Condor Premier / Premier GFI Technical Manual

Money Controls

Contents

Figures

Tables

1. Diary of Changes

Issue 1.0 ..... 3rd June 2005

- Based on Condor Premier Functional Specification Draft E.

2. Introduction

The Condor Premier range of electronic coin acceptors has been designed specifically for the international gaming machine industry, accepting up to 10 coins per second. Whilst conforming to the industry standard space envelope, Condor Premier brings advanced coin handling technology and sets a new standard in discrimination, reliability and servicing.

2.1 Theory of operation

When a coin enters the Condor Premier, the coins material – conductivity, and volume, affect the magnetic fields generated by the 2 inductive coils. Two magnetic fields are generated – one with the fields in-phase (Sensor 1), the second with the fields out-of-phase (Sensor 2). The coin / token has a different affect on each on both the amplitude and frequency.

Sensor 3 is a reflective sensor. An infra-red beam is emitted from the Condor Premier and a measurement of the beam reflected back is taken.

Sensor 4 is a diameter sensor consisting of three linear optical devices, A, B and C, whose beams travel horizontally across the coin path. As the coin / token breaks the beams in turn, the time taken is measured and the diameter can be calculated.

Sensor 5 is a Frequency Modulation sensor (FM Max). Sensor 1 and Sensor 2 measure the change in amplitude, Sensor 5 measures the change in frequency on Sensor 2 caused by the coin / token.

Sensor 6 Not used.

Sensor 7 is a combination sensor whose output is a linear equation based on three out of the first five sensors. The detail is determined during the coin specification and is fixed for a nominated currency

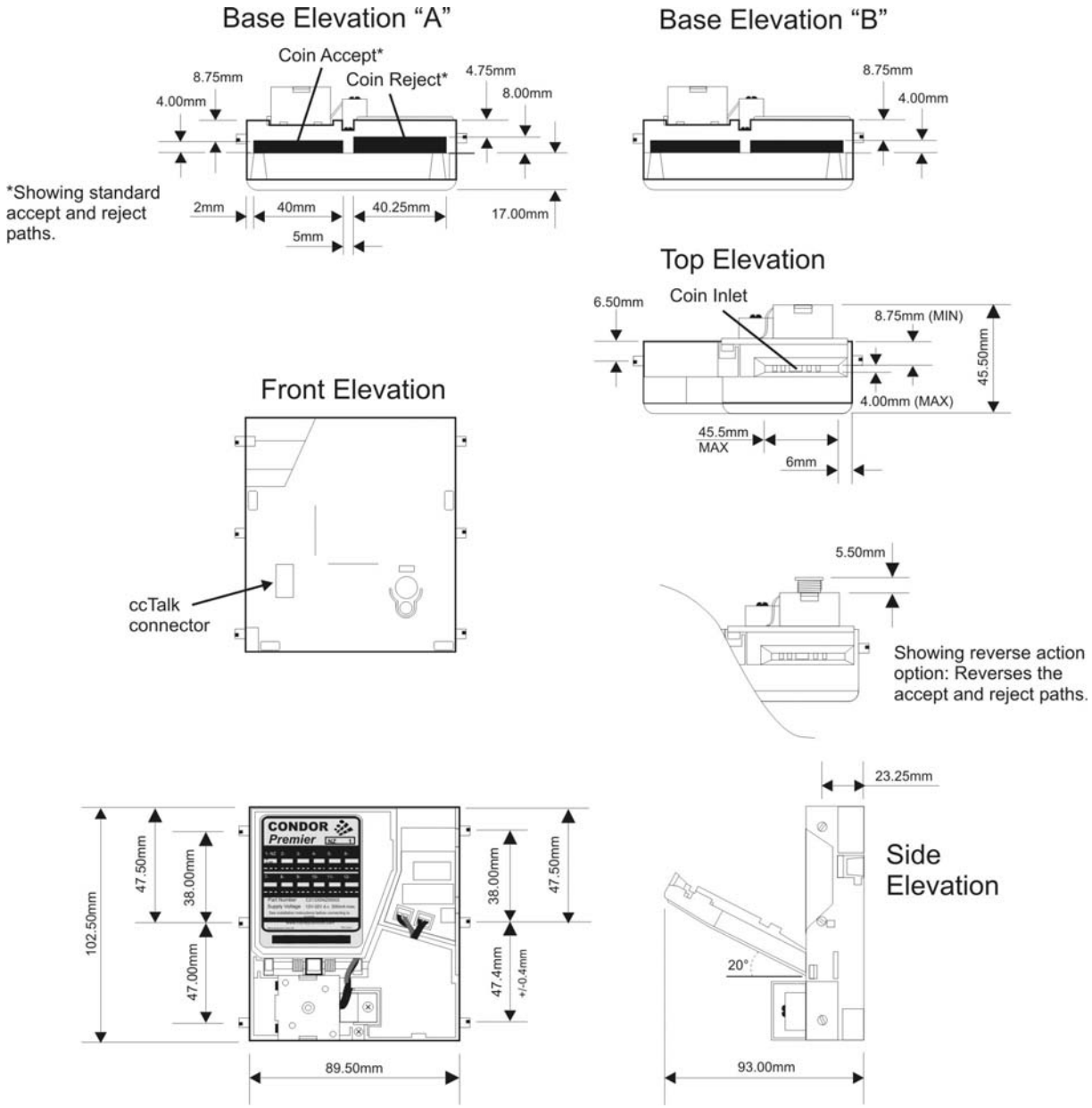
When a Condor Premier is pre-programmed by Money Controls values from true coin readings are stored in memory. When a coin is entered the readings generated are compared to those windows programmed into EPROM. If a match is **NOT** found on **ALL** the programmed sensors then the coin will be rejected.

If the readings from the coin entered fall within **ALL** those programmed in memory, then a VACS (see section 8.1) signal will be generated. Shortly afterwards the accept gate will be activated, the coin will pass the credit opto's and a credit pulse (see section 8.2) will be issued.

The accept gate will stay open for a short time after the coin passes the credit opto's. If another **true** coin, is closely following the 1st coin, then the accept gate will remain OPEN.
If the following coin is deemed **false,** then the accept gate will close immediately a window is not matched and the coin will be rejected.

3. Mechanical Configurations

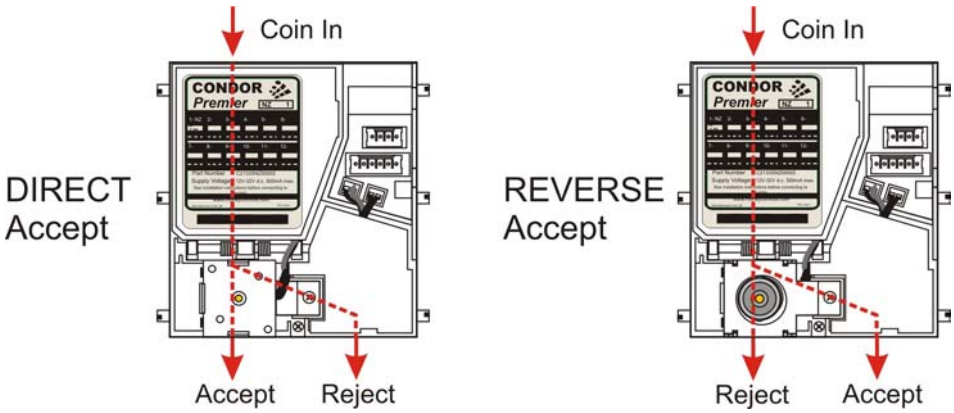
Figure 1: Condor Premier External Dimensions



Notes:- All Direct (EXCEPT US $1 TKN) builds use Divertor "A". (Anti-beering divertor).

All Reverse action builds use Divertor "B".

Figure 2: Direct and Reverse Accept Paths



4. Coin Dimensions

Accepted range of coin sizes are shown below:

Table 1: Coin Dimensions

Diameter	15mm to 44.5mm (0.59" to 1.75")
Thickness	1.5mm to 3.75mm (0.059" to 0.148").

Condor Premier is designed to accept coins within the diameter range 15mm to 44.5mm and thickness range 1.5mm to 3.75mm.

For coins larger than 38.5mm sections of the divertor assembly are removed.

For coins thicker than 2.85mm a selection of spacers are available. The spacers open the debris flap wider than standard. However, when a Condor Premier is built to accept larger coins / tokens, its performance in discriminating smaller coins may be reduced due to the increased space, allowing the coins to rattle or bounce through the acceptor.

Table 2 lists the available builds:

5. Build Variations

Table 2: Condor Premier Builds:

CONDOR PREMIER	Gate Size	Spacer	Deflector	Accept Path	Divider Plate Profile
AA	33mm	3mm	YES	DIRECT	“A”
AB	40mm	3mm	NO	DIRECT	“A”
AC	45mm	3mm	NO	DIRECT	“A”
AD	33mm	4mm	YES	DIRECT	“A”
AE	40mm	4mm	NO	DIRECT	“A”
AF	45mm	4mm	NO	DIRECT	“A”
AG	33mm	3mm	YES	REVERSE	“B”
AH	40mm	3mm	NO	REVERSE	“B”
AI	45mm	3mm	NO	REVERSE	“B”
AJ	33mm	4mm	YES	REVERSE	“B”
AK	40mm	4mm	NO	REVERSE	“B”
AL	45mm	4mm	NO	REVERSE	“B”
AM	25mm	3mm	YES	DIRECT	“A”
AN	25mm	4mm	YES	DIRECT	“A”
AP	25mm	3mm	YES	REVERSE	“B”
AX	45mm	3mm	NO	REVERSE	“B”
AY	45mm	3mm	NO	DIRECT	“A”
AQ	25mm	3.5mm	YES	DIRECT	“A”
AR	33mm	3.5mm	YES	DIRECT	“A”
AS	40mm	3.5mm	NO	DIRECT	“B”
AT	45mm	3.5mm	NO	DIRECT	“A”
AU	33mm	3.5mm	YES	REVERSE	“B”
AV	40mm	3.5mm	NO	REVERSE	“B”
AW	45mm	3.5mm	NO	REVERSE	“B”

6. Configuration Code Details

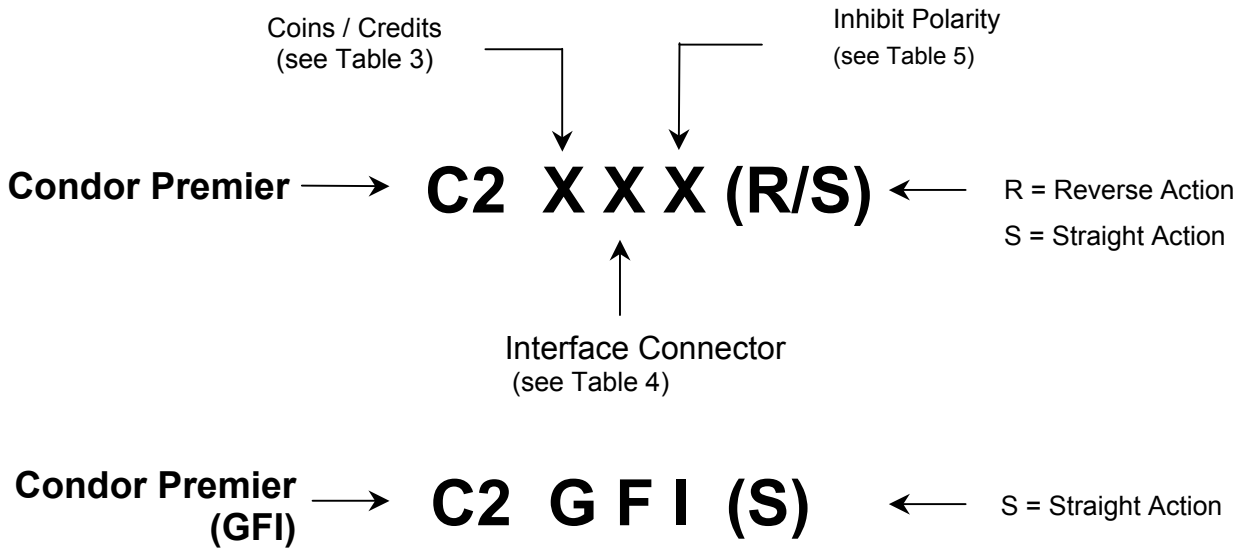


Table 3: Coins / Credits

Model				Description
C2	**1**	X	X	Single / multi* coin – single credit pulse.
C2	**3**	X	X	Multi coin - Fixed credit pulses.
C2	**4**	X	X	Multi coin - Customer specific credit pulses.

* Can be used for Old/New coinage or for multiple windows of the same coin to increase security, i.e. multiple small windows as opposed to 1 large window.

Table 4: Parallel Interface Connector

Model				Connector type	Part No.	Description
C2	X	**3**	X	AMP	640456-7	7 Way - pin 5 removed

Table 5: Inhibit Polarity

Model				Inhibit line status (High > 4V, Low < 1V)	Inhibit line not connected
C2	X	X	**0**	HIGH = COIN INHIBITED	COIN INHIBITED
C2	X	X	**1**	HIGH = COIN INHIBITED	COIN ACCEPTED
C2	X	X	**2**	LOW = COIN INHIBITED	COIN INHIBITED
C2	X	X	**3**	LOW = COIN INHIBITED	COIN ACCEPTED

7. Condor Premier Connectors

Figure 3: Connector Positions

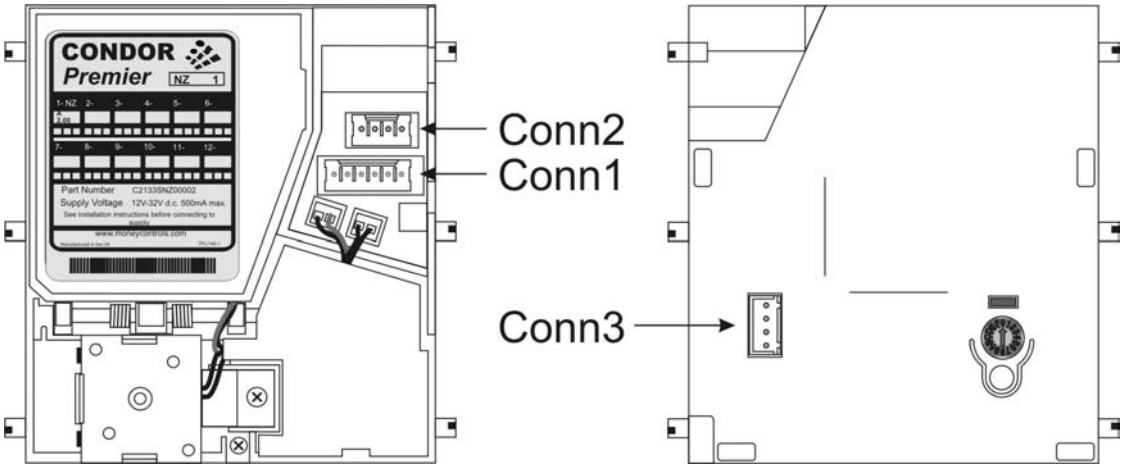


Table 6: Connector Descriptions

Condor Premier

Conn1	Parallel Interface	See Figure 4
Conn2	Divertor Driver	See Figure 8
Conn3	**ccTalk** Interface	See Figure 10

Condor Premier (GFI)

Conn1	Parallel Interface (6w JST)	See Figure 4
Conn2	Parallel Interface (4w JST)	See Figure 4
Conn3	**ccTalk** Interface	See Figure 10

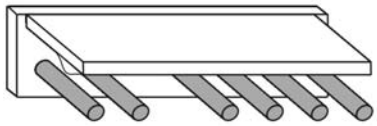
8. Parallel Interface

Figure 4: Parallel Interface - Connector 1 (GFI – and Connector 2)

Condor Premier

CONDOR PREMIER
C2x3x

Connector type:-
AMP Part No:- 640456-7



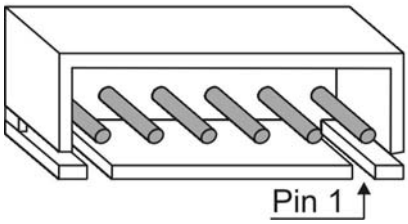
Pin 1	0V	
Pin 2	VACS o/c	17ms (35ms*)
Pin 3	Alarm o/c	12ms
Pin 4	Credit o/c	12ms
Pin 5	Key	
Pin 6	Vsupply	12 to 32V dc
Pin 7	Inhibit All	High/Low@

@ Depends on Model
* Reverse Action

Condor Premier (GFI)

CONN1

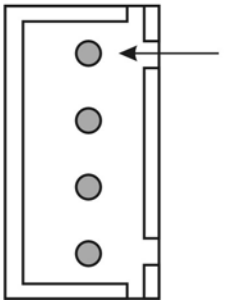
Connector Type:-
JST Part No:- B6B-XH-A



Pin 1	Inhibit All	High/Low@
Pin 2	VACS	17ms
Pin 3	+12V dc	
Pin 4	+24V dc	
Pin 5	+32V dc	
Pin 6	GND	

CONN2

Connector Type:- JST
Part No:- B4B-XH-A



Pin1	Credit o/c	
Pin 2	VACS o/c	Open collector
Pin 3	Alarm o/c	12ms
Pin 4	Error o/c	

8.1 VACS Signal

VACS is an acronym for **V**alid **A**dvanced **C**redit **S**ignal.

A VACS signal is generated when the readings from the entered coin fall within ALL programmed memory limits for a particular given coin.

The VACS signal is generated at the same time that the accept gate is opened.

On model C2x3x the VACS can be used to confirm the Credit signal is true. i.e. a VACS signal issued before a Credit signal = valid coin condition. Any other condition = invalid.

The length and polarity of the VACS signal is given in Table 7.

See Figure 4 for the pin-out of the parallel connector.

Table 7: VACS timers.

Model	Output Polarity	Standard	Reverse
C2x3x	Open Collector (low)	17ms	35ms

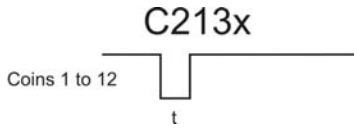
8.2 Credit Signals

Shortly after the accept gate has been activated, the coin passes the credit opto sensor and a credit pulse is issued.
The accept gate will stay open for a short time after the coin passes the credit opto's. If another **true** coin, is closely following the 1st coin, then the accept gate will remain OPEN.
If the following coin is deemed **false,** then the accept gate will close immediately and the coin will be rejected.
The Credit output consists of an open collector NPN transistor. On acceptance of a true coin the transistor is turned on for a period of *t* ms (+/- 10%) to less than 0.7 volts at a Max. 50mA. The host machine must look for valid credit pulse of NOT LESS THAN *t* – 50%. It is not sufficient to merely detect the edges of a credit pulse. This 'de-bounce' will prevent credits being registered by the host machine as a result of any noise or false credit pulses being induced on the output lines.

8.21 C213X & GFI CREDITS

t = 12ms, minimum time between output credits = 80ms.

Figure 5: C213x Credit Output Pulse

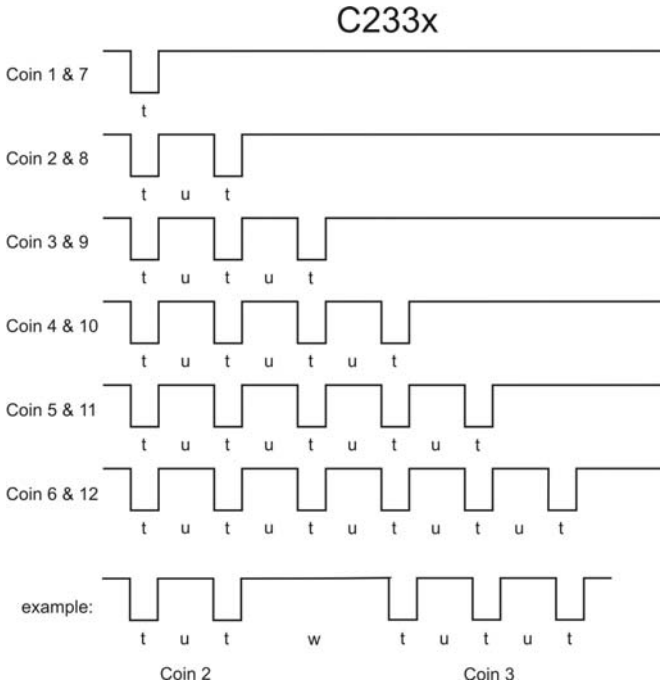


8.22 C233X CREDITS

t = 12ms, u = 20ms, w = 80ms (4 x 20ms).

Number of pulses are FIXED.

Figure 6: C233x Credit Output Pulses



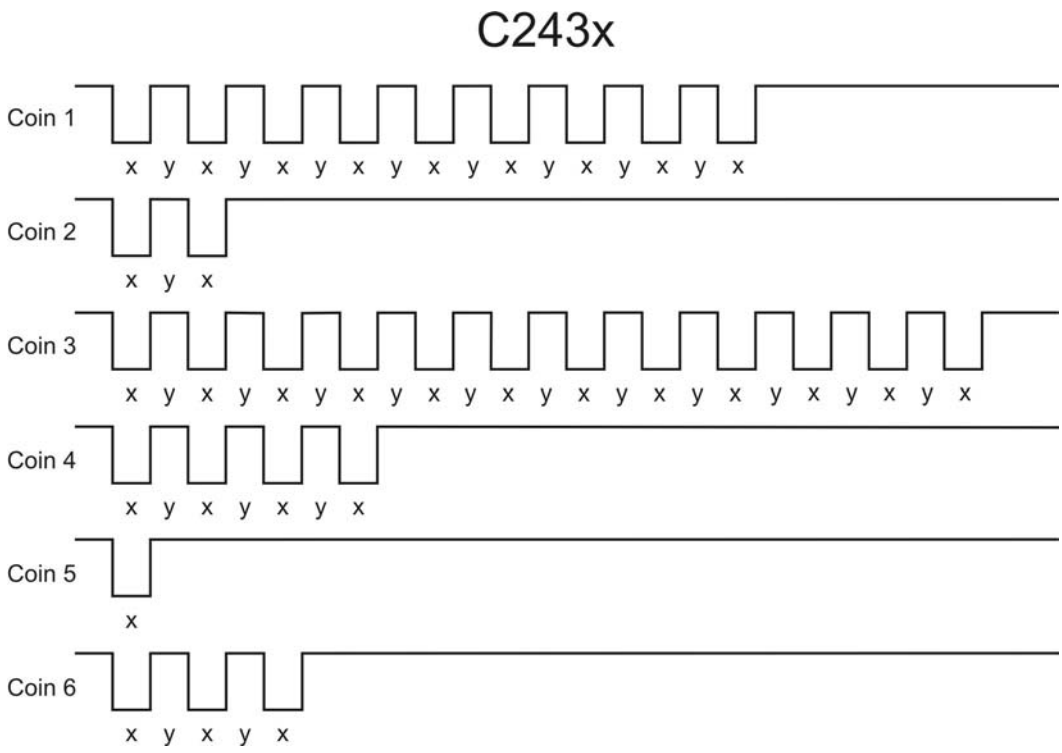
8.23 C243X CREDITS

x , y = CUSTOMER SELECTABLE.

Minimum time between output credits = 4 x gap timer (y) = 4 x 20ms = 80ms.

Number of pulses are CUSTOMER SELECTABLE.

Figure 7: C243x Credit Output Pulses



Credit pulse (x), selectable between 1ms and 250ms in 1ms steps.
Gap timer (y), selectable between 10ms and 60ms in 10ms steps.

Credits are stacked in a buffer. Care should be taken in specifying the number of pulses per coin, the length of credit pulse and the gap timer, especially in fast feed applications due to the time required to actually send the pulses to the host machine.

e.g. 10 pulses x 100ms (credit timer (x)) + 9 x 50ms (gap timer (y)) + 4 x 50ms (y) (minimum time between credits) = 1,650ms (1.65secs).

8.3 Inhibit All

Inhibits the acceptance of all the coins programmed.

4 options are available.

0	Inhibit High	Default Inhibit
1	Inhibit High	Default Accept
2	Inhibit Low	Default Inhibit
3	Inhibit Low	Default Accept

Inhibit High requires an active drive >4V
Inhibit Low requires an active drive <0.5V

The Default condition determines whether a coin accepts or rejects if the Inhibit All pin is not connected.

Note: In some applications, although the Inhibit is driven High/Low, it is not necessarily driven High/Low to enable the coins, i.e. it is left floating.
In this instance a model which is 'Default Accept' should be used.

8.4 Alarm (C2x3x only)

The alarm signal is activated if any one of the following three conditions occurs:

1 A coin or coins are seen to travel in the wrong direction
2 The credit opto's are obscured
3 An event occurs out of sequence.

Once the alarm condition has been activated, the following will occur:

1 The status LED changes from continuous green to continuous yellow.
2 All coins are inhibited
3 A single 12ms pulse is output on the Alarm o/p unless the credit opto's are blocked, in which case the output is active for the duration of the blockage. Once the blockage is removed, the Alarm output will be reset.

8.5 Error (GFI only)

The error signal is an open collector output switching to 0V which is activated if any one of the following two conditions occurs:

1 A coin or blockage is present in the reject sensor area i.e every time a coin is rejected or any object blocks the reject sensor beams.
2 When there is a coin or blockage in the credit sensor area and the gate is **not** being driven.

The Error output remains active for as long as the coin / blockage is present.

8.6 Diagnostics (power-up)

Diagnostics is a customer option which can be enabled or disabled according to customer requirements.

The diagnostics routines performed at power-up cover the following areas:-

- Inductive coils
- Reflective sensor
- Diameter opto's
- Credit opto

If no faults are found, the coin acceptor will be ready to accept coins within 60ms of power-up.

If a fault is found the following will occur:

1 The status LED will flash red
2 No coins will be accepted
3 On Models C2x3x the Alarm pin will activate as per normal alarm conditions

9. LED Status

Continuous GREEN

Normal operation (no faults). Coin / token will accept

The status LED must NOT turn RED during normal operation.
If Power-up Diagnostics eeprom setting is OFF, any faults present will not be indicated

Flashing RED

Critical fault detected at power-up. Coin / token NOT accepted

Regardless of the Power-up Diagnostics setting, the following fault is indicated:

- EEPROM checksum error.

When Power-up Diagnostics is set to ON the following additional faults are indicated:

- Fault on inductive coils.
- Fault on reflective sensor.
- Fault on diameter opto's.
- Fault on credit sensor.
- Fault on reject sensor.

Continuous YELLOW

When Condor Premier powers-up, the status LED turns yellow while the mech is calibrating the discrimination sensors. This is normally very fast, but if the mech is unable to calibrate the sensors then the LED will stay continuous YELLOW. Condor Premier will not accept any coins / tokens.

Alarm condition active

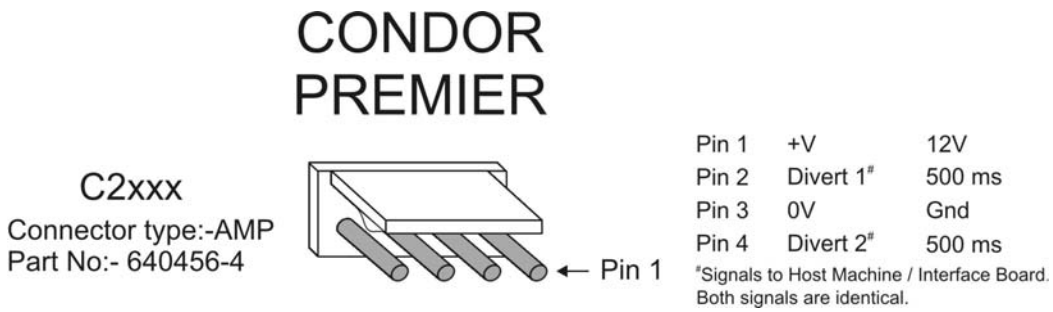
The following are not valid LED status indications:

- Continuous RED
- Flashing GREEN
- Flashing YELLOW

10. Divertor Driver

Condor Premier

Figure 8: Divertor Driver - Connector 2



10.1 Description

There is an option to drive an active 2-way divertor, which fits below the Condor Premier acceptor. The function of the active divertor is to direct coins down one of two paths according to the 'divert' details held within acceptor EEPROM for each programmed coin. It may, for example direct a single coin type to a hopper for payout purposes and direct all other coins/tokens to a cashbox.

The sorter module contains a PCB that interfaces with Condor Premier and the host machine.

10.2 Operation

Condor Premier send a logic signal to the divertor, generated co-incidentally with the VACS signals. The divertor signal is dependent on both the coin 'divert' information stored in EEPROM and the timing gap between inserted coins.

As the typical coin throughput on Condor Premier can exceed 10 coins per second, it is not possible to actively divert coins at this level of throughput.

The divertor drive signal operates according to the following:-

a) Where the timing gap between any two adjacent coins in a stream of coins is greater than 300ms, each coin is diverted according to its programmed 'divert' path. Adjacent coins can have identical or different 'divert' paths.

b) Where the timing gap between any two adjacent coins in a stream of coins is less than 300ms, the operation depends upon the coin's divert paths.

   i. Where the coin divert paths are the same, all will accept and divert according to their divert path.

   ii. Where the coin divert paths are different, the first will accept and be diverted according to its divert path. The second coin will reject. Coin acceptance is inhibited until the Condor Premier detects a timing gap between coins sufficient to resume normal operation. This is coin size dependent, but typically 0.5 seconds.

11. Coin Security – Window Adjustment

Condor Premier offers different levels of security depending on the customer's requirements (see Table 8 below).

All security options must be selected at the time of ordering.

Figure 9 shows the operation of the rotary switch. The operation of the switch will be dependant on the tuning options selected below.

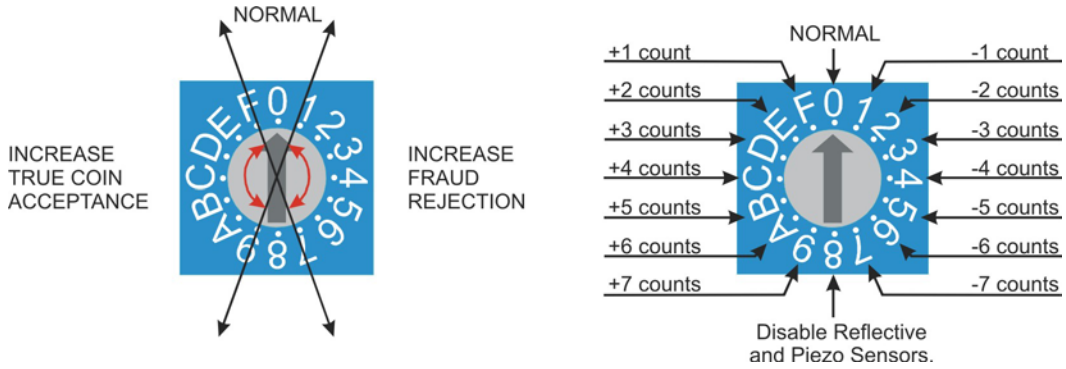
(The rotary switch has no functional effect in **C2xxxA** applications).

Table 8: Coin Security Options

Window Tuning [1]	Secure Tuning [2]	Individual Tuning [3]	Coin Security Level
OFF	OFF	OFF	No coin window modification is possible.
OFF	OFF	ON	Individual window tweaks possible. All windows can be widened or narrowed.
OFF	ON	OFF	No coin window modification is possible.
OFF	ON	ON	Individual window tweaks possible, but tweaks can only narrow programmed windows.
ON	OFF	OFF	*Standard tuning*[1] on all windows which can be widened or narrowed.
ON	OFF	ON	Both *Standard Tuning*[1] and individual window tweaks are possible on all windows which can be widened or narrowed. Their cumulative[4] effect on the window is used.
ON	ON	OFF	*Standard Tuning*[1] performed on ALL windows, but only to narrow programmed windows.
ON	ON	ON	Both *Standard Tuning*[1] and individual window tweaks are possible on all windows which can be narrowed only. Their cumulative[4] effect on the window is used.

11.1 Coin Security – Rotary Switch

Figure 9: Coin Security – Rotary Switch



Each count is added/subtracted to/from the upper and lower limits of the programmed windows, therefore, each count represents an **actual** increase/reduction of 2 counts.

[1] Window Tuning (*Standard Tuning*), when enabled, allows window tweaks during 'normal' operation of the Condor Premier.

[2] Secure Tuning, when enabled, only allows windows to be narrowed – NOT widened.

Note: Enabling Secure Tuning will IGNORE previously programmed window WIDENING values.

[3] Individual Tuning, when enabled, allows individual window tweaks to be programmed into eeprom.

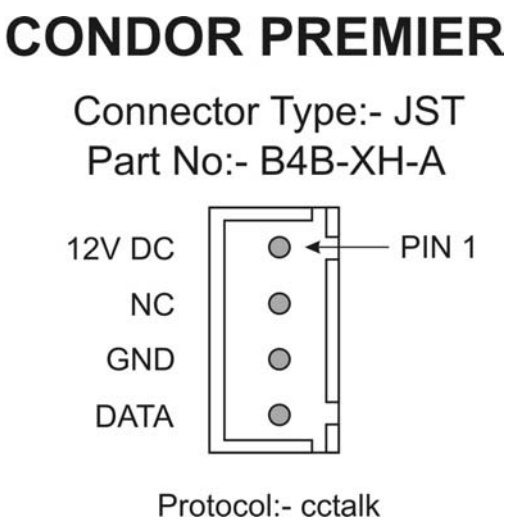
Note: Disabling Individual Tuning will IGNORE previously programmed Individual Tuning values.

[4] Cumulative effect. Any *Standard Tuning* tweaks are added to tweaks programmed in EPROM. e.g. Individual tweak = 2 (-2 counts), standard tuning tweak = D (+3 counts), total effect on the programmed window = +1 count top and bottom of each sensor window.

12. Serial Interface - ccTalk

Protocol: **ccTalk** compliant implementation.

*Figure 10: **ccTalk** Interface - Connector 3*



13. ccTalk Serial Messages

*Table 9: **ccTalk** Serial Commands*

Header	Function	Header	Function
255	Factory set-up and test	226	Request insertion counter
254	Simple poll	225	Request accept counter
253	Address poll	216	Request data storage availability
252	Address clash	213	Request option flags
251	Address change	212	Request coin position
250	Address random	210	Modify sorter paths
249	Request polling priority	209	Request sorter paths
248	Request status	202	Teach mode control
247	Request variable set	201	Request teach status
246	Request manufacturer id	197	Calculate ROM checksum
245	Request equipment category id	196	Request creation date
244	Request product code	195	Request last modification date
242	Request serial number	194	Request reject counter
241	Request software revision	193	Request fraud counter
240	Test solenoids	192	Request build code
238	Test output lines	185	Modify coin id
237	Read input lines	184	Request coin id
236	Read opto states	183	Upload window data
233	Latch output lines		
232	Perform self-test	4	Request comms revision
231	Modify inhibit status	3	Clear comms status variables
230	Request inhibit status	2	Request comms status variables
229	Read buffered credit or error codes	1	Reset device

13.1 ccTalk error codes.

Table 10: Error Codes

Code	Error	Code	Error
0	Null Event (no error)	14	Credit opto blocked
1	Reject coin	17	Coin going backwards
2	Inhibited coin	19	Coin too slow (over credit sensor)
3	Multiple window (ambiguous coin type)	24	Reject coin (repeated sequential trip)
5	Discrimination timeout	25	Reject slug
6	Accept sensor timeout	26	Reject opto's blocked
10	Credit sensor not ready	128	Inhibit coin (Type 1)
11	Divertor not ready	…	Inhibit coin (Type n)
12	Reject coin not cleared	139	Inhibit coin (Type 12)
13	Discrimination sensors not ready		

13.2 ccTalk fault codes.

Table 11: Fault Codes

Code	Fault	Code	Fault
0	OK (no fault detected)	4	Fault on piezo sensor
1	EEPROM checksum corrupted	5	Fault on reflective sensor
2	Fault on inductive coils	6	Fault on diameter sensor
3	Fault on credit sensor	18	Fault on reject sensor

13.3 ccTalk status codes.

Table 12: Status Codes

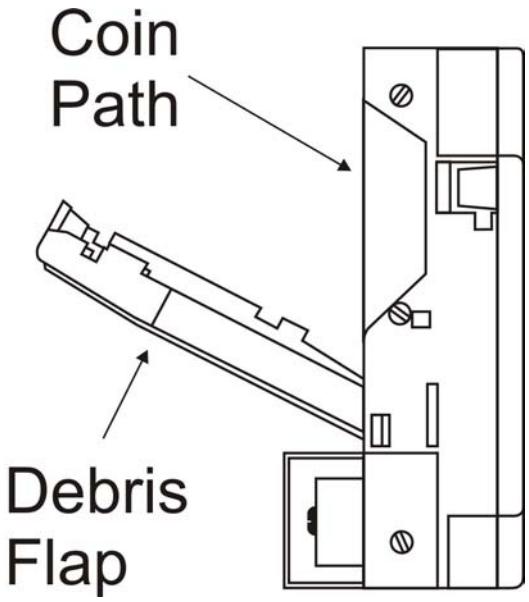
Code	Status
0	OK
1	Coin return mechanism activated (flight deck open)
2	C.O.S. mechanism activated (coin-on-string)

14. Service

The following service advice is given:

- The coin path area should be cleaned regularly, every 100,000 coins or 3 months, whichever is the sooner, to ensure accurate acceptance of coins and tokens.
- Only a damp cloth should be used.
- Under NO circumstances should any solvent or foam type cleaner be used.
- Access to the coin path is gained by opening the Debris Flap (see below).

Figure 11: Coin Path Access



15. Electrical Interface

Table 13: Power Requirements

Voltage:	12V – 24Vdc (GFI: 12 – 32Vdc)
Absolute:	Min 11V Max 32V
Min / Max rise time:	5ms / 500ms (From 0V to within supply range)
Min / Max fall time:	5ms / 500ms (From within supply range to 0V)
Acceptor Power up time:	60ms from the application of a valid voltage supply. A valid supply must be between the limits specified above.
Ripple voltage [< 120Hz]:	< 1 Volt
Ripple voltage [> 120Hz]:	< 100mV
Ripple voltage [> 1KHz]:	< 20mV

Table 14: Current Consumption

Typically:	50mA
Maximum:	500mA

Table 15: Environmental Ranges

Operating temperature range:	0°C to 60°C 10% to 75% RH non-condensing
Storage temperature range:	-25°C to 70°C 5% to 95% RH non-condensing
(Recovery time by the acceptor after a temperature step change is 20°C per hour. Maximum operating rate of change is 20°C per hour.)	

16. Product Compliance

16.1 EMC Emissions

The product complies with:

EN55022: 1995 – Radiated Emissions Class B.

EN55022: 1995 – Conducted Emissions Class A.

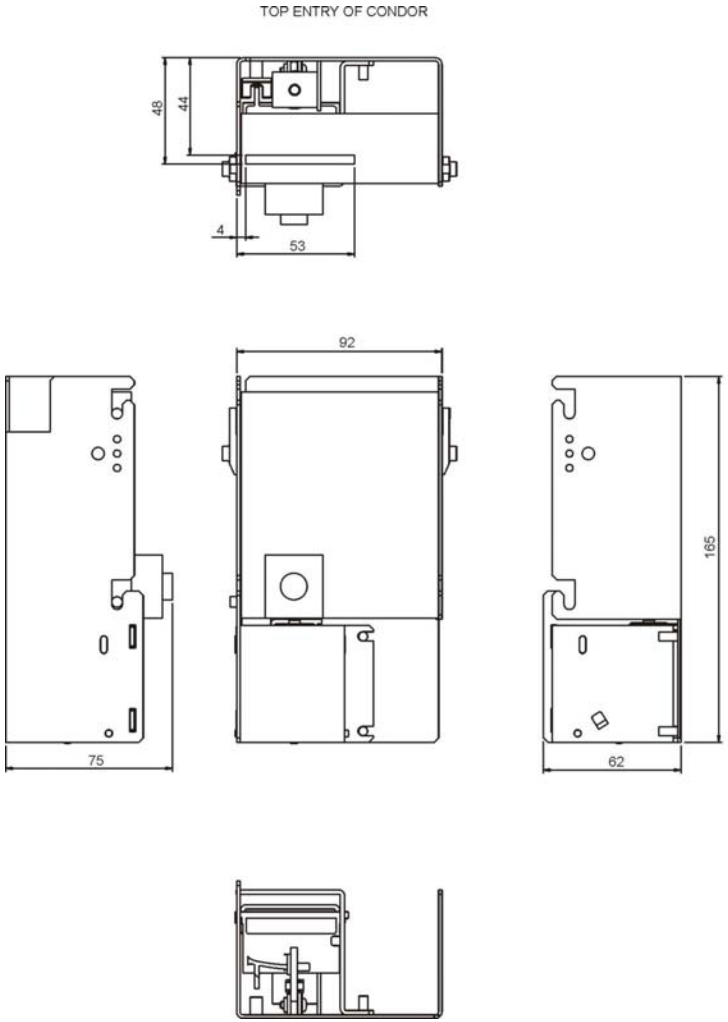
16.2 EMC Immunity

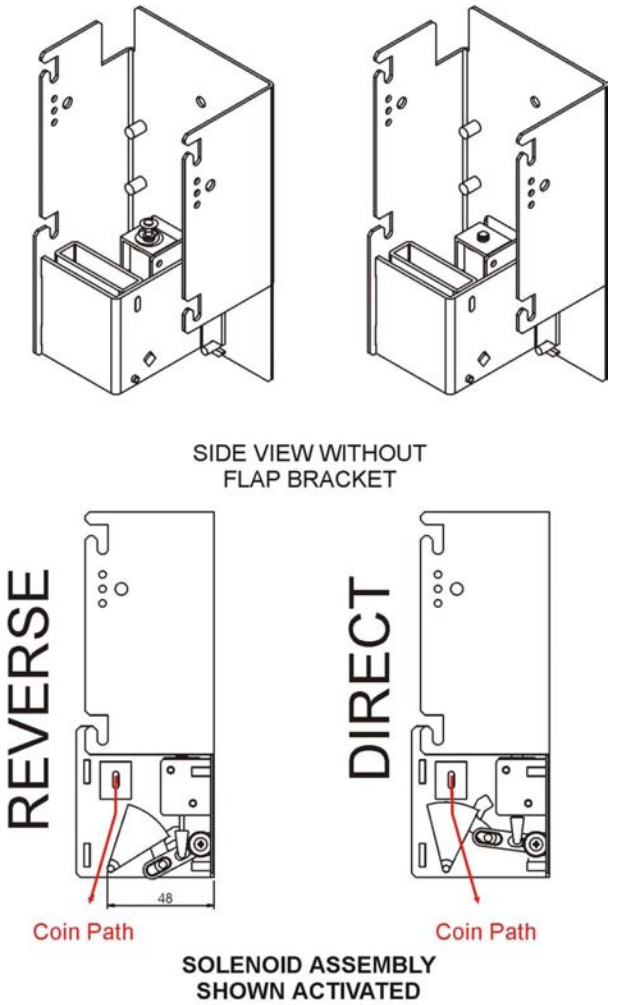
The product complies with:

EN50082-1: 1992 - Immunity.

17. Appendix 1 – Divertor

Figure 12: Divertor Dimensions

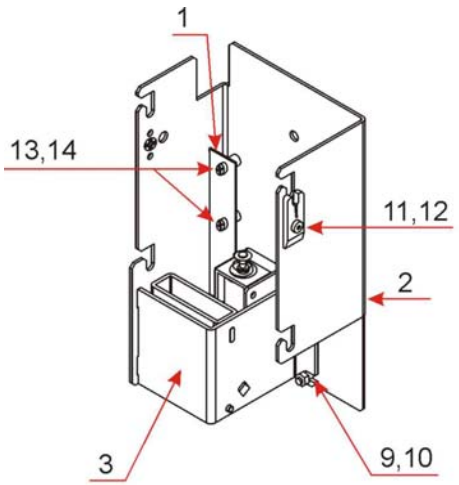


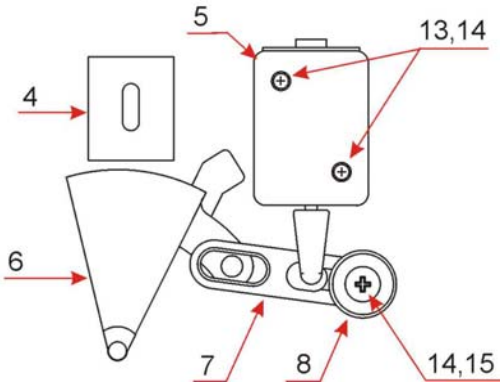


17.1 Divertor Spares

Table 16: Divertor Spares

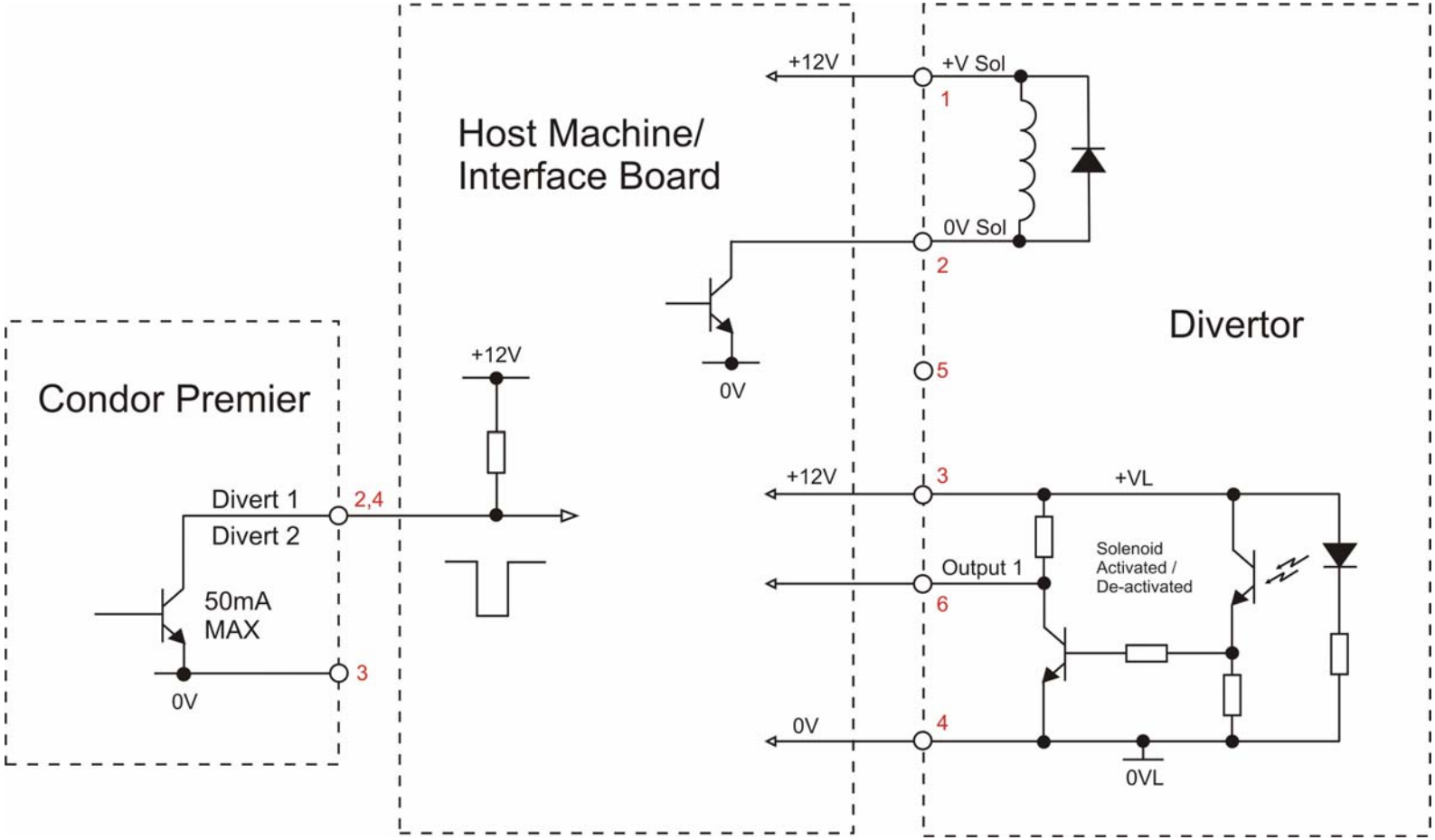
Item	Description	
1	PCB	SCNDORXX00060
2	Main Bracket	SCNDORXX00107
3	Divertor Flap Bracket	SCNDORXX00099
4	Coin Guide	SCNDORXX00092
5	Direct Solenoid (complete)	SCNDORXX00090
5	Reverse Solenoid (complete)	SCNDORXX00091
6	Divertor Flap	SCNDORXX00095
7	Pivot Link	SCNDORXX00093
8	Spacer Bush	SCNDORXX00096
9	M4 Full Nut	SCNDORXX00100
10	M4 Shakeproof Washer	SCNDORXX00101
11	Mounting Bracket Clip	SCNDORXX00097
12	Self Tapping c/sunk Screw	SCNDORXX00106
13	M3 x 5 Pozi Pan M/C Screw	SCNDORXX00102
14	M3 Internal Shakeproof Washer	SCNDORXX00103
15	M3 x 10 Pozi Pan M/C Screw	SCNDORXX00104





17.2 Divertor Application Example

Figure 13: Divertor Interface Example



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