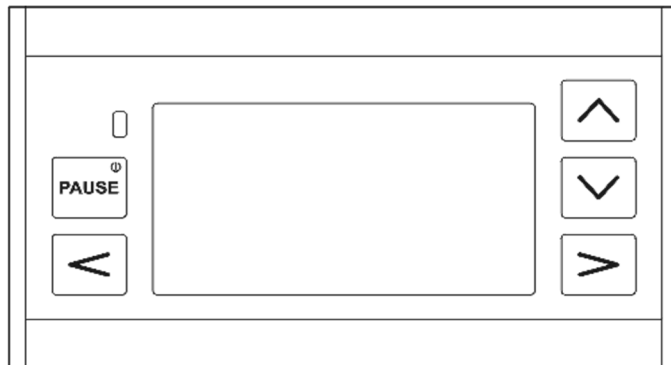


AD system

AD20 controller
in software version 2.004
and compatible AD system components



Instruction manual

Last update 26.08.2016

This instruction manual concerns only the operation of the graphic control panel with the software adapted to the management of the AD system in the basic version, i.e. with the multi-purpose actuator tracking module.

The subsequent chapters concern the function of the control module in the software version 2.004 and the AD system configuration adapted to the cooperation with the AD20 controller in this software version.

It should be noted that the other software versions may differ significantly both in terms of functions and appearance which may cause difficulties in the operation. Therefore the use of the instruction manual designed for the specific software version is recommended.

The manufacturer of the AD system reserves the right to introduce the modifications both into the construction and functionality of equipment as well as into the operation of the software, enhancing the devices' functionality.

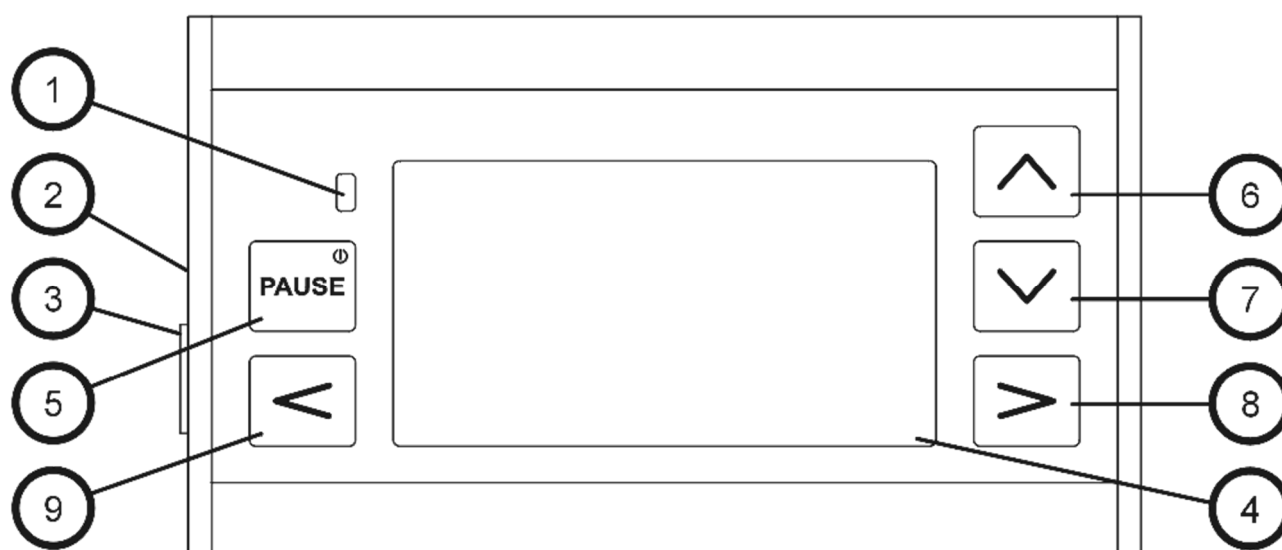
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How to handle and how not with components of AD system

1. Use original cabling delivered by the manufacturer.
2. Due to the potential significant power consumption the safe connection of the system cables directly to the accumulator battery of the tractor is recommended, while the polarity (red cable with fuse, to terminal + accumulator) is being maintained. The low power supply quality may prevent the proper work of the system.
3. The connection of the system to the defective electrical installation is forbidden. The defective electrical installation means the installation including a defective accumulator, generating over-voltages as well as voltage drops and decays.
4. Keep sockets and plugs clean, in particular the connection of earlier soiled sockets and plugs is forbidden.
5. Route the cables in a way to protect the insulation from being cut, worn or crushed and short-circuited to the ground of the machine or tractor.
6. The cables should be maximally immobilised which will protect them from breaking. The loops for the sufficiently large bending radius should be formed in places of the necessary deformations appearing during work.
7. The moving cables that lead to the interior of the modules must be immobilised before the entrance to the interior of the modules through the attachment to the constructional elements of the machine.
8. Every damaged cable must be absolutely replaced. The damages to the cables as well the damages to the electronics caused by the closing and opening of the cables are easy to detect and not covered by the guarantee.
9. Route the cables so that water condensing on the cables does flow down into the glands, sockets and plugs.
10. All the housings must be always tightly screwed and the glands - tightened. The use of the cables of non-circular cross-section at a section of the passage through the tight glands is excluded.
11. Do not touch the keypad with the sharp or angular objects that can damage the coat. The controller must be securely fastened in the tractor cab.
12. The controller and the other modules designed for the work inside the tractor cab are not encapsulated. They must be not sprayed with water or other liquids. In particular the use of organic solvents can cause damage to the controller housing and keypad.
13. The controller and the other modules can be kept clean by wiping only with a clean, damp and soft cloth. The use of any agents including abrasive or active chemical substances is forbidden.
14. In the event of a failure of the fuse that supplies the system the installation of the new fuse before having diagnosed and removed the cause of the overload is forbidden.
15. The cables should be tightened to the internal terminals and external modules of the sockets and plugs with force that ensures a good contact and does not cause damage to the gentle components and their connections with the boards of electronics at the same time. In particular there is no need for the strong tightening of the low power signals, including the cables of sensors.
16. The elements submitted to the service must absolutely include the description of defect, probable cause of defect, must be also well protected for a period of transport and should be well cleaned as far as possible.

Description of AD20 controller panel



- 1 Pause /alarm lamp and light sensor
- 2 Acoustic signal
- 3 System socket of power supply and digital data transmission
- 4 Backlit graphical screen
- 5 Power ON/OFF, pause and alarm locking button
- 6 The *increase / up* context button of function selection, menu branch selection and option selection or parameter value adjustment
- 7 The *decrease / down* context button of function selection, menu branch selection and option selection or parameter value adjustment
- 8 The *next / accept / select / save* context button of the access to the working screen, menu branch and confirmation of the selected or new parameter value
- 9 The *return / quit / exit* context button of the return to the previous screen, previous menu branch, cancellation of the entered change of option or parameter value

Quick start: minimum information for controller operation

Turning controller on and off

The illuminated red lamp signalises that the controller is ready to be activated.

To turn the controller on press the button 5.

The controller cannot be started if the supply voltage is lower than 9V.

After the activation the controller is automatically switched to the working screen of the tracks.

To turn the controller off press and hold down the button 5 for about 3 seconds until the message "> TURNING OFF <" meaning the acceptance of the system shutdown command appears on the screen.

The shorter press of the button 5 cancels the optional alarms and turns on / off the PAUSE function.

The controller switches off automatically when during work the supply voltage drops below 7V.

The automatic shutdown does not cause the loss of the readout of the hectare counters and path counter.

Graphical selection screen

Below there is the appearance of the main selection screen which leads to the selected measurement and control functions (working screens) and settings (MENU):



In order to access the graphical selection screen, starting from anywhere, press the button 9 (*return*) until the screen appears as presented above.

This screen is located at the top of the menu structure of the controller. All the other screens and setup *MENU* are the branches of "the trunk", i.e. the graphical selection screen.

The screen consists of the fields, in this case - of 4 fields, meaning the individual selection options:

- *S.T.* means the working screen of the track control
- *COUNT* means the working screen of the hectare counters
- *MEASURE* means the working screen of the (speed and output) meters
- *MENU* opens the access to the controller setups and AD system properties

One field is always optically distinguished (selected). To select the other field press the button 6 (*up*) or 7 (*down*).

The press of the button 8 (*next*) switches from the graphical selection screen to the specific function hidden under the distinguished field - one of 3 working screens, or to the *MENU* setups.

Working screens

Each of 3 working screens is different, contains the other elements, but all of them have one common element, i.e. the status line located at the top of the screen and the status bar above it.

The following information elements may appear on the status bar:

- **PAUZA** [PAUSE] marker of the activation of the pause during which the automatic path count does not operate; the function is activated manually by the button 5, the lamp 1 shines at the same time.
- **STOP** [STOP] marker of the activation of the level sensor which locks the hectare count
- **START** [START] information on the preparation for the setup of the initial path number, appropriate for the selected tracking mode
- **KASUA** [CANCEL] information on the preparation for the cancellation of the marked hectare counter
- **↔** marker of the prompts informing of the fact which of the buttons 6..9 can be used at the specific moment; the arrow corresponding to the inactive button disappears
- text information on the system status or alarm cause

The elements appropriate for the selected working screen are below the status line.

In case of the working screen of the tramlines following information appears on the screen:

- the current number of path and (behind the separator "/") information on the numbers of paths where the markers of tracks will be active
- the current speed of the machine in km/h
- the statuses of active cylinders that control the tracks (retracted, extended, during work, closing)
- the seed level in the container (if installed - is a seed level sensor)

On the activated working screen of the tramlines the user can:

- increase freely the number of the path (ranging from the first to the maximum one) by the button 6 (*increase*)
- set the initial number of the path in the selected mode, by pressing twice the button 8 (*select*)



On the screen: number of the current path =3, maximum number of the path (tramline) =4, current speed 12,9 km/h, first cylinder extended, second cylinder in motion, seed level in the container (currently low);

on the status bar: visible activated manual pause function, active buttons - left, right, up

In case of the working screen of the hectare counters there are 2 identical and independently working hectare counters, i.e. "daily" *ha* and "total" *ha+* visible on the screen.

These counters can be cancelled independently. To select the counter to be cancelled press the proper button 6 (*upper*) or 7 (*lower*), then the selected counter starts flashing and the following message **PAUSE** [CANCEL] appears on the status bar.

The pressed button 8 (*accept*) cancels the flashing counter, the pressed button 9 (*quit*) withdraws the preparation for the cancellation.

The cancellation of the counter, if accepted, is irreversible.

On the working screen of the speed meters the current speed of movement expressed in *km/h* and the current output of sowing expressed in *ha/h* are visible.

Furthermore this shows the filling level of the container, the same as on the screen of the tracks.

All the functions on the working screen of the meters are for informative purposes only and they cannot be changed.

Menu

The switch from the graphical selection screen into the menu function causes the appearance of the selection tree on the screen.

The detailed structure of the menu tree together with the description of the individual options is annexed to this instruction manual. The selected individual elements of the setting menu are described separately in further part of the manual.

The buttons 6 and 7 (*up, down*) are used to select the menu branch.

The button 8 (*next*) is used to move to the next menu level, finally, to the setup and the acceptance of this setup modification.

The button 9 (*exit, back*) is used to return to the higher menu branch or to cancel the parameter after modification without saving.

The access to the certain menu options (branches), these indicated by the cursor < located on the right side of the option name, implies the selection of the specific option, even if no parameters hidden deeper under this option were further modified.

In this case the „*back*” button does not restore the previous setups but the access to the setup to be set as active is required.

All the modifications of the setups are saved in the memory which does not require to be powered while leaving *MENU* and since then they are used until the next modifications of the setups are introduced by the user.

Basic controller operation

During the machine work the following control features are useful:

- The deactivation of the alarms (if they are set) by the button 5, the user can deliberately lock the burdensome warning signals (see page 15)
- The PAUSE function activated by pressing the button 5 shortly, indicated by the adequate message on the status bar and illumination of the lamp 1, is used to lock the undesirable counts of the paths during the manual lifting of the machine on the obstacles
- The manual adjustment of the path number and the automatic setting of the initial path on the working screen of the tracks
- The help screen accessible during the activation of the controller - to open this screen press and hold down the button 8

Components of AD system

The AD system consists of the permanent and optional components: modules, cables and connectors. The basic division line of the system runs between the tractor and the machine and differentiates the components between the local ones, i.e. which can be attached to the tractor, and the external ones, i.e. which can be detached from the tractor and which are equipment of the agricultural machine.

Furthermore the components can be divided into the permanent ones, i.e. without which the system cannot work, and the optional ones, i.e. which allow the selection of solution or complete abandonment (at the cost of the lack of specific functions).

Some of the components are called the bus ones because they communicate with the controller of the AD system only digitally, so they have the interface compatible with the bus of the AD system.

The local components include the permanent elements:

- system controller
- hub device
- power cable (connection of the hub device with the battery)
- main internal signal cable (connection of the hub device with the 7-pin socket)
- signal cable of the controller (connection of the controller with the hub device)

and optional elements:

- local wheel sensor
- local additional sensor (status, tracks)
- AD GPS module or other bus module compatible with the AD system providing information about speed, location, covered distance etc.

The external components include the permanent elements:

- main actuator module of the tracks
- actuator cylinders of the tracks
- main internal signal cable (connection of the actuator module with the 7-pin socket)

and optional elements:

- external wheel sensor
- external additional standard sensors (status, tracks, shaft revolution)
- external additional bus sensors (e.g. seed level)

To ensure the minimum functionality one (local or external) sensor at least **must** be connected to the system; this can be used to count the paths; additionally one sensor or bus (local or external) source of speed and distance signal at least **should be** connected.

Assignment of installed sensors to measurement functions

The AD system has the open configuration and in case of many functions - allows their flexible adaptation to the features of the agricultural machine and applied components of the system. One of the basic opportunities is the significant freedom in the assignment of the functions to the sensors, even a way itself of the connection of the certain sensors to the system.

Any really connected sensor designed for the operation of the specific function can be selected to the performance of the definite function. Only the sensor selected in the controller menu is used for the cooperation with the specific system function. The exceptions include the functions which optionally can use more signals. Every function of the sensor control can be switched off by selecting the *-NONE-* option.

The capabilities of the AD20 controller in this field are described below:

- **Wheel sensor** (speed, output, hectares) - more details on page 13

The active wheel sensor can be the sensor connected to the actuator module (external *WHEEL*):

MENU > SENSORS > SPEED / FIELD > MACHINE WHEEL

or to the hub device (local *I1*):

MENU > SENSORS > SPEED / FIELD > TRACTOR WHEEL

The provision of the substitute wheel circumference is required for the proper work of the wheel sensors.

furthermore the speed and distance signals can be proved by the bus module connected to the hub device (local), e.g. GPS module:

MENU > SENSORS > SPEED / FIELD > BUS

- **Track sensor** (count of paths) - more details on page 12

The active track sensor can be the sensor connected to the actuator module (external *IMPL*):

MENU > SENSORS > TRACKS > MACHINE

or to the hub device (local *I2*):

MENU > SENSORS > TRACKS > TRACTOR

The selection of the work mode and the provision of the response times to opening and closing are required for the proper work of the track sensors.

- **Status sensor** (STOP function) - more details on page 13

The active status sensor can be the sensor connected to the actuator module (external *IMPL*):

MENU > SENSORS > STOP FUNCTION > MACHINE

or to the hub device (local *I2*):

MENU > SENSORS > STOP FUNCTION > TRACTOR

- **Seed level sensor**- more details on page 13

The active status sensor can be any sensor connected to the actuator module (external). There are available the sensor single-threshold with tuning (connected to *SRX* or *BUS*):

MENU > SENSORS > SEED LEVEL > SINGLE-THRESHOLD

or the multi-threshold providing the precise readout of the container filling level (connected to *SRX + STX*):

MENU > SENSORS > SEED LEVEL > MULTI-THRESHOLD

It should be added that the seed level sensors are the digital bus modules that are automatically integrated with the system. However, their operation on the screen of the AD20 controller requires the selection of the specific type of the sensor in the menu, as described above.

Operational tramline programming

The cycle of the path count is selected by the user from among several ones determined and factory-built in the device.

The tracking modes are a consequence of the relations between the working width of the sowing-machine and the working width of the sprayer that should be the multiple of the sowing-machine width.

This means that there is the specific combination number of the path count and tramline activation.

The AD20 controller offers the following tracking modes that can be freely selected or changed any time by the user (there is available the multiple of the detector width in relation to the sowing-machine width, e.g. the combination of the sowing-machine 3 m and the sprayer 15m means the multiple of *5):

when sowing with returns - respectively the modes:

- track on the **4th** path (from the field edge: we start from the 2nd path) - multiple of *4
- track on the **5th** path (from the field edge: we start from the 3rd path) - multiple of *5
- track on the **6th** path (from the field edge: we start from the 3rd path) - multiple of *6
- track on the **7th** path (from the field edge: we start from the 4th path) - multiple of *7
- track on the **8th** path (from the field edge: we start from the 5th path) - multiple of *8

and when sowing around the field - respectively the modes:

- track on the **7th** and **8th** path (from the field edge: we start from the 3rd path) - multiple of *4
- track on the **9th** and **10th** path (from the field edge: we start from the 5th path) - multiple of *5
- track on the **11th** and **12th** path (from the field edge: we start from the 5th path) - multiple of *6
- track on the **13th** and **14th** path (from the field edge: we start from the 7th path) - multiple of *7
- track on the **15th** and **16th** path (from the field edge: we start from the 7th path) - multiple of *8

The path number can be adjusted by the button 6 (*increase*) on the working screen of the tracks.

The response of the cylinders is shortly delayed.

Furthermore the number of the initial path, proper for the used working mode, can be set automatically. For this purpose press the button 8 (*set*); the message **START** meaning the readiness of the initial path setting appears on the status bar. The next press of the button 8 (*save*) makes that the initial number of the path is recorded as the current one. To quit press the button 9 (*annul*).

The tracking mode is selected as follows:

MENU > TRACKS > OPERATION MODE > select

Then the mode is selected by the buttons 6 (*increase*) and 7 (*decrease*), the selection is finally confirmed by the button 8 (*save*).

The working width of the sowing-machine is determined as follows:

MENU > MACHINE PARAMETERS > TOTAL WIDTH > set

Then the width is determined by the buttons 6 (*increase*) and 7 (*decrease*), the determination is finally confirmed by the button 8 (*save*).

The construction of the machine also forces the proper setups of the operation mode and the response time of the path count sensor:

MENU > SENSORS > TRACKS > TRACTOR or MACHINE > OPERATION MODE > select
available ZWIERANIE, OPENING, FREE CHANGE

MENU > SENSORS > TRACKS > TRACTOR or MACHINE > CLOSING TIME > set

MENU > SENSORS > TRACKS > TRACTOR or MACHINE > OPENING TIME > set

Substitute wheel circumference; automatic measurement and manual adjustment

The correct value of the substitute wheel circumference (i.e. the distance covered by the machine between two subsequent impulses from the wheel sensor) is crucial for the proper measurement of speed, output and hectare counters.

The substitute wheel circumference can be entered manually or calculated automatically by the controller.

For this purpose the test path at the precisely measured section specified by the controller during the procedure is needed. This is 100m, 50m or 30m as a standard and depends on the operation properties of the specific sensor input.

The needed length of the test section can be checked on the menu tree enclosed to this instruction manual.

The manual setup of the wheel circumference:

*MENU > SENSORS > SPEED / FIELD > MACHINE WHEEL (or TRACTOR WHEEL)
> SET MANUALLY > set*

Then the distance between the impulses from the sensor is determined by the buttons 6 (*increase*) and 7 (*decrease*), the value is finally confirmed by the button 8 (*save*).

To activate the function of the automatic wheel measurement place the machine at the beginning of the previously prepared proper test section then select:

*MENU > SENSORS > SPEED / FIELD > MACHINE WHEEL (or TRACTOR WHEEL)
> SET AUTOMATICALLY > PATH Xm > READY*

Then drive the test section (at any speed) and precisely at its end confirm the completion of the measurement by the button 8 (*ready*).

The wheel circumference will be calculated and presented on the screen, with the automatic switch into the manual adjustment. The repeated press of the button 8 (*save*) completes the process.

Use of level sensor - STOP function

The STOP function unlike the PAUSE one released manually by the button 5 is activated by the sensors and it is optional.

The same physical sensors than can be assigned to the function of the path count are used for the operation of the STOP function.

This means that in particular the same sensor can be used to count the paths and operate the STOP function at the same time. This does not make problems because the STOP function does not affect the track count but only the hectare count.

Furthermore the operation of the physical sensor is independent for every function assigned to it separately and these setups do not affect each other.

The status sensor for the STOP function - if it is to be activated - is programmed as follows

MENU > SENSORS > STOP FUNCTION > TRACTOR or MACHINE >select
available *CLOSING* or *OPENING* as the condition that is to be interpreted as the STOP of the hectare counters

Types of seed sensors; calibration of threshold seed sensor

The AD system may use 2 different seed sensors. The type of the used sensor should be set in the configuration:

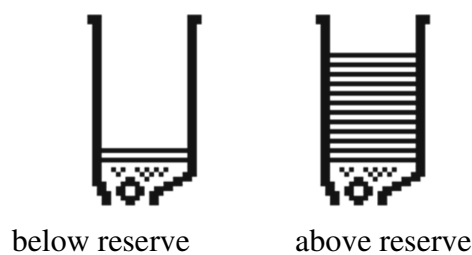
MENU > SENSORS > SEED LEVEL > ...

Available *-NO-* sensor, *SINGLE-THRESHOLD* sensor and *MULTI-THRESHOLD* sensor.

The type of the sensor must conform with the actual sensors connected to the system. If e.g. the single-threshold sensor is selected but in fact the multi-threshold sensor is connected then the sensor is ignored by the controller and the system reports the fault (*NO MODULE*). If both sensors are connected to the system only the sensor selected in the settings is used.

In case of the proper installation, i.e. the conformity of the declared sensor with the actually connected one, the symbol of the container with the level indication appears on the screen of the AD20 controller.

In case of the single-threshold sensor whose task is to signal the "seed reserve", the drawing of the container is filled minimally when the level is below the reserve, and it is filled to the high level when the sensor is covered by the seed. The image is changed gradually.



The single-threshold sensor is physically installed in the place determined as the reserve level. Because this is the capacitive sensor whose sensitivity may be affected by dirt collected during the operation therefore it can be calibrated.

To perform the calibration fill the container up with the seed so that the sensor is half-covered and then press:

MENU > SENSORS > SEED LEVEL > SINGLE-THRESHOLD > CALIBRATE

Every press of the button 8 (*accept*) determines the level of the signalled reserve exactly at the level of the fill.

In case of the multi-threshold sensor the drawing of the container is filled exactly to the extent that corresponds with the fill height of the sensor over its entire length. Every line inside the drawing of the container means the physical and separately detected seed level.

For the multi-threshold sensor the user can select the level at which the alarm starts to be signalled:

MENU > SENSORS > SEED LEVEL > MULTI-THRESHOLD > ALARM PROGRAMMING > set

The range of the setups includes 10 lower thresholds.

The multi-threshold sensor works correctly when the cover of the container is lowered.

Otherwise the external factors may disturb the measurement.

The measurement error is signalled by the mark "?" inside the drawing of the container.

The contamination status of the sensor is signalled by the symbol "... " meaning the contamination.

Adaptation of alarm functions to the user's preferences

The AD20 controller reports the alarm conditions in 3 independent ways:

- the flashing of pause lamp (if simultaneously the pause is active, the light is intermittent, if the pause is not activated, the alarm causes the short flashes)
- the cyclic sounds
- the text message with the description of the problem displayed in cycles on the status bar

The alarms are divided into critical and periodical.

The critical alarms which mean the error or defective work of the system cannot be switched off. They can be removed when the cause is solved.

The critical alarms include:

- *MODULE ERROR* - one or more bus modules does not respond or cannot be configured according to the expectations of the controller
- *CYLINDER ERROR* - one or more cylinders does not operate properly (usually closing of cable or other cause of overload)
- *SETTING ERROR* - setups in the controller memory are defective, the system cannot be properly configured to the operation

The reporting and handling of the periodical alarms which include:

- *LOW SEED LEVEL* * - the seed level is below the reserve
- *SOWING ERROR*** - the sowing shaft rotates irregularly which may mean that the continuous variable transmission or shaft clutch is damaged

can be freely determined for each of the signalling way separately:

MENU > ALARMS > LAMP or SOUND or SCREEN-MESSAGE > select
available complete deactivation of alarming way (*OFF*), option of alarm cancellation (*CANCEL*) by the button 5 (*alarm locking*) and permanent activation of alarming way (*ON*)

*) The bus seed sensor must be installed and activated in the system

***) The sowing shaft sensor/sensors must be installed and activated in the system

Configuration of outputs

The basic AD actuator module for the control of the tracks has 3 cylinder outputs (operating in the retract - extend mode).

Each of the outputs has the programmable work time of the engine which should be appropriately selected so that the cylinder can be completely retracted / extended with the engine stopped when the accumulator is not supported by the alternator and the supply voltage is lowest.

Furthermore each of the cylinders can be deactivated separately setting the work time to 0.0 seconds.

The work time of the cylinders is set as follows:

MENU > OUTPUTS > CYLINDERS > CYLINDER 1 or CYLINDER 2 or CYLINDER 3 > set

Other functions, system testing

Selecting in the menu:

MENU > TEST, OTHER > ...

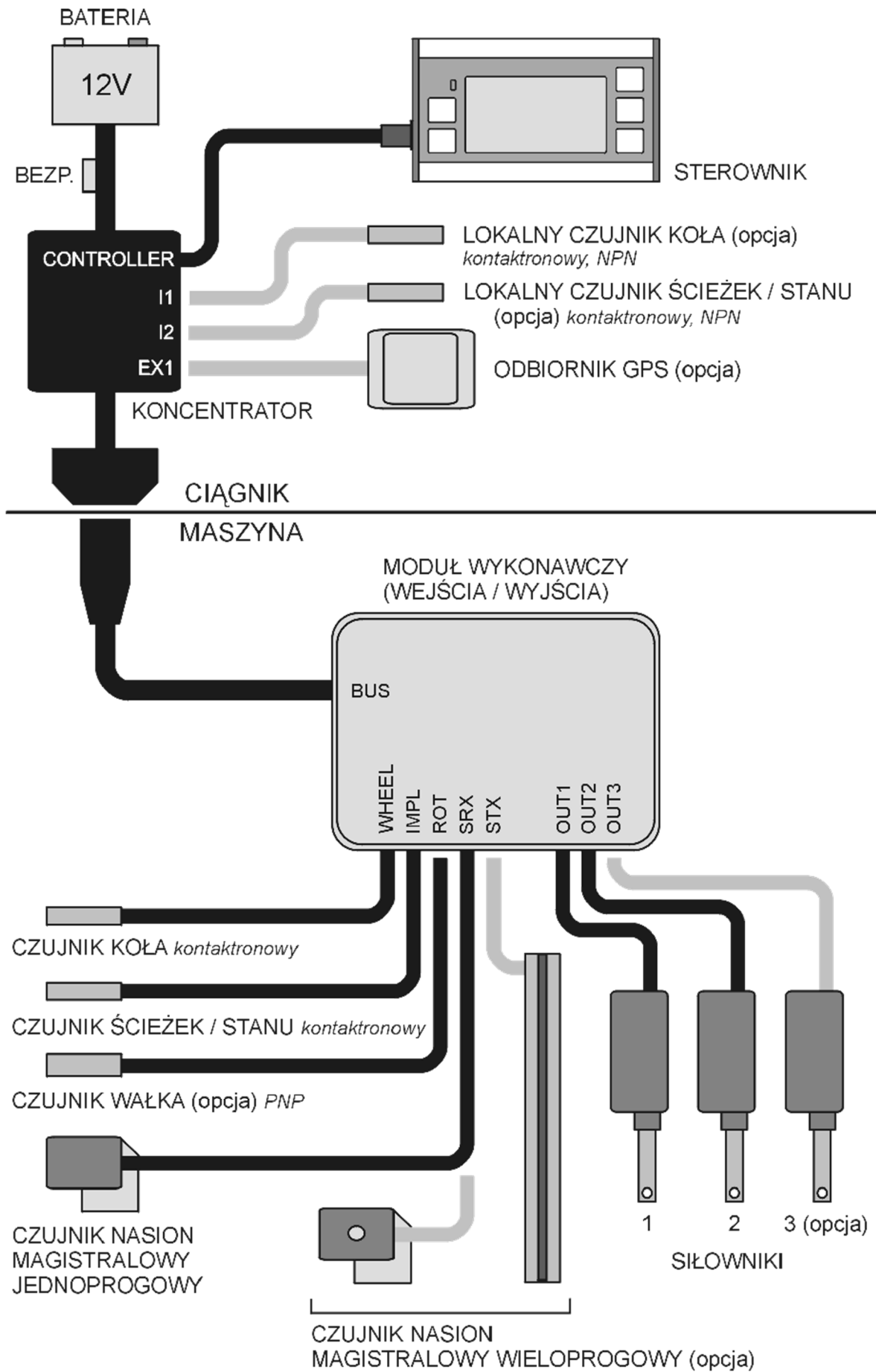
the AD20 controller allows the analysis of the system, functionality of the connected modules, operation of the sensors, proper response of the inputs and status of the outputs.

Because these are the service functions generally intended for the technical service of for the needs of the remote cooperation of the service department with the user, they will not be discussed in this document.

Besides the strictly service functions the test menu allows also the selection of the language from among the languages available in the specific software version:

MENU > TEST, OTHER > SELECTION OF LANGUAGE > select

Installation diagram of system for AD20 controller



PL	ENG
BATERIA	BATTERY
BEZP.	BATTERY
STEROWNIK	CONTROLLER
LOKALNY CZUJNIK KOŁA (opcja), kontaktronowy, NPN	LOCAL WHEEL SENSOR (option), reed, NPN
LOKALNY CZUJNIK ŚCIEŻEK / STANU (opcja), kontaktronowy, NPN	LOCAL TRACK/STATUS SENSOR (option), reed, NPN
ODBIORNIK GPS (opcja)	GPS RECEIVER (option)
KONCENTRATOR	HUB DEVICE
CIĄGNIK	TRACTOR
MASZYNA	MACHINE
MODUŁ WYKONAWCZY (WEJŚCIA / WYJŚCIA)	ACTUATOR MODULE (INPUTS / OUTPUTS)
CZUJNIK KOŁA, kontaktronowy	WHEEL SENSOR, reed
CZUJNIK ŚCIEŻEK / STANU, kontaktronowy	TRACK/STATUS SENSOR, reed
CZUJNIK WAŁKA (opcja), PNP	SHAFT SENSOR (option), PNP
CZUJNIK NASION MAGISTRALOWY JEDNOPROGOWY	BUS SINGLE-THRESHOLD SEED SENSOR
CZUJNIK NASION MAGISTRALOWY WIELOPROGOWY	BUS MULTI-THRESHOLD SEED SENSOR
SIŁOWNIKI	CYLINDERS
(opcja)	(Option)

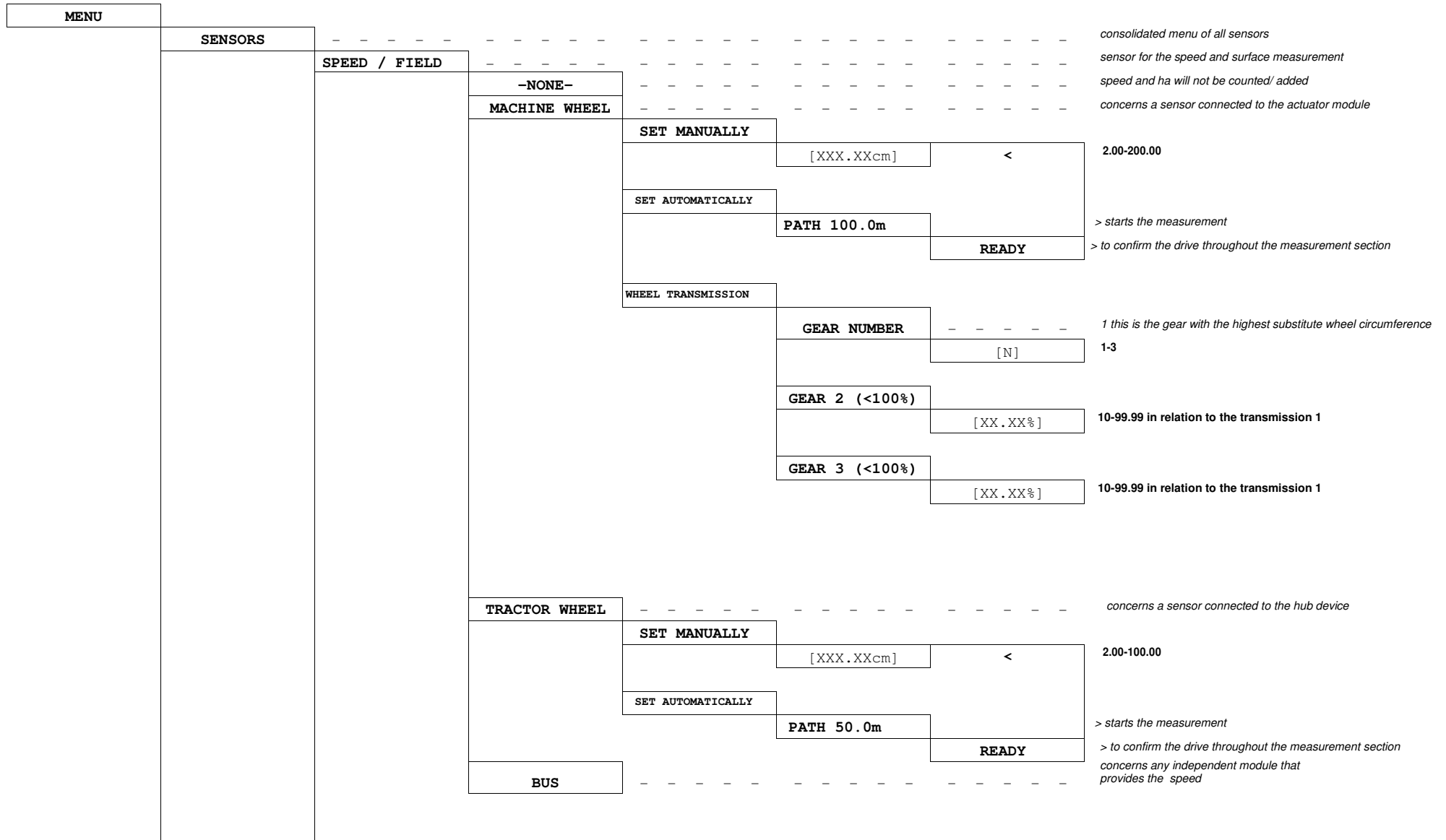
Technical data

parameter	value	unit
Power consumption of standard actuator module in disabled state during work	<5 <160	mA
Power consumption of AD20 controller in disabled state during work	<6 <30	mA
Power consumption of single-threshold seed sensor in disabled state, connected to SRX in other cases	<1 <14	mA
Minimum permitted supply voltage during start-up during work (momentary drops)	9 7	V
Maximum permitted continuous supply voltage	17	V

The values of the program parameters are included in diagram of the MENU tree which is annexed to this instruction manual.

NOTES:

menu AD20 v3



menu AD20 v3

MENU

SENSORS

TRACKS	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	sensor for the count of path numbers
-NONE-	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	tracks will not be counted
MACHINE	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	concerns a sensor connected to the actuator module
	WORK MODE			[mode name]			CLOSING, OPENING, FREE CHANGE
	CLOSING TIME	- - - - -	- - - - -	[XX.Xs]	- - - - -	- - - - -	minimum value for activation 0.1-5.0 with step of 0.1s
	OPENING TIME	- - - - -	- - - - -	[XX.Xs]	- - - - -	- - - - -	minimum value for activation 0.1-5.0 with step of 0.1s
TRACTOR	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	concerns a sensor connected to the hub device
	WORK MODE			[mode name]			CLOSING, OPENING, FREE CHANGE
	CLOSING TIME	- - - - -	- - - - -	[XX.Xs]	- - - - -	- - - - -	minimum value for activation 0.1-5.0 with step of 0.1s
	OPENING TIME	- - - - -	- - - - -	[XX.Xs]	- - - - -	- - - - -	minimum value for activation 0.1-5.0 with step of 0.1s
STOP FUNCTION	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	sensor that causes the lock of ha count
-NONE-	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	ha counters will not be locked by the sensor
MACHINE	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	concerns a sensor connected to the actuator module
				[mode name]			CLOSING, OPENING
TRACTOR	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	concerns a sensor connected to the hub device
				[mode name]			CLOSING, OPENING

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MENU

SENSORS

SEED LEVEL	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	sensor that indicates the container filling level
	-NONE-	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	sensor is not used
	SINGLE-	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	module of the single-threshold sensor will be used
		CALIBRATE	- - - - -	- - - - -	- - - - -	- - - - -	> will cause the calibration of the sensor threshold
	MULTI-	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	module of the multi-threshold sensor will be used
	ALARM PROGRAMMING	- - - - -	- - - - -	- - - - -	- - - - -	determine the level that will activate the alarm of the low seed level	
		[N]	- - - - -	- - - - -	- - - - -	1-10	
SOWING SHAFT	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	optional sensor (sensors) that controls the proper operation of the sowing shaft	
	[mode name]	- - - - -	- - - - -	- - - - -	- - - - -	NONE, WAVING TEST*, ROTATION TEST*, WAVING TEST + ROTATION TEST*	
ALARMS	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	configuration of alarm signalling	
LAMP	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	alarming by red light	
	[off/cancel/on]	- - - - -	- - - - -	- - - - -	- - - - -	NONE, CANCELABLE, ACTIVATED	
SOUND	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	alarming by sound	
	[off/cancel/on]	- - - - -	- - - - -	- - - - -	- - - - -	NONE, CANCELABLE, ACTIVATED	
SCREEN-MASSGE	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	alarming by the massage on the screen	
	[off/cancel/on]	- - - - -	- - - - -	- - - - -	- - - - -	NONE, CANCELABLE, ACTIVATED	
TRACKS	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	configuration of tracking control	
SENSOR	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	configuration of sensor	
	to menu	- - - - -	- - - - -	- - - - -	- - - - -	short-cut to the appropriate branch in the menu "SENSORS"	
WORK MODE	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	configuration of paths	
	[mode]	- - - - -	- - - - -	- - - - -	- - - - -	automatically defined as in T1	

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MENU

MACHINE PARAMETERS	-----				settings of physical parameters of the machine
TOTAL WIDTH	-----	-----	-----	-----	working width
	[cm]	-----	-----	-----	100-1000; overwrites "TRACK WIDTH"
TRACK WIDTH	-----	-----	-----	-----	set if there is other than total width on the track
	[cm]	-----	-----	-----	100-1000
MACHINE WHEEL	-----	-----	-----	-----	substitute wheel circumference and transmissions
	to menu	-----	-----	-----	short-cut to the appropriate branch in the menu "SENSORS"
OUTPUTS	-----				configuration of accessible actuator outputs
CYLINDER	-----				
CYLINDER 1	-----	-----	-----	-----	0-40,0s ;0 = cylinder deactivation
	[work time]	-----	-----	-----	
CYLINDER 2	-----	-----	-----	-----	0-40,0s ;0 = cylinder deactivation
	[work time]	-----	-----	-----	
CYLINDER 3	-----	-----	-----	-----	0-40,0s ;0 = cylinder deactivation
	[work time]	-----	-----	-----	test menu and other configuration
TEST, OTHER	-----				
SYSTEM MODULES	-----				status of functions available in the system
	[info]	-----	-----	-----	
OUTPUT LINES	-----				state of activation of available inputs
	[info]	-----	-----	-----	
OUTPUTS	-----				state and status of available power outputs
	[info]	-----	-----	-----	
		-----	-----	-----	POLISH, ENGLISH*