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**Technical Documentation**

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## **Description**

# **Electronic Coin Validator G-13.6000**

08/99 JBe/vBi/ds  
Edition 3.0  
AB.136-GB

## The coin validator system G-13.6000

### The advantages at a glance:

- 2 devices in one, due to the 2x12 configuration
- great functional variety
- measuring system with reliable rejection of false coins
- high protection against manipulation
- a wake-up mode enables operation with a battery or an accumulator

**Preface** This description gives you a survey of the most important features of the proven coin validator system G-13.6000 including its variants. The appendix contains the technical data, electric circuit diagrams and views of the devices.

If you have any questions please do not hesitate to contact us. Our sales staff will provide any information.

National Rejectors, Inc. GmbH

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# 1 General information

## Interesting facts about the coin validator system G-13.6000

The validator G-13.6000 is a worldwide established product for the machine industry in standardized 3 1/2" format. Due to its modular design and the compact construction the validator is the optimum solution for the amusement and services industry.

Due to the CMOS processor and an electronic system that is done completely in SMD technique a **greater functional variety**, an **improved measuring system** and a **greater protection** against manipulation are possible. Apart from that the system now provides **2x12 coin channels**.

Starting with number /1 (marking within the model number) the G-13.6000 offers the possibility to choose from two configurations (blocks) with 12 coin channels each. These blocks may be programmed in a different way and thus can obtain different coin combinations. This feature is particularly suitable for flexible switching over from one currency to the other.

Due to the short switching-on time operation in a so-called wake-up mode is possible. A sensor located in front of the coin slot switches the coin validating system on. The feature is of great advantage for devices that are operated with a battery or an accumulator.

The **teach mode** offers more flexibility to the operator when selecting coins and token. Without any additional help only by using the teach mode you can programme quickly coins or token on site.

Like all electronic coin validator systems from NRI the devices of the series G-13.6000/G-13.7000 can be adjusted by means of a **programming station**. For this you need an IBM compatible PC and the adjustment programme KUNEMP. (*For more information refer to NRI.*)



**Before changing the device take care that the supply voltage is switched off.**

## Variants

The series G-13.6xxx combines all **variants without a front plate**, whereas the series G-13.7xxx combines all **variants with a front plate**.

We distinguish between two product series with three resp. four variants

- |  |                     |
|--|---------------------|
| 1. <b>Standard coin validator</b><br>6 parallel output lines   | G-13.6000/G-13.7000 |
| 2. <b>Casino variant</b><br>– fast coin acceptance<br>– V2A enforcement  | G-13.6100           |
| 3. <b>Timer variant</b><br>– adjustable length of the<br>output pulse  | G-13.6200/G-13.7200 |
| 4. <b>2 - price totalizer</b><br>– handling of the remaining credit<br>– sales counter                         | G-13.6300/G-13.7300 |
| 5. <b>TV totalizer</b><br>– for video games/pin ball machines<br>– serial pulse output<br>– discounts possible | G-13.6400/G-13.7400 |

## 2 Characteristic features of the system

### Measuring system

The features of the inserted coins are recognized by six measuring probes that are installed in successive order. Among others the measuring parameters are the diameter, the thickness, the alloy and for certain coins also the embossing features.

The obtained measurement values are compared with the acceptance bands stored within the 12 channels. If they correspond completely with a channel the validator values the inserted coin corresponding to the programmed denomination or output information respectively, unless the channel is inhibited by the appropriate DIL switch or the appropriate input line.

After successful measurement a light barrier in the area of the acceptance gate checks whether the inserted coins fall unhindered into the cash channel. Within validators containing a sorting the 'accepted coin sensor' is completed by a 'sorting control'. Only after passing this additional sensor is the appropriate coin signal given. Thus the whole acceptance area including the falling direction is supervised, thus preventing manipulations.

### Adjustment of the channels

12 channels are provided in the coin validators to programme all required types of coins. Apart from the **normal** bandwidth for many types of coins a **narrow** bandwidth can be adjusted. For types of coins that are likely to be forged a **super narrow** channel can be adjusted to provide the greatest possible protection against misuse. Several channels can have the same coin value. The corresponding settings are given on the label (*upper row: channels 1–6, lower row: channels 7–12*).

## Single blocking

Two blocks with six DIL switches each are installed on the back side of the coin validator. They can be used to block individual coin channels. To do this the corresponding switch must be set to the **upper position**. *(If more than one channel is assigned to one type of coin, e.g. for old and new coins or for different bandwidths all the switches must be set to the upper position.)*

Six output lines are assigned to the 12 coin channels *(not valid for totalizers)*. If an inserted coin is recognized the corresponding channel receives a signal. If one type of coin is blocked externally the corresponding output line is set to ground potential. Line 6 can be used to block the **whole acceptance** *(all types of coins)*.

## Sorting outlets

A JST plug is installed on the pc-board. Hoppers or sorting gates can be controlled by means of this plug. Signals can also be received since these are **bidirectional lines**. If e.g. a hopper sends a "Full" signal the coins are directed into the cash-box.

The validators can also be adjusted by NRI in that way that the **return line** sends a sorting signal onto the 10-pole connecting cable.

## String recognition

As a protection against manipulation with strings the coin validators are equipped with a **directional accept sensor**. That means that a coin signal is only given when a coin passes the light barrier coming from the coin insert. To pull coins back out of the device is also made more difficult by additional design measures.

For devices **without a front plate** the accept sensor is located on the **left side** whereas it is located on the **right side** for devices **with a front plate**.

Apart from that standard coin validators of the series G-13.6000 can be equipped with a spring for additional support of this safety device.

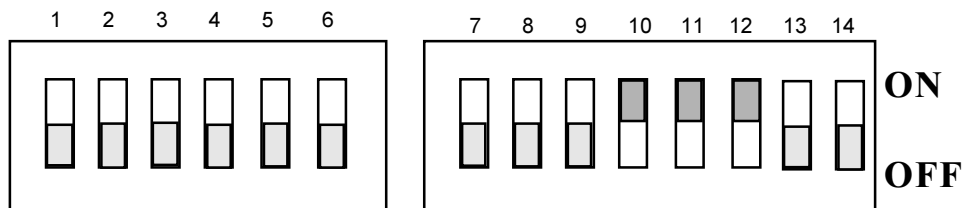
## Teach Mode

By using the teach mode you can programme coins or token in channel 10 and 11. In all versions of the G-13. validator the teach mode is programmable. However, a combination of the 2-price-totalizer with sales counter and the teach mode does not make sense as the tasks of the switch for single coin inhibit for the 12th channel would overlap each other.

Using the teach mode:

The validator remains connected in the vending machine.

- On the rear of the validator two Dual-In-Line switches are positioned. Switch no. 12 ON.
- Depending on the intention to teach channel 10 or 11, please switch ON the appropriate switch.
- Insert coins or token.  
After insertion of the 10th coin (token) the validator gives an acoustic signal (click of the acceptance gate). The measured values are now registered.
- Turn switch no. 12 OFF.
- Also turn appropriate switch for channel 10 or 11 OFF.  
Once again the acceptance gate gives an acoustic signal (1 time), i.e. the programming has been finished successfully.





In case the acceptance rate for a coin or token programmed by teach mode is not sufficient, you can programme the coin or token with wider acceptance bandwidths. Therefore please do the following:

- DIL-switch no. 12 ON. Teach mode is now active.
- Turn switch for desired channel 10 or 11 ON.
- Insert new coin or token at least 10 times.  
The acceptance gate gives an acoustic signal (1 time). Coin values are registered.
- Turn channel no. 10 and 11 ON.  
Wide acceptance bandwidths are now calculated.
- Turn switch no. 12 OFF.
- Turn switch 10 and 11 OFF.  
Coin or token is now programmed. The teach mode has now be finished and the channel 10 and 11 are enabled.

In case the acceptance gates gives an acoustic signal twice, the following reasons could be possible:

- coin could not be programmed. It exist an overlapping of the acceptance limits with already programmed coins/token.
- an error has happend during measurement.
- the programming has been interrupted.
- the acceptance limits could not be assigned to a channel as switch no. 10 or 11 was turned ON first instead of switch no. 12.

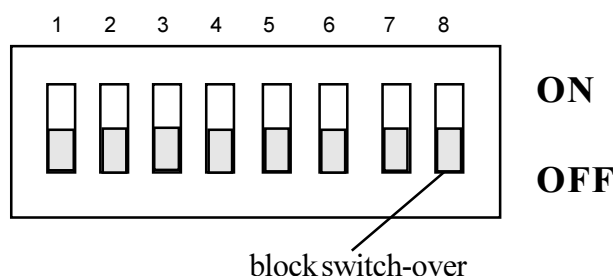
If a coin or token could not be programmed the existing values remain stored in any case.

## Block switch-over

Starting with model no. G-13/1 the validator offers the possibility to have two configurations, independent from each other. To each of these 'blocks' 12 individual coin channels are assigned with appropriate tables (signals, denominations, sorting information). The programming is done either at NRI or at a service station. Although both blocks are programmed you can only work with one of them. This type of validator can be recognized by the label with the extended indications.

This function is ideal for storing additionally to the actual currency a second coin combination with individual interface information (table). For example in case of a currency conversion the actual settings are deactivated and the new ones are activated. A further application can be if independent from currency an alternative vending machine interface is selected.

For standard devices the switch-over is done by only **one** DILswitch!



On the rear of the G-13 two switch arrangements are positioned. For switching over from block 0 to block 1 please use switch no. 8 of the lower switch arrangement. Please proceed as follows:

- Switch off power supply.
- Switch on switch no. 8
  - lower position = block 0 active only (left side on label)
  - upper position = block 1 active only (right side on label)
- Switch on power supply.
- Check coin acceptance (please refer to label).

## 3 Description of the variants

### Standard coin validator

Each inserted coin is checked for its type and genuiness and assigned to the corresponding channel. As soon as the coin has passed the light barrier a pulse signal (*100 ms*) is given onto the corresponding output line and the output is set to ground potential via an open-collector-transistor. If the light barrier is already blocked when the coin is inserted the coin is rejected.

Since the channel can be assigned to different outlets by NRI it is possible to transmit coin signals in a binary code or assign more than one line to a type of coin.

### Casino variant

The Casino variant has two special features:

1. **Fast coin acceptance**

The coin insert speed can be up to **6 coins/second** without any malfunctions occurring or transmitting of wrong signals.

2. **V2A enforcement**

This enforcement in the slot area reduces the wear and tear that appears in slot machines because of the usually frequent coin flow.

To provide additional protection an **accept sensor signal** can be transmitted on the coin return line (*line 5*) as an option. The coin signal and the accept sensor signal are given independently of each other. Since the acceptance gate is triggered at the same time the next coin can be tested without causing problems (*a continuous signal at the acceptance gate will not cause a problem*).

## Totalizers

A totalizer is a coin validator with a **credit function**. These units have no channel allocation. Instead the value of the inserted coins is determined and added up until an adjustable comparison value (*price*) is reached. As soon as the pre-set value has been reached the totalizer triggers a function. There is a total of **two output lines** that can be adjusted independently of each other. In the **Timer variant** these are functional lines, whereas they are price lines in the **2-price totalizer**.

Additionally all totalizers are equipped with two DIL switch arrangements with eight switches each. They serve to **adjust the sales price** (*not valid for Timer variant/TV totalizer*). The adjustment is done in a binary code. The value of each switch is indicated below the switch. By selecting a combination of these eight switches any value between 1 and 255 can be adjusted. The step number serves as a multiplier for the lowest coin value when calculating the price. The acceptance limit is 230.

If one of the two prices is set to 0 the corresponding functional line is always activated and cannot be erased. This is the so-called **free sales mode**.

**Tokens** can be used to activate the functional line directly and simultaneously increase the credit by the adjusted value of the price switch.

## Multiple sales

In case of inserting too much money there are three possibilities concerning the **remaining credit** which can be adjusted by the NRI:

- **Variant A:**
  - 2-price variant
    - The remaining credit is erased after a sale.
    - Multiple sales are not possible.
    - Both prices can be used.
    - Acceptance is blocked as soon as the higher price has been reached.

- **Variant B:**

Multiple sales - type 1

- The remaining credit remains valid after the first price has been erased.
- Multiple sales are possible.
- Only the first price can be used.
- The second switch is set to the free sales mode.

- **Variant C:**

Multiple sales - type 2

- The remaining credit is erased after 2 minutes. When inserting a further coin in this period the erasing procedure is cancelled.
- Only the first price can be used.
- The second switch is set to the free sales mode.

### Timer variant

The timer function means that the credit is erased or a **functional line is deactivated after a pre-set time.**

The **time unit** is normally set to 60 sec., but it can be adjusted by NRI to any value between 1 and 255.

The **time unit** is determined by the value of the inserted coin. Use the upper switch arrangement to define how much a time period costs (see fig. 2).

e. g.:      lowest coin = 0.10 DM / adjusted multiplier = 10 (2 + 8)

∅      price/min. = 1.00 DM

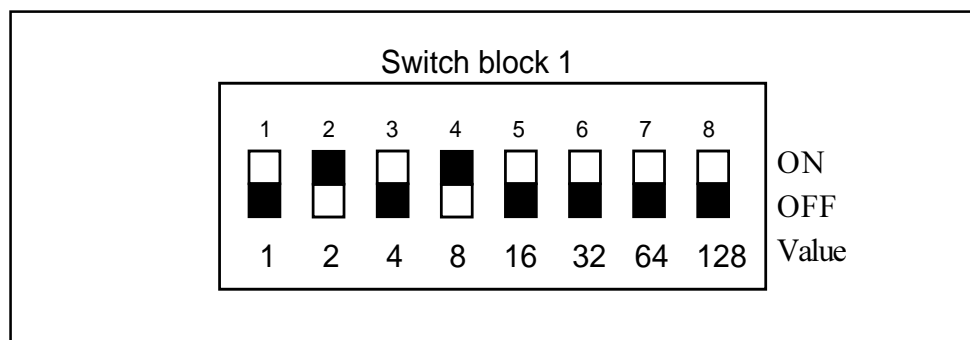


Fig. 2: Setting the price for one time unit

With each inserted coin the credit is increased by the corresponding value. The current credit can be **displayed**.

The lower switch arrangement is used to define the amount of credit at which the time unit starts (see fig. 3).

e.g.: lowest coin = 0.10 DM / adjusted multiplier = 20 (4 + 16)

∅ amount of credit for the start = 2.00 DM

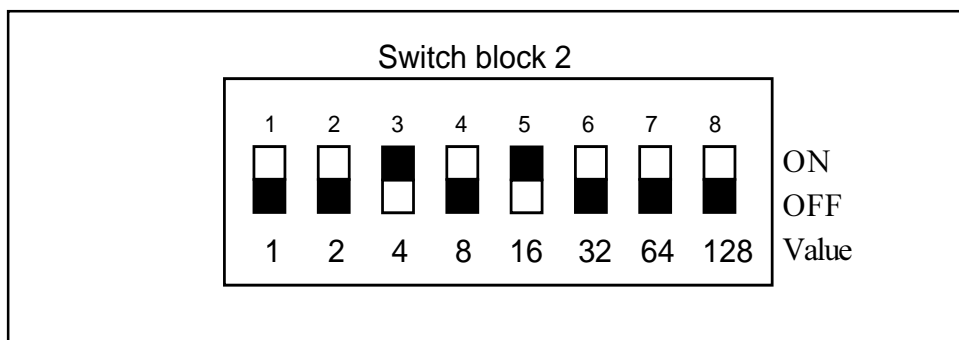


Fig. 3: Adjusting the amount of credit for the start

As soon as the credit adjusted with switch block 2 has been exceeded, the display will stop showing the credit but will instead show the time unit. A flashing point indicates the running time. Simultaneously the **functional line 1** is triggered. It remains activated during the whole time.

If the line for total blocking has not been activated it is still possible to insert further coins. The time on the display is increased correspondingly.

**Functional line 2** is additionally activated when the last time unit is running. This signal can be used for a warning sound. When the time has run out this is indicated in the display. The functional lines 1 and 2 are deactivated.

From the machine the time counting can always be interrupted (*high signal*) or started (*low signal*) via **line 8** (*reset line*).

The **remaining credit** is displayed when pressing the return button.

### Application of tokens

When inserting a token that is allocated to **switch block 1** the credit is increased by the price of one time unit.

When inserting a token that is allocated to **switch block 2** the credit is increased by the value adjusted at switch block 2. The number of time units is increased correspondingly.

### 2-price totalizer

This totalizer variant is also equipped with two switch arrangements for adjusting the sales prices. The upper switch arrangement serves to adjust the first price, the second price is adjusted at the lower switch arrangement.

e.g.: lowest coin = 0.10 DM / adjusted value = 6 (2 + 4)

∅ price = 0.60 DM

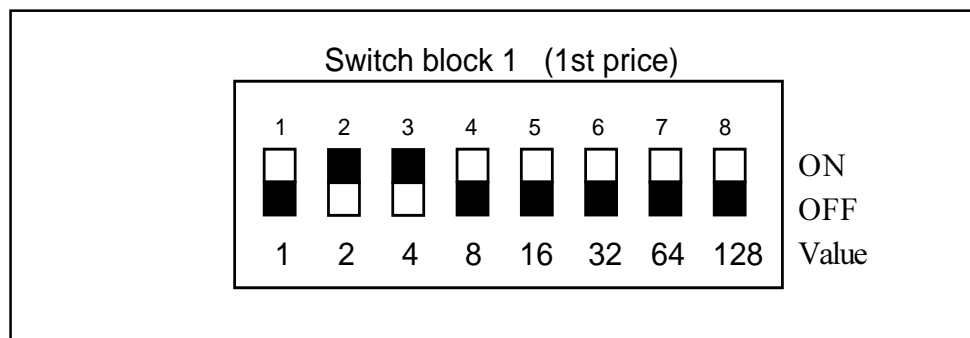


Fig. 4: Adjusting the 1st price

e.g.: lowest coin = 0.10 DM / adjusted value = 8

∅ price = 0.80 DM

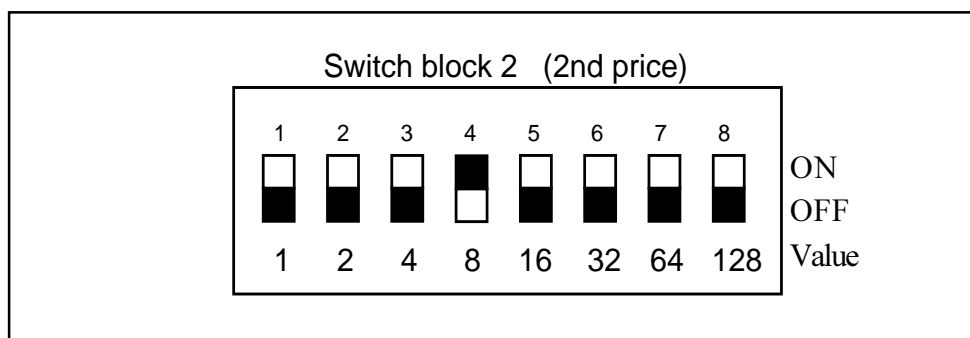


Fig. 5: Adjusting the 2nd price

The values of the inserted coins are added up until the adjusted price has been reached or is exceeded. The corresponding **output line** is activated. When the higher price has been reached both output lines are activated.

When a sales procedure has been completed the **blocking resp. reset line** must be activated for 50msec. to reset the credit and to deactivate the output lines. In the standard adjustment the blocking line is also used for reset. NRI can change it over to the reset line.

The credit can be shown by means of a **display**.

### **Sales counter**

On request the totalizers can be equipped with a sales counter. With this new function the coin acceptance can be blocked after a pre-set amount of sales. The **blocking** can only be released by inserting a **reset-token**. By inserting this token the sales counter is re-programmed. It is programmed with the number of sales that are adjusted at the second price switch. This token is programmed in channel 12 and can only be used by authorized personnel. When the blocking is released the pre-set number of sales can be carried out again.

### **TV totalizer**

This variant is a totalizer with a **serial pulse output**. The value of the coins is added up until the pre-set price has been reached. For two types of coins a **discount** can be allowed, this is done by higher pulse numbers.

For the TV totalizer a credit does not have to be reset.

The two switch arrangements serve to adjust the **pulse numbers** resp. the **price**. The first six switches of the upper switch arrangement serve to adjust the price (*e.g. for a game*). Here the multiplier (*max. 63*) is adjusted for the lowest coin value that is required for reaching the game price and for transmitting a pulse. When the price has been reached output line 1 is activated. The credit can be shown by means of a **display**. The last two switches are used to change the pulse frequency:



| Switch 7 | Switch 8 | Pulse frequency ( <i>pulse-pause relation</i> ) |
|----------|----------|---|
| down     | down     | 20 msec. pulse /80 msec. pause                  |
| up       | down     | 50 msec. pulse /200 msec. pause                 |
| down     | up       | 100 msec. pulse /400 msec. pause                |
| up       | up       | 200 msec. pulse /800 msec. pause                |

e.g.: lowest coin = 0.10 DM / adjusted value = 10 (2 + 8)  
 ∅ price = 1.00 DM  
 pulse-pause relation = 20 msec. pulse / 80 msec. pause

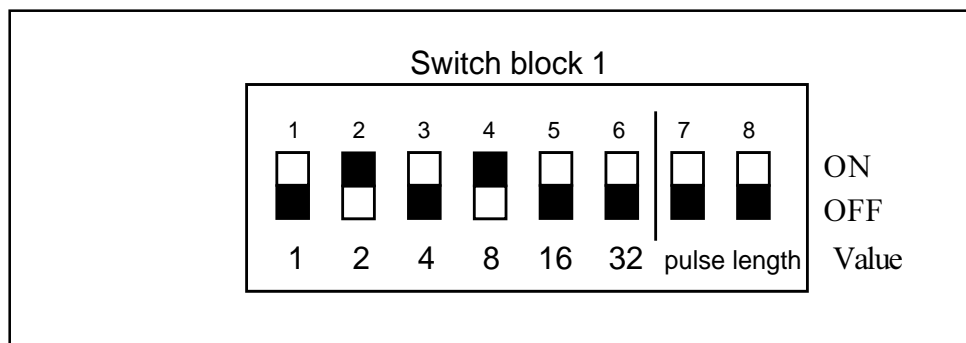


Fig. 6: Adjusting the price and the pulse frequency

By means of the second switch arrangement the discounts can be adjusted for those types of coins that are indicated on the label of the totalizer. This is done by means of four switches that serve to enter the pulse number (0 - 15).

e.g.: pulse number for coin A = 3 / pulse number for coin B = 7

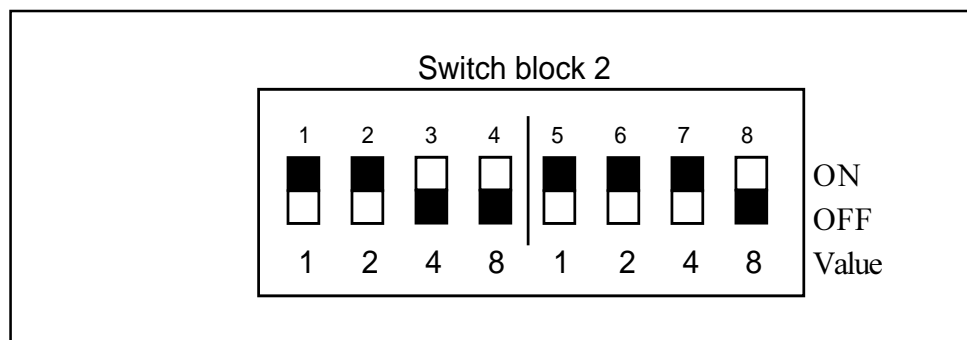


Fig. 7: Adjusting the pulse number

If required the TV totalizer can also transmit a so-called **inventory pulse** (*must be adjusted by NRI*). It means that directly after inserting a coin a number of pulses is transmitted to output line 2. The number of pulses corresponds with the value of the coin. When transmitting the pulses the coin acceptance is blocked.

As far as the remaining credit is concerned the three variants A - C described in *chap. 3.2 Totalizers* are available.

It is also possible to connect a 4- or 5-digit display to this device.

# APPENDIX

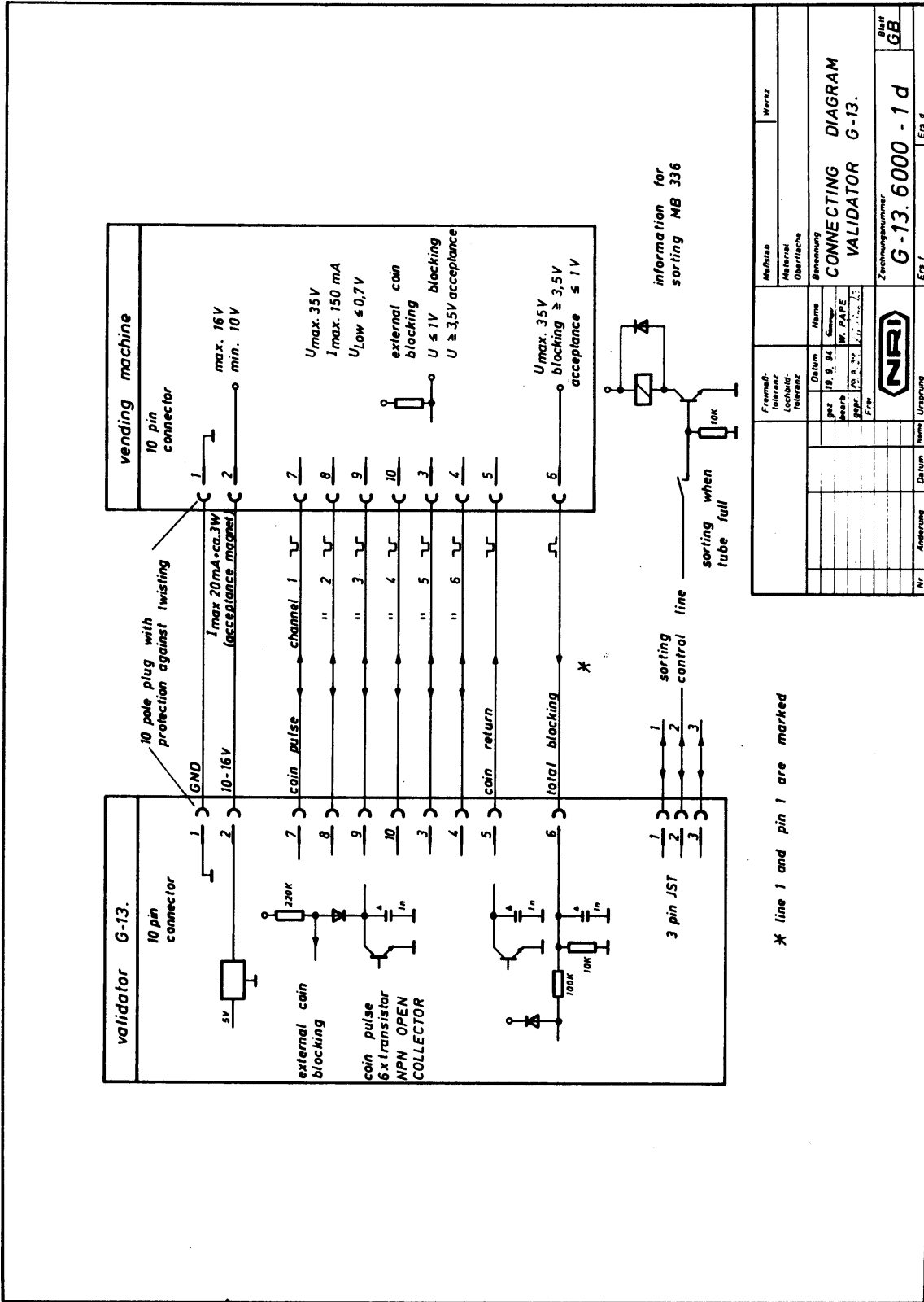


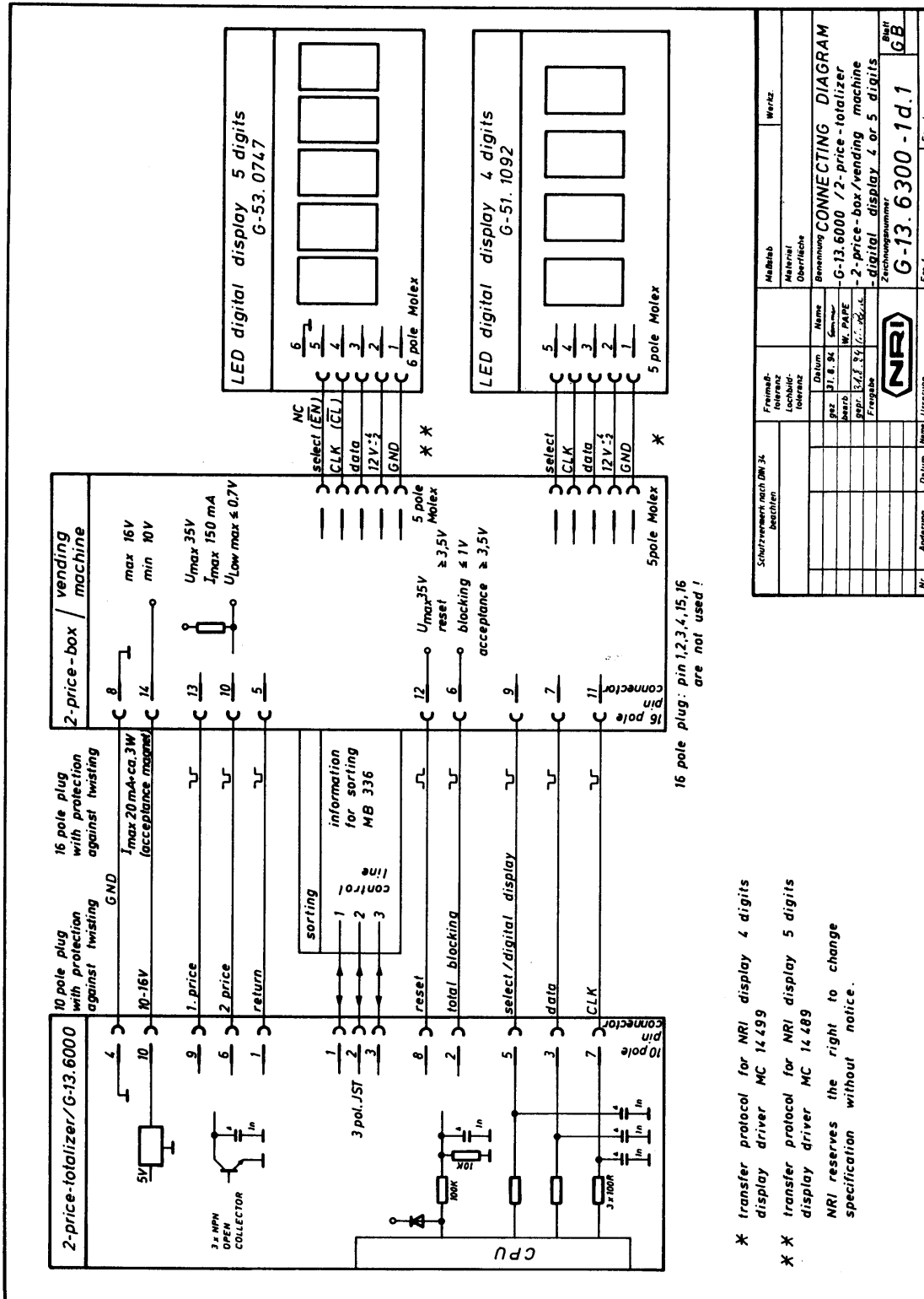
### Assignment of pins, standard coin validators

| pin feature | assignment     | potential | characteristic                                   |
|-------------|----------------|-----------|--|
| 1           | GND            | low       |  |
| 2           | UB +12V DC     | high      | 10V - 16V DC / 20mA                              |
| 3           | output line 5  | act. low  | low = blocking A5                                |
| 4           | output line 6  | act. low  | low = blocking A6                                |
| 5           | return         | act. low  | accept sensor signal for Casino variant possible |
| 6           | total blocking | act. high |  |
| 7           | output line 1  | act. low  | low = blocking A1                                |
| 8           | output line 2  | act. low  | low = blocking A2                                |
| 9           | output line 3  | act. low  | low = blocking A3                                |
| 10          | output line 4  | act. low  | low = blocking A4                                |

### Assignment of pins, totalizer

| pin | assignment      | potential | characteristic feature      |
|-----|-----------------|-----------|-----------------------------|
| 1   | return          | act. low  |                             |
| 2   | total blocking  | act. low  | standard reset              |
| 3   | display         | DATA      |                             |
| 4   | GND             | low       |                             |
| 5   | display         | SELECT    |                             |
| 6   | function line 2 | act. low  | 2nd price line              |
| 7   | display         | CLOCK     |                             |
| 8   | reset line      | act. high | time stop for Timer variant |
| 9   | function line 1 | act. low  | 1st price line              |
| 10  | UB +12V         | high      | 10V-16V DC / 20 mA          |





\* transfer protocol for NRI display 4 digits display driver MC 14499  
 \* transfer protocol for NRI display 5 digits display driver MC 14489  
 NRI reserves the right to change specification without notice.

|                                       |  |  |  |                                 |  |                               |  |
|---------------------------------------|--|--|--|---------------------------------|--|-------------------------------|--|
| Schutzvermerk nach DIN 34<br>beachten |  | Freiab-<br>toleranz<br>Lochbild-<br>toleranz |  | Material<br>Oberfläche          |  | Werkz.                        |  |
| Datum                                 |  | Name   |  | Benennung                       |  | CONNECTING DIAGRAM            |  |
| St. 8. 84                             |  | W. PAPE                                      |  | G-13.6000 / 2-price-totalizer   |  | - 2-price-box/vending machine |  |
| ppr. 24.1.85 (C. 02.15)               |  | C. 02.15                                     |  | - digital display 4 or 5 digits |  | Zeichnungsnummer              |  |
| Nr.                                   |  | Datum  |  | Menge                           |  | Ursprung                      |  |
| Änderung                              |  | Datum  |  | Menge                           |  | Ursprung                      |  |
| Erst                                  |  | Erst   |  | Erst                            |  | Erst                          |  |
| G-13.6300-1d.1                        |  | G-13.6300-1d.1                               |  | G-13.6300-1d.1                  |  | G-13.6300-1d.1                |  |
| GB                                    |  | GB   |  | GB                              |  | GB                            |  |