CONTROLLER HC6500

Instruction book - SW 1.2X

67002900-111 - Version 1.11
GB - 10.2008

We congratulate you for choosing a HARDI plant protection product. The reliabi-
lity and efficiency of this product depend upon your care. The first step is to
carefully read and pay attention to this instruction book. It contains essential
information for the efficient use and long life of this quality product.

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Declaration of conformity

CE

Manufacturer: Importer:

HARDI INTERNATIONAL A/S

Helgeshøj Allé 38

DK 2630 Taastrup

DENMARK

declare that the following product;

Model no.

Serial no.

A. was manufactured in conformity with the provisions in the COUNCIL DIRECTIVE of 22 June 1998 on mutual approxima-tion of the laws of Member States on the safety of machines (98/37/EEC) with special reference to Annex 1 of the Directive on essential health and safety requirements in relation to the construction and manufacture of machines.

B. was manufactured in conformity with the provisions in other relevant COUNCIL DIRECTIVES.

C. was manufactured in conformity with the current standards implementing harmonised standards in accordance with Article 5 (2) and other relevant standards.

Taastrup, 04. 2006

Lars Bentsen

Product Development Manager

HARDI INTERNATIONAL A/S

Operator safety

This symbol means DANGER. Be very alert as your safety is involved!

This symbol means WARNING. Be alert as your safety can be involved!

This symbol means ATTENTION. This guides to better, easier and more safe operation of your sprayer!

General info

Note the following recommended precautions and safe operating practices.

Read and understand this instruction book before using the equipment. It is equally important that other operators of this equipment read and understand this book.

Keep children away from the equipment.

If any portion of this instruction book remains unclear after reading it, contact your HARDI dealer for further explanation before using the equipment.

Turn electrical power off before connecting and disconnecting the display and transducers, servicing or using a battery charger.

If an arc welder is used on the equipment or anything connected to the equipment, disconnect power leads before welding.

Test with clean water prior to filling with chemicals.

Do not use a high pressure cleaner to clean the electronic components

Press the keys with the underside of your finger. Avoid using your fingernail.

General info

General info

The HARDI Controller HC 6500 is for use in agricultural and horticultural production. The Controller permits automatic control of volume rate, tracking and operation of other features.

The HC 6500 is a CAN system. This allows communication through cables that are smaller and more flexible.

The controller itself contains a ❷ key that is always active and all menu pages contain a help text at the bottom of the display that explains the actual menu and choices. In many cases, these two features allow you to find the needed information without using the instruction book. Once installed try the ❷ key as one of the first thing. Also note the bottom of the display once the 🔲 key is pressed.

Main components are:
• Terminal HC 6500 (on tractor)
• Grip HC 6300 (on tractor)
• SetBox HC 6400 (on tractor)
• FluidBox HC 6200 (on sprayer)
• Jobcom HC 6100 (on sprayer)
• Flow transducer (on sprayer)
• Speed transducer (on sprayer or tractor)

The Terminal has a 4,7" colour display. Working pictures will be shown in different colours depending on the function used. Display readout includes volume rate, speed, liquid rate per minute, total covered area, total volume sprayed and 99 trip registers. It includes a total register that summarizes data from the 98 trip registers. It is illuminated internally so readout is possible even for night-time work.

Functions include correct area with closure of up to 13 spray boom sections, up to 27 alarm functions and possibility for audio/visual alarm etc. There are also 23 warnings depending on operation. Alarms and warnings will be shown in the bottom left corner 1/4 of the display.

The Grip has integrated controls for the spray functions (up to 13 sections) main ON/OFF, boom raise, boom lower, boom slant, boom tilt left and right and status diode.

The transducers utilised are chosen for long service life and good signal quality. The speed and flow transducer has a built-in diode that will flash thereby indicating it functions, to aid servicing.

The Terminal is also compatible for Variable Rate Application and is prepared for communication with Precision Farming tools (e.g. HARDI AutoSectionControl).

Data dump of registers and configuration to a personal computer are possible.

The system has a non-volatile memory with no battery which simplifies storage. All parameters in the menus are saved in the memory and are not lost when the power is disconnected.

The Terminal, SetBox and Grip should be protected from moisture and removed for storage if the tractor does not have a cabin. The components are rain and dust proof and have been developed to last many years under agricultural conditions.

Optional transducers include pressure and revolutions readout. Other options include a 12 Volt printer and a foot operated remote ON/OFF for the main ON/OFF.

3 - Description

HARDI LookAhead

With LookAhead, the pressure regulation valve can predict the correct setting before the main switch goes to ON. It improves application precision, also when re-starting after a tank fill.

LookAhead helps farmers who have tractors with semiautomatic gearbox, meaning the "hardimatic" function does not work due to constant PTO revs.

The LookAhead system has 3 main features:

1. To improve regulation response time when sections are shut OFF or opened.

2. To improve regulation response time when the spraying speed changes during headland turns.

3. To stabilise regulation during pressure/flow fluctuations in the period immediately after main ON/OFF function is turned ON.

The LookAhead feature is active when the boom is unfolded and the LookAhead menu is activated and calibrated.

When the power is switched to ON, note the regulation valve will adjust from the actual setting to the minimum setting and then back again to determine its actual position.

For LookAhead to function correctly the controller must know which nozzles and application rate will be used. This is selected from a number of nozzle choices stored in memory. At start up of the controller, it will promt user for a choice between using nozzles used at last spray job or select a new nozzle to be used.

ATTENTION! The tractor gearbox must be an automatic or semi-automatic type with constant revolutions P.T.O. or the tractor must be driven with constant R.P.M. for the LookAhead to work properly.

Pressure based regulation (optional equipment)

To improve the non-equal systems EFC and PrimeFlow an optional sensor can be mounted to switch from flow to pressure based regulation. When active, the system automatically switches to pressure based regulation when the flow drops below the minimum flow rate for the flowmeter.

The drop of flow can be due to number of sections selected for the boom and number of nozzles in each section. If there are few or only one nozzle in the last section of the boom and the sprayer is spraying in an angle and only the last section is open there is almost no flow in the liquid system, resulting it to close down.

Same will happen if the sprayer is fitted with a large flow house. The flowmeter will stop rotating and measure no flow with small boom sections or nozzles with low output.

SafeTrack and IntelliTrack

SafeTrack and IntelliTrack are a steering mechanism for the HARDI sprayers. When using a track system, sprayer stability is a common concern. Many factors influence the sprayer and conditions where the sprayer might tip over have to be dealt with. The factors that the driver can influence with are:

- Driving behaviour

- Field conditions

- Tyre width

- Tyre pressure

Read sprayers instruction book for further information.

If unsafe driving occurs an alarm will be triggered, and the sprayer will align. Be aware that the alarm can not be turned off as long as unsafe driving still occurs! (See paragraph "Menu 3.6 Track")

ATTENTION! If necessary the level of security can be adjusted - please contact your local HARDI dealer.

DANGER! The system has been calibrated during driving on flat fields. Special attention should be made when driving in hilly conditions.

DANGER! When driving on fields with deep tracks, then the speed must be decreased.

HeadlandAssist

HeadlandAssist is a function that will close the main ON/OFF and raise the boom.

If the boom is slanted to one side it will go to neutral when the main ON/OFF is closed. The boom will automatically slant to opposite side when the main ON/OFF is switched on again (mirror function).

The HeadlandAssist is recognized by two extra potentiometers for sensing of boom lift and slant - both placed on the center section.

The following rules apply to the enabling of HeadlandAssist:

1. Only pressing ON/OFF will activate HeadlandAssist. Closing all sections will not start the delay and move the boom. Pressure regulation and LookAhead will remain to function.

2. HeadlandAssist can be activated by entering a value in menu 2.2.4.

3. Menu 2.2.1 Auto main ON/OFF is only active when HeadlandAssist is in manual mode or when it is disabled.

HeadlandAssist jumps to manual mode in the following situations:

1. Long press OFF on main ON/OFF button.

2. Slowing down below 1.8 km/h while spraying. Note that stopping in the headland can be done with closed nozzles and staying in Auto mode.

3. Operating the boom while the system is positioning it.

4. Pressing main OFF before the expiry of the delay.

5. Folding the inner wing.

3 - Description

System description

Overall description

1. HC 6500 Terminal.
2. HC 6400 SetBox.
3. HC 6300 Grip.
4. HC 6100 Jobcom junction box.
5. Harness for the tractor.
6. Harness for the cabin.
7. Harness for the sprayer.
8. Speed sensor & pulse ring.
9. Flow sensor.
10. Power supply to sprayer.
11. Hydraulics block.
12. EFC junction box
13. Electric Fluid Control unit.
14. LookAhead pressure control.
15. LookAhead boom position sensor.
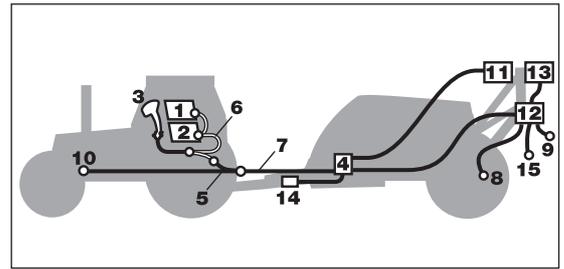
Keys

General key description

A. Preset keys:

Vital information whilst spraying is quick and easy to access. With just one preset key press information is shown in lower left corner of display. Pressing same botton twice will show a graphic information of same readout on volume rate and speed.

B. Soft keys:

Soft keys control optional features. Pressing a soft key will activate it. When any of the 4 soft keys (F1, F2, F3 or F4) are pressed the soft key menu appears in the "large right" area.
The number of levels in the soft key menu system depends on the number of functions.

C. Navigation keys:

The navigation keys are initially used for set up in the menu system by coding in values. The navigation keys can change the volume rate in a set percentage or fixed volume rate.

C is used to clear a value or register.

ESC is used to escape back to your working screen.

? Is used if you have questions to the menu you are in. A short help text will appear.

D. Numeric keys:

These are very much like a mobile phone. It is very easy to enter text like a field name. They are also used to key in a value or direct access a menu.
The numeric keys are used when a name or a number is keyed in.
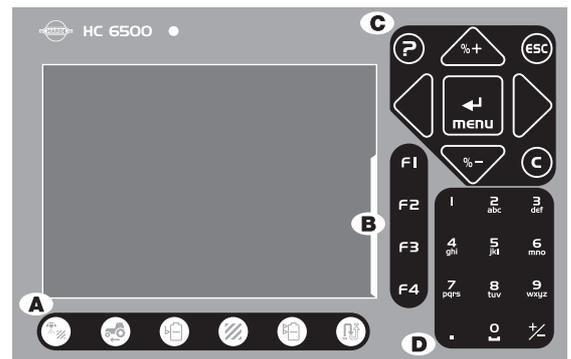
Help key

The help key is always active. It is the operator's built-in quick guide and instruction manual. After the help key has been activated, an explanation of any control key or switch is shown on a full screen. Furthermore, if a message, warning or service reminder appears, more details are found by pressing the help key. This will free the operator from finding details in the instruction manual.

Press **?** to activate help text.

Press **?** to leave help function.

3 - Description

Terminal HC 6500

1. Status diode.

2. Preset key - Volume rate.

3. Preset key - Speed.

4. Preset key - Tank contents.

5. Preset key - Area treated.

6. Preset key - Total volume sprayed out.

7. Preset key - Distance or area remaining.

8. Help key.

9. Scroll up or down, change a value or volume rate.

10. Escape a menu.

11. Enter menu or confirm a value.

12. Move cursor to right or left.

13. Clear a value.

Icons for status:

auto	Volume rate Automatic	⚠	Warning	Track ▶	Track Crab right	A B	Options B on	🔒	Pendulum Locked
	Volume rate Manual	✉	Information	TWIN	TWIN Manual	A B	Options both on	🔓	Pendulum Unlocked
	Variable rate (GPS) active	Track auto	Track Automatic	TWIN 1	TWIN Preset 1	A	Dual Line A on	auto	HeadlandAssist on
✓	All "OK"	Track	Track Manual	TWIN 2	TWIN Preset 2	B	Dual Line B on		Headland Assist Mirror
STOP	Stop (critical)	Track ▶◀	Track Lock	A B	Options A on	A B	Dual Line both on		Headland Assist Centre slant
Track ◀	Track Crab left	A B	Options both off		Dual Line both off	man	Headland Assist Manual		
⏳	HeadlandAssist waiting mode	% 0	Over or under application						

Night illumination

It is possible to choose between day and night illumination. Go to menu [2.7.1 Choose day/night colours] for selection. Picture shows night illumination.

SetBox HC 6400

The SetBox controls secondary functions. The keys are large so even at a distance, operation can be carried out. The keys are grouped into control areas to simplify operator understanding.

1. Power ON/OFF.

2. Status diode.

3. Pendulum lock controls.

4. Boom fold controls.

5. Automatic volume rate.

6. Manual pressure control.

7. Foam marker regulation.

8. Foam marker ON/OFF.

9. TWIN presets.

10. Air slot for TWIN.

11. Air volume for TWIN.

12. Valve function A-B.

13. HeadlandAssist automatic.

14. HeadlandAssist manual.

15. HeadlandAssist boom centring.

16. SafeTrack manual control.

17. SafeTrack align

18. SafeTrack automatic selection.

19. SafeTrack manual selection.
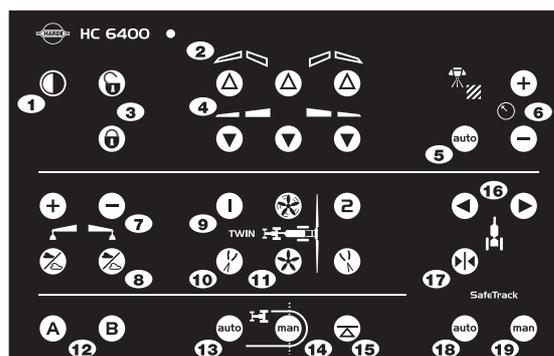
Grip HC 6300

The Grip is an ergonomical remote unit that can be easily mounted inside the tractor cabin. All common functions required during normal spraying can be operated with the Grip.

The Grip cannot be switched ON or OFF separately. It receives the power supply from the Terminal HC 6500. It is therefore automatically switched ON or OFF with the Terminal.

1. Status diode.

2. Boom section controls (up to 13).

3. Main ON/OFF.

4. Tilt.

5. Boom height.

6. Boom slant.

7. TWIN presets.
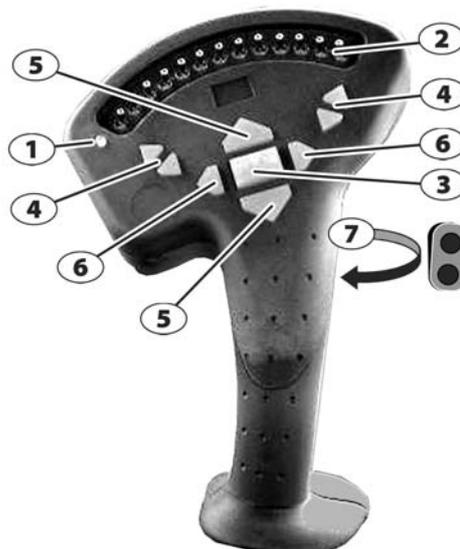
3 - Description

FluidBox HC 6200

The FluidBox is used in conjunction with AutoAgitation, AutoFill and AutoWash. It is a remote control of the liquid system and is logically placed at the filling area (storage locker). All the stationary spraying operations can be performed without the need to enter the tractor cabin. This is a time saver and greatly reduces potential cabin contamination. Other operations, like activation of the main ON/OFF, can also be done; a neat feature when checking nozzles.

1. Emergency STOP of all functions.

2. Status diode.

3. Main ON/OFF.

4. Spray pressure increase and decrease.

5. AutoFill start.

6. AutoFill manual open of valve and AutoFill pause.

7. AutoAgitation override control.

8. Suction SmartValve override control.

9. Pressure SmartValve override control.
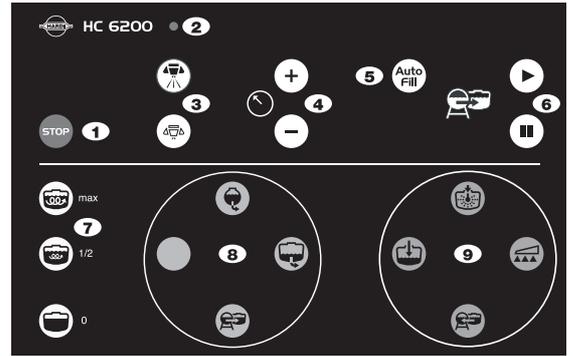
Display symbols

1. The 1st Line is for status and register number.

2. The 2nd Line is for boom, foam marker and end nozzles

3. The bottom half can be set-up to show 1 or 2 and up to 5 boxes with information.

Soft keys: When activated 4 rows appear beside the bottons F1 - F4.

Alarm and warning error number will be shown in the upper right corner of the display. The number has an exclamation sign in front of it, as this is also used for register number indication.

General keystrokes, daily settings

Press ⏎ to enter the menu system.

Note that the menu numbers are unique to each line or page.

When adjustments are made in settings the display will be as shown.

The two markings > > show the actual menu where you are located. It is now possible to go up and down by using the ▲ and ▼ keys, or by pressing the menus last digit at the numeric keypad; e.g. pressing "6" for menu [4.6 Speed simulation].

The last value which is used, is marked with this symbol ®

In the bottom of the display there will be help text for each menu. Where you see the two > > you will see the help text for that menu only.

This display setup will be shown every time adjustments have to be made in the menu.

4 TOOLBOX
» 4.1 Measure
4.2 Service interval: Hours until
4.3 Stop-watch
4.4 Alarm clock
4.5 Test
4.6 Speed simulation
4.7 Emergency track Align
4.8 Computer CAN status
To measure distance and area. Setup working width
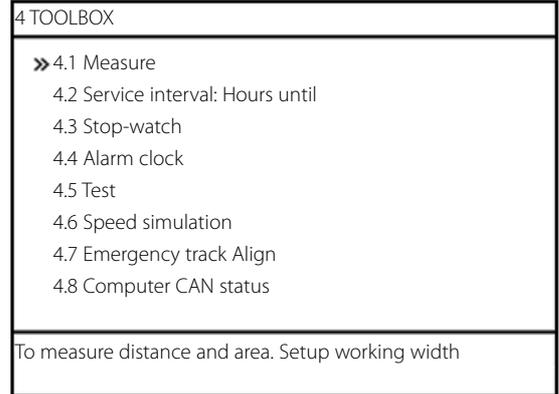
General keystrokes, Example: Tank contents

Press ⏎ to enter [1.2 TANK CONTENTS].

To clear value move cursor to digit and press C
To move the cursor press ◀ or ▶ .
Press ▲ or ▼ to set the desired value, or key in value on numeric keys.
Press ⏎ to confirm.
Press ESC to exit.

1.2 Tank cont.

4 .00

litre

To change displayed tank contents. Use arrow or numeric keys to set
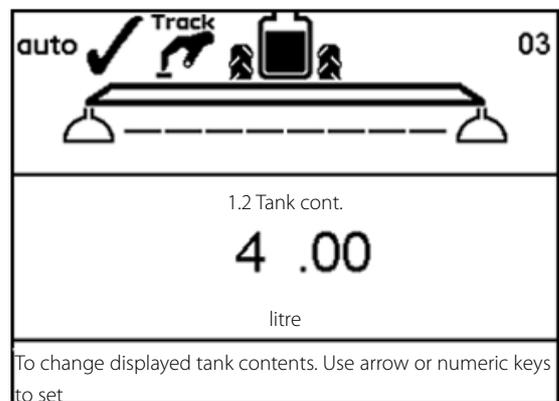
Keystroke menu tree

The first steps to choose a menu are shown below.
Press ⏎ to proceed into the menu. See the relevant section in the book.
Press ESC and hold to exit the menu system.

Extended menu

This menu has been set up by your HARDI Service centre. It contains parameters that are typically set only once, normally before the Controller is used.

ATTENTION! Unless instructed, do not tamper with the settings and values in these menus. Failure to do so may void warranty.

3 - Description

Auto functions

General info

The Soft key buttons F1, F2, F3 and F4 are used for the functions AutoWash, AutoFill, End Nozzles and Dual Line. See a complete menu tree in chapter "Soft keys".

AutoWash with AutoSectionControl

When using AutoWash with HARDI AutoSectionControl then HARDI AutoSectionControl needs to be disabled when spraying out the diluted rinse water in the field that has just being sprayed.

Disabling the HARDI AutoSectionControl can be done in two ways:

A. Resetting the treatment data in HARDI AutoSectionControl. This method is not recommended when interrupting an ongoing spray session.

B. Go to menu [2.3 VRA / Remote control] in HC 6500 and select sub-menu [2.3.1 VRA / Remote control disable]. This intervenes the HARDI AutoSectionControl's covering of treated areas and allow the HC 6500 to spray out the diluted rinse water at an already treated area.

2.3 VRA / Remote control
» 2.3.1 VRA / Remote control disable
2.3.2 VRA / Remote control enable
Variable Rate Application / Remote control disabled. Dish icon will disappear
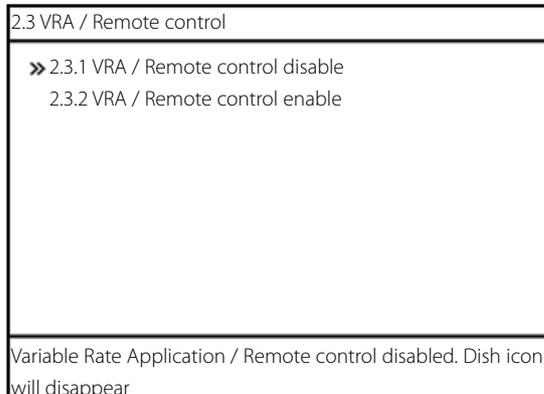
AutoWash

AutoWash is used when the sprayer has to be cleaned. When AutoWash operates, it takes control of both suction SmartValve and pressure SmartValve.

The AutoWash functions are meant as an aid for the user to get an complete cleaning of the sprayer. But it is not intended to do the following 3 things:

Do not:

• use AutoWash at stand still. Stationary washing can cause point contamination.

• put cleaning agent in the rinsing tank.

• pause a wash program and add cleaning agent into the main tank.

In case the amount of water in the rinsing tank is not enough for the selected AutoWash program, the Controller will promt "Not enough rinse water". You will need to fill the rinsing tank before attempting to use the AutoWash program again.

ATTENTION! When AutoWash has ended and main valve is being activated, then both suction and pressure valves automatically turn back to correct positions used when spraying.

WARNING! The AutoWash functions are meant as an aid for the user to get an complete cleaning of the sprayer. HARDI cannot undertake any responsibility that possible operational faults from the operator result in a poor cleaned sprayer.

The following programs are available to wash the sprayer:

BoomFlush:

Rinses the spray lines. Takes about 3 minutes and will use approximately 100 litres from the rinsing tank. This is used when there is an interruption in the spray job, e.g. rain.

Spray the rinse water at nominal driving speed to avoid overdosing. Spraying distance for rinse spray is approximately 350 metres at 7km/h.

Explanations to the chart below:

A: Suction SmartValve

B: Pressure SmartValve

C: Main ON/OFF

D: CycloneFilter boost

E: Agitation

BoomFlush	A	B	C	D	E
01					
02					
03	●	●	●	●	●
04	●	●	●	●	●
05	●	●	●	●	●
06	●	●	●	●	●
07	●	●	●	●	●
08	●	●	●	●	●
09	●	●	●	●	●

3 - Description

FastFlush:

This is a quick, basic wash. Takes about 9 minutes and will use approximately 200 litres from the rinsing tank. Used for planned stop where the same pesticide is sprayed next day in the same crop.

Spray the rinse water at nominal driving speed to avoid overdosing. Spraying distance for rinse spray is approximately 1100 metres at 7km/h.

MultiRinse:

The extended wash takes about 25 minutes depending on nozzle size, and will use approximately 400 litres from the rinsing tank. Used if there is a slight change in pesticide or crop or the next spraying task is in compatible pesticide/crop combination.

The cleaning process is done in the field so the residues do not end up in the farm yard. The operator stays in the cabin thus avoiding contamination from equipment and the sprayed crop to himself and the tractor cabin.

Spraying distance for rinse spray is approximately 2100 metres (1100m at 7km/h, then 1000m at 3,5 km/h).

In AutoWash steps 16 to 39, the chemical in the sprayer is diluted and you can reduce driving speed, whereby dose rate (litres/ha) is increased. This makes driving and washing more comfortable. Recommended speed is the half of normal spraying speed.

Note that driving speed reduction must be due to lower gear selection. P.T.O. revolutions must be 450 r/min or higher for AutoWash to operate.

Also note that spraying time is unchanged as flowrate and spray pressure is the same as for normal spraying.

Explanations to the chart below:

A: Suction SmartValve

B: Pressure SmartValve

C: Main ON/OFF

D: CycloneFilter boost

E: Agitation

F: FlexCapacity Pump steps

MultiRinse		FastFlush		A	B	C	D	E
01		01						
02		02						
03		03		⦿	⦿	⦿	⦿	⦿
04		04		⦿	⦿	⦿	⦿	⦿
05		05		⦿	⦿	⦿	⦿	⦿
06		06		⦿	⦿	⦿	⦿	⦿
07		07		⦿	⦿	⦿	⦿	⦿
08		08		⦿	⦿	⦿	⦿	⦿
09		09		⦿	⦿	⦿	⦿	⦿
10		10		⦿	⦿	⦿	⦿	⦿
11		11				F		
12		12		⦿	⦿	⦿	⦿	⦿
13		13		⦿	⦿	⦿	⦿	⦿
14		14		⦿	⦿	⦿	⦿	⦿
15		15		⦿	⦿	⦿	⦿	⦿
16	22	28	34	⦿	⦿	⦿	⦿	⦿
17	23	29	35	⦿	⦿	⦿	⦿	⦿
18	24	30	36	⦿	⦿	⦿	⦿	⦿
19	25	31	37			F		
20	26	32	38	⦿	⦿	⦿	⦿	⦿
21	27	33	39	⦿	⦿	⦿	⦿	⦿

3 - Description

SoakWash:

Wash of sprayer between jobs with incompatible crops must be done according to prescriptions from chemical producer. Use e.g. AllClearExtra, as this is a commonly used cleaning agent. If your chemical prescribes an other cleaning agent and/or an other cleaning procedure, you must follow that.

Procedure for wash with a cleaning agent, e.g. AllClearExtra:

Step 1: Wash sprayer in field with MultiRinse

Step 2: Drive to farm fill station

Step 3: Prepare sprayer for cleaning with cleaning agent, e.g. AllClearExtra. Fill water in the main tank to 10% of capacity (respectively 350 litres, 500 litres, 700 litres). Fill the rinsing tank completely. This water is used later in step 6.

Step 4: With the FluidBox, operate sprayers valves according to cleaning agent instructions.

• Wash the main tank with the cleaning nozzles.

• Fill the boom tubes with cleaning agent from the main tank.

• Rinse the safety valve.

• Rinse the PressureEmpty hose.

• Rinse the Agitation valve, hose and tube.

Wash the ChemFiller with cleaning agent water from the main tank. This also rinse ejector with cleaning agent water.

Step 5: Spray out water with cleaning agent and chemical residue. Note that this still contains active chemical and choose an appropriate area to spray out this. Be aware of chemical accumulation in case the same area is used repeatedly.

Step 6: Use FastFlush to wash out all remains of the cleaning agent. This is to avoid that the cleaning agent remains in the fluid system. Remains could damage the next spray chemical filled into the main tank.

If the pesticide label does not state otherwise, the following schematic are recommendations as to when to use BoomFlush, FastFlush, MultiRinse or SoakWash.
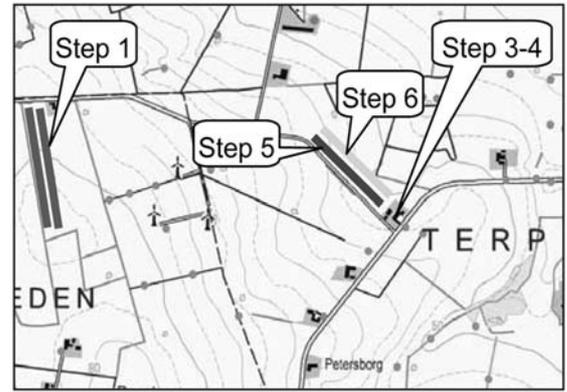
	Interruption Stop spraying due to wind, rain, heat ect.	**Planned stop** Same pesticide and crop next day	**Slight change** In pesticide or crop. Compatible pesticide-crop	**Conflict** Dangerous pesticide crop combination
Pesticide	Same pesticide morning and evening	Same pesticide morning and evening	Different pesticide	Incompatible pesticides
Crop	Same crop	Same crop	Similar crops	Different crops
Examples	E.g. Brand X morning and evening	E.g. Brand X morning and evening	E.g. Fungicide in wheat followed by insecticide in barley	E.g. Herbicide in wheat then spray in sugar beet
No cleaning	No crop damage. Boom might drip. Sedimentation.	No crop damage. Boom might drip. Sedimentation.	**Little crop damage**	**Severe crop damage**
BoomFlush	Safe	Probably ok	**Little crop damage**	**Severe crop damage**
FastFlush	Not possible. Main tank not empty	Safe	Probably ok	**Crop damage**
MultiRinse	Not possible. Main tank not empty	Safe but overkill	Safe	Probably ok except when chemical binding occurs
SoakWash (FastFlush & MultiRinse)	Not possible. Main tank not empty	Safe but overkill	Safe but overkill	Safe

3 - Description

Cleaning results:

	BoomFlush	FastFlush	MultiRinse	SoakWash	TankFlush	ChemFiller Wash
Liquid system	Partially	Completely	Completely	Completely	Partially	No
Boom lines	Yes	Yes	Yes	Yes	No	No
Main tank	No	Yes	Yes	Yes	Yes	No
ChemFiller	No	No	No	Yes	No	Yes
Rinse action steps		2	7			
Residual concentration		10%	0.05%			
Total amount - Rinse water		140 Litres	300 Litres	480 to 990 Litres	200 Litres	From FastFiller or RinseTank
Time (24 m boom, ISO F110-03)	1 min	2 min	20 min	20 min. +	8 min	
Action	From cabin	From cabin	From cabin	Add neutral agent, ChemFiller	Connect hose	Operate ChemFiller valves

AutoFill

AutoFill is used when the sprayer has to be filled totally or filled to a specified amount of water.

The specified amount has to be keyed into the Display. Press F1 for Edit filled and key in the volume. The filling is started by pressing AutoFill on the HC 6200 FluidBox.

4 buttons are active on the FluidBox when a filling amount has been keyed in at the display:

⬤ button: Used to stop any filling.

AutoFill button: Opens FastFiller valve and activate monitoring for stop.

Play button: Opens FastFiller valve. Monitoring for stop is not activated.

⬤ button: Closes FastFiller valve.

If the system has to be stopped when filling, you have to press the ⬤ or the ⬤ button on the FluidBox or "Abort" on the display.

The are 3 methods of filling the sprayer, which is decribed in the following:

1. Use the ChemFiller while using the AutoFill.

2. Stop AutoFill, then use the ChemFiller and then continue with use of AutoFill.

3. AutoFill a half tank, use the ChemFiller and then fill the rest with AutoFill.

Method 1:

1. Setup AutoFill litres on softkeys.

2. Press the "AutoFill" button

3. Operate the 3 manual valves for ChemFiller while filling chemicals (see seperate instruction book).

4. AutoFill stops filling at the selected amount of litres.

5. If the ChemFiller is not emptied out before the main tank is filled, use water with chemical in MainTank to flush ChemFiller.

Method 2:

1. Setup AutoFill litres on softkeys.

2. Press the "AutoFill" button.

3. Operate the 3 manual valves for ChemFiller while filling chemicals (see seperate instruction book).

4. Press (❚❚) button to close the FastFiller valve, which pauses the filling.

5. Operate the Suction SmartValve and Pressure SmartValve on the blue and green buttons at the FluidBox.

6. Operate the 3 manual valves for ChemFiller while filling chemicals (see seperate instruction book). When the chemicals is loaded into the main tank, containers are cleaned etc. then continue with:

7. Press the "AutoFill" button to continue the AutoFill process.

8. Close the lid on the ChemFiller.

9. Operate the 3 manual valves for ChemFiller to rinse the ChemFiller with clean water from the rinsing tank.

Method 3:

1. Setup AutoFill litres to half tank filling on softkeys.

2. Press the "AutoFill" button.

3. Await that the AutoFill process stops at half full tank.

4. Operate the Suction SmartValve and Pressure SmartValve on the blue and green buttons at the FluidBox.

5. Operate the 3 manual valves for ChemFiller while filling chemicals (see seperate instruction book). When chemical is loaded to MainTank, containers are cleaned etc. continue with:

6. Setup AutoFill litres to full tank on softkeys.

7. Press the "AutoFill" button to activate the AutoFill process.

8. Close the lid on the ChemFiller.

9. Operate the 3 manual valves for ChemFiller to rinse the ChemFiller with clean water from the rinsing tank.

ATTENTION! Agitation will stop when filling, and re-start when filling has been stopped.

ATTENTION! AutoFill function can not be used when boom is unfolded.

ATTENTION! If the sprayer does not have electric suction and pressure valves, then valves should be set for filling to main tank before pressing AutoFill button - refer to the sprayers instruction book for further instructions.

3 - Description

End nozzles (Fenceline) (optional)

If End nozzles/Bijet are fitted, set the value to the equivalent coverage by the boom nozzles. E.g. End nozzle coverage is 2 metres. This is equal to [04 Boom nozzles]. Choose End Nozzles by pressing F3. When end nozzle is active it will be shown in the display with to icons in the end of the boom line.

Set up of end nozzles/Bi-jet can be done from menu 3.3.4.

ATTENTION! It is important that the volume applied from the end nozzle or Bijet matches the volume applied under the boom. This is a comparison of volume per minute per length. (Litre/min/metre).

When the end nozzle or Bijet is active, the area covered and volume sprayed is calculated and registered. If "Active boom size" is displayed, it will show an increase when the end nozzle or Bijet is activated.

Dual Line

For limited markets only. If the sprayer is fitted with 2 sets of boom lines this function can be used to ensure volume rate and droplet size is maintained during large changes to forward speed.

The boom lines are pronounced A and B. The system is set up in menu 2.2.3 if it's active.

Choose that menu there is right for your spraying job. When Dual line is active it will be shown in the display with an icon.

The Dual line is set up so it reacts on pressure or speed.

PrimeFlow

Primeflow is pressure based system for circulation of liquid to the nozzles before the actual spraying starts. It prevents sedimentation and ensures a homogenous pesticide before spraying onto the ground.

It is only relevant for sprayers equipped with liquid system with PrimeFlow. The Prime flow liquid system has to be set up from the Extended menu at installation. The HARDI Service centre does this.

AutoAgitation

AutoAgitation will ensure an even agitation as the tank empties. The agitation flow is regulated to prevent foam and minimize liquid residues when the tank is empty. It is possible to select different settings for optimal agitation. AutoAgitation is also a part of the AutoWash program.

TWIN Preset

It is possible to set the air volume and air angle in 2 different positions in menu 2.2.5 to 2.2.5.2, for headwind and tailwind. When air volume and air angle are set a long key press (position 1 headwind) will store the present setting. The same setting can be done for (position 2 tailwind). TWIN preset can be setup so it will shift automatically from position 1 to position 2 when the main ON/OFF is activated.

HARDI AutoSectionControl

HARDI AutoSectionControl is a fully automatic system that opens and closes booms sections as necessary. HARDI AutoSectionControl manages the sections when driving over sprayed area like into a headland or wedge or around obstacles like trees etc. HARDI AutoSectionControl is a small module connected to the HC 6500 and to a GPS receiver. When spraying, the HARDI AutoSectionControl automatically records the area sprayed. In a typical situation where the headland is sprayed first, HARDI AutoSectionControl will now automatically close the sections if the operator passes over a sprayed area.

Tractor installation

Control units

Find a suitable place in the tractor's cabin to secure the control units from movement. Best recommended placement is to the right of the driver seat. The supplied bracket will fit most tractors. Threaded mounting holes may be hidden behind front corner cover.
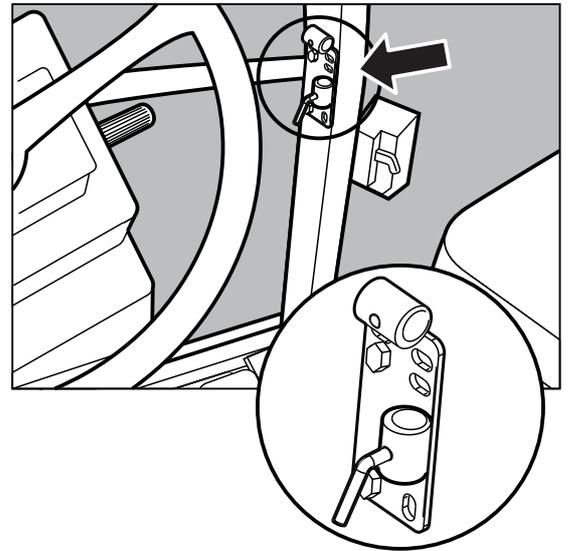
Installation of control unit brackets

The supplied tractor pillar bracket (A) has a hole spacing of 100 and 120 mm. Check tractor instructions manual for information regarding attachment points.

Three tubes (B) are supplied. One, two or all 3 may be used. They can be bent and shortened. A spacer (C) is also supplied to allow further attachment possibilities. Find the best solution for your tractor or vehicle.

Tube (B) plate is staggered so if correctly orientated, all boxes will line up.
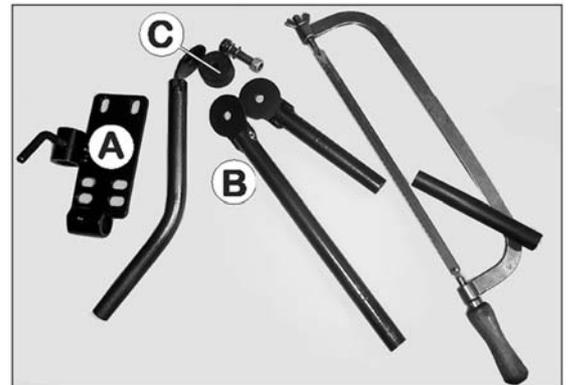
The recommended setup is to place the spacer (C) between the two tubes (B) used for the controllers and the 3rd tube (B) which is to be mounted in the bracket (A), as shown on the picture.

ATTENTION! An extension cable is available as an option if the HC 5500 control unit is to be placed further away from the EFC control unit. (Ref. no. 261933)

Power supply

The power requirement is 12-15 Volt DC. Always note polarity!

Red wire is positive (+)

Black wire is negative (-).

Power supply must come directly from the battery. For proper function of the electric equipment, the wires must have the following recommended cross sectional areas and correct fuses to ensure a sufficient power supply. The delivered power connectors follows the standard of most newer tractors. If having a tractor with another power connector it is necessary to disassemble connector and fit it to the actual tractor connector.

Use the HARDI power cable 26013900. A 25 amp fuse is located on the positive connection. Use the HARDI Electric distribution box (Ref. no. 817925) if the tractor has a doubtful wiring.
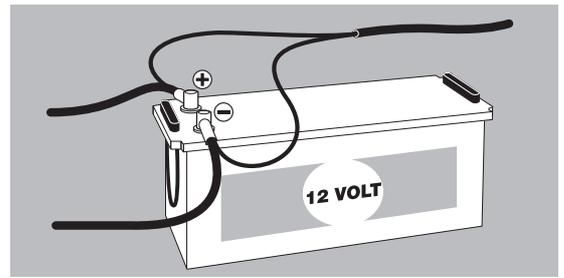
WARNING! Do not connect to the starter motor or generator/alternator. Warranty is void if this is done.

ATTENTION! See paragraph "System start-up" for more about connecting the controller.

Mounting of tractor harness

Mount fuse on (+) pole at tractor battery.
Connections are as follows:
A: Red.
B: Red/Brown.
C: Yellow.
D: Mounted on (+) pole at tractor battery.

E: Black.
F: Black/White.
G: Blue.
H: Mounted on (−) pole at tractor battery.
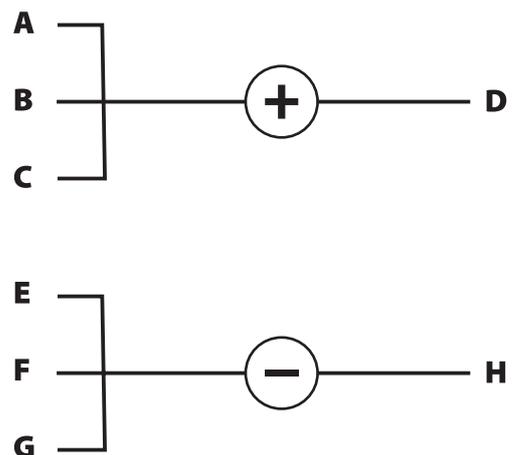
WARNING! Connector "H" must be connected to (−) pole on the battery. Do NOT connect to ground on tractor as this might blow the controller!

Printer

If the 12 Volt printer is fitted, the supplied tube can be utilised to fit the printer on the Controller/Terminal brackets.

ATTENTION! The Controller/Terminal should be protected from moisture and should be removed when not in use, if the tractor does not have a cabin.

Speed transducer for sprayer

The speed transducer is located at the inside of the sprayers right wheel. It is an inductive type that requires a metallic protrusion to pass by it to trigger a signal. To trigger a speed ring is used. It should be adjusted so transducer is placed to the centre of the holes in the speed ring (vertical direction). Recommended distance between protrusion and transducer (A) is 3 to 6 mm. Check this in the whole circumference. Correct fitting is indicated by constant blinking from transducer when the wheel rotates.
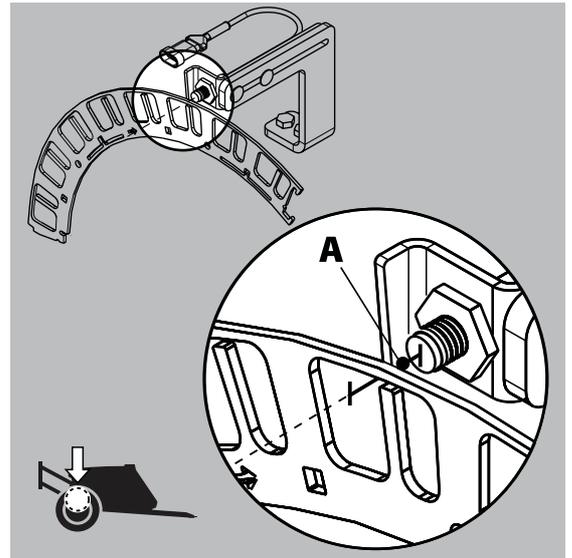
Speed transducer for tractor

It is possible to connect a speed sensor from tractor gearbox or radar/GPS to the controller. A speed/switch harness (A) and extension cable are needed to connect the speed transducer to the Controller/Terminal.

Foot pedal remote ON/OFF (optional)

Note the following if the Foot pedal remote is to be fitted.

Remote ON/OFF switch has to be activated from the extended menu at installation. The HARDI Service centre does this.

The speed/switch harness (A) is connected to the Controller/Terminal. Connect the plug from the Foot pedal ON/OFF to the correct connector on harness (A).

ATTENTION! The main ON/OFF valve switch at Grip overrides all remote switches. It must be set to ON for the optional Remote ON/OFF switch to function.

4 - System setup

Initial system start-up

The HC 6500 system with basic tractor equipment and sprayer control unit.

1. Terminal HC 6500.

2. SetBox HC 6400.

3. Grip HC 6300.

4. To Jobcom HC 6100 on sprayer.

5. Printer connection DB 9 COM1/COM2 port.

6. DB 25 connector harness with power and CAN communication.

7. Tractor harness.

8. Connector for tractor to Jobcom HC 6100.

9. Power from tractor battery with a 25 amp fuse.
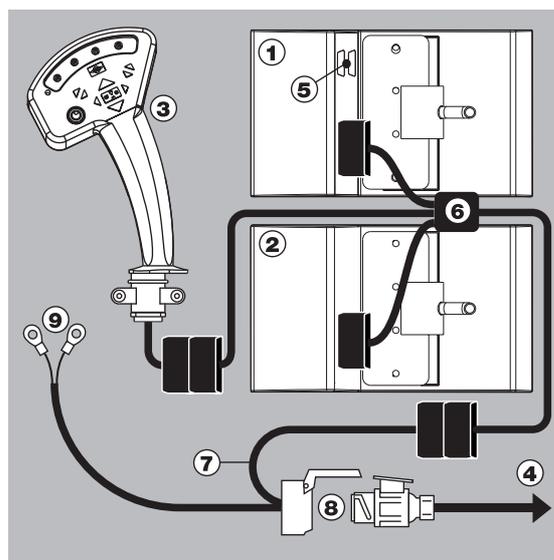
Daily settings

System start-up

When the HC 6500 is turned on then the controller is initiating it self. If the Controller is put into operation for the very first time it will prompt for date and time. Set clock to enable register. Refer to "Menu 2.4 Set clock" for details on setting of clock.

If LookAhead is enabled in the HC 6500 it will promt user for a nozzle choice - see section "LookAhead nozzle choice".

If the pressure based regulation is enabled in the HC 6500 it will promt user for a nozzle choice and minimum pressure - see section "Pressure based regulation".

LookAhead nozzle choice

If LookAhead or pressure based regulation is enabled the HC 6500 will promt user for a nozzle choice at every start-up of the controller. The present selected nozzle is designated by the (R) symbol at the line of the nozzle description in the display.
If the nozzle used at last spray job is going to be re-used, then press (ESC) or (menu).
Selecting another nozzle:
1. Select another nozzle by pressing ⬆ or ⬇.
2. Confirm the choice by pressing (menu).
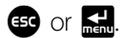
1.6 LookAhead nozzle select
» 1.6.01 Pink ISO 0075
1.6.02 Orange ISO 01
1.6.03 Green ISO 015
1.6.04 Yellow ISO 02
1.6.05 Lillac ISO 025
1.6.06 Blue ISO 03
1.6.07 Red ISO 04
1.6.08 Brown ISO 05
1.6.09 Grey ISO 06
Select nozzle for ISO 0075 0.3 l/min at 3 bars

If LookAhead is not calibrated then the screen changes to menu [3.7.1.1 Application rate]. Enter the expected application rate and press (menu) to spray and calibrate. Then prepare for calibration - see menu [3.7 LookAhead] for details on this.

auto ✓ Track 🚜 03

3.7.1.1 Application rate

120.000

litre/ha

Keyin planned application rate.
Press Enter to spray and calibrate
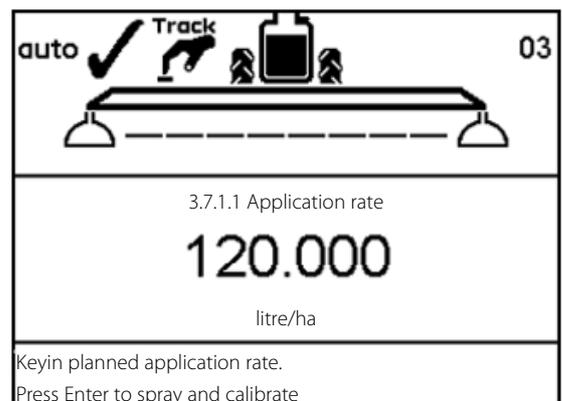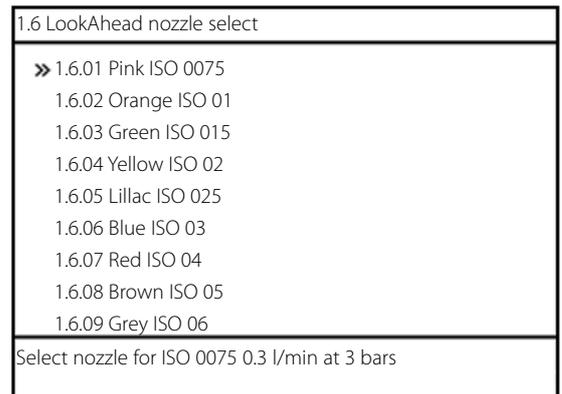
4 - System setup

Check LookAhead pressure regulation at speed change

1. Press (auto) button for pressure regulation on the HC 6400. Check that fly-leg icon appears in upper left corner of the display.

2. Go to menu [4.6 speed simulation]. Key in e.g. 9 km/h and press ⬅menu to use the value. Stay in this menu (i.e. do not press ESC to leave).

3. Start PTO at nominal RPM.

4. Press main ON/OFF at the grip to ON, to open all sections. Check that the pressure regulation valve rotates and that pressure stabilises at 5 bar.

5. In menu [4.6 speed simulation]. Key in e.g. 6 km/h and press ⬅menu to use value. Check that pressure regulation valve rotates and that pressure stabilises at 2 bar.

6. When pressure regulation valve is stable (i.e. does not rotate/adjust), then wait 30 seconds before proceeding.

7. Press main ON/OFF at the grip to OFF, to close all sections.

8. Go to menu [4.6 speed simulation]. Key in e.g. 9 km/h and press ⬅menu to use the value. Check if pressure regulation valve rotates counterclockwise (to reduce pressure) immediately after pressing ⬅menu. If pressure regulation valve rotates when all sections are closed, then LookAhead is activated and works correctly.

9. Press main ON/OFF at the grip to ON, to open all sections. After a delay of approx. 3 sec the pressure regulation valve begins rotating to adjust actual flow to set flow.
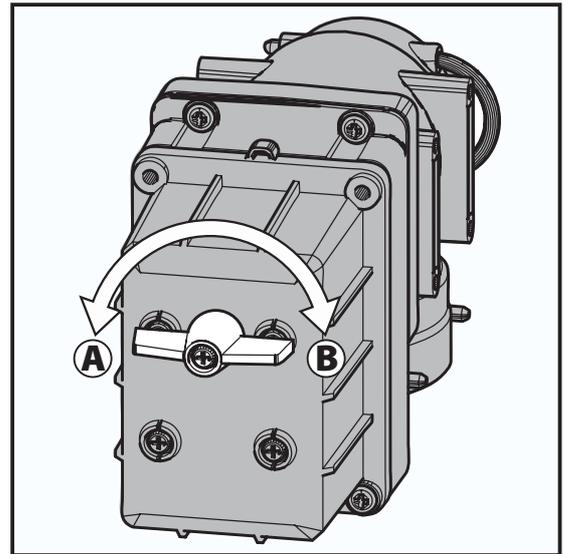
Rotation counterclockwise (A)	Rotation clockwise (B)
Decreasing pressure	Increasing pressure
Lower boom flow	Higher boom flow
Closing section	Opening section
Decreasing speed	Increasing speed

Open/close the Main On/off = No movement

Check LookAhead pressure regulation at section change

1. Go to menu [4.6 speed simulation]. Key in 6 km/h and press ⏎ to use the value.

2. Press ⎋ to leave to workscreen.

3. Press (auto) button for pressure regulation on the HC 6400. Check that fly-leg icon appears in upper left corner of the display.

4. Start PTO at nominal RPM.

5. Flip down all section switches.

6. Press main ON/OFF at the grip to ON, to open all sections. Check that pressure regulation valve rotates and that pressure stabilises at 2 bar.

7. Press main ON/OFF at the grip to OFF, to close all sections.

8. Flip up half of the section switches to close half of the sections. Check if pressure regulation valve rotates counterclockwise (to reduce pressure) immediately after the change of section switches. If pressure regulation valve rotates when all sections are closed, then LookAhead is activated and works correctly.
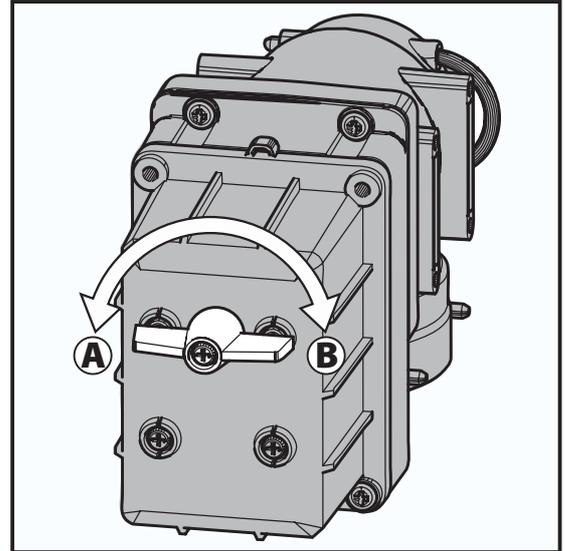
Rotation counterclockwise (A)	Rotation clockwise (B)
Decreasing pressure	Increasing pressure
Lower boom flow	Higher boom flow
Closing section	Opening section
Decreasing speed	Increasing speed

Open/close the Main On/off = No movement

Pressure based regulation (optional equipment)

When the pressure based regulation is enabled the HC 6500 will promt for a nozzle choice. The last used nozzle is designated by the ⓡ symbol at the line of the nozzle description in the display.

If the nozzle and application rate used at last spray job is going to be re-used, then press ⎋ and the work screen will appear.

If another nozzle will be used then confirm your nozzle selection by pressing ⏎. Then the minimum pressure screen will appear. If LookAhead is enabled, then LookAhead calibration will be done before menu [E8.1.3 Minimum pressure] appears.

In menu [E8.1.3 Minimum pressure] the minumum pressure allowed is typed in. Confirm by pressing ⏎.

In practice this means the regulation valve will stop if the pressure goes below this value. See "Check LookAhead pressure regulation at speed change" for illustration of pressure regulation valve functionality.

1.6 LookAhead nozzle select
≫ 1.6.01 Pink ISO 0075
1.6.02 Orange ISO 01
1.6.03 Green ISO 015
1.6.04 Yellow ISO 02
1.6.05 Lillac ISO 025
1.6.06 Blue ISO 03
1.6.07 Red ISO 04
1.6.08 Brown ISO 05
1.6.09 Grey ISO 06
Select nozzle for ISO 0075 0.3 l/min at 3 bars

E8.1.3 Minimum pressure

1 .00

Bar

Pressure where regulation valve starts. Needs a pressure sensor
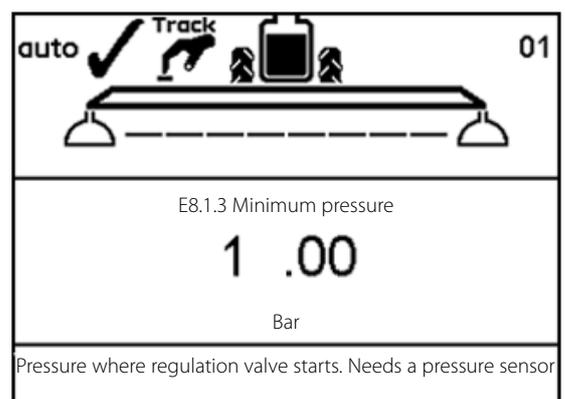
Menu 1.1 Volume rate

How to change the volume rate

The volume rate can be changed by:

1. Setting the desired rate in the Controller.

2. Manually raising or lowering the pressure via the SetBox (HC 6400)

3. Pressing ⏶ or ⏷ to apply over or under in a preset percentage, e.g. 10% (the % icon in the display indicates when this is active).

To read the volume rate:

Shortcut ⏚

Press ⏚ and hold until menu [1.1 VOLUME RATE] is shown.

To change volume rate:

Move cursor with ◀ or ▶ to the value to be changed.

Use ⏶ or ⏷ to change the value. Alternatively clear value by pressing **C** and key in value on the numeric keys.

Press ⏎ to confirm.

Manual dosage

To dose in manual mode, use the pressure buttons on the SetBox HC 6400. The manual mode is indicated by the ➡ symbol at the top of the display.

To go from manual to preset volume rate, press AUTO.
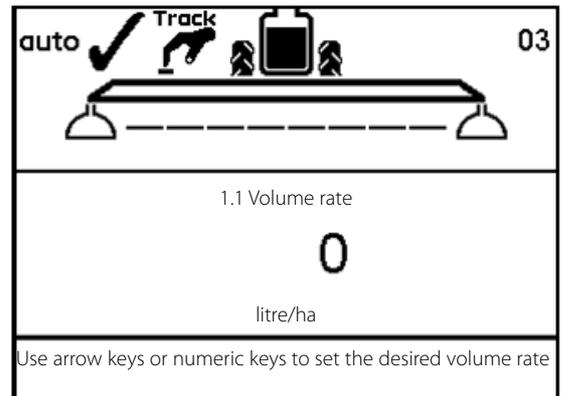
ATTENTION! Under 0.5 km/h, the Controller will not regulate automatically.


```
auto ✓ Track 🔥 👣🔋👣      03
       _____
       ⏚ ——————————— ⏚
      ─────────────────────────
            1.1 Volume rate

                 0

               litre/ha
      ─────────────────────────
  Use arrow keys or numeric keys to set the desired volume rate
```

5 - Menu 1 Daily settings

Menu 1.2 Tank contents

To change the displayed Tank contents

Shortcut ⊞

Press ⊞ and hold until menu [1.2 Tank contents] is shown.

Press ◀ or ▶ to move the cursor in order to change the value.

Press ▲%+ or %▼ to set the desired value.

Press ⏎menu to confirm.

The maximum size of the tank is displayed

Press ⊞ again and the tank contents maximum value is shown.

```
┌──────────────────────────────────────────┐
│ auto ✓  🏁Track  🚜 👥📦👥            03 │
│ ┌────────────────────────────────────┐   │
│ │                                    │   │
│ │ ⊻ ───────────────── ⊻              │   │
│ ├────────────────────────────────────┤   │
│ │           1.2 Tank cont.           │   │
│ │                                    │   │
│ │               0                    │   │
│ │                                    │   │
│ │             litre                  │   │
│ ├────────────────────────────────────┤   │
│ │ To change displayed tank contents. │   │
│ │ Use arrow or numeric keys          │   │
│ │ to set                             │   │
└──────────────────────────────────────────┘
```
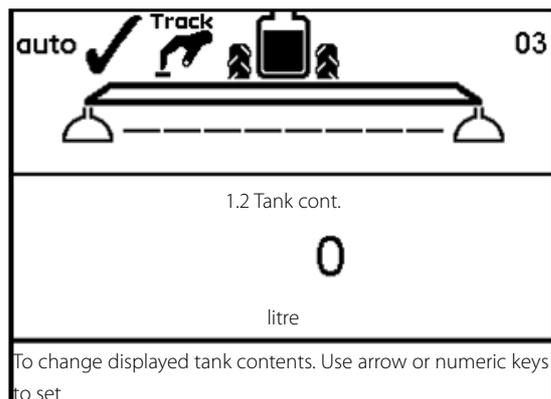
✋ ATTENTION! If the sprayer is fitted with Tank gauge, contents readout is automatic.

Menu 1.3 Select register

Menu 1.3.1 Register readout and selection

Register 1 to 98 can be used for individual areas.

Register 99 is a tally of register trips 1 to 98. They are identified with a number and it is also possible to name them. The data is memorised when the system is switched off.

To read the totals of all registers:

Shortcut 🔘

1. Press 🔘 and hold until menu [1.3 Select register] is shown.
2. Press 🔼 or 🔽 to go to register 99.
3. Press 🔁 to enter the register and read main data.
4. Press 🔁 again to see spray data.
5. Press 🔴 to exit the menu.

To read the data in the active register:

Shortcut 🔘

1. Press 🔘 and hold until menu [1.3 Select register] is shown.
2. Press 🔁 to enter register and read main data.
3. Press 🔁 again to see spray data.
4. Press 🔴 to exit the menu.

To change the register:

Shortcut 🔘

1. Press 🔘 and hold until menu [1.3 Select register] is shown.
2. Press 🔼 or 🔽 to change the register.
3. Press 🔁. If necessary, the register can be reset - see below.
4. Press 🔴 to exit the menu.

To reset register:

Press 🅲 and hold for 5 seconds to reset register. Status diode will blink once, and then blink again to indicate that register has been reset.

Reset of a register can be stopped if the 🅲 key is released before the status diode is blinks again.

1.3 Select register
» 1.3.1 Field 651
1.3.2 Field 68
1.3.3 Field 684
1.3.4 Field 64
1.3.5 Field 654
1.3.6 Field 6541
1.3.7 Field 687
1.3.8 Field 984
1.3.9 Field 1234
Use register 1 to 99 for job. Scroll to register, then press Enter to show data
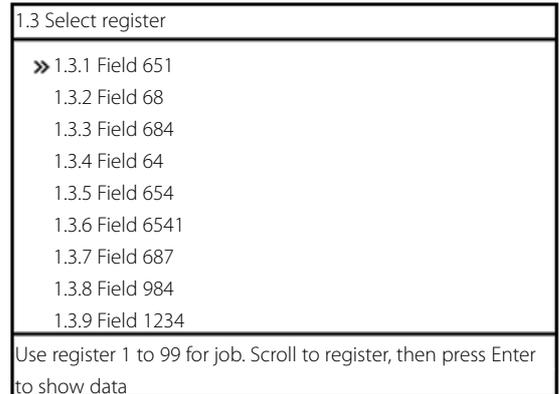
👉 ATTENTION! The active register number is always visible in the right upper corner of the display.

👉 ATTENTION! Naming of registers are done in menu 2.6.

Menu 1.6 LookAhead nozzle select

LookAhead nozzle selection

In this menu it is possible to select an other nozzle without re-starting the controller. Do the following:

1. Go to menu [1.6 LookAhead nozzle select] then press ⏎.
2. Select nozzle with ▲ or ▼.
3. Confirm by pressing ⏎.
4. The Controller jumps to menu [3.7.1.1 Application rate]. Enter an application rate here.
5. See further steps in the chapter "Menu 3.7 LookAhead".

Menu 2.1 Display readout

General info

The following menu explanations assume you have mastered the general keystrokes and you can "find your way" to the specific menu. If this is not so, please re-read section "Keys".

Menu 2.1.1 Display readout

It is possible to freely choose which functions to be shown in the 4 different boxes (A, B, C and D) of the display.

1. Go to menu [2.1 Display readout].

2. Use ![up] or ![down] to choose which of following boxes you want the data shown and press ![menu] to confirm.

2.1.1 Show upper middle (A)

2.1.2 Show upper right (B)

2.1.3 Show lower middle (C)

2.1.4 Show lower right (D)

3. Choose a submenu e.g. menu [2.1.1.04 Work rate]. Press ![menu] to confirm.

4. Press ![esc] to leave menu.
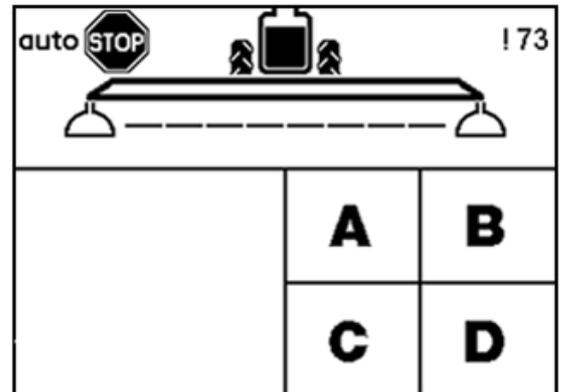
See next page for a full list of possible display readouts.

Display text Description.

[2.1.1.01 Program]	Shows programmed volume rate
[2.1.1.02 Flow rate]	Flow rate per minute sprayed out through the boom
[2.1.1.03 Time]	Actual time
[2.1.1.04 Work rate]	Rate shown in hectares per hour or acre per hour
[2.1.1.05 Volume rate]	Actual rate in litre per hectare or gallon per acre
[2.1.1.06 Tank contents]	Main tank contents
[2.1.1.07 Speed]	Driving speed
[2.1.1.08 Volume sprayed]	Readouts for volume sprayed in currently active register
[2.1.1.09 Area sprayed]	Readouts for area sprayed in currently active register
[2.1.1.10 Active boom size]	Active boom size including End nozzle
[2.1.1.11 Pressure]	Displays spray pressure if sensor is fitted
[2.1.1.12 Fan speed]	Displays Twin fan speed if sensor is fitted
[2.1.1.13 Wind speed]	Displays wind speed if sensor is fitted
[2.1.1.14 Wind direction]	Displays wind direction if sensor is fitted
[2.1.1.15 Humidity]	Displays relative humidity if sensor is fitted
[2.1.1.16 Temperature]	Displays ambient temperature if sensor is fitted
[2.1.1.17 PTO Revolutions]	Displays revolutions if sensor is fitted
[2.1.1.18 Name "Extra 1"]	Readout from extra sensor 1 frequency
[2.1.1.19 Name "Extra 2"]	Readout from extra sensor 2 frequency
[2.1.1.20 Name "Extra 3"]	Readout from extra sensor 3 analog
[2.1.1.21 Name "Extra 4"]	Readout from extra sensor 4 analog
[2.1.1.22 Voltmeter]	Displays system voltage. Useful when fault finding
[2.1.1.23 Agitation]	Agitation valve opening
[2.1.1.24 Rinse Tank Content]	Rinsetank calculated content

ATTENTION! As some readouts need extra sensors, the relevant sensor has to be connected to get a readout.

Menu 2.2 Auto functions

Menu 2.2.1 Main ON/OFF

The Controller can be set to open the main ON/OFF function above a certain speed and close it below the same speed. This allows the user to concentrate on driving. If the speed is set at zero the function is deactivated. Suggested speed setting is spraying speed less 20%.

When the Auto ON/OFF is active and the main switch and boom section switches are on, the boom status symbol have a bar across that is blue.

Procedure is:

1. Go to menu [2.2 Auto functions]

2. Press ⏎.

3. Select menu [2.2.1 ON/OFF].

4. Press ⏎.

5. Set the desired minimum speed.

6. Press ⏎.

✋ WARNING! Remember to set the main ON/OFF switch to OFF before leaving the field, otherwise the main ON/OFF will open under transport.

Menu 2.2.2 Foam Marker (optional)

The Controller can be set to operate the HARDI Foam marker automatically through the main ON/OFF valve. When the main ON/OFF is ON, it will automatically start the Foam marker.

Furthermore, the Foam marker can be set for up and back spraying or race-track (round and round) spraying.

Procedure:

1. Go to menu [2.2 Auto functions].

2. Press ⏎.

3. Select menu [2.2.2 Foam marker]

4. Press ⏎.

5. Select one of the below settings:

Setting	Activity
[Disable]	The marker will only follow the setting of the switch on the SetBox.
[Same side]	The Terminal will automatically activate the same side for race-track spraying.
[Change side]	The Terminal will automatically change side for up and back spraying.

6. Press ⏎.

Menu 2.2.3 Dual line (optional)

If the sprayer is fitted with 2 sets of boom lines this function can be used to ensure volume rate and droplet size is maintained during large changes to forward speed.

The boom lines are pronounced A and B.

System options:

2 step: A to B

3 step: A to B to A&B

Menu 2.2.3.1 From A to B pressure level:

Here the lower limit are selected. Depending on the setup, either speed or pressure can be the trigger for changing between the steps.

Menu 2.2.3.2 From B to A+B pressure level:

Here the upper limit are selected. Depending on the setup, either speed or pressure can be the trigger for changing between the steps.

Menu 2.2.3.3 From A to A+B speed level:

Key in speed to switch Dual line from A to A+B.

Menu 2.2.3.4 From A to B speed level:

Key in speed to switch Dual line from A to B.

Menu 2.2.3.5 From B to A+B speed level:

Key in speed to switch Dual line from B to A+B.

ATTENTION! Note this menu is only shown if Jobcom hardware is fitted, and the software is enabled.

Menu 2.2.4 HeadlandAssist setup (optional)

The menu contains 3 submenus to adjust function of HeadlandAssist:

Menu 2.2.4.1: The delay of the main ON/OFF is set in metres from a point, e.g. the front wheel of the tractor or from the drivers seat to the boom. The system will then calculate the time to close the main ON/OFF and lift the boom at the right time.

Menu 2.2.4.2: Set the height that the boom should lift when HeadlandAssist is lifting the boom. The value is set in metres. The function is disabled if 0 metre is keyed in.

Menu 2.2.4.3: The slant mirror function can be enabled/disabled here. Select one of the submenus to enable or disable.

ATTENTION! A useful tip is to set delay as the distance from boom to a fix point of free choice (e.g. drivers seat).

Symbols and explanation:

HeadlandAssist not active and pendulum locked.

HeadlandAssist not selected in main settings of controller and pendulum is open (Setting is "0" in menu 2.2.3).

man	HeadlandAssist is in manual mode.	auto	HeadlandAssist is in AUTO mode.
⧗	The system is activated and awaits to execute a function.	⧗	The hydraulics is moving the boom.
▲	Nozzles spraying.	▲	Nozzles spraying and awaits to close.
△	Nozzles not spraying.	△	Nozzles not spraying and awaits to open.

Menu 2.2.5 TWIN preset shift auto/man (TWIN only)

This menu is to select if TWIN preset shifts is automatically at main ON/OFF or manually at key press.

Select the way to use the function in the submenus:

Menu 2.2.5.1 selects whether manual operation is done at the HC 6400 or at the bottons behind the grip.

Menu 2.2.5.2 is for selecting of automatic shift every time the main ON/OFF is pressed.

Menu 2.2.5.3 disables the function.

Menu 2.2.6 AutoAgitation select level (optional)

By selecting one of the submenus, it is possible to select the level of agitation:

Menu 2.2.6.1 Powerfull AutoAgitation

Menu 2.2.6.2 Soft AutoAgitation

Menu 2.2.6.3 No agitation

Menu 2.2.6.4 Fixed agitation

For fixed agition the level is set in menu 2.2.7.

ATTENTION! Long keypress on ⬤ (AutoAgitation override control) will stop agitation. If restarted, agitation has to be setup in the menu again.

Menu 2.2.7 AutoAgitation fixed level

Key in the percentage value corresponding to position of agitation valve for fixed agitation level. Percentage range is 0 % (closed) to 100 % (wide open).

This setting should be done when Menu [2.2.6.4 Fixed agitation] is selected.

6 - Menu 2 Setup

Auto function icons

In the following schematics shows the significance of the icons that will appear in the top right corner of the screen.

1st schematic:

Icons/screen code	Active	Active	Active	Mounted
sa				Regular NCM 05 without extra intelligent features
sb	End nozzles			End nozzles mounted and active
sc	AutoFill			AutoFill is mounted and active
sd	AutoWash			AutoWash mounted and active
se	AutoFill	End nozzles		AutoFill and End nozzles is mounted and active
sf	AutoWash	End nozzles		AutoWash and End nozzles mounted and active
sg	AutoWash	AutoFill		AutoWash and AutoFill is mounted and active
sh	AutoWash	AutoFill	End nozzles	AutoWash, AutoFill and End nozzles is active

2nd schematic:

Icons/screen code	Possible to do by pressing F1	Possible to do by pressing F2	
vb	Start	Abort	Will be shown before intelligent feature start
vc	Done	Abort	Will be shown during program
vd	Pause	Abort	Will be shown during program

Menu 2.3 VRA/Remote control

Variable Rate Application (VRA) / Remote / HARDI AutoSectionControl

If the volume rate is to come from an external source (e.g. a site specific application map or a remote sensor), this menu has to be enabled. This is done by selecting one of the submenus:

Menu 2.3.1 Disable

Menu 2.3.2 Enable

The ✍ symbol on the 1st line will be visible. Manual pressure regulation and stepped over/under application is still possible.

The external source is connected to the COM 1 or COM 2 via a 9 pin sub D connector.

ATTENTION! The COM port may have to be set up in the extended menu. Contact your HARDI service center.

ATTENTION! Use of HARDI AutoSectionControl requires a sprayer equipped with JobCom computer. If in doubt whether your sprayer has a JobCom installed, please contact your local HARDI dealer.

ATTENTION! AutoSectionControl also uses Variable Rate Application when connected to RS 232 port on the Terminal.

Menu 2.4 Set clock

How to set clock

If the Controller prompts for date and time, [Set clock to enable register]:

This must be done before the Controller is put into operation for the first time, otherwise no start and stop time will be recorded in the registers.

ATTENTION! If no prompt, the dealer may already have done this.

Press ⏎.

Press ▼ to menu [2 Setup].

Press ⏎.

Press ▼ to menu [2.4 Set clock].

Press ⏎ to enter first submenu, menu [2.4.1 Time format (12 or 24 hour)].

By using ▲ or ▼ you can choose between:

Menu [2.4.1.1 12 hour format]

Menu [2.4.1.2 24 hour format]

Press ⏎ and return to previous menu by pressing ESC.

Press ▼ to menu [2.4.2 Set time]

Press ⏎ and set minutes and hours with ▲ or ▼ and ◀ or ▶. Alternatively use the numeric keys.

Press ⏎ to confirm.

Press ▼ to menu [2.4.3 Set date and month]

Press ⏎ and set day and month with ▲ or ▼ and ◀ or ▶. Alternatively use the numeric keys.

Press ⏎ to confirm.

Press ▼ to menu [2.4.4 Set year]

Press ⏎ and set year with ▲ or ▼ and ◀ or ▶. Alternatively use the numeric keys.

Press ⏎ to confirm.

Press ESC and hold to exit menu system.

Menu 2.5 Alarms, Warnings and Info

How to set up alarms

Different alarms can be set up. Choices are listed as follows.

Display text	Notes
[2.5.01 Volume rate]	Suggested setting is 10%
[2.5.02 Tank contents]	Measured in litres
[2.5.03 Spray pressure]	High/low pressure
[2.5.04 Fan speed]	High/low rpm
[2.5.05 Speed]	Speed max.
[2.5.06 Wind speed]	Wind speed max./min.
[2.5.07 PTO revolutions]	PTO revolutions max./min.
[2.5.08 Air temperature]	Air temperature max./min.
[2.5.09 Relative humidity]	Relative humidity max./min value.
[2.5.10 RPM]	RPM max./min.
[2.5.11 Extra1]	Value (PPU) max/min
[2.5.12 Extra2]	Value (PPU) max/min
[2.5.13 Extra3]	Value (Volt) max/min
[2.5.14 Extra4]	Value (Volt) max/min
[2.5.15 Sections off warning]	Warning when sections are switched off
[2.5.16 Audio level]	Audio steps sound when moving from one step to another.
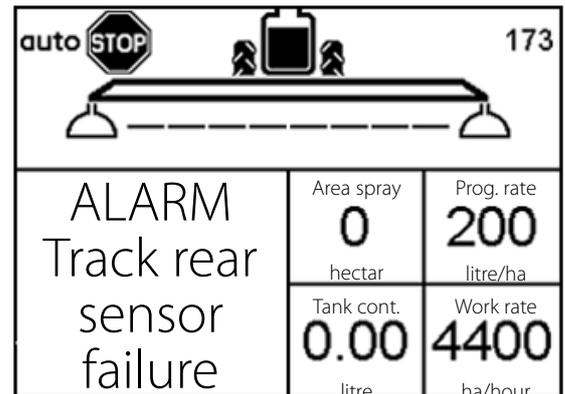
When outside the alarm parameters, the relevant warning will flash lower left corner of the screen. The alarm beep can also be adjusted in audio level in menu [2.5.16 Audio level]. Audio level can be selected in steps from 1 to 5. For no alarm, set at 0.

Volume rate alarm for over or under application activates after 20 seconds.

For more details on alarms see "Fault finding".

Warnings

The warnings appear as shown. For more details on warnings see "Fault finding".
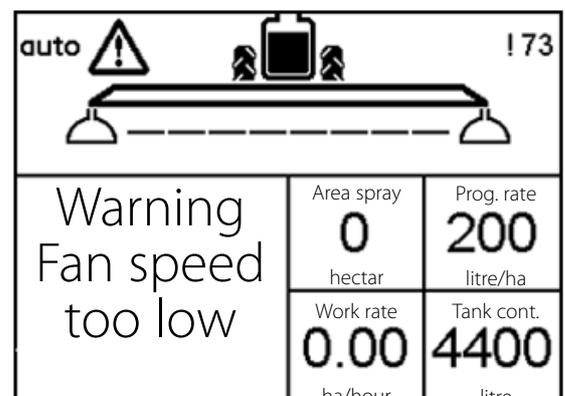
Menu 2.6 Register names

How to name the registers

If desired, the registers can be given names:

1. Go into menu [2.6 Register names]

2. Select the register number that should be named.

3. Use the numeric keys to key in name.

4. Confirm with ![menu].

5. When registers has been named, press ![ESC] to exit to main menu.
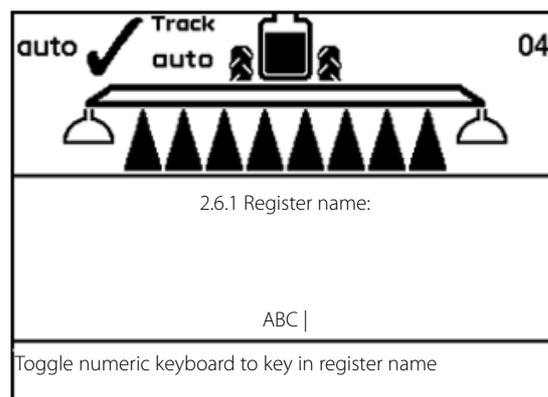
Menu 3.1 Speed calibration

Menu 3.1.1 Sprayer

The calibration process is the same for each sensor type. In the following example a "speed sensor on sprayer" is used.
The menu can be reached in two ways. The shortcut ⊙ can be used or navigating via the menu structure.

Navigating the menu:

1. From menu [3 Calibration] the menu [3.1 Speed calibration] should be selected with ▲ or ▼.

2. Press ↵.

3. Select one of the following menus corresponding to desired speed sensor:

[3.1.1 Sprayer]   Speed sensor on sprayer

[3.1.2 Tractor]   Speed sensor on tractor

[3.1.3 Radar]   Radar speed sensor

4. Press ↵ to confirm. The last confirmed sensor is the active speed sensor.

5. Choose submenu with ▲ or ▼ and press ↵.

6. The rest of calibration procedure is the same as when using the shortcut - see below.

Shortcut ⊙ procedure:

1. Press ⊙ until menu [3.1.1 Sprayer speed] is shown.

2. Choose submenu with ▲ or ▼ and press ↵.

3. The rest of calibration procedure is the same as when navigating the menus - see below.

From here you are at the same place in the menu whether you did navigate the menus or used the shortcut.
It is possible to calibrate the speed sensor in different ways. By entering a theoretical speed constant or by doing a practical calibration.
Select calibration method in the two submenus to choose between:
Menu 3.1.1.1 Speed constant
Menu 3.1.1.2 Speed practical
The procedure of each menu is described in the below parts.

The speed transducer can be calibrated theoretically or practically.
The practical method is recommended.

3.1 Speed calibration

» 3.1.1 Sprayer speed
  3.1.2 Tractor speed
  3.1.3 Radar speed

Choose if speed sensor is located on sprayer

---
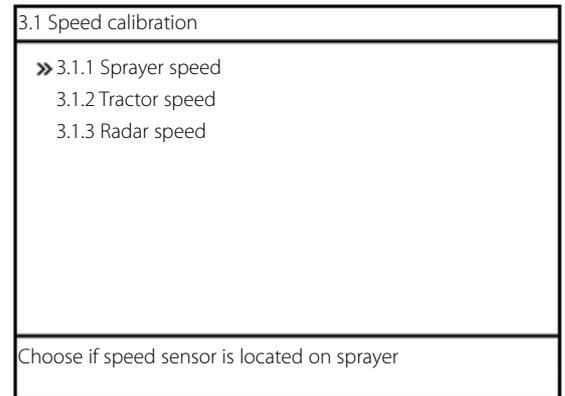
7 - Menu 3 Calibration

Menu 3.1.1.1 Constant

The theoretical speed constant, pulses per unit (PPU), is the distance in metre on the circumference of the wheel between holes (A) (or protrusions / magnets (B)) that the speed sensor records.

3.1.1.1 Sprayer speed

4 .00

PPU

Shows and permit change to the constant, Pulses Per Unit (metre / feet)
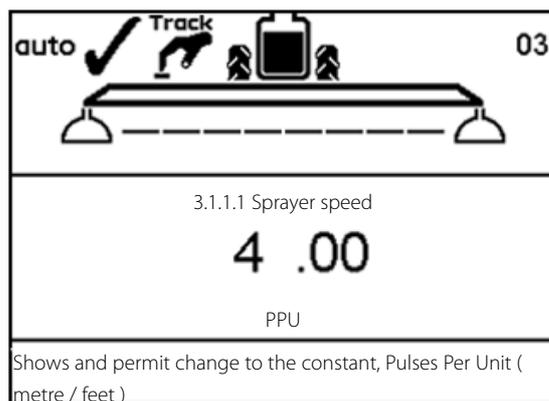
Menu 3.1.1.2.1 Practical

Practical calibration of speed is done by driving a measured distance and correcting the display so that the actual and the calculated distances are the same. Calibration should take place in the field with a half full tank and normal working tyre pressure in order to obtain the wheel's real "working radius".

3.1.1.2.1

70

Measure up a distance more than 70 metres or 200 feet. Then drive distance
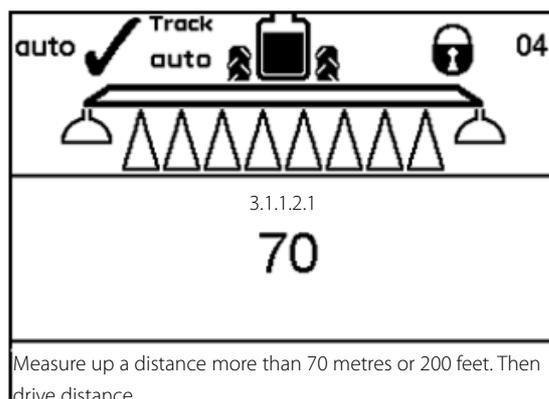
Method:

1. Measure a distance not less than 70 metres.

2. Park the tractor at the start of the measured distance.

3. Press ⏎. When zero distance [0 m] shows, drive the distance.

4. Press ⏎.

5. Correct the distance shown on the display with the ▲ or ▼ to read the actual distance. Alternatively key in on the numeric keys.

6. Press ⏎ to see the new calculated value.

7. Press ⏎ again to accept the value.

Menu 3.2 Flow calibration

Which method to use

The flow transducer can be calibrated theoretically or with two practical methods. The practical methods are preferred. Calibration is done with clean water. The Flow Tank method is time consuming, but is more accurate than the Flow Nozzle method.

When changing to nozzles with more than a 100% increase or decrease in output, it is recommended to recalibrate the flow transducer.

Calibration is recommended to be done at least once during the spraying season. Use the chart at the back of the book to record the values.

3 Calibration
» 3.1 Speed calibration
3.2 Flow calibration
3.3 Boom setup
3.4 Regulation constant
3.5 Tank gauge calibration
3.6 Track calibration
Sprayer, tractor, Alpha or radar speed input. Calibration of selected sensor

Menu 3.2.1 Flow constant

Use the navigation keys to change the flow constant theoretically.

Approximate PPU values for different flow housings are as follows in the table. Different flow housings are designated by groove (A).

3.2.1 Flow calibration

120.000

PPU

Flow sensor dia 13mm ca 120PPU 20mm ca 60PPU. 36mm ca 17 PPU

Housing	Housing identification (A)	Flow range	Orifice	PPU
		L/min	mm	value
S/67	Three grooves	1-30	6	310.00
S/67	Four grooves	2.5-75	9.5	180.00
S/67	One outside groove	5 - 150	13.5	120.00
S/67	No groove	10 - 300	20.0	60.00
S/67	Two outside grooves	35 - 600	36.0	17.00

Pressure drop over 13.5 mm orifice is 1 bar at 150 l/min.

ATTENTION! PPU indicates the number of pulses which theoretically come from the flow transducer whilst 1 litre of liquid passes through.

Menu 3.2.2 Nozzle method

During practical flow calibration the individual nozzle output on the display is compared to the actual individual nozzle output. The output displayed is corrected to read the actual output.

```
auto ✓ Track 🖐 👤🗌👤                    03
        ╔══════════════════╗
       ╱ ─ ─ ─ ─ ─ ─ ─ ╲
      △                    △
─────────────────────────────────
          3.2.2.1 Nozzle method

              4 .00

               litre/min
─────────────────────────────────
Measure the flow per minute from a number of nozzles. Press
Enter
```
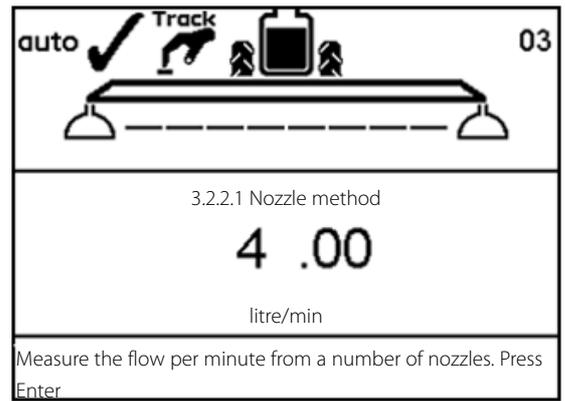
ATTENTION! See menu [3.3 Boom] if no boom data has yet been entered.

Method:

1. Open all boom sections. Switch the main ON/OFF to ON. Close End nozzles (if fitted).

2. Go to menu [3.2.2 Nozzle method].

3. Press ⏎. The display will then show the individual nozzle output per minute.

ATTENTION! If a section has not been opened or a End nozzle is not closed, a warning will show up in the largest window on the display.

4. Using a HARDI calibration jug, check the actual nozzle output per minute. It is recommended that an average of several nozzles be taken.

5. Press ⏎.

6. Correct the output shown on the display with the ▲ or ▼ keys or use the numeric keys to read the average output measured with the calibration jug.

7. Press ⏎ to see the new value.

8. Press ⏎ again to accept the value.

Menu 3.2.3 Tank method

During practical flow calibration the tank is partly emptied through the nozzles. Whilst emptying, the display calculates the quantity emptied on the basis of the actual calibration value (PPU). The quantity displayed is compared with the quantity actually dosed.

This can be according to the tank contents level indicator or by weight difference before and after. The quantity displayed is corrected to read the quantity actually dosed.

```
auto ✓ Track 🖐 👤🗌👤                    03
        ╔══════════════════╗
       ╱ ─ ─ ─ ─ ─ ─ ─ ╲
      △                    △
─────────────────────────────────
           3.2.3.1 Tank method

              0 .00

                litre
─────────────────────────────────
The sprayed amount is counted up when the sections are
opened
```
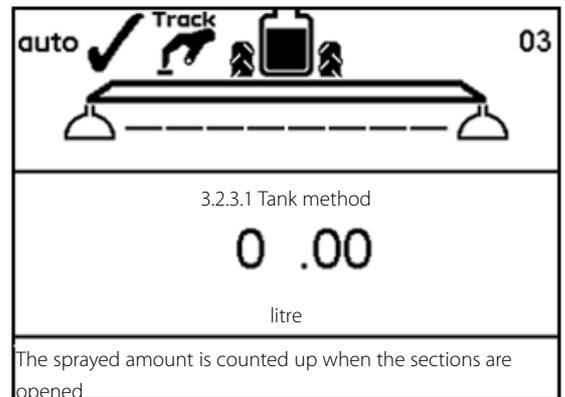
Method:

1. Place the tank on level ground and fill it up with water until the level reaches a unique mark on the tank contents level indicator, e.g. 1000 litres.

2. Open all boom sections.

3. Go to menu [3.2.3 Tank method], press ⏎ and switch the main ON/OFF to ON.

4. The display unit will then begin to count the volume being emptied through the nozzles.

5. When for example, 600 litres have been emptied out, as shown by the tank contents level indicator, and switch the main ON/OFF to OFF.

6. Press ⏎.

7. Correct the volume shown in menu 3.2.3.2 on the display with the 🔺 or 🔻 keys or the numeric keys to read the volume shown on the tank contents level indicator.

8. Press ⏎ to see the new value.

9. Press ⏎ again to accept the new value.

3.2.3.2 Tank method

4 .00

litre

Press Enter. The shown volume is adjusted to match the actual volume

3.2.3.3 Tank method

120.000

PPU

This is the PPU constant from the volume previously just measured
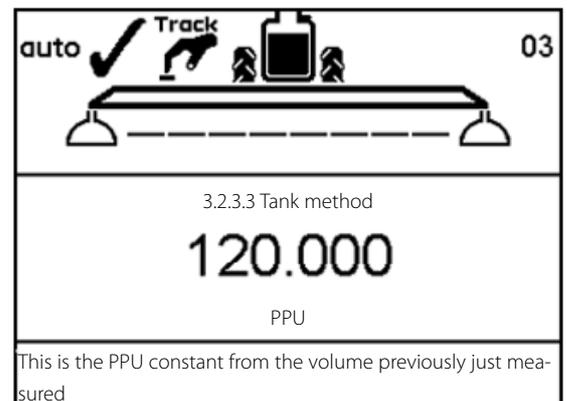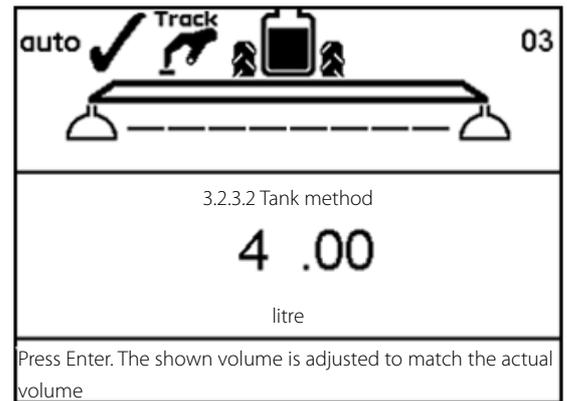
7 - Menu 3 Calibration

Menu 3.3 Boom

Menu 3.3.1 Width

Use the ▲ or ▼ keys or numeric keys to enter boom width.
Press ◄ to confirm.

Menu 3.3.2 Number of sections

Use the ▲ or ▼ keys or numeric keys to set number of boom sections.
Press ◄ to confirm.

Menu 3.3.3 Nozzles/section

Use ▲ or ▼ keys or numeric keys to set correct number of nozzles per section.

Press ◄ to continue to next boom section.

Press ◄ after the last section.

Menu 3.3.4 End nozzles and Bi-jet (optional)

If end nozzles or Bijet are fitted, it should be set up corresponding to
the number of boom nozzles it covers.

1. In menu [3.3 Boom setup] go to the menu [3.3.4 End nozzles and
Bi-jet].

2. Press ◄.

3. Select submenu corresponding to the type of end nozzle:

Menu 3.3.4.1 None

Menu 3.3.4.2 End nozzles fitted

Menu 3.3.4.3 Bi-jet fitted

2. Press ◄.

3. In the sub menus [3.3.4.2] and [3.3.4.3] set the value to the equi-
valent coverage by the boom nozzles. E.g. end nozzle coverage is 2
metres. This is equal to 4 boom nozzles.

ATTENTION! It is important that the volume applied from the end nozzle matches the volume applied under the
boom. This is a comparison of volume per minute per length. (Litre/min/metre).

When the end nozzle is active, the area covered and volume sprayed is calculated and registered. If "Active boom
size" is displayed, it will show an increase when the end nozzle is activated.

Menu 3.4 Regulation constant

Regulation constant

The sensitivity of pressure regulation valve can be adjusted. The goal is to find a value where the regulation does not overshoot the set point, but slows down and stops right before the set point.

Increasing the regulation constant will give a faster response on the pressure regulation valve. If the constant is too high, the valve will become unstable. There will also be excessive wear on the valve.

The range is in percent and is typically set between 30% to 50%. Begin with regulation constant set at 50%.

Monitor the regulation valve, does it overshoot? Then adjust until the valve slows down and stops right before the set point:

If yes it overshoots, reduce the regulation constant in steps of 5%.

If no it do not overshoot and the valve stops far away from the set point, then increase contant in steps of 5%.

ATTENTION! For sprayers with regulation feedback the value can be reduced to 30 %.

Menu 3.5 Tank gauge

General info

This menu item is only present if the HARDI Tank Gauge is fitted. For increased accuracy it is recommended to do the flow calibration [3.2] before proceeding.

Present accuracy is up to +/- 25 litre. This is at the widest liquid surface area in the tank. The smaller the liquid surface area, the more accurate the readout.

```
3.5 Tank gauge calibration

 » 3.5.1 Adjustment of specific gravity
   3.5.2 Calibration of Tank gauge
   3.5.3 Select factory calibration
   3.5.4 Offset at empty MainTank




Calibrate if factory calibration is not adequate
```
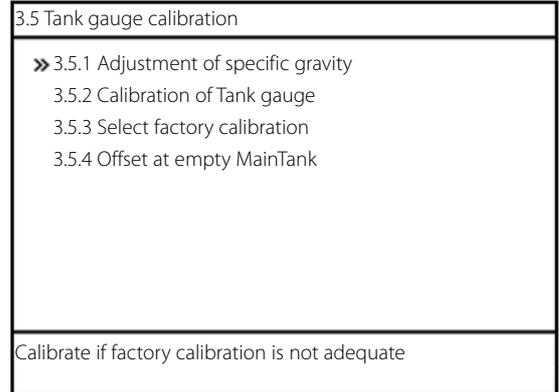
Menu 3.5.1 Adjustment of specific gravity

The correction factor for the specific gravity of the liquid sprayed can be set.
Default value is 1.000.
For liquid fertilisers, the specific gravity may range up to 1.3 kg/L. The value in this case would be 1.300.
Method:
1. Press ⏎ to change value.
2. Use ◀ and ▶ to move cursor to the figure to be changed.
3. Change figure by pressing ▲ and ▼. Alternatively key in on the numeric keys.
4. Confirm setting by pressing ⏎.

```
auto ✓ Track 🚜 🛢 👥👥                01
   ⌂ ———————————— ⌂

      3.5.1 Adjustment of specific gravity

            1 .00

                 kg/litre

Chemical 1,0 kg/litre. Liquid fertilizer 1,1 to 1,3 kg/litre
```
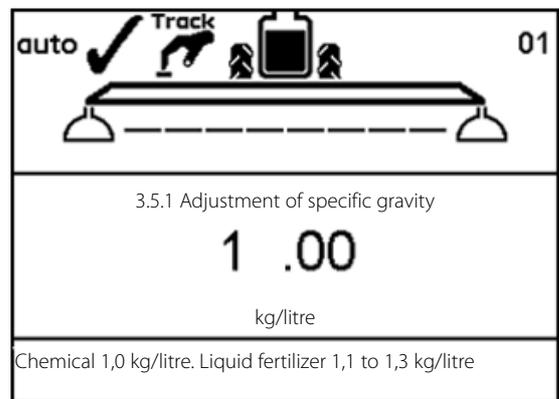
Menu 3.5.2 Custom calibration of Tank gauge

Calibration of the HARDI Tank Gauge is necessary if the factory calibration shows inaccurate. This can e.g. be due to different placed hitch point on the tractor, other tyre mounting resulting an inaccurate calculation of the tank contents.

Therefore it is recommended to begin the custom calibration with connecting the sprayer to the tractor that will be used for spraying. Later changes of tractor can affect the accuracy of the Tank gauge.

To make a custom calibration of TankGauge, do the following:

1. First enter menu [3.5.3 Select factory calibration]. Then select the submenu [3.5.3.01 Custom calibration of gauge].

```
3.5.3 Select factory calibration

 » 3.5.3.01 Custom calibration of gauge
   3.5.3.02 NCM 3200 factory calibration
   3.5.3.03 NCM 4400 factory calibration
   3.5.3.04 NCM 6600 factory calibration
   3.5.3.05 NCM 9000 factory calibration
   3.5.3.06 Alpha 2500 factory calibration
   3.5.3.07 Alpha 3500 factory calibration
   3.5.3.08 Alpha 4100 factory calibration
   3.5.3.09 Alpha 3000 factory calibration

Tank gauge table from custom calibration
```

2. Check that menu [3.2.1 Flow calibration] uses the correct PPU value corresponding to the sprayers flow housing.

```
auto ✓ 🔫 👥 🗋 👥                        03
┌────────────────────────────────────────┐
│  ⌂ —————————————————— ⌂  │
└────────────────────────────────────────┘
3.2.1 Flow calibration

120.000

PPU
Flow sensor dia 13mm ca 120PPU 20mm ca 60PPU. 36mm ca
17 PPU
```
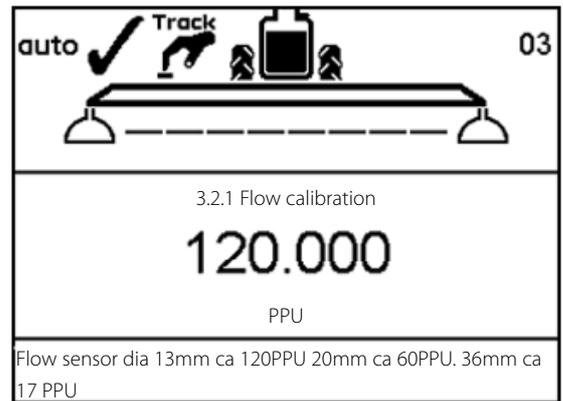
3. Go to menu [3.5.2.1 Water level].

4. Fill the sprayer completely up to the filler lid in the top of the tank, with a known amout of water, using an external calibrated flowmeter. Alternatively weight the sprayer before and after filling, and note the weight difference.

5. Press 🔙.

```
auto ✓ 🔫 👥 🗋 👥                        01

3.5.2.1 Water level

0

mm
Fill up the tank to the max level, then press Enter
```
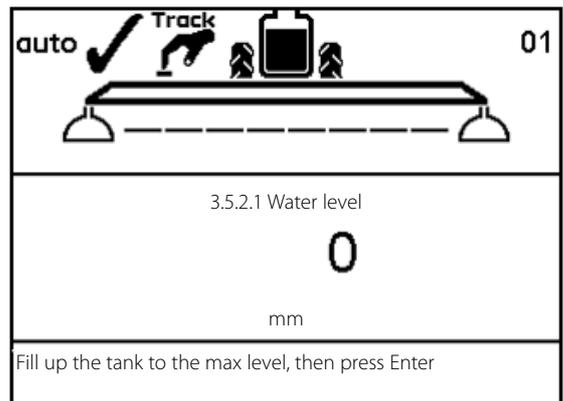
ATTENTION! As the accuracy of the custom calibration is affected, it is of high importance that the external calibrated flowmeter measures the correct quantity within a 2 % deviation. Same accuracy of 2 % must be kept if weighting the sprayer before/after filling is used.

WARNING! Do not leave the sprayer whilst filling the tank and keep an eye on the level indicator in order NOT to overfill the tank.

6. Press 🔙 after ensuring the sprayer is level. Refill the tank up to the tank lid if the sprayer is re-levelled.

```
auto ✓ 🔫 👥 🗋 👥                        01

3.5.2.2 Water level

0

mm
Level the sprayer, then press Enter
```
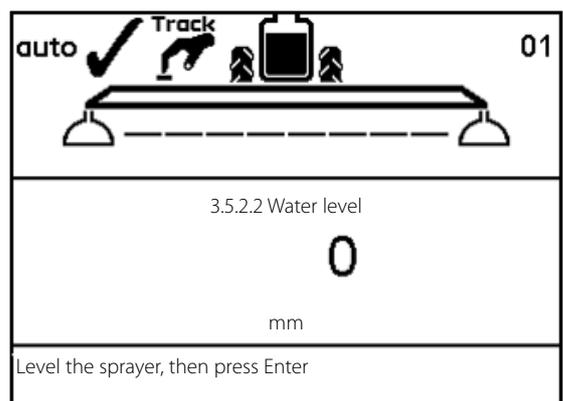
Levelling the procession of sprayer is of great importance as the accuracy is directly affected!

Assumed that the same tractor will be used after custom calibration, it is not necessary for the sprayer to be level itself. But the whole procession of tractor and sprayer (A) need to be level.

Use e.g. a beam (B) of approximately 6 m length, placed on two wooden blocks at the location where the calibration will take place. Place a level (C) on the beam (B) to find the level point of the calibration location.
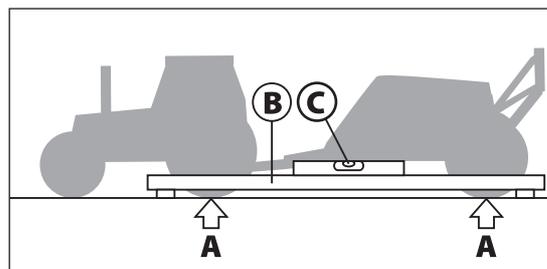
7. Engage the pump and set P.T.O. revolutions at 540 rpm or 1000 rpm (depending on pump model).

8. Open all boom sections and empty the tank. The pulses from the flow transducer are logged as data points. During this session the screen shows: [xxxx] as the actual water level in millimetres and [yyyyyyy] is the number of pulses from the flow meter.

auto ✓ Track 01

3.5.2.3 Water level

0

mm

Empty sprayer through main flow meter at boom. Computer will register flow
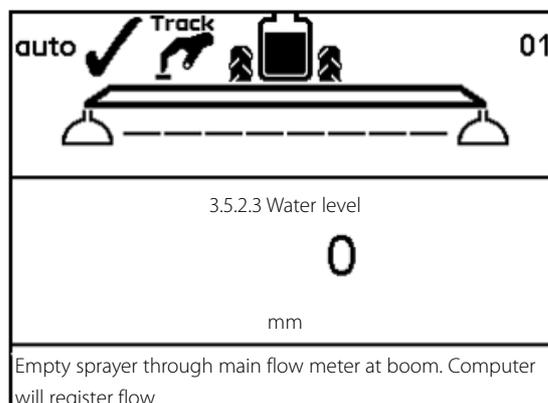
ATTENTION! The definition of having an empty tank, is when no spray comes out of the nozzles anymore. Note that when empty, there will still remain about 10 litre in the sump of the tank.

9. Press ⏎ when the tank is empty.

10. Correct the displayed volume with the ▲ or ▼ or with numeric keys to the actual volume sprayed out.

11. Press ⏎. The new custom gauge table is calculated and the calibration of the HARDI Tank Gauge is finished.

auto ✓ Track 03

3.5.2.4 Calibration of Tank gauge

120.000

litre

Key in true volume from flowmeter. Computer will calculate table
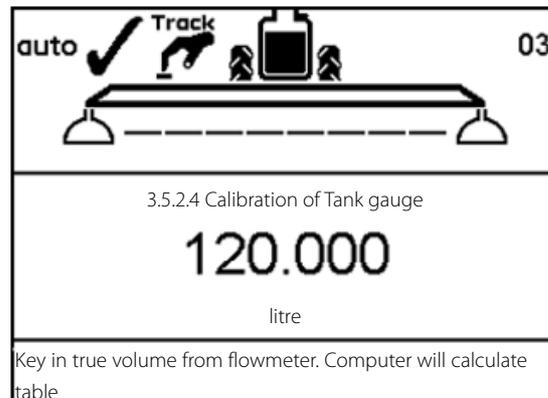
Menu 3.5.3 Select factory calibration

This menu may have been set up by your HARDI service centre. Selection can only be done with no water in the tank. See "Menu 3.5.4 Offset at empty MainTank" to check if empty.

The prerequisites for accuracy of the level, when selecting the factory calibration is:

Level sprayer; When mounted to the tractor then the sprayer should be level. Check if level by placing a level on the frame of the COMMANDER sprayer as follows:

COMMANDER 3200 and 4400: Underside of the frame.

COMMANDER 6600: Upperside of the frame (Important as frame is not parallel).

Height of hitch point when mounted to tractor; The height of hitch point measured from the ground should be 550 mm. Measure of tank contents changes with the hight of the sprayer at the hitch point. In the schematic an example of the difference in tank contents can be seen.

3.5.3 Select factory calibration
» 3.5.3.03 NCM 4400 factory calibration
3.5.3.04 NCM 6600 factory calibration
3.5.3.05 NCM 9000 factory calibration
3.5.3.06 Alpha 2500 factory calibration
3.5.3.07 Alpha 3500 factory calibration
3.5.3.08 Alpha 4100 factory calibration
3.5.3.09 Alpha 3000 factory calibration
3.5.3.10 NCM 5000 factory calibration
3.5.3.11 NCM 7000 factory calibration
Empty tank for automatic registration of zero-point of tanksensor

ATTENTION! If one of the prerequisites are not fulfilled, then refer to "Menu 3.5.2 Custom calibration of Tank gauge" to make a custom calibration of the tank gauge.

Height at hitch eye	COMMANDER 3200	COMMANDER 4400	COMMANDER 6600
Actual content*	2800 litre	3900 litre	6000 litre
450 mm	2900 litre	4000 litre	6100 litre
500 mm	2950 litre	3950 litre	6050 litre
550 mm**	2800 litre***	3900 litre***	6000 litre***
600 mm	2750 litre	3850 litre	5950 litre
650 mm	2700 litre	3800 litre	5900 litre

*known amount of water measured with a calibrated flowmeter.

**specified height.

***Displayed contents at correct hitch height.

Menu 3.5.4 Offset at empty MainTank

In menu [3.5.4.1 TankGauge Offset] read out the frequency (Hz) at empty tank. If the is completely empty, then press 🔲 to accept the frequency.

In case the main tank is not empty, this menu can only be used to correct the empty-frequency if it is known to the user.

auto ✓ Track 👋 👤▉👤 01
3.5.4.1 TankGauge Offset
0
Hz
Actual frequency. Accept if empty. Or keyin recorded empty-frequency
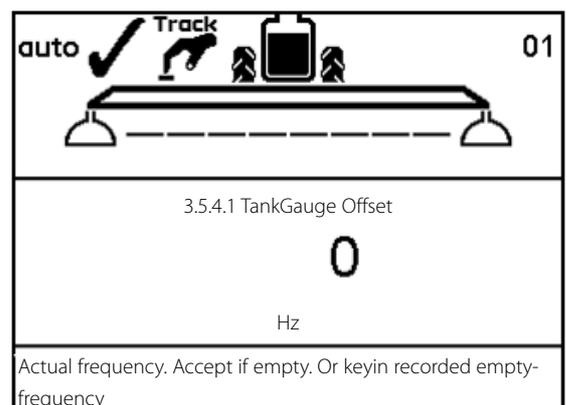
Menu 3.6 Track

General info

There is no standard setting for the Track set up. The Track needs to be adjusted

for different kinds of tractors, the sprayer and spraying practices and can only be found under the actual conditions.

For example; for spraying done at high speed (20 to 25 km/h), the Track must be set up

so it reacts slowly and the dead zone could be set higher than the standard setting.

Another example; spraying with relatively low speed (7 to10 km/h) in a crop where the

precision must be high, the dead zone can be reduced for more precision.

For each adjustment is described what happens if the setting is changed and what effect

will it have on the sprayer.

SafeTrack

The SafeTrack is operated at the hydraulic SetBox.

Track selection switches has 4 positions

1. When pressing the align button (17) sprayer will align to be in position for folding the boom.

2. When pressing "auto" (18) the system is in auto and the sprayer will follow the track from the tractor.

3. When pressing the manual button (19) the system is in manual. Using the two arrows (16) left and right , will steer the sprayer right and left.

If unsafe driving occurs an alarm will be triggered, and the sprayer will align. Press 🔙 to turn alarm off. Switching to "manual" (19) or pressing "align" (17) will also turn alarm off. Be aware that the alarm can not be turned off as long as unsafe driving still occurs!
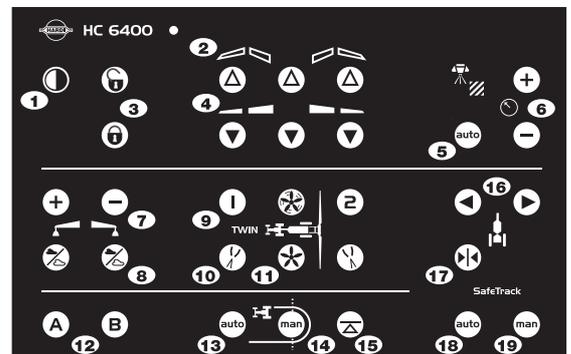
Menu 3.6.1 Track width

Here the track width can be entered. The track is measured from right side tyre centre to left side tyre centre of the sprayer wheels. It is important that the right track width is entered. The controller will calculate the speed to the centre of machine and not the speed of the wheel.

If the track width is incorrect, it will influence on track precision and the safety factor.

Factory setting: 180 cm

Menu 3.6.2 Tractor drawbar

Here the length of the tractor drawbar is entered. The measurement is from the centre of the tractor rear axle to the centre of the drawbar pin. This has to be adjusted every time a new tractor is hooked on to the sprayer. When hooked on, check the rigidity of the tractor drawbar mounts. There must be no sideways movement.

Factory setting: 80 cm

Too short measurement: The Track reacts faster, but will make the sprayer steer too large curves.

Too long measurement: The Track reacts slower, but will make the sprayer steer to short curves.

Menu 3.6.3 Dead zone

This is the non regulation zone when the sprayer is straight behind the tractor. If the sprayer is oscillating in the hydraulics when driving straight, this value must be increased.

Factory setting: 5 cm; Over 15 cm not recommended.

Decreasing value:	Reacting on small deviations. Tendency to oscillate that will damage the boom. High precision, but more unstable driving with small corrections all the time.
Increasing value:	No oscillation but tendency to sway. Low precision, but very steady driving with less corrections.

Menu 3.6.4 Damping

If the system is to aggressive the damping constant must be increased. Failure to do so may damage the boom.

Factory setting: 50%

No damping (0%):	High precision, but very unsteady. Fast reaction time, but more aggressive movement that potentially can damage the boom.
Full damping (100%):	Low precision, but very steady. Slow reaction time, but less aggressive.

Menu 3.6.5 Alignment offset

Here the fine tuning of tractor and sprayer alignment is done. This is to compensate if the front potentiometer is placed offset to the centreline when the sprayer is attached.

Note +/- can be changed with 🔼 and 🔽

Factory setting: 0 %

Negative setting will move the sprayer to the left of the track, and positive setting will move the sprayer to the right of the track. The sprayer must follow the tractor in a straight line in all situations. If the value is over 10 cm, it is recommended to manually adjust position of the front angle sensor.

Menu 3.6.6 Sensitivity

The purpose of this menu, is to adapt the track regulation to the tractor hydraulics and to the characteristics of the sprayer hydraulics system.

Calibration procedure is divided into 4 acts where an offset and gain value is found to both left and right movement, 4 values in all.

Method:

1. Unfold boom and without driving set P.T.O. to spraying R.P.M.

2. Align sprayer and press (auto) to enable "auto" at the controller. First left/right offset is found:

3. Go to menu [3.6.6 Sensitivity] and select "Yes" with 🔼 or 🔽 and press 🔙. Press 🔙 again and calibration starts.

3.6.6.1 Sensitivity to tractor hydraulics

0

%

Press ESC to abort. Press Enter to start calibration of offset and gain
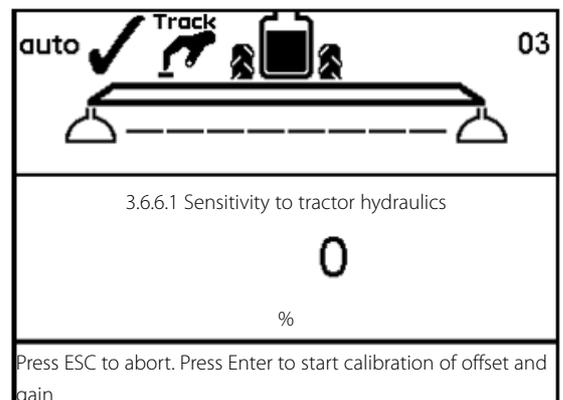
7 - Menu 3 Calibration

4. Press and hold the manual "steer to right" button. Display will show a counting percentage ending with an "OK" message when offset is found.

3.6.6.2 Finding offset right side

0

%

Press hold 'steer to right' button. Computer will activate valve and find offset

5. Afterwards same procedure is repeated for opposite direction.

3.6.6.3 Offset right side is Ok

0

%
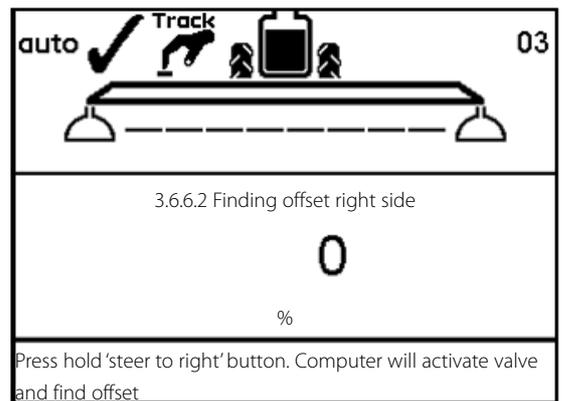
Press Enter to continue calibration
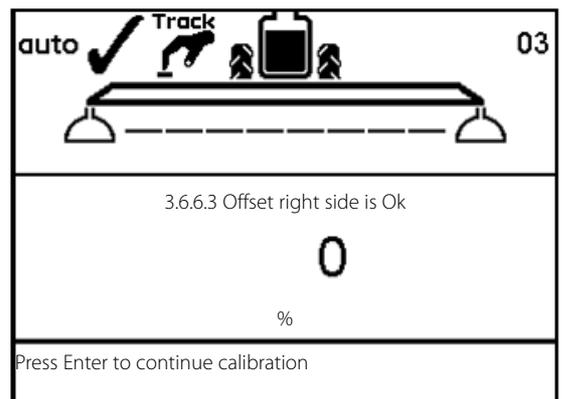
Then calibration automatically continues with gain calibration:
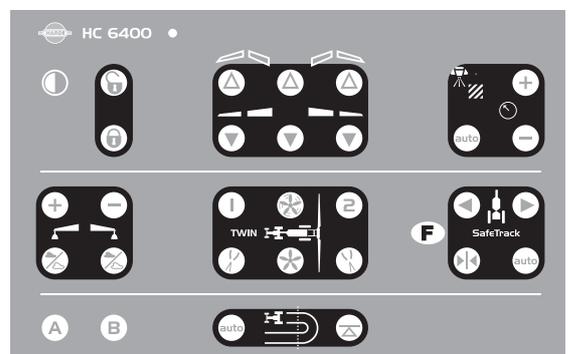
6. Press and hold the manual "steer to right" button. Display will show a counting percentage ending with an "OK" message when gain is found.
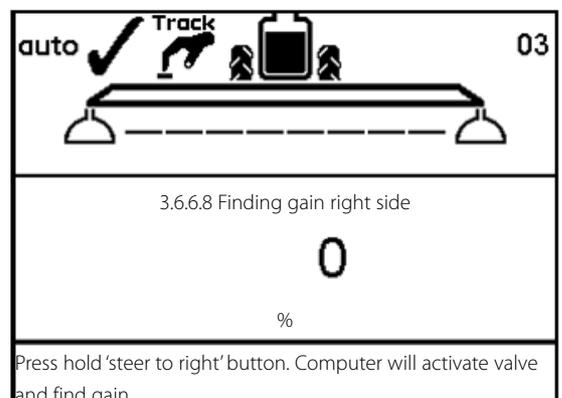
3.6.6.8 Finding gain right side

0

%

Press hold 'steer to right' button. Computer will activate valve and find gain

7. Afterwards same procedure is repeated for opposite direction.

```
auto  ✓  Track  🐾  🐾 [] 🐾                    03
         _____
        ⊔ ——————————————————— ⊔

        3.6.6.9 Gain right side is Ok

                    0

                    %

Calibration is OK. Press Enter to return to Track calibration
menu
```
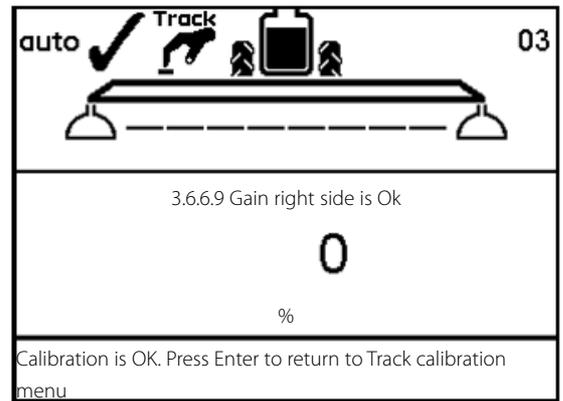
8. The display reads "CALIBRATION OK" when calibration has finished. Confirm and leave menu by pressing [menu].

```
auto  ✓  Track  🐾  🐾 [] 🐾                    03
         _____
        ⊔ ——————————————————— ⊔

        3.6.6.12 Gain left side is Ok

                    0


Calibration is OK. Press Enter to return to Track calibration
menu
```
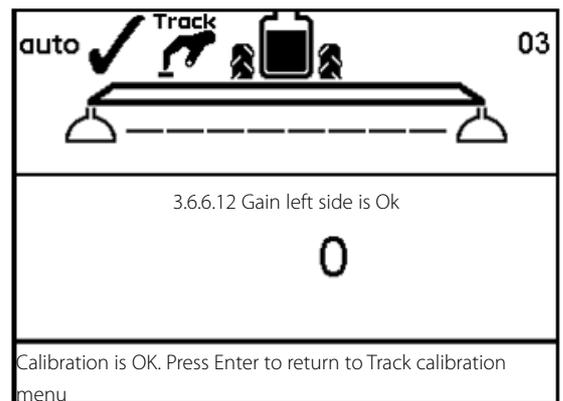
Emergency Track

If a problem with the Track should occur, please see "Menu 4.7 Emergency Track".

Menu 3.7 LookAhead

Menu 3.7.X LookAhead calibration

At start-up of the HC 6500 the user is promted for a nozzle choice. If the selected nozzle holds no LookAhead calibration in the HC 6500 memory, it will need to be calibrated.

Press (auto) to enable "auto" mode prior to calibration.
Calibration method:
1. Select menu 3.7 and press ⏎.
2. Select the nozzle to be calibrated and press ⏎.
3. Enter an application rate in the display.
4. Confirm by pressing ⏎.

Two spraying speeds for calibration are now calculated in the HC 6500. Set P.T.O. revolutions to fit the calculated spraying speed.
5. Start spraying at the calculated speed.
6. Meanwhile spraying at calculated speed, a digit in 3rd line of the display "Counter to 9" is counting up to 9. If calibration value is found a "ok" is shown in the display. If a value is not found, the digit start re-counting up to 9 until a value is found.
7. Another calculated speed is now shown in the display. Repeat point 5 and 6 again for this 2nd calculated speed. It is preferred to maintain same P.T.O. revolutions at second driving speed.
8. The digit in the display counts up as told in point 6. But when a value is found it will this time be shown with a "done" as calibration now has finished.

If custom nozzle LookAhead calibration is selected the flow at 3 bars must first be defined.
1. Enter value.
2. Confirm by pressing ⏎.
3. Do all the above calibration routine as usual.
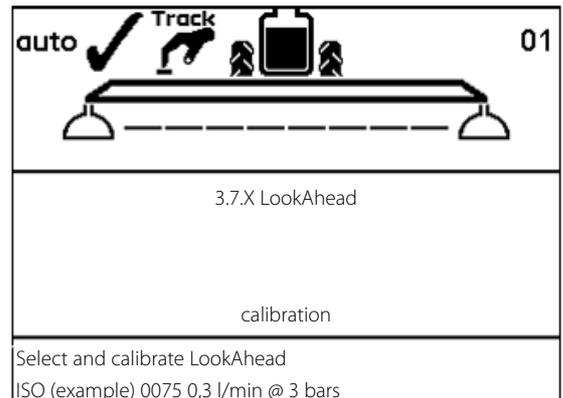
ATTENTION! To calibrate, the speed must exceed the minimum speed set in the controller memory. If minimum driving speed is set too high, please contact your local HARDI dealer.

ATTENTION! If all section valves are turned off then LookAhead is standby. When turning single sections off, e.g. in wedge shaped fields, then last valve must be turned off by using the main on/off.

ATTENTION! During the entire calibration process the fluid system should be in "Auto" mode. If not, press (auto) to enable it.

ATTENTION! When using very large nozzles it could be necessary to reduce speed until application rate is stable.

ATTENTION! If controller suggest a speed lower than min. regulation speed, then choose a higher application rate.

auto ✓ Track	01

3.7.X LookAhead

calibration

Select and calibrate LookAhead
ISO (example) 0075 0,3 l/min @ 3 bars

Menu 4.1 Measure

Trip meter

This is a simple electronic trip meter. You can measure distance. If the implement width is entered in menu [4.1.3 Working width], area can also be measured in menu [4.1.2 Area].
Use **C** to clear the value.

Following submenus are possible:
[4.1.1 Distance] Measures a distance being travelled.
[4.1.2 Area] Measures the area the boom covers at a travelled distance.
[4.1.3 Working width] Menu for entering the boom working width to be measured.
[4.1.4 Stop watch] Measures the time being used.
[4.1.5 Alarm clock] Can give an alarm at a preset time.

Menu 4.2 Service intervals

Menu and intervals

Service intervals and a nozzle check are programmed into the Controller. This makes it easier for the operator to remember the service intervals.

From the factory, the Controller is set up with three service and a nozzle check reminder.

Menu & interval	Hours	Action
[4.2.1 Check filters]	10	See sprayer instruction book, Maintenance.
[4.2.2 Grease boom]	50	See sprayer instruction book, Maintenance.
[4.2.3 Grease track and centre]	250	See sprayer instruction book, Maintenance.
[4.2.4 Miscallaneous service]	-	Not defined from factory.
[4.2.5 Check nozzles]	50	Check flow rate. Change nozzles if more than 10% of rated flow.

Entering the above menu's will display the hours remaining until next service.

The importer or dealer may have added Interval D. If no interval is set,

[D Not defined] is shown.

Press ⏎ to register service or control, if displayed when switched on.

The warning ⚠ will remain present until the service interval is reset.

Menu 4.3 Service interval reset

Service interval reset

8.3

To reset service interval, go to relevant interval menu listed:

[4.2.1 Check filters reset]   10   See sprayer instruction book, Maintenance.

[4.2.2 Grease boom reset] 50   See sprayer instruction book, Maintenance.

[4.2.3 Grease track and centre reset] 250   See sprayer instruction book, Maintenance.

[4.2.4 Miscallaneous service reset]   -   Not defined from factory.

[4.2.5 Check nozzles reset] 50   Check flow rate. Change nozzles if more than 10% of rated flow.

Press **C** to reset hour meter.

Press ⬅menu to confirm.

8 - Menu 4 Toolbox

Menu 4.4 Reserved

Reserved function - This menu is not used

Menu 4.5 Test

How to test

All readouts for the transducers are in accumulated counts, i.e. one signal gives one count, except for the optional (analog) transducer that is read in milli-ampere.

Go to menu [4.5 Test]. Choose the item to be tested and open the menu. Activate sensor and see if the signal is detected.

[4.5.1 Flow Speed Optional sensors]   Activate function to monitor sensor (e.g. drive forwards, start flow).

[4.5.2 Active keys]   Push key to see if a count is registered. If yes, the key or switch function is OK.

[4.5.3 PrimeFlow test]   PrimeFlow test for nozzles and PrimeFlow computers on boom.

[4.5.4 Input test]   See computer readings of sensors. Frequency, switch, analog inputs.

[4.5.5 Valve test]   Selftest.

[4.5.6 Reset PrimeFlow counters]   Reset error and data error counters for all PrimeFlow modules.

Menu 4.6 Speed simulation

How to use speed simulation

Speed may be simulated for certain purposes. A two figure value may be entered. The state remains valid until the Controller is re-starting or the value is set to "0".
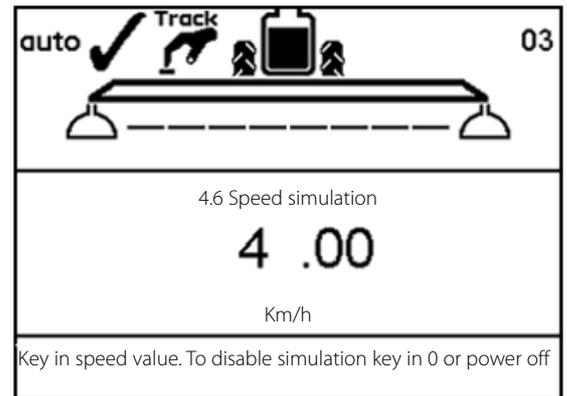
Menu 4.7 Emergency Track

Menu 4.7 Emergency Track

When this menu is entered the "bypass" function is active, so that all sensors are ignored. The system can be operated manually so it is possible to fold the boom and drive home. In the menu the sensor status and voltages can be checked, which is useful for the HARDI service to solve the problem.

Status for following sensors are shown in the menu:

Front sensor

Rear sensor

Lock sensor

Boom sensor

Lock sensor:

If the lock sensor indicates "released" (high voltage) and the track selection switch is in either "auto" or "manual" it is possible to use the "Left/Right steer" and "Fold inner in" switches disregard any other inputs the Controller recieve from sensors.

If the lock sensor indicates "locked" (low voltage) and the track selection switch is in either "auto" or "manual" it is possible to use "Fold inner in" switch disregard any other inputs the Controller recieve from sensors. Manual or automatic tracking is not possible.

If the track selection switch is switched to "align" the trapeze lock is attempted locked disregard any sensor reading. No automatic align is attemped. Manual or automatic tracking is not possible.

Once the boom is folded into transport position, exit the menu. This will activate the track lock if it is not damaged. As an extra security, switch power to HC 6500 to OFF and stop oil flow to the sprayer.

⚠ DANGER! Emergency only. Don't track with the boom folded! Safety system is disabled.

4.7 Emergency Track	
» Front sensor	2.38 Volt
Front sensor	1.9 Degree
Rear sensor	Volt
Rear sensor	Degree
Boom sensor 1	5.00 Volt
Boom sensor 2	Folded
Lock sensor	0.80 Volt
Lock sensor	Locked

Emergency only. Align sprayer and fold boom in case a sensor is defect.

8 - Menu 4 Toolbox

Menu 4.8 Computer CAN status

Menu 4.8.X Computer CAN status

In this menu you can see if there is communication between the units, Controller, Jobcom and Track. See part "Emergency operation".

Following submenus are available:

[4.8.1 Operating status all computer] Show operating status details in case of faults.

[4.8.2 Software versions all computer] Show software versions details in case of faults.

[4.8.3 Hardware versions all computer] Show hardware versions details in case of faults.

[4.8.4 Work status Terminal HC 6500] Show faults occurred since power-up. Press **C** key to reset counters.

[4.8.5 Work status JobCom HC 6100] Show faults occurred since power-up. Press **C** key to reset counters.

[4.8.6 Work status Grip HC 6300] Show faults occurred since power-up. Press **C** key to reset counters.

[4.8.7 Work status SetBox HC 6400] Show faults occurred since power-up. Press **C** key to reset counters.

[4.8.8 Work status FluidBox HC 6200] Show faults occurred since power-up. Press **C** key to reset counters.

Menu 5.1 Print

What you can print

This menu has to do with printing of data.

The following can be printed via the 12 volt printer.

[5.1.1 Register number] A specific register

[5.1.2 All registers] Register 1 to 99. Only active ones will be printed.

[5.1.3 Configuration] This records all the parameters of the Controller.

Two examples of printouts is shown. To the left is a printout of a specific register (menu 5.1.1). To the right is a printout of the configuration (menu 5.1.3).

```
****************************************
              HARDI HC6500
****************************************

Serial number                         0
Register                2/BENT
Volume applied                   1588 L
Area                               3 ha
Travelled spray distance         1.7 km
Start date                     11.03.08
Start time                        11:27
Stop date                      11.03.08
Stop time                         15:40
Time Used (spraying tim)             00
Work rate                    8.75 ha/h
Average spray speed           5.2 km/h
Max. spray speed              9.7 km/h
Average volume rate           558 L/ha
Date printed                   11.03.08
Time printed                      15:55
Notes
```

```
****************************************
        HARDI HC6500 - configuration
****************************************

Date printed:                  11;03;08
Time printed:                     14;29

****************************************

Terminal Serial number:         7011376
JobCom Serial number:           7041057
Terminal SW version:               1.09
JobCom SW version:                 1.12
Register:                             1
Total volume applied:            1257 L
Total area:                     1.91 ha
Tot travel spray distanc:        1.4 km
Start date:                    11;03;08
Start time:                       11;00
Stop date:                     11;03;08
Stop time:                        11;47
Tot time used spray time:             0
Total work rate:              2.91 ha/h
Total averag spray speed:      2.2 km/h
Total max. spray speed:        7.2 km/h
Total averag volume rate:      657 L/ha
*************Configuration**************
Programmed volume rate:        200 L/ha
Selected register number:             1
GPS remote: OFF
Clock set up: 24
Language:                            UK
```

9 - Menu 5 Logbook

Menu 5.2 Data dump

How to dump data

Enables data dump to an office printer. This could be done for example, by using the Hyper Terminal function in Microsoft Windows. Note the Hyper Terminal has to be activated and a communication cable (ref. no. 72271600) and 12 volt power supply to the Controller and Spray Box is needed.

The Hyper Terminal baud rate should be set at one of the following before transmitting data:

19200 baud

9600 baud (HC 6500 default)

4800 baud

2400 baud

1200 baud

If only the display unit is to be removed from the tractor, a 12 Volt power supply cable (ref. no. 72244500) is necessary.

The following can be printed to an office printer.

[5.2.1 Data dump of raw data]

[5.2.2 Hyperterminal service report] Permits data to be set up with a column header.

Soft keys

Soft keys menu tree

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
	F1 BoomFlush	F1 Start/Break	9 steps
		F2 Abort	
F1 AutoWash	F2 FastFlush	F1 Start/Break	15 steps
		F2 Abort	
	F3 MultiRinse	F1 Start/Break	39 steps
		F2 Abort	
F2 AutoFill	F1 Edit filed	Key in volume	
	F2 Abort		
	F1 Left ON		
	F2 Left OFF	Work screen	
F3 EndNozzles	F3 Right ON		
	F4 Right OFF	Work screen	
	F1 A ON and B OFF		
	F2 B ON and A OFF		
F4 DualLine	F3 A and B ON		
	F4 Auto mode		
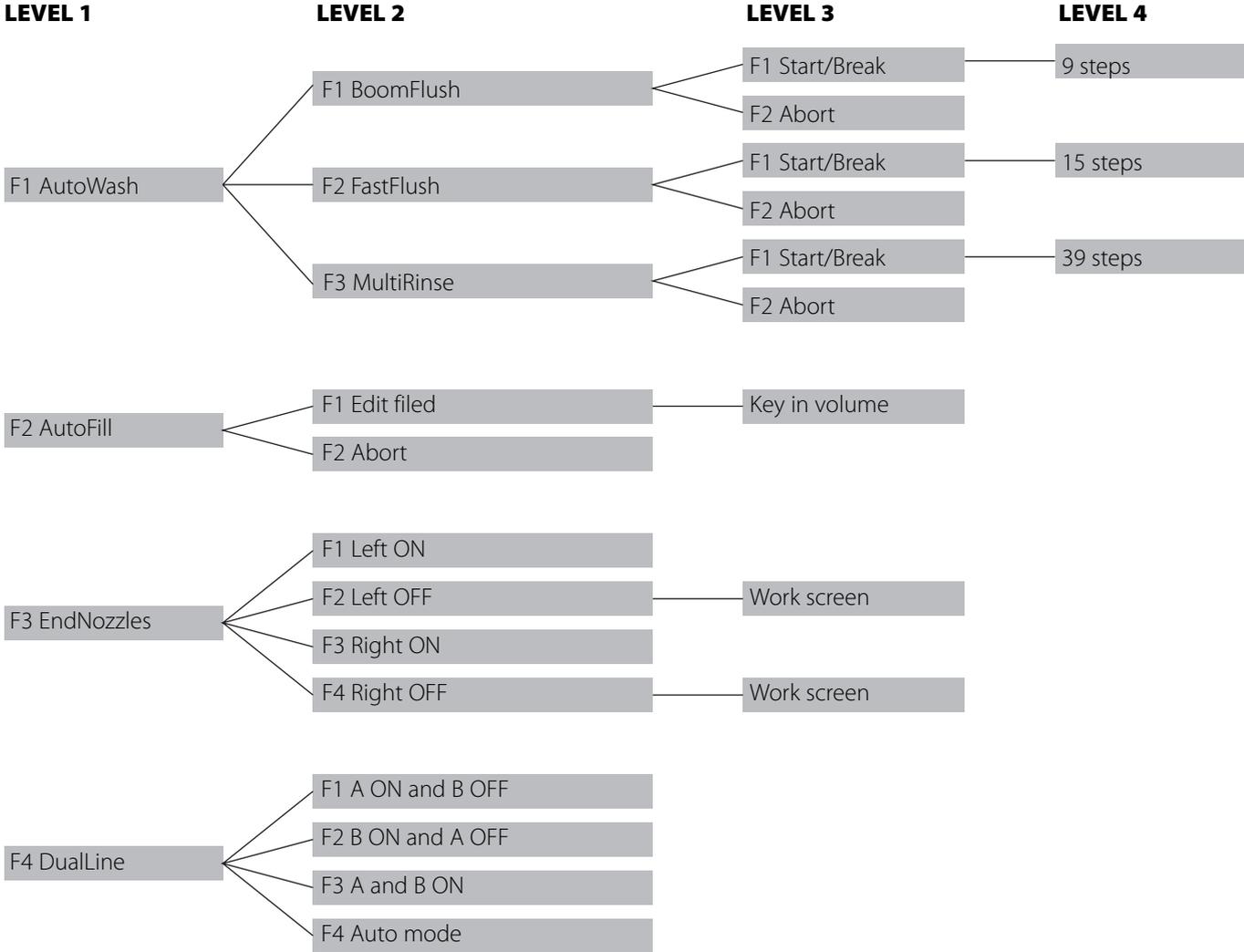
ATTENTION! See paragraph "Auto function" in the chapter Description.

Off-season storage

Storage

When the tractor and sprayer are parked, disconnect the power supply to the SetBox. This will stop the system from using power.

The Controller, SetBox and Grip should be protected from moisture and should be removed if the tractor does not have a cabin.

Spare parts

Spare parts

To see updated spare part information the website
www.agroparts.com can be visited. Here all parts information can be
accessed when free registration has been made.
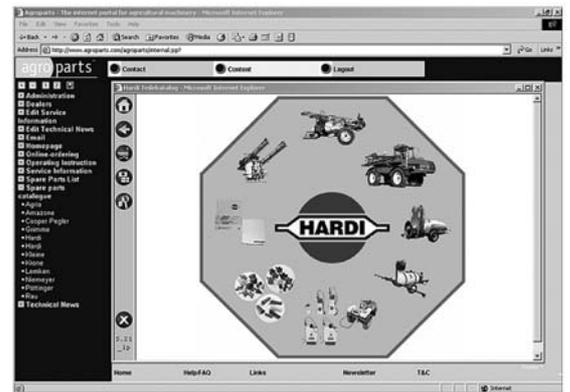
Emergency operation

In an emergency situation

If an error occurs in the system then choose Computer CAN status. This test will show if there is communication between the units. The menu will be as shown.

4.8 Computer CAN status

4.8.1	Operating status all computer
4.8.2	Software versions all computer
4.8.3	Hardware versions all computer
4.8.4	Work status Terminal HC6500
4.8.5	Work status JobCom HC6050
4.8.6	Work status Grip HC6300
4.8.7	Work status SetBox HC6400

4.8 Computer CAN status

» 4.8.1 Operating status all computer
   4.8.2 Software versions all computer
   4.8.3 Hardware versions all computer
   4.8.4 Work status Terminal HC 6500
   4.8.5 Work status JobCom HC 6100
   4.8.6 Work status Grip HC 6300
   4.8.7 Work status SetBox HC 6400

Computer detail screens show details in case of faults
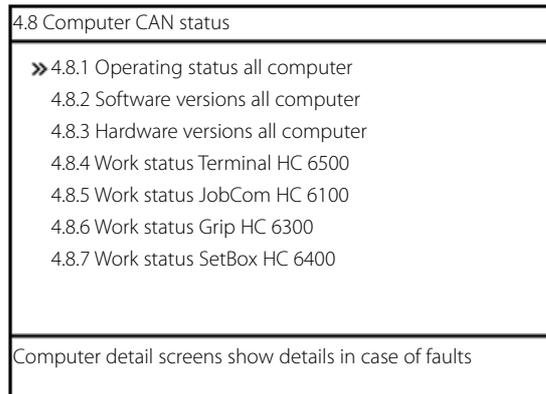
12 - Fault finding

Operational problems

Fault finding - HC 6500

Under these menus you can check if the communication is ok. The units can also be checked by looking at the LED on the units. It will give out light when the units are turned on. If there is an error a signal will show in a morse code if the CAN connection is damaged to that specific unit.

Each computer unit has a LED, which indicates condition and status of this computer. This is used when trouble shooting in field and CAN communication works. This is used both by technicians and skilled operators.

In the following is a full table of Alarms, Warnings etc. that will or can be shown on Terminal display.

Note that ID is the fault identifier, and Pr is alert priority. These are useful for service staff.

ID	Pr	Type	Text at display	Criteria for fault Operations disabled	Full screen Help text
01	1	Alarm	Sensor 12V supply failure	While the short circuit is present. SafeTrack shifted to manual. Auto is disabled.	Sensor 12V supply failure
02	2	Alarm	Sensor 5V supply failure	While the short circuit is present. SafeTrack shifted to manual. Auto is disabled.	Sensor 5V supply failure
03	3	Alarm	Track Lock sensor failure	Sensor signal is less than 0,5V. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.	Track Lock sensor failure. All SafeTrack keys are disabled. Manual tracking, "Align" and "Boom fold inner in" is only possible from menu 4.7.
04	4	Alarm	Trapeze lock locked illegally	Lock is detected locked unintentionally. All SafeTrack keys are disabled.	Lock is detected locked unintentionally. Missing hydraulic pressure on lock cylinder. Misadjusted lock sensor.
05	5	Alarm	Trapeze lock not locking	Attempt to lock, but no "lock" signal on sensor input. All SafeTrack keys are disabled.	Attempt to lock, but no "lock" signal on sensor input. Lock sensor misadjusted. Mechanical defect prevents lock to penetrate hole. Misadjusted rear angle sensor.
06	6	Alarm	Trapeze lock released illegally	Lock is detected released unintentionally. All SafeTrack keys are disabled.	Lock is detected released unintentionally. Poor lock sensor adjustment. Lock cylinder fallen off.
07	7	Alarm	Trapeze lock not released	When pressing auto to release lock but no "release" signal from lock sensor. Auto and manual are disabled.	Trapeze lock not released. Attempt to release lock, but no "release" signal from lock sensor. No hydraulic pressure. Misadjusted lock sensor. Mechanical defect.
08	8	Alarm	Track Boom sensor failure	The boom sensor signal is less than 0,5V. The boom sensor changes state, without "Boom fold inner" button is active. Auto and Manual is disabled. Only "Align" function is possible.	Track Boom sensor failure. Automatic and manual tracking is aborted. Only "Align" function is possible.
09	9	Alarm	Track Front sensor failure	The alarm is generated, if the sensor signal is less than 0,2V or exceeds 4,8V. Automatic tracking is aborted until the system has been rebooted. SafeTrack shifted to manual. Auto is disabled.	Track front sensor failing. Automatic tracking is aborted. Manual tracking and "Align" function is possible. Repair sensor and reboot to remove alarm.

10	10	Alarm	Track Rear sensor failure	The alarm is generated, if the sensor signal is less than 0,5V or exceeds 4,5V. SafeTrack shifted to manual. Auto and Align is disabled.	Track Rear sensor failure. Automatic tracking is aborted until the system has been rebooted. If "Align" mode is selected no movement takes place, but trapeze is attempted locked. Manual tracking still possible.
11	11	Alarm	Agitation valve fault	Error detection on AutoAgitation valve in self test and during spray work.	Agitation valve fault. Motor disconnected. Motor short circuited or blocked. Sensor failing.
12	12	Alarm	Fill valve fault	Error detection on Fill valve in self test. On fault following occurs: AutoWash allowed. AutoFill disabled.	Fill valve fault. Motor disconnected Motor short circuited or blocked. Sensor failing.
13	13	Alarm	Fluid system fault	When suction SmartValve is on other port than RinseTank and RinseTank flow exceed 10 l/min. On fault following occurs: AutoWash disabled. AutoFill disabled.	Illegal flow is detected in Sections line or in RinseTank line.
14	14	Alarm	No RinseTank flow	Error detection on AutoAgitation valve. On fault following occurs: AutoWash disabled. AutoFill allowed.	RinseTank empty or no rinse water flow due to other reasons.
15	15	Alarm	Pressure valve fault	Error detection on AutoAgitation valve. On fault following occurs: AutoWash disabled. AutoFill disabled.	PressureValve fault. Motor disconnected. Motor short circuited or blocked. Sensor failing.
16	16	Alarm	Regulation valve fault	Error detection on AutoAgitation valve. On fault following occurs: AutoWash disabled. AutoFill allowed.	Regulation valve fault. Motor disconnected Motor short circuited or blocked. Sensor failing.
17	17	Alarm	Suction valve fault	Error detection on AutoAgitation valve. On fault following occurs: AutoWash disabled. AutoFill disabled.	SuctionValve fault. Motor disconnected. Motor short circuited or blocked. Sensor failing.
18	18	Alarm	TankGauge fault	When TankGauge is enabled and frequency is below 50Hz. AutoWash is disabled. AutoFill is disabled.	TankGauge fault. TankGauge frequency is detected below 50Hz.
19	19	Warning	Software error Terminal	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
20	20	Warning	Software error JobCom	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
21	21	Warning	Software error Grip	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
22	22	Warning	Software error SetBox	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
23	23	Warning	Software error FluidBox		Turn off PTO to stop spray. Turn off power to stop hydraulics.
24	24	Warning	CAN bus failing to JobCom	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
25	25	Warning	CAN bus failing to SetBox	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.
26	26	Warning	CAN bus failing to Grip	Close hydraulic valves	Turn off PTO to stop spray. Turn off power to stop hydraulics.

27	27	Warning	CAN bus failing to FluidBox		Turn off PTO to stop spray. Turn off power to stop hydraulics.
28	28	Illegal action	Track Boom fold. Align sprayer	User starts to fold the boom, and the sprayer trapeze is not locked. BoomFoldInner is disabled.	Track Boom fold Align sprayer. The alarm is present while the sprayer is not locked, and a "fold inner" button is pressed. No folding takes place.
29	29	Illegal action	Track unfold Boom	Alarm for attempt to switch to "Manual" or "Auto" mode in a situation where boom is not detected unfolded. When the boom is detected unfolded the trapeze lock is unlocked and the message disappears. Auto and manual is disabled.	Track unfold Boom. Alarm for attempt to switch to "Manual" or "Auto" mode in a situation where boom is not detected unfolded. Unfold the boom.
30	30	Illegal action	Main on/off is on	When pressing softkey for BoomFlush, FastFlush, MultirRnse while Main on off is on. Keypress does not start process.	Main on off is on. Turn Main ON OFF to off before starting AutoWash.
31	31	Illegal action	MainTank not empty	When pressing softkey for BoomFlush, FastFlush, MultiRinse while MainTank is not empty. Keypress does not start process.	MainTank not empty. AutoWash cannot be started.
32	32	Illegal action	No rinse water	When pressing softkey for either BoomFlush, FastFlush, MultirRnse while RinseTank is calculated too empty for that program. Keypress does not start process.	Not enough rinse water for selected program. AutoWash cannot be started.
33	33	Illegal action	Steering not active - Over speeding!	When speed is too high for steering (SafeTrack ESP). SafeTrack is disabled. Steering is enabled upon keypress SafeTrack auto.	Speed too high for steering - slow down!
34	34	Waiting	Start pump 2	Valves are positioned as in AutoWash table. After press on softkey computer continues to next step. See also screen layouts.	Double pump must be started to flush hoses. Stop and start Double pump with hydraulic lever, as Warning prompts you to.
35	35	Waiting	Stop pump 2	Valves are positioned as in AutoWash table. After press on softkey computer continues to next step. See also screen layouts.	Double pump must be stopped to avoid chemical in boom. Stop and start Double pump with hydraulic lever, as Warning prompts you to.
36	36	Waiting	Pause	Upon press of softkey. See also screen layouts.	AutoWash is paused by keypress.
37	37	Warning	PrimeFlow Comm fault		Communication to PrimeFlow SMCU's are failing. Fault is probably due to broken cable or bad connectors for power or data.
38	38	Warning	Output failing to sect 1	Detected by H-bridge on I2C bus	Output failing to sect 1
39	39	Warning	Output failing to sect 2	Detected by H-bridge on I2C bus	Output failing to sect 2
40	40	Warning	Output failing to sect 3	Detected by H-bridge on I2C bus	Output failing to sect 3
41	41	Warning	Output failing to sect 4	Detected by H-bridge on I2C bus	Output failing to sect 4
42	42	Warning	Output failing to sect 5	Detected by H-bridge on I2C bus	Output failing to sect 5
43	43	Warning	Output failing to sect 6	Detected by H-bridge on I2C bus	Output failing to sect 6
44	44	Warning	Output failing to sect 7	Detected by H-bridge on I2C bus	Output failing to sect 7
45	45	Warning	Output failing to sect 8	Detected by H-bridge on I2C bus	Output failing to sect 8
46	46	Warning	Output failing to sect 9	Detected by H-bridge on I2C bus	Output failing to sect 9
47	47	Warning	Output failing to sect 10	Detected by H-bridge on I2C bus	Output failing to sect 10
48	48	Warning	Output failing to sect 11	Detected by H-bridge on I2C bus	Output failing to sect 11

49	49	Warning	Output failing to sect 12	Detected by H-bridge on I2C bus	Output failing to sect 12
50	50	Warning	Output failing to sect 13	Detected by H-bridge on I2C bus	Output failing to sect 13
51	51	Warning	Output failing to bypass		
52	52	Warning	Electronic fuse 1 is on	Measurement of voltage drop over electrothermal fuse.	
53	53	Warning	Electronic fuse 2 is on	Measurement of voltage drop over electrothermal fuse.	
54	54	Warning	Electronic fuse 3 is on	Measurement of voltage drop over electrothermal fuse.	
55	55	Warning	Electronic fuse 4 is on	Measurement of voltage drop over electrothermal fuse.	
56	56	Warning	RinseTank not full	When main tank has been filled and rinse tank is empty.	Remember to re-fill rinse tank.
57	57	Warning	Main tank nearly empty	Main tank empty (tank gauge value set in menu 2.5.2).	Main tank is nearly empty. Consider distance left before leaving field.
58	58	Warning	Sections OFF	If main ON/OFF is switched ON and one or more sections are OFF.	Note that one or more sections are switched OFF.
59	59	Warning	Spray pressure too high	Spray pressure too high (limit set in menu 2.5.3.1).	Decrease speed or change to nozzles with larger capacity.
60	60	Warning	Spray pressure too low	Spray pressure too low (limit set in menu 2.5.3.2).	Change to nozzles of less capacity or increase speed if safe.
61	61	Warning	Speed too high	Speed too high (limit set in menu 2.5.5.1).	Decrease speed. Pressure will be too high.
62	62	Warning	Speed too low	Speed too low (limit set in menu 2.5.5.2).	Increase speed if safe. Pressure will be too low.
63	63	Warning	Application volume too high	Application volume too high (% limit set in menu).	Increase speed if safe or change nozzle size. Check regulation valve hoses and filters.
64	64	Warning	Application volume too low	Application volume too low (% limit set in menu).	Decrease speed or change nozzle size. Check regulation valve.
65	65	Warning	Fan speed too high	Fan speed too high (limit set in menu 2.5.4.1).	Reduce fan speed
66	66	Warning	Fan speed too low	Fan speed too low (limit set in menu 2.5.4.2).	Increase fan speed
67	67	Warning	PTO speed too low	PTO rev. too low (limit set in menu).	Increase PTO speed
68	68	Warning	PTO speed too high	PTO rev. too high (limit set in menu).	Decrease PTO speed
69	69	Warning	Ladder not up		Raise ladder, to avoid damage to ladder or crop.
70	70	Warning	Wind Speed too high	Wind Speed too high (limit set in menu).	Stop spraying or consider other nozzle types like HARDI LowDrift.
71	71	Warning	Air Temperature too high	Air Temperature too high (limit set in menu).	Stop spraying or consider other nozzle types.
72	72	Warning	Air temperature too low	Air Temperature too low (limit set in menu).	Air Temperature too low
73	73	Warning	RH too high	RH too high (limit set in menu).	Relative humidity too high
74	74	Warning	RH too low	RH too low (limit set in menu).	Relative humidity too low
75	75	Warning	Opt. sensor 1 too high	Limit set in menu.	
76	76	Warning	Opt. sensor 1 too low	Limit set in menu.	
77	77	Warning	Opt. sensor 2 too high	Limit set in menu.	

78	78	Warning	Opt. sensor 2 too low	Limit set in menu.	
79	79	Warning	Opt. sensor 3 too high	Limit set in menu.	
80	80	Warning	Opt. sensor 3 too low	Limit set in menu.	
81	81	Warning	Opt. sensor 4 too high	Limit set in menu.	
82	82	Warning	Opt. sensor 4 too low	Limit set in menu.	
83	83	Reminder	Aborted by keypress	Upon press of softkey	AutoWash is Aborted by keypress.
84	84	Reminder	AutoWash completed	When program is completed	AutoWash is completed
85	85	Reminder	FastFiller valve high friction	After valve self test	AutoAgitation valve has high friction or poor cabling. Valve will fail within some time. Arrange repair.
86	86	Reminder	Pressure Valve high friction	After valve self test	PressureValve has high friction or poor cabling. Valve will fail within some time. Arrange repair.
87	87	Reminder	Suction Valve high friction	After valve self test	SuctionValve has high friction or poor cabling. Valve will fail within some time. Arrange repair.
88	88	Reminder	Check filters and brakes	Periodically, period defined in extended menu. (Only checked at power up)	It is now time to check the suction and pressure filters. The Cyclone pressure filter is hidden under the grey right-hand cowling at the front of the sprayer. Check line and nozzle filters too. Check brakes.
89	89	Reminder	Grease boom and track	Periodically, period defined in extended menu. (Only checked at power up)	The boom now needs to be lubricated. Yellow labels indicate lubrication points otherwise see operators manual.
90	90	Reminder	Grease misc	Periodically, period defined in extended menu. (Only checked at power up)	The track system now needs to be lubricated. Yellow labels indicate lubrification points otherwise see operators' manual.
91	91	Reminder	Miscellaneous service	Periodically, period defined in extended menu. (Only checked at power up)	See operators' manual for specific sprayer service.
92	92	Reminder	Check nozzles	Periodically, period defined in extended menu. (Only checked at power up)	You need to check the individual nozzle flow per minute. A stopwatch and good quality measuring jug is needed. Do the test with clean water. Nozzles with over 10% of rated new capacity must be discarded.
93	93	Reminder	Stop watch is zero		Stop watch is zero
94	94	Changed	Track in manual		Operator has put Track in manual
95	95	Changed	Track in auto		Operator has put Track in auto
96	96	Changed	Track is locked		Operator has locked Track
97	97	Changed	Reversing		Operator is reversing

98	98	Changed	Track unlocked			Lock is detected released.
						Hydraulic pressure established. Misadjusted lock sensor.
99	99	Alarm	PrimeFlow data cable weakness	JobCom does not recieve the data it sends.		PrimeFlow bus cable fault is detected.
				Shift the relay to Full duplex (transmit to both ends).		A failure handling circuit is enabled.
				Data cable defect is only detected at Half Duplex (listen only right end).		PrimeFlow is in full operation.
				No further Data cable defect are detected at Full duplex (transmit to both ends).		
100	100	Alarm	Low PrimeFlow voltage	JobCom measure PrimeFlow supply voltage after fuse for left and right boom part at AI11 and AI12. Alarm occur when voltage is below 14 volt.		A fuse is open or too many rapid shifts on and off of sections has drained the power supply.
101	101	Warning	PrimeFlow power cable defect	Low power warning from SMCU, when supply is re-established.		Poor power wiring to PrimeFlow computers. One of the 2 power lines are disconnected or connectors are corroded and gives high resistance
				First low power warning received after power up of system is not valid		
				First low power warning received after "Low voltage on supercap" is not valid		
102	102	Warning	PrimeFlow computer defect	SMCU does not reply on status		Internal fault in PrimeFlow computer. Can also be caused by 2 or more defects in PrimeFlow data cable. Check for Prime-Flow data cable weakness
				No status request while "Low voltage on supercap" occurs		
103	103	Warning	Fold with unlocked pendulum	When pressing FoldCenterIn, FoldLeftIn or FoldRightIn and pendulum is unlocked		Fold with unlocked pendulum
104	104	Warning	Boom wing loose	Buttons FoldLeftIn or FoldRightIn are not pressed but the 4 sensors on outer boom wings change from "In spray" to "Not in spray" respectively when they change from "In transport" to "Not in transport"		Boom wing loose
105	105	Changed	Agitation in Auto	Forward speed > 0,5km/h and Main On/Off = On		Agitation in Auto
106	106	Warning	Regulation valve in end stop	Warning appears when pressure regulation algoritm tries to close Regulation valve to increase pressure, but encoder does not give any signals, as micro switch has turned of motor.		JobCom detected that pressure regulation valve does not turn and cannot close and increase pressure and flow any further.
				Alarm should not appear at self test at start up.		Increase PTO RPM.
				Pressure regulation is unchanged.		Review flow used for agitation.
						Check for internal leakages.
107	107	Alarm	Slant angle sensor fault	Alarm is active when 2.2.4.3 Slant mirror is enabled and/or if 2.2.4.4 Slant in steps is enabled.		Check sensor and cable on pendulum.
				The alarm is generated, if the sensor signal is less than 0.2 Volt or exceeds 4.8 Volt.		Disable HeadLandAssist.
						Disable Slant in steps.
108	108	Alarm	Boom height sensor fault	Alarm is active when 2.2.4.2 Boom height at headlands is enabled.		
				The alarm is generated, if the sensor signal is less than 0.2 Volt or exceeds 4.8 Volt.		
109	109	Alarm	Pressure sensor alarm	The alarm is generated, if the sensor signal on AI26 (J10_33, J11_33) is less than 3mA or exceeds 21mA.		Check connection to boom pressure sensor at distribution valve junction box

Testing and fine tuning

Fine tuning the flow constant - PPU

Calibration of the flow transducer is carried out with clean water but small changes may occur when adding pesticides or fertiliser. This will effect the final readings. This is typically noted when the volume displayed on the display does not equal the actual known volume that was sprayed out. The below formula can be used to "fine tune" the flow transducer PPU.

New PPU = (Original PPU x Displayed Volume) / Sprayed Volume

For example, the spray tank is filled with 2400 litres of spray liquid. When sprayed out, the display showed a total of 2300 litres. (Original PPU = 120.0)

New PPU = (120.0 (Original PPU) x 2300 (Displayed Volume)) / 2400 (Sprayed Volume) = 115.0

Note the relation is inverse:

* To raise the displayed volume, the PPU is lowered.

* To lower the displayed volume, the PPU is raised.

Pin & Wire connection

AMP Super Seal	Box	Colour coding
2	+	Brown
3	Sig.	Blue
1	-	Black
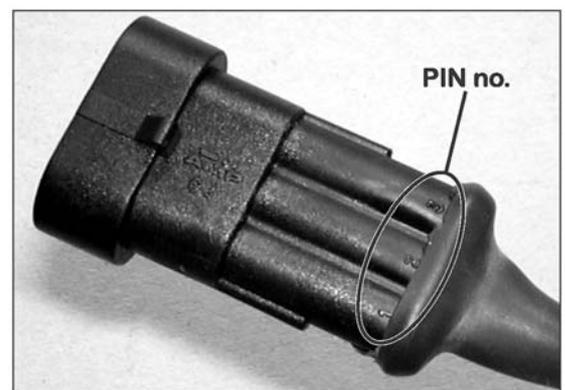
Testing flow transducer

BROWN wire to positive of 12 volt battery.

BLACK wire to negative.

BLUE wire to multimeter positive.

1. Check the rotor turns freely.

2. Each vane in the rotor has a magnet in it with the pole facing out. Check that the 4 magnets are present.

3. Use a magnet to check that every second magnet in the rotor has the same pole orientation. The rotor magnets must be N - S - N - S.

4. Connect negative from multimeter to negative of battery.

5. Set multimeter to DC volt.

6. By turning the mill wheel slowly, this will register approx. 8.0 +/- 1 volt with the diode on and 0.3 +/- 0.1 volt with the diode off with every second magnet.
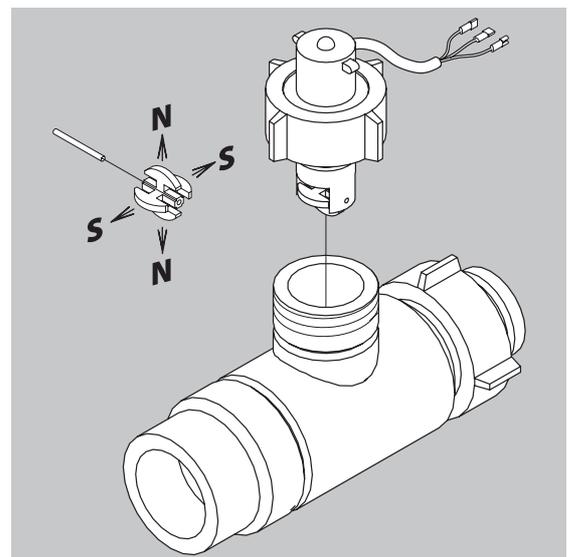
13 - Testing and fine tuning

Testing speed transducer

BROWN wire to positive of 12 volt battery.

BLACK wire to negative.

BLUE wire to multimeter.

1. Connect negative from multimeter to negative of battery.

2. Set multimeter to DC volt.

3. Bring a metallic object (distance 3 to 5 mm) up to the transducer. This will register 1.4 +/- 0.2 volt and the diode will turn on.

4. By removing the object, this will register 12.0 +/- 1.0 volt. Diode is OFF.

Specifications

Specifications

Supply voltage:	12 Volt DC
Controlled shutdown "low battery":	9 Volt DC
Maximum supply:	16 Volt DC
Maximum peak:	28 Volt DC
Ambient temperature:	– 5℃ to + 70℃
Memory:	Flash PROM non-volatile
Digital transducers (option 2, 3 and 4):	Square signal
Frequency::	0.5 Hz to 2 kHz
Trigger high:	4.0 to 12.0 Volt DC
Trigger low:	0.0 to 2.0 Volt DC
Analog transducers (option 1):	
Supply:	12 V
Input:	4 to 20 mA
Minimum speed for volume regulation	0.5 km/h

Flow ranges for the flow transducers

Housing	Housing identification (A)	Flow range	Orifice	PPU
		L/min	mm	value
S/67	Three grooves	1-30	6	310.00
S/67	Four grooves	2.5-75	9.5	180.00
S/67	One outside groove	5 - 150	13.5	120.00
S/67	No groove	10 - 300	20.0	60.00
S/67	Two outside grooves	35 - 600	36.0	17.00

Pressure drop over 13.5 mm orifice is 1 bar at 150 l/min.

14 - Technical specifications

Electrical connections

Types of plugs and fuses

Fuses are located into the JobCom:15 A auto fuse, for TWIN versions also 2x 10 A auto fuse.

Breakout PCB: 2x 10 A auto fuse.

DAH PCB: 10 A slowblow fuse.

PrimeFlow power PCB glass fuse 10 A slowblow.

Plugs AMP Super Seal 1.5 with 2,3 and 4 pins.

13 pin plug ISO 11446.

Materials and recycling

Disposal of electronics

Cardboard: Can recycle up to 99% and therefore should be put into the waste collection system.

Polyethylene: Can be recycled.

When the operating unit has completed its working life, it must be thoroughly cleaned. The synthetic fittings can be incinerated. The printed circuit boards and metallic parts can be scrapped.

Packaging information

Materials used for packaging are environmentally compatible. They can be safely deposited or they can be burnt in an incinerator.

Charts

Chart for recording values

Menu	Function	1 - Values	2 - Values	3 - Values
[3.2.1 Flow constant]	Flow PPU			
[3.1.X.1 Speed constant]	Speed PPU			
[3.4 Regulation constant]	%			