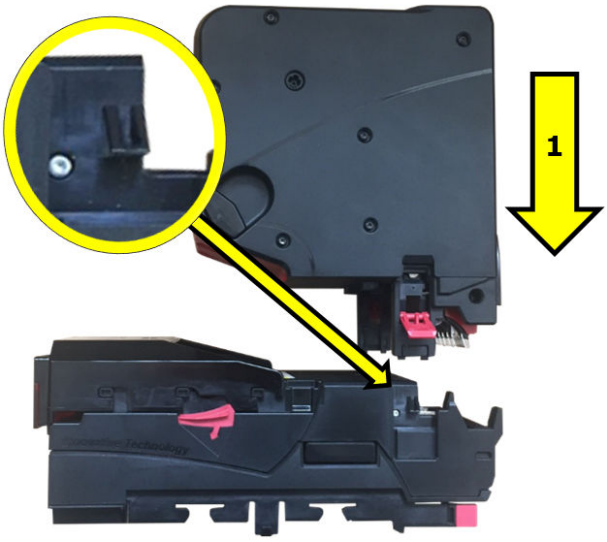
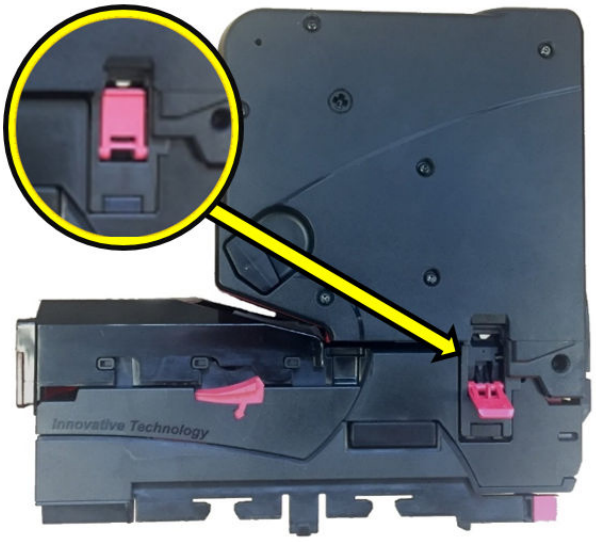
Removing the rear cover

Opening NV9 Spectral Before removing the rear cover, the validator head will need to be opened, push the release catch and lift the validator head.	
Latch Release Pull the release catch on each side.	
Lift rear cover With latches release lift the rear cover.	

Multi Notefloat mounting

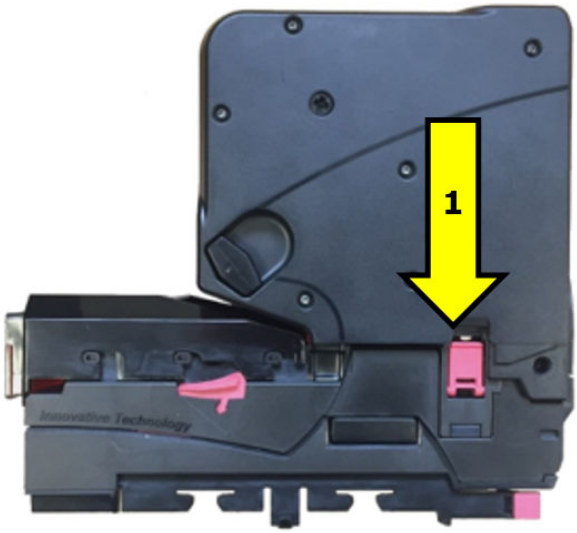
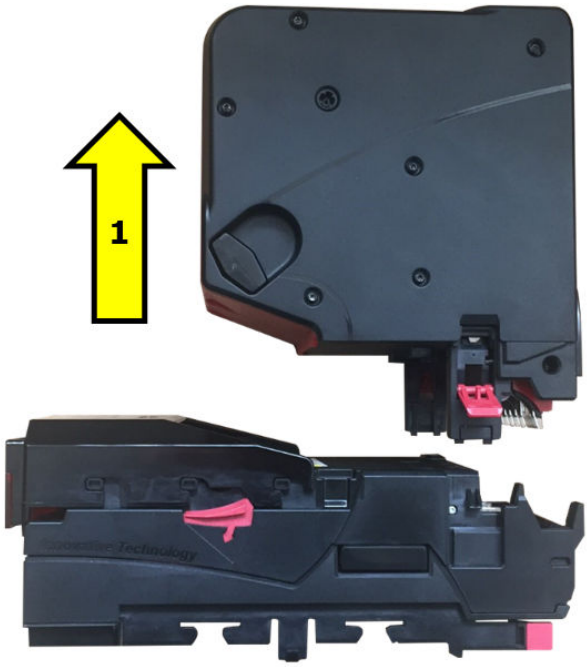
Mounting the Multi Noteflote

To ensure correct operation of the device, do not add or remove the modules while the NV9 Spectral is powered.

Removing rear cover If the rear cover has not already been removed follow 'Removing the rear cover'.	
Positioning Multi Notefloat Make sure the MNF is aligned with NV9S at the highlighted position and slide the MNF in to position. Make sure the MNF's locking tabs are open to make it easier to fit.	
Locking Tabs To finish fitted the MNF close the locking tabs on both sides.	

Removing the Multi Notefloat

To ensure correct operation of the device, do not add or remove the modules while the NV9 Spectral is powered.

Locking Tabs Undo locking tabs on both sides.	
Lift MNF Remove the MNF lifting the MNF of the validator.	

NV9 Spectral Range Software Installation and Configuration

Contents

- Introduction
- Software downloads
- Drivers
- Dataset and firmware programming
  - Validator Manager
    - General description
    - System requirements
    - Hardware setup
    - Switching to programming mode (SSP)
    - Programming the device
  - Updating using a micro SD card
  - Updating using a micro SD card with multiple currencies
- Micro SD card logging
- Setting the rainbow bezel colour

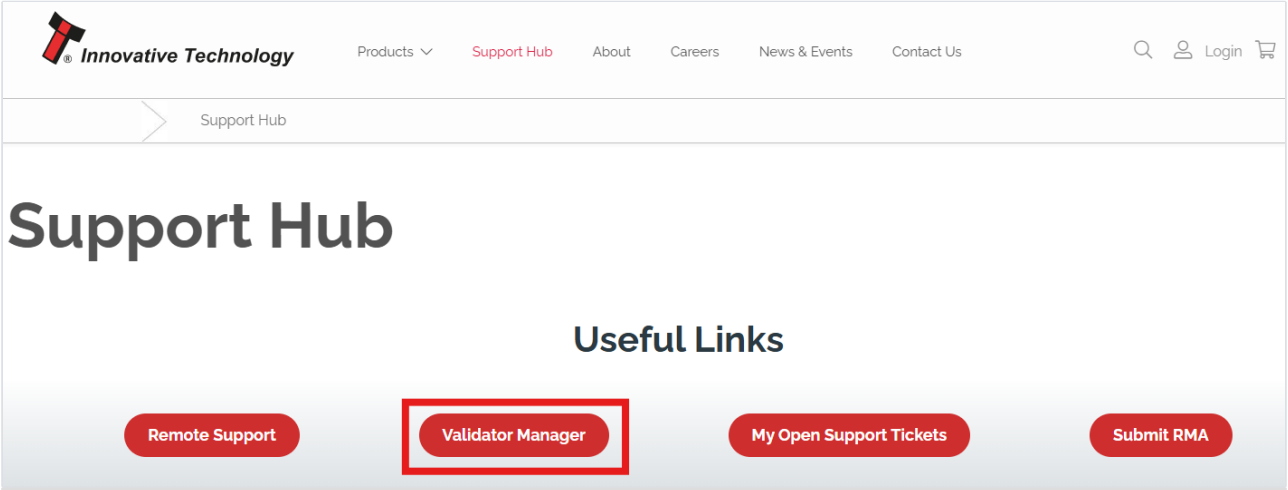
Introduction

The NV9 Spectral range leaves the factory pre-programmed with the latest dataset and firmware files. However, it is important to ensure that the device is kept up to date with the latest dataset and firmware.

This section will provide a brief overview of the various update possibilities with the NV9 Spectral. For detailed instructions refer to the relevant manual package supplied with the software or contact support@innovative-technology.com.

Software downloads

All software from Innovative Technology Ltd is free of charge. Validator Manager can be downloaded from the Support Hub of our Website.



Drivers

The ITL drivers allow you to connect any of our validators to a compatible Windows device. If you are connecting via an IF17 then you will not need to follow this process as they are signed Microsoft Drivers and should install automatically. If this isn't the case or your computer is disconnected from the network, there is a standalone package available.

Please contact support@innovative-technology.com for further details.

Dataset and firmware programming

Validator Manager

General description

Validator Manager is a utility which allows the user to reprogram any of ITL's products. Note that admin rights are required during installation.

The validator must be in SSP for the Validator Manager to detect the device.

We recommend using version 5.1 or higher of Validator Manager.

System requirements

- Windows 8.1 or later
- .NET Framework 4.5 or later
- Visual C++ redistributable runtimes
- 256 Mb ram
- 100 Mb disk free
- Connected with active port
- Externally powered USB Hub

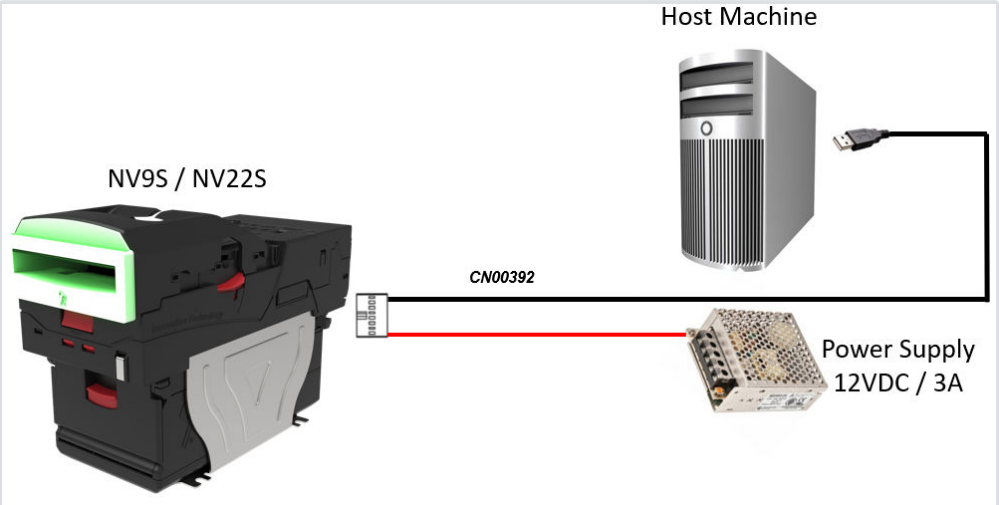
> We have seen instances where one of the dll's (itdata1.dll) used in Validator Manager are flassed as a Trojan, this is a false positive and if this happens you will need to add a rule ro your antivirus to allow the file to run.

Hardware setup

Supplies power to the CN00392 with 12 or 24 V. Connect the 16/20-way connector to the validator and the USB connector to the Hub that communicates with the computer.

> The use of an externally powered USB hub is highly recommended to protect the computer.

Please see the connection recommendation below for updating and testing:



It is not recommended to use IF17 or DA2 (obsolete) to reprogram the device due to the slowness of the data bus which can take up to 20 minutes to update.

Switching to programming mode (SSP)

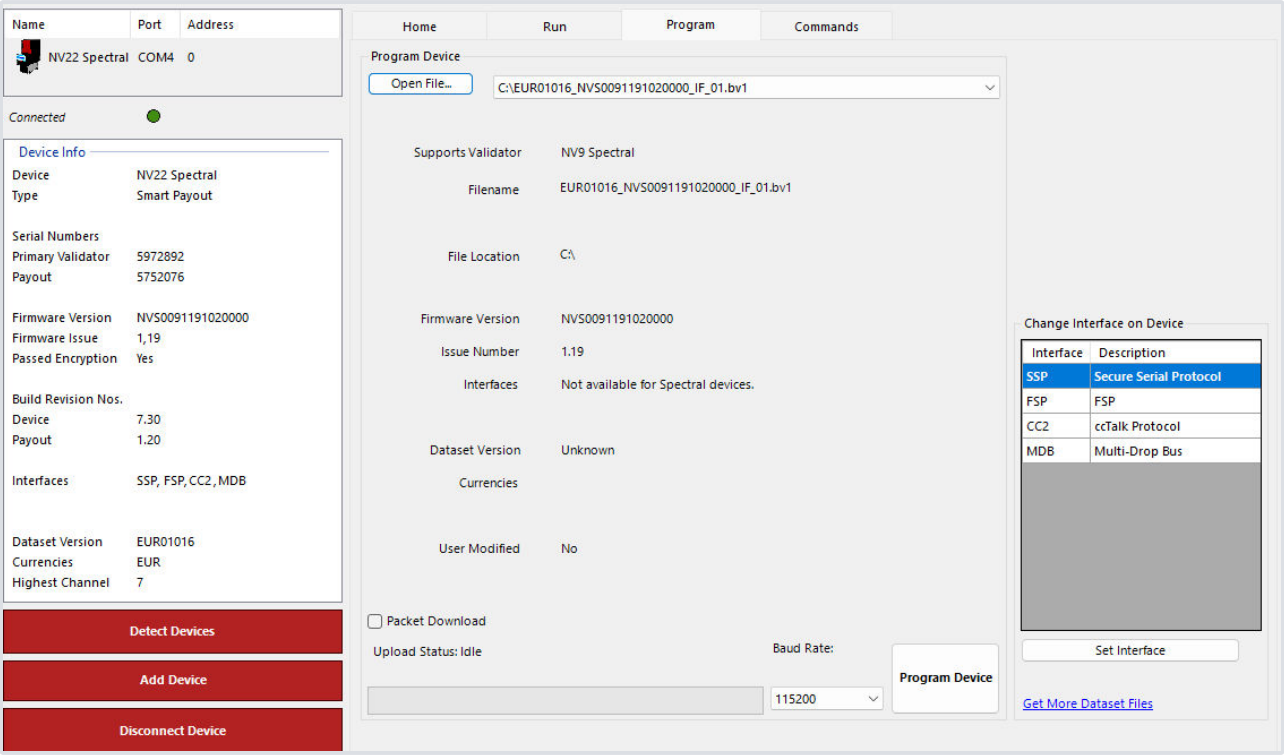
Before programming via validator Manager, the validator needs to be switched to its programming mode (SSP interface).

Refer to Configuration Button Functionality for the procedure for doing this.

Programming the device

Once the unit has been switched to SSP, open Validator Manager and click detect devices.

This will scan all active com ports for a unit, if the unit fails to connect, ensure the correct drivers are installed and the unit is in SSP.



By selecting the program tab, the device can be reprogrammed. To begin the upload, click open file, then browse to the file location (usually downloads).

Once the file has been selected its information will be populated and the Program device tab will become active. thereafter hit ‘Program Device’, the unit’s bezel will now begin to flash signalling the update has begun.

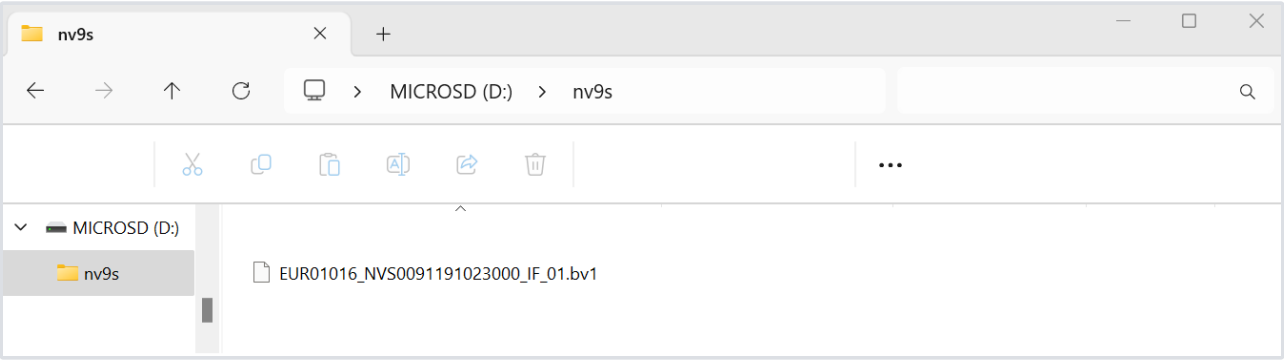
> Interrupting the download process can result in the unit entering a non-functional state, once the process has started it cannot be halted.

When completed the unit will restart and a pop-up box will appear saying “Device Programming Complete”.

Updating using a micro SD card

The device can be updated by microSD. Refer to section microSD card slot for further information.

Create a folder on the micro SD card root directory named as **nv9s** and copy the currency file in:



From firmware ≥1.21: the device will auto create the **nv9s** folder on a blank micro SD card if inserted

The NV9 Spectral must be turned on, when the card is inserted the update will start.

During the process the internal bezel will flash, when the update is complete the internal bezel will remain solid.

At this point, can safely remove the card, the device will reboot automatically.

While updating we recommend not to stare at the light it may cause eye discomfort!

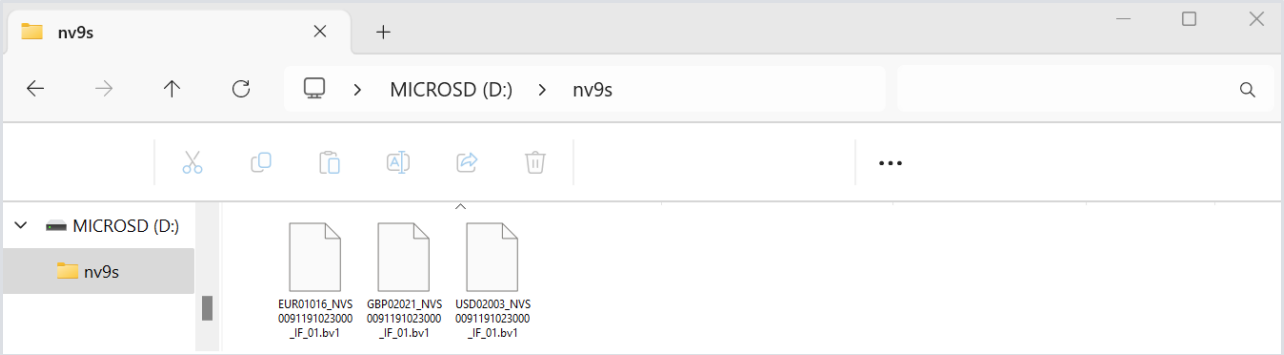
Updating using a micro SD card with multiple currencies

> This function only works from firmware ≥1.21 onwards
>
> **Note**: the device will auto create the **nv9s** folder on a blank micro SD card if inserted. Datasets for updates can then be saved into this folder using a PC

This allows the operator to load different currency files on the card to update different datasets, like for example where there are machines that accept different currencies.

Create a folder on the micro SD card root directory named as **nv9s** and copy the currency files in.

Several currency files can be copied inside the folder to perform a match download:



The NV9 Spectral must be turned on, when the card is inserted the update will start.

During the process the internal bezel will flash, when the update is complete the internal bezel will remain solid. At this point can safely remove the card, the device will reboot automatically.

> While updating we recommend not to stare at the light it may cause eye discomfort!

Note:

Matched download only updates the unit when currency and dataset code match the one already in the unit.

For example, EUR01 has to match in the unit as well as in the file to be downloaded. If there is just one file in that folder, the file is downloaded into the unit as an override download, as usual.

Micro SD card logging

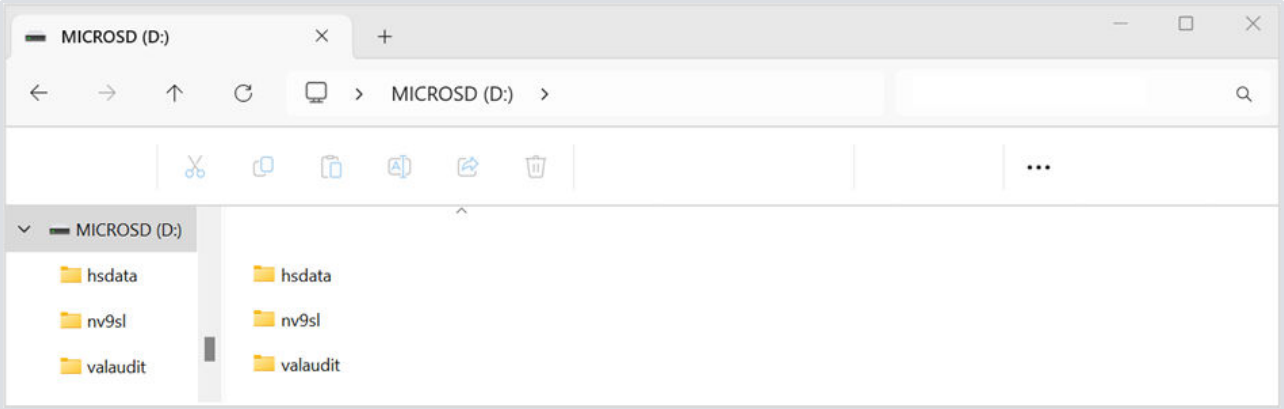
This function can be used to collect logs and data. Refer to section MicroSD card slot for further information.

From **firmware version ≥ 1.20** when inserting the micro SD card, regardless of the power status of the device, three folders will be created automatically in the root directory and the unit will start recording data:

hsdata

nv9sl

valaudit



Additionally, the folder nv9sl will extract data from the internal storage, the internal bezel will flash once when the process is complete.

> The card can be safely removed when no operation is being performed with the validator.

*If an earlier firmware version is available, the folders must be created manually: the device must power on with the card inserted to start the logging. Ensure the folders present in the root directory **before** inserting the micro SD card, the order is indifferent.*

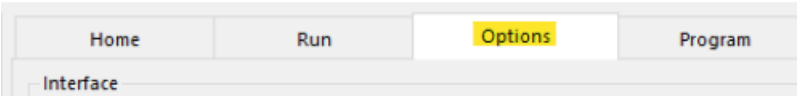
Setting the rainbow bezel colour

There are two options to use the rainbow bezel: rainbow mode or fixed colour.

The colour of the rainbow bezel can be changed by SSP commands or with the Validator Manager software.

To select the colour or bezel configuration with Validator Manager select advanced mode in the upper right-hand corner:

Select the 'options' tab:



At the bottom left, a menu to set the colours and bezel options is displayed:

"Set colour" sends the configuration, but changes must be applied to save them in the memory of the device.

Additionally, the test mode allows the colour to be displayed before applying the changes as reference.

Bezel Mode	Description
Enable Flash	Sets the flashing colour when unit is enabled
Restore Rainbow	The rainbow mode is set by default
Restore Default	• **Rainbow bezel:** restores rainbow mode • **Standard bezel:** resets to default mode with a black bezel color

NV9 Spectral Range Protocols and Interfacing

Contents

- Introduction
- SSP and eSSP
  - General description
  - Pin assignments
  - Setup examples
    - Direct USB cable
    - IF17 setup
    - NV22 and SMART Coin System
- ccTalk® CCT / CC2
  - General description
  - Pin assignments
  - ccTalk® DES encryption - Trusted mode
- CC4
  - General description
- MDB
  - General description

Introduction

The NV9 Spectral supports standard industry protocols.

For any queries regarding interfaces that are not listed or doubt contact support@innovative-technology.com.

> Is strongly recommended to achieve the highest security using the eSSP protocol.
>
> We provide SDK packages including documentation only for eSSP and SSP.

Product	Interfaces
NV9 Spectral	SSP, CCT, MDB, IF3
NV11 Spectral	SSP, CC4, MDB
NV22	SSP, CC2, MDB

Important notes for firmware ≥ 1.21:

- Note Float support is disabled for all protocols
- The CC4 protocol is disabled on the NV11 Spectral

Please contact your sales representative for more information.

SSP and eSSP

General description

Smiley® Secure Protocol (SSP) and Encrypted Smiley® Secure Protocol (eSSP) are field proven secure interfaces specifically designed by Innovative Technology Ltd. to address the problems by cash handling systems.

> Please contact support for the necessary protocol documentation.

This interface is recommended for all new implementations.

Pin assignments

Pin	Name	Type	Description
1	Vend 1	Output	Serial Data Out (Tx)
2-4	Not Used		
5	Inhibit 1	Input	Serial Data In (Rx)
6-10	Not Used		
11	USB +	Data	USB Data +
12	USB -	Data	USB Data -
13	USB Vcc	Power	USB Vcc (+5VDC)
14	Not Used		
15	+ Vin	Power	+12/24VDC Supply
16	0V	Power	0V Supply (GND)

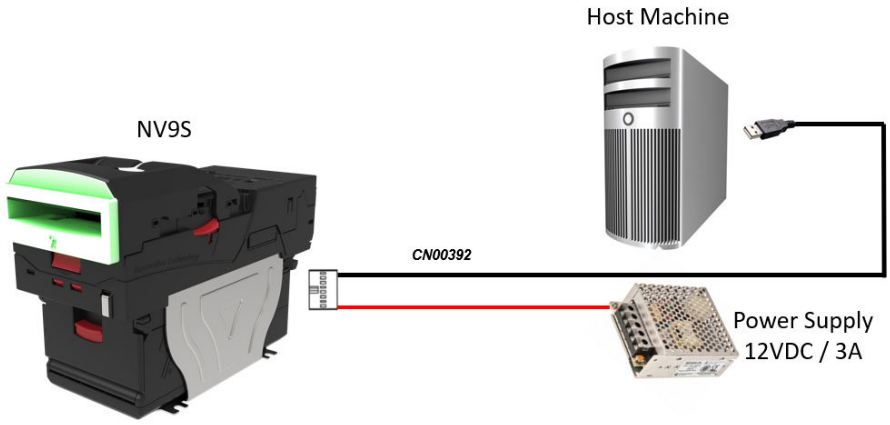
> VDC and 0V (GND) must always be connected also when using USB connections, recommended that the host has the USB opto isolated port for direct USB connection.

Setup examples

The drawings below highlight's how to connect the NV9 Spectral to an SSP or eSSP host machine using available cables and interfaces. For cable drawings refer to cable drawings appendix.

Direct USB cable

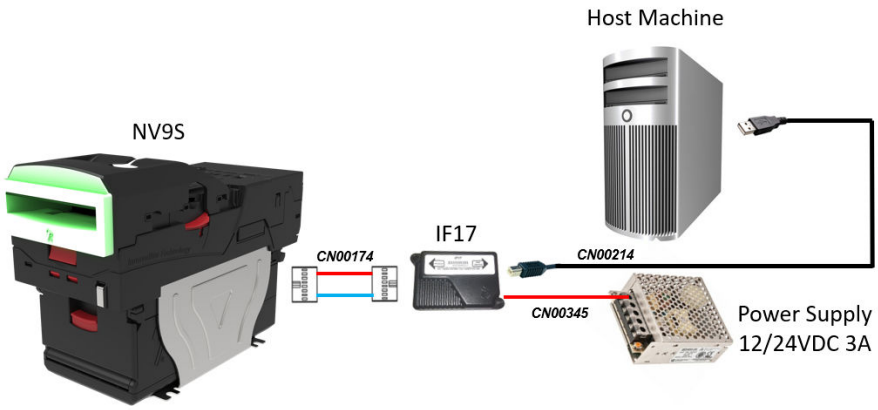
It is highly recommended that the host has the USB opto isolated port for direct USB connection.



Type	ITL Part Number	Description
Cable	CN00392	Validator to USB Cable

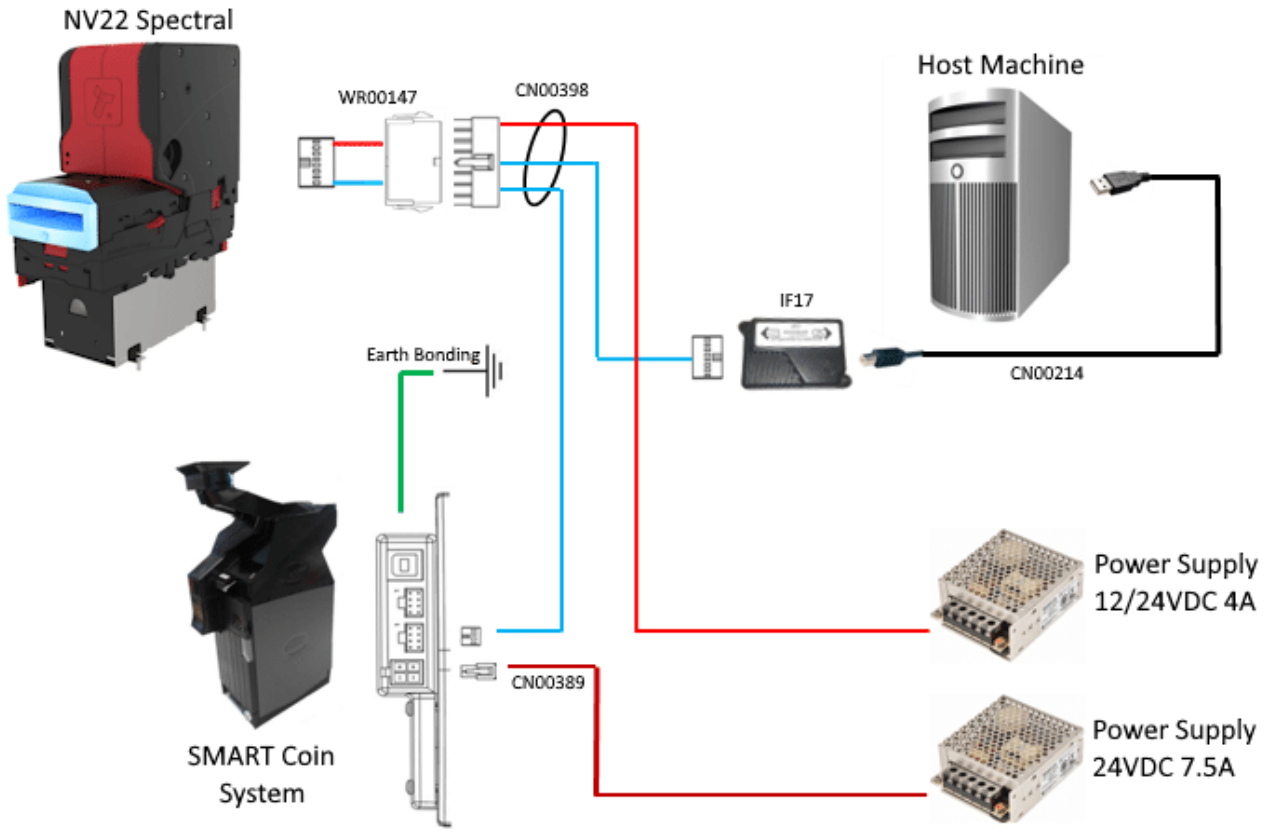
IF17 setup

The IF17 interface is compatible with 12 or 24 V.



Type	ITL Part Number	Description
Cable	CN00174	NV9 / NV10 Ribbon Cable
Cable	CN00214	USB A to B cable assembly
Cable	CN00345	DA3 / IF17 / IF18 Power Cable
IF17	PA01081	TTL to USB Converter

NV22 and SMART Coin System



Type	ITL Part Number	Description
Cable	CN00398	Dual eSSP interface to both Smart Payout and Hopper Assembly
Cable	WR00147	Smart Payout to NV200 Adapter Harness
Cable	CN00214	USB A to B cable assembly
Cable	CN00389	Hopper Power Cable
IF17	PA01081	TTL to USB Converter

ccTalk® CCT / CC2

General description

The CC2 protocol is an extension of ccTalk to support the Multi Note Float recycler. If no recycler is to be used use the CCT protocol.

This protocol is not under continuous improvement by our development team, no new features will be added. Please use SSP or eSSP.

Please contact support for documentation.

Pin assignments

Pin	Name	Type	Description
1	Vend 1	Output	Serial Data (link to pin 5)
2-4	Not Used		
5	Inhibit 1	Input	Serial Data (link to pin 1)
6-10	Not Used		
11	USB +	Data	USB Data +
12	USB -	Data	USB Data -
13	USB Vcc	Power	USB Vcc (+5VDC)
14	Not Used		
15	+ Vin	Power	+12/24VDC Supply (12VDC Note Float Only)
16	0V	Power	0V Supply (GND)

VDC and 0V (GND) must always be connected also when using USB connections, recommended that the host has the USB opto isolated port for direct USB connection.

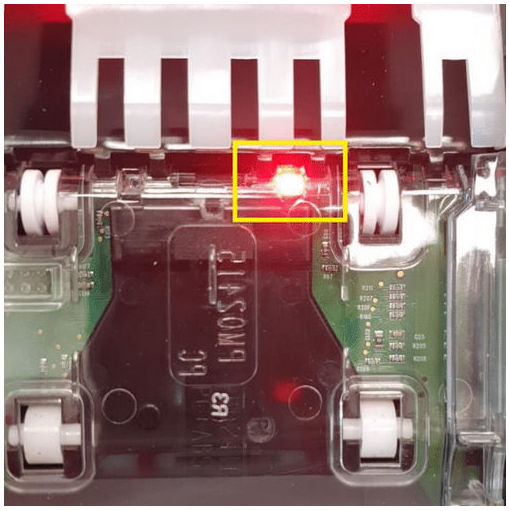
ccTalk® DES encryption - Trusted mode

When using ccTalk® DES encryption, the device and host machine must exchange a secret key which forms the basis of the communication encryption.

This is performed in a trusted mode, only be entered by a physical access to maintaining security.

With the note path open, power on the device while the configuration button is pressed.

When the internal led starts blinking release the button. The unit will be temporarily in trusted mode when the unit is in ccTalk protocol.



CC4

General description

CC4 protocol used by the NV11 Spectral is disabled with firmware ≥ 1.21.

Please contact your sales representative for more information.

CC4 protocol is an extension with additional status commands to support NV11 Spectral in ccTalk. The same pinout is used as in ccTalk.

Note: VDC and 0V (GND) must always be connected also when using USB connections.

This protocol is not under continuous improvement by our development team, no new features will be added. Please use SSP or eSSP.

Please contact support for documentation.

MDB

General description

MDB (Multi-Drop Bus) is used in the vending industry and is an open standard from the National Automatic Merchandising Association (NAMA), ensuring that all vending machines and peripheral equipment communicate consistently.

> We support MDB version 4.0 and later.
>
> Please contact support for further information.

IF5 interface

An NV9S Range running MDB can use an IF5, an external interface box, which regulates the power supply and opto-isolates the communication lines.

Typically vending machines power supply higher voltage than the maximum for the validator. The IF5 drops this higher voltage down to the required level.

Type	ITL part number	Description
Interface Kit	PA05419	MDB adaptor

NV9 Spectral Range Service Guide

Contents

- Routine maintenance
  - Cleaning the device
    - Recommended cleaning intervals
    - Cleaning the validator
  - Housing assembly cleaning
  - Lozenge removal and cleaning
    - Locking clip removal
    - Detaching the lozenge from the housing assembly
    - Cleaning the lozenge
    - Changing drive belts
    - Lozenge fitting
- Flash Codes
  - Interface Flash Codes
  - NV9 Spectral Flash Codes
  - Multi Note Float Flash Codes
    - Operational Flash Codes
    - Error Flash Codes
- Fault Flowchart

Routine maintenance

Depending upon the environment the NV9 Spectral is running in it may require cleaning, belt changing or note path clearing more frequently.

Cleaning the device

> Disconnect the power **BEFORE** carrying out any cleaning operations to avoid the risk of causing damage to the validator.

Recommended cleaning intervals

Change the **drive belts** of the NV9 Spectral every 6-12 months or as required, dependant on environmental factors. If dirt can be seen to be building up or if the belts themselves have had excessive use and are starting to wear, then this time period may not apply, and they would need to be swapped sooner.

Clean the **optical lenses** every 6 months or more if the unit is in a particularly harsh environment. Dirt, dust or other residue leads to bad note acceptance and other performance degradation.

Cleaning the validator

> Do not use solvent based cleaners such as alcohol, petrol, methylated spirits, white spirit or PCB cleaner.

Do not use solvent based cleaners such as alcohol, petrol, methylated spirits, white spirit or PCB cleaner. Using these solvents can cause permanent damage to the units; only use a mild detergent solution as directed below.

Housing assembly cleaning

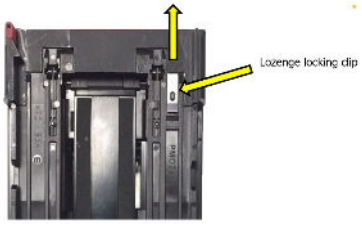
The upper housing assembly contains vital sensors for required for optimum operation of the validator, dirt can obscure the light paths which can lead to failure in sensing the note, therefore upper housing assembly should be cleaned using a lint free cloth.	

Lozenge removal and cleaning

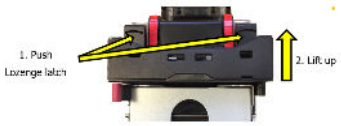
Locking clip removal

The NV9 Spectral Range allows with the rear housing assembly (PA04349) the feature of securing the lozenge via a locking clip (MC02186).

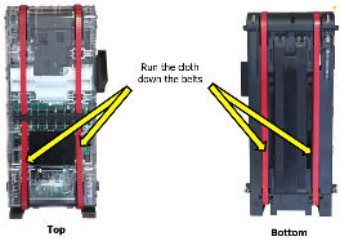
Refer to Appendix for locking clip details and plastic cashbox section for the optional door lock assembly.

The lozenge is secured into place via a locking clip. To remove the lozenge the locking clip must be removed. Ensure that the cashbox has been removed initially to gain access to the locking pin on the underside of the main housing assembly.	
After the cashbox is removed the locking pin can be removed by lifting the locking pin upwards and pushing it towards the bezel.	
Please note the cashbox will need to be removed to perform this action.	

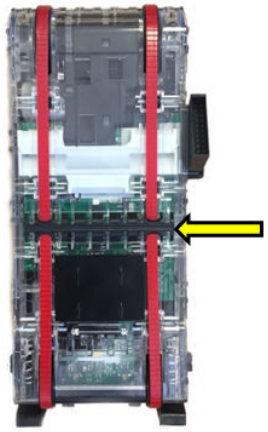
Detaching the lozenge from the housing assembly

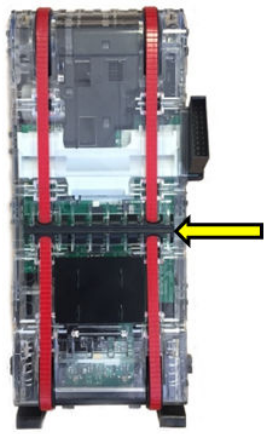
The Lozenge assembly is secured into place via the latches attached to the lozenge. Pushing the lozenge latches forwards will release the Lozenge out of the housing assembly, then lift up the lozenge.	

Cleaning the lozenge

A lint free cloth dampened with water and containing a mild detergent (such as dish detergent) can be used to clean the belts on the lozenge. ensure both the top and bottom parts of the lozenge are cleaned.	

Changing drive belts

Remove the security fastening from the belts Press sideways on the belt fastening to remove the part.	
Remove the old belts Press both drive wheels inwards to create slack in the belts. This slack will allow you to remove belts from the lozenge. Pushing the drive wheels down into your desk, helps.	
Replace with new belts Place new belts onto drive wheels, push them inwards to allow you enough slack to position belts into place.	

Insert the security fastening Press sideways on the belt fastening to insert the part.	

Lozenge fitting

Placing the lozenge into place When placing the lozenge back into the housing assembly, ensure that the lozenge is secured into the grooves of the rear side of the housing assembly, then push down the lozenge.	
Clicking the lozenge into place After the lozenge is in place, push the lozenge latches down to click into place. Ensure the lozenge is secured into grooves provided.	

Flash Codes

The NV9 Spectral Range supports various flash codes that are displayed to the user via the entry bezel or LED on the attached recycler.

Interface Flash Codes

If you double press the red configuration button the bezel will flash a series of times:

Flashes	Interface	Interface settings flashes			
		CCT Plain	CCT 8-bit	No Escrow Timeout	DES
1	SSP				
3	MDB				
4	IF3				
6	ccTalk	1	2	3	4

NV9 Spectral Flash Codes

The NV9 Spectral has inbuilt fault detection facilities. If there is a configuration or other error the front bezel will flash in a specific sequence:

Flashes		Indicated status	Recommended action
Long	**Short**		
0	**1**	Recycler updating the firmware (recycler and validator flashing alternatively)	Wait for the process to finish, the device will reboot after it is completed
1	**1**	Note path open	Ensure upper assembling is closed
	2	Note path jam	Clear the jam in the note path
	3	Unit not initialised	Contact ITL technical support
2	**1**	Plastic cashbox removed	Insert the cashbox
	2	Cashbox jam	Check stacking mechanism
	3	Recycler not detected (FW≥1.21)	• Check the connection to the recycler • Send poll or reboot the unit
3	**1**	Firmware checksum error	Reprogram the device to the latest available version
	2	Interface checksum error or unable to set programmed interface	
	3	EEPROM checksum error	
	4	Dataset checksum	
	5	Recycler not compatible	• The Multi Note Float is not supported on NV9 Spectral build revision 7.0 when using firmware ≥ 1.15 • All other build revisions are supported • Note Float support is disabled in firmware ≥ 1.21
	7	Software error	Contact ITL technical support
4	**1**	Power supply too low	Check power supply
	2	Power supply too high	

Multi Note Float Flash Codes

Operational Flash Codes

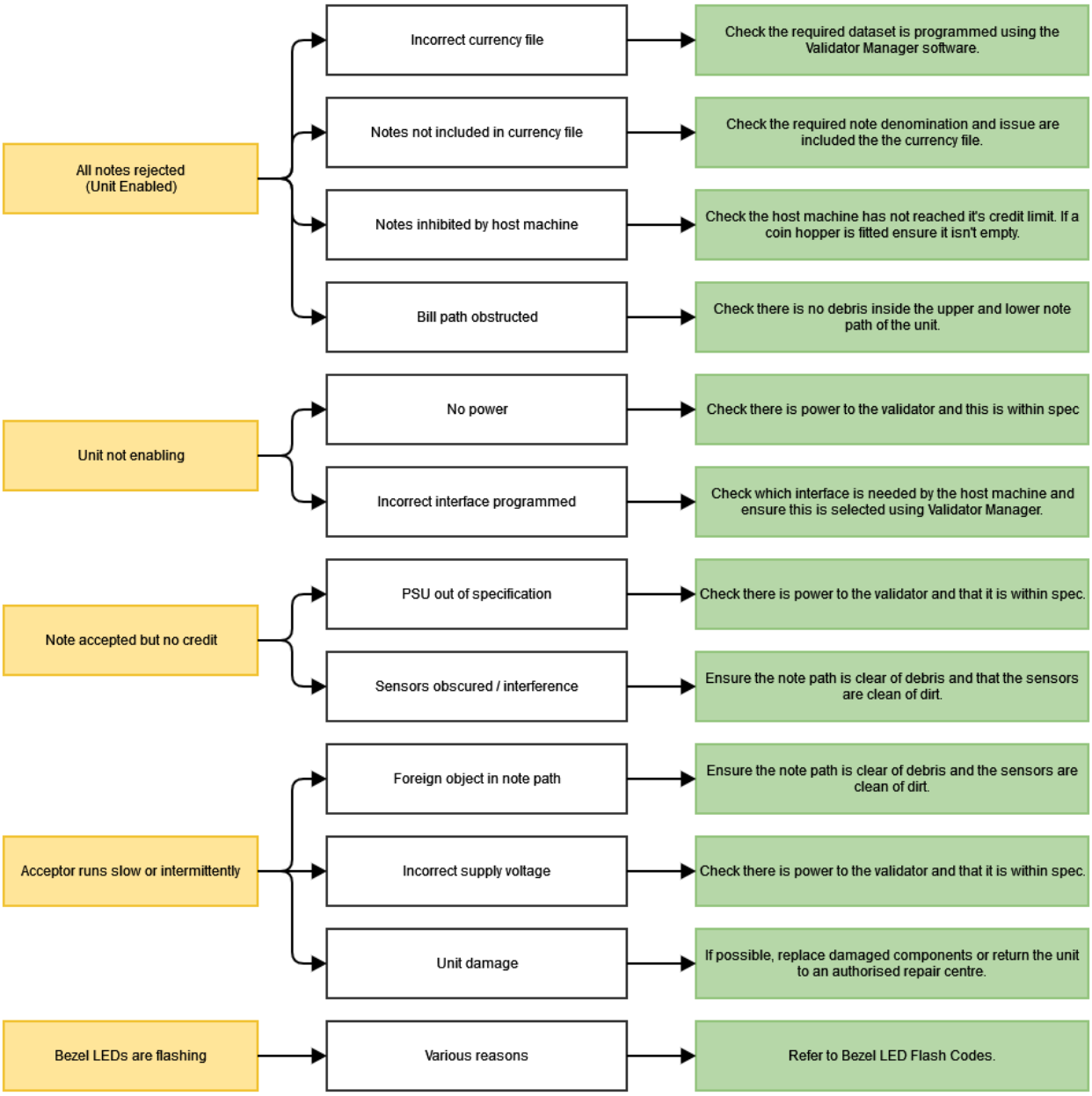
LED State	Status
Recycler and validator flashing alternatively - rapid flashing	Updating the recycler firmware
Rapid flashing	Starting up
On	Idle
Pulse every 3 seconds	Disabled
Flash until cycle finished - rapid flashing	Paying out

Error Flash Codes

Long	Short	Error
0	**1**	Invalid currency
3	**0**	Recovery mode
	1	Note jam
	2	Sensor fault
	3	Tape fault
	4	Diverter fault
	5	Note memory not accessible

Fault Flowchart

A flow chart has been generated in the section below for troubleshooting and fault-finding issues that may occur with the NV9 Spectral, this section should be used in conjunction with routine maintenance.



NV9 Spectral Range Product Compliance

CE Marking

For full compliance details, please visit the NV9 Spectral Range Support Hub page.

WEEE

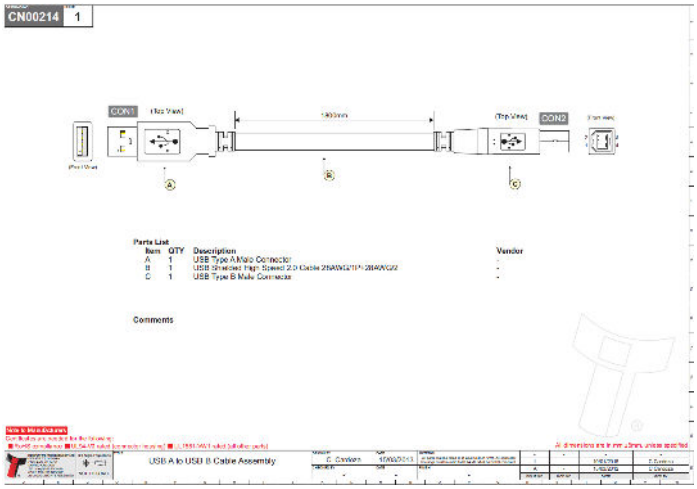
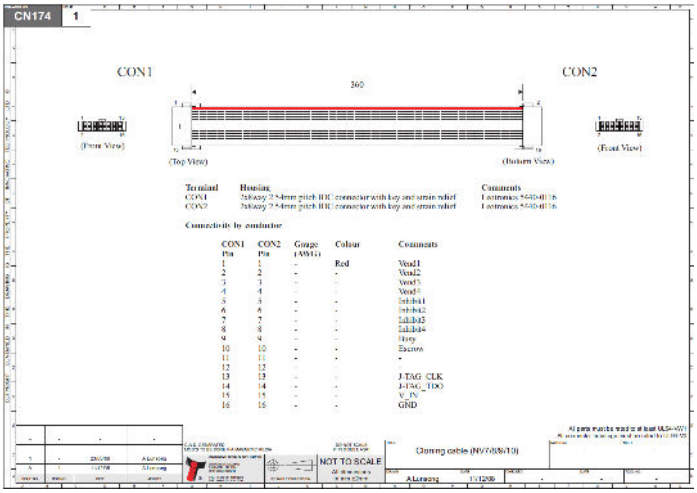
The European Union's directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) was adopted by the European Council and Parliament in 2003 with a view to improving the collection and recycling of Waste Electrical and Electronic Equipment throughout the EU, and to reduce the level of non-recycled waste. The directive was implemented into law by many EU member states during 2005 and 2006. Products and packaging that display the symbol (shown left) indicates that this product must NOT be disposed of with other waste. Instead it is the user's responsibility to dispose of their Waste Electrical and Electronic Equipment by handing it over to an approved re-processor, or by returning it to the original equipment manufacturer for reprocessing.

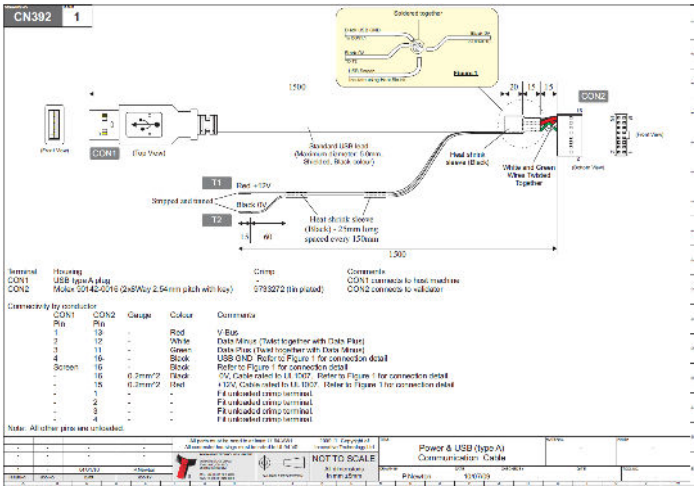
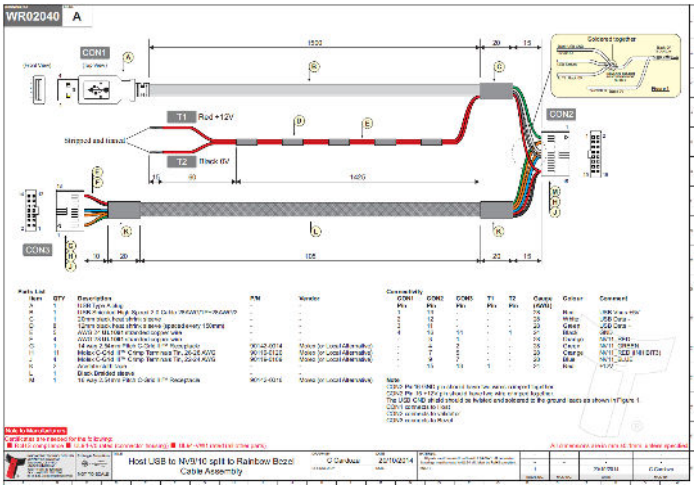
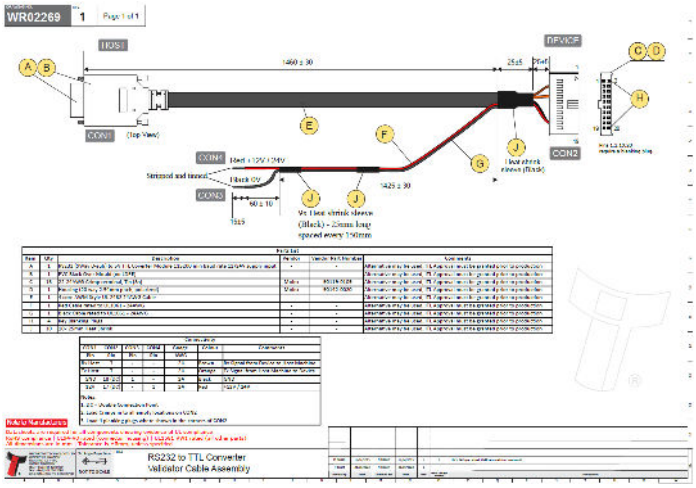
NV9 Spectral Range Appendix

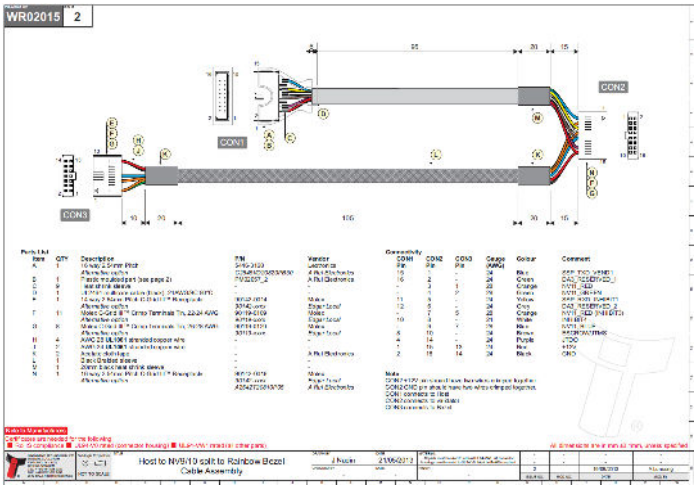
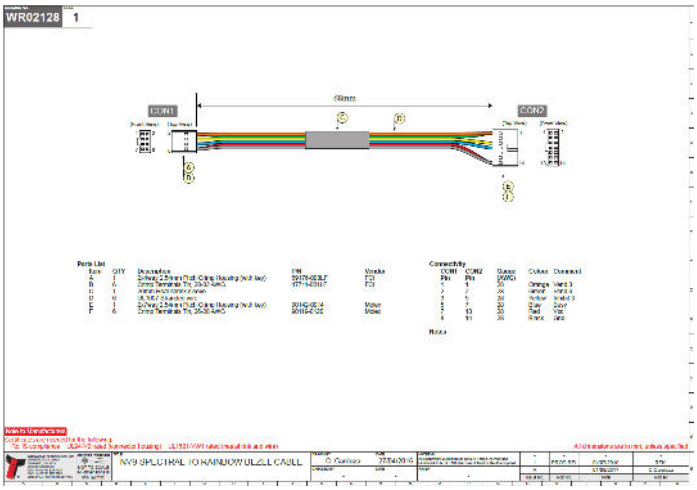
Contents

- Cable Drawings
- Moulded Cashbox
- Accessories
- File Naming Convention

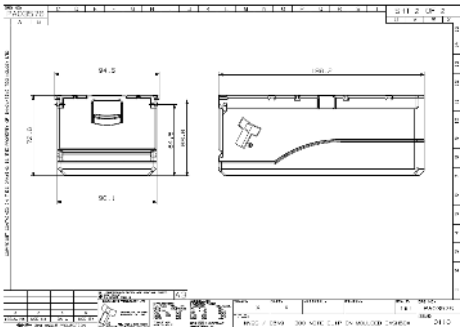
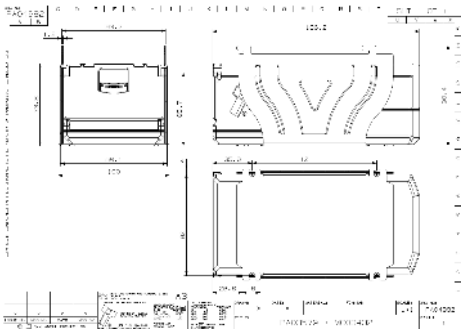
Cable Drawings

Cable	Description	Drawing
CN00214	USB A to USB B	
CN00174	NV9 / NV10 ribbon cable	

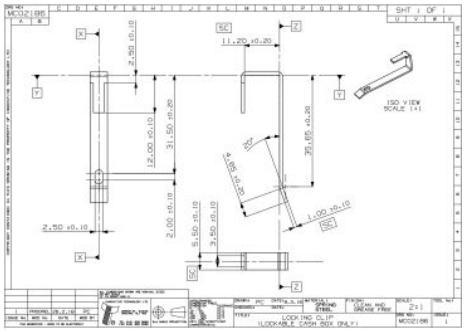
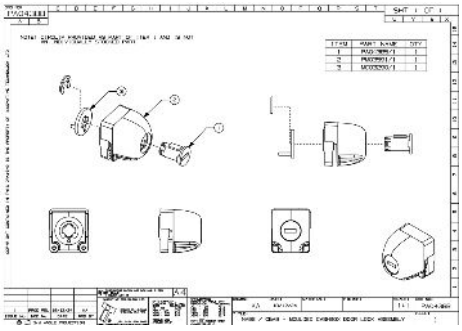
CN00392	NV9 USB / NV10 USB host cable Not for use with Rainbow Bezels, please see alternative WR02040	
WR02040	NV9 USB / NV10 USB split to rainbow bezel (220 mm)	
WR02269	RS232 to TTL Converter Validator Cable Assembly	

WR02015	NV9 USB / NV10 USB split to rainbow bezel (170 mm)	
WR02128	NV9 Spectral to rainbow bezel	

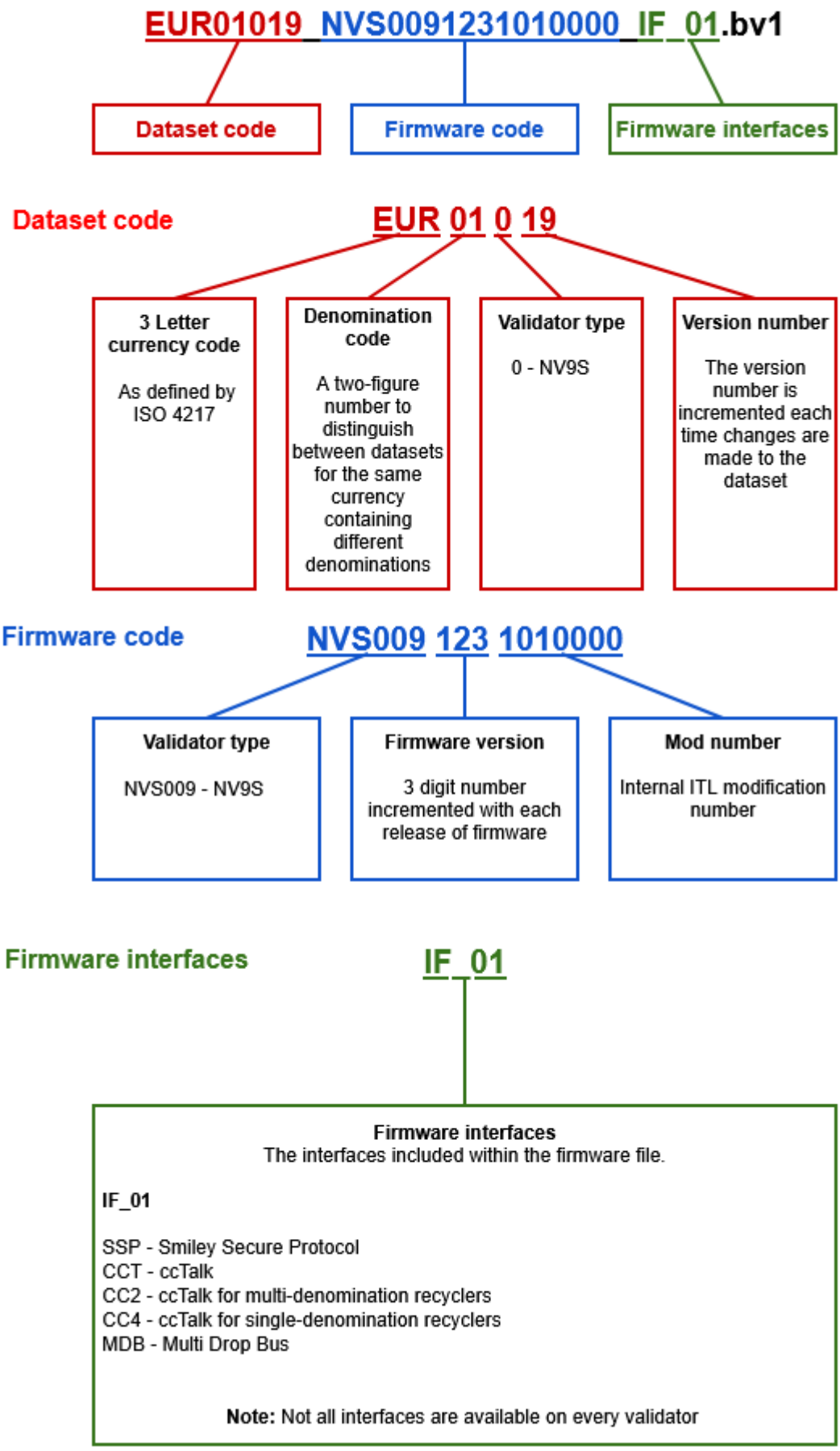
Moulded Cashbox

Reference	Description	Drawing
PA03576	NV9S 300 Note Clip-on Moulded Cashbox	
PA03579 + MC03432	NV9S 300 Note Slide-in Moulded Cashbox	

Accessories

Reference	Description	Drawing
MC02186	Locking clip Must use rear housing assembly (PA04349)	
PA04388	NV9 Spectral Moulded Cashbox Door Lock Assembly Must use rear housing assembly (PA04349)	

File Naming Convention



NV9 Spectral Range Disclaimer and Safety Information

Contents

- Disclaimer
- Product Safety Information

Disclaimer

Innovative Technology:

- Is not responsible for any loss, harm, or damage caused by the installation and use of this product. This does not affect your local statutory rights. If in doubt, contact Innovative Technology for details of any changes.
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- Does not accept liability for any errors or omissions contained within this document. Innovative Technology shall not incur any penalties arising out of the adherence to, interpretation of, or reliance on, this standard.

> The contents of this manual set may be subject to change without prior notice.

Product Safety Information

Throughout this user manual, attention should be drawn to key safety points when using or maintaining the product.

These safety points will be highlighted in a box:

> This is an example text.

This user manual and the information it contains is only applicable to the model stated on the front cover and must not be used with any other model.

⚠ **Danger!**	**IR and UV Radiation**
	• Possible skin or eye damage due to presence of IR and UV radiation internally. Disconnect power before servicing • Use PPE measures • Follow safety precautions given in IEC 62471