ELECTRONIC SHELF LABELLING SYSTEM ESL

METRA BLANSKO a.s., Prazska 7/ 1602, 678 49 Blansko, Czech Republic
Tel.:+420 516 591 281 Fax:+420 516 591 299
www.metra.cz
Description of the ESL System

The system for the electronic price marking on the stores includes a computer, a transmitter, an antenna, electronic labels and a manual terminal.

The computer is connected by the network interface Ethernet to the computer interface of the store. Information about prices is received from central database of the store of various items. The computer program running on this computer finds out items which prices should be updated. New information about these items is delivered through interface RS232 to transmitter, which transmits the accordant modulo signal to the antenna. The transmitter works on frequency 38,4 kHz with amplitude modulation. If the ESL register sends the signal, it compares the address covered in the received account with its own address (saved in internal memory); in case that price address agrees, than the price data are activated on the display of ESL.

The electronic labels are composed with the receiving ferrite rod antenna, the receiver, the processor, the LCD display and the power lithium battery. Everything is closed in the plastic box, which has dimensions 100 x 32 x 9 mm. The display comprises from three main fields:

a) displayed item price (to 19 999,99 CZK or €)
b) displayed unit price (to 999,99) currency of this price is the same as the currency featured in field of the LCD display, unit quantity is printed with all other information about stuff on the self-adhesive label on the left of the LCD
c) displayed alternative price (to 19 999,99 CZK, €, %, Points). displays the featured price in another currency than is indicated in field a), or features bonus for customers in CZK, €, % or in the retrieved points.

ESL enters low power consumption in the stand-by level, thus saving battery life. The received signal is tested in 4 sec. interval in 50 msec. If no signal is received, the ESL is again introduced in the stand-by level. If ESL takes up emission from the transmitter (or from manual controller), then it stays in active level for another 4 sec. This time is always extended when ESL receives any correct data. Life time of battery is around 5 years.

The data are issued from the transmitter by the starting and synchronizing impulse, than follows the address with the controlling summation and than data are emitted, which have to be featured on the display of ESL. When ESL detects this impulse it initializes itself, the receiving previous data is stopped and it starts receiving of the new data.

The data transferring for each ESL lasts 0,3 sec. long. In one hour it is possible to change the levels of about 1 000 ESLs.
The control of the correct transport of the data
The data are sending out by the ensured control summation and by the repeating sending of the data for the reduced probability of disturbance effect.

Identification of the faulty ESL (transmission wasn´t realized)
The transmitter is sending the initialization sequence in the fixed period; all ESLs are waiting for the receiving of this sequence. If they don´t receive it through the specific time, it is assumed, that in receiving part of electronic network the defect happened. This level is analysed by the ESL and error message is displayed.

The control of the correct functionality of the transmitter
The output amperage is metered in the transmitter. The defect is signed when the amperage is falling. The transmitter is fitted by own diagnostic.

The system includes a manual terminal, which is equipped with bar-code reader and wireless connection to the computer network of the store. Thanks to this terminal it is possible to change data displayed on the display of the ESL (e.g. warehouse stock, to change price displayed on the display of ESL-after set password). Requirement for change of the displayed data on the display of the ESL by the help of VF signal (WiFi) transmitted to the operating computer of the transmitter, which sequentially issue asked data by the standard mode to the ESL. It is possible to take supplementary information from central database by stuff and to display them on the display of the manual terminal.

When the ESL is installed for the first time or when it is changed it is necessary to assign the address in accordance to the code of things, whose price have to be displayed on the ESL. The address is established on max. 10 place code of the stuff and supplementary sign for resolution specific of the store. The address is assigning via programming adapter which is connected to the PC or to the manual terminal. The transmission of the data is secured from the adapter by amplitude-modulated signal like is provided transfer of the data for the labels on the store.

The structure of the receiving circuit of the addressed label is secured by approximation of the ferrite antenna programming adapter to the antenna of label for distance less than 5 cm. Assigning of the address of the label is done in time less than 5 sec., in this time pointer printed self-adhesive label is connected with information about stuff which is used on the front site of the label.

EMC compatibility
NF transmitter for electronic labels was successfully tested by accredited testing laboratory for Test of resistivity - EMC (Electromagnet. Compatibility) – Radiating high-frequency electromagnetic field.
Electronic shelf labelling system ESL

Electronic shelf labelling is not only a substitute for conventional paper labels but also means of cutting the cost of labelling merchandise. With ESL, consumers can be confident that items are labelled with the correct price, while waiting times at the checkout are reduced. ESL is thus a sensible investment for improving customer satisfaction, too. The flexible pricing it offers means that retailers can use it as a marketing instrument to realize new price models and improve their competitiveness and margins.

Studies prove that consumers regard clear and reliable electronic pricing system as a visible sign of the retailer’s desire to give them enhanced service, and consequently reward this with higher sales. This underlines the fact that ESLs have positive impact on customers loyalty and create competitive advantages.

The ESL system is based on low radio frequency (RF) comprises reliable, robust, tried-and-tested technology, is good value for money and provides a medium-term return of investment of 121 to 36 months. Now we have to prove this to our customers and ourselves. This means establishing the necessary know-how on all levels – Sales, Marketing, and Services – in the months ahead. In view of the difficult economic situation at present, this task is both a challenge and an opportunity to establish a new field of business.

Shelf labelling – the necessity of ESL solutions

Shelf labels are important for indicating prices since they provide consumers with the necessary price and other information. Manually attaching paper labels to shelf rails is error-prone, labour intensive and time-consuming. Differences between the prices shown on the shelves and those charged at the checkout regularly cause complaints by customers and consumers associations. The resultants loss of confidence in price labelling leads to customer dissatisfaction and consequently loss of sales for the retailer.

An electronic shelf labelling system is a remedy for this. As an integral component of store merchandise management and the sales solution, it ensures automated and prompt changes to prices and so guarantees the necessary price integrity between shelf labels, scanner POS terminals and merchandise management system – without any time pressure, the work of the printing and handling paper labels, or searching for the right shelf location. The time saved can be used by staff to replenish shelves and provide customers with better service.

Yet ESLs are more than just a substitute for conventional paper labels. Thanks to this flexible means of pricing, retailers also have an instrument for realizing new price models, such as happy hour and late night promotions that allow them to improve their competitiveness and margins. ESLs considerably enhance the store’s image. Studies prove that consumers regard clear and reliable electronic pricing as a visible sign of the retailer’s desire to give them enhanced service, and consequently reward this with higher sales. This underlines the fact that ESLs have a positive impact on customer loyalty and create competitive advantages.

Conclusion:
- Accurate labelling and price integrity are a must for improving customer satisfaction, and are thus crucial components of customers loyalty programs.
- Thanks to flexible pricing, retailers have an instrument to realize new price models such as ad hoc, happy hours and late night promotions that can improve competitiveness and margins.
- ESLs help to reduce personnel costs on the one hand, and to set up adequate, customer-oriented staff management to improve customer services on the other hand.
- The lock mechanism, that has been integrated in the ESL system prevents wilful removal of shelf labels which, in turn, helps retailers to recognize out-of-stock situations on the shelves faster as a result of missing labels, and thus to reduce the loss of sales that this entails.
- Providing up-to-date merchandise information helps to improve the efficiency of shelf staff, for instance when stocking the shelves and performing a physical inventory.
- close relation between the manager who making price policy and prices on shelves
ROI calculation

A key criterion in the decision for blanket rollout of an ESL system is the financial aspect. In other words answering the question “When will the investment pay off and save money?” This is called return of investment (ROI) and depends very much on their profile of the retailer/store in question so customer-specific ROI calculations are needed.

Estimated time of ROI: 12 to 36 months
ESL is particularly interesting for the new supermarkets because investments for conventional shelf labelling (rails, paper labels, installation time and expense, etc) are not incurred.

ESL system – product overview and advantages

The ESL system consist of various hardware components and special software that is part of the control software of retail. It requires specific knowledge of the products possible customizing and the necessary on-site services.

The following components/services have to be considered when making proposals:

Hardware:
- shelf labels, fruit and vegetable labels
- shelf rails, hook adapters (if needed)
- administration software
- label printer
- 38,4 kHz radio transmitter (low frequency)

Software:
- system software
- label control and Management software

Services:
- profitability calculation and concept
- store inspection, installation and training
- software adaptation (interface for POS system and merchandise management system)
- Hotline and support

Product – specific advantages of the ESL system

- **ESL display**: excellent legibility, large characters
- **ESL lock mechanism**: quick and effortless snap-in/removal
- **Battery**: guaranteed life of more than 6 years
- **Low RF technology (38.4 kHz)**: tried-and-tested, reliable and robust
- **Easy installation of infrastructure**: powerful transmitter for up to 5000 m³ operates with simple single-wired loop antenna, multidirectional transmission signal will also pass through walls and ceilings (one antenna is sufficient for two floors)
- **low running costs**: extremely simple installation, operating and maintenance

Transmitter and antenna:

The transmitter is the core element of the ESL system. It transmits data to the ESLs via low frequency radio technology (38.4 kHz). The antenna is a single-wire cable, connected to the transmitter in the form of a loop.

Stationary label printer:

The printer is intended for printing the paper labels with the item description and the barcode, which is also the ESL’s ID, are attached to the ESL label. ESL administration system and is controlled from the ESL application software. It is a standard version of barcode printer, it can be a part of delivery but it can be also used any barcode printer in retail.
ELECTRONIC SHELF LABELLING SYSTEM ESL

General advantages of ESL
An electronic shelf labelling system not only ensures the necessary price integrity for customers but also acts as a marketing instrument for retailers to increase their competitiveness and boost efficiency at stores. The table below lists the benefits of ESL in general both for customers and retailers.

Advantages for consumers and retailers

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Customers</th>
<th>Retailers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price integrity:</strong> Identical prices are used at the POS systems and on the shelves because it is an automated process in conjunction with merchandise management on their store and head office levels.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Accurate labelling:</strong> Information is presented clearly and labels and merchandise can be readily associated with each other as the ESLs are securely mounted so they cannot be removed wilfully.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Reduction of lines:</strong> There are no more discussion about prices at the checkout or searching for the right label on the shelves.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>More information for consumers:</strong> Additional details can be presented – such as the reference price per kg, litter or unit, flashing promotion symbol,</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Flexible pricing:</strong> Prices can be changed practically at the touch of a button, for example to respond to competitors’ price.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Reduced costs:</strong> Consumable materials and personnel can be saved (label management, price discussions), and fines and or gifts to customers can be avoid.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Increased sales:</strong> Customers are confident in the prices displayed, customer service is improved, there are a fewer out-of-stock situations on the shelves because of shell labels that have been willfully removed.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Better margins:</strong> Prices can be adjusted as and when required, and new prices models can be introduced, for example late evening or at night.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Improved customer service:</strong> Staff can be deployed on a more customer-oriented basis and in line with requirements because manual, time-consuming and error-prone price labelling is eliminated. Staff are motivated because labelling is free of stress.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Image:</strong> ESL signals to consumers that the retailer is willing to innovate and, in particular, wants merchandise to be labelled clearly and without errors.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Miscellaneous:

Warranty: 12 months
Technical data

ESLs – Electronic shelf labels

- Technology
  LCD, 7-segment display

- Displayable information (€ versions)
  - Main price field
    6,5 places, character height 19,6/ 7,4 mm
    Symbols: CZK, €
  - 2nd price field
    5,5 places, character height 6/5 mm
  - 3rd price field
    6,5 places, character height 6/5 mm
    Symbols: points, €, CZK, %, BONUS

- Dimensions
  - Width (in the middle)
    105 mm (large)
    95 mm (medium)
    85 mm (small)
  - Height
    34 mm
  - Thickness
    9,5 mm
  - LCD dimensions
    51 x 23 mm (large)
    35 x 23 mm (medium)
    35 x 19 mm (small)

- Mounts
  Rails, peg hook adapters

- Housing
  Plastic

- Colours
  White

- ESL surface
  Exchangeable and customizable silkscreen printing

- Operating temperature
  - 20˚ to + 50˚ C

- Storage temperature
  - 25˚ to + 60˚ C

- LCD viewing angle
  120˚

- Battery
  CR 2450 3V/600 mAh
  Life 5 years
  Data preservation time 45 seconds

- Weight
  40 g (large)
  33 g (medium)

---

Fruit and vegetable electronic labels

- Technology
  LCD, 7-segment displays

- Displayable information
  - Main price field
    6 places, character height 38/24 mm
    Symbols : €, F, FL PROMOTION,
  - 2nd price field
    6 places, character height 14/8 mm
    Symbols : CZK, €, L/Kg
  - 3rd price field
    6 places, character height 17/11 mm
    Symbols : FL, points, €, F

- Dimensions
  - Width
    243 mm
  - Height
    221 mm (large)
    168 mm (small)
  - Thickness
    25 mm
  - LCD dimensions
    168 x 63 mm
  - Housing colours
    Black and green

- Operating temperature
  0˚ to + 40˚ C

- Storage temperature
  - 20˚ to + 50˚ C

- LCD viewing angle
  70˚

- Battery
  2 x AA (alkaline)
  Life 3 years
  Data preservation time 45 seconds

- Weight
  430 g (large)
  300 g (small)
Low RF transmitter

- Frequency type: Low radio frequency 38.4 KHz
- Bandwidth: 5 KHz (~36 to 40 KHz)
- Frequency deviation: ± 1,8 KHz
- Frequency tolerance: ± 50 ppm (parts per million)
- Data type: NRZ (non-return to zero), 600 bits
- Max. transmission power in: 120 W
- Transmission direction: Multidirectional
- Antenna: Single-wire loop antenna (up to 2 m)
- Antenna cable type: 1 x AWG 12 / ø 4.00 mm / 4.56 kg per 100m
- Area covered (best case): Up to 5 000 m² (120 W) or 800 m² (30 W)
- Strength of magnetic field at 10 m: < 71 dBμA/m
- ESL reception sensitivity: ~ 54 dBμA/m
- Average time for single price change: 8 000 retail prices/ hour, or 24 000 price changes with internal calculation feature of the ESL for price per Unit / L / Kg and price in alternative currency
- Average time for activating all ESLs via broadcast signal: 1’13”
- Interface to ESL administration system: RS232 / 9600 baud
- Housing dimensions:
  - Width: 380 mm
  - Depth: 290 mm
  - Height: 130 mm
- Operating temperature: 0˚ - 50˚ C
- Weight: ~ 12,4 Kg (120 W)
- Power supply: 230 V / 2 A
- RF standards: According to EN 300 330, ETS 300 683, EN 60950

External buffer

- Application:
  - Max. no. of RF transmitters: 4 (necessary if area is > 4 000 m²)
- Interface to Low RF transmitters: Fibre glass
- Interface to ESL administration system: RS232
- Housing dimensions:
  - Width: 470 mm
  - Depth: 265 mm
  - Height: 100 mm
- Operating temperature: 0˚ to 50˚ C
- Weight: 4,56 Kg
- Power supply: 230 V / 2 A
- Standards: According to ETS 300 683

Others

- 12 months
- Other certifications: Warranty
- Delivery times: Project-specific as arranged, depending on customizing