CashCode

VU(MVU) Stackerless Bill Validator

Operation and Service Manual

Part 1. Operation Manual

CONTENTS

INTRODUCTION

The scope of this document is to provide full and clear information about the VU (MVU) series – the next generation of CashCode stackerless bill validators.

This document will be useful in the:
- Design of equipment using the Validator,
- Identify the right Validator part number,
- Installation of the Validator,
- Maintenance and service of the product,
- Repair.

The Manual consists of two parts: part 1 – Operation and Service Manual, and part 2 – Repair Manual.

PRODUCT OVERVIEW

CashCode VU (MVU) bill Validator was designed for on-door installation. Typically the VU (MVU) bill Validator is installed on the front door (or the front panel) of a machine. Access to the Bill box is from the rear side of the Validator.

VU bill **Validator** has a fixed width bill path and is available for currencies 67mm or 71mm wide. These two implementations cover most of the countries using fixed width denominations.

MVU **bill Validator** has a centering mechanism with a self-adjustable bill path. The width of the path is automatically adjusted to accommodate each bill. The MVU is used for currencies where the width of the bill changes with the denomination.

VU (MVU) bill Validator has a very high acceptance rate due to a set of advanced **sensors** and smart software that can precisely identify authentic bills from all known counterfeits.

Six multi-colour **optical sensors** collect images from both sides of the bill.
Patented **inductive sensors** evaluate magnetic properties of specialized ink at the bill.
Patented **dielectric sensors** detect authenticity of bill paper and some special protective features of the bill.

All sensors have **auto-calibration** and do not require any manual adjustment. As a result, the validator keeps the same high acceptance level during its lifetime.

The VU (MVU) bill Validator can **accept bills** inserted in **any** of four **directions** (any side forward, face up or face down).

The highest security level is provided by an **anti-stringing sensor** that can detect any sort of string, thread or film attached to the bill.

The highest efficiency is provided in the following features:
Beltless roller design minimizes maintenance of bill transport mechanism.
"**Clamshell**" design provides fast and easy access to all portions of the bill path.
Special rollers to **prevent bill jams** with wet or worn bills.
Fast and easy software updates with the CashCode Smart Memory stick.
Twice the speed of the previous BV series.
Support to wide variety of **protocols** – MDB, CC serial, CCNET and BDP.
Several types of the **front bezels** to suit a wide range of applications.

GENERAL SPECIFICATIONS

Acceptance:

Bills…………………………………………………………………..lengthwise 4 ways
Validating rate…………………………………………..96% or higher on first insertion
Width of bills, in mm……………………………………………………………67 or 71
Maximum length of bill, in mm………………………………………….…………160
Minimum length of bill, in mm……………………………………….……………120
Bill escrow……………………………………………………………..one bill

Complete transport cycle, in seconds……………………………………………1.7

Protocols/Interfaces:

24V………………………………………….....MDB
                                                Single Price (with adapter)
                                                Host Intelligence Interface (HII, with adapter)
12V…………………………   ………………..Pulse, opto-isolated (IPI)
                                                CCS (serial, TTL)
                                                CCNET (single slave mode, RS232)
                                                BDP (TTL, RS232)

Memory programming………………………. download from CashCode Memory Stick or
                                                from host controller (available in CCNET
                                                only)

Power supply voltage……………………………………….…………………12 V DC $\pm$ 1 V
                                                24 V AC or 15-42.5 V DC

Current consumption:

12 V DC operating mode, max………………………………………………………….2 A
12 V DC standby………………………………………………………………………0.2 A
24 V AC or 15-42.5 V DC, operating mode (max)……………………………………….1 A
24 V AC or 15-42.5 V DC, standby……………………………………………………0.1 A

Power consumption, W:
Idle mode…………………………………………………………………………………2
Validation mode……………………………………………………………………………12

Environmental:

Operating temperature (12 V DC)……………………………………….………0°C to +50°C
(24 V AC or 15-42.5 V DC)……………………………………………………..-18°C to +60°C
Storage temperature……………………………………………….……………-30°C to +60°C
Humidity (non-condensing)…………………………………………………….30%-90%RH

Validation **M.T.B.F**……………………………………………………….………..750,000 cycles

Weight (with plastic bezel)
VU…………………………………………………………………………………1 kg
MVU…………………………………………………………………………..….1.1 kg

DIMENSIONS
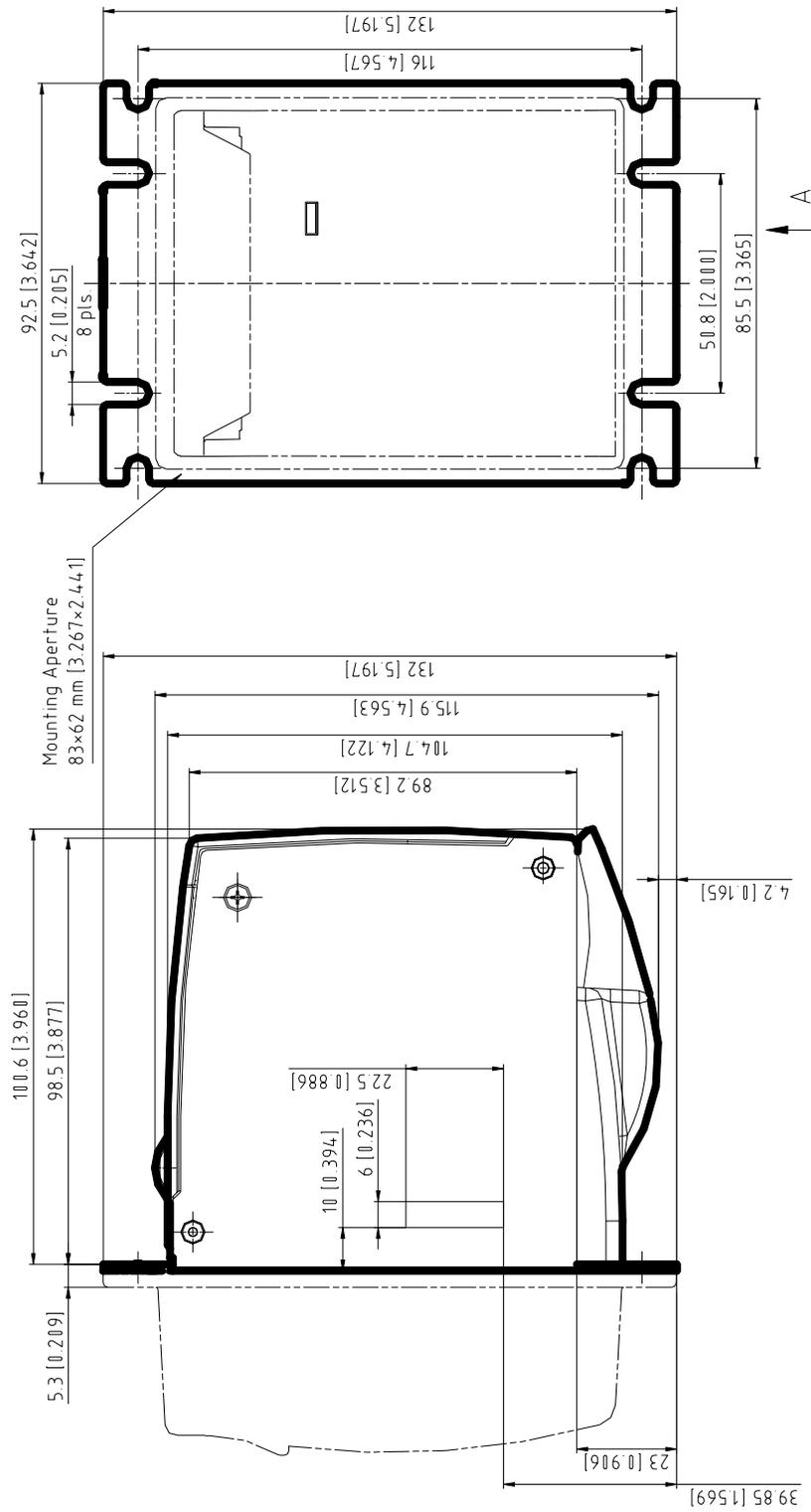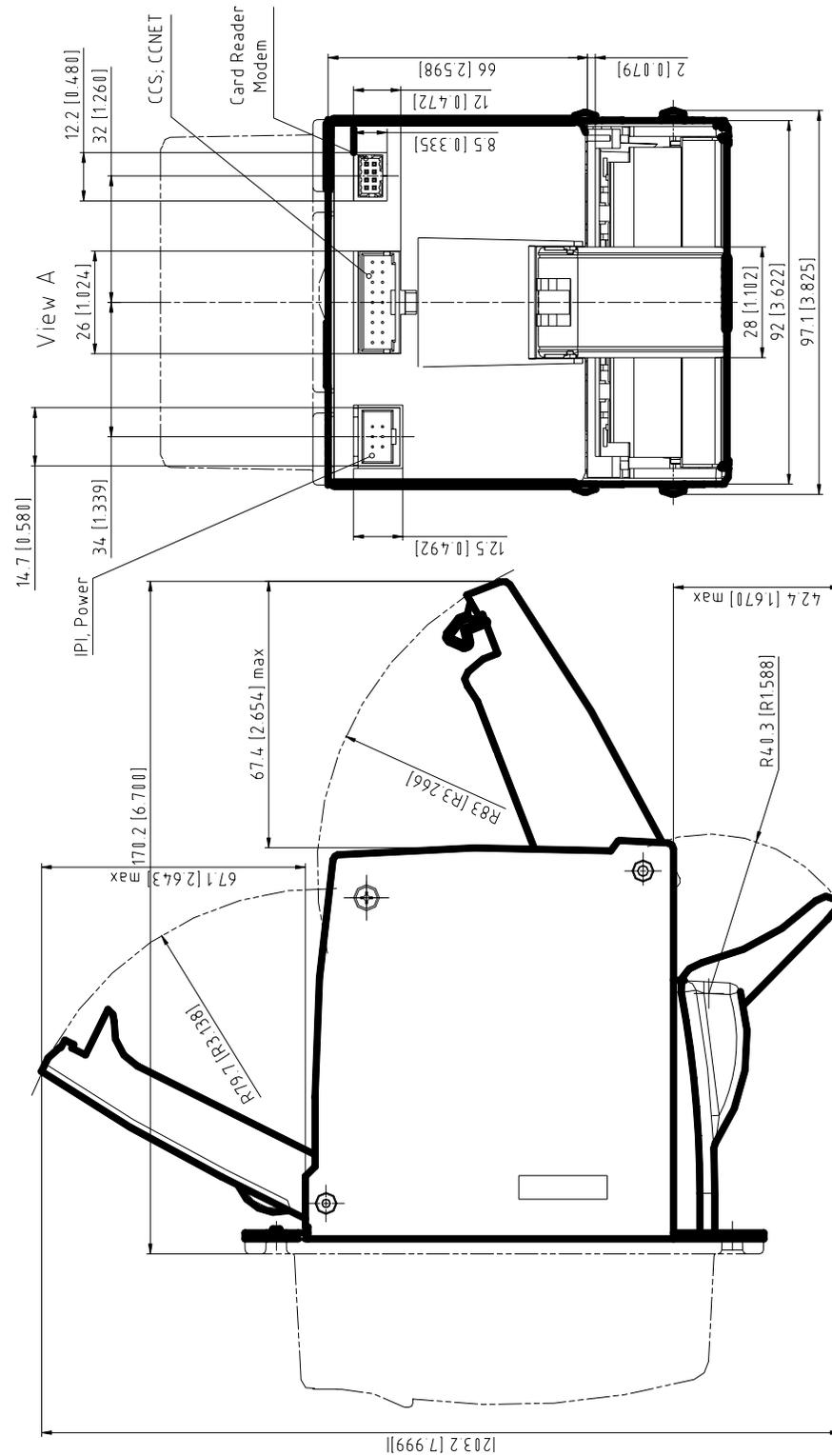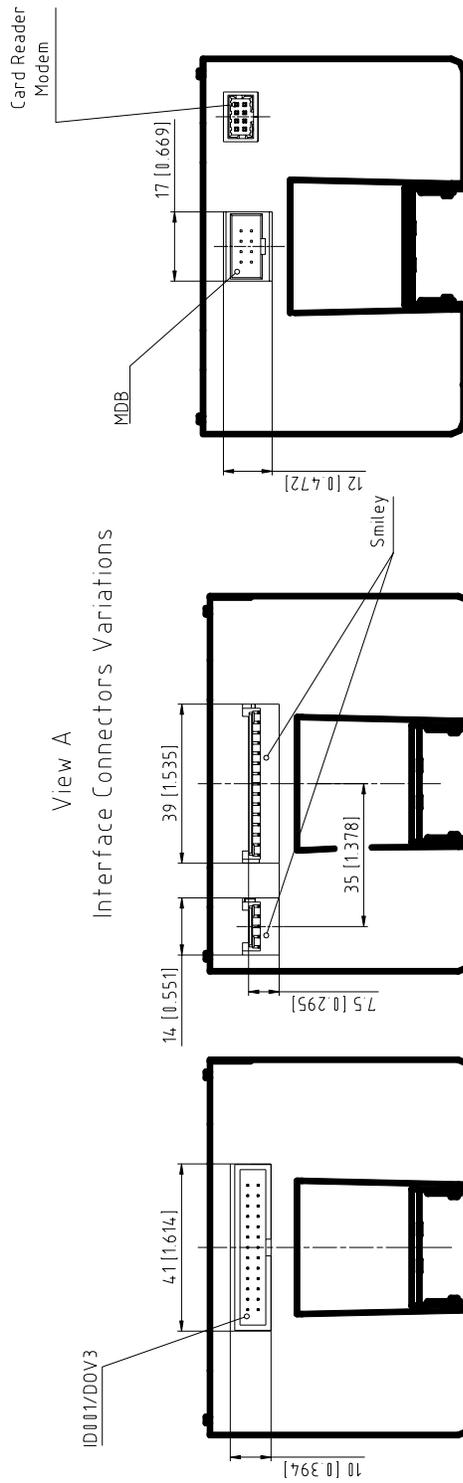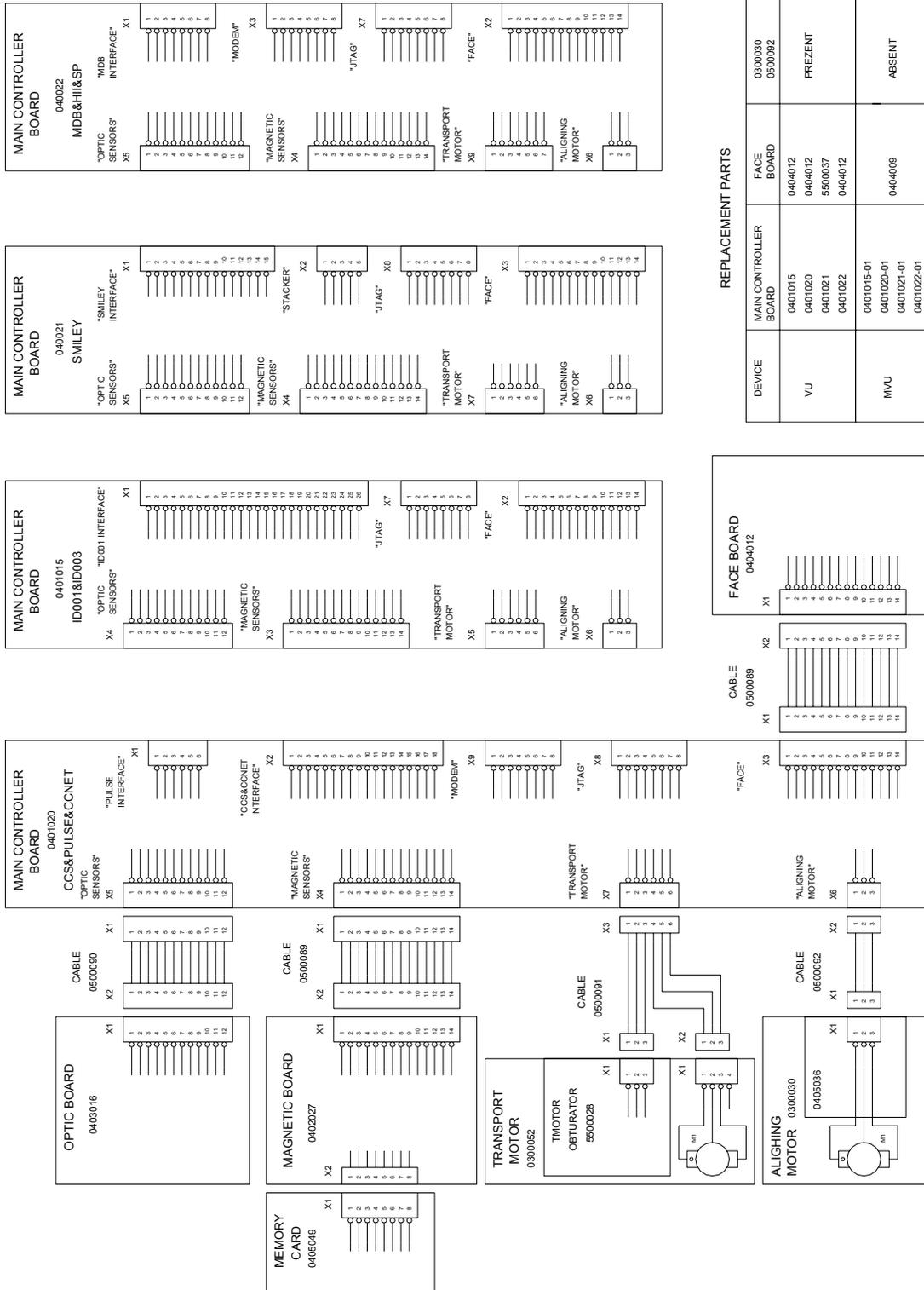
132 [5.197]

116 [4.567]

92.5 [3.642]

5.2 [0.205]

8 pls

50.8 [2.000]

85.5 [3.365]

A

Mounting Aperture
83×62 mm [3.267×2.441]

132 [5.197]

115.9 [4.563]

104.7 [4.122]

89.2 [3.512]

4.2 [0.165]

100.6 [3.960]

98.5 [3.877]

22.5 [0.886]

6 [0.236]

10 [0.394]

5.3 [0.209]

23 [0.906]

39.85 [1.569]

View A

Interface Connectors Variations

Card Reader
Modem

17 [0.669]

MDB

12 [0.472]

Smiley

39 [1.535]

35 [1.378]

14 [0.551]

7.5 [0.295]

41 [1.614]

ID001/DOV3

10 [0.394]

GENERAL WIRING DIAGRAM
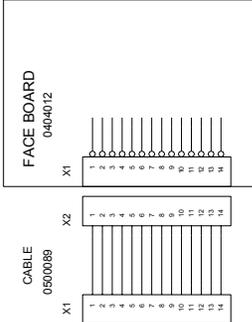
CHOOSING VU(MVU) FEATURES AND PART NUMBERS

Bill Validator

Following data is required to make a correct choice of the bill validator:
- Currency (country);
- Protocol type (interface);
- Bezel style;
- Indoor or outdoor application (coated boards are used for outdoor application);

Currency

The chart below specifies countries currently supported by VU.

| Currency	Denominations accepted	Path width, mm
Argentina	ALL	67
Australia	ALL	67
Brazil	ALL	67
Canada	ALL	71
Chile	ALL	71
China	5, 10, 20	71
Colombia	ALL	71
Costa Rica	ALL	67
Dominican Republic	ALL	67
Guatemala	ALL	67
Argentina	ALL	67
Jamaica	ALL	71
Mexico	ALL	67
Peru	ALL	67
Philippines	ALL	67
South Africa	ALL	71
Ukraine	ALL	71
USA	ALL	67
Venezuela	ALL	71
USA + Mexico	ALL	67

Interface

For detailed description see chart "Interface Connection".

Bezel style

Three different styles of bezel are currently available:

Standard plastic bezel. This bezel is used for standard BILL UP or BILL DOWN installations. The bezel has a status indicator that glows GREEN when ready and RED when busy. The status light also provides a diagnostic for service personnel. The bezel has 2 designated places to accommodate stickers of 35x12 mm and 76x48 mm size.
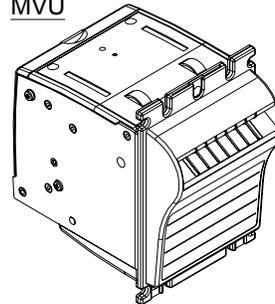
VU (63,67,71 mm)
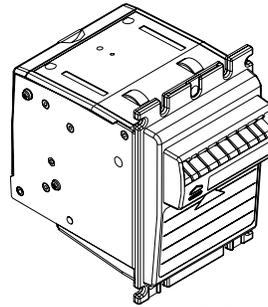
VU (77 mm)
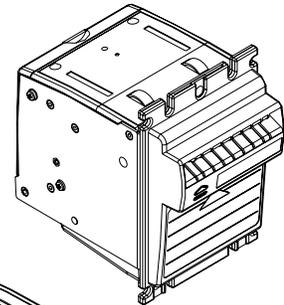
MVU

Plastic Bezel
(shown as BILL DOWN)

The **Metal bezel** is developed to protect the VU (MVU) from intentional damage or in environments where impact from other objects is likely. It has curved bill path to protect from inadvertent insertion of coins. The metal bezel has an additional transport motor necessitating additional power. A red/green light indicates the status of the validator. Customized stickers of size 76x48 mm can be applied on the bezel. Two configurations of the metal bezel are available – for BILL UP and for BILL DOWN installation.
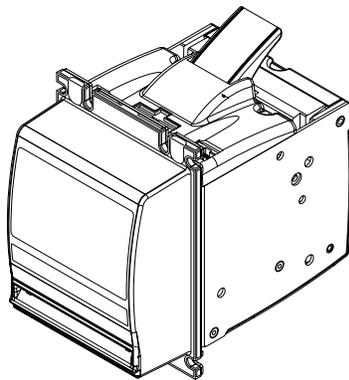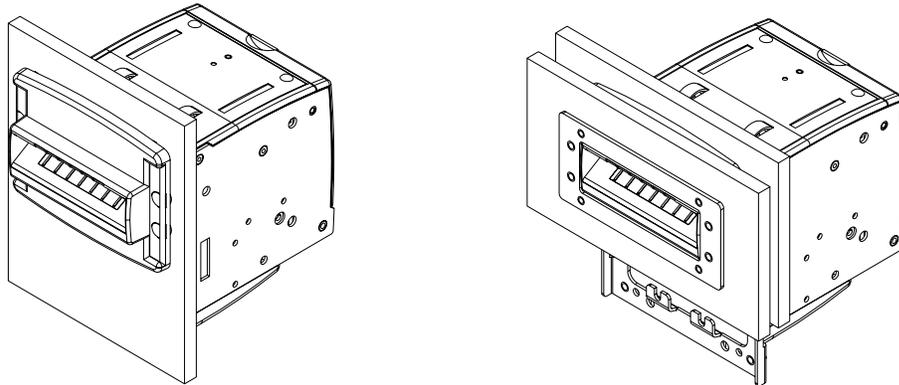
Metal Bezel (BILL DOWN)
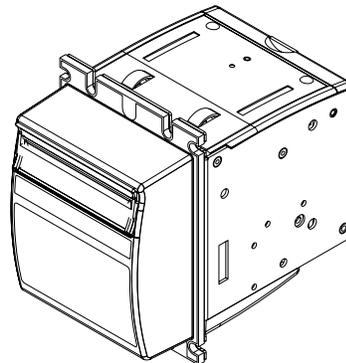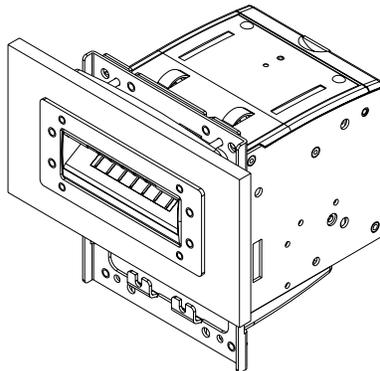
Metal Bezel (BILL UP)

Indoor or outdoor application

The VU (MVU) bill Validator can be ordered specifically for outdoor applications. This configuration will incorporate specially coated printed boards that are immune to humidity and moisture.

MVU + Mini Bezel Exterior Installation

MVU + Mini Bezel Internal Installation

Memory Stick and software update options

CashCode VU (MVU) Bill Validators are supplied with pre-installed software, according to user's order. A "Dummy Card" is normally placed in the slot instead of a Memory stick. Software updates are released to accommodate new currency releases or to improve security against counterfeits. Software updates are offered in three options:

1) Single-download Memory stick.

The software from the new Memory stick is downloaded when it is first installed on the Validator. This Memory stick must be left in its position for the Bill Validator to operate.

2) Multi-download Memory stick.

The multi-download Memory stick allows the operation of the SM bill Validator without the Memory Card. Thus the Memory stick can be used for updating more than one Validator depending on the number of licenses ordered.

3) Network download Memory stick.

This smart stick allows the download of new software through the interface connector. After the download, the Memory stick must be left in the Bill Validator. If the host controller supports the CCNET protocol, then the download can be done via the host controller (and local network).

Other protocols do not support this download feature. Downloads may be performed by connecting the Validator to a personal computer through an appropriate adapter. Instructions for Memory stick replacement and software updates can be found in the chapter named "SOFTWARE UPDATES".

Final part numbers for the VU (MVU) bill Validator consist of two parts: a hardware part number and software part number.

Example: **VU(MVU) – 2005 US7712**

Software part number

Hardware part number

The Hardware part number reflects the contents of the Bill Validator
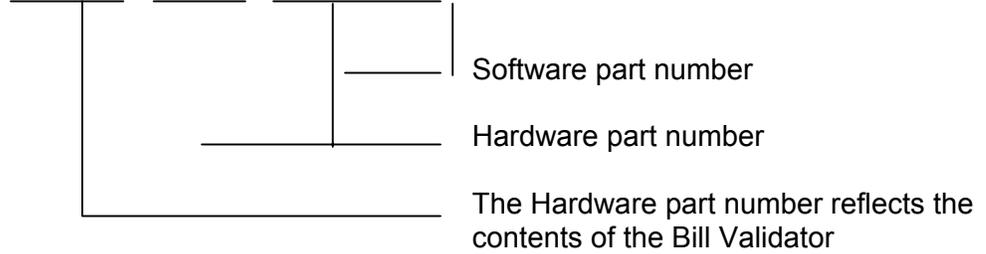
The Software part number reflects country (currency) and communication protocol.

INSTALLATION

Bill validator installation

The VU(MVU) bill Validator is placed on a door or a panel. The panel or door must have a rectangular cutout and four threaded studs as per picture below.
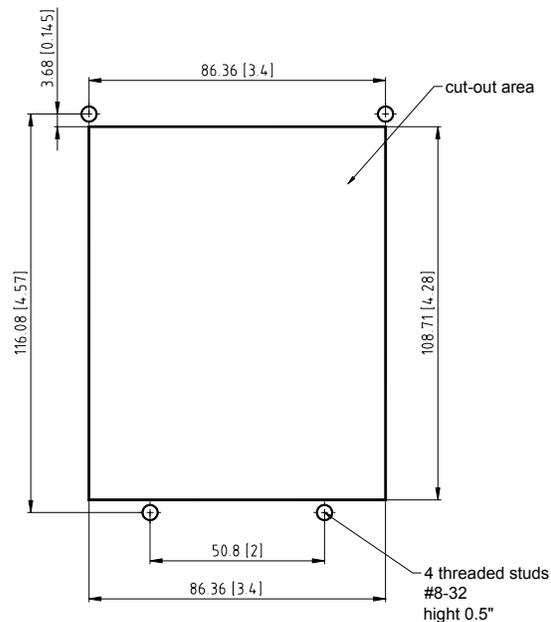
INTERFACE CONNECTION

The VU (MVU) Bill Validator has the flexibility to offer five different hardware interface options:

Type 1: Opto-Isolated, 24 Volt DC/AC, (Suited for MDB applications, or Single Price and Host Intelligence through suitable adaptors);

Type 2: Opto-Isolated, 12 Volt DC, Isolated Pulse Interface;

Type 3: TTL level , 12 Volt DC, CCS Interface;

Type 4: RS232 level, 12 Volt DC, CCNET or BDP;

Type 5: RS232 level, 12 Volt DC, CCNET or BDP

For detailed interface descriptions, please refer to the corresponding Interface Description Manual available at www.cashcode.com

The type of interface hardware depends on CPU board.

Opto-isolated version (Type1, Processor Board VU03.51.300):

Pin assignment
(cable connector):

1 3 5 7

2 4 6 8
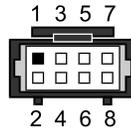
Molex, Part #: 15-04-5084, 1 pc;
50-57-9304, 2 pcs;
16-02-0086, 8 pcs

Signal descriptions:

TERMINAL	SIGNAL	FUNCTION	ACTIVITY
1	DC/AC POWER RET	POWER	-
2	34V DC/24V AC	POWER	-
3	GROUND	GROUND	-
4	ADDITIONAL OUTPUT	AUXILIARY OUTPUT	LOW
5	MASTER RECEIVE	MASTER RECEIVE INPUT	HIGH /LOW
6	ADDITIONAL INPUT	AUXILIARY INPUT	HIGH
7	COMMON	COMMUNICATION'S COMMON	-
8	MASTER TRANSMIT	MASTER TRANSMIT OUTPUT	HIGH /LOW

The additional input/output circuits (terminals 4 and 6) are used by external adapters.
For connecting to equipment with Single Price Interface, the **Single Price Adapter (OPT-AD-SP)** is used.

For connecting to equipment with the Host Intelligence Interface, the **Host Intelligence Interface Adapter (OPT-AD-HII)** is used.

Isolated Pulse Interface (Type2, Processor Board VU03.51.200):

Pin assignment
(cable connector):

1   5

2   6
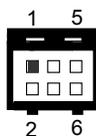
Molex, Part #:15-04-5064, 1 pc;
50-57-9303, 2 pcs;
16-02-0096, 6 pcs..

Signal descriptions:

TERMINAL	SIGNAL	FUNCTION	ACTIVITY
1	+ 12 V DC Power	Power Supply (+)	-
2	Ground	Power Supply (-)	-
3	Pulse Output 1	Pulse Signal	Current Presence
4	Pulse Output 2	Pulse Signal	Current Presence
5	Inhibit Line (+)	Enable/Disable Accept Bill	Current Presence is Enable Accept Bill
6	Inhibit Line (-)	Enable/Disable Accept Bill	Current Presence is Enable Accept Bill

CCS, CCNET (TTL/RS232) and BDP Interfaces (Type3 –Type6, Processor Board VU03.51.200):

Pin Assignment
(cable connector):
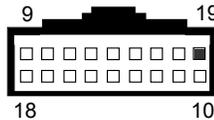
**AMP, Part #:102398-7, 1 pcs;**
102536-7, 1 pcs;
102681-4, 1 pcs.

Signal descriptions:

TERMINAL	SIGNAL	FUNCTION	ACTIVITY
1	Credit Pulse	Pulse Signal NIP Interface (output)	Low
2	Interrupt	Availability to transfer a status message (output)	Low
3	Serial/Pulse Select	Interface type (input)	High/Low
4	Ground	Signal Ground	-----------
5	Serial Data Output	An eight bit status message (output)	High/Low
6	Not connected	-----------	-----------
7	Not connected	-----------	-----------
8	Not connected	-----------	-----------
9	Not connected	-----------	-----------
10	Out of Service	The information on that cassette is full or jam has occurred (output)	Low
11	TXD-TTL	Transmitted data (TTL level)	High/Low
12	Accept Enable	Enable accept bill (input)	Low
13	LED Power Source	200 ohm to 5 VDC (output)	High
14	Send	Control system signal initiating transfer a status message (input)	Low
15	TXD-RS	Transmitted data (RS level)	High/Low
16	RXD-TTL	Received Data (TTL level)	High/Low
17	RXD-RS	Received Data (RS level)	High/Low
18	Not connected	-----------	-----------

MULTI LINE Interfaces (Type5, Type7, Processor Board VU03.51.000):

Pin Assignment
(cable connector):
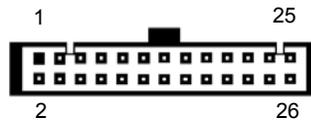
Molex, Part #: 15-49-6260

Signal descriptions:

TERMINAL	SIGNAL	FUNCTION	ACTIVITY
1	+12V	Power Supply (+)	-----------
2	GND	Power Supply (-)	-----------
3	+12V	Power Supply (+)	-----------
4	GND	Power Supply (-)	-----------
5	Vend1(+)	Received currency type signal	Low
6	Vend1(-)		
7	Vend2(+)	Received currency type signal	Low
8	Vend2(-)		
9	Vend3(+)	Received currency type signal	Low
10	Vend3(-)		
11	Busy(+)	Signal to be output during validator operation	High
12	Busy(-)		
13	ABN(+)	Signal to be output when an error has occurred in the validator	High
14	ABN (-)		
15	INH(+)	Bill reception inhibit signal	High
16	INH (-)		
17	ACK(+)	Signal sent from external device to store bill after validator outputs the VEND signal	Low
18	ACK (-)		
19	REJ(+)	Signal sent from external device to return bill after validator outputs the VEND signal	Low
20	REJ (-)		
21	DT.Valid(+)	Final signal of the VEND signal	Low
22	DT.Valid (-)		
23	STKF(+)	Signal to be output when the stacker is full	High
24	STKF (-)		
25	Serial OUT	Transmitted data	High/Low
26	Serial IN	Received Data	High/Low

Smiley Interfaces (Type8, Processor Board VU03.51.210):

Main Connector:

Pin Assignment
(cable connector):

15   1
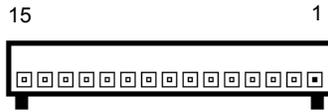
Molex, Part #: 22-01-1152

Signal descriptions:

TERMINAL	SIGNAL	FUNCTION	ACTIVITY
1	Vend1(TXD) **(binary bit 1)**	Note accepted on Channel 1, Also the Pulse Stream output Also the serial output pin in Serial Mode Also the pulse stream output in Pulse Stream Mode	Low (High/Low)
2	Vend2 **(binary bit 2)**	Note accepted on Channel 2 pulse output	Low
3	Vend3 **(binary bit 4)**	Note accepted on Channel 3 pulse output	High/Low
4	Vend4 **(binary bit 8)**	Note accepted on Channel 4 pulse output	-----------
5	Inhibit1(RXD)	Inhibit channel 1 Also the Serial input pin in RS232 serial mode	High (High/Low)
6	Inhibit2	Inhibit channel 2	High
7	Inhibit3	Inhibit channel 3	High
8	Inhibit4	Inhibit channel 4	High
9	Escrow	Operate Escrow function	Low
10	Alarm	Problem indication Output	Low
11	Supply Voltage	+11V to +15V DC	-----------
12	Ground	Power Supply (-)	-----------
13	+VCOM	Must be connected to the host machine interface supply voltage.	-----------
14	Parallel/Serial Select	Hold this pin HIGH for parallel Pulse output. Connect this pin LOW for Serial Output	High/Low
15	Not connected	-----------	-----------

Stacker/RS232 Connector:

Pin Assignment
(cable connector):

5   1
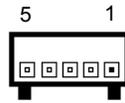
Molex, Part #: 22-01-1052

| TERMINAL	SIGNAL	FUNCTION	ACTIVITY
1	PWR+	Power Supply (+)	-----------
2	GND	Power Supply (-)	-----------
3	Stacker Control	Used to control the stacker	Low
4	StackerStatus/ RXD	When stacker is connected, monitors the stacker status. If no stacker is fitted, acts as the serial input pin in RS2323 serial mode	High/Low
5	TXD	If no stacker is fitted? Acts as the serial Output pin in RS2323 serial mode	High/Low

Input/Output circuits

For CPU board 0401018 (with MDB interface)

INPUT/OUTPUT CIRCUTT FOR MDB INTERFACE (PROCESSOR BOARD VU03.51.300)

For CPU board 0401017 (with CCS, IPI, CCNET, BDS interfaces)

INPUT/OUTPUT CIRCUIT FOR CCS, IPI, CCNET, GFI INTERFACES (PROCESSOR BOARD VU03.51.200

CashCode®
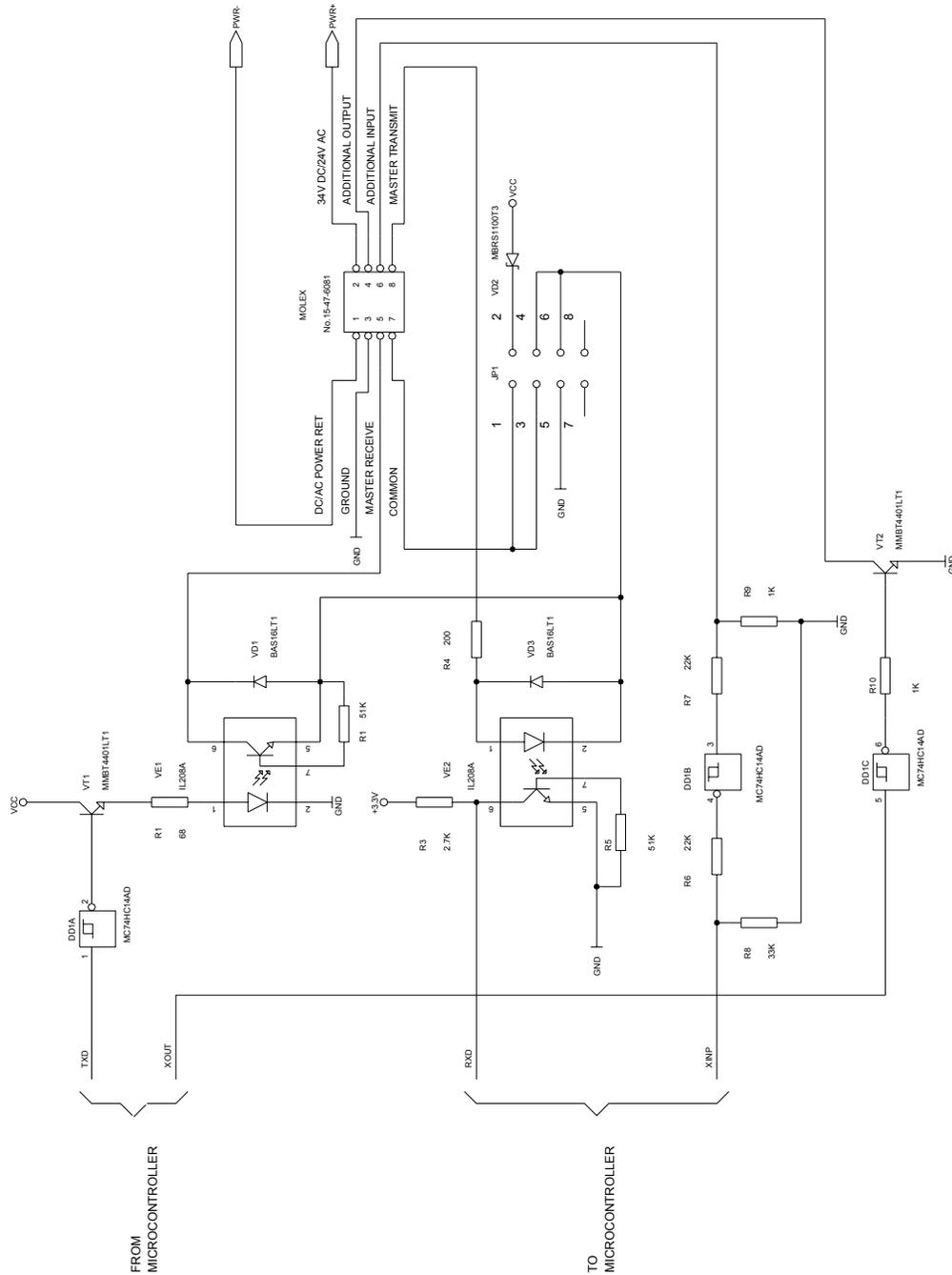
INPUT/OUTPUT CIRCUIT FOR ID001, ID003 INTERFACES (PROCESSOR BOARD VU03.51.000)
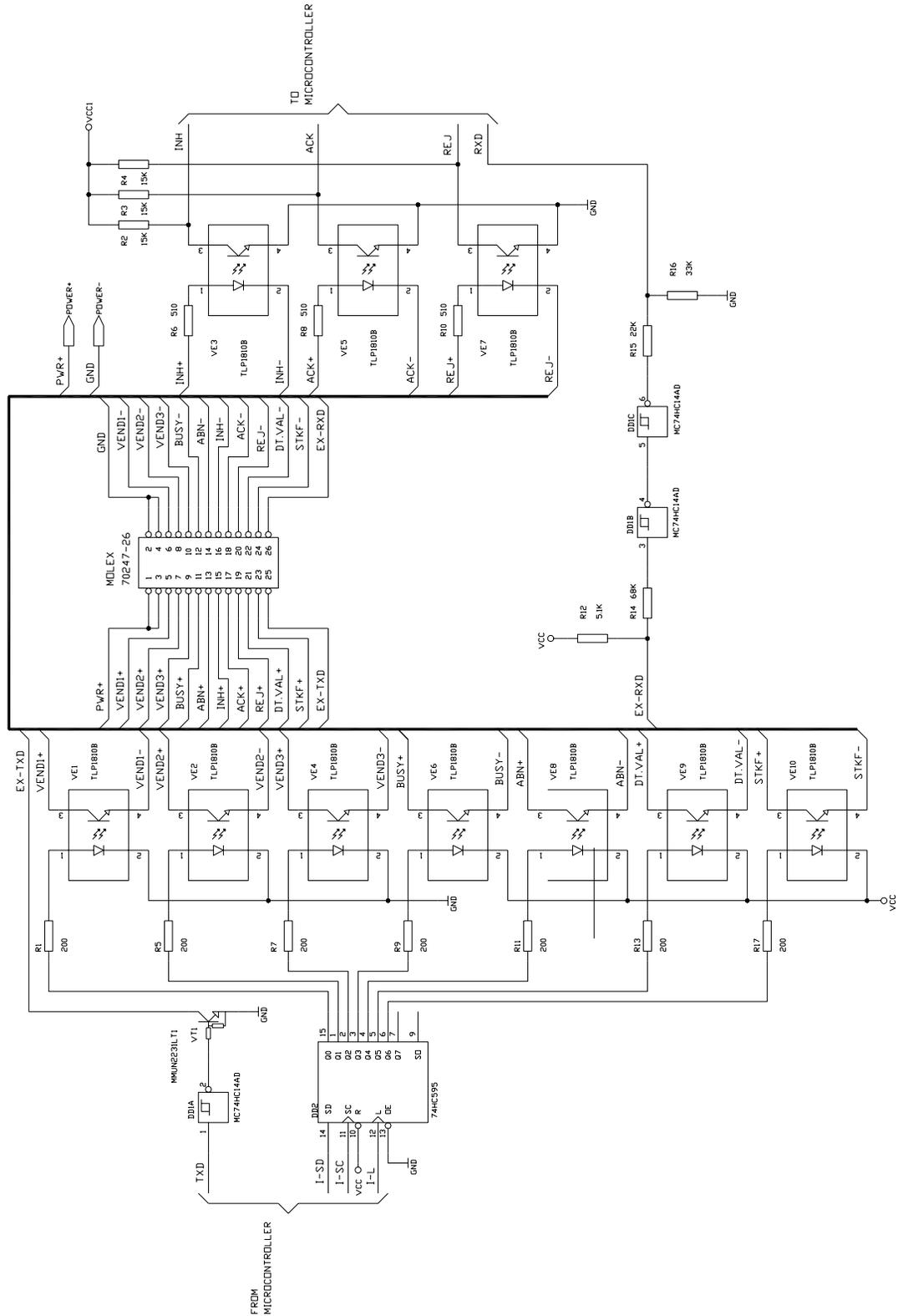
# INPUT/OUTPUT CIRCUTT FOR SMILEY INTERFACE (PROCESSOR BOARD VU03.51.210
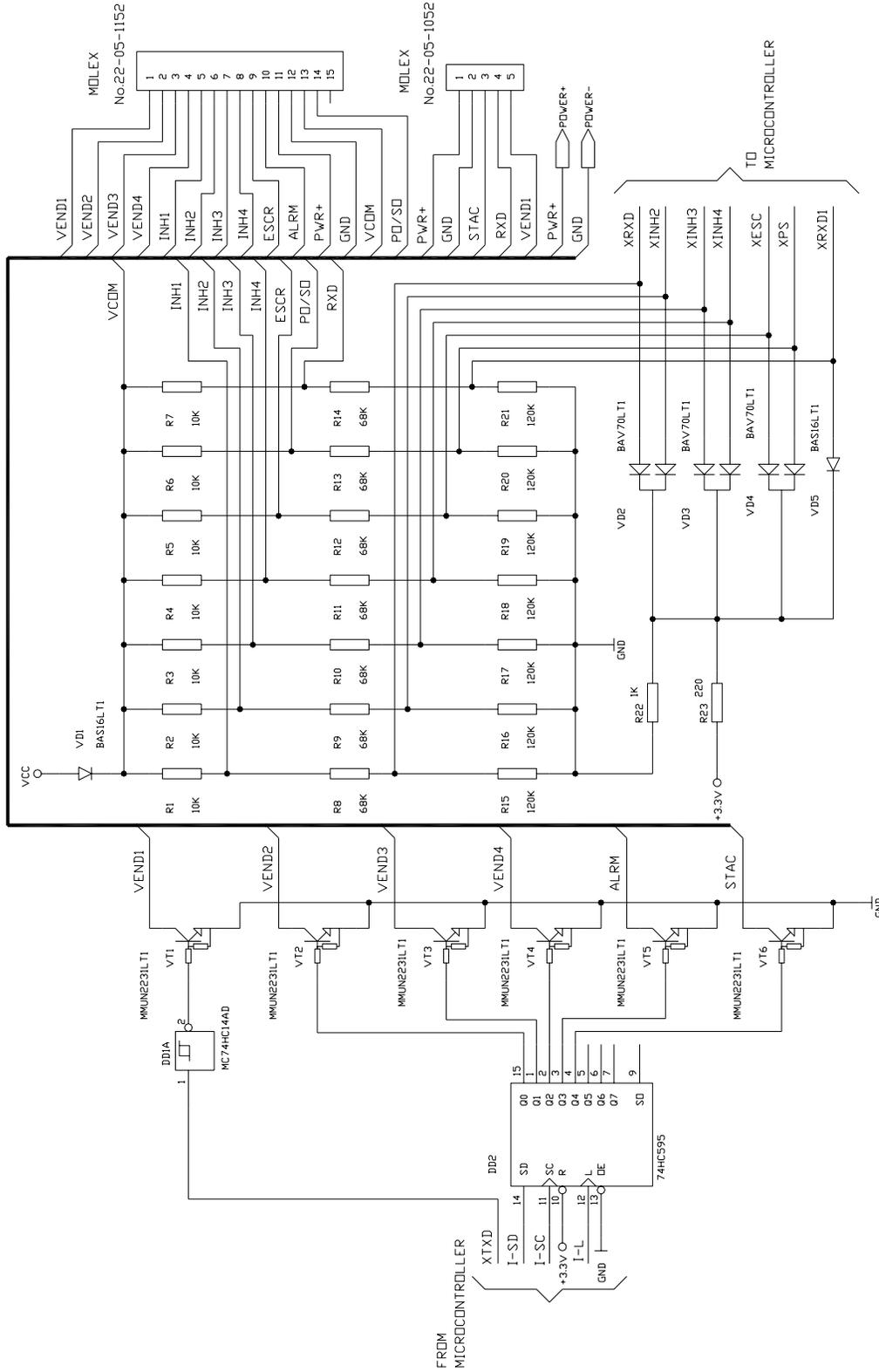
SWITCH SETTINGS

The switches are located at the CPU board.

The VU(MVU) bill Validator operates in two basic modes: Validation Mode and Service Mode.

**Validation Mode:** This is the mode for normal operation.

Service Mode: This is the mode for programming and testing.

A set of 8 DIP switches (SW1) defines the settings and programs the Bill Validator to recognize and validate different denominations or define other parameters.
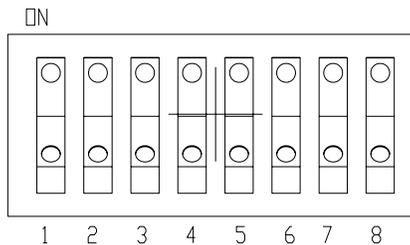
A set of 4 DIP switches (SW1) defines the settings of interface type.

For a complete explanation of switch description, please see the software User's Guide (enclosed to each bill validator and available at www.cashcode.com).
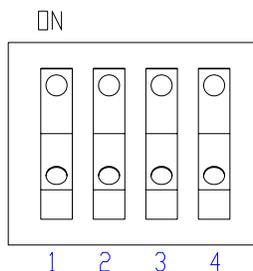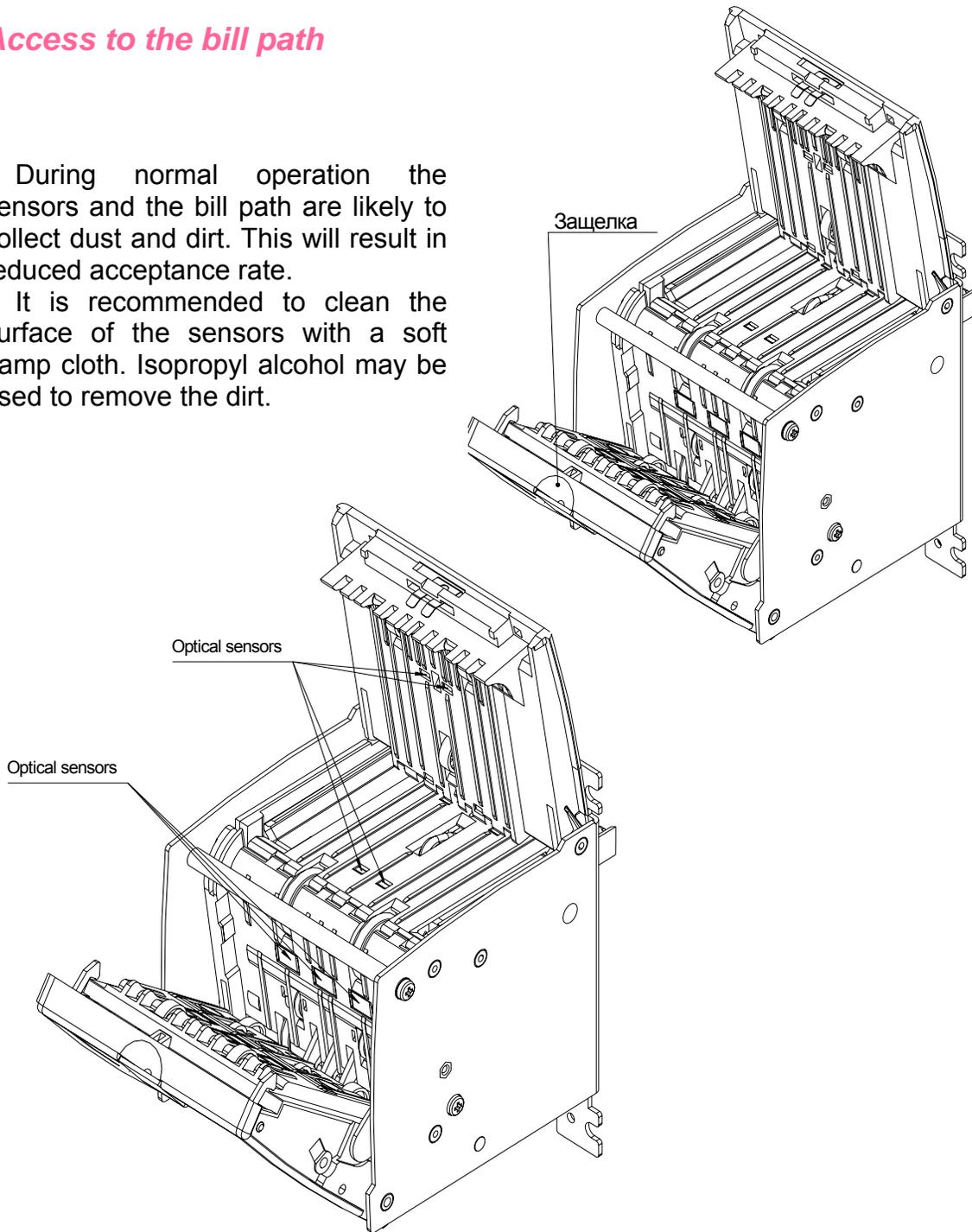
MAINTENANCE AND SERVICE

## *Access to the bill path*

During normal operation the sensors and the bill path are likely to collect dust and dirt. This will result in reduced acceptance rate.

It is recommended to clean the surface of the sensors with a soft damp cloth. Isopropyl alcohol may be used to remove the dirt.
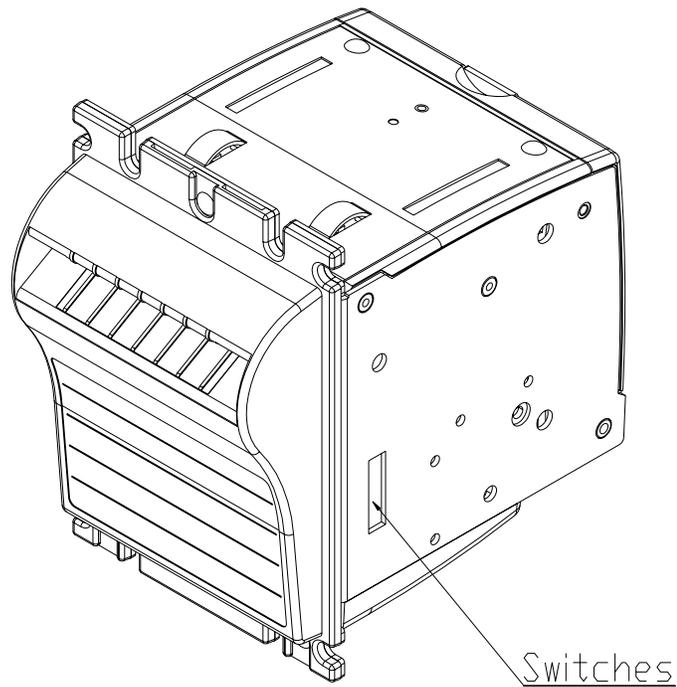
Защелка

Optical sensors

Optical sensors

Access to the switches and to the Memory stick

The location of Memory stick.

Карточка
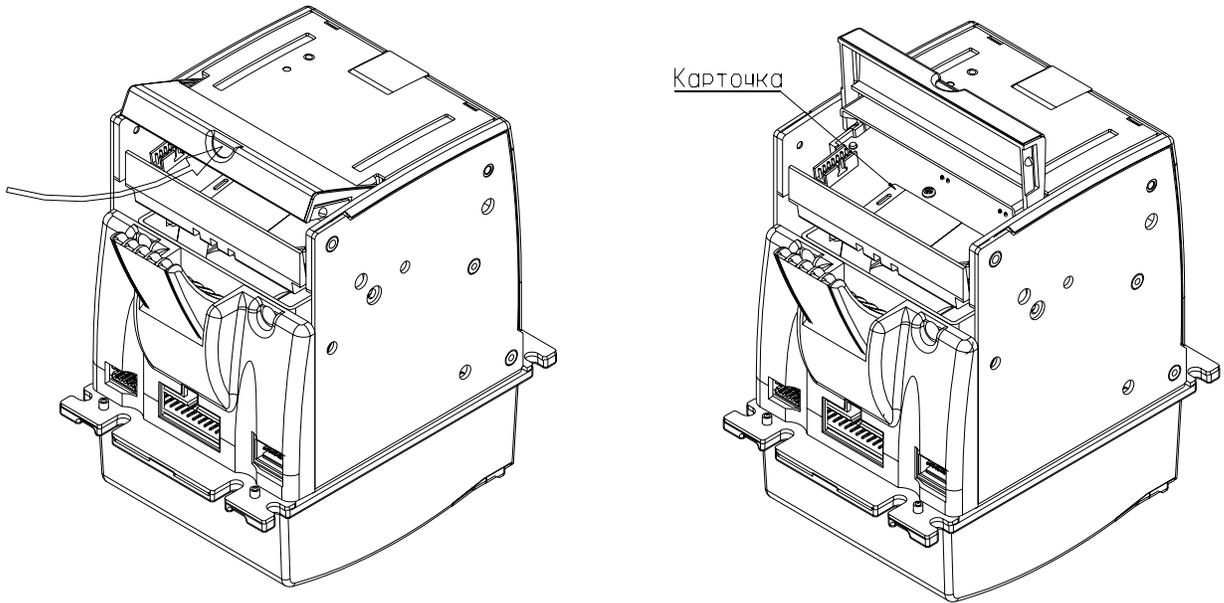
The location of switches.

Switches

SOFTWARE UPDATES

The VU(MVU) Bill Validator is shipped with pre-installed software, according to ordered specifications. Further updates are delivered through smart sticks or data files.

Download procedure for a single-download Smart Stick:

Step 1. Turn Power OFF.
Step 2. Open the cover.
Step 3. Remove the Dummy Card (or Memory stick) from the Memory stick slot.
Step 4. Insert the new CashCode Memory stick into the Memory stick slot of the CPU Board.
Step 5. Close cover.
Step 6. Turn Power ON and wait until the download process is completed. During the download, a red-green status light will blink. Once the download is completed, the diagnostic light will turn green. Should the light stay red; this means there is no communication between the VU(MVU) Bill Validator and the host controller. A single-download Memory stick must be present in the Bill Validator at all times.

Download procedure for the multi-download Smart Stick:

Please refer to the instructions concerning the single-download Memory stick. Follow steps 1, 2, 4, 5 and 6. After the successful completion of step 6, follow steps 1, 2, 3 and 5.

The Memory Card can be used to update more units, until the number of licenses is reached.

Download procedure via interface connector:

In order to properly complete an interface download, the Network Enabled Memory stick must be present in the slot at all times.

1. When the VU(MVU) Bill Validator has a CCNET protocol, the software download can be completed via the host controller (refer to CCNET Protocol Description).

2. For a direct download via the interface connector, please follow the instructions below:

Step 1. Turn power OFF.
Step 2. Disconnect the interface connector from the Bill Validator.
Step 3. Connect the CashCode Adaptor (For CPU Board 0401017 use adaptor OPT-PS2-VU-CCNET, for Processor Board adapter 0401018 - OPT-AD-MDB-PC) : between the computer and Validator.
Step 4. From the computer, run the latest software version of the VU(MVU)***.exe** program.
Step 5. Follow the instructions displayed on the computer screen.
Step 6. After completing step 5, disconnect the CashCode Adaptor:
Step 7. Connect the interface connector to the Bill Validator.
Step 8. Turn power ON.

SOFTWARE UPDATE DIAGNOSTICS

Normally, the download process will be accompanied by a blinking red-green status light for about 1 minute. If the download has competed successfully, the status light will turn green. Should the download be unsuccessful, the status light will emit short green flashes followed with a longer red flash ("green flashes on red").

The following table lists description of errors, based on status of indicator flashes.

STATUS OF DIAGNOSTIC LIGHT	ERROR DESCRIPTION	FAULT – HANDLING
1 GREEN FLASHES ON RED	External interface ERROR in CCNET Download mode	1. Verify that software is suitable for CCNET download. 2. Repeat procedure.
2 GREEN FLASHES ON RED	Memory stick CRC ERROR	1. Turn POWER OFF, remove and insert the Memory stick again, turn POWER ON. 2. Replace Memory stick with the new one.
3 GREEN FLASHES ON RED	Incorrect data in Memory stick	1. Verify that the software is suitable to the Bill Validator type. 2. Insert correct type of CashCode Memory stick.
4 GREEN FLASHES ON RED	Memory stick is not inserted	Properly insert the Memory stick.
5 GREEN FLASHES ON RED	Wrong type of Memory stick	Insert correct type of CashCode Memory stick.
6 GREEN FLASHES ON RED	Failure during download	1. Turn POWER OFF, remove and insert the Memory stick again, turn POWER ON. 2.
7 GREEN FLASHES ON RED	Operation ERROR of Memory stick Interface	1. Turn POWER OFF, remove and insert the Memory stick again, turn POWER ON. 2. Replace Memory stick with new one.

TROUBLESHOOTING

CashCode VU(MVU) Bill Validator is equipped with a self-diagnostic feature to aid in repair and maintenance. When the power to the Bill Validator is turned ON, the Bill Validator begins its self-diagnostic operation. If the self-diagnostic test is passed, the status light will turn green. If an error is detected, then the status light on the front of the Bill Validator will blink red. The number of times the red light flashes on the Bill Validator is an indication of a specific problem or malfunction. A detailed list of these errors and corrective action is provided below.

OPERATION MODE DIAGNOSTICS

Number of status light flashes	Error description	Fault - handling
2	Wrong type of sensors or no communication with sensors	Check reliability of electrical connection to processor board
5	Failure of dielectric sensors	Open the guides and clean dielectric sensors.
6	Failure of optical sensors	Open the guides and clean optical sensors.
7	Failure of inductive sensors	Open the guides and clean inductive sensors.
8	Failure of transport motor	1. Open the guides and clean the bill path. 2. Remove the cassette from the bill validator and open the cover. Check mechanical and electrical connections
11	Bill pathway is not empty	Open the guides and check the condition of the bill path

Technical support

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