



**Intelligent Control**

**Intelligent, fully automatic control of the multi-stage process of grain collection, cleaning, drying and storage.**



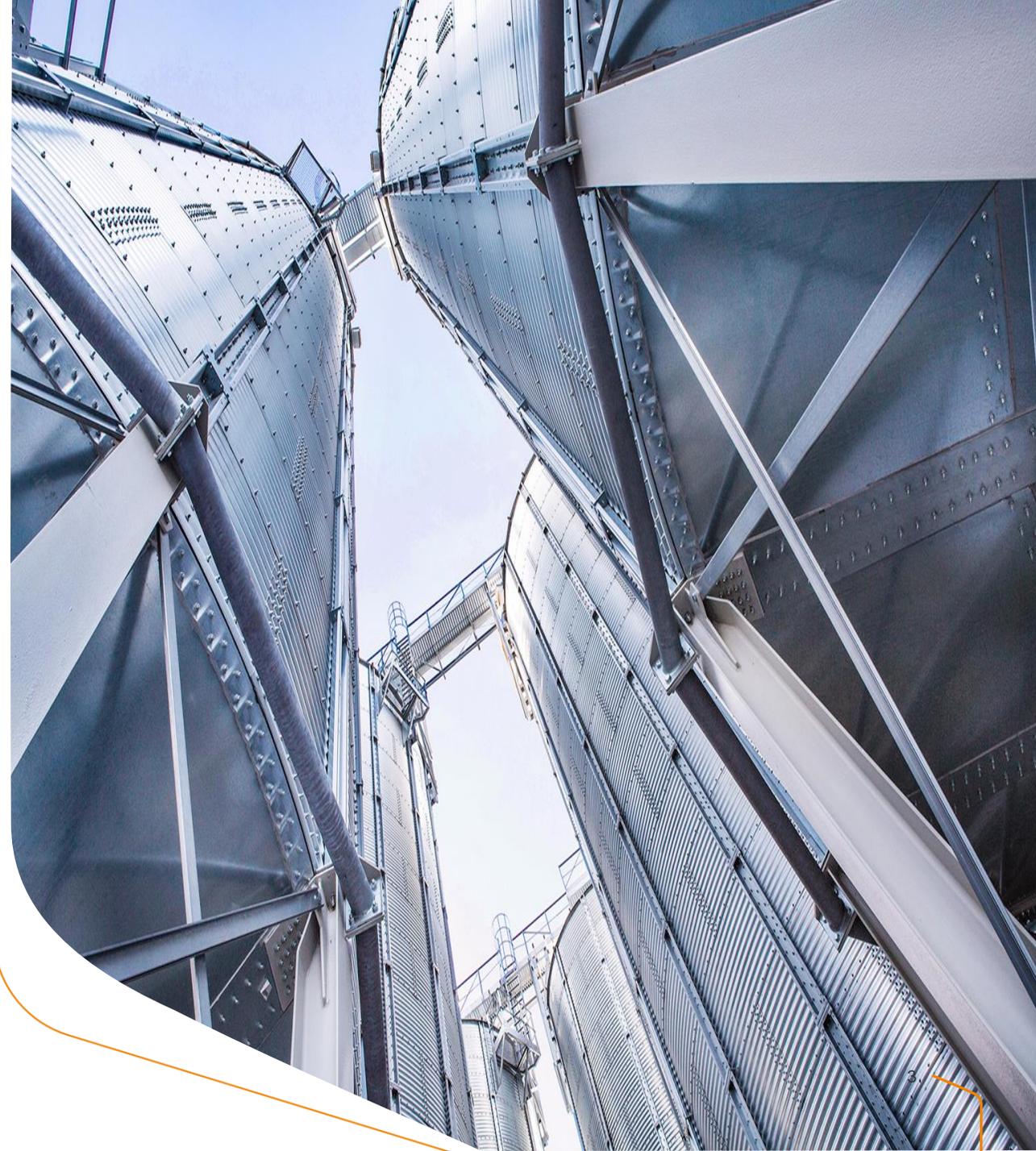
**We have completed investments with a total capacity exceeding 3 million m<sup>3</sup>**

We provide comprehensive drying and storage teams, consisting of silos, a wide range of dryers and reliable grain transport systems.



### **Reliability and ease of use**

**The automatic control system of the FEERUM complexes allows you to supervise the multi-stage process of grain collection, cleaning, drying and storage. It is very simple and intuitive to use. Available online, also on your smartphone.**



# Control cabinets

The standard FEERUM control cabinets are manufactured based on modern Eaton products. Each device powered from the control cabinet is properly secured. In addition, the start-up of devices depending on their power is carried out using Softstarts or frequency converters.

## Automatic or manual control

The control, depending on the size of the object, is carried out via a touch panel or a computer (SCADA system) with an LCD monitor. From the operator's point of view, the customer can control the entire technological process. This process is illustrated on the LCD monitor or panel, on which you can check, among others temperature, grain level in silos or dryer, operating states of individual sensors, switching on and off times, number of operating hours, etc.

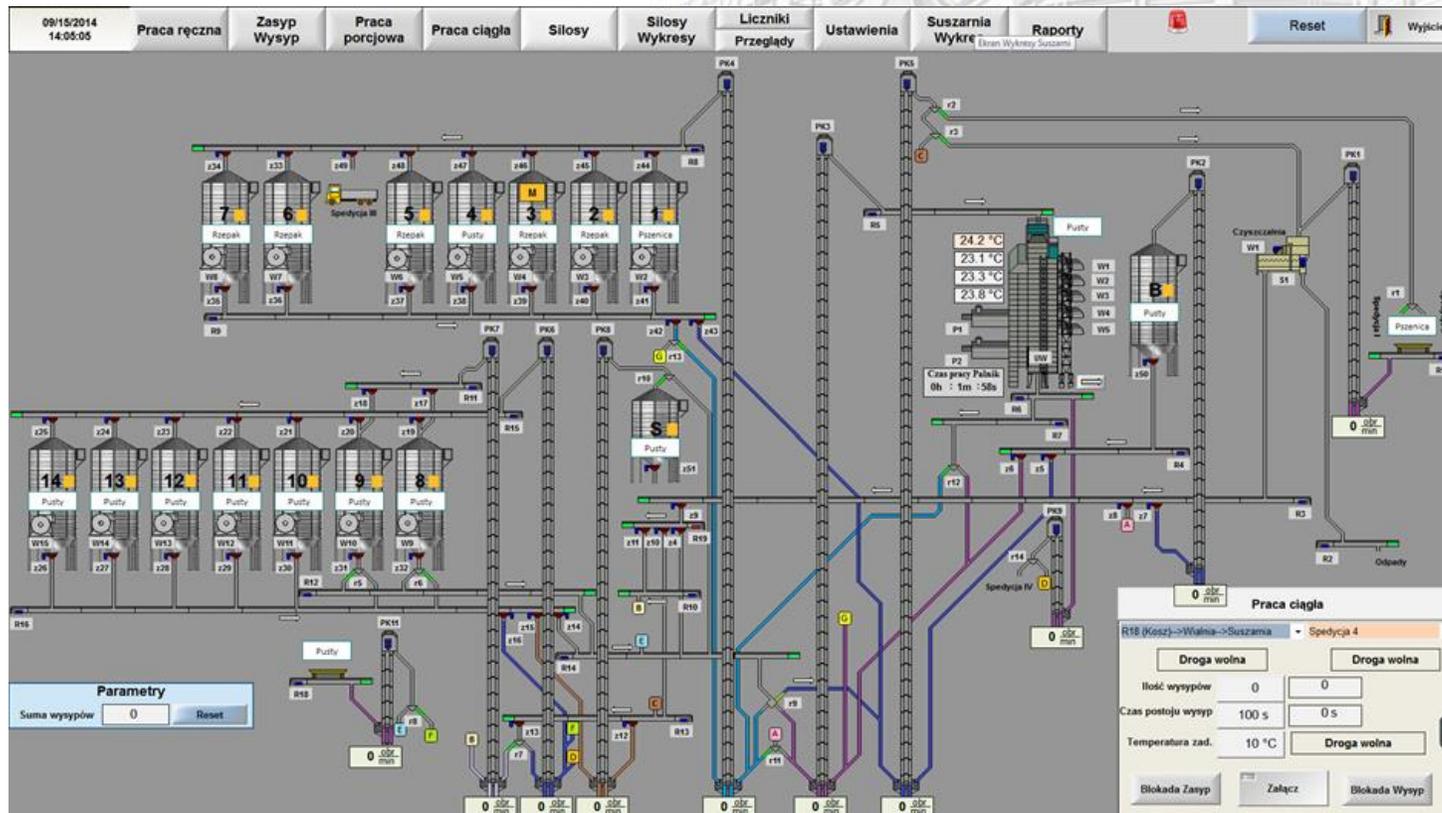
## Confirmation of filling silos or dryers

The system receives information from high-class capacitive sensors.



# Visualization of the program

In order to increase the efficiency of the operator's work, the system is equipped with program visualization. The entire sequence of technological routes is visible on the computer screen. The operator can choose the starting point and the target grain and the system will start the individual devices by itself - with the appropriate time delay.



Podgląd drogi

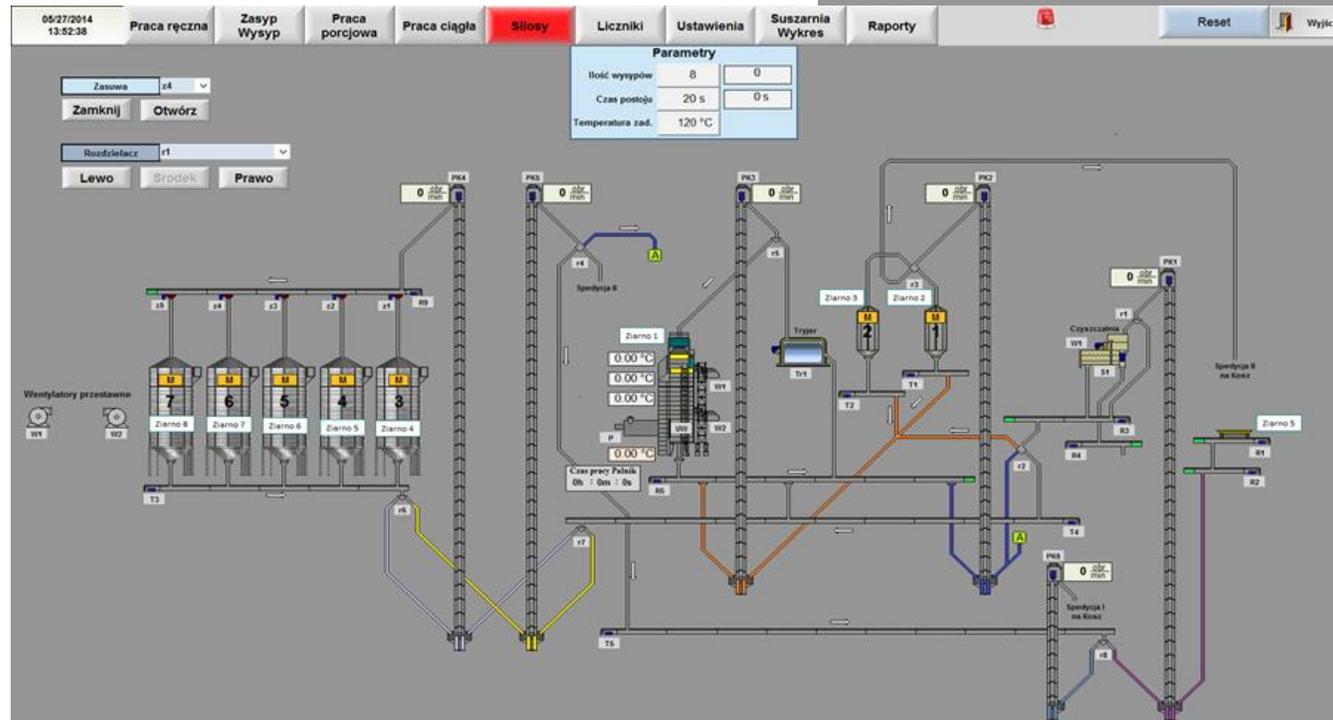
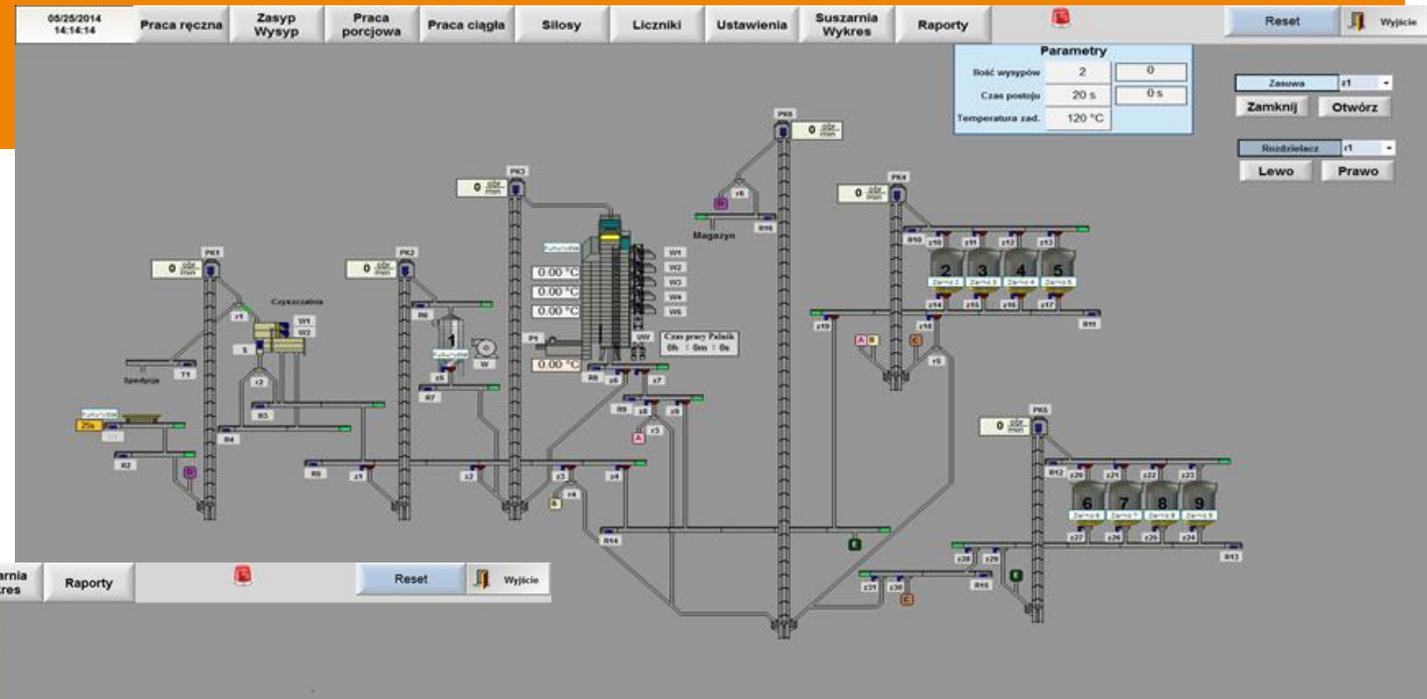
1	Kosz 1	<input checked="" type="checkbox"/>
2	Redler 2	<input checked="" type="checkbox"/>
3	PK 1	<input checked="" type="checkbox"/>
4	Rozdzielacz 1	<input checked="" type="checkbox"/>
5	Cz. Went. 1	<input checked="" type="checkbox"/>
6	Cz. Went. 2	<input checked="" type="checkbox"/>
7	Cz. Sito	<input checked="" type="checkbox"/>
8	Redler 3	<input checked="" type="checkbox"/>
9	Redler 4	<input checked="" type="checkbox"/>
10	Redler 5	<input checked="" type="checkbox"/>
11	Zasuwa 1	<input checked="" type="checkbox"/>
12	PK 2	<input checked="" type="checkbox"/>
13	Redler 6	<input checked="" type="checkbox"/>
14	K Silos 1	<input type="checkbox"/>

Zamknij

# Manual control

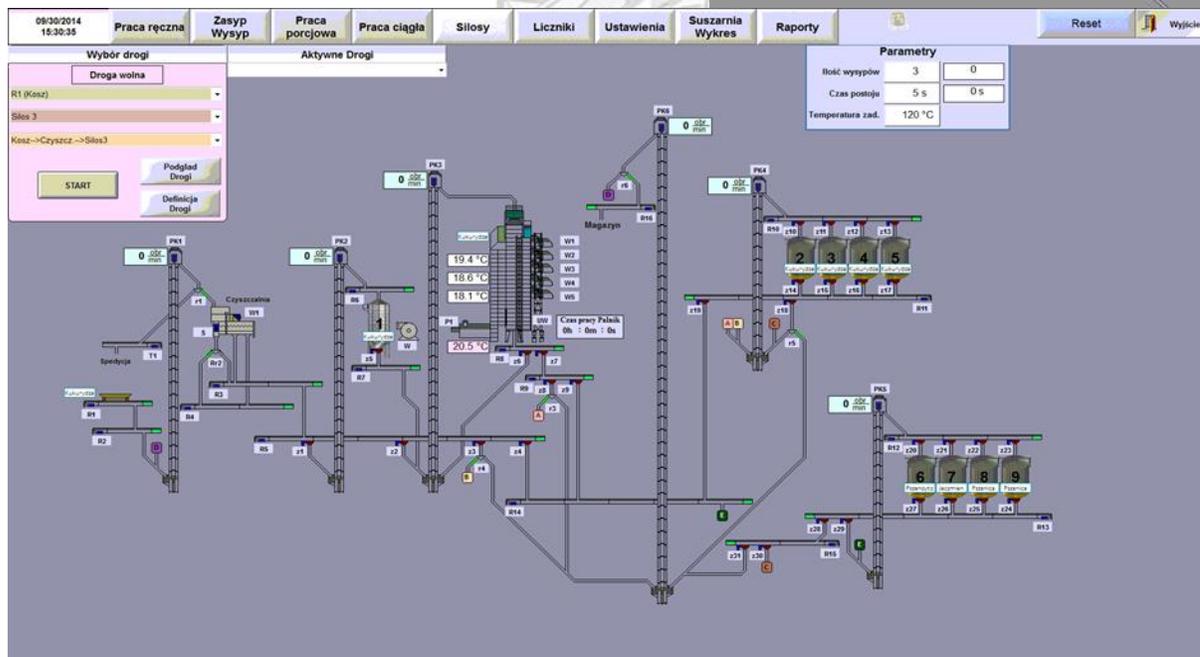
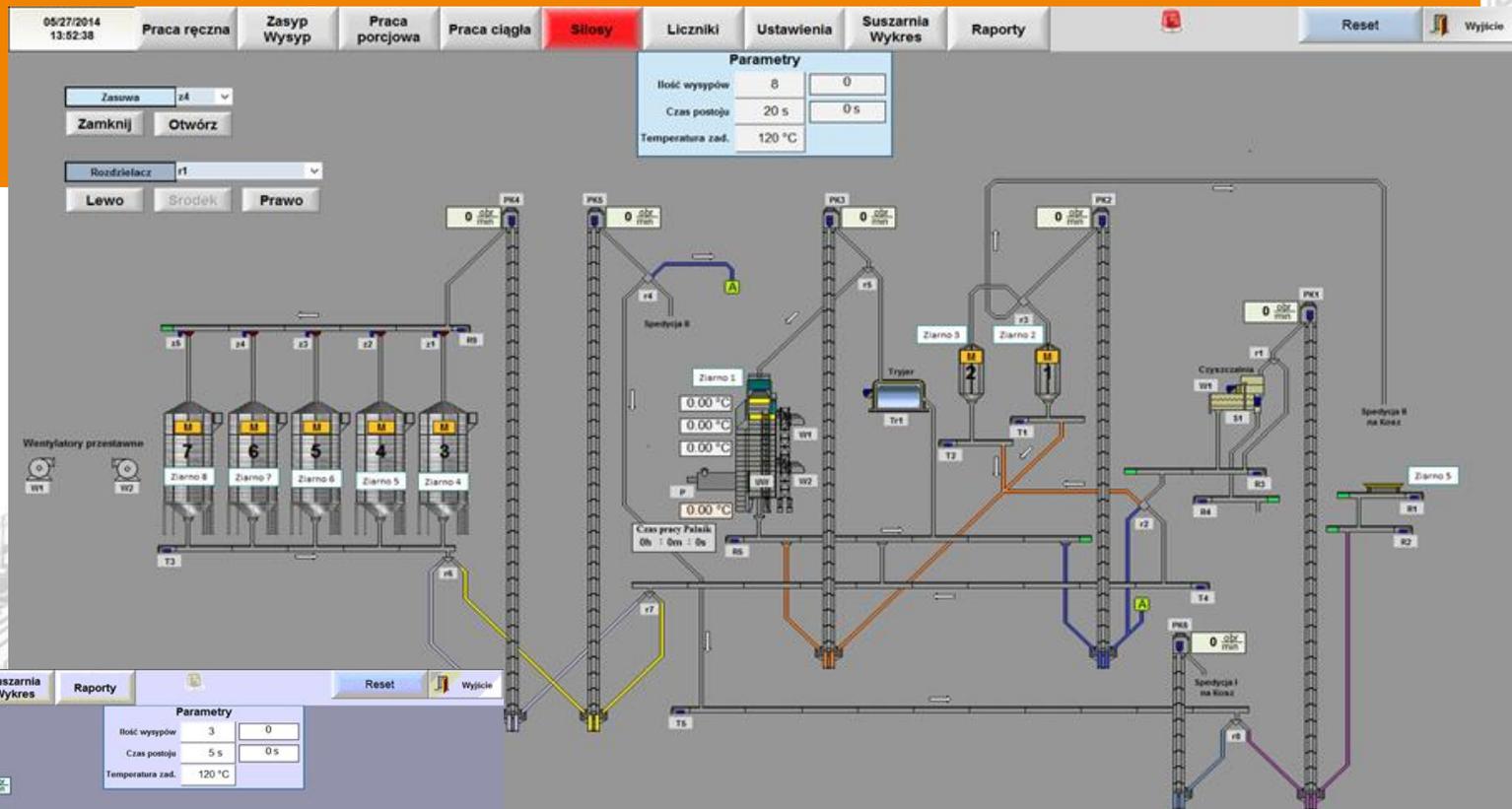
In manual mode, the operator can service the individual device service, close or open the latch and switch the distributor.

The devices start up without a time delay and in the order as the operator decides.



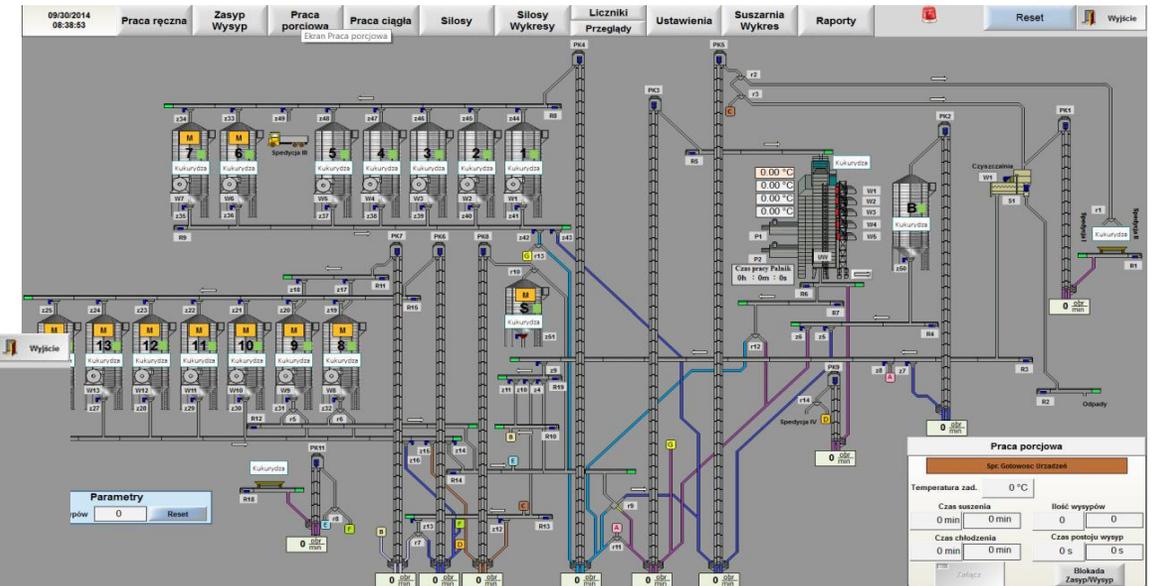
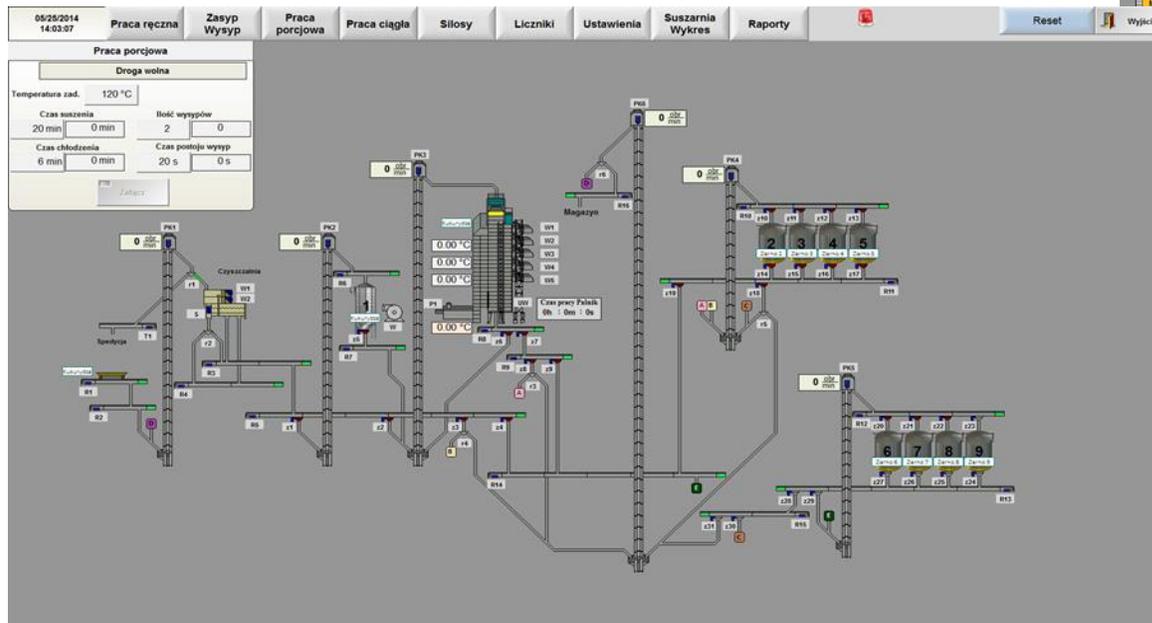
# Loading/unloading

We can control loading and unloading by selecting the technological path from the starting point from which we want to start filling or pouring to the destination point, and then the program selects which and which device should it attach with the appropriate time delay.



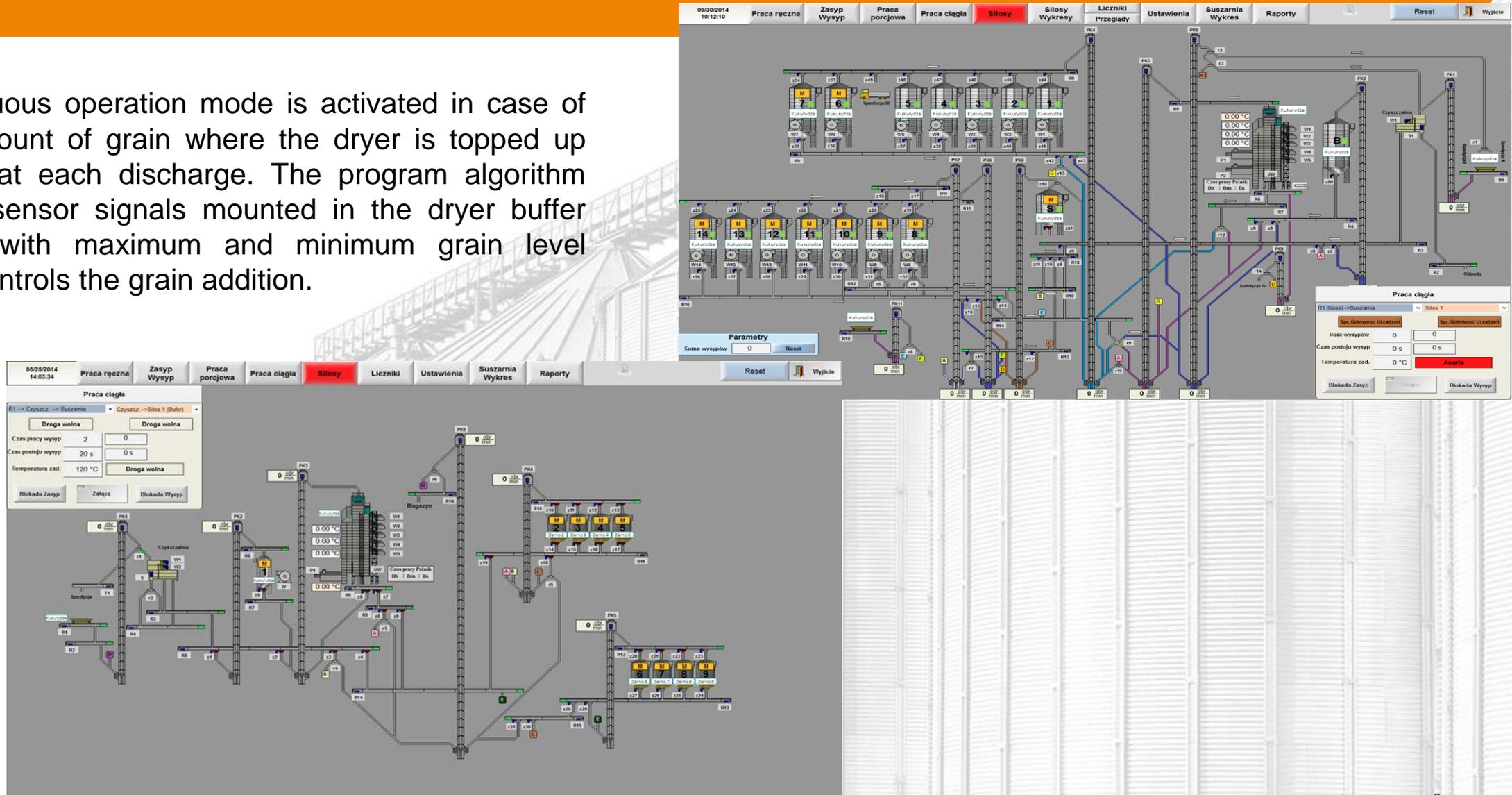
# Batch work

In the case of a small amount of grain to be dried, we can control the dryer's operation in batch mode. Then we dry the given portion of grain, which after cooling it is sent to the silos once.



# Continuous work

The continuous operation mode is activated in case of a large amount of grain where the dryer is topped up with grain at each discharge. The program algorithm based on sensor signals mounted in the dryer buffer (equipped with maximum and minimum grain level sensors) controls the grain addition.



# Temperature monitoring

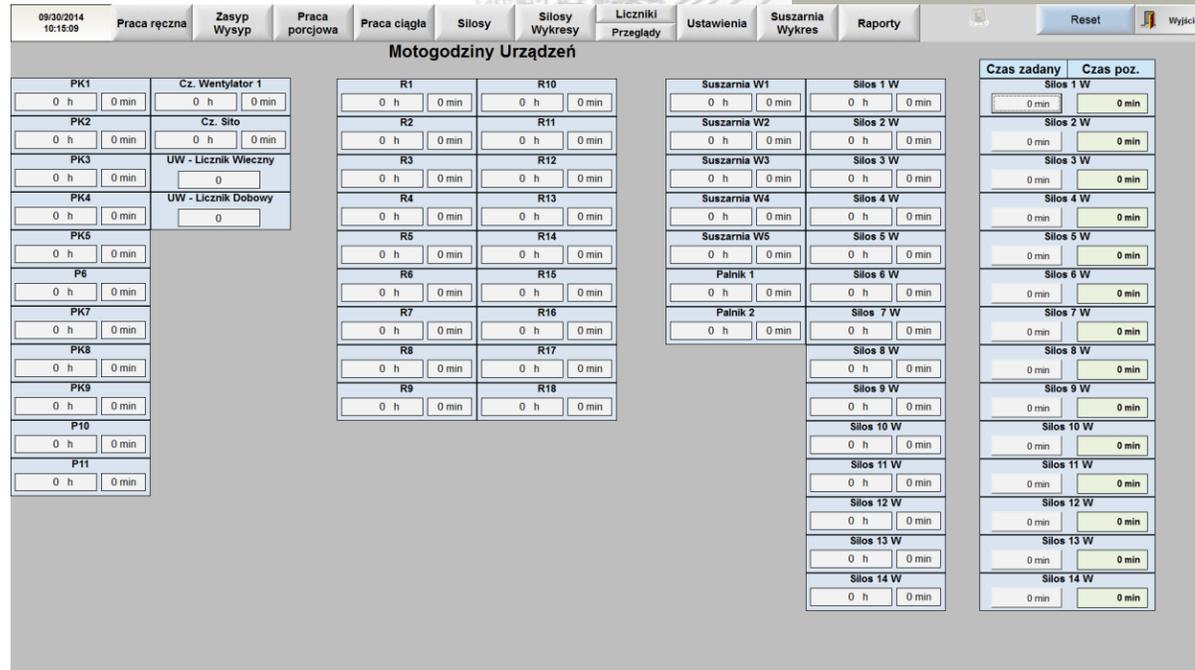
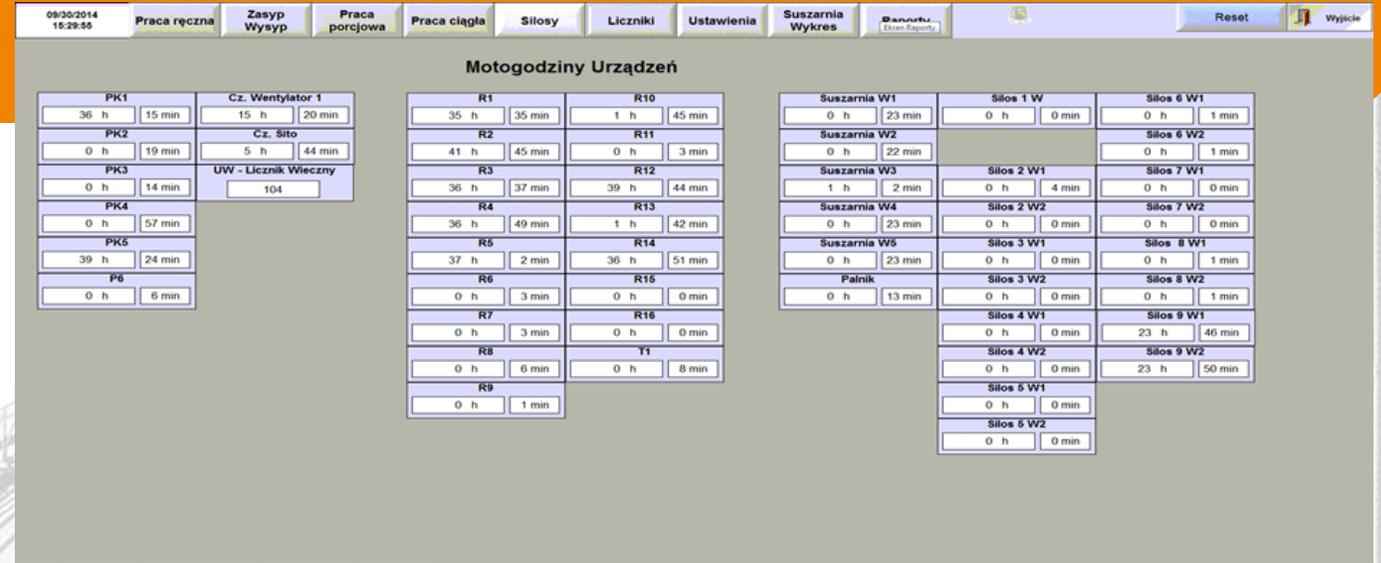
Temperature monitoring based on Dallas sensors. The probes are suspended from the silo roof structure on special holders. The probe has an ATEX certificate which allows us to use it inside a silo, in which there is an explosion danger zone 20.



The readout is possible with the help of the object control application which allows automatic control of ventilation inside the silos and enables data archiving. In the case of a small number of probes, we can use a portable terminal, from which we can read up to two probes from one module.

# Device counters

Hours counters of devices - after exceeding values given by the manufacturer displayed a message about necessity to execute periodic service. Thanks to the use of meters, we can monitor which devices work the most and properly care for them to serve as long as possible.



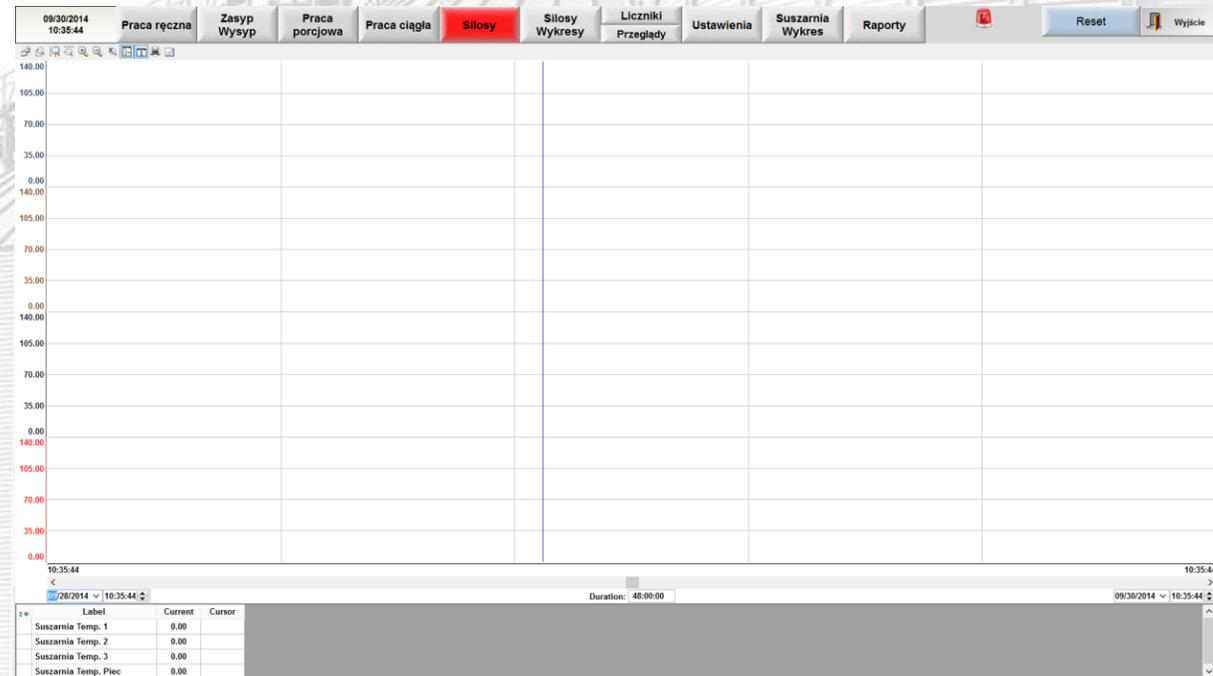
# Settings

In the settings window, you can change the time between starting individual devices, the number of revolutions after which the lift will be turned off and the frequency of the drives. We also choose the type of grain that is in the given silo and on the hopper. The type of grain defined in this way activates the blockade: when there is maize on the basket and in rape No. 1 the rape, the program will not allow starting the road from the basket to silo No. 1.

# Dryer diagrams

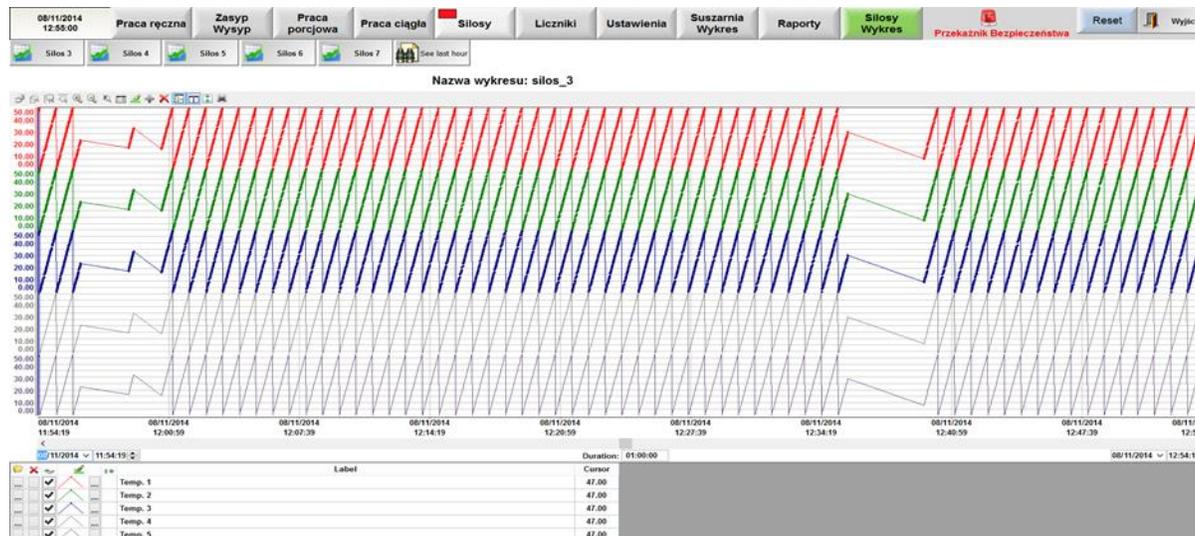
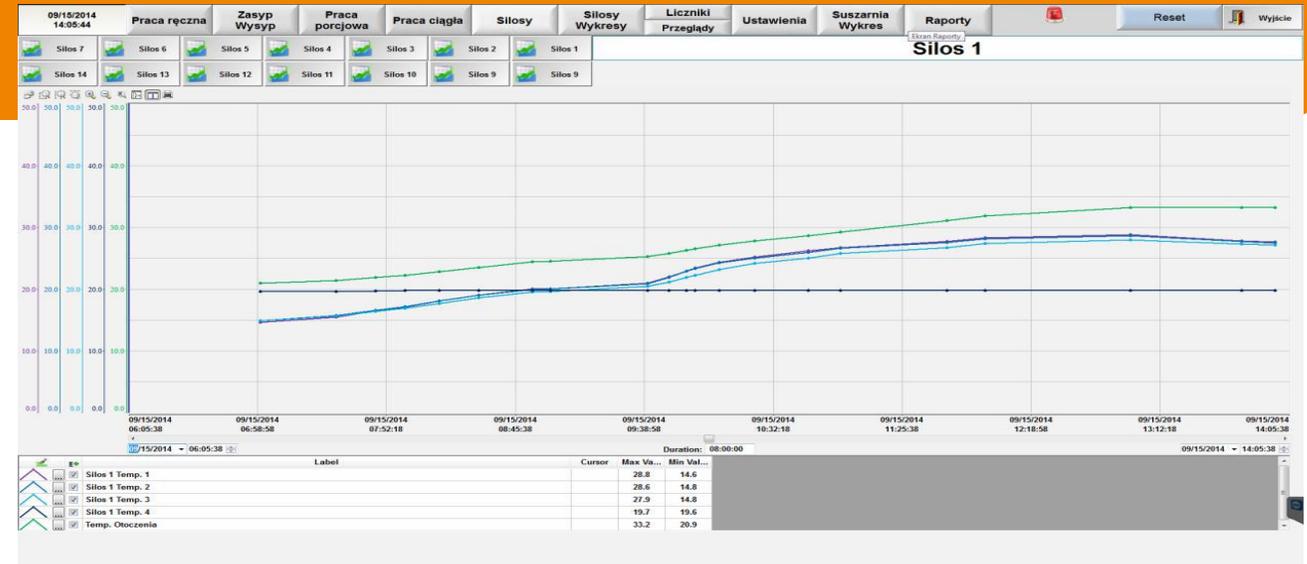
Temperature chart in the dryer.

By archiving the burner data, we can verify the effectiveness of the burner controller that maintains the temperature setpoint. You can see how quickly the dryer has reached the set temperature, what temperature at the time prevailed at each sensor.



# Silo charts

The temperature graph in the silos - presents the state of the grain kept in the silo. Thanks to monitoring of temperatures and its archiving, we can reproduce data such as: temperatures at a given time, and whether the aeration of grain is effective, at what time the grain temperature has been lowered.



# Reporting an error

The system records errors that occur during the operation of the elevator. Every protection of the motor, etc. generates an error that we are informed about in the visualization window.

The screenshot displays a software interface for an elevator control system. At the top, there are several tabs: 'Praca ręczna', 'Zasyp Wysyp', 'Praca porcjowa', 'Praca ciągła', 'Silosy', 'Liczniki', 'Ustawienia', 'Suszarnia Wykres', 'Raporty', 'Reset', and 'Wyjście'. The main area is a table with columns for 'Czas wystąpienia' (Occurrence Time), 'Czas unormowania' (Normalization Time), 'Treść' (Content), and 'Stan' (Status). The table lists numerous error entries, each starting with a yellow warning triangle icon. The errors include messages like 'Awaria PK 1 (Przeznosnik Kubelkowy) - Zbyt niskie obrotы' and 'Awaria Model BDK - CAN1\_14 (Brawo)'. At the bottom of the interface, there are buttons for 'Kasuj Błędy', 'Potwierdź', 'Potwierdź wszystkie', and 'Historia'.

Czas wystąpienia	Czas unormowania	Treść	Stan
05/25/2014 13:57:16	05/25/2014 14:00:50	Awaria PK 1 (Przeznosnik Kubelkowy)	UNACK_...
05/25/2014 13:57:16	05/25/2014 14:00:50	Awaria PK 1 (Przeznosnik Kubelkowy) - Zbyt niskie obrotы	UNACK_...
05/25/2014 13:53:19	05/25/2014 13:55:38	Awaria PK 2 (Przeznosnik Kubelkowy)	UNACK_...
05/25/2014 13:53:19	05/25/2014 13:55:38	Awaria PK 2 (Przeznosnik Kubelkowy) - Zbyt niskie obrotы	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN1_14 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN1_15 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN1_16 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN1_17 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN2_1 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN2_2 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN2_3 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN2_4 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN2_5 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN2_6 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - Suszarnia W1	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - Suszarnia W2	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - Suszarnia W3	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - Suszarnia W4	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - Suszarnia W5	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - Suszarnia W6	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - P12	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - P13	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - P14	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - P15	UNACK_...
05/25/2014 13:42:23		Awaria Model BDK - CAN1_13 (Brawo)	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - P16	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H1	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H2	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H3	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H4	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H5	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H6	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H7	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H8	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H9	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H10	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H11	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H12	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H13	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H14	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H15	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H16	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H17	UNACK_...
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05/25/2014 13:42:23		Awaria Sułtana - H19	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H20	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H21	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H22	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H23	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H24	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H25	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H26	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H27	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H28	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H29	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H30	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H31	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H32	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H33	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H34	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H35	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H36	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H37	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H38	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H39	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H40	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H41	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H42	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H43	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H44	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H45	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H46	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H47	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H48	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H49	UNACK_...
05/25/2014 13:42:23		Awaria Sułtana - H50	UNACK_...

# Constant measurement sensor

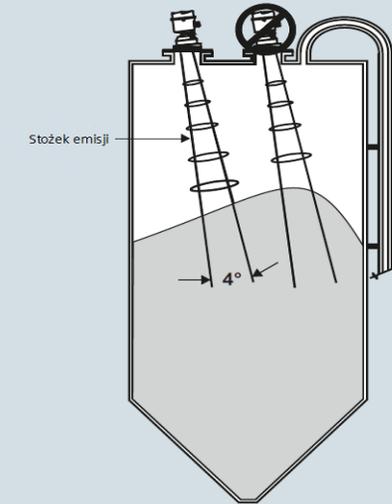
For continuous measurement of grain in a silo we recommend using a non-contact transducer radar LR 560.

This is a radar in modern 78 GHz technology, which is perfect for level measurement not only cereal products but also other products bulk materials used in industry (coal, cement, ash, biomass, sugar, etc.).

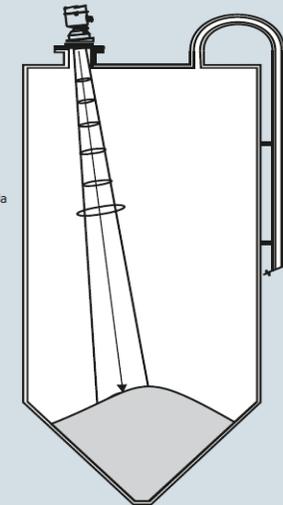


# Pros of a permanent measurement sensor

1. Low weight and dimensions - shortening assembly time
2. An integrated viewfinder that allows you to measure the level up to the lowest point in the silo
3. Built-in purge connection, which allows to clean the radar antenna with compressed air in the event of an intensive dust deposition
4. Stable measurement also in conditions of strong dustiness
5. Durable stainless steel construction



Zintegrowany zestaw celowniczy ułatwia pozycjonowanie wiązki radaru



# Grain balancing system - new!

In the work of transport devices, we use a grain balancing system

- ✓ for controlling conveyor belts (or redlers to receive grain from silos), frequency converters were used
- ✓ for controlling bucket elevators, overload-short-circuit protection with measuring element was use (we measure the current that the engine takes on the PK)

## Innovative device control application - two operating modes:

- ✓ manual operation mode - the operator sets a constant grain transport efficiency
- ✓ automatic operation mode - the system analyzes the operation of equipment and tries to maintain maximum efficiency of grain transport operation; It independently detects the uneven load of individual devices and aligns their work by means of a control algorithm

# Grain balancing system

## Benefits:

- ✓ self-monitoring of grain transport devices
- ✓ protection against backfilling of the bucket lift while making maximum use of its capacity;

## Requirements:

- ✓ control cabinet in automatic mode with a controller or operator panel
- ✓ on devices transporting grain from silos – inverter
- ✓ on a bucket lifter, overload and short-circuit protection with a measuring element.



## FEERUM JSC

6 Okrzei Street  
59-225 Chojnów  
Polska

+48 76 81 96 738  
+48 76 81 88 485  
sekretariat@feerum.pl

[www.feerum.pl](http://www.feerum.pl)